CCGS George R. Pearkes

Drydocking Refit

Oct. 02 –Nov 13, 2017

Spec Item:	**SPECIFICATION**	TC/MS Field #:

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PREAMBLE

1. Intent

These specifications are supplied to the shipbuilder or ship repairer, hereinafter referred to as the Contractor for the purpose of outlining the objectives, performance, standards and basic engineering requirements for the refit, including dry-docking, of the CCGS George R Pearkes for the Canadian Coast Guard, Department of Fisheries and Oceans for the entire refit period scheduled from Oct 2 –Nov 13, 2017.

The intention is to provide sufficient information such that the Contractor, with this guidance and his own experience and knowledge of good marine practice, shall complete the work items herein by carrying out the engineering and production work, while conforming to the requirements of all applicable regulatory bodies.

The intent of this specification shall describe the necessary work involved in carrying out the ship's Annual Refit. 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 TCMS Surveyor. 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 equipment 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 is to provide an electronic copy of all tests and records

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 cranage 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 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. Contractor shall be responsible to ensure the safety of Contractor's personnel, including any subcontractors, inspection personal, TC Surveyor, Chief Engineer and Technical Authority Representative.

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 are satisfied that the agreed upon procedures are in place and being conformed 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

Any WHIMIS – 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 when these WHIMIS – 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

The following is a list of applicable work instructions
7. B.2 FALL PROTECTION
7. D.9 ENTRY INTO ENCLOSED SPACES
7. D.9 (N) ENTRY INTO ENCLOSED SPACES-WORK INSTRUCTION
7. D.10 DRYDOCKING
7. D.11 HOTWORK
7. D.11 (N) HOTWORK – WORK INSTRUCTIONS
7. F.1 HANDLING FUEL, OIL AND WASTE OIL PRODUCTS
7. F.6 HANDLING STORAGE AND DISPOSAL OF HAZARDOUS MAT'LS
7. F.9 PAINT AND OTHER COATINGS
7. D.19 LOCKOUT AND TAGOUT

28. CONTRACTOR SAFETY AND SECURITY

All contractors shall follow applicable OHS regulations in accordance with CCG safety/security/environmental requirements, fire alarm protocol and conduct to follow in case of fire or other emergency situations, familiarization of restricted areas and spaces, known risks and hazards encountered at the worksite (ie asbestos, fire fighting systems,hazardous materials, flammables etc)

HD-01 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.

1.1 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.

1.2 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.

1.3 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. Quote unit cost per day. Contractor shall have meter installed so that meter readings can be confimred weekly.

1.4 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.

1.5 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

1.6 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.

1.7 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.

1.8 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.

1.9 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 10 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.

1.10 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 m^2. 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.

1.11 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.

1.12 Fresh Water

During the drydocking period only:
A fresh water connection through a regulator to ship's central cooling system (2" connection @ 30 PSI), using ship supplied stub piece. This cooling water shall be metered and contractor shall bid on 3000 M^3. Quote unit cost per day. Contractor shall have meter installed so that meter readings can be confimred weekly.

1.13 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

1.14 Grey and Black Water

The contractor is responsible for the disposal of all grey and black water according to provincial regulations. Approx 250M^3

Note: Contractor to provide two heated portable sanitation equipment (Porta potties) during 2 intervals when the vessels sewage system will be shut down. The first interval is for the fitting of a temporary bypass connection from the media tank inlet to the overboard discharge prior to upgrade work. The second interval is for the reinstallation of the removed discharge piping upon completion of sewage upgrades. The sewage discharged from the overboard during the upgrade work will be untreated therefore the contractor shall quote on providing a collection tank for this purpose.

1.15 Engineering

Contractor shall allow for $10,000 for engineering services required during the refit period. Cost to be adjusted on proof of invoice.

1.16 TM Readings

Contractor shall allow for 1500 shots to be used at the direction of the Chief Engineer. Contractor shall bid unit cost per additional shot.

HD-02 PRODUCTION CHART

Part 1: Scope:

1.1 The intent of this specification shall be to develop a production chart using MS Project encompassing all work specifications detailed in this project.

1.2 All refit specification items and shall be updated by the contractor prior to all production meetings.

Part 2: References:

2.1 Guidance Drawings/Nameplate Data:

2.2 Standards:

2.3 Regulations:

2.4 Owner Furnished Equipment:

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

Part 3: Technical Description:

General

3.1 The successful contractor shall supply three hard copies and forward one electronic copy to the vessel's Project Engineer darrin.hancock@dfo-mpo.gc.ca

The contractor shall forward a copy of the Production Chart to the Contracting Authority

3.2 The chart shall show for each specification item, the start date, the duration, and the completion date.

3.3 A critical path of work shall be identified, which shows critical tasks that may delay the completion of the refit if they are not completed within the estimated time frame. The critical path may exist due to labour constraints or tasks that cannot be completed concurrently with other tasks.

3.4 If work arises that affects the critical path, it shall be immediately brought to the attention of the Chief Engineer, Project Engineer and PWGSC. Every effort shall be made to prevent completion delay.

Part 4: Proof of Performance

4.1 The Production Charts shall be done to the satisfaction of the Chief Engineer and PWGSC.

Part 5: Deliverables:

5.1 The successful Contractor shall supply three copies of a detailed bar chart showing the planned work schedule for the ship's refit. This bar chart shall show, for each specification item, the start date, the duration and the completion date.

5.2 Three copies of the original and three copies of each weekly update shall be given to the Chief Engineer one day prior to each weekly Production Meeting.

5.3 The bar 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. The Contractor shall include on the updates to the production chart any Work Arising from PWGSC 1379 action and indicate how the additional work will impact the completion schedule for the vessel.

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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 Oct 2 – Nov 13, 2017 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.

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.

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.

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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 replace 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. The contractor to bid on replacing 30 such anodes.

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.

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UNDERWATER HULL CLEANING AND PAINTING		

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.

3.6 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 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.

3.7 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.

3.8 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.

3.9 In conjunction with Item HD-06, Hull Painting, the waterline is to be cut in.

3.10 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).

3.11 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.

3.12 All staging, cranage, 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 bid the cost of enclosure.

3.13 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.

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UNDERWATER HULL CLEANING AND PAINTING		

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.

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**	TC/MS Field #:
HULL INSPECTION AND WELDING		

HD-05 HULL INSPECTION AND WELDING

Part 1: SCOPE:

1.1 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 TC/MS. In lieu of staging, the Contractor may provide the use of a certified man-lift (with operator) for 2 working days. Contractor to include a unit cost per additional day

3.3 The Contractor is to quote on gouging 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. Provide unit cost per tank entry.

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-06**	**SPECIFICATION**	TC/MS Field #:
HULL PAINTING		

HD-06 HULL PAINTING

Part 1: SCOPE:

1.2 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 M^2; 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 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 M^2, and is to quote a unit cost per M^2, for surface preparation & priming, as detailed in 3.2; this cost will be adjusted by 1379 action.

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.

Spec Item: **HD-07**	**SPECIFICATION**	TC/MS Field #:
SEA CHEST AND SEA BAY INSPECTIONS		

HD-07 SEA CHEST AND SEA BAY INSPECTIONS

Part 1: SCOPE:

1.1 The Seabay and Sea Chests require entry for Cathodic Protection system installation. 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-04, 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	TC/MS Field #3L118
Port Sea Suction – Fr 96-106	TC/MS Field #3L120
Starboard High Sea Suction – Fr 96-106	TC/MS Field #3L119
Starboard Sea Suction – Fr 96-106	TC/MS Field #3L121
R.O. & Distiller Sea Bay – Fr 102-106	TC/MS Field #3L117

Propulsion Motor Room

Aft Sea Chest – Fr 51-53	TC/MS Field #3L122
Sterntube 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-07**	**SPECIFICATION**	TC/MS 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 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 M² of the sea chests. Sea chests area approx 100 M².

