

**CCGS George R. Pearkes
Annual Refit and Dry-Docking**

September 28th – November 2nd, 2012

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PREAMBLE

1. INTENT

This specification outlines the work required for the 2012 Docking and annual refit of CCGS George R. Pearkes. The period of work is September 28th – Nov 2nd, 2012. All work specified herein and all repairs, inspections and renewals shall be carried out to the satisfaction of the Owner's Representative and, where applicable, the attending TC Marine Safety Inspector. Unless otherwise specifically stated, the 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. All tests are to be witnessed by the Inspection Authority, Technical Authority and where required, Transport Canada Marine Safety. The Contractor is responsible for contacting TC-MS when their presence is required for inspections or testing. The Contractor shall advise the Technical Authority in every case when Marine Safety arrives onsite for inspection of vessel's equipments or structure. The recorded test results, calibrations, measurements and readings from the entire refit specification shall be provided in 3 typewritten binded reports on 8.5" X 11" paper. The binded reports shall be tabbed as per table of contents in the refit specification. The binded reports shall be provided to the Chief Engineer prior to the end of refit.

The Contractor shall also provide reports/measurements/readings per individual specification item within the timeline indicated to the Chief Engineer.

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 crange 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.

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, airborne particles from 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. 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 a Coast Guard's Safety Management System, section 7.D.9 and section 7.D.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 Part II and 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.

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 Coast Guard's Safety Management System, 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.

15. LOCKOUT AND TAGOUT PROCEDURES

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

- electrical currents
- hydraulic
- pneumatic
- gas or stem 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 NQA262/NQA026 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.

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.

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 (TCMS) 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 and the Inspection Authority. Inspection of any item by the Technical Authority does not substitute for any required inspection by Transport Canada Marine Safety (TC-MS) or by the Inspection Authority.

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 and Dry-docking.

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

http://142.130.14.20/fleet-flotte/Safety/main_e.htm

SHIP'S PARTICULARS

Length O.A. ----- 83.0 Metres
Breadth Mld. ----- 16.2 Metres
Depth Mld. ----- 7.75 Metres
Deep Draft ----- 6.06 Metres
Displacement ----- 5146 MT
Gross Tonnage ----- 3853 Tonnes
Year built ----- 1986

Rigging Weights

Tailshaft 24280 kg, Length 14.448 meters
Propeller 7200 kg
Sterntube 12,185 kg
Anchor (Complete) 2028 kg
Anchor Shank 549 kg
Rudder 17381 lbs
Rudder Stock 16958 lbs

Spec Item: HD-01	SPECIFICATION	TCMS Field #:
PRODUCTION CHART AND SUBCONTRACTORS ALLOWANCES		

HD-01 PRODUCTION CHART AND SUBCONTRACTORS ALLOWANCES

Part 1: SCOPE:

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

Part 2: REFERENCES:

N/A

Part 3: TECHNICAL DESCRIPTION:

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 spec. item, the start date, the manpower loading, the duration 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, brian.mannion@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 of the ships arrival at the Contractors premises.

Subcontractors with Allowances

Spec Item: HD-01	SPECIFICATION	TCMS Field #:
PRODUCTION CHART AND SUBCONTRACTORS 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, Contracting Officer and Project Authority the day prior to the weekly scheduled Progress Meeting.

3.10

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: HD-02	SPECIFICATION	TCMS Field #:
SERVICES		

HD-02 SERVICES

The following services are to be supplied and connected to the vessel by the Contractor when the vessel arrives at the Contractor's facility, maintained during the refit period and removed upon completion of refit work. The Contractor shall supply all material to point of onboard connection and all cranes/scaffolding required for connection/disconnection. The Contractor will be responsible for any additional connections required as a result of the ship being shifted between berths and to the drydock. Daily rates and unit costs, where applicable, are to be quoted. The bid price is to be broken down by item.

Berthage

During refit, while not in dry-dock, the vessel shall be berthed at the Contractor's wharf at a safe and secure berth with adequate water at extreme low tide to ensure that the vessel will not touch bottom. The Contractor is to include in quote all costs for initial tying up, any movement of the vessel during refit and slipping of lines from Contractor's wharf on departure of vessel from yard upon completion of the refit.

Electrical Power

A metered electrical service of 600 VAC, 3 phase, 60Hz, 400A continuous is to be provided. Quote on supplying 180,000 kWhr and the unit cost per kWhr; to be adjusted up or down by 1379 action. The vessel's shore power cable is not to be used without express permission of the Owner's representative.

Potable Water

Potable water connection through a pressure regulator to the ship's domestic system (1½" hose at a minimum pressure of 75 PSI). Water supply to be connected to the fill station on the upper deck aft. Approximately 300 M³ required for the refit.

Gangways

Labour and services are to be supplied for the rigging of two separate and independent boarding gangways, complete with safety nets and two handrails; they are to be illuminated for use at night. The gangways are to be on opposite sides of the vessel, and are to be as widely separated in a fore & aft direction as practicable; final location to be in consultation with the ship's Commanding Officer.

Spec Item: HD-02	SPECIFICATION	TCMS Field #:
SERVICES		

Waste Management

A garbage dumpster/container is to be provided on the Well Deck for ship's garbage only. Refuse is to be removed daily from the ship; quotation is to indicate a per-diem charge for garbage removal only.

Provision is to be made for any recycling mandated by local authorities; any receptacles specifically required to meet these requirements are to be provided by the Contractor at no cost; the Contractor is to quote removal costs only. The Contractor is also to quote on removal costs (per unit volume/quantity) for:

- Newsprint/bond paper
- Corrugated cardboard
- Beverage containers

Telephone Service

Two independent and private telephone lines are to be supplied and connected to the ship's phone system connections located on the Officers' Deck. The cost of connection, unlimited local service and removal to be included in bid price. All telephones to be active 24 hours a day for the duration of the contract. Lines are to have long distance dialing capabilities. The cost of long-distance calls will be dealt with using PWGSC 1379 action. The Contractor shall be responsible for giving notice for connection/disconnection times to the Telephone Company as required for any ship movements during the dry-docking period.

Should regular landlines not be available, the Contractor shall provide 3 cellular phones, with unlimited local service.

The Contractor shall supply a list of shipyard telephone numbers, and local fire and emergency numbers at the Contractor's repair location.

Spec Item: HD-02	SPECIFICATION	TCMS Field #:
SERVICES		

Fluids Removal

The Contractor is to bid on the removal and disposal, in accordance with provincial requirements, of 5,000 litres of waste oil and 20,000 oily water mixtures (25% oil/75% water) from the ship's waste oil tanks and bilges. Quote unit cost per each additional removal and disposal of 5,000 litres of each.

Cable TV

The Contractor is to supply one local Cable Television connection to the ship's internal system; service is to consist of the basic package available in the area. Cable is to be connected as directed by the Technical Authority. The cost of connections/ disconnection and service charges are to be quoted and included with the bid. In the event that cable television is not available, the Contractor is to provide a home satellite television system, complete with service costs, for the duration of time cable television is unavailable.

Staging & Cranage

Contractor is to provide all necessary staging, shoring, and rigging that will be required to carry out the specified work. These are to be removed from the vessel on completion of work. The Contractor is to provide all necessary cranage that is required to perform the specified work, as well as the transportation of all materials that are required. Bidders shall allow 5 lifts in the bid for cranage, to be adjusted by 1379 action, for loading and unloading ships stores; quote cost per each additional lift.

In addition, the Contractor is to quote an hourly rate for cranage. This hourly rate is to include the crane, operator and all other required personnel.

Protection

The contractor shall supply and fit ¼ inch thick Masonite to protect the ship's interior decks for the duration of the refit. Placement of Masonite shall be as directed by the Owner's representative. At a minimum, areas to be protected will be in the Main, Upper & Boat Deck alleyways, and shall include stair treads in the corresponding sections of the stair tower as well. The Contractor shall bid on supplying and installing 233 square meters and provide unit cost for the supply and installation per m². All seams and edges shall be duct taped in place to prevent movement of the sheets and the ingress of dirt. Upon completion of all work, the Contractor shall remove all Masonite and clean the areas that were covered by the Masonite.

Bulkheads and deckheads in the accommodation areas shall be protected where temporary services are run or where there is a possibility of damage as a result of the performance of contracted work.

Spec Item: HD-02	SPECIFICATION	TCMS Field #:
SERVICES		

Fire Main

During the drydocking period only, the Contractor shall provide shore water connections to ship's fire main, 80 PSI, 2½" diameter. Two independent & separate connections are to be supplied at extremities of the vessel, as directed by the Owner's representative. Pressure to be maintained at all times.

Fresh Water

During the drydocking period only:

- a. A fresh water connection through a regulator to ship's central cooling system (1" connection @ 30 PSI), using ship supplied stub piece.

Overboard Discharge

During the drydocking period only, overboard discharge connections to the following:

- a. Central cooling at Fr 95 (P)
- b. Sewage at about Fr 20(S) in under the shaft

Grey and Black Water

The contractor is responsible for the disposal of all grey and black water according to provincial regulations.

Spec item #: HD-03	SPECIFICATION	TCMS Field #:
DRYDOCKING		

HD-03 DRYDOCKING

Part 1: SCOPE:

- 1.1** The intent of this specification is for the contractor to provide all required services to dock and undock the vessel including all tugs, and handling of ships lines.

Part 2: REFERENCES:

- 2.1** The Contractor shall dock the vessel in accordance with the vessel's docking plan drawing #555-H-0022

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The Contractor shall include in the bid all costs for docking and undocking the ship, allowing time to complete all the identified known work within the Sept 28th – Nov 2nd, 2012 timeframe.
- 3.2** The contractor shall quote on the unit cost per additional day at the contractor's facility for a) Vessel on Dock and b) Vessel Floating, and provide the unit cost per day for services a) Vessel on Dock and b) Vessel Floating.
- 3.3** The Contractor shall dock and undock the vessel under the direct supervision of a Certified Docking Master.
- 3.4** A copy of the Docking Plan, DFO/CCG Dwg. #555-H-0022, shall be made available to the Contractor prior to the docking date. Also a copy of the Docking Plan used in the previous refit will be made available to the Contractor to allow the block location to permit exposure of those areas that were covered in the previous refit. The Contractor shall return the drawings upon completion of the refit. The Contractor shall prepare blocks and necessary shoring to maintain the true alignment of the vessel's hull and machinery during the docking period. A laser alignment of the blocks is to be performed by the Contractor and an alignment report is to be prepared and provided to the Owner's representative.

Spec item #: HD-03	SPECIFICATION	TCMS Field #:
DRYDOCKING		

- 3.5** The following information is to be recorded by the Contractor on Ship Condition Reports:
- a. Prior to docking, all tanks on vessel to be sounded and contents recorded. Copy to be signed by the ship's Captain, the Chief Engineer and Contractor's Docking Master.
 - b. On docking, all tanks emptied to be listed, and copies held by Contractor and Chief Engineer.
 - c. At undocking, all tanks to be refilled to obtain same draft and trim as at docking, and condition agreed by the Docking Master, the ship's Captain and the Chief Engineer.
- 3.6** The Contractor shall supply the services of a diver to confirm that the vessel is settling evenly on the bilge and keel blocks.
- 3.7** A minimum clearance of 4' (1.22 m) is to be available below the keel.
- 3.8** The Contractor will be responsible for all line handling during docking and undocking operations, and is to include any tug and/or pilotage service cost.
- 3.9** The Contractor shall ensure that docking blocks are clear of transducer faces, docking plugs, sea inlet grids and anodes.
- 3.10** The frame spacing is to be marked on the hull to aid in the initial hull survey by the Owner's representative & TCMS. Immediately after hydro-blasting, but prior to any grit blasting for the underwater hull coating, the Contractor is mark the frame spacing at 5 frame intervals from the stern post (Fr "0"); markings are to be in a contrasting colour, 6" in height, and are to be at the turn of the bilge, port and starboard. Where keel blocks align with the frame spacing, they are also to be marked in a similar manner, port and starboard.

Spec item #: HD-03	SPECIFICATION	TCMS Field #:
DRYDOCKING		

3.11 The Contractor shall remove 27 docking plugs to drain water accumulation. All docking plugs removed shall be tagged immediately after removal, stored in a suitable container and given to the owner's representative. A ship's Officer is to be present when docking plugs are removed and reinstalled. The location of plugs is shown on the docking plan. Any docking plugs removed will require openings to be temporarily filled with wood plugs during operations such as sandblasting, painting, etc. which could cause contamination of the tanks to occur.

3.12 During undocking, the Contractor is to have sufficient personnel in attendance to standby any sea connections, stern tubes, seachests, etc. that were opened up during the drydocking period to correct any deficiencies that may arise.

Part 4: PROOF OF PERFORMANCE:

4.1 The Contractor shall dock the vessel in accordance with the vessel's docking plan drawing #555-H-0022

Part 5: DELIVERABLES:

5.1 At undocking, all tanks to be refilled to obtain same draft and trim as at docking, and condition agreed by the Docking Master, the ship's Captain and the Chief Engineer.

Spec Item: HD-04	SPECIFICATION	TCMS Field #:
UNDERWATER HULL CLEANING AND PAINTING		

HD-04 UNDERWATER HULL CLEANING AND PAINTING

Part 1: SCOPE:

- 1.1** The intent of this specification is to clean the ship's underwater hull, properly prepare the surfaces, and recoat with a high performance icebreaker coating. This work shall be carried out in conjunction with all other dry-docking items

Part 2: REFERENCES:

- 2.1** The Contractor shall supply International Marine Coatings Intershield 163-Inerta 160, Black and apply to all prepared areas in accordance with the manufacturer's specifications. The temperature of the surrounding air and steel is crucial and no painting is to take place at a temperature of less than 60 degrees Fahrenheit (15.6°C). Also, all painting is to be done when the relative humidity is less than 85%. A blast profile of 75 microns minimum is required.

Part 3: TECHNICAL DESCRIPTION:

- 3.1** Within two hours of docking, the entire underwater hull including rudders, propellers and the thruster tube is to be cleaned by high pressure fresh water washing (5000 PSI minimum) to remove all marine growth and allow a preliminary hull inspection. Prior to commencing hydroblasting, all hull mounted equipment and openings are to be fully protected. The Owner's representative and the attending TCMS Surveyor will then inspect the entire hull.
- 3.2** The CG will provide the services of a NACE inspector to supervise all aspects of the surface preparation and paint application.
- 3.3** The contractor shall remove all the sacrificial zinc anodes mounted on the underwater hull, stern tubes and rudder. Attachment straps and studs shall be removed and ground down smooth.

Spec Item: HD-04	SPECIFICATION	TCMS Field #:
UNDERWATER HULL CLEANING AND PAINTING		

- 3.4** The total underwater area of the hull is 1900 square meters. The Contractor shall bid on abrasive blasting 950 square meters to ISO 8501 SA-2½ or SSPC SP10 and provide unit cost for abrasive blasting per square meter. The remainder of the hull including areas of the undamaged coating are to be grit swept and edges feathered or chipped back to provide a suitable bonding surface for the new application. The hard grit sweeping is to overlap onto existing coats by 3 cm. The Contractor shall provide unit cost per square meter for abrasive sweep blasting.
- 3.5** Contractor ensure the ICCP anodes at frames 32 ½ Port and Stbd and the reference cells at frame 68 ½ Port and Stbd are protected from sandblasting and painting damage. Additional care is to be taken around the aft anodes as they are surrounded by dielectric shield epoxy.
- 3.5** The Contractor is to assign a representative to view the ship as it sits on the blocks, subsequent to cleaning and prior to blasting and painting. An Owner's representative, a representative of PWGSC and the NACE inspector will view the ship and agree upon the total area of the underwater hull which is to be grit blasted and touched up.
- 3.6** The contractor shall then supply and apply the following:
- a. One Complete coat of Intershield 163-Inerta 160, Black on the complete underwater portion of the hull. The continuous coat shall be applied as 20 mil DFT on the bare areas and as 10 mil DFT on the non-bare areas.
 - b. To ensure the 20 DFT mil coverage on the bare areas, the contractor shall take Wet film Thickness measurements to confirm the thicker application on the bare areas.
- 3.7** After grit blasting, but prior to hull coating, any slot welds in the stern post or rudder requiring fairing are to be filled flush with Inerta putty.
- 3.8** In conjunction with Item H-01, Hull Painting, the waterline is to be cut in.
- 3.9** Sea bay grids are to be protected during application of coating and orifice diameters are to be verified as original before undocking (i.e. not blocked or reduced).
- 3.10** The Contractor to be responsible and liable for ensuring that the hull is clear and clean prior to, during, and immediately after the coating application.

Spec Item: HD-04	SPECIFICATION	TCMS Field #:
UNDERWATER HULL CLEANING AND PAINTING		

- 3.11** All staging, cramage, screens, lighting and any other support services, equipment, paint and materials necessary to carry out these specifications shall be Contractor-supplied. If, due to steel and air temperature, enclosures and forced air heaters are required, the Contractor is to allow \$15,000 to supply and install/remove, which will be adjusted up or down by 1379 action.
- 3.12** Suitable storage facilities are to be provided close to the work site for the material and equipment, to ensure they will be maintained at the recommended temperature of the coating manufacturer for ease of preparation and proper application.

Part 4: PROOF OF PERFORMANCE:

- 4.1** Grit for blast cleaning is not permitted to enter any part of the vessel. The Contractor is to ensure that every opening into the vessel where grit can gain entry is suitably covered. All traces of grit used for blast cleaning shall be removed from the vessel by the Contractor.
- 4.2** Deck machinery and other equipment, susceptible to damage by grit or coating material, is also to be protected as necessary. All anodes and transducers are to be protected from coating. Protection is to be removed before undocking.
- 4.3** The Contractor shall plug deck scuppers and discharges as well as taking any other measures necessary to prevent any liquids from contaminating areas being prepared or coated. Measures shall also be taken to ensure that no damage, unnecessary cleaning or repairs result from either the hull preparation process or the coating application. The Contractor is responsible for removing any overspray on the vessel as a result of this work.
- 4.4** The coating is to be applied in order to give a DFT of 20 mils. Thickness determination of the new coating is to be verified and recorded at three positions on each repair area.
- 4.5** The equipment used to apply the coating is to meet the specifications of the coating manufacturer. The mixing and spraying equipment shall be kept heated and protected as necessary, while in use, to ensure that the coating is maintained at the recommended temperature.

Spec Item: HD-04	SPECIFICATION	TCMS Field #:
UNDERWATER HULL CLEANING AND PAINTING		

- 4.6** All coatings are to be applied in strict accordance with the manufacturer's instructions and recommendations. The Contractor is to allow \$2500 for the attendance of an International Paint Technical Service Representative to view the initial hull preparation and the initial set up of the application equipment, in addition to any other consultation deemed necessary to obtain a high quality finished coating; this cost will adjusted by 1379.

Part 5: DELIVERABLES:

- 5.1** The contractor shall prepare a report that indicates;
- a. The areas on the underwater hull that were repaired.
 - b. Which areas were blasted and indicate the blast media type and air pressure
 - c. Which areas were coated with what type of product and how much coating was used.
 - d. Thickness measurements of the applied coatings
 - e. Atmospheric conditions (temp, humidity)
 - f. Temperature of the vessel hull.

Spec Item: HD-05	SPECIFICATION	TCMS Field #:
HULL PAINTING		

HD-05 HULL PAINTING

Part 1: SCOPE:

- 1.1** The intent of this specification is to properly prepare the ship's hull from the waterline to the bulwarks, apply primer as required and then apply two complete finish coats of paint, as per the Coast Guard Identity Program. This work is to be carried out in conjunction with HD-04, Underwater Hull Cleaning & Painting.

Part 2: REFERENCES:

Part 3: TECHNICAL DESCRIPTION:

- 3.1** During hull painting operations, scuppers and discharges are to be plugged, as well as taking any other measures necessary to prevent any liquids from contaminating areas being prepared or coated. Plugs are to be fitted with a pipe and drain hose, if required, to direct liquids away from the hull
- 3.2** The total surface area is 970 M²; this area is to be sand-swept to obtain the required profile for the application, commercial standard SP-7. Any bare or damaged areas are to be grit blasted to ISO 8501 SA-2½ or SSPC-SP-10; the edges of the existing coating shall be "feathered back" to allow a sound surface to accept the new coating. These areas are then to be given a primer coat of Contractor-supplied Intergard FP. These areas are then to be given a coat of matchless compatible primer within the required "paint-over" period.
- 3.3** The Contractor is to assign a representative to view the ship's hull with an Owner's representative. The representatives will view the ship and agree upon the total area of the hull which is to be grit blasted and primed.
- 3.4** The Contractor is to quote on 250 M², and is to quote a unit cost per M², for surface preparation & priming, as detailed in 3.2; this cost will be adjusted by 1379 action.

Spec Item: HD-05	SPECIFICATION	TCMS Field #:
HULL PAINTING		

- 3.5** For the duration of the sand-sweeping and painting, all openings in the ship's hull, such as portholes and fairleads, and all ventilation ducts are to be masked with 6 mil polyethylene to prevent the material from entering. Particular care is to be paid to any machinery space vent ducting and to the Colbourne fairleads.
- 3.6** After all sand-sweeping operations are complete; the Contractor is to sweep the entire hull with compressed air to remove all traces of grit prior to the application of the finish coat.
- 3.7** The Contractor is to supply and apply two finish coats of Matchless Super Marine/Laurentide CCG Red (RAL3000), according to the manufacturer's recommendations, to the entire hull from the waterline to the bulwark caps.
- 3.8** Upon completion of all underwater hull coating and the painting of the hull Red, the draft marks, load lines, thruster symbols, and all government symbols and icons forming parts of the CCG Identity Program, including the vessel's name and port of registry, are to be painted with Contractor-supplied white.
- 3.9** The Port and Stbd Colbourne fairleads are to be painted black (RAL9004); they are first to be proven to be free-moving and not contaminated by blasting grit. The 18 Panama fairleads are also to be painted black, as is the bulwark cap from the break of the Well Deck to the stem.

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is responsible for the removal of protective coverings installed for the sand blasting. The Contractor is to ensure that all grit and debris from the grit blasting is cleaned from the ship's decks and removed ashore.

Part 5: DELIVERABLES:

- 5.1** The contractor shall prepare a report that indicates;
- g. The areas on the underwater hull that were repaired.
 - h. Which areas were blasted and indicate the blast media type and air pressure
 - i. Which areas were coated with what type of product and how much coating was used.
 - j. Thickness measurements of the applied coatings
 - k. Atmospheric conditions (temp, humidity)
 - l. Temperature of the vessel hull.

Spec Item: HD-06	SPECIFICATION	TCMS Field #:
HULL INSPECTION AND WELDING		

HD-06 HULL INSPECTION AND WELDING

Part 1: SCOPE:

In conjunction with spec item for Dry-docking, and for the Underwater Hull Cleaning and Painting, the entire hull will be given an inspection by the Technical Authority and attending Transport Canada Marine Safety (TCMS) Surveyor.

Part 2: REFERENCES:

- 2.1** Guidance Drawings - Shell Expansion drawing (555-H-0001)

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Owner's representative, in advance, to allow his/her attendance.
- 3.2** Any required staging will be covered under section H-01.10; areas requiring detailed examination will be determined at the time of the initial inspection by TCMS. In lieu of staging, the Contractor may provide the use of a certified man-lift (with operator) for 2 working days. An allowance of \$500 is to be quoted for the man-lift and operator; this cost will be adjusted by 1379.
- 3.3** The Contractor is to quote on proper preparation and repairs to 100 linear feet of butt and seam welding on the ship's hull. Each linear foot is to be quoted as 15 passes on Grade "E" steel, for a total of 1500 bead feet. The quote shall include any staging or man lifts required for the repairs.
- 3.4** The Contractor is to provide a quotation per bead foot of welding, as well as per additional linear foot of gouging – this unit cost shall include any staging or man lifts required for the repairs.
- 3.5** Any gas-freeing, certification as Gas Free, safe for personnel to enter, fuel residue removal and safe for hot work will be by PWGSC1379 action.

Spec Item: HD-06	SPECIFICATION	TCMS Field #:
HULL INSPECTION AND WELDING		

- 3.6** The Contractor is to include the cost of 5 non-destructive tests on the new welds; these tests will be as directed by the attending TCMS Surveyor. The Contractor shall provide a unit cost for each additional x-ray and the cost shall include travel expenses for the NDT testing company.

Part 4: PROOF OF PERFORMANCE:

- 4.1** The contractor shall not apply any underwater hull coatings until TCMS has completed the required inspection and shall notify the Owner's representative and TCMS before the application of any coatings.

Spec Item: HD-07	SPECIFICATION	TCMS Field #: 3LL120, 3LL140
ANCHORS AND CHAINS		

HD-07 ANCHORS AND CHAINS

Part 1: SCOPE:

- 1.1** The intent of this specification is to remove both Anchors and Chains for cleaning and TCMS survey. This work shall be carried out in conjunction with item E-04, Anchor Windlass Survey.

Part 2: REFERENCES:

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The bitter ends of both cables shall be let go. The port and starboard anchors with their respective cables (9 shots of 40 mm SL chain per side) shall be run out and ranged on the dock floor for inspection by the Chief Officer and attending TCMS Inspector.
- 3.2** Both anchor cables shall be ranged in a suitable area for cleaning, inspection, and subsequent painting of shot markings. The joining shackles shall be broken at both anchors.
- 3.3** Each cable shall be hydro blasted clean ensuring all previous painted links show no residual markings; all seizing wire markings to be removed from each cable. All links and studs on each cable shall be hammer tested and visually inspected for defects. Any defective links and studs shall be marked for identification and brought to the attention of the Chief Officer.
- 3.4** The first two shots on each cable shall be removed and re-attached at the bitter end.
- 3.5** Contractor is to measure 3 random links in each shot of chain port and stbd. All measurements are to be tabulated and a copy given to the Chief Engineer and the Chief Officer.

Spec Item: HD-07	SPECIFICATION	TCMS Field #: 3LL120, 3LL140
ANCHORS AND CHAINS		

- 3.6** After inspection, the joining shackles shall be re-assembled and the tapered pins sealed in place with lead. Cable shots shall be marked as per accepted marine practice using new seizing wire. The shot lengths shall be marked off with white marine enamel and joining shackles shall be painted with red marine enamel; the Contractor shall ensure the entire links are painted. Care shall be taken to prevent grit, sand, or other debris from contacting the paint before it has dried.
- 3.7** The Contractor shall grit blast both anchors to SSPC-SP-6 and shall apply two coats of Amercoat 238 Abrasion Resistant Epoxy (Black) at 10 mils DFT per coat.
- 3.8** Anchors shall be reconnected and both Anchors and Chains shall be stowed onboard, ensuring proper fleeting of the cables within the Chain Lockers. Bitter ends shall be reattached.
- 3.9** The Contractor shall note that stowing of the cable shall be carried out in conjunction with item E-04, Anchor Windlass Inspection.

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Owner's representative, in advance, to allow his/her attendance.
- 4.2** The Chief Officer shall inspect the attachment of the bitter ends prior to closing up the Chain Lockers.

Part 5: DELIVERABLES:

- 5.1** Upon completion of all measurements a copy of all readings are to be given to the Chief Engineer and the Chief Officer.

Spec Item: HD-08	SPECIFICATION	TCMS Field #:
SEA CHEST AND SEA BAY INSPECTIONS		

HD-08 SEA CHEST AND SEA BAY INSPECTIONS

Part 1: SCOPE:

1.1 The Seabay and Sea Chests require Transport Canada/ Marine Safety survey. The intent of this specification is to detail the work required to open up and clean the Sea Chests and the Seabay; this work is to be carried out in conjunction with Item HD-03, Underwater Hull Cleaning and Painting.

Part 2: REFERENCES:

2.1 The Sea Chests are located as follows:

Propulsion Generator Room

Port High Sea Suction – Fr 96-106	TCMS Field #3L118
Port Sea Suction – Fr 96-106	TCMS Field #3L120
Starboard High Sea Suction – Fr 96-106	TCMS Field #3L119
Starboard Sea Suction – Fr 96-106	TCMS Field #3L121
R.O. & Distiller Sea Bay – Fr 102-106	TCMS Field #3L117

Propulsion Motor Room

Aft Sea Chest – Fr 51-53	TCMS Field #3L122
Stern tube Suction – Fr 38	

Part 3: TECHNICAL DESCRIPTION:

3.1 The sea strainers, port & starboard are to be opened up; this will involve disconnecting the sea strainer vents & drains. The cover gaskets are to be inspected by the Owner's representative and reused if satisfactory; replacement, if deemed necessary, is to be by 1379 action. The sea strainer grids are to be removed and cleaned, by hand wire brushing, to remove any marine growth or corrosion.

Spec Item: HD-08	SPECIFICATION	TCMS Field #:
SEA CHEST AND SEA BAY INSPECTIONS		

- 3.2** After inspection by the Owner's representative (or designate), the sea strainer covers are to be replaced; anti-seize compound is to be used on all fasteners. Vents and drain piping is to be reconnected.
- 3.3** The grids and manhole covers are to be removed from all Sea Chests and Seabays for cleaning and inspection. The grids and inlet areas are to be cleaned and grid holes are to be mechanically reamed to the original diameter.
- 3.4** The Contractor is to inform the Owner's representative when the Sea Chests are opened up, but prior to cleaning. The Sea Chests will then be inspected by the Owner's representative.
- 3.5** The Contractor shall thoroughly clean the Sea Chests using high pressure water jets; minimum pressure is to be 2000 PSI. Contractor shall then hand scrape any loose areas of coating. After inspection by the Owner's representative and TCMS inspector, the spaces are to be given two coats of Intershield ENA 300 of differing colours (.006" DFT each); each coat is to be witnessed by the Owner's representative (or designate). Contractor to bid on hand scraping 40 M³ of the sea chests.
- 3.6** The contractor shall replace all the sacrificial zinc anodes mounted in the Sea Chests. Contractor to bid on replacing twenty-three 48 pound anodes in the sea chests. Contractor to supply a unit cost for additional anodes.
- 3.7** The after sea chests are to be fitted with contractor supplied modified zinc anodes.
- 3.8** Sea Chest access grids are to be closed up, using thirty-four new 3"X 3/4" UNC stainless steel bolts; the bolts are to be locked by tack welds. The thirty-four captive 3/4" UNC stainless steel nuts inside the Sea Chests are also to be replaced.
- 3.9** All manholes to be closed up, using new 1/4" neoprene gaskets and new nuts and washers; the Contractor is to quote on renewing 10 studs, with a unit cost per stud or further renewals.
- 3.10** The Main Seabay (TCMS Field #3L123) is located in the Propulsion Generator Room, Fr 96-102; it is accessed via a manhole at Fr 96. The docking plug will have been removed as part of Item HD-02 Drydocking.

Spec Item: HD-08	SPECIFICATION	TCMS Field #:
SEA CHEST AND SEA BAY INSPECTIONS		

- 3.11** The manhole cover shall be removed and the space thoroughly cleaned using high pressure water jets with a minimum pressure of 2000 PSI. Contractor shall then hand scrape any loose areas of coating. All debris is to be removed ashore at the completion of each day's work. Contractor to bid on hand scraping 50 M³ of the sea bays.
- 3.12** After inspection by the Owner's representative and TCMS inspector, the Main Seabay is to be given two coats of Intershield ENA 300 of differing colours (.006" DFT each); each coat is to be witnessed by the Owner's representative (or designate).
- 3.13** The contractor shall replace all the sacrificial zinc anodes mounted in the Sea Bays. Contractor to bid on removing and installing eighteen 22 pound zinc anodes. Contractor to supply a unit cost for additional anodes.
- 3.13** Upon completion of all inspection and repair work, the docking plug and manhole cover are to be re-installed, using new jointing and new galvanized fasteners on the manhole cover.
- 3.14** The Contractor shall supply all materials to complete this specification item.

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is responsible for arranging all inspections and to ensure that TCMS inspects the space and signs of the items in the vessels Hull and Machinery Survey Record Book. The Contractor shall prior to commencement of work determine an inspection schedule by TCMS and at each inspection point the Contractor shall advise the Owner's representative in advance to allow his/her attendance.

Part 5: DELIVERABLES:

- 5.1** At undocking, the Contractor is to carry out leakage inspections and check for any ingress of water. Any leakage is to be corrected immediately, prior to undocking the vessel.

Spec Item: HD-09	SPECIFICATION	TCMS Field #:
AF ANODE REPLACEMENT		

HD-09 AF ANODE REPLACEMENT

Part 1: SCOPE:

- 1.1** The intent of this specification is to have the Contractor exchange the Anti-Fouling anodes in the Sea Chests. This item to be carried out in conjunction with item HD-06 Sea Bays and Sea Chests inspections.

Part 2: REFERENCES:

Reference document: G.04/02, rev 9, ANFOMATIC Instruction Manual

Installation and Commissioning, section 3.3

- 2.1** The power supply for the AF anodes is to be isolated at breaker P103-20 located in the control room.

Part 3: TECHNICAL DESCRIPTION:

- 3.1** Contractor to replace 8 antifouling anodes. Two anodes, one aluminum and one copper are fitted in each of the four sea chests.
- 3.2** The sheeting and insulation on the high sea chests is to be removed Port and Stbd to allow access to the high sea chest anodes. Sheeting and insulation to be reinstalled upon completion of the anode installations.
- 3.3** Cofferdam lids are to be removed and the wiring disconnected from the anodes.
- 3.4** The securing nuts are to be removed and the anodes lifted from the mounting boss.
- 3.5** The nitrile gasket is to be removed and a new owner supplied used upon reinstallation.

Spec Item: HD-09	SPECIFICATION	TCMS Field #:
AF ANODE REPLACEMENT		

- 3.6** New owner supplied anodes are to be installed and secured. Contractor to ensure that one aluminum and one copper anode are installed in each sea chest in the same location as the old anodes.
- 3.7** Contractor to rewire the anodes and place the cofferdam lids in place with new owner supplied o rings.

Part 4: PROOF OF PERFORMANCE:

- 4.1** All items to be inspected by the Chief Engineer prior to reassembly.
- 4.2** Upon undocking anodes are to be inspected to ensure there is no ingress of water. Contractor shall repair any leakage.
- 4.3** Once in the water, the system is to be powered and the readings taken to ensure the system is operating properly.

Part 5: DELIVERABLES:

- 5.1** Removed anodes are to be left with the ship.

Spec Item: HD-10	SPECIFICATION	TCMS Field #:
SEA TRIALS		

HD-10 SEA TRIALS

Part 1: SCOPE:

1.1 The intent of this specification shall be to carry out sea trials as a functional test of the ship's propulsion and other systems.

Part 2: REFERENCES:

N/A

Part 3: TECHNICAL DESCRIPTION

3.1 On completion of all specification items, sea trails will be carried out as a functional test of the ship's propulsion and other systems.

3.2 Sea trials will last a minimum of eight hours.

3.3 Trials will contain ahead and astern movements at various power levels.

3.4 Trials will be carried out to the satisfaction of the Inspection Authority and Technical Authority.

3.5 The Contractor is to have sufficient supervisory staff on board, during these trials to witness the operation of machinery which he has worked on during this refit.

Part 4: PROOF OF PERFROMANCE:

N/A

Part 5: DELIVERABLES:

N/A

Spec Item: H-01	SPECIFICATION	TCMS Field #:
VOID SPACE INSPECTION AND SURVEY		

H-01 VOID SPACE INSPECTION AND SURVEY

Part 1: SCOPE:

- 1.2 The intent of this specification item shall be to open up the above void spaces listed for cleaning, inspection, testing to cover the continuous survey for Transport Canada Marine Safety (TCMS).

Part 2: REFERENCES:

<u>Tank</u>	<u>Location</u>	<u>Capacity</u>	<u>Field #</u>
D. Bottom Empty Comp (P)	Fr 102-106	7.2 M ³	3L081
Pipe Tunnel (F)	Fr 102-163	66.3 M ³	3L114

Part 3: TECHNICAL DESCRIPTION:

- 3.1 The Contractor shall provide a method to have the space certified Gas Free, safe for personnel to enter and safe for hot work. Certificates shall be forwarded to the Owner's representative and a copy shall be posted in a conspicuous location near the entrance to each space.
- 3.2 The void space is to be thoroughly cleaned; all scale, dirt and debris is to be removed ashore. Any rusty areas are to be power tool cleaned. All vent and sounding pipes are to be proven clear.
- 3.3 The Contractor is to allow for 10 M² of coating repairs, and is to provide a cost per M² for preparation and a cost per M² for recoating, as detailed above; cost to be adjusted by 1379. The internal coating is to be Intertuf Epoxy Black followed by a coat of Intertuf Epoxy aluminum; application is to be to the manufacturer's recommendations.

Spec Item: H-01	SPECIFICATION	TCMS Field #:
VOID SPACE INSPECTION AND SURVEY		

- 3.4** The tank vents are to be opened for inspection; this will involve the removal of both cover plates, both screens and the ball. Any defective screens will be renewed with Owner-supplied replacements. Cover plate fasteners are to be replaced with new Contractor-supplied fasteners; the Contractor's quote is to include the renewal of 6 damaged cover plate fasteners.
- 3.5** Following the cleaning of the void spaces, the tanks and vents will then be inspected by the Owner's representative and the attending TCMS Surveyor.
- 3.6** The Owner's representative (or designate) will be present when the manhole covers are reinstalled. The Contractor shall clean the sealing surfaces around the manhole and cover and install the cover using new ¼ inch thick neoprene gaskets. Anti-seizing compound shall be used on all threads. The Contractor is to quote separately the unit cost per stud to replace any broken manhole securing studs.
- 3.7** The Contractor shall bid on the pneumatic testing of each individual void space, as well as quoting a unit price for each for hydrostatic testing. The quote shall include the installation and removal of blanks for suctions, overflow pipes and vent head removals, additional tank openings, and tank drainage (including the disposal of water and the wiping down of the tank internals).
- 3.8** The attending TCMS Surveyor solely shall determine the test method. All tests shall be witnessed by the attending TCMS Surveyor and the Technical & Inspection Authorities.

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Owner's representative, in advance, to allow his/her attendance.

Spec Item: H-01	SPECIFICATION	TCMS Field #:
VOID SPACE INSPECTION AND SURVEY		

Part 5: DELIVERABLES:

- 5.2** Upon completion of all repairs and testing, the Contractor and the Owner's representative (or designate) shall conduct a final inspection and ensure all tanks, covers, vents and piping connections have been returned to operating conditions and the attending TCMS Surveyor has completed all inspections.
- 5.3** The Contractor is responsible to ensure that the TCMS Inspector signs off the surveyed tanks in the vessel's Hull and Machinery Survey Record Book.

Spec Item: H-02	SPECIFICATION	TCMS Field #:
DECK UNDERLAY AND COVERING REPAIRS		

H-02 DECK UNDERLAY AND COVERING REPAIRS

Part 1: SCOPE:

- 1.1** The intent of this specification is to repair damaged sections of deck covering in the Main deck Crew's Lounge and Crew's Mess, including the A60 fire-rated underlay.

Part 2: REFERENCES:

Areas of repair:

- 2.1** Main Deck, Crew's Lounge
Area of repair: The entire lounge; approximately 300 ft².
Covering: Broadloom carpet.
- 2.2** Main Deck, Crew's Mess
Area of repair: The entire mess; approximately 305 ft².
Covering: Vinyl tile
- 2.3** Upper Deck, Stbd Gangway Entrance
Area of repair: Entire area approximately 24 ft².
Covering: Vinyl tile

Part 3: TECHNICAL DESCRIPTION:

- 3.1** Contractor is to remove all furnishings from the lounge and properly protect and store them prior to starting any work. The bar and shelving is to be properly protected prior to the commencement of work. All items are to be returned upon completion of work.
- 3.2** Contractor is to ensure the shutter door between the galley and the mess is properly covered and sealed to prevent dust from deck work entering the galley. All mess furnishings are to be properly protected during the deck work. The refrigerator in the mess shall be removed to allow the deck repairs. Refrigerator is to be reinstalled upon completion of deck repairs.

Spec Item: H-02	SPECIFICATION	TCMS Field #:
DECK UNDERLAY AND COVERING REPAIRS		

- 3.3** In the Crew's Lounge and Mess, carpeting, tiles and the existing "70 MM floating floor" system (which consists of tack-welded sheet metal over a dex-o-tex-like material, which is, in turn, laid over batts of fibreglass insulation) is to be removed to the steel deck in the areas of repair by hand tooling to reduce the production of dust. All debris to be removed ashore; any damage to bulkhead panels, doors or door frames, or any other part of the ship's interior furnishings will be repaired by the Contractor at no cost to the Crown. The steel decking to be primed, if required, as directed by the manufacturer's recommendations.
- 3.4** Under the present tiles in The Crew's Mess, there are two old chair mounts and one table mount at the end of the forward table and three old mounts inboard of the mess refrigerator, which are to be removed to the steel deck
- 3.5** A new trowel-applied magnesium oxychloride cement (magnesite) deck under-layment system such as Dex-o-tex Decklite or Polyspec 7K is to be applied, as directed by the manufacturer's recommendations. Application will generally consist of a ½" thick layer of Magnabond #3 or 408 Grip Bond coating applied to the primed steel deck, followed by a 1" layer of Decklite or Polyspec 7K, then a 1" layer of noise reducing cork. A final layer of Decklite or Polyspec 7K, approximately ¾" thick is then to be applied to give proper profile for laying the new floor covering. The Contractor is to quote a unit cost per ft² to remove the existing "floating floor" and to renew with the magnesium oxychloride system as detailed above.
- 3.6** In the Stbd Gangway Entrance, the existing 10 MM Dex-o-tex is to be removed to the steel deck by hand tooling to reduce the production of dust. A new 10 MM layer of magnesium oxychloride system (Decklite or Polyspec 7K) is to be applied according to the manufacturer's specifications. When it has properly cured, new vinyl tiles to be installed.
- 3.7** All materials, to be Contractor-supplied.