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 ¾" UNC stainless steel bolts; the bolts are to be locked by tack welds. The thirty-four captive ¾" UNC stainless steel nuts inside the Sea Chests are also to be replaced.

3.9 All manholes to be closed up, using new ¼" 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 (TC/MS 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-03 Drydocking.

Spec Item: **HD-07**	**SPECIFICATION**	TC/MS 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 days work. Contractor to bid on hand scraping 50 M^2 of the sea bays. Sea Bay area approx 150 M^2.

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.

3.14 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. (26, ¾" nuts)

3.15 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 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-08**	**SPECIFICATION**	TC/MS Field #:
AF ANODE REPLACEMENT		

HD-08 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-07 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.

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.

Spec Item: **HD-08**	**SPECIFICATION**	TC/MS Field #:
AF ANODE REPLACEMENT		

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-09**	**SPECIFICATION**	TC/MS Field #:
ANCHORS AND CHAINS		

HD-09 ANCHORS AND CHAINS

Part 1: SCOPE:

1.1 The intent of this specification is to remove both Anchors and Chains for cleaning and TC/MS survey. This work shall be carried out in conjunction with item E-05 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 TC/MS 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. Four measurements per link shall be taken.

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.

Spec Item: **HD-09**	**SPECIFICATION**	TC/MS Field #:
ANCHORS AND CHAINS		

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-05, 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-10**	**SPECIFICATION**	TC/MS Field #:
FOREPEAK EXTENDED SPINDLE LINKAGE RENEWAL AND VALVEL REPLACEMENT		

HD-10 FOREPEAK EXTENDED SPINDLE LINKAGE RENEWAL AND VALVEL REPLACEMENT

Part 1: SCOPE:

1.1 The intent of this specification is to have the Contractor replace all 4 of the mounting brackets for the 90 degree gearboxes. The contractor shall also supply and install a new 90 degree angle valve.

1.2 This specification shall be carried out with the tank survey for TCMS.

Part 2: REFERENCES:

Reference documents:

Extended Spindles – 60-00-01 sheet 1 of 2

Ballast Diagram – 67-10-01 sheet 2 of 2

Part 3: TECHNICAL DESCRIPTION:

3.1 The Contractor shall lockout the fore peak tank.

3.2 The contractor shall replace all 4 of the gearbox mounts in their entirety. Each of the 2 gearboxes are secured to the vessel at both ends of the gear box.

3.3 The contractor shall fabricate mounting brackets as per the original installation.

3.4 The mounting brackets shall be shot blasted to a surface profile of SA 2.5 prior to installation.

3.5 The contractor shall apply coating to all areas affected by the welding similar to that used in specification for Ballast tank cleaning.

3.6 The contractor shall either replace or reuse the existing gearboxes. The decision to reuse or replace the gearboxes shall be made by the Technical Authority. If the gearboxes are deemed to require replacement, the vessel shall supply the replacements.

3.7 The contractor shall measure the existing forepeak valve and order a replacement. The replacement valve shall be bronze body, bronze trim, bolted bonnet and 150 # flanges as per

the original installation. The replacement valve shall be a direct replacement for the valve which is to be replaced.

3.8 The contractor shall take note that there is very limited room to access the forepeak tank valve.

3.9 The replacement valve shall be approved by one of the TCMS Approved Recognized Organizations for use onboard a ship. The valve shall come with a certificate to this effect.

3.10 Prior to installation, the contractor shall prove to the Technical Authority that the replacement valve does not jam in either the open or closed position.

3.11 The price of the valve shall be agreed to by the Project Engineer or his delegate prior to purchasing. The payment for this valve shall be by 1379.

3.12 The contractor shall use all new grade 8 bolts, nuts, and washers. The contractor shall apply never seize to all threads prior to bolting together.

3.13 The contractor shall supply and install new Neoprene or equivalent gasket material.

Part 4: PROOF OF PERFORMANCE:

4.1 All items to be inspected by the Chief Engineer prior to reassembly.

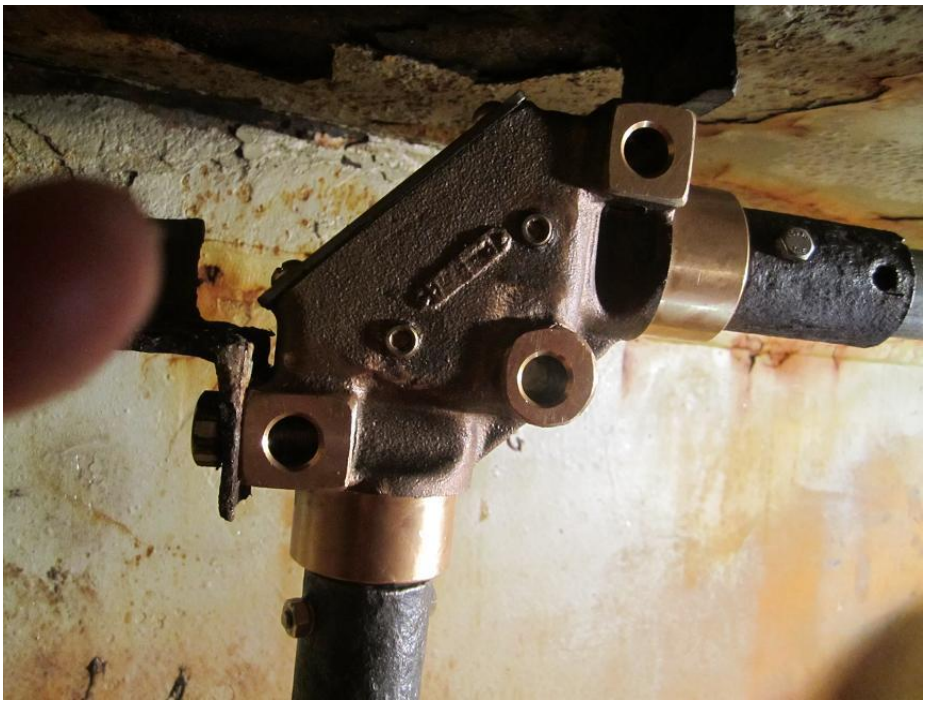
4.2 The contractor shall function test the complete forepeak extended spindle operation to the Technical Authority. The Technical Authority shall witness the full range of motion from fully opened to fully closed 5 times. The Technical Authority or his delegate shall operate the extended spindle arrangement on the foredeck to their satisfaction.

Part 5: DELIVERABLES:

5.1 If the existing gearboxes are not reused, they shall be given to the Technical Authority. The removed forepeak valve shall be given to the Technical Authority. The copy of the valve certificate shall be given to the Technical Authority and the original shall be put in the QA package from the contractor.