Spec Item: H-02	SPECIFICATION	TCMS Field #:
DECK UNDERLAY AND COVERING REPAIRS		

Part 4: PROOF OF PERFORMANCE:

- 4.1** For the Crew's Lounge, a suitable high quality broadloom carpet, with underlay (if required), is to be selected by the Owner's representative (or designate); the Contractor is to provide a selection of colours, similar to the existing, readily available in the local area. The Contractor is to allow \$4000 for carpet/underlay; to be adjusted by 1379 action on proof on invoice. Carpet is to be installed, as per existing, in the Crew's Lounge by the Contractor using best industry practices.
- 4.2** For the Crew's Mess and Stbd Gangway Entrance suitable high quality vinyl tiles are to be selected by the Owner's representative (or designate); the Contractor is to provide a selection of colours, similar to the existing, readily available in the local area. The Contractor is to allow \$2000 for tiles; to be adjusted by 1379 action on proof on invoice. Tiles are to be installed, as per existing, in the Crew's Mess and Stbd Gangway Entrance by the Contractor using best industry practices.

Spec Item: H-03	SPECIFICATION	TCMS Field #: LL111
CHAIN LOCKER SURVEY		

H-03 CHAIN LOCKER SURVEY

Part 1: SCOPE:

1.1 The intent of this specification is to open both Chain Lockers for TCMS survey, in conjunction with item E-04, Anchor Windlass Survey and item HD-05 Anchors and Chains.

Part 2: REFERENCES:

Part 3: TECHNICAL DESCRIPTION:

- 3.1** These Chain Lockers are to be considered as confined spaces under the Coast Guard's Safety Management System. The Contractor shall ensure confined space entry permits and lockout/tagouts, as required, are in place.
- 3.2** The Contractor shall provide a method to have the Chain Lockers gas freed, and certified gas free, safe for personnel to enter and safe for hot work. Original certificates shall be forwarded to the Chief Engineer, prior to entry, and a copy shall be posted in a conspicuous location near the entrance to each manhole.
- 3.3** The Port and Starboard Chain Locker access manhole covers are located behind the tool board above the foc'sle workbench. The tool board shall be removed and subsequently replaced to allow access to the chain lockers.
- 3.4** All internal surfaces of the chain lockers shall be hydro-blasted and cleaned of all scale, and debris. All rusted areas are to be power tooled clean. Contractor to bid on 10M³ of power tooling and quote cost per additional M³. The false floor plates shall be unfastened and taken up for thorough cleaning and subsequent painting on both sides. All scale and debris shall be disposed of ashore.

Spec Item: H-03	SPECIFICATION	TCMS Field #: LL111
CHAIN LOCKER SURVEY		

- 3.5** Bilge wells to be thoroughly cleaned and suctions proven clear. Proper operation of the bilge alarm shall be proven. Test to be witnessed by the Technical Authority.
- 3.6** After internals are completely dry, the Chain Lockers and false floors shall be coated are coated with two coats of Amercoat Amerlock #2 Surface Tolerant Epoxy (Aluminum) or equivalent. Apply at 5-6 mils DFT per coat. Quote on 50 M² of interior surface of both Chain Lockers; a quote is also to be provided per additional M².
- 3.7** Sounding pipes, drains, and vents shall be proven clear. Both Chain Lockers shall be inspected by the Technical Authority, the Inspection Authority and the attending TCMS Inspector prior to stowing the anchor cables. Upon completion of inspection, the false floor plates shall be secured in place, using new Contractor-supplied fasteners.
- 3.8** Upon completion of items H- Anchors and Chains and item E- , Anchor Windlass Survey, the Contractor shall clean the sealing surfaces around the manhole and cover and install the covers, using new ¼" thick rubber gaskets. Anti-seize compound shall be used on all threads. The Contractor is to quote separately the unit cost per stud to replace broken or defective manhole securing studs. The Technical Authority shall witness the installation of the manhole covers.

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Owner's representative, in advance, to allow his/her attendance.

Part 5: DELIVERABLES:

Spec Item: H-04	SPECIFICATION	TCMS Field #:
BARGE DAVIT INSPECTION		

H-04 BARGE DAVIT INSPECTION

Part 1: SCOPE:

- 1.1** The intent of this specification is to have the Contractor disassemble the barge davits for inspection and testing.

Part 2: REFERENCES:

Schat Barge Davit Type P.H.A. SWL 38520 lbs

- 2.1** Contractor will have access to the davit manual and associated drawings.
- 2.2** Barge power pack to be locked out at breaker P 605/6 on the AFT MCC in the stores handling area prior to any work commencing

Part 3: TECHNICAL DESCRIPTION:

- 3.1** All certified weights, lifting devices, load cells and scaffolding to be contractor supply
- 3.2** All pins and sheaves from each davit arm shall be removed for inspection. Pins, sheaves and bushings shall be cleaned and measured for wear and inspected for defects. Note: all sheaves and pins are to be labeled and kept together as a set.
- 3.3** The compensating arms shall be removed from the main arms and the sheave shall be removed from the arms end. Pins sheaves and bushings shall be cleaned, measured for wear and inspected for defects.
- 3.4** The Traveling Blocks shall have the pins and sheaves removed and cleaned, measured and inspected for defects.

Spec Item: H-04	SPECIFICATION	TCMS Field #:
BARGE DAVIT INSPECTION		

- 3.5** The main hydraulics for the davit system shall be isolated and the hydraulic lines to the main davit arm rams shall be disconnected from the rams and the ends plugged. The rams are to be removed and sent ashore to a certified Hydraulics company for seal replacement. All hoses are to be removed and replaced with new. All seals and hoses to be contractor supply. Allow \$3000 for parts. Rams to be reinstalled in good order upon completion of work. All fittings to be cover in Denso tape after completion of operational tests.
- 3.6** The electric lines for the davit limit switch on the forward davit arm shall be isolated and removed from the davit arm. The four main davit arm heel pins are to be removed and the main davit arms removed from the ship. The pins and bushings are to be cleaned measured and inspected. The electrical lines are to be replaced upon reinstallation of the davit arms.
- 3.7** The Davit winch is to be drained of oil and the brake and clutch assembly is to be removed and opened up for inspection. Unit will be reassembled and reinstalled after inspection. Any part replacements will be owner supply. The gearbox will be filled with 15 liters of owner supplied oil.
- 3.8** Upon completion of the inspections the davits and all sheaves shall be reinstalled in good order. All grease ways are to be proven clear and all items are to be greased with EP2 grease. Any repairs to be covered by 1379.
- 3.9** New owner supplied wires are to be reeved as per the manufacturer's diagrams and under the supervision of the Chief Officer. Contractor is to pressure grease the wires prior to installation. Grease to be used is Petrocan OG-2 or equivalent.

Part 4: PROOF OF PERFORMANCE:

- 4.1** Upon reassembly of the davits the davits are to be load tested to achieve a SWL of 12.5 tonnes. A static load test of 9.35 tonnes per arm (18.7 tonnes total) shall be performed. A dynamic load test of 6.875 tonnes per arm (13.75 tonnes total). All load tests to be witnessed by Chief Officer and TCMS Surveyor. All weights are to be certified correct.
- 4.2** All items to be inspected by the Chief Engineer, Chief Officer and the TCMS Surveyor. .

Spec Item: H-04	SPECIFICATION	TCMS Field #:
BARGE DAVIT INSPECTION		

4.3 The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Owner's representative, in advance, to allow his/her attendance.

Part 5: DELIVERABLES:

5.1 Three typed and tabulated copies of all readings shall be given to the Technical Authority.

Spec Item: H-05	SPECIFICATION	TCMS Field #:3N0090
FM 200 SMOTHERING SYSTEMS INSPECTION		

H-05 FM 200 SMOTHERING SYSTEMS INSPECTION

Part 1: SCOPE:

- 1.1 The FM 200 fire fighting systems are to be thoroughly examined and tested as per Transport Canada/Marine Safety (TCMS) requirements. All tests to be witnessed by the Technical Authority (or designate) and the attending TCMS Surveyor.

Part 2: REFERENCES:

TYPE	CON	LOCATION	✓	SPACE PROTECTED
FM 200	B	Propulsion Motor Room (port platform)		Main D/G Rm (lower) – F
	B			Main D/G Rm (lower) – A
	B			Converter Room
	B			Transformer Room
FM 200	B	Propulsion Motor Room (starboard platform)		Purifier Room
	B			Main D/G Rm (upper) – F
	B			Main D/G Rm (upper) – A
FM 200	A	Propulsion Motor Room Flat		Central Stores
FM 200	B	Stores Handling Room, Main Deck Aft		Propulsion Motor Rm - lower
	B			Propulsion Motor Rm - bilge
	B			Propulsion Motor Rm - upper
	B			Sewage Compartment
	A			Helicopter Fuel Cofferdam
	B			Steering Gear
FM 200	A	Speedcrane Winch Room		Speedcrane Winch Room
FM 200	A	Upper FM-200 Room		Emergency D/G Room

Spec Item: H-05	SPECIFICATION	TCMS Field #: N0090
FM 200 SMOTHERING SYSTEMS INSPECTION		

	B		Main D/G Room – Stack
FM 200	A	Forward CO ₂ Room	Forepeak Winch Rm
	A		Bosun Stores
	A		Paint Locker
FM 200	A	Forepeak Winch Room	Bow Thruster Comp't
FM 200	A	Lower Main D/G Room	Main D/G Room bilges (F)
	A		Main D/G Room bilges (A)



Configuration

A – ECS Series; FM-200/nitrogen bottle

B – ADS Series; FM-200 with separate nitrogen bottle(s)

Part 3: TECHNICAL DESCRIPTION:

- 3.1 The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Technical Authority, in advance, to allow his/her attendance.

- 3.2 All bottles are to be disconnected before any tests are conducted. The Technical Authority shall be advised prior to disconnecting any bottles or system components. The Contractor is to limit hotwork in areas where the FM-200 system has been disconnected for testing.

- 3.3 All hand control levers, pull handles, cables, cocks, and valves are to be checked and proven operational. The piping shall be blown through with compressed air or nitrogen to prove the lines are clear and the time delays operational. All pressure-operated switches are to be proven operational.

Spec Item: H-05	SPECIFICATION	TCMS Field #: N0090
FM 200 SMOTHERING SYSTEMS INSPECTION		

- 3.4 All FM-200 bottles are to have their levels ascertained. The contents are to be recorded and a copy provided to the Technical Authority in the service report.
- 3.5 The Contractor to confirm operation of all local/remote manual releases.

Part 4: PROOF OF PERFORMANCE:

- 4.1 Upon completion of testing, the FM 200 systems are to be reassembled and placed in working order. The Contractor shall replace, at no expense to the Crown, any FM 200 discharged as a result of testing.

Part 5: DELIVERABLES:

- 5.1 Copies of all certificates are to be forwarded to the Chief Engineer and attending TCMS Surveyor. A complete service report with all test results is to be submitted to the Technical Authority.

Spec Item: H-06	SPECIFICATION	TCMS Field #:
SHIP'S PORTABLE FIRE EXTINGUISHERS		

H-06 SHIP'S PORTABLE FIRE EXTINGUISHERS

Part 1: SCOPE:

- 1.1** The Contractor is to remove the ship's fire extinguishers and transport them to an authorized service centre for servicing and testing.

Part 2: REFERENCES:

- 2.1** List of ship's Extinguishers attached.

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The extinguishers are to be removed so that the total ashore at any one time does not exceed one-third the total of the extinguishers onboard. The Chief Officer will determine which extinguishers go ashore at any given time.
- 3.2** Upon completion of servicing ashore, the Contractor is transport all extinguishers back onboard the ship and is to install them in their original positions as directed by the Chief Officer.

Spec Item: H-06	SPECIFICATION	TCMS Field #:
SHIP'S PORTABLE FIRE EXTINGUISHERS		

3.3 Listing of extinguisher types onboard:

<u>TYPE</u>	<u>SIZE</u>	<u>QUANTITY</u>
Dry chemical:	5 Lb.	Ea. 4
	10 Lb.	Ea. 50
	18 Lb.	Ea. 1
	20 Lb.	Ea. 3
	50 Lb.	Ea. 2
Wet Chemical	10 lb	Ea 1
CO ₂	5 Lb.	Ea. 2
	10 Lb.	Ea. 11
	15 Lb.	Ea. 2
	20 Lb.	Ea. 2
Foam (AFFF):	2.5 gal.	<u>Ea. 2</u>
Total:		80

3.4 The Contractor shall include a \$1K allowance to cover any repairs, which will be adjusted by 1379 action on proof of invoice.

3.5 Mounting locations of portable extinguishers as per attached list.

Spec Item: H-06	SPECIFICATION	TCMS Field #:
SHIP'S PORTABLE FIRE EXTINGUISHERS		

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is to obtain all test certificates and forward them to the Chief Officer with a detailed description of any repairs carried out. Each extinguisher is to be “tagged” to show the inspection date.

✓	#	Type	Location	Serial #	Last Hydro	Next Hydro	Weight (lbs.)	Next 6 Year Maint.	Comments
BRIDGE DECK/ WHEELHOUSE									
	1A	5 lbs CO2, BC	W/h A/C Unit Rm. Port, inside door	X 409198	Nov 2007	Nov 2012	13.5	N/A	
	1	10 lbs CO2, BC	Bridge, Port	121030	Oct 2009	Oct 2014	25.5	N/A	
	2	10 lbs CO2, BC	Bridge, Stbd	W122744	Oct 2009	Oct 2014	27	N/A	
	3	10 lbs Dry Chem, ABC	Bridge, Port	R-307190		2021		2015	
	4	10 lbs Dry Chem, ABC	Bridge, Stbd	R-307702		2021		2015	
OFFICERS DECK									
	5	10 lbs Dry Chem, ABC	Outside Capt's Cabin	R-307011		2021		2015	
	5A	10 lbs Dry Chem, ABC	Outside CH/O's Cabin	ZP-217230	Oct 2008	Sept 2020	17	Oct 2014	
	5B	10 lbs Dry Chem, ABC	E/R Casing, on aft side of casing ladder	ZP-216306	Feb 2008	Feb 2020	17	Feb 2014	

BOAT DECK									
6	10 lbs Dry Chem, ABC	Next to Elect. Equip. Rm	R-307007		2021		2015		
7	10 lbs Dry Chem, ABC	Next to Off. Lounge	R-307700		2021		2015		
8	10 lbs CO2, BC	Elect. Equip. Rm.	W121021	Oct 2009	Oct 2014	27	N/A		
9	10 lbs Dry Chem, ABC	Emerg. Generator Compt.	N997616		2021		2015		
10	10 lbs CO2, BC	Computer Room	W122759	Oct 2009	Oct 2014	27	N/A		
12	10 lbs Dry Chem, ABC	A/C Fan Room	R305044		2021		2015		
13	10 lbs CO2, BC	Helicopter Hangar	13334	July 2008	July 2013	23.5	N/A		
14	20 lbs. Dry Chem, ABC	Helicopter Workshop	K930008C	Sept 1998	Sept 2010	42	N/A		
15	5 lbs. Dry Chem, ABC	Helicopter Workshop	ZY201420	Oct 2008	Oct 2020	11	Oct 2014		
16	10 lbs Dry Chem, ABC	Flight Deck, Port	2736	2005	2017	22	June 2011	Bracket corroded	
17	20 lbs. Dry Chem, ABC	Helicopter Hanger	K-209091		2021		2015		
18	10 lbs Dry Chem, ABC	Flight Deck, Port	2732	Jan 2005	Jan 2017	22	Jan 2011		
52	50 lbs. Dry Chem, BC	Helicopter Hanger	YT-364408	May 2009	May 2021		May 2015		
53	50 lbs. Dry Chem, BC	Helicopter Hanger	YT-364407	May 2009	May 2021		May 2015		
UPPER DECK									
19	10 lbs Dry Chem, ABC	Officers Mess	R-307424		2021		2015		
20	10 lbs Dry Chem, ABC	Port Alleyway @ Stn #7	H-695620		2021		2015		
21	10 lbs Dry	Stbd Alleyway @	R-307960		2021		2015		

		Chem, ABC	Stn #8						
22		10 lbs Dry Chem, ABC	Stbd Alleyway @ Stn #10	H-695956		2021		2015	
23		10 lbs Dry Chem, ABC	Port Alleyway @ Stn #9	R-307194		2021		2015	
MAIN DECK									
24		10 lbs Dry Chem, ABC	Deck Entranceway	R-307518		2021		2015	
25		10 lbs Dry Chem, ABC	Stbd Alleyway @ Stn #16	R-307699		2021		2015	
26		10 lbs Dry Chem, ABC	Port Alleyway @ Stn #15	H-695768		2021		2015	
27		10 lbs Dry Chem, ABC	Stbd Alleyway @ Stn #18	R-307510		2021		2015	
28		10 lbs Dry Chem, ABC	Port Alleyway @ Stn #17	G726682C	Nov 2005	Nov 2017	23	N/A	
29		10 lbs Dry Chem, ABC	Galley Aft Door	D666659C	Aug 1998	Aug 2010	22	N/A	
30		1.5 gal Foam, AB	Incinerator Compt.	AB-884226		2014		N/A	
31		1.5 gal Foam, AB	Incinerator Compt.	AB-884231		2014		N/A	
32		10 lbs Dry Chem, ABC	Stores Handling Room	R-305733		2021		2015	
49		10 lbs Dry Chem, ABC	Stores Handling Room	R-307516		2021		2015	
50		20 lbs. Dry Chem, ABC	Stores Handling Room	F543986C	July 2007	July 2019	40	N/A	
33		10 lbs Dry Chem, ABC	Steering Gear Compt.	R-307696		2021		2015	
54		10 lbs CO2, BC	Cargo Hold	122674	Nov 2009	Nov 2014		N/A	
55		10 lbs CO2, BC	Cargo Hold	W191335	Jan 2005	Jan 2010	26	N/A	
56		10 lbs Dry	Bowthruster	N-996193		2021		2015	

		Chem, ABC	Compartment						
57		18 lbs. Dry Chem, BC	Forecastle	F377567C	July 2007	July 2019	38	N/A	
57A		Chemical Wetting Agent	Galley	AA28041	Oct 2008	Oct 2013		N/A	
58		15 lbs CO2, BC	Deck Workshop Aft	W385833	2007	Aug 2012	26	N/A	
69		10 lbs Dry Chem, ABC	Well Deck, on exterior Blkhd.	ZP-215489	Feb 2008	Feb. 2020	17	Feb. 2014	
UPPER ENGINE ROOM FLAT									
35		10 lbs CO2, BC	Control Room	W121020	Nov 2009	Nov 2014		N/A	
36		10 lbs CO2, BC	Control Room Aft	122728	Nov 2009	Nov 2014		N/A	
37		10 lbs Dry Chem, ABC	Outside Control Room	R-307514		2021		2015	
38		10 lbs Dry Chem, ABC	Gen. Room, Aft Port	N-996192		2021		2015	
39		10 lbs Dry Chem, ABC	Gen. Room, Aft, Stbd	R-307512		2021		2015	
44		10 lbs Dry Chem, ABC	Entrance to Transformer Rm.	R-307698		2021		2015	
48		10 lbs Dry Chem, ABC	Calorifier Room	R-305563		2021		2015	
34		10 lbs Dry Chem, ABC	Winch Room	R-307010		2021		2015	
59		20 lbs CO2, BC	Winch Room	YE005767	Feb 2009	Feb 2014		N/A	
60		20 lbs CO2, BC	Winch Room	YE005746	Feb 2009	Feb 2014		N/A	
61		10 lbs Dry Chem, ABC	Engineer's Workshop	035317C	July 2004	July 2010	23	July 2016	
71		10 lbs Dry Chem, ABC	Central Store	52375	May 2002	May 2014	16	May 2020	
68		10 lbs CO2,	Electrical	122663	2009	2014	27	N/A	

		BC	Workshop						
TANK TOPS) LOWER ENGINE ROOM FLAT									
	40	10 lbs Dry Chem, ABC	Gen. Room Fwd,	R-307008		2021		2015	
	41	10 lbs Dry Chem, ABC	Gen. Room Fwd, Stbd	R-307009		2021		2015	
	42	10 lbs Dry Chem, ABC	Gen. Room Aft	N-996189		2021		2015	
	43	15 lbs CO2, BC	Gen. Room Aft	46260	2009	2014	37	N/A	
	45	10 lbs Dry Chem, ABC	Purifier Room	R-305562		2021		2015	
	46	10 lbs Dry Chem, ABC	Propulsion Motor Rm. Fwd.	R-307515		2021		2015	
	47	10 lbs Dry Chem, ABC	Propulsion Motor Rm. Aft.	B343175	Oct 2008	Oct 2020	23	Oct 2014	
BOATS									
	62	10 lbs Dry Chem, ABC	Lifeboat	WH-26077	Sept 2004	Sept 2016	18	Sept 2010	
	63	10 lbs Dry Chem, ABC	Lifeboat	WH-26176	Sept 2004	Sept 2016	18	Sept 2010	
	65	5 lbs Dry Chem, ABC	FRC 295	VU-553759		2015		2021	
	66	5 lbs Dry Chem, ABC	FRC 295	N-935011		2021		2015	
	76	10 lbs Dry Chem, ABC	Barge	VP293685	2004	2016	18	Jan 2010	
	78A	10 lbs CO2, BC	Barge	W494195	Apr 2008	Apr 2013	25.5	N/A	
SPARE FIRE EXTINGUISERS									
	64	5 lbs Dry Chem, ABC	Central Stores	ZW748426	July 2008	July 2020	9	July 2014	
	67	5 lbs CO2,	Central Stores	BF0064965	Nov 2009	Nov		N/A	

		BC				2014			
72	10 lbs Dry Chem, ABC	Central Stores	52377	May 2002	May 2010	16	Sept 2016		
73	10 lbs Dry Chem, ABC	Central Stores	52372	May 2002	May 2014	16	Oct 2014		
75	5 lbs Dry Chem, ABC	Central Stores	TD943898	2008	2014	18	Jan 2014		
77	10 lbs Dry Chem, ABC	Central Stores	VP293020	Jan 2004	Jan 2016		Jan 2010		
78	10 lbs Dry Chem, ABC	Central Stores	VP293018	Jan 2004	Jan 2016		Jan 2010		
79	5 lbs Dry Chem, ABC	Central Stores	N-938475	2009	2021		2015		

Spec Item: H-07	SPECIFICATION	TCMS Field #:
CO₂ SYSTEM SERVICING		

H-07 CO₂ SYSTEM SERVICING

Part 1: SCOPE:

- 1.1** The CO₂ Fire Fighting System protecting the Cargo Hold is to be thoroughly examined and tested as per TCMS requirements.

Part 2: REFERENCES:

- 2.1** Bottles are located in the Forward CO₂ Room, port side Well Deck forward; there are a total of 13 bottles of 75Kg Tare Wt. (45kg CO₂).

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Technical Authority, in advance, to allow his/her attendance.
- 3.2** All bottles are to be disconnected before tests are conducted. The Technical Authority shall be advised prior to disconnecting. All hand control levers, pull handles, cables, cocks, and valves are to be checked and proven operational. The piping shall be blown through with dry nitrogen to prove the lines are clear and that the time delays and sirens are operational. All pressure-operated switches are to be proven operational.
- 3.3** All CO₂ bottles are to have their levels ascertained. The contents are to be recorded and a copy given to the Technical Authority. The Contractor shall replace any CO₂ accidentally discharged in the performance of this work
- 3.4** The Contractor to confirm operation of all local/remote electronic and manual releases.
- 3.5** Upon completion of testing, the CO₂ System is to be reassembled and returned to operational condition.

Spec Item: H-07	SPECIFICATION	TCMS Field #:
CO₂ SYSTEM SERVICING		

Part 4: PROOF OF PERFORMANCE:

- 4.1** Copies of all certificates are to be forwarded to the Technical Authority and the attending TCMS Surveyor.

Spec Item: H-08	SPECIFICATION	TCMS Field #:
PROPULSION CO₂ SYSTEM SERVICING		

H-08 PROPULSION CO₂ SYSTEM SERVICING

Part 1: SCOPE:

- 1.1** The CO₂ Fire Fighting Systems protecting the Propulsion Alternators and Motors are to be thoroughly examined and tested as per TCMS requirements.

Part 2: REFERENCES:

- 2.1** Bottles are located in the Machinery Spaces; there are three 50 lb bottles in the Lower D/G Room (aft of each D/G) and two 75 lb bottles in the Propulsion Motor Room (inboard of each motor).

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Technical Authority, in advance, to allow his/her attendance.
- 3.2** All bottles are to be disconnected before tests are conducted. The Technical Authority shall be advised prior to disconnecting. All hand control levers, pull handles, cables, cocks, and valves are to be checked and proven operational. The piping shall be blown through with dry nitrogen to prove the lines are clear and that any time delays or sirens are operational. Any pressure-operated switches are to be proven operational.
- 3.3** All CO₂ bottles are to have their levels ascertained. The contents are to be recorded and a copy given to the Technical Authority. The Contractor shall replace any CO₂ accidentally discharged in the performance of this work
- 3.4** The Contractor to confirm operation of all local/remote electronic and manual releases.
- 3.5** Upon completion of testing, the CO₂ Systems are to be reassembled and returned to operational condition.

Spec Item: H-08	SPECIFICATION	TCMS Field #:
PROPULSION CO₂ SYSTEM SERVICING		

Part 4: PROOF OF PERFORMANCE:

- 4.1** Copies of all certificates are to be forwarded to the Technical Authority and the attending TCMS Surveyor.

Spec Item: H-09	SPECIFICATION	TCMS Field #:
GALLEY RANGE FIRE EXTINGUISHING SYSTEM		

H-09 GALLEY RANGE FIRE EXTINGUISHING SYSTEM

Part 1: SCOPE:

- 1.1** The Contractor is to provide the services of an certified fire protection service company to perform annual inspection and servicing of the Galley range fire fighting system as per manufacturer's recommendations.

Part 2: REFERENCES:

Nameplate Data: Kitchen Knight PCL-460 Wet Chemical

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The servicing and inspection on the system is to include the following:
 - 3.1.1** Disconnect the cylinder. Contents of cylinder to be ascertained and recorded
 - 3.1.2** Clean linkages, cabling and pulleys.
 - 3.1.3** Prove the associated piping is clear.
 - 3.1.4** Pressure switches, hand controls, control head, fusible links and electrical shutdowns are to be proven operational.
- 3.2** Upon completion of the above, the system is to be reconnected and returned to operational status.
- 3.3** The ship is to be given 48 hours notice prior to commencement of this work to enable scheduling changes to minimize disruption to the Galley staff.

Spec Item: H-09	SPECIFICATION	TCMS Field #:
GALLEY RANGE FIRE EXTINGUISHING SYSTEM		

Part 4: PROOF OF PERFORMANCE:

- 4.1** All tests to be witnessed by the Technical Authority (or designate) and the attending TCMS Surveyor.

Part 5: DELIVERABLES:

- 5.1** Copies of the test certificates to be forwarded to the Technical Authority (or designate).

Spec Item: H-10	SPECIFICATION	TCMS Field #:
FOAM FIREFIGHTING SYSTEM – HELICOPTER HANGAR		

H-10 FOAM FIREFIGHTING SYSTEM – HELICOPTER HANGAR

Part 1: SCOPE:

- 1.1** The Contractor is to provide the services of a certified fire protection service company to perform annual inspection and servicing of the Helicopter Hangar foam fire fighting system, as per the manufacturer's recommendations.

Part 2: REFERENCES:

Manufacturer: Cronin

Subassemblies: Skum and Nordic

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

Part 3: TECHNICAL DESCRIPTION:

- 3.1** Integrity of diaphragm in each of the two 560 gallon capacity tanks to be proven. A sample to be taken from each of the foam tanks. Sample strength to be tested and copies of results given to Technical Authority (or designate). The Contractor is to allow \$500.00 to renew the tank manhole gaskets; this total will be adjusted by 1379 action.
- 3.2** Upon completion of the above, the system is to be secured in good operational condition with all valves in proper positions.

Part 4: PROOF OF PERFORMANCE:

- 4.1** Copies of the test certificates to be forwarded to Technical Authority (or designate).

Spec Item: H-11	SPECIFICATION	TCMS Field #:
FOAM FIREFIGHTING SYSTEM – MONITORS & HOSE REELS		

H-11 FOAM FIREFIGHTING SYSTEM – MONITORS & HOSE REELS

Part 1: SCOPE:

- 1.1** The Contractor is to provide the services of a certified fire protection service company to perform annual inspection and servicing of the Foam fire fighting system, as per the manufacturer's recommendations

Part 2: REFERENCES:

Nameplate Data: SKUM SKA 50/MP100 Balanced Pressure
Proportioning System
Model: MK/MJ 100
(500 litre three percent AFFF concentrate)

Part 3: TECHNICAL DESCRIPTION:

- 3.1** Pressure balancing valve to be carefully disassembled for inspection. Any deposits left by foam concentrate to be cleaned from valve internals. After inspection, the valve to be reassembled in correct operating condition.
- 3.2** Level and contents of foam tank to be checked. A sample to be taken from foam tank. Sample strength to be tested and copies of results given to Technical Authority (or designate).
- 3.3** Condition of hoses, nozzles, valves, gauges, piping, hoses and hose-reels, monitors and pumps to be checked. Correct operation of local and remote start/stop switches for foam pump and sea water pump to be verified.

Spec Item: H-11	SPECIFICATION	TCMS Field #:
FOAM FIREFIGHTING SYSTEM – MONITORS & HOSE REELS		

- 3.4** Upon completion of the above the system is to be secured in operational condition with all valves in proper positions.
- 3.5** Any recharging/repairs are to be covered by 1379 action.

Part 4: PROOF OF PERFORMANCE:

- 4.1** Copies of the test certificates to be forwarded to Technical Authority (or designate).

Spec Item: H-12	SPECIFICATION	TCMS Field #:
GALLEY EXHAUST DUCTING CLEANING		

H-12 GALLEY EXHAUST DUCTING CLEANING

Part 1: SCOPE:

- 1.1** The Galley exhaust ducting is to be given its regular cleaning. As this is a crewed refit, the Contractor is to arrange the work to be carried out after 18:30 hours each day; if this is not possible for any portion of the work, 24 hours notice is to be provided to allow alternative messing arrangements to be made.

Part 2: REFERENCES:

- 2.1** Ship's crew will lock out the Galley range (breakers P-216-1 & -2), Deep Fryer (breaker P-216-3), Steam Kettle (breaker P-216-4) and the Galley Exhaust Fan (breaker P-615-8) prior to the commencement of work. The Contractor is to be aware the ducting contains fusible links & actuating wires connected to the fire suppression system; any accidental discharge of this system will be rectified at the Contractor expense.
- 2.2** All materials, equipment, chemicals, cleaners, etc. required to perform the cleaning shall be supplied by the Contractor.

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The exhaust ducting from the range and aft appliance hoods to the Upper Deck is to be cleaned of all deposits; the tubeaxial Exhaust Fan motor and fan blades are also to be cleaned. Access can gained through a bolted 27" square panel in the Upper Deck breezeway and a bolted grill on the fan outlet. The effectiveness of the cleaning will be approved by the Technical Authority (or designate) prior to reinstallation of these accesses.
- 3.2** Grease deflectors above the appliances are to be removed prior to the ducting cleaning; they are to be stored in a secure location as directed by the Logistics Officer. Upon final inspection, the grease deflectors will be reinstalled by ship's crew.

Spec Item: H-12	SPECIFICATION	TCMS Field #:
GALLEY EXHAUST DUCTING CLEANING		

Part 4: PROOF OF PERFORMANCE:

- 4.1** The work areas are to be inspected at the completion of this specification by the Technical Authority (or designate); any debris, residue or general untidiness resulting from work performed in this item shall be removed/rectified by the Contractor at the Contractor's expense. All work shall be completed to the satisfaction of the Chief Engineer.

Part 5: DELIVERABLES:

- 5.1** Any WHMIS-controlled products used onboard shall be accompanied by a current MSDS; 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.

Spec Item: H-13	SPECIFICATION	TCMS Field #:
DRYER DUCTING CLEANING		

H-13 DRYER DUCTING CLEANING

Part 1: SCOPE:

- 1.1** The ducting from the clothes dryers in the Crew's and Officer's Laundries requires an annual cleaning.

Part 2: REFERENCES:

- 2.1** The Laundry Exhaust Fan will be isolated by the Ship's Electrical Officer at MCC 5, Breaker P-615-5.

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The Contractor is to retain the services of a specialized vacuum duct cleaning firm to remove the lint accumulations from the Officer's Laundry dryer ducting.
- 3.2** The ducting runs above the deckhead panels aft to outside the bulkhead on the Boat Deck in the vicinity of Fire Station #3. There are two outlets (one from each dryer), 4 inches in diameter, each approximately 5 feet in length, at which point they tie together into one outlet, 4 inches in diameter, approximately 22 feet in length. The Contractor is also to ensure the Exhaust Fan, including the fan blade and the outlet screen are also cleaned.
- 3.3** The lint accumulations are also to be cleaned from ducting from the four dryers in the Crew's Laundry on the Main Deck. The four steel goosenecks in the Upper Deck (P) breezeway for the Crew's Laundry dryers are to be cleaned. The ducting from the Crew's Laundry has four outlets, 4 inches in diameter, each approximately 12 feet in length;

Spec Item: H-13	SPECIFICATION	TCMS Field #:
DRYER DUCTING CLEANING		

- 3.4** After inspection of the dryer ducting by the Technical Authority (or designate), any removed deckhead panels are to be replaced; any panels damaged will be repaired to “like-new” condition or replaced at no expense to the Crown.

Part 4: PROOF OF PERFORMANCE:

- 4.1** After inspection of the dryer ducting by the Technical Authority (or designate), any removed deckhead panels are to be replaced; any panels damaged will be repaired to “like-new” condition or replaced at no expense to the Crown.

Spec Item: H-14	SPECIFICATION	TCMS Field #:
SMOKING LOUNGE EXHAUST DUCT CLEANING		

H-14 SMOKING LOUNGE EXHAUST DUCT CLEANING

Part 1: SCOPE:

1.1 The Contractor is to retain the services of a specialized vacuum duct cleaning firm to clean the cigarette-smoking related accumulations from the interior of the Smoking Lounge Exhaust Fan & natural vent ducting

Part 2: REFERENCES:

2.1 The Exhaust Fan will be locked out by the ship's Electrical Officer at breaker L-104-20.

Part 3: TECHNICAL DESCRIPTION:

3.1 Three louvers in the Lounge are to be removed & cleaned. The external ducting from the Exhaust Fan has a bolted clean-out panel located just aft of the external bulkhead of the space, and a removable screen on the outboard end of the ducting. The inlet on the natural vent ducting also has a removable screen.

3.2 The Contractor is to bid on renewing six ½" UNC stainless steel fasteners on the clean-out panel.

3.3 There is approximately 20 feet of external & internal ducting associated with the Exhaust Fan with a further 6 feet of internal natural vent ducting to be cleaned.

Part 4: PROOF OF PERFORMANCE:

4.1 Upon completion of the cleaning, the vents shall be inspected by the Technical Authority (or designate) before the louvers, the clean-out panel and duct screens are replaced. Any removed deckhead panels are to be replaced; any panels damaged will be repaired to "like-new" condition or replaced at no expense to the Crown

Spec Item: H-14	SPECIFICATION	TCMS Field #:
SMOKING LOUNGE EXHAUST DUCT CLEANING		

Part 5: DELIVERABLES:

5.1 Any WHMIS controlled cleaners utilized will be accompanied by a current MSDS; 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.

Spec Item: H-15	SPECIFICATION	TCMS Field #:
TOILET EXHAUST FAN DUCT CLEANING		

H-15 TOILET EXHAUST FAN DUCT CLEANING

Part 1: SCOPE:

1.1 The Toilet Exhaust Fan, which services the 26 washrooms and 6 other spaces onboard, requires the removal of any accumulations of dust & lint from the rather extensive network of ducting.

Part 2: REFERENCES:

2.1 The Toilet Exhaust Fan will be locked out by the ship's Electrical Officer at breaker P-615-9 on MCC #5 prior to commencement of work.

2.2 Spaces to be accessed:

- Wheelhouse 1 W/R
- Officer's Deck 3 W/R's
- Boat Deck 2 W/R's, Officer's Laundry, Officer's Lounge, Bar Stores
- Officer's Deck 11 W/R's, Officer's Pantry
- Main Deck 9 W/R's, Crew's Laundry, Linen Locker

2.3 Ship's drawings H-3810 through H-3840 will be provided to the Contractor for reference.

Part 3: TECHNICAL DESCRIPTION:

3.1 As this is a crewed refit, the Contractor is to arrange the work in consultation with the Technical Authority to minimize disruption of crew routine, as some personnel may be on night watches. Work in the Linen Locker will require 24 hours notice to allow the removal of the contents to another storage location.

3.2 The Contractor is to retain the services of a specialized vacuum duct cleaning firm to remove the dust and lint accumulations from the ducting. A HEPA-filtered vacuum unit is to be used to create a negative pressure in the ducting from the outlet side of the fan in the A/C Unit Room, located on the Boat Deck. A screwed 18" X 20" access panel on the aft side of the ducting may be removed for this purpose.

Spec Item: H-15	SPECIFICATION	TCMS Field #:
TOILET EXHAUST FAN DUCT CLEANING		

- 3.3** A “whisker line” is to be employed from the inlet side of each leg of ducting to agitate the accumulated lint and other debris towards the suction side of the vacuum unit.
- 3.4** The vent louvers, deflectors and grills in each space are to be removed and cleaned; once the ducting is determined to be clean by visual inspection by the Technical Authority (or designate), they are to be reinstalled.
- 3.5** Once all the suction ducts up to the Toilet Exhaust Fan are determined to be clean, the fan blades and housing are also to be cleaned, as is the outlet ducting from the fan to the mushroom vent, located on the deck above.

Part 4: PROOF OF PERFORMANCE:

- 4.1** All areas of the ducting etc to be inspected by the Technical Authority prior to reinstallation.

Part 5: DELIVERABLES:

- 5.1** A service report detailing the work performed and methodology used is to be provided to the Technical Authority within 3 working days of the completion of this item.

Spec Item: H-16	SPECIFICATION	TCMS Field #:
LIFERAFT SERVICING.		

H-16 LIFERAFT SERVICING.

Part 1: SCOPE:

- 1.1** The Contractor shall remove and transport the ship's liferafts and hydrostatic releases to and from an authorized service centre for servicing.

Part 2: REFERENCES:

2.1 Owner Furnished Equipment

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

Location

- 1 X 20 Person "DPS" liferaft – Boat Deck (S)
- 2 X 20 Person "DPS" lifeafts – Officers Deck (P)

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The Contractor's quote shall include the removal of the rafts and releases from the ship and their reinstallation onboard in original cradles as directed by the Technical Authority (or designate).
- 3.2** An allowance of \$500 per liferaft is to be quoted for replacement of survival equipment for a total allowance of \$1500 for this specification item; this cost is to be adjusted by 1379 action on proof of invoice

Spec Item: H-16	SPECIFICATION	TCMS Field #:
LIFERAFT SERVICING.		

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor shall obtain and forward all test certificates to the Technical Authority (or designate).

Spec Item: H-17	SPECIFICATION	TCMS Field #:
IMMERSION SUIT SERVICING		

H-17 IMMERSION SUIT SERVICING.

Part 1: SCOPE:

- 1.1** The Contractor is to remove the fifty-five Immersion Suits from the vessel and transport them to/from an authorized service center for servicing as required by Transport Canada/Marine Safety (TCMS).

Part 2: REFERENCES:

2.1 Owner Furnished Equipment

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

- 2.2** The following suits require inspection & testing:
- “Mustang Ocean Commander”, regular size, 45
 - “Fitzwright”, jumbo size, 4
 - “Fitzwright”, small size, 3
 - “Fitzwright”, Regular, 3

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The Contractor is to be responsible for the transportation of the suits from the Survival Suit Stowage Locker on the vessel’s Boat Deck (S) to the authorized service centers, and the return transportation to the same location on the vessel upon completion of servicing.
- 3.2** All suits are to be tested and inspected as required by TCMS; the Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Technical Authority, in advance, to allow his/her attendance.

Spec Item: H-17	SPECIFICATION	TCMS Field #:
IMMERSION SUIT SERVICING		

- 3.3** The Contractor is to allow \$1000 for any repairs, the cost will be adjusted by 1379 action, upon proof of invoice; any suit deemed unfit for further use is to be returned to the vessel, and is to be conspicuously marked as “condemned”. According to onboard records, the “Di-gi lights” are acceptable for re-use.

Spec Item: H-18	SPECIFICATION	TCMS Field #:
SPEEDCRANE CONTROL ROOM WINDOW REPAIRS		

H-18 SPEEDCRANE CONTROL ROOM WINDOW REPAIRS

Part 1: SCOPE:

- 1.2** The upper Speed Crane Control Room windows are leaking. The intent of this specification is to detail the work required to remove the upper Speed Crane Control Room windows, repair the present leaks and replace the windows.

Part 2: REFERENCES:

2.1 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** The Contractor is to ensure that the Crane Control Room and Speedcrane controls are properly protected during the window work. The window space is to be covered and made waterproof while the window is removed.
- 3.2** The steel bulkhead sheeting around the window shall be removed to allow access to the window securing bolts. The aluminum securing pieces around each window are to be removed and discarded. The aluminum pieces are to be replaced by new contractor supplied frames.
- 3.3** The windows are to be carefully removed and retained for reinstallation. Windows are to be cleaned of old sealant
- 3.4** All old sealant and gasket is to be removed from the window frames. The window frames are to be power tool cleaned down to bare metal for inspection. Contractor shall arrange with TCMS to have the window frames inspected. Any repairs will be covered by 1379 action.