Spec Item: **HD-10**	**SPECIFICATION**	TC/MS Field #:
FOREPEAK EXTENDED SPINDLE LINKAGE RENEWAL AND VALVEL REPLACEMENT		

Spec Item: **HD-10**	**SPECIFICATION**	TC/MS Field #:
FOREPEAK EXTENDED SPINDLE LINKAGE RENEWAL AND VALVEL REPLACEMENT		



Spec Item: **HD-11**	**SPECIFICATION**	TC/MS Field #:
HULL ANODES		

HD-11 HULL ANODES

Part 1: SCOPE:

1.1 Provide brief introductory overview of work required addressing what, where and when, but not how. The how shall be the responsibility of the Contractor based on the following criteria stated in the SOW and so reflected in the Contractor's proposal for the tasking work.

Part 2: REFERENCES:

Guidance Drawings/Nameplate Data

Standards

Regulations

Quality Assurance Standards

Part 3: TECHNICAL DESCRIPTION:

3.1 The Contractor shall replace any severely wasted anodes that are fitted to the hull, stern tubes and rudder. Any remaining anodes are to be left in place.

3.2 The Contractor is to ensure an additional 4 anodes (2 per side) are installed in the area of the propellers as directed by the Technical Authority. Quote on supplying and fitting twenty, 22 pound zinc anodes; quote a unit price per anode to supply and fit additional anodes.

3.3 Anodes are to be properly covered during hull coating and this protection is to be removed prior to the vessel being refloated

Part 4: PROOF OF PERFORMANCE:

Inspection

Testing

Certification

Spec Item: **H-01**	**SPECIFICATION**	TC/MS Field #:
VOID SPACE & BALLAST TANK INSPECTION & SURVEY		

H-01 VOID SPACE AND BALLAST TANK INSPECTION AND SURVEY

Part 1: SCOPE:

1.1 The intent of this specification item shall be to open up the above spaces listed for cleaning, inspection, testing to cover the continuous survey for Transport Canada Marine Safety (TC/MS).

Part 2: REFERENCES:

Tank	Location	Capacity	Field #
DB Void Port	Fr 102-106	M^3	3L081
No. 4 Void port	Fr 30-54	M^3	3L085
No. 4 Void stbd	Fr 30-54	M^3	3L086
No. 5 Void port	Fr 13-30	M^3	3L087
No. 5 Void stbd	Fr 13-30	M^3	3L088
Pipe Tunnel Fwd	Fr 102-163		3L114

Part 3: TECHNICAL DESCRIPTION:

3.1 The Contractor shall provide a method to have the spaces 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 spaces and ballast 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 and sounding pipes are to be proven clear.

3.3 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 10 damaged cover plate fasteners.

3.4 Following the cleaning of the void spaces and ballast tanks, the tanks and vents will then be inspected by the Owner's representative and the attending TC/MS Surveyor.

3.5 The Contractor is to allow for 100 M^2 of coating repairs, and is to provide a cost per M^2 for preparation and a cost per M^2 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.

3.6 Following the repairs/recoating of the void spaces and ballast tanks, the tanks and vents will then be re-inspected by the Owner's representative and the attending TC/MS Surveyor.

3.7 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 contractor supplied 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.

3.8 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) should hydrostatic testing be required by TCMS.

3.9 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.

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 all tanks, covers, vents and piping connections have been returned to operating conditions and the attending TCMS Surveyor has completed all inspections.

Spec Item: **H-01**	**SPECIFICATION**	TC/MS Field #:
VOID SPACE & BALLAST TANK INSPECTION & SURVEY		

Spec Item: **H-02**	**SPECIFICATION**	TC/MS Field #:
Potable water tanks coating and survey		

H-02 Potable water tanks coating and survey

Part 1: SCOPE:

1.1 The intent of this specification item shall be to open up the above spaces listed for cleaning, inspection, testing to cover the continuous survey for Transport Canada Marine Safety (TC/MS).

1.2 The areas where the integrity of the coating has been broken or removed; must be power tooled clean and bare and a coating of epoxy applied.

Part 2: REFERENCES:

Tank	**Location**	**Capacity**	**Field #**
Potable Water Port	Fr 30-41	50 M^3	3L124
Potable Water Stbd	Fr 30-41	50 M^3	3L125

Part 3: TECHNICAL DESCRIPTION:

3.1 The Contractor shall provide a method to have the spaces 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 potable water 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 and sounding pipes are to be proven clear.

3.3 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.

3.4 Following the cleaning of the potable water tanks, the tanks and vents will then be inspected by the Owner's representative and the attending TC/MS Surveyor.

3.5 The Contractor is to allow for 50 M^2 of coating repairs, and is to provide a cost per M^2 for preparation and a cost per M^2 for recoating, as detailed above; cost to be adjusted by 1379.

The internal coating is to be International Intergard EX Series/EXA008; application is to be to the manufacturer's instruction and quality controlled by NACE Inspector. At no times are thinners or any other product/chemical to be used in the mixing of the tank coatings. The Contractor shall provide the Owner's Representative with the remaining coatings of each batch that were mixed for the tanks for future reference and testing if there should be any dispute or abnormal chemicals found by the laboratory testing the potable water.

3.6 Following the repairs/recoating of the tanks, the tanks and vents will then be re-inspected by the Owner's representative and the attending TC/MS Surveyor.

3.7 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 contractor supplied 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.

3.8 The Contractor shall bid on the hydrostatic pressure testing of each tank and arrange the visit of the attending Surveyor from Transport Canada.

3.9 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.

3.10 Once the credits are obtained from TC, the contractor shall bid on super-chlorinating each tank with a concentration above 50 ppm of chlorine and allowing it to sit overnight. The chlorinated water must then be removed from the tanks and disposed of in accordance with local laws and regulations.

3.11 Once the tanks have been emptied, they are to be filled and dumped two complete times to rid the tanks of any residual chlorinated water.

3.12 Once the tanks are flushed two times, the tanks are to be filled with municipal water with a concentration of between .2 to .5 ppm of chlorinated water. Once filled, the Chief Officer can proceed with bringing a water sample from each tank to the laboratory for proper testing.

3.13 Once the approved tests are complete, and the water is certified as safe to drink, the tanks will be put back into service and the water will be used by the ship's crew.

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-02**	**SPECIFICATION**	TC/MS Field #:
Potable water tanks coating and survey		

4.2 The contractor shall provide samples of each mixed batch of coatings for future reference and testing to prove that no additional chemicals were added during the application process.

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 all tanks, covers, vents and piping connections have been returned to operating conditions and the attending TCMS Surveyor has completed all inspections.

Spec Item: **H-03**	**SPECIFICATION**	TC/MS Field #:
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 TC/MS survey, in conjunction with item E-05, Anchor Windlass Survey and item HD-09 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 10M² of power tooling and quote cost per additional M². 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.

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 with two coats of Amercoat Amerlock #2 Surface Tolerant Epoxy (Aluminum) or equivalent. Apply at 5-6 mils DFT per coat. Quote on 50 M^2 of interior surface of both Chain Lockers; a quote is also to be provided per additional M^2.

Spec Item: **H-03**	**SPECIFICATION**	TC/MS Field #:
CHAIN LOCKER SURVEY		

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 TC/MS 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 HD-09 Anchors and Chains and item E-05 , 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.

Spec Item: **H-04**	**SPECIFICATION**	TC/MS Field #:
FM 200 SMOTHERING SYSTEMS INSPECTION		

H-04 FM 200 SMOTHERING SYSTEMS INSPECTION

Part 1: SCOPE:

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

Spec Item: **H-04**	**SPECIFICATION**	TC/MS Field #:
FM 200 SMOTHERING SYSTEMS INSPECTION		

	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
	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)

↑

CON figuration

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 TC/MS, 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. All inspections are to be completed by a company certified for FM 200 systems.