Spec Item: H-18	SPECIFICATION	TCMS Field #:
SPEEDCRANE CONTROL ROOM WINDOW REPAIRS		

- 3.5** After inspection and any required repairs, the frames are to be primed and top coated with two coats of owner-supplied white paint.
- 3.6** The windows are to be reinstalled using a suitable polyurethane adhesive sealant.
- 3.7** The new window securing pieces shall be installed with new contractor-supplied stainless steel bolts.

Part 4: PROOF OF PERFORMANCE:

- 4.1** Upon completion of work, the windows shall be hose tested and proven free of leaks in the presence of Technical Authority.

Spec Item: H-19	SPECIFICATION	TCMS Field #:
BATTERY LOCKER VENT RENEWAL		

H-19 BATTERY LOCKER VENT RENEWAL.

Part 1: SCOPE:

- 1.2** The upper vent in the Boat Deck battery compartment is in need of replacement.

Part 2: REFERENCES:

2.1 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** The battery compartment will have all its contents removed by ship's crew prior to vent replacement. Space is to be proven safe for Hotwork.
- 3.2** The insulation in way of the vent is to be removed to allow the vent replacement.
- 3.3** The existing vent is to be cropped from the top of the battery locker. A new vent, as per original is to be manufactured and welded in place in the locker. The new vent shall protrude approx. 1" into the locker to allow for venting through the insulation.
- 3.4** Upon completion, the vent is to be primed and coated with 2 coats of owner supplied white paint.
- 3.5** Area of repair in the locker is to be reinsulated upon completion of all work.

Part 4: PROOF OF PERFORMANCE:

- 4.1** Upon completion of vent installation and prior to re-insulating, vent shall be hose tested and proven free of leaks in the presence of Technical Authority.

Spec Item: H-20	SPECIFICATION	TCMS Field #:
TREAD RENEWAL, CENTRAL STORES STAIRS		

H-20 TREAD RENEWAL, CENTRAL STORES STAIRS

Part 1: SCOPE:

- 1.2** The intent of this specification is to renew the flat treads on the access stairs to Central Stores with a more non-slip material (such as used on the Machinery Space stairs).

Part 2: REFERENCES:

- 2.1** Ship's drawing 555-H-0025 General Arrangement, sheet 3 of 3

Part 3: TECHNICAL DESCRIPTION:

- 3.1** All materials to be contractor supply; the non-slip stair tread material is to be approved by the Owner's representative prior to purchase.
- 3.2** Prior to removing the stair assembly, the doorway from the Main Deck alleyway is to be secured & placarded.
- 3.3** The stair assembly is to be unbolted and removed ashore to the Contractor's workshop.
- 3.4** Existing 12 stair treads are to be cropped and the side plates ground smooth.
- 3.5** The replacement treads, approximately 70 cm in width, are to be installed with continuous welding. Spacing is to remain as per original
- 3.6** All new and disturbed work is to be given one coat of marine-grade primer. The entire stair assembly is to be given two coats of gloss marine-grade black enamel.

Spec Item: H-20	SPECIFICATION	TCMS Field #:
TREAD RENEWAL, CENTRAL STORES STAIRS		

- 3.7** Stairs are to be returned onboard and reinstalled using new cap-screws, lock washers and nuts.
- 3.8** Once the installation is completed, the doorway from the Main Deck alleyway is to be returned to normal service.

Part 4: PROOF OF PERFORMANCE:

- 4.1** Upon completion of all work, the stairs are to be utilized by the Chief Engineer, Chief Officer and a crew representative of the OHS Committee.

Spec Item: H-21	SPECIFICATION	TCMS Field #:
P & S FW TANK VENT PIPE RENEWAL		

H-21 P & S FW TANK VENT PIPE RENEWAL

Part 1: SCOPE:

1.1 The intent of this specification is to have the Contractor replace vent pipes for the port and stbd Fresh Water tanks, in their entirety. This item is to be completed in conjunction with the ship's crew cleaning of the Fresh Water tanks.

Part 2: REFERENCES:

Reference document: Drawing #2740 Man hole covers

Drawing # 67-30-01 Air Vent and sounding pipes

2.1 Vents located at Frame 21 port and stbd, in Seaman's Cabin 148 and Oilers Cabin 149

2.2 Piping to be 2.5" Sch 40 galvanized pipe.

Part 3: TECHNICAL DESCRIPTION:

3.1 Contractor to ensure the cabins are properly protected against damage prior to work commencing.

3.2 Contractor is to open up Void Space #4 Port and Stbd Fr 30-54, to gain access to the lower section of the vent pipe. Access to this void space is through #3 Void space with the manholes located in the upper engine room. Void Space is to be proven gas free and safe for Hotwork prior to any work commencing. Fresh water tanks will be opened up for cleaning by Ship's crew. Fresh Water tanks to be proven safe for Hotwork prior to removal of vent pipes.

3.3 In the cabins, deck head panels, porthole framing, cabin heaters etc are to be removed as required to allow the bulkhead paneling to be removed to access the vent piping. All removed items are to be protected against damage

3.4 Contractor to remove deck head insulation as required, allowing access to the vent pipe and a proper fire watch. Upon completion of all work the disturbed deck head areas to be reinsulated.

Spec Item: H-21	SPECIFICATION	TCMS Field #:
P & S FW TANK VENT PIPE RENEWAL		

- 3.5** The vent pipes are to be removed from the upper deck to the fresh water tank bulkheads. The Stbd vent head is to be removed from the existing vent pipe and safely stowed to allow reinstallation on the new vent pipe. The Port vent head is to be removed and discarded. A new owner supplied flanged vent head shall be installed on the new vent pipe.
- 3.6** New vent pipes are to be reinstalled from the Fresh Water tank to the Upper Deck Vent heads as per original. A new contractor supplied flange, sized to fit the new vent head flange will be fitted to the port vent piping. All deck and bulkhead penetrations are to be welded on both sides complete with doublers as required.
- 3.7** The stbd vent head is to be reinstalled with the existing Victaulic coupling and a new contractor supplied gasket. The port vent head will be installed with a new rubber gasket and 4 stainless steel bolts, nuts and lock washers. The new vent head shall be fitted with a welded nipple, pipe elbow and a plug in its side as per original vent head.
- 3.8** All piping is to be primed upon completion of work
- 3.9** Upon completion of vent pipe installation all items removed in the cabins shall be reinstalled as per original.

Part 4: PROOF OF PERFORMANCE:

- 4.1** All items to be inspected by the Chief Engineer prior to reassembly.
- 4.2** Welds on upper deck to be hose tested to ensure welds are watertight.
- 4.3** Vent pipes are to be proven watertight prior to the cabins and void spaces being closed up.

Spec Item: H-22	SPECIFICATION	TCMS Field #:
SOUNDER COMPARTMENTS		

H-22 SOUNDER COMPARTMENTS

Part 1: SCOPE:

1.1 The intent of this specification is to have the Contractor open the Port and Stbd sounder compartments to allow Coast Guard SEW techs to repair the sounder units.

Part 2: REFERENCES:

Reference document: Drawing #2740 Man hole covers

Part 3: TECHNICAL DESCRIPTION:

- 3.1** Contractor to remove the Port and Stbd sounder compartment manhole covers located at Frame 127 in the Cargo hold.
- 3.2** Spaces are to be proven gas freed once the compartments are open. Contractor to ensure the compartments are regularly tested while the compartments are open.
- 3.3** The Owner's representative (or designate) will be present when the manhole covers are reinstalled. The Contractor shall clean the sealing surfaces around the manhole and cover and install the cover using new ¼ inch thick neoprene gaskets. Anti seizing compound shall be used on all threads. The Contractor is to quote separately the unit cost per stud to replace any broken manhole securing studs.

Part 4: PROOF OF PERFORMANCE:

- 4.1** All items to be inspected by the Chief Engineer prior to reassembly.
- 4.2** Manhole covers are not to be reinstalled until after the vessel has been refloated to ensure not leakage at the sounders.

Spec Item: H-23	SPECIFICATION	TCMS Field #:
TREAD RENEWAL, FLIGHT DECK STAIRS		

H-23 TREAD RENEWAL, FLIGHT DECK STAIRS

Part 1: SCOPE:

1.1 The intent of this specification is to renew the existing treads on the access stairs to the Flight Deck Port and Stbd, with a more non-slip material (such as used on the Machinery Space stairs).

Part 2: REFERENCES:

2.1 Ship's drawing 555-H-0024 General Arrangement, sheet 2 of 3

Part 3: TECHNICAL DESCRIPTION:

- 3.1** All materials to be contractor supply; the non-slip stair tread material is to be approved by the Owner's representative prior to purchase.
- 3.2** Only one set of stairs are to be taken out of service at a time. Stairs to be properly marked and blocked off during work to prevent injury.
- 3.3** Existing 11 stair treads are to be cropped and the side plates ground smooth.
- 3.4** The replacement treads, approximately 76 cm's in width, are to be installed with continuous welding. Spacing is to remain as per original
- 3.5** All new and disturbed work is to be given one coat of marine-grade primer. The entire stair side plates are to be given two coats of gloss marine-grade white enamel.

Part 4: PROOF OF PERFORMANCE:

4.1 Upon completion of all work, the stairs are to be utilized by the Chief Engineer, Chief Officer and a crew representative of the OHS Committee.

Spec Item: ED-01	SPECIFICATION	TCMS Field #:
STERNTUBE BEARING WEARDOWN		

ED-01 STERNTUBE BEARING WEARDOWN

Part 1: SCOPE:

- 1.1** The intent of this specification is for the contractor to measure and record the bearing wear-down of both Port and Stbd stern tube bearings.

Part 2: REFERENCES:

N/A

Part 3: TECHNICAL DESCRIPTION:

- 3.1** Port and starboard rope guards shall be removed to gain access to the after end of each stern tube.
- 3.2** Wear-down readings shall be taken on the port and starboard stern tube bearings within eight hours of dry-docking the ship. The Contractor may use the Owner-supplied poker gauge on the port side, but, as the bracket is damaged on the starboard side, feeler gauges will be required on that side.

Part 4: PROOF OF PERFORMANCE:

- 4.1** Upon completion of all work, both rope guards shall be reinstalled

Part 5: DELIVERABLES:

- 5.1** Three typewritten copies of the readings shall be provided to the Owner's representative.

Spec Item: ED-02	SPECIFICATION	Field #: 3F014 & 015
STERN TUBE BEARING WEARDOWN		

ED-02 PROPELLER SURVEYS, PORT AND STBD

Part 1: SCOPE:

- 1.1** The intent of this specification is to remove and inspect the port and starboard propellers for Transport Canada/Marine Safety (TCMS) credit. This work will be in conjunction with item ED-02, Tailshaft & Shaft Bearing Surveys (P&S).

Part 2: REFERENCES:

Propeller particulars:

- Diameter: 3600 mm
- No. of Blades: 4
- Weight: 7200 Kg
- Outboard Turning

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The Contractor shall install sufficient lifting arrangements on the hull of the vessel to remove the propeller tail cones, propeller nuts and propellers.
- 3.2** Jacking plates, studs, hydraulic power pack, and associated removal equipment is available onboard the vessel; access is through the flush deck hatch on the Helicopter (Boat) Deck. Ship's crew will retract the Hangar and open and close the hatch.
- 3.3** The Contractor shall remove the propeller tail cone, the forward propeller gland seal rings and seals, the propeller nut locking key, propeller nuts and propellers. Rope guards will be removed/installed as part of ED-01, Sterntube Bearing Weardown.
- 3.4** The propeller and cone shall be thoroughly cleaned and examined for defects; any defects are to be recorded on the provided Propeller Inspection Report form, available from the Technical Authority. The Contractor shall verify each key and propeller keyway with dye penetrant. This to be witnessed by TCMS, the Technical Authority and the Inspection Authority.

Spec Item: ED-02	SPECIFICATION	Field #: 3F014 & 015
STERN TUBE BEARING WEAR DOWN		

- 3.5** The Contractor shall install the propellers and harden up the propeller nuts in accordance with manufacturer's instructions. The Contractor shall advise the Technical Authority when this is to be carried out. The Technical Authority and the Attending TCMS Surveyor are to witness the final installation of the propeller on the shaft to ensure that the propeller is properly aligned with the original proof marks and that the travel is equivalent.
- 3.6** Propeller nuts are to be locked in place. Stainless steel locking wire is to be used on compression bolts.
- 3.7** The tail cones and the back of the propeller nuts shall be filled with tallow. The tail cone nuts shall be secured with stainless locking wire, the nut recesses filled with cement and faired to the contour of the cones.
- 3.8** The Contractor shall supply and install new rubber seal rings to the front of the propellers prior to fitting the glands. The gland nuts shall be secured with stainless steel locking.
- 3.9** The Contractor's bid shall include the cost for three separate fits of each propeller on the appropriate shaft. The Contractor shall provide a quotation for the unit cost of each additional fit.

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Technical Authority, in advance, to allow his/her attendance.

Part 5: DELIVERABLES:

Spec Item: ED-03	SPECIFICATION	3FF010, 30, 60 & 80
TAILSHAFT AND SHAFT BEARING SURVEY PORT AND STBD		

ED-03 TAILSHAFT AND SHAFT BEARING SURVEY PORT AND STBD

Part 1: SCOPE:

- 1.1** The intent of this specification item is to remove both tail shafts for cleaning, overhaul and inspection for TCMS credit. This inspection is to include shaft bearings and all associated fittings. The stern tube staves on the stbd side shall be replaced with new owner supplied Thordon Bushings.

Part 2: REFERENCES:

LOA 14.513 meters.

Diameter: 510 mm.

Weight: 24644 Kg.

Reference Drawing: 3591-10 (Tailshaft)

3591-400 (Arrangement of Shafting)

Part 3: TECHNICAL DESCRIPTION:

- 3.1** In conjunction with ED-02, the Contractor shall remove both propellers. The Contractor shall scribe proof marks on each propeller and tail shaft and remove the propellers to the dock floor.
- 3.2** The tail shaft shall be let go at the shaft coupling at the propulsion motor end. All shaft coupling flanges, nuts, and fitted-bolts shall be proof marked to ensure replacement in their original positions.
- 3.3** The turning gear and brake assembly located on the tail shaft in the Propulsion Motor Room shall be removed to gain access to the Pilgrim nut to permit shaft removal. The Pilgrim nut shall be removed and the coupling shall be jacked from the shaft. The Contractor is to ensure the coupling and tail shaft are properly supported at all times.

Spec Item: ED-03	SPECIFICATION	3FF010, 30, 60 & 80
TAILSHAFT AND SHAFT BEARING SURVEY PORT AND STBD		

- 3.4** The John Crane mechanical stern tube seal shall be disassembled prior to removal of the shaft to prevent damage to the seal components. A John Crane FSR shall be present during the removal, disassembly and reassembly of the shaft seals. All components shall be cleaned, checked for wear and defects as per manufacturer's recommendations, and laid out for inspection. Any components found to be defective to be replaced under 1379 action. The contractor is to include an allowance of \$20,000 for a John Crane FSR.
- 3.5** Upon completion of the seal removal, the tail shaft shall be withdrawn and removed ashore to the Contractor's shop.
- 3.6** In the Contractor's shop, the tail shaft shall be properly supported at all times. The shaft shall be thoroughly cleaned and checked for wear and defects. Particular attention to be paid to the following areas:
- Forward and aft keyways on shaft tapers,
 - Forward and aft shaft tapers,
 - Forward and aft ends of each of the two liners where they meet the tail shaft,
 - Fwd and aft pilgrim nuts and threads on shafting,
 - Liner wear in way of staves and condition of staves,
 - Fwd end of fwd liner in way of "SEALOL" seal.
 - Rematek coating between liners.
- 3.7** Inspection of the keyways and tapers are to include non-destructive crack detection (dye penetrant) by a certified technician. All materials for testing shall be supplied by the Contractor; a report, detailing the results of this testing, is to be provided to the Technical Authority within 3 days of completion.
- 3.8** Inspection of the liners shall consist of thoroughly cleaning the "Rematek" coating in way of the join, but is not to include any cutting, peeling, or otherwise disturbing the coating
- 3.9** The contractor shall conduct a Hi-Pot Test on the tail shaft to ensure that the "Rematek" coating is sound. The Contractor's bid shall include an allowance of \$5,000 for repairs to the "Rematek" coating – the actual cost for replacing the coating will be adjusted up or down using 1379 action.

Spec Item: ED-03	SPECIFICATION	3FF010, 30, 60 & 80
TAILSHAFT AND SHAFT BEARING SURVEY PORT AND STBD		

- 3.10** The tailshaft shall be set in a lathe and checked for trueness. The Contractor shall provide 4 copies of the run-out readings of the shaft and of a drawing showing the extent of grooving on each shaft. While in the lathe, the lathe steady-rest is not to be located so as to interfere with the shaft surface in way of the mechanical seal. Every effort shall be made to prevent the lathe steady-rest from grooving the shaft.
- 3.11** Shaft bearing (stern tube) bushings on the port side shall be cleaned; inspected for wear and defects. Internal measurements shall be taken at 4 positions over the length of the stern tube bushings.
- 3.12** The starboard bearing staves and securing bars fore and aft are to be removed from the sterntube in order to fit owner supplied Thordon Bushings. All locking bars and securing screws are to be returned to the Chief Engineer.
- 3.13** The contractor shall measure the stbd sterntube and shafting in way of the new bushings. Contractor is to consult with the Thordon representative to determine the proper finished dimensions of the bushings.
- 3.14** The contractor shall machine the 4 sections of bushings to the proper dimensions as recommended. All bushings will have water passages machined the length of the bushings as per the Thordon representatives recommendations.
- 3.15** The stbd shaft's aft liner shall be machined at its fwd end to the dimensions of the bearing section of the liner to obtain a uniform dimension for the length of the liner.
- 3.16** Contractor to "freeze" the bushings to allow proper installation. Contractor is to supply dry ice as required.
- 3.17** Upon completion contractor is to take new clearance measurements to ensure the proper clearances have been achieved.
- 3.18** Cooling water lines to the sterntube shall be proven clear and water flow to the sterntube to be proven adequate.
- 3.19** The area of the stern tube between the staves shall be mechanically cleaned (SSPC-SP-3) and coated with one coat of Amercoat 78 HB coal tar epoxy, applied at 8 mils DFT.

Spec Item: ED-03	SPECIFICATION	3FF010, 30, 60 & 80
TAILSHAFT AND SHAFT BEARING SURVEY PORT AND STBD		

- 3.20** Contractor is to dress the 18 fitted coupling bolts as required prior to reinstallation to ensure a proper fit.
- 3.21** Upon completion of inspection and repairs, the Contractor shall assemble the shafting, turning gear, brake, propeller, mechanical seal and couplings and propeller as per manufacturer's recommendations and in good running order. The John Crane FSR shall be present for the reinstallation and set up of the mechanical seals.
- 3.22** The Contractor shall supply all equipment, such as chain falls, slings and shackles; all equipment shall be appropriate for the expected duties, and be accompanied by current certification indicating, or be permanently marked as to being, of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this item shall be installed by CWB-certified welders; upon completion of all work, they shall be removed, the affected area ground flush, and a surface treatment to match the existing is to be applied.

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Technical Authority, in advance, to allow his/her attendance.
- 4.2** Upon undocking of the vessel, a dock trial shall be conducted. The shafting system shall be test run for 1 hour to check for gross overheating or vibration; the Contractor shall have personnel in attendance to observe this testing.
- 4.3** Upon completion of all refit work, but prior to Acceptance, a 4 hour sea trial shall be conducted; various evolutions shall be undertaken to test the ship's equipment. The ship will be gradually worked up to full speed; the Contractor shall have personnel in attendance to monitor the shafting system on a continual basis. Any overheating or vibration will be remedied at no expense to the Crown.

Part 5: DELIVERABLES:

- 5.1** Three typewritten copies of the readings shall be provided to the Owner's representative.

Spec Item: ED-04	SPECIFICATION	3F016, 17 & 18
RUDDER AND RUDDER STOCK		

ED-04 RUDDER AND RUDDER STOCK

Part 1: SCOPE:

- 1.1** The intent of this item shall be to open up the rudder system for inspection, cleaning, and quinquennial inspection for Transport Canada/Marine Safety (TCMS) credit. This item shall be performed in conjunction with Item D-19, Underwater Hull Cleaning and Painting.

Part 2: REFERENCES:

- 2.1** The Steering Gear shall be locked out except when required to move the rudder; at these times, the Steering Gear shall be operated under the supervision of a designated member of the ship's crew. The vessel's Electrical Officer will ensure that all circuits have been isolated prior to the commencement of any work. The Main Steering Pumps will be locked out at breakers P-618, located in the MCR, and P-619, located in the Transformer Room; the Emergency will be locked out at breaker EP-601, located in Emergency Generator Room.

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The Contractor shall gain access to the steady bearing by way of the rudder trunk manhole covers, located in the Aft Void space. The Aft Void space is to be considered as a confined space under the Coast Guard's Safety Management System and shall be certified "Gas Free", safe for personnel to enter and safe for hot work prior to entry. The original certificates shall be provided to the Chief Engineer and a copy shall be posted in a conspicuous location near the entrance to each tank.
- 3.2** Rudderstock steady bearing clearances shall be measured and recorded. Bearing clearances shall be taken and recorded when the rudder is in each of the following positions:
- hard to Port
 - hard to Starboard
 - midships

The clearance between the jumping collar and the ship shall be measured at four equal distances around the collar.