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.

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 TC/MS Surveyor. A complete service report with all test results is to be submitted to the Technical Authority.

Spec Item: **H-05**	**SPECIFICATION**	TC/MS Field #:
SHIP'S PORTABLE FIRE EXTINQUISHERS		

H-05 SHIP'S PORTABLE FIRE EXTINQUISHERS

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.

3.3 Listing of extinguisher types onboard:

TYPE	SIZE	QUANTITY
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

Spec Item: **H-05**	**SPECIFICATION**	TC/MS Field #:
SHIP'S PORTABLE FIRE EXTINQUISHERS		

CO_2	5 Lb.	Ea. 2
	10 Lb.	Ea. 11
	15 Lb.	Ea. 2
	20 Lb.	Ea. 2
Foam (AFFF):	2.5 gal.	Ea. 2
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.

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.

George R. Pearks Portable Extinquishers

□	#	Type	Location	Serial #	Last Hydro	Next Hydro	Full Weight	Next 6 Year Maintenance	Commen
Bridge Deck / Wheelhouse									
	1A	5 lbs CO2, BC	W/H A/C Rm Port Inside Door	409198	2012	2017	13 1/8	N/A	
	1	10 lbs	Bridge, Port	121030	2009	2014	25	N/A	

Spec Item: **H-05**	**SPECIFICATION**	TC/MS Field #:

SHIP'S PORTABLE FIRE EXTINQUISHERS

		CO2, BC							
	2	10 lbs CO2, BC	Bridge, Stbd	122744	2009	2014	26 1/8	N/A	
	3	10 lbs Dry Chem, ABC	Bridge, Port	R-307190	2009	2021		2015	
	4	10 lbs Dry Chem, ABC	Bridge, Stbd	R-307702	2009	2021		2015	
Officer's Deck									
	5	10 lbs Dry Chem, ABC	Outside Capt's Cabin	R-307011	2009	2021		2015	
	5A	10 lbs Dry Chem, ABC	Outside CH/O's Cabin	ZP-217230	2008	2020		2014	
	5B	10 lbs Dry Chem, ABC	E/R Casing, on aft side of casing ladder	ZP-216306	2008	2020		2014	
Boat Deck									
	6	10 lbs Dry Chem, ABC	Next to Elect. Equip. Rm	R-307007	2009	2021		2015	
	7	10 lbs Dry Chem, ABC	Next to Off. Lounge	R-307700	2009	2021		2015	
	8	10 lbs CO2, BC	Elect. Equip. Rm.	121021	2009	2014	25	N/A	
	9	10 lbs Dry Chem,	Emerg. Generator	N997616	2009	2021		2015	

Spec Item: **H-05**	**SPECIFICATION**	TC/MS Field #:
SHIP'S PORTABLE FIRE EXTINQUISHERS		

		ABC	Compt.						
	10	10 lbs CO2, BC	Computer Room	122759	2009	2014	26 1/8	N/A	
	12	10 lbs Dry Chem, ABC	A/C Fan Room	R-305044	2009	2021		2015	
	13	10 lbs CO2, BC	Helicopter Hangar	128179	2010	2015	25	N/A	
	14	20 lbs. Dry Chem, ABC	Helicopter Hanger Workshop	X-366625	2010	2022		2016	
	15	5 lbs. Dry Chem, ABC	Helicopter Hanger Workshop	ZY201420	2008	2020		2014	
	16	10 lbs Dry Chem, ABC	Flight Deck, Port	999277	2011	2023		2017	
	17	20 lbs. Dry Chem, ABC	Helicopter Hanger	K-209091	2009	2021		2015	
	18	10 lbs Dry Chem, ABC	Flight Deck, Port	529792	2011	2023		2017	
	52	50 lbs. Dry Chem, BC	Helicopter Hanger	7457	2009	2021		2015	
	53	50 lbs. Dry Chem, BC	Helicopter Hanger	7521	2009	2021		2015	
Upper Deck									
	19	10 lbs Dry Chem,	Officers Mess	R-307424	2009	2021		2015	

Spec Item: **H-05**	**SPECIFICATION**	TC/MS Field #:
SHIP'S PORTABLE FIRE EXTINQUISHERS		

		ABC							
	20	10 lbs Dry Chem, ABC	Port Alleyway @ Stn #7	H-695620	2009	2021		2015	
	21	10 lbs Dry Chem, ABC	Stbd Alleyway @ Stn #8	R-307960	2009	2021		2015	
	22	10 lbs Dry Chem, ABC	Stbd Alleyway @ Stn #10	H-695956	2009	2021		2015	
	23	10 lbs Dry Chem, ABC	Port Alleyway @ Stn #9	R-307194	2009	2021		2015	
Main Deck									
	24	10 lbs Dry Chem, ABC	Deck Entranceway	R-307518	2009	2021		2015	
	25	10 lbs Dry Chem, ABC	Stbd Alleyway @ Stn #16	R-307699	2009	2021		2015	
	26	10 lbs Dry Chem, ABC	Port Alleyway @ Stn #15	H-695768	2009	2021		2015	
	27	10 lbs Dry Chem, ABC	Stbd Alleyway @ Stn #18	R-307510	2009	2021		2015	
	28	10 lbs Dry Chem, ABC	Port Alleyway @ Stn #17	998637	2011	2023		2017	
	29	6 litre Wet	Galley Fwd	AC57308	2010	2015		N/A	

Spec Item: **H-05**	**SPECIFICATION**	TC/MS Field #:
SHIP'S PORTABLE FIRE EXTINQUISHERS		

		Chem, K	Door						
	30	1.5 gal Foam, AB	Incinerator Flat.	AB-884226		2014		N/A	
	31	1.5 gal Foam, AB	Incinerator Flat.	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	2007	2019		N/A	
	33	10 lbs Dry Chem, ABC	Steering Gear Compt.	R-307696		2021		2015	
	54	10 lbs CO2, BC	Cargo Hold, Tween Deck	122674	2009	2014	26 1/8	N/A	
	55	10 lbs CO2, BC	Cargo Hold	191335	2010	2015	26	N/A	
	56	10 lbs Dry Chem, ABC	Bowthruster Compartment	N-996193		2021		2015	
	57	18 lbs. Dry Chem, BC	Forecastle	F377567C	2007	2019		N/A	
	57A	Chemical Wetting Agent	Galley	280401	2013	2018		N/A	

Spec Item: **H-05**	**SPECIFICATION**	TC/MS Field #:

SHIP'S PORTABLE FIRE EXTINQUISHERS

	58	15 lbs CO2, BC	Deck Workshop Aft	385833	2012	2017	26	N/A	
	69	10 lbs Dry Chem, ABC	Well Deck, Fwd	AX-43369	2012	2024		2018	
Upper Engine Room									
	35	10 lbs CO2, BC	Control Room, Fwd	121020	2009	2014	25	N/A	
	36	10 lbs CO2, BC	Control Room, Aft	122728	2009	2014	26 1/8	N/A	
	37	10 lbs Dry Chem, ABC	Outside Control Room, Fwd	R-307514	2009	2021		2015	
	38	10 lbs Dry Chem, ABC	Gen. Room, Aft Port	N-996192	2009	2021		2015	
	39	10 lbs Dry Chem, ABC	Gen. Room, Aft, Stbd	R-307512	2009	2021		2015	
	44	10 lbs Dry Chem, ABC	Entrance to Transformer Rm	R-307698	2009	2021		2015	
	48	10 lbs Dry Chem, ABC	Calorifier Room	R-305563	2009	2021		2015	
	34	10 lbs Dry Chem, ABC	Speed Crane Winch Rm	R-307010	2009	2021		2015	
	59	20 lbs CO2, BC	Speed Crane Winch Rm	5767	2009	2014	35 ½	N/A	

Spec Item: **H-05**	**SPECIFICATION**	TC/MS Field #:
SHIP'S PORTABLE FIRE EXTINQUISHERS		

	60	20 lbs CO2, BC	Speed Crane Winch Rm	5746	2009	2014	35 ½	N/A	
	61	10 lbs Dry Chem, ABC	Engineer's Workshop	Z-759982	2010	2022		2016	
	71	10 lbs Dry Chem, ABC	Central Stores, Fwd	52375	2002	2014		2020	
	68	10 lbs CO2, BC	Outside Elect. Workshop	122663	2009	2014	36 1/8	N/A	
Lower Engine Room (Tank Tops)									
	40	10 lbs Dry Chem, ABC	Gen. Room Fwd,	R-307008	2009	2021		2015	
	41	10 lbs Dry Chem, ABC	Gen. Room Fwd, Stbd	R-307009	2009	2021		2015	
	42	10 lbs Dry Chem, ABC	Gen. Room Aft	N-996189	2009	2021		2015	
	43	15 lbs CO2, BC	Gen. Room Aft	46260	2009	2014	34	N/A	
	45	10 lbs Dry Chem, ABC	Purifier Room	R-305562	2009	2021		2015	
	46	10 lbs Dry Chem, ABC	Propulsion Motor Rm Fwd	R-307515	2009	2021		2015	
	47	10 lbs Dry Chem,	Propulsion Motor Rm Aft	B343175	2008	2020		2014	

Spec Item: **H-05**	**SPECIFICATION**	TC/MS Field #:
SHIP'S PORTABLE FIRE EXTINQUISHERS		

		ABC							
Boats									
	62	10 lbs Dry Chem, ABC	Lifeboat	AB-532465	2010	2022		2016	
	63	10 lbs Dry Chem, ABC	Lifeboat	WH-26176	2004	2016		2022	
	65	5 lbs Dry Chem, ABC	FRC 295	902520	2011	2023		2017	
	66	5 lbs Dry Chem, ABC	FRC 295	N-935011	2009	2021		2015	
	76A	10lbs Dry Chem ABC	Barge	293685	2010	2022		2016	
	76	10 lbs Dry Chem, ABC	Below Deck of Barge	28071	2008	2020		2014	
	81	10 lbs Dry Chem, ABC	Below Deck of barge	BZ-248837	2013	2025	-	2019	
Spare Fire Extinguishers									
	64	5 lbs Dry Chem, ABC	Central Stores	ZW748426	2008	2020		2014	
	67	5 lbs CO2, BC	Central Stores	64965	2009	2014	13 ¼	N/A	
	72	10 lbs Dry	Central Stores	Z-759806	2010	2022		2016	

		Chem, ABC							
	73	10 lbs Dry Chem, ABC	Central Stores	52372	2008	2014		2014	
	75	5 lbs Dry Chem, ABC	Central Stores	TD943898	2008	2014		2014	
	77	10 lbs Dry Chem, ABC	Central Stores	VP293020	2004	2016		2022	
	78	10 lbs Dry Chem, ABC	Central Stores	VP293018	2004	2016		2022	
	79	5 lbs Dry Chem, ABC	Central Stores	N-938475	2009	2021		2015	
	80	10 lbs Dry Chem, ABC	Central Stores	Z-760521	2010	2022		2016	
	82	5 lbs Dry Chem, ABC	Central Stores	BU-344136	2013	2025		2019	
	83	5 lbs Dry Chem, ABC	Central Stores	2498	2008	2020		2020	

Spec Item: **H-06**	**SPECIFICATION**	TC/MS Field #:
CO_2 SYSTEM SERVICING		

H-06 CO_2 SYSTEM SERVICING

Part 1: SCOPE:

1.1 The CO_2 Fire Fighting System protecting the Cargo Hold is to be thoroughly examined and tested as per TC/MS requirements.

Part 2: REFERENCES:

2.1 Bottles are located in the Forward CO_2 Room, port side Well Deck forward; there are a total of 13 bottles of 75Kg Tare Wt. (45kg CO_2).

Part 3: TECHNICAL DESCRIPTION:

3.1 The Contractor is to be responsible for all inspections and is to consult with TC/MS, 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 CO_2 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 CO_2 System is to be reassembled and returned to operational condition.

Part 4: PROOF OF PERFORMANCE:

Spec Item: **H-06**	**SPECIFICATION**	TC/MS Field #:
CO_2 SYSTEM SERVICING		

4.1 Copies of all certificates are to be forwarded to the Technical Authority and the attending TC/MS Surveyor.

Spec Item: **H-07**	**SPECIFICATION**	TC/MS Field #:
PROPULSION CO_2 SYSTEM SERVICING		

H-07 PROPULSION CO_2 SYSTEM SERVICING

Part 1: SCOPE:

1.1 The CO_2 Fire Fighting Systems protecting the Propulsion Alternators and Motors are to be thoroughly examined and tested as per TC/MS 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 TC/MS, 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 CO_2 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 CO_2 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 CO_2 Systems are to be reassembled and returned to operational condition.

Part 4: PROOF OF PERFORMANCE:

4.1 Copies of all certificates are to be forwarded to the Technical Authority and the attending TC/MS Surveyor.

Spec Item: **H-08**	**SPECIFICATION**	TC/MS Field #:
GALLEY RANGE FIRE EXTINGUISHING SYSTEM		

H-08 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.

Part 4: PROOF OF PERFORMANCE:

4.1 All tests to be witnessed by the Technical Authority (or designate) and the attending TC/MS Surveyor.

Part 5: DELIVERABLES:

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

Spec Item: **H-09**	**SPECIFICATION**	TC/MS Field #:
FOAM FIREFIGHTING SYSTEM – HELICOPTER HANGAR		

H-09 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 diaphram in each of the 560 gallon capacity tanks to be proven. A sample to be taken from the foam tank. 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-10**	**SPECIFICATION**	TC/MS Field #:
FOAM FIREFIGHTING SYSTEM – MONITORS & HOSE REELS		

H-10 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, guages, 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.

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-11**	**SPECIFICATION**	TC/MS Field #:
GALLEY EXHAUST DUCTING CLEANING And ACCESS HATCH REPLACEMENT		

H-11 GALLEY EXHAUST DUCTING CLEANING and ACCESS HATCH REPLACEMENT

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.

1.2 The hatch used to gain access to the duct work, has to be replaced and new stainless steel bolts and gasket supplied and installed by the contractor to seal properly.

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.

3.3 The contractor shall install a new access door 27"x 27", fabricated from stainless steel sheet metal approximately 3/16" think. The contractor shall supply and install all new

hardware 36, ¼" stainless steel bolts and gasket when installing the door. The contractor shall bid on removing 12 broken ¼" bolts and rethreading the holes to ensure all bolts are replaced when complete.