Spec Item: ED-04	SPECIFICATION	3F016, 17 & 18
RUDDER AND RUDDER STOCK		

- 3.3** Rudder fairwater plates shall be removed to gain access to the rudder pintles and reinstalled upon completion of work. The clearances between the bearings and the pintles shall be recorded. Also, the clearances between the rudder arms and the machined pads above each gudgeon shall be recorded. Clearances shall be taken with rudder in each of the positions as noted above. Copies of the clearances are to be provided to Chief Engineer.
- 3.4** Rudder drain plug shall be removed to verify that the rudder is dry and tight. The Contractor is to block the rudder in position. Clean, number stamp (for identification purposes), and disconnect rudder coupling bolts and nuts. Note that the palm bolts are of the MORE GRIP TYPE and require to be pressurized to be removed.
- 3.5** The three rudder pintle pilgrim nuts shall be removed. The pintles shall be removed from the rudder, cleaned, and measured. The rudder shall be lifted and lowered to the dock bottom. The rudder gudgeon bushings shall be cleaned and measured. Measurements for the pintles and bushings shall be taken forward and aft, port and starboard, and at three locations over the length.
- 3.6** Due to past wastage, the welds on the forward and aft rudder lifting pipes are to be gouged, rewelded around the attachment & machined flush. The plugs are to be reinstalled, using new 1/8" nylon washers. The rudder shall then be hydrostatically tested as detailed in attached "General Notes" from Drwg H-2620, drained and then flow-coated upon completion. Drain plugs are to be reinstalled and locked.
- 3.7** Upon successful completion of the hydrostatic test, and after grit blasting, but prior to hull coating, any slot welds in the rudder requiring fairing are to be filled flush with Inerta putty.
- 3.8** Quadrant and bearing shall be opened for inspection. Tiller nut shall be removed and the quadrant lifted and laid aside. This will entail disconnection of the two rams and proper supporting of them during the course of the work.
- 3.9** Keyways in the rudder stock and quadrant shall be inspected and key clearance to be measured and recorded. Carrier bearing and gland housings shall be unbolted and lifted aside. Carrier bearing shall be inspected for wear and measurements of the same shall be taken and recorded in both radial and axial directions.

Spec Item: ED-04	SPECIFICATION	3F016, 17 & 18
RUDDER AND RUDDER STOCK		

- 3.10** Within the rudder trunk, apply and tighten ring clamps above and below the steady bearing. Unbolt the steady bearing housing from the stern frame. Lower the rudder stock gently to the dock bottom; turning as required to clear obstacles.
- 3.11** Rudder stock complete with the steady bearing shall be transported to the Contractor's workshop. Steady bearing position on rudder stock shall be marked and rudder stock and steady bearing housing surfaces to be cleaned of all corrosion and debris. Caution shall be taken at all times to prevent debris from entering the steady bearing.
- 3.12** Rudder stock shall be supported on its side; ring clamps removed aside and steady bearing assembly moved down the rudder stock clear of the normal bearing running area. Rudder stock in way of bearing running area is to be inspected for corrosion.
- 3.13** Upon completion of repairs, if required, the rudder stock and steady bearing assembly shall be transported back to the vessel and re-installed as per original. The shipyard to supply two temporary bolts to align both rudder and rudder stock. The rudder shall be assembled back on the vessel and fastened as per original; plugs with nylon washers are to be reinstalled in lifting pipes & locked in place.
- 3.14** The gland housing to be cleaned and re-installed as per original using new Contractor-supplied gland packing. 25 feet of 1" packing is required and is installed in 4 sections. Carrier bearing to be cleaned and greased and re-installed as per original. Quadrant to be re-installed as per original and tiller nut re-secured. Steering rams to be re-connected to tiller.
- 3.15** Following the above work, all clearances shall be measured and recorded again as detailed in section 3.2 prior the disassembly. Discrepancies from the initial readings shall be rectified at no cost.
- 3.16** The steady bearing is to be inspected by the Technical authority (or designate) and the attending TCMS Surveyor prior to securing manhole covers. Two covers removed by the Contractor are to be fitted with new ¼" neoprene gaskets prior to installation.

Spec Item: ED-04	SPECIFICATION	3F016, 17 & 18
RUDDER AND RUDDER STOCK		

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Technical Authority, in advance, to allow his/her attendance.
- 4.2** Upon refloating the ship, the steering system to be tested in the presence of the Technical Authority (or designate) and the attending TCMS Surveyor. The rudder is to be moved hard over to hard over, under the influence of first one pump, then the other, and finally both pumps together; times for each evolution are to be recorded. The accuracy of the rudder angle indicators is to be verified to be "as found".

Part 5: DELIVERABLES:

- 5.1** Three typewritten copies of the readings shall be provided to the Owner's representative.

Spec Item: ED-05	SPECIFICATION	TCMS Field #:3LL110
SEA CONNECTION INSPECTIONS		

ED-05 SEA CONNECTION INSPECTIONS

Part 1: SCOPE:

- 1.1** The intent of this item is to open up the sea connection valves for cleaning, overhaul and inspection for Transport Canada/Marine Safety (TCMS) credit.

Part 2: REFERENCES:

Location	Description	Application
Port sea chest Fr. 96 – 106	4" butterfly valve	Air vent high chest
Port sea chest Fr. 96 – 106	4" butterfly valve	Air vent low chest
Port sea chest Fr. 96 – 106	¾" SDNR globe	Air inj. high chest
Port sea chest Fr. 96 – 106	¾" SDNR globe	Air inj. low chest
Port sea chest Fr. 96 – 106	1/2" SDNR globe	Steam inj. high chest
Port sea chest Fr. 96 – 106	1/2" SDNR globe	Steam inj. low chest
Port sea chest Fr. 96 – 106	8" butterfly valve	Recirc. high chest
Port sea chest Fr. 96 – 106	8" butterfly valve	Recirc. low chest
Port sea chest Fr. 96 – 106	16" butterfly valve	Sea inlet high chest
Port sea chest Fr. 96 – 106	16" butterfly valve	Sea inlet low chest
Stbd. sea chest Fr. 96 – 106	4" butterfly valve	Air vent high chest
Stbd. sea chest Fr. 96 – 106	4" butterfly valve	Air vent low chest
Stbd. sea chest Fr. 96 – 106	¾" SDNR globe	Air inj. high chest
Stbd. sea chest Fr. 96 – 106	¾" SDNR globe	Air inj. low chest
Stbd. sea chest Fr. 96 – 106	1/2" SDNR globe	Steam inj. high chest
Stbd. sea chest Fr. 96 – 106	1/2" SDNR globe	Steam inj. low chest

Location	Description	Application
Stbd. sea chest Fr. 96 – 106	8" butterfly valve	Recirc. high chest
Stbd. sea chest Fr. 96 – 106	8" butterfly valve	Recirc. low chest
Stbd. sea chest Fr. 96 – 106	16" butterfly valve	Sea inlet high chest
Stbd. sea chest Fr. 96 – 106	16" butterfly valve	Sea inlet low chest
F/W gen. sea chest Fr. 102-106	4" butterfly valve	Air vent
F/W gen. sea chest Fr. 102-106	3" SL angle globe	F/W gen. Suction
F/W gen. sea chest Fr. 102-106	1 ¼" SL angle globe	R/O unit suction
F/W gen. sea chest Fr. 102-106	¾" SDNR globe	Air injection
F/W gen. sea chest Fr. 102-106	½" SDNR globe	Steam injection
Aft sea chest port Fr. 51-54	4" butterfly valve	Air vent
Aft sea chest port Fr. 51-54	3" SL angle globe	Sub. Fire pump
Aft sea chest port Fr. 51-54	2 1/2" SL angle globe	Sterntube pump
Aft sea chest port Fr. 51-54	¾" SDNR globe	Air injection
Aft sea chest port Fr. 51-54	½" SDNR globe	Steam injection
Sea Bay Fr. 96 – 102	16" butterfly valve	Sea inlet port
Sea Bay Fr. 96 – 102	16" butterfly valve	Sea inlet stbd.
Sea Bay Fr. 96 – 102	6" butterfly valve	Air vent port
Sea Bay Fr. 96 – 102	6" butterfly valve	Air vent stbd.
Sea Bay Fr. 96 – 102	5" SL angle globe	Fire pump suction
Sea Bay Fr. 96 – 102	3" SL angle globe	Aux. D/G. suction
Sea Bay Fr. 96 – 102	8" SL angle globe	Foam pump
Sea Bay Fr. 96 – 102	8" butterfly valve	Main S/W P/P aft
Sea Bay Fr. 96 – 102	8" butterfly valve	Main S/W P/P fwd
Sea Bay Fr. 96 – 102	8" butterfly valve	Main S/W P/P Stdby
Sea Bay Fr. 96 – 102	4" SL angle globe	Ballast pumps
Sea Bay Fr. 96 – 102	4" SL angle globe	Distiller / RO unit

Spec Item: ED-05	SPECIFICATION	TCMS Field #:3LL110
SEA CONNECTION INSPECTIONS		

Part 3: TECHNICAL DESCRIPTION:

- 3.1 All valves shall be suitably tagged such that they may be reinstalled in their respective original locations.
- 3.2 The contractor shall disassemble all valves listed. The globe valves shall have their spindles removed, cleaned and laid out for inspection. The internals of the valve bodies, valves, and sealing surfaces shall be cleaned thoroughly cleaned, and laid out for inspection. The butterfly valves shall be removed, disassembled, cleaned and laid out for inspection.
- 3.3 The butterfly valves are to be carefully inspected, paying close attention to the seals. Any seal replacements will be with Owner-supplied replacements; this cost is to be adjusted by 1379 action.
- 3.4 Metal-to-metal seated valves will be lapped to provide a watertight seal.
- 3.5 The Contractor shall provide a test method to insure that a watertight seal is maintained between the valve and valve seat for the screw type valves.
- 3.6 This test method shall be determined to be acceptable to the attending TCMS Surveyor.
- 3.7 Following all inspections and tests, all valves shall be assembled with new gland packing and jointing, and installed in good order in their original respective locations.
- 3.8 The Contractor shall supply all material required to carry out the specified work. Contractor to allow \$10,000 for valves, parts and materials.

Part 4: PROOF OF PERFORMANCE:

- 4.1 The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Technical Authority, in advance, to allow his/her attendance.
- 4.2 Upon the refloating of the vessel all valves are to be inspected for water tightness. Any leaks are to be repaired by the contractor.

Spec Item: ED-06	SPECIFICATION	TCMS Field #:3LL110
STORM VALVE INSPECTIONS		

ED-06 STORM VALVE INSPECTIONS

Part 1: SCOPE:

1.1 The intent of this specification item is to open up the overboard discharge valves and their associated steam de-icing valves for cleaning, overhaul and inspection for Transport Canada/Marine Safety (TCMS) credit.

Part 2: REFERENCES:

Location	Description	Application
Propulsion motor room Frame 35 stbd	2" SDNR globe	OW separator
Propulsion motor room Frame 47 stbd.	3" SDNR globe	Sub fire pump
Generator room Frame 83 port.	2" right angle cock	Boiler blowdown
Generator room Frame 90 – 91port.	4" SDNR globe	Ballast pump
Generator room Frame 89 – 90 port.	4" SDNR globe	Ballast pump
Generator room Frame 101 –102 port.	12" butterfly	Central cooler
Generator room Frame 90 – 91 stbd.	4" SDNR globe	F/W distiller
Generator room Frame 92 – 93 stbd.	3" SDNR globe	Aux. Generator
Engine room flat Frame 95 stbd.	3" SDNR globe	Galley drains
Engine room flat Frame 95 stbd	2" SDNR globe	Galley drains
Frame 29 in void tank # 6P	4" SDNR globe	Grey water drain
Frame 28 in void tank # 6P	3" SDNR globe	Sewage discharge
Frame 29 in void tank # 6S	3" SDNR globe	Grey water drain
Frame 169 port, fwd halon locker	2" SDNR globe	Fwd. Bilge pump
Frame 176 stbd. Fwd rope stores	2" SDNR globe	Chain locker
Frame 13 port, bosun stores	2"SDNR globe	Av. Cofferdam
Frame –4 port, engineer stores	2" SDNR globe	Bilge pump

Spec Item: ED-06	SPECIFICATION	TCMS Field #:3LL110
STORM VALVE INSPECTIONS		

Part 3: TECHNICAL DESCRIPTION:

- 3.1** All valves and associated steam valves, where applicable, shall be suitably tagged such that they may be reinstalled in their respective original locations.
- 3.2** The Contractor shall completely disassemble the overboard valves as well as their respective steam de-icing valves. Spindles shall be removed from the valve bonnets, cleaned and laid out for inspection. The internals of the valve bodies, valves, and sealing surfaces shall be cleaned thoroughly. The 12 inch butterfly valve shall be removed, disassembled, cleaned and laid out for inspection.
- 3.3** Metal to metal seated valves shall be lapped to provide a watertight seal.
- 3.4** The Contractor shall provide a testing method to insure that a watertight seal is maintained between the valve and valve seat. The method used shall be to the satisfaction of the attending TCMS Surveyor.
- 3.5** Upon the completion of all work and satisfactory testing, all valves shall be assembled with new gland packing and jointing and installed in their respective positions aboard the vessel.
- 3.6** The Contractor shall supply all material required to carry out the specified work. Contractor to allow \$5,000 for valves, parts and materials.

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Technical Authority, in advance, to allow his/her attendance.
- 4.2** Upon the refloating of the vessel all valves are to be inspected for watertightness. Any leaks are to be repaired by the contractor.

Spec Item: ED-07	SPECIFICATION	TCMS Field #:
BOWTHRUSTER OIL CHANGE		

ED-07 BOWTHRUSTER OIL CHANGE

Part 1: SCOPE:

- 1.1** The intent of this specification is to drain and flush the leg and lower unit, then refill with new gear oil.

Part 2: REFERENCES:

All materials, flushing equipment, filter elements, oil sample kits and lubricants will be Contractor-supplied

Nameplate Data: Ulstein/Maritime Industries Ltd
 Model 900 TT
 S/N 1122-3433-004

Lubricant Type: 325 liters (approx) of Petrocanada Traxon 80W90 Gear Oil

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The Contractor is to drain the header tank and lower unit; it will first be necessary to remove the guard from the Bowthruster tunnel on the starboard side to access the drain plugs. The Contractor is then to collect the oil for disposal as part of Item HD-01.8.
- 3.2** The bolted cover is to be removed from the header located in the Bowthruster Compartment; the tank is to be wiped out and all oily residues removed. The ½” vent line and the ¾” supply line are to be disconnected from the tank and from the input bearing retainer at the leg; any remaining oil is to be drained & disposed of.

Spec Item: ED-07	SPECIFICATION	TCMS Field #:
BOWTHRUSTER OIL CHANGE		

- 3.3** The Contractor will be responsible to ensure all provincial environmental requirements for the disposal of the oil residues are met.
- 3.4** The drain plugs will be replaced with drain valves and oil resistant hose; installation is to be witnessed by the Technical Authority (or designate). The vent and supply lines are to be reconnected to the bearing retainer and the header tank. The header tank cover is to be re-installed with a new oil-proof gasket.
- 3.5** After the drain valves have been installed, the system is refilled with heated Contractor-supplied gear oil (approximately 70°C), through a 3 micron absolute filter to operating level; the drain valves are then to be opened and the oil collected in clean receptacles.
- 3.6** The Contractor is to again heat the oil to 70°C and return the oil from the clean receptacles to the header tank through a 3 micron absolute filter. The drain process will be repeated once more; the drain valve assemblies are to be removed and the drain plugs reinstalled. The drain plugs will be installed with thread sealant, then tightened securely; this shall to be witnessed by the Technical Authority (or designate).
- 3.7** The gear oil is to be returned, through the 3 micron filter, to the system; the header tank is to be filled to operating level. Any make-up oil is to be Contractor-supplied.

Part 4: PROOF OF PERFORMANCE:

- 4.1** Once the ship is undocked and able to energize the Bowthruster, it will be test run for approximately 1 hour, at which time the Contractor will take a MOB-3 sample for analysis by Wearcheck Canada; sample identification information will be provided by the Senior Engineer. This will provide a base-line from the ship's analysis laboratory to trend further regularly scheduled oil samples against.

Part 5: DELIVERABLES:

- 5.1** The Technical Authority will be provided with three copies of all testing results within three working days of the completion of all work; the final Wearcheck sample results will be provided to the ship by that company's online site.

Spec Item: E-01	SPECIFICATION	TCMS Field #:
WASTE OIL TANK CLEANING AND SURVEY		

E-01 WASTE OIL TANK CLEANING AND SURVEY

Part 1: SCOPE:

1.1 The intent of this specification item shall be to open up the listed tanks for cleaning, inspection, testing and to cover the continuous survey for Transport Canada Marine Safety (TCMS). These tanks are considered as confined spaces under the Coast Guard's Safety Management System.

Part 2: REFERENCES:

<u>Tank</u>	<u>Location</u>	<u>Capacity</u>	<u>Field #</u>
Waste Oil Tank	Port Fr 30 – 37	4.9 M ³	3L107
Oily Bilge Tank	Stbd Fr 30 – 37	4.9 M ³	3L108
Purifier Sludge Tank	Stbd Fr 55 – 64	2.5 M ³	3L106
#3 D.B. Tk Port	Port Fr 54 – 70	43.4 M ³	3L074

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The Contractor shall provide a method to have the tanks gas freed, and certified Gas Free, safe for personnel to enter and safe for hot work. Certificates shall be forwarded to the Owner's representative and a copy shall be posted in a conspicuous location near the entrance to each tank.
- 3.2** The Contractor will be responsible for all environmental requirements for disposal of tank residues. The ship's crew will pump the tanks down to the suction levels.
- 3.3** The Contractor will open up the tanks and dispose of the remaining waste oil/water residues. The Contractor shall quote on removing and disposing of a total of 4000 litres of waste oil/water residue from these tanks. Residue shall be considered 25% waste oil/75% bilge water.

Spec Item: E-01	SPECIFICATION	TCMS Field #:
WASTE OIL TANK CLEANING AND SURVEY		

- 3.4** The tanks are to be thoroughly cleaned; all scale, dirt and debris is to be removed ashore. Any rusty areas are to be power tool cleaned. All vent, sounding and overflow pipes are to be proven clear.
- 3.5** Following the cleaning of the tanks, the tanks and vents will then be inspected by the Owner's representative and the attending TCMS Surveyor.
- 3.6** The Owner's representative (or designate) will be present when the manhole covers are reinstalled. The Contractor shall clean the sealing surfaces around the manhole and cover and install the cover using new ¼ inch thick neoprene gaskets. Anti seizing compound shall be used on all threads. The Contractor is to quote separately the unit cost per stud to replace any broken manhole securing studs.
- 3.7** The Contractor shall bid on the pneumatic testing of each individual tank, as well as quoting a unit price for each tank for hydrostatic testing. The quote shall include the installation and removal of blanks for suctions, overflow pipes and vent head removals, additional tank openings, and tank drainage (including the disposal of water and the wiping down of the tank internals).
- 3.8** The attending TCMS Surveyor solely shall determine the test method. All tests shall be witnessed by the attending TCMS Surveyor and the Technical & Inspection Authorities.

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Owner's representative, in advance, to allow his/her attendance.

Spec Item: E-02	SPECIFICATION	TCMS Field #: 3L130
EMERGENCY D/G F.O. TANK SURVEY & REPAIRS		

E-02 EMERGENCY D/G F.O. TANK SURVEY & REPAIRS

Part 1: SCOPE:

- 1.1** The intent of this specification item shall be to open up the above tank for cleaning, inspection, testing and to cover the continuous survey for Transport Canada Marine Safety (TCMS). This tank is considered as a confined space under the Coast Guard's Safety Management System.

Part 2: REFERENCES:

<u>Tank</u>	<u>Location</u>	<u>Capacity</u>	<u>Field #</u>
Emergency Gen Tank	Fr 60-63.5 (S)	1.9 M ³	3L130

- 2.1** The Emergency Generator will be locked out by Ship's Crew prior to work beginning on the tank

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The Contractor shall provide a method to have the tank gas freed, and certified Gas Free, safe for personnel to enter and safe for hot work. Certificate shall be forwarded to the Owner's representative and a copy shall be posted in a conspicuous location near the entrance to each tank.
- 3.2** The Contractor will be responsible for all environmental requirements for disposal of tank residues. The ship's crew will pump the tank down to the suction level.
- 3.3** The Contractor will open up the tank and dispose of the remaining fuel residues; quote on the removal and proper disposal of 100 litres. The Contractor is to quote a cost per litre; the total will be adjusted by 1379 action.