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-12**	**SPECIFICATION**	TC/MS Field #:
DRYER DUCTING CLEANING		

H-12 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;

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-13**	**SPECIFICATION**	TC/MS Field #:
SMOKING LOUNGE EXHAUST DUCT CLEANING		

H-13 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

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-14**	**SPECIFICATION**	TC/MS Field #:
ACCOMODATION DOOR REPLACEMENT		

H-14 ACCOMODATION DOOR REPLACEMENT

Part 1: SCOPE:

1.1 The intent of this item shall be to replace the three accommodation doors as listed below.

1.2 The doors to be replaced are as follows

1.2.1 Port entrance Upper Deck QM Station-aluminum door

1.2.2 Port side Entrance main deck-steel door

1.2.3 Wire leads compartment main deck-steel door

Part 2: REFERENCES:

2.1 Drawings

General Arrangement

Joiner Systems Drawing Aluminum Door 160229-002rC

Joiner Systems Drawing Steel Door 160229-001Rc

Joiner Systems Weld Procedure for Steel plate doors

2.2 Certificates

Lloyds Cert Aluminum Door MTL1600758

TC Component Cert Steel Door 2016-07618-301

2.3 Standards

2.3.1 Ships ISM Hot-Work, Confined Space, Fall Protection and Lockout Procedures. The contractor will be responsible for completion of the lockout / tag out log sheets. The contractor is to demonstrate how the lockout / tag out procedure meet the requirements before work begins. For audit purposes the completed lockout / tag out log sheets are to be delivered to the Chief Engineer when completed.

Part 3: TECHNICAL DESCRIPTION:

Spec Item: **H-14**	**SPECIFICATION**	TC/MS Field #:
ACCOMODATION DOOR REPLACEMENT		

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

3.2 The owner shall identify to the contractor the location for each of the new doors to be installed in prior to installation.

3.3 The contractor shall secure the grounding lead from their welder as close as practicable to the weld site prior to welding and must remain for the duration of welding.

3.4 The contractor shall ensure that there is not so much heat applied to the new door frames and the bulkheads while welding that the new doors warp up and will not have an effective seal. The contractor shall follow the weld procedure provided by the manufacturer to install the door correctly, which must be posted next to the installation work site for clear viewing by the attending TCMS Surveyor.

3.5 The contractor is responsible for scheduling the visit of the TCMS Surveyor prior to commencing and discuss with them the schedule of the inspections required at different stages of installation.

3.6 New doors are to be installed as per supplied Joiner drawings and as directed by the attending TCMS Inspector.

3.7 Weather Tight Door (3)

3.7.1 The contractor shall remove the original weather tight doors and frames, and install the new weather tight door at the port entrance of the vessel at the top of the gangway, the main deck accommodation area to the well deck, and the wire leads compartment off the well deck. The steel door and frame will be replaced with an aluminum door with steel frame at the port gangway entrance, while the other two are steel doors with steel frames.

3.7.2 Contractor to ensure the entranceways are protected against damage prior to any work commencing. During removals and installations, the door opening is to be suitably sealed to protect the ships interior from weather. During all cutting and welding, work areas are to be properly ventilated. Hotwork permit must be followed to complete this item.

Spec Item: **H-14**	**SPECIFICATION**	TC/MS Field #:
ACCOMODATION DOOR REPLACEMENT		

3.7.3 Contractor is to remove the deck head paneling and bulkhead covering in order to perform the work. Note: The deckhead panels are to be reused upon installation of the new door. Any damage will be at contractor's expense. The replacement door is not the same design as the original therefore the cladding trim will not fit. The contractor shall allow for 1 m2 / door for steel renewal for a total of 3 m2. Quote unit cost / additional m2.

3.8 Upon completion of welding, all doors are to be subjected to a hose test for integrity and fitting to the satisfaction of the attending TCMS Inspector.

3.9 The complete area, new steel and heat effected steel is then to be coated with one complete coat of primer. This process is to ensure that all steel in the repair area is completely primed.

3.10 After priming, the exterior bulkheads are to have two top coats of marine epoxy. The exterior coating is to match the current vessel paint type and color

3.11 Applicable areas around the interior of doors to be re-insulated with new material and trim and paneling re-installed as per original.

3.12 The contractor must weld securing arrangements to the ship and door to hold the door in the fully open position at each door, such as a hook arrangement.

3.13 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Weld Inspection and Testing

4.1.1 The Contractor shall perform tests to verify that all requirements of the Specification are met.

4.1.2 The steel work is to be completed to the satisfaction of the attending TCMS Inspector and Chief Engineer. The completed steel work is to be visually inspected after welding is completed.

Spec Item: **H-14**	**SPECIFICATION**	TC/MS Field #:
ACCOMODATION DOOR REPLACEMENT		

4.1.3 There is to be NDT testing completed on the welds by approved testing personnel as directed by the attending TCMS Inspector.

4.1.4 After completion each installation shall be water hose tested for leaks. The weather tight doors shall be hose tested and proven spray tight/watertight to the satisfaction of the Technical Authority and the attending TC/MS surveyor. Hose pressure shall be above 60 psi and held for 30 minutes, moving around all sealing areas of the doors.

4.1.5 This testing is to be carried out in the presence of the attending TCMS Inspector and Chief Engineer. All costs associated with the inspection to be included in the contractor's price for known steel work. The contractor is to be responsible to contact TCMS for all inspections.

4.1.6 The contractor is responsible for all air quality testing to ensure hot work and entry is permitted. The contractor shall issue and post hot work permits and shall maintain a fire watch.

4.1.7 After acceptance of the test on the weld seams by the TCMS and owner's representatives, the area is to be inspected to ensure all debris has been removed.

4.1.8 After acceptance of the steel work, the contractor may commence to reinstall insulation and outfit.

4.2 Certification:

4.2.1 The Contractor shall obtain and provide to the Technical Authority all required technical Certifications as specified in the applicable rules and codes in accordance with Standards.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 Contactor shall provide copies of all NDT and hot work permits to the Chief Engineer upon completion of work.

Spec Item: **H-15**	**SPECIFICATION**	TC/MS 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.

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.

Spec Item: **H-15**	**SPECIFICATION**	TC/MS Field #:
TOILET EXHAUST FAN DUCT CLEANING		

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**	TC/MS Field #:
Sounding Pipes and Miscellaneous Welding Repairs		

H-16 Sounding Pipes and Miscellaneous Welding Repairs

Part 1: SCOPE:

1.1 The intention of this specification is for the contractor to renew 8 sounding pipe plugs and 2 guards on the well deck and two on the raised foc'sle deck.

1.2 Listing of sounding plugs

a) Fore Peak
b) Chain Locker
c) Port and Stbd Wing Tks
d) #3 and #4 Fuel Oil Tanks
e) Upper and Lower Flume Tanks

1.3 The contractor shall install/weld stainless couplings into existing sounding pipe fittings for Fuel and ballast tanks. New brass plugs to be fabricated to suit. Sounding pipe guards are to be replaced at the same time.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 General arrangement H-0016

2.1.2 Diagram Air and Soundings 67-30-01

2.1.3 During the viewing, the contractor shall view the replacement plugs installed during the last refit and use the same type in this spec.

2.2 Standards

2.2.1 All repairs and modifications must be considered acceptable in relation to the latest ship building and repair practices.

2.3 Regulations

2.3.1 This ship falls under the Canada Shipping Act and is regulated by Transport Canada Marine Safety. All repairs must be authorized and inspected by the attending Marine Surveyor.

2.4 Owner Furnished Equipment

2.4.1 The Contractor shall supply all materials and equipment to perform this task unless clearly stated otherwise.

Spec Item: **H-16**	**SPECIFICATION**	TC/MS Field #:
Sounding Pipes and Miscellaneous Welding Repairs		

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor shall remove the existing sounding plugs and guards as appropriate and prepare the deck for the welding of new ones. The renewal of the water ballast sounding plugs can be performed as they are.

3.1.2 The fuel from the fuel tanks must be emptied by the ship's crew, and isolated prior to commencement. The contractor is responsible for the gas freeing and certifying the fuel tanks for hot work.

3.1.3 The contractor is responsible for providing the confined space rescue team to be in attendance while contractors are required inside the tank completing this spec item.

3.1.4 The contractor shall provide welders and CWB certificates, along with a copy of the weld procedures to install the new plugs and guards.

3.1.5 The contractor shall be responsible for the scheduling of Transport Canada Inspector prior to starting, during the renewal process, and final inspection once complete.

3.1.6 The contractor shall allow for UT or other NDT testing as required by TC for the renewal of sounding pipe plugs.

3.1.7 The contractor shall include in the bid, the cost to hydrostatically/pneumatically pressure test the tanks for final inspection.

3.1.8 The contractor shall coat all new and heat affected steel with two coats of marine grade metal primer.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All welds will be subjected to 100% visual inspection.

4.1.2 The insert and welding completed to the new sounding plug shall be tested in accordance with the attending TCMS, which will be UT or X-ray. Any deficiencies resulting in repairs will be at the contractor's expense.

4.1.3 The Contractor is responsible for the scheduling of inspection by TCMS and following the direction and tests required by TC to get authorization to proceed.

Spec Item: **H-16**	**SPECIFICATION**	TC/MS Field #:
Sounding Pipes and Miscellaneous Welding Repairs		

4.2 Testing

4.2.1 The contractor shall include the cost to hydro test the two ballast tanks and pneumatically test the two flume tanks.

4.3 Certification

4.3.1 All welders must be CWB certified and be able to produce their certificate upon request.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall provide the UT/X-ray reports to the Owner's Representative indicating no deficiencies.

Example of required new sounding plug

Spec Item: **H-17**	**SPECIFICATION**	TC/MS Field #:
Bridge Top Cabinet Door Replacement		

H-17 Bridge Top Cabinet Door Replacement

Part 1: SCOPE:

1.1 The intention of this specification is for the Contractor to remove two exterior cabinet doors on top of the wheelhouse, fabricate new ones and install in the cabinets in good working order.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 General Arrangement Wheelhouse Floor and Top 555-H-0024

2.1.2 Port Cabinet is for the Main Transmitter Antenna, and the starboard is for the Helicopter Homing Beacon.

2.2 Standards

2.2.1 All repairs and materials used must be in compliance with today's Ship Building and Repair Standards.

2.3 Regulations

2.3.1 This ship is regulated by the Canada Shipping Act and repairs will be subjected to the inspection and approval of TCMS, marine surveyor.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all the materials and equipment necessary to execute this spec item, unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor shall ensure the power is isolated to the Main Transmitter Antenna, and the Helicopter Homing Beacon, and locked out as per ISM procedures.

3.1.2 The contactor shall remove the existing doors complete with hinges and carry to their facility for re-fabrication. The opening into each cabinet must be protected with temporary sheeting while the doors are removed.

Spec Item: **H-17**	**SPECIFICATION**	TC/MS Field #:
Bridge Top Cabinet Door Replacement		

3.1.3 The contractor shall replace any deteriorated coaming metal on the cabinet to ensure proper sealing to the newly fabricated door. The contractor shall quote on replacing approximately 4 feet of angle or flat bar to renew the rotted lips on the coaming especially on the port side bottom.

3.1.4 The contractor shall fabricate two new doors which are 25" X 45" and made of 3/16" sheet metal. The doors must be fitted with the hinges and securing tongues as per original.

3.1.5 The doors shall be fitted with a framing of flat bar on the interior and a new piece of foam insulation secured to prevent condensation from forming, as shown in the picture.

Spec Item: **H-17**	**SPECIFICATION**	TC/MS Field #:
Bridge Top Cabinet Door Replacement		

3.1.6 The doors, new steel, and any heat affected areas, shall be coated with two coats of primer and two coats of white top to prevent corrosion.

3.1.7 The contractor shall install new gasket material in the channel created between the door edge and flat bar to ensure proper sealing.

3.1.8 The doors shall be re-installed and secured with new stainless steel wing nuts and washers.

3.1.9 The contractor must fabricate and secure two new labels as per original shape, size, and material.

3.1.10 The doors must be free to operate and be weather tight.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All welds will be subjected to 100% visual inspection.

Spec Item: **H-17**	**SPECIFICATION**	TC/MS Field #:
Bridge Top Cabinet Door Replacement		

4.1.2 All sealing surfaces shall be inspected for sufficient contact and no visible light indication on the inside when dogged.

4.2 Testing

4.2.1 The doors shall be tested for visible light indication on the inside when properly dogged in normal operation.

4.3 Certification

4.3.1 All welders must be CWB certified and be able to produce their certificate upon request.

Spec Item: **H-18**	**SPECIFICATION**	TC/MS Field #:
DECK DRAINS RENEWAL		

H-18 DECK DRAINS RENEWAL

Part 1: SCOPE:

1.1 The intention of this specification is for the Contractor to remove the three rotted deck drains penetrating the decks and connect the plumbing to ensure functional and leak free, scuppers.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

General Arrangement 555-H-023.
Arrangement of Deck Drains and Scuppers 65-40-01.
Arrangement of Main Deck Scuppers 65-40-02.

2.2 Standards

2.2.1 All repairs and materials used must be in compliance with today's Ship Building and Repair Standards.

2.3 Regulations

2.3.1 This ship is regulated by the Canada Shipping Act and repairs will be subjected to the inspection and approval of TCMS, marine surveyor.

2.3.2 Hotwork permits shall be obtained and adhered to while performing certain aspects contained in this work request.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all the materials and equipment necessary to execute this spec item, unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor shall bid on replacing the three deck scuppers listed in this specification.

3.2.1 The first deck drain is located on the port side above the port gangway from the boat deck. The contractor shall remove the sheet metal work to gain access to the corroded deck drain.

Spec Item: **H-18**	**SPECIFICATION**	TC/MS Field #:
DECK DRAINS RENEWAL		

3.3.1 The contractor shall renew the deck connection and 6 feet of 2" pipe down through the sheet metal and connect to existing down spout.

3.4.1 Once all repairs are completed, the contractor shall re-insulate and replace the sheet metal.

3.5.1 The second drain line is in the galley deck on the stbd side forward. The contractor shall replace the deck connection and replace 5' of 2" drain line to connect to the capped off line in the winch room below, on the starboard side.

3.6.1 The third line is located in the deck in the HVAC room on the boat deck on the port side. The deck head panels have to be removed in the Second Engineers cabin in order to facilitate these repairs. The rotted section has to be renewed and re-insulated and the deck head panels replaced. The contractor shall protect the room and contents from any damage during the repairs, and to be returned to as found condition prior to leaving.

3.7.1 All new and heat affected steel shall be coated with two coats of metal primer.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All welds will be subjected to 100% visual inspection.

4.1.2 The Contractor is responsible for the scheduling of inspection by TCMS and following the direction and tests required by TC marine surveyor.

4.2 Testing

4.2.1 20 liters of water shall be poured down each drain to prove they are leak free, prior to closing access.