Spec Item: E-02	SPECIFICATION	TCMS Field #: 3L130
EMERGENCY D/G F.O. TANK SURVEY & REPAIRS		

- 3.4** The tank is to be thoroughly cleaned; all scale, dirt and debris is to be removed ashore. Any rusty areas are to be power tool cleaned. All vent, sounding and overflow pipes are to be proven clear.
- 3.5** The ½” tank drain line on the aft side of the tank shall be removed and new piping shall, as per original, shall be installed. The Spring loaded drain valve shall be opened up for inspection. Valve and valve seat shall be lapped in place to ensure a proper seal.
- 3.6** The pneumaricator gauge line is to be disconnected from the top of the tank. The Vent pipe is to be disconnected from the tank top flange. A new tank vent pipe shall be manufactured using a new owner-supplied vent.
- 3.7** The 3 fittings in the top of the tank shall be cropped out of the tank top. New fittings are to be manufactured and welded into the fuel tank top. Upon completion of all work and testing, the vent piping and pneumaricator gauge line shall be reinstalled, as per original.
- 3.8** Following the cleaning of the tanks, the tank and vent will then be inspected by the Owner’s representative and the attending TCMS Surveyor.
- 3.9** The Owner’s representative (or designate) will be present when the manhole cover is reinstalled. The Contractor shall clean the sealing surfaces around the manhole and cover and install the cover using new ¼ inch thick neoprene gasket. Anti seizing compound shall be used on all threads. The Contractor is to quote separately the unit cost per stud to replace any broken manhole securing studs.
- 3.10** The Contractor shall bid on the pneumatic testing of the tank. The quote shall include the installation and removal of blanks for suction, overflow pipes and vent head removals, additional tank openings, and tank drainage (including the disposal of water and the wiping down of the tank internals).
- 3.11** All tests shall be witnessed by the attending TCMS Surveyor and the Technical & Inspection Authorities.

Spec Item: E-02	SPECIFICATION	TCMS Field #: 3L130
EMERGENCY D/G F.O. TANK SURVEY & REPAIRS		

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Owner's representative, in advance, to allow his/her attendance.

Part 5: DELIVERABLES:

- 5.1** Upon completion of all repairs and testing, the Contractor and the Owner's representative (or designate) shall conduct a final inspection and ensure the tank, cover, vent and piping connections have been returned to operating conditions and the attending TCMS Surveyor has completed all inspections.
- 5.2** The Contractor is responsible to ensure that the TCMS Inspector signs off the surveyed tanks in the vessel's Hull and Machinery Survey Record Book.

Spec Item: E-03	SPECIFICATION	TCMS Field #:
LO-REZ ISOLATOR INSTALLATION		

E-03 LO-REZ ISOLATOR INSTALLATION

Part 1: SCOPE:

- 1.1** The intent of this item shall be to replace the old vibration isolation mounts on #1 and #2 DG's with new owner supplied Lo-Rez isolators.

Part 2: REFERENCES:

Nameplate Data: Alco 251F Engines SN M-4890 and M-4891

L0 Rez BR4 MS Isolator

Drawings: Lo-Rez DWG No F-1450-5 Isolator Overall Dimensions

Lo-Rez DWG No F-1420-3 Isolator General Assembly

Bombardier DWG No C14 1037435 Isolator Position

Part 3: TECHNICAL DESCRIPTION:

- 3.1** Contractor will replace 12 existing vibration mounts on each of the two engines.
- 3.2** The hydraulic ram systems for the #1 and #2 DG's shall be isolated by the ship's electrical officer prior to work commencing.
- 3.3** Contractor shall make all adjacent areas to the main engines, including bilges safe for Hotwork. Any items that could be affected by welding shall be covered to prevent any damage.
- 3.4** Contractor is to properly support the engine, at all times, to allow the existing mounts to be removed and the new mounts installed. Approx weight of each gen-set is 47,000 Kilograms.

Spec Item: E-03	SPECIFICATION	TCMS Field #:
LO-REZ ISOLATOR INSTALLATION		

- 3.5** Contractor is responsible for any removals required to gain access to the mounts to allow their removal. The generator cooling pipes may need to be disconnected to allow removal and installation of the aft two isolators on the stbd side of the engines. Prior to removing any piping the Contractor is to discuss removals with the Chief Engineer to allow the systems to be isolated. The alternator casing shall be opened to gain access to the aft two isolator bolts. Alternators are to be properly protected at all times the casing is open and during welding of the new isolator brackets. All items removed shall be reinstalled upon completion of the installation.
- 3.6** The existing mounts are bedded in chock fast. The entire mount is to be removed and the chock fast completely removed to bare steel.
- 3.7** The existing hydraulic rams and supports are to be removed. The rams are to be isolated at each local valve and each hydraulic hose and ram is to be removed and returned to the vessel. The outlet from each valve is to be properly capped.
- 3.8** The new isolators are to be installed in the same locations as the previous units. The new isolators shall be installed complete with supplied mounting plate and vertical spacing bracket. Once lined up in the proper position the plate and bracket shall be tacked to the engine rail and girder. The coupling is to be removed to allow the complete welding of the brackets. NOTE: Contractor shall ensure there is proper grounding at each mount to ensure that there is no tracking across engine bearings and components. All welding is to be in accordance with Lo-Rez's recommendations and instructions.
- 3.9** Upon completion of all welding the new isolators are to be reinstalled and bolted in place. At which time all supports used to allow the installation of the isolators can be removed.
- 3.10** Contractor shall manufacture removable covers for the holes left by the removals. Covers in the alternator casing are to be secured to the engine rail.
- 3.11** The Contractor shall include an allowance of \$10,000 for a Lo-Rez FSR to oversee initial installation and to complete the final set up of the new isolators. This amount will be adjusted by 1379 upon receipt of invoice. FSR contact Info. Lo-Rez Vibration Control Vancouver BC. Ph (604) 879-2964 Fax (604) 879 -6588 Attention: Richard Hordyk

Spec Item: E-03	SPECIFICATION	TCMS Field #:
LO-REZ ISOLATOR INSTALLATION		

Part 4: PROOF OF PERFORMANCE:

4.1 Upon completion of installation the new isolators are to be set up as per the FSR and Lo-Rez instructions. With final set up completed during vessel sea trials.

Part 5: DELIVERABLES:

Spec Item: E-04	SPECIFICATION	TCMS Field #: 3H096
ANCHOR WINDLASS SURVEY		

E-04 ANCHOR WINDLASS SURVEY

Part 1: SCOPE:

1.1 The intent of this item shall be to open up the Anchor Windlass for inspection, and survey as per TCMS requirements.

Part 2: REFERENCES:

Nameplate Data:

Pacific Winches

Hydraulic double wildcat Windlass

s/n 56/1-2

Drwg # 900-400-351, Shaft & Motor Assembly

2.1 The Anchor Windlass hydraulic power pack will be locked out by the vessel's Electrical Officer at breaker P-604-15-1, located in the Forward Winch Room.

Part 3: TECHNICAL DESCRIPTION:

3.1 Anchor chains are to be paid out and ranged in the dock bottom for survey under item HD-05 Anchors and Chains.

3.2 The Contractor is to drain the gear case; quote on disposal of 40 liters of 68-220 gear oil, as per applicable provincial government regulations. The top cover is to be removed from the gear case and is to be protected from damage.

3.3 Both band brake assemblies and clutch operating assemblies are to be marked as to their position and are to be disassembled; all parts are to be removed to the Contractor's facility for cleaning and TCMS survey.

Spec Item: E-04	SPECIFICATION	TCMS Field #: 3H096
ANCHOR WINDLASS SURVEY		

- 3.4** The four main bearing caps are to be marked to their position and removed. The warping head covers and retainers are to be removed; fasteners are to be discarded. Warping heads are to be pulled from the main shaft; keys are to be retained for reuse.
- 3.5** The main shaft and remaining fittings is to be removed to the Contractor's facility for cleaning, disassembly and TCMS survey; the main shaft is to be suitably supported to prevent damage to the main gear. Clutch plates, wildcats and associated spacers are to be marked as to their position and are to be removed; all parts are to be cleaned, examined for defects and laid out for inspection. Shaft seals are to be removed and discarded.
- 3.6** Both band brake assemblies and clutch operating assemblies are to be completely disassembled, cleaned, examined for defects and laid out for inspection. Brake material is to be examined for wear; the Contractor is to quote unit cost per section to renew brake material with non-asbestos friction material.
- 3.7** Bearings are to be thoroughly cleaned of grease; all grease fittings are to be removed and discarded; grease passages are to be proven clear by mechanical cleaning. The main shaft in way of the four bearings is to be examined and any minor imperfections are to be corrected using crocus cloth or other fine abrasive.
- 3.8** Immediately prior to reassembly, the gear case, upper and lower portions, is to be cleaned and de-greased to remove any traces of the emulsified oil.
- 3.9** After all TCMS inspections, witnessed by the Technical Authority, are completed, the Anchor Windlass is to be reassembled; new Owner-supplied shaft seals are to be fitted. Gear oil and grease will also be Owner-supplied; all other parts and fittings required (such as gasket material) will be Contractor-supplied.

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Technical Authority, in advance, to allow his/her attendance.

Spec Item: E-04	SPECIFICATION	TCMS Field #: 3H096
ANCHOR WINDLASS SURVEY		

Part 5: DELIVERABLES:

5.1 Upon completion of items HD-05, Anchors and Chains, the Anchor Windlass shall be tested as directed by the attending TCMS Inspector; these tests shall be witnessed by the Technical Authority.

Spec Item: E-05	SPECIFICATION	TCMS Field #: 3H106
CENTRAL COOLING SW COOLER SURVEY		

E-05 CENTRAL COOLING SW COOLER SURVEY

Part 1: SCOPE:

1.1 The intent of this item shall be to open up the Fwd Central Cooling system seawater cooler for cleaning, inspection, and survey as per TCMS requirements.

Part 2: REFERENCES:

Nameplate Data:

Manufacturer: Alfa-Laval
Model A15-BFM
No: Fwd – 30100-04746
Design Pressure: 8.6 bar
109 plates/cooler

Part 3: TECHNICAL DESCRIPTION:

- 3.1** Seawater and fresh water valve will be locked out by ship's crew prior to the commencement of work; the Contractor is to be aware that shore-supplied cooling water must be available prior to isolating this cooler.
- 3.2** The plate pack will be refurbished by Alfa-Laval under a separate contract; therefore the Contractor will be required to liaise with the local Alfa-Laval representative, Diesel Injection Sales & Service, regarding shipping requirements.
- 3.3** The cooler is to be drained to the D/G Room bilges, with each cooler containing approximately 200 L total liquid volume; the Contractor is quote on removing 1000 L of Maxigard-contaminated oily bilge water ashore for proper disposal as per applicable provincial government regulations.
- 3.4** The center 2 bolts are to be removed completed, with the remaining four corner bolts being slackened in a diagonal fashion, from the fixed end, with the slant of the pressure plate not exceeding 10 MM (2 turns/bolt) across the width and 25 MM (5 turns/bolt) across the height.

Spec Item: E-05	SPECIFICATION	TCMS Field #: 3H106
CENTRAL COOLING SW COOLER SURVEY		

- 3.5** Once the pressure plate has been slackened off completely, the Contractor is to carefully remove the plates from the Machinery Spaces, where they are to be crated as directed by the local Alfa-Laval representative. The Contractor is to allow \$5K to cover the costs of crating and shipping; this will be adjusted by 1379 action upon proof of invoice.
- 3.6** When the refurbished plates are returned, the Contractor is to carefully return them to the Lower D/G Room. The counter-faces and threads of the tightening bolts are to be checked to ensure they are undamaged, clean and smeared with a thin film of lubricating paste (such as molybdenum disulphide). Ensuring the utmost cleanliness, the plate pack is to be reassembled, following the plate arrangement table available from the Chief Engineer.
- 3.7** Bring the plates together and insert the four corner bolts; start tightening in a diagonal fashion. During compression, the slant of the pressure plate should not exceed 10 MM (2 turns/bolt) across the width and 25 MM (5 turns/bolt) across the height. Check this dimension frequently at the four bolts being used.
- 3.8** When the compression of the plate pack has reached 330 MM, insert the remaining two bolts and tighten all six bolts equally to 327 MM \pm 1 MM.
- 3.9** The Contractor is to allow \$2K for a hydrostatic test of the cooler to 1.5 WP if required by TCMS; this will be adjusted by 1379 action.

Part 4: PROOF OF PERFORMANCE:

- 4.1** Valves are to be unlocked and returned to operating position; coolers are to be bled. Using the ship's Central Cooling pumps, proper operation of the coolers is to be demonstrated to the Chief Engineer.
- 4.2** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Technical Authority, in advance, to allow his/her attendance.

Spec Item: E-06	SPECIFICATION	TCMS Field #: 3H106
RELIEF VALVE CERTIFICATION		

E-06 RELIEF VALVE CERTIFICATION

Part 1: SCOPE:

- 1.1** There are 14 air, steam and fuel system safety relief valves which require recertification for TCMS. The Contractor is to remove these valves and transport them to a recognized facility for testing and recertification

Part 2: REFERENCES:

VALVE	LOCATION	S/N	TYPE	SET POINT	SIZE
Auxiliary Craft Fuelling	E/R Casing (A) – Officers' Dk	N/V 2924	Kunkle 20 G03	50 PSI	1½"
Whistle Air	E/R Casing (F) – Officers' Dk	N/V 2437	Aquatrol 88	112 PSI	½"
Emergency Air Receiver	Emergency D/G Rm	N/V 2438	Aquatrol 88	164 PSI	½"
Main Air Receiver (upper)	D/G Room Flat (S)	84C2226	Consolidated 1990C	270 PSI	1"
Main Air Receiver (lower)	D/G Room Flat (S)	84C2227	Consolidated 1990C	270 PSI	1"
Ship Service Starting Air	D/G Room Flat (S)	N/V 2436	Aquatrol 88	115 PSI	¾"
Whistle Air reducing stn	D/G Room Flat (S)	N/V 2440	Aquatrol 88	110 PSI	¾"
Main Starting Air (upper)	D/G Room Flat (A)	31481D01	Kunkle 6010EEM01-KM0165	165 PSI	1"
Main Starting Air (lower)	D/G Room Flat (A)	N/V 2442	Aquatrol 88	165 PSI	1"

Control/Service Air reducing stn	Lwr D/G Room (S)	N/V 2439	Aquatrol 88	112 PSI	1"
Control Air receiver	Lwr D/G Room (S)	6383E92	Kunkle 6010DD	115 PSI	¾"
Seabay Air service	Lwr D/G Room (S)	N/V 2441	Aquatrol 88	55 PSI	1"
Auxiliary Steam	D/G Room Flat (A)	V-02464	Kunkle 6010GGM01-KM	55 PSI	1½"
Emergency Air Comp	D/G Room Flat (A)				

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Technical Authority, in advance, to allow his/her attendance.
- 3.2** Lock-out of air inlet valves shall be on a case-by-case basis by ship's personnel, with boilers being isolated at the respective circuit breaker/MCC by the ship's Electrical Officer.
- 3.3** Air relief valves shall be removed in such a way as to allow ship service air to the vessel to remain uninterrupted as much as possible; the Contractor is to provide 24 hours notice of any interruption of ship service air supply to allow ship's personnel to make alternative arrangements, if required.
- 3.4** Suitable blanks/plugs are to be installed in the piping/receivers while the safety valves are removed; the Technical Authority (or designate) are to witness the removal of the blanks/plugs upon reinstallation of the relief valves.
- 3.5** Contractor-supplied thread sealant or new gasket material is to be used on re-installation; connections are to be proven leak-free, using the medium normally contained in the receiver/piping at operating pressure.
- 3.6** The Contractor is to allow \$1,000.00 for any adjustments or repairs required as a result of the above recertification procedures; this value will be adjusted by 1379 action. Any valves failing to operate as required will be replaced by 1379 action.

Spec Item: E-06	SPECIFICATION	TCMS Field #:
RELIEF VALVE CERTIFICATION		

Part 4: PROOF OF PERFORMANCE:

- 4.1** Original test certificates are to be supplied to the Technical Authority within three working days of the completion of all work.

Spec Item: E-07	SPECIFICATION	TCMS Field #:
HELICOPTER FUELLING SYSTEM SERVICING		

E-07 HELICOPTER FUELLING SYSTEM SERVICING

Part 1: SCOPE:

- 1.1** The Helicopter Fuelling System requires a recommended annual servicing routine. This specification will address this issue.

Part 2: REFERENCES:

Nameplate Data: Newmar Refueling System
Reference: AB1703 – M036

Represented by: P.W. Adamson Ltd
Howe Kirk Drive
Aberdeen, AB21 0GL, Scotland
e-mail: bryan@pwadamson.co.uk

- 2.1** The Helicopter Refueling System will be locked out by the ship's Electrical Officer at breaker P-613-3 in MCC #3, located in the MCR. Any components, such as the Sample Pump, requiring servicing located in the Aviation Fuel Tank Cofferdam will be governed by the Confined Space Entry procedures.

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The required annual service items, by component, are:
Helicopter Fuel Storage Tank:

- Suction Vacuum Relief Valve is to be removed, tested to 0.5" Hg and recertified.
- Uniact Pressure Relief Valve is to be removed, tested to 12 PSIG and recertified
- Fire Engulfment Relief Valve is to be removed, tested to 17 PSIG and recertified
- Silica Gel Vent Dryer is to have the desiccant replaced with 25 pounds of Contractor-supplied Indicating Drierite (particle size 2.5 – 6 MM on 8 mesh).
- The Vent Flame Arrester is to be removed, cleaned and inspected, as detailed in the system manual. The flame arrester is to be disassembled, cleaned in a suitable solvent, and then blown through with compressed air. The element is composed of 9 layers of 316 stainless steel mesh (0.112mm wire X 0.254 pitch)

Spec Item: E-07	SPECIFICATION	TCMS Field #:
HELICOPTER FUELLING SYSTEM SERVICING		

Dispensing Unit:

- Refueling hose is to be hydrostatically tested, using JET A-1, to 150 PSI.
- Bonding cable is to be visually inspected for defects and tested for continuity to ground.
- Dispensing meter calibration is to be verified. The meter is a positive displacement flow-meter, Bopp & Reuther 0150M5F5, calibrated for use with JET A1.

Pumping Unit & Sample Pump:

- Calibration of pressure & suction gauges on Dispensing Pumps is to be verified. Gauges consist of two 0-100 PSI pressure gauges and two 0-30" Hg suction gauges; all gauges can be removed for calibration by shutting off the respective isolating valve.
- Check operation of the Dispensing Pump pressure relief valves & record lifting pressure; this can be done by slowly closing in on the discharge valves while the unit is pumping. Any adjustment or repair to be by 1379 action.
- Remove pump end plates, on the end opposite the drive shaft, on the three pumps; check for wear and the presence of foreign bodies, as detailed on page 44 of the Newmar manual. The pumps are Blackmer vane-type positive displacement pumps,
- Perform oil changes on the Dispensing Pump reduction gearboxes; each gearbox requires 2.38 kg of Shell Tellus T46 oil, or an equivalent suitable for a temperature range of -40°C to +35°C.
- On the Sample Pump, grease the pump bearings with low temperature grease and check drive coupling alignment.

Piping System:

- The Contractor is to verify the electrical continuity of all the piping associated with the system.

Heat Detector:

- Operation of the heat detector, a component of the ship's Fire Detection System located in the Aviation Fuel Tank Cofferdam, is to be verified; as this testing is already detailed in Item L-01.2.13, the Contractor is to provide evidence of satisfactory results of this testing.

3.2 All components are to be reassembled, using new gaskets; gaskets are to be compatible with JET A1, e.g. C.A.F. type with PTFE envelope. Specialized seals, such as those used on the Dispensing Pumps, will be GSM.

Spec Item: E-07	SPECIFICATION	TCMS Field #:
HELICOPTER FUELLING SYSTEM SERVICING		

- 3.3** Fasteners, the majority of which are 316 stainless steel, may be re-used if judged to be in good condition by the Technical Authority. Any fastener renewals to be by 1379 action.

Part 4: PROOF OF PERFORMANCE:

- 4.1** Upon the completion of all work associated with the Helicopter Fuelling System, a functional test will be required, proving the operation of all components. Under the supervision of ship's crew, fuel will be re-circulated through the water separator, re-circulated through the hose, dispensed from the nozzle, and dispensed from the sampling point.

Part 5: DELIVERABLES:

- 5.1** All test & calibration certificates and reports shall be furnished to the Technical Authority upon completion of all specified work.

Spec Item: E-08	SPECIFICATION	TCMS Field #:
REFRIGERATION SYSTEM LEAK TESTING & REPAIRS		

E-08 REFRIGERATION SYSTEM LEAK TESTING & REPAIRS

Part 1: SCOPE:

- 1.1 Under the Federal Halocarbon Regulations, it is an annual requirement to test any large refrigeration system (above 19 kW) for leaks; it has been a common practice onboard to test all refrigeration units annually.
- 1.2 This work shall be carried out in Conjunction with the following:

Part 2: REFERENCES:

- 2.1 The vessel's inventory consists of 5 air conditioning units, 2 mid-range units and 33 small units; a detailed copy of the inventory is attached.