4.3 Certification

4.3.1 All welders must be CWB certified and be able to produce their certificate upon request.

Spec Item: **H-19**	**SPECIFICATION**	TC/MS Field #:
DAVITS ANNUAL INSPECTION		

H-19 DAVITS ANNUAL INSPECTION

Part 1: SCOPE:

1.1 The intent of this specification is to have the Contractor supply the services of a Palfinger-Harding FSR to perform the annual inspection of the ship's Miranda, Lifeboat and Lifeboat Davit, and Barge Davit.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

General Arrangement 555-H-023.
Schat Davit Type P.H.A. 38520 lbs
Miranda Davit Type MRT 3900
Lifeboat Davit GRA 10400/4425
The contractor can have access to the Owner's Manuals to assist in execution of this task.

2.2.1 Standards

2.2.1 All repairs and materials used must be in compliance with today's Ship Building and Repair Standards.

2.3 Regulations

2.3.1 This ship is regulated by the Canada Shipping Act and repairs will be subjected to the inspection and approval of TCMS, marine surveyor.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all the materials and equipment necessary to execute this spec item, unless stated otherwise. This includes all certified weights, lifting appliances, load cells, and scaffolding.

Part 3: TECHNICAL DESCRIPTION:

3.1 The contractor shall include an allowance of $5000.00 to hire the Palfinger-Harding FSR.

Spec Item: **H-19**	**SPECIFICATION**	TC/MS Field #:
DAVITS ANNUAL INSPECTION		

3.2 The contractor shall ensure the Palfinger-Harding FSR completes an early summary inspection to identify any obvious deficiencies that require parts that require long lead times to obtain.

3.3 The contractor shall carry out all the inspections as per manufacturer's instruction manual, working within the limits and tolerances provided.

3.4 The main hydraulics for the davit systems shall be inspected for deficiencies, and noted in the inspection report to be installed during the next maintenance period.

3.5 The contractor shall inspect the braking system on all davits and ensure suitable material remaining for the next operating year.

3.6 The contractor shall inspect all wire ropes and block and supporting tackle for future use.

3.7 The contractor shall complete the gearbox inspection on each davit, installing a new gasket on the inspection cover when complete. Anything remaining open for extended periods must be suitably protected to prevent the ingress of water while not being attended to.

3.8 All access covers removed shall be properly sealed upon completion to ensure weather tight.

3.9 Once all the inspections are complete, a function test shall be performed on each davit, using the necessary weights as determined by the FSR.

Part 4: PROOF OF PERFORMANCE:

4.1 The function test with the predetermined weights must ensure smooth, trouble free, operation.

4.2 All items to be inspected by the Chief Engineer, Chief Officer and the TC/MS Surveyor. .

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 work inspections shall be provided to the Owner's Representative, showing work completed and deficiencies that require correction.

Spec Item: **H-20**	**SPECIFICATION**	TC/MS Field #:
Escape Hatch Replacement		

H-20 Escape Hatch Replacement

Part 1: SCOPE:

1.1 The intent of this item shall be to have two (2) forward existing Escape Hatches replaced with owner-supplied new.

1.2 This work shall be carried out in Conjunction with:
1.2.1 H-18 Sounding and Misc Welding Repairs
1.2.2 E-05 Windlass Overhaul

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data
Guidance Drawings 160358-001 Joiner Systems Drawing

2.2 Reference Drawings
n/a

2.3 Standards
2.3.1 Coast Guards ISM hotwork, Confined Space entry, Lockout, and fall protection procedures are to be strictly enforced.

2.3.2 A valid Hotwork permit must be obtained from vessel's Chief Engineer before any type of hot work is performed.

2.3.3 The following standards shall be used, as required, in carrying out this work. Current edition of documents, at time of contract implementation, shall be used.
2.3.3.1 Lloyd's Register – Rules and Regulations for the Classification of Ships.
2.3.3.2 Safety of Life at Sea – SOLAS.

2.4 Regulations
2.4.1 CSA – Hull Construction Regulations.
2.4.2 CSA – Load line Regulations (Sea).

2.5 Owner Furnished Equipment
2.5.1 The contractor shall supply all materials, equipment, parts and labor required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General
3.1.1 Work is located in/near bulkheads/deck heads with insulation. Contractor shall remove

any insulation that will obstruct the work area. Contractor shall install new Insulation when work is completed.

3.1.2 The Contractor shall lay down protective material to prevent damage to the surrounding areas as a result of the work. Contractor shall remove and dispose of the protective material and any dirt and debris resulting from this item following all work.

3.1.3 Existing Hatches are to be cropped according to specified opening requirements in supplied drawings. The Contractor shall consult TCMS on the crop and weld procedure prior to commencing this work.

3.1.4 Contractor to remove old hatches from the vessel and dispose of in an approved manner.

3.1.5 The attachments for the escape ladder shall be removed in a manner to not damage and re-install on the new coamings of the new hatches as they were before.

3.2 New Hatch Installations:

3.2.1 The welds shall be 100 % NDT tested for integrity and a copy of the report given to the Chief Engineer. The welds shall be coated internally and externally as per coating of that particular area. The NDT method shall be ultrasonic testing.

3.2.2 All cropped edges shall be ground clean.

3.2.3 New Hatches are to be installed as directed by the attending TCMS Inspector. The contractor shall weld the supports that were removed for the escape ladders back to the inside of the coamings of the new hatches.

3.2.4 Upon completion of welding, all hatches are to be subjected to a hose test for integrity and fitting to the satisfaction of the attending TCMS Inspector.

3.2.5 The complete area, new steel and heat effected steel is then to be coated with one complete coat of primer. This process is to ensure that all steel in the repair area is completely primed.

3.2.6 After priming, the exterior bulkheads are to have two top coats of marine epoxy. The exterior coating is to match the current vessel paint type and color

3.2.7 Applicable areas around the interior of hatches to be re-insulated with new material and trim and paneling re-installed as per original.

Spec Item: **H-20**	**SPECIFICATION**	TC/MS Field #:
Escape Hatch Replacement		

3.2.8 Contractor shall follow welding procedure as laid down by Joiner Systems installation drawings and TCMS.

3.3 Location

3.3.1 Foc'sle Deck Stbd Side into bosun stores

3.3.3 Main Deck Aft Cargo Hold Man Hatch

Spec Item: **H-20**	**SPECIFICATION**	TC/MS Field #:
Escape Hatch Replacement		

3.4 Interferences

3.4.1 Contractor shall be responsible for identification of interference items, their temporary removal, storage, and refitting to the vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

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

4.2 Testing

4.2.1 All Hatches shall be water tested at a minimum of 60 PSI pressure and witnessed by both TCMS and Chief Engineer.

4.2.2 All welds shall be 100% NDT as directed by TCMS.

4.3 Certification

4.3.1 Welding Certification as per Specification Preamble.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 All reports from the work specified shall be given to the Chief Engineer.

Spec Item: **H-20**	**SPECIFICATION**	TC/MS Field #:
Escape Hatch Replacement		

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

Spec Item: **H-21**	**SPECIFICATION**	TC/MS Field #:
Repairs to Fire Station #4		

H-21 Repairs to Fire Station #4

Part 1: SCOPE:

1.1 The intention of this specification is for the contractor to renew the 2" fire station piping and 1" drain piping at station #4.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data
General arrangement H-0016
Fire and Wash Deck 66-40-01

2.2 Standards
2.2.1 All repairs