Part 3: TECHNICAL DESCRIPTION:

- 3.1 Testing of the systems is to be performed by a certified refrigeration company, using certified technicians
- 3.2 Initial leak detection is to be by any of the following methods: bubble method, Halide torch, or electronic detector. If any leaks are detected, they will be corrected & retested; the Contractor is to allow \$1000.00 for repairs (to be adjusted on proof of invoice). Final leak detection on the five air conditioning units and two mid-range main domestic systems will require pressure testing with an inert gas, such as nitrogen or CO₂.
- 3.3 The two main refrigeration systems, located in the Winch Room (E/R Flat), are to be given an annual servicing in addition to the leak detection. Compressor oil is to be changed; the 2 suction strainer cartridges (Sporlan RC-4267 or equivalent) and 5 discharge filter/driers (4 Sporlan C-083 and one C-163 or equivalents) are to be replaced.
- 3.4 Any defects or deficiencies noted in the course of this testing will immediately be brought to the attention of the Chief Engineer or designate. Materials, unless specified, will be Contractor-supplied.

Spec Item: E-08	SPECIFICATION	TCMS Field #:
REFRIGERATION SYSTEM LEAK TESTING & REPAIRS		

Air Conditioning Units:

UNIT	MODEL	S/N	REFRIGERANT	CHARGE	ID No
A/C Unit #1 (port)	Berg MCR-30-FXR	W2240-0185	R-22	50 pounds	NFL 13332
A/C Unit #2 (starboard)	Berg MCR-30-FXR	W2239-0185	R-22	50 pounds	NFL 13333
A/C Unit #3 (Wheelhouse)	Berg MCR-5-AC	A2231-0185	R-22	10 pounds (est)	NFL 13334
Electronic Workshop A/C Unit	Carrier 90MA006-600-1	0585G06530	R-22	10 pounds	NFL 13335
MCR A/C Unit	Carrier 90MA012-600-1	0485G06305	R-22	10 pounds	NFL 13336

Domestic Refrigeration (Mid-size):

UNIT	MODEL	S/N	REFRIGERANT	CHARGE	ID No
Domestic Refrigeration (Compressor)	Carrier 5F30-C654	Inboard – 030320146 Outboard – 1509UA0971	R-134a	30 pounds (est)	NFL 13337

Domestic Refrigeration:

UNIT	MODEL	S/N	REFRIGERANT	CHARGE	ID No
Control Air Dryer	DeVilbiss-Hankison 870-1-A01	3564	R-414b	23 oz	NFL 13338
Officer's Pantry Refrigerator	Copeland FAAH-A025-1AA-109	6087	R-414b	40 oz (est)	NFL 13339
Officer's Pantry Dessert Cooler	True GDM-5	12116636	R-134a	9 oz	NFL 13340
Officer's Pantry Milk Dispenser	Kelvinator MD	30/10861	R-409	4.3 oz	NFL 13341

UNIT	MODEL	S/N	REFRIGERANT	CHARGE	ID No
Tabletop Cooler – Officer's Mess	True GDM-09	1-4489811	R-134a	10 oz	NFL 0341
Crew's Mess Refrigerator	Amana BX21TW	9812118870	R-134a	4.5 oz	NFL 13342
Crew's Mess Milk Dispenser	Kelvinator MD	30/10857	R-12	4.3 oz	NFL 13343
Crew's Mess Tabletop Cooler	True GDM-5-S	6563137	R-134a	9 oz	NFL 0396
Galley Refrigerator	Turbo Air TSR-23D	R911230063	R-134a	7.76 oz	NFL 13344
Galley Ready-use Refrigerator	Coldstream R24	85A0294	R-12	10 oz (est)	NFL 13345
Galley Ready-use Freezer	Coldstream RF24	85A0295	R-134a	10 oz (est)	NFL 13346
Ice Machine – Boat Deck	Scotsman CS60MAS1A	346254 04C	R-22	12 oz	NFL 13347
Ice Machine – Main Deck	Manitowoc QM30A	310077399	R-134a	5.8 oz	NFL 13348
Ice Machine – Crew's Mess	Hoshizaki DCM-270BAH	S03388J	R-404a	14.8 oz	NFL 0424
Water Fountain – Wheelhouse	Elkay WD701 5 1E	030313061	R-134a	4.25 oz	NFL 13349
Water Fountain – Boat Deck	Haws HFE-14D	<i>(against blkhd)</i>	R-12	5 oz	NFL 13350
Water Fountain – Upper Deck	Haws HFE-14D	NN32759A	R-12	5 oz	NFL 13351
Water Fountain – Crew's Mess	Aquarius PLF5M-D	9 134 240 052	R-12	4 oz	NFL 13352
Water Fountain – D/G Room	Oasis PLF8H-D101	D220231244	R-134a	6.1 oz	NFL 13353
Bar Fridge – Officer's Lounge	Kenmore 461.90485	0106080100287	R-134a	1.41 oz (40 gr)	NFL 13356
Bar Fridge – Crew's Lounge	Kenmore 461.90485	0106070100593	R-134a	1.41 oz (40gr)	NFL 13357

UNIT	MODEL	S/N	REFRIGERANT	CHARGE	ID No
Canteen Refrigerator	Coldstream RSCP24	84K4560	R-12	8.5 oz	NFL 13358
Refrigerator – Wheelhouse	Danby DCR052W	1100050021000316	R-134a	2.12 oz	NFL 13361
Refrigerator – Captain's Cabin	GE GMR02BAWACW	RD 056814	R-134a	1.6 oz	NFL 13360
Refrigerator – Chief Officer's Cabin	Haier HSB02-01	G2004605450	R-134a	1.6 oz	NFL 1149
Refrigerator – Chief Engineer's Cabin	Haier HSB02-01	F200560340	R-134a	1.6 oz	NFL 13359
Refrigerator – Sick Bay	Kenmore 461.90482	0108070100250	R-134a	1.41 oz	NFL 13362
Refrigerator – Electrical Officer's Cabin	Kenmore 461.99252	0108030100099	R-134a	1.31 oz	NFL 13363
Refrigerator – Senior Engineer's Cabin	Igloo FR100	A041000427	R-134a	1.84 oz	NFL 13362
Refrigerator – Logistics Officer's Cabin	Kenmore 461.99252	0108030100005	R-134a	1.31 oz	NFL 13364
Refrigerator – Engineer's Office	Kenmore 461.99252	0108030100096	R-134a	1.31 oz	NFL 1148

Units not in service:

UNIT	MODEL	S/N	REFRIGERANT	CHARGE	ID No
Water Cooler (ex-Crew's Mess)	B1RRPK	9920225112	R-134a	1.6 oz	NFL 13354
Water Cooler (ex-Officer's Dining Room)	B1RRPK	9921237885	R-134a	1.6 oz	NFL 13355

Spec Item: E-08	SPECIFICATION	TCMS Field #:
REFRIGERATION SYSTEM LEAK TESTING & REPAIRS		

Part 4: PROOF OF PERFORMANCE:

- 4.1** Each unit is to be tagged on completion of the leak test with a ODS emission control "Record of Refrigerant Service".

Part 5: DELIVERABLES:

Spec Item: E-09	SPECIFICATION	TCMS Field #:
HOTWELL CONDENSATE INLET PIPE REPLACEMENT		

E-09 HOTWELL CONDENSATE INLET PIPE REPLACEMENT

Part 1: SCOPE:

1.1 The Hotwell condensate inlet pipe is corroded and is in need of replacement.

Part 2: REFERENCES:

2.1 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 The Hotwell will be drained by the ship's crew prior to work beginning.

3.2 The manhole cover on the fwd side of the hotwell is to be removed to gain access to the cooling pipe. The manhole cover gasket is to be removed and discarded. A new contractor supplied gasket will be installed on the cover upon completion of the work.

3.3 The Hotwell shall be tested and proven safe for hotwork.

3.4 The condensate line shall be disconnected between the cooler and the hotwell flange and retained for reinstallation. The condensate line shall be cut out and removed from the hotwell and a new line complete with a new flange, will be manufactured, installed and welded into the hotwell.

3.5 The removed condensate line shall be reinstalled complete with a new contractor supplied gasket and bolts at the hotwell flange. The external section of the pipe shall be primed and finish painted with two coats of white paint.

3.6 All debris is to be removed from the hotwell and inspected by the Technical Authority prior to the manhole cover being reinstalled.

Spec Item: E-09	SPECIFICATION	TCMS Field #:
HOTWELL CONDENSATE INLET PIPE REPLACEMENT		

Part 4: PROOF OF PERFORMANCE:

4.1 Upon completion of pipe installation the hotwell will be filled to ensure the new piping is watertight.

Spec Item: E-10	SPECIFICATION	TCMS Field #:
SEWAGE SEPARATOR REPLACEMENT		

E-10 SEWAGE SEPARATOR REPLACEMENT

Part 1: SCOPE:

- 1.2** The intent of this specification is for the contractor to manufacture and install a new Sewage Separator.

Part 2: REFERENCES:

Vacusan Drawing # 200149 (attached)

Separator located in stack at Upper Deck Level.

Part 3: TECHNICAL DESCRIPTION:

- 3.1** Contractor to manufacture sewage separator as per attached drawing and the as-fitted unit. The as-fitted unit is not to be removed until the new unit is complete.
- 3.2** New separator is to be made from 3/16" mild steel. The unit is to be manufactured as per attached drawing. The following items on the as-fitted unit are to be added to the construction of the new unit.
- . Forward elbow to have a 9" long extension threaded at the free end. Extension to be fitted with a 45° coupling.
 - a. Forward side of separator to have a 2 1/2" pipe and flange installed for fresh water flushing.
 - b. Extension and flange to be fitted on the top of the unit complete with ball valve and fittings.
- 3.3** Upon completion of the new separator, the internals are to be coated with epoxy.
- 3.4** Prior to removing the old separator and installing the new, the contractor shall liaise with the Chief Engineer to arrange an appropriate time to shut down the vacuum system to allow the installation with the least amount of disruption to the crew.

Spec Item: E-10	SPECIFICATION	TCMS Field #:
SEWAGE SEPARATOR REPLACEMENT		

3.5 Contractor to disconnect the flanges and remove the old unit. The new unit is to be fitted with new ball valves, pipe nipples, unions and gaskets. All materials to be contractor supply. The water flushing line to be reinstalled.

Part 4: PROOF OF PERFORMANCE:

4.1 Upon completion of all work, vacuum to be placed on the system and Separator to be proven operational.

Spec Item: E-11	SPECIFICATION	TC/MS Field #: N/A
STEERING GEAR RAM SEAL REPLACEMENTS		

E-11 STEERING GEAR RAM SEAL REPLACEMENTS

Part 1: SCOPE:

- 1.1** The seals on the Steering Gear Rams need replacement. Spec item is to be completed in conjunction with item ED-04 Rudder and Rudderstock Inspection

Part 2: REFERENCES:

2.1 Owner Furnished Equipment

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

Nameplate Data:

Steering Gear: Wagner LA2-33.4-40

- 2.2** All circuits are to be isolated prior to the commencement of any work. The Main Steering Pumps will be locked out at breakers P-618, located in the MCR, and P-619, located in the Transformer Room; the Emergency will be locked out at breaker EP-601, located in Emergency Generator Room.

Part 3: TECHNICAL DESCRIPTION:

- 3.1** The hydraulic hoses shall be disconnected from the Port and Starboard hydraulic rams and the steering gear piping. Piping and rams are to be blanked to prevent any leakage or dirt ingress. New hoses shall be manufactured and installed upon completion of work.
- 3.2** The forward and aft locking plates and pins are to be removed and set aside to be reinstalled upon completion of the work.

Spec Item: E-11	SPECIFICATION	TC/MS Field #: N/A
STEERING GEAR RAM SEAL REPLACEMENTS		

- 3.3** The two hydraulic rams are to be removed from the steering gear and taken to the stores handling area forward of the steering flat to be removed from the ship by crane through the soft patch. The rams are to be sent to a certified hydraulic repair facility to have the rams inspected and new seals installed.
- 3.4** Upon completion of the seal replacement and inspections the rebuilt rams are to be returned to the vessel and reinstalled on the steering gear with the existing pins and lock plates.
- 3.5** The rams shall be reconnected to the steering gear hydraulic piping with new contractor supplied hoses and fittings.

Part 4: PROOF OF PERFORMANCE:

- 4.1** Upon completion of ram installation and all work on the rudder the steering gear shall be operated in all modes to prove proper operation and ensure the unit is leak free.

Spec Item: L-01	SPECIFICATION	TCMS Field #: 3E043
AUX ALTERNATOR INSPECTION AND CLEANING		

L-01 AUX ALTERNATOR INSPECTION AND CLEANING.

Part 1: SCOPE:

- 1.1 The intent of this specification is to open up the Aux Alternator for inspection, cleaning and survey as per TCMS requirements.

Part 2: REFERENCES:

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

Auxiliary Alternator: Newage Stamford Type MSC634C

S/N H9795.1 Rated 625 KVA, 60 Hz, 3 Phase, PF .8 600v,

601A, Enclosure IP 23, Insulation Class B.

Part 3: TECHNICAL DESCRIPTION:

- 3.1 The Contractor is to note this work shall be carried out in conjunction with the Ship's Crew overhaul of the Aux Diesel engine and attachments.
- 3.2 The Contractor shall measure and record the megger readings for the main and exciter windings for the rotor and stator. The Contractor is to know the Alternator is fitted with an AVR that must be disconnected prior to megger testing taking place.
- 3.3 The air gaps shall be taken and recorded prior to any work commencing and taken again upon completion.
- 3.4 The continuity of the anti-condensation heaters shall be checked; Megger and record readings. All wiring and connections to be checked.
- 3.5 Resistance of stator winding RTD's to be checked and recorded.

Spec Item: L-01	SPECIFICATION	TCMS Field #: 3E043
AUX ALTERNATOR INSPECTION AND CLEANING		

- 3.6** The AVR connections and wires to be inspected.
- 3.7** Contractor is to uncouple the alternator from the Aux Generator. The main wire leads are to be marked and disconnected. All additional wiring is to be disconnected as required. The alternator hold down bolts are to be removed and all shims marked to as to their corresponding position. The side connection box is to be removed and the connections protected.
- 3.8** Contractor to remove the railings and ducting as required between the generator and the engine room soft patch. Generator is to be separated from the generator engine and shifted to the soft patch area and carefully removed from the vessel and taken to a suitable facility for inspection and cleaning.
- 3.9** Once the generator is in the shop the rotor is to be removed from the stator. Contractor is to ensure rotor and stator are protected properly prior to the rotor removal. Both rotor and stator are to be steam cleaned to the satisfaction of the ships Electrical Officer. Upon completion of steam cleaning the rotor and stator are to be baked to remove any moisture.
- 3.10** The rotating rectifier is to be inspected ensuring all solder joints on diodes are in good condition.
- 3.11** All wire connections are to be checked for tightness and all wiring and cables are to be checked for chafing and general condition.
- 3.12** Inspect fan blades for cracks/damage.
- 3.13** Upon completion of cleaning and all checks the generator is to be reassembled with new contractor supplied NDE and DE bearings.
- 3.14** Generator is to be returned to the vessel, aligned to the generator and re-secured to the engine and bedplate. Contractor to ensure that bolts and shims are reinstalled in the appropriate locations.

Spec Item: L-01	SPECIFICATION	TCMS Field #: 3E043
AUX ALTERNATOR INSPECTION AND CLEANING		

- 3.15** The connection box shall be reinstalled and all wiring shall be reconnected. Upon completion of reinstallation all Meggar readings shall again be performed. Any discrepancies to original readings shall be rectified by the contractor.
- 3.16** All removed ducting and railing shall be reinstalled as per original.

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor is to be responsible for all inspections and is to consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor is to advise the Technical Authority, in advance, to allow his/her attendance.
- 4.2** Alternator to be load tested for 2 hrs upon completion of diesel overhaul and re floating of the vessel. Winding and bearing temperatures to be monitored through out the test run.

Part 5: DELIVERABLES:

- 5.1** Three typewritten copies of the readings shall be provided to the Owner's representative.

Spec Item: L-02	SPECIFICATION	TCMS Field #:
BARGE KICK PIPE REPLACEMENTS		

L-02 BARGE KICK PIPE REPLACEMENTS

Part 1: SCOPE:

- 1.1 The electrical kickpipes on the barge motor need replacement. Three pipes on the motor shall be replaced in their entirety and replaced as per original.

Part 2: REFERENCES:

2.1 Owner Furnished Equipment

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

- 2.2 This item shall be completed in conjunction the H-04 Barge Davit Inspection.

Part 3: TECHNICAL DESCRIPTION:

- 3.1 The Barge Davit motor will be locked out at breaker 605-6 on the Aft MCC in the Stores Handling Room.
- 3.2 The deckhead panels in cabin 217 will be taken down as required to allow access to the barge wiring. The cabins furnishings and deck shall be protected against hotwork and damage prior to any work commencing in these areas.
- 3.3 The deckhead insulation shall be removed in the area around the kickpipes to allow for wire removal and proper fire watch.
- 3.4 All wires shall be pulled through the kickpipes into the cabin below and properly secured.

Spec Item: L-02	SPECIFICATION	TCMS Field #:
BARGE KICK PIPE REPLACEMENTS		

3.5 The old kickpipes are to be cut from the deck and discarded. New kickpipes, complete with wire glands, shall be installed and welded to the deck.

3.6 The wires are to be run through the new kickpipes and reconnected. The wires are to be properly sealed in the wire glands.

Part 4: PROOF OF PERFORMANCE:

4.1 Upon completion of the kickpipe installation and prior to re-insulating the cabin deck head panels, a minimum 50 PSI hose test shall be completed on the kickpipes to prove the pipes are watertight. Test to be witnessed by Technical Authority.

4.2 The Ship's crew shall operate the barge davits after all electrical connections have been made, to ensure proper operation.

Spec Item: L-03	SPECIFICATION	TCMS Field #:
P & S HIAB CRANE KICK PIPE REPLACEMENTS		

L-03 P & S HIAB CRANE KICK PIPE REPLACEMENTS

Part 1: SCOPE:

- 1.1 The electrical kickpipes on the Port and Stbd Sea Cranes need replacement. Five pipes on the port side and four pipes on the stbd side shall be replaced in their entirety and replaced as per original.

Part 2: REFERENCES:

2.1 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 The Port and Starboard cranes will be locked out at breakers 605-4 and 605-5 on the Aft MCC in the Stores Handling Room. The talkback speaker on the port side shall be isolated by the ship's Electrical Officer.
- 3.2 The deckhead panels in cabin 241 and in the washroom in cabin 240 will be taken down as required to allow access to each cranes wires. The cabins furnishings and deck shall be protected against hotwork and damage prior to any work commencing in these areas.
- 3.3 The deckhead insulation shall be removed in the area around the kickpipes to allow for wire removal and proper fire watch.
- 3.4 All wires shall be pulled through the kickpipes into the cabins below and properly secured.

Spec Item: L-03	SPECIFICATION	TCMS Field #:
P & S HIAB CRANE KICK PIPE REPLACEMENTS		

3.5 The old kickpipes are to be cut from the deck and discarded. New kickpipes, complete with wire glands, shall be installed and welded to the deck.

3.6 The wires are to be run through the new kickpipes and reconnected. The wires are to be properly sealed in the wire glands.

Part 4: PROOF OF PERFORMANCE:

4.1 Upon completion of the kickpipe installation and prior to re-insulating the cabin deck heads, a minimum 50 PSI hose test shall be completed on the kickpipes to prove the pipes are watertight. Test to be witnessed by Technical Authority.

4.2 The Ship's crew shall operate the cranes after all electrical connections have been made, to ensure proper operation.

Spec Item: L-04	SPECIFICATION	TCMS Field #:
THERMOGRAPHY INSPECTIONS		

L-04 THERMOGRAPHY INSPECTIONS

Part 1: SCOPE:

- 1.2** As required by TP-127E, this specification will address the requirement to survey the ship's electrical generators, switchboards and transformers (over 10 kVA) using infrared Thermography.

Part 2: REFERENCES:

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

Part 3: TECHNICAL DESCRIPTION:

- 3.17** The Contractor is to retain the services of certified Infrared Thermographer who will, with the assistance of the ship's Electrical Officer, survey the three Diesel Generators, Auxiliary Diesel Generator, Emergency Generator, two Propulsion Motors, Main, Emergency and Ship's Service Switchboards, and the required transformers.
- 3.18** To obtain sufficient electrical load to conduct a meaningful survey, it will be necessary to place the propulsion system "on line" and conduct maneuvers; it will also be necessary to place the Auxiliary and Emergency Diesel Generators on their respective buses on hotel/emergency service.
- 3.19** The survey shall be conducted as early as practicable in the refit period to allow any necessary corrective measures to be performed; the Contractor is to allow \$5,000.00 for these repairs and resurvey of the affected areas. This value will be adjusted by 1379 action.

Part 4: PROOF OF PERFORMANCE:

- 4.1** The Contractor will prepare a written report, detailing any defects or deficiencies discovered and the corrective action taken, for submission to the attending Transport Canada/Marine Safety (TCMS) Surveyor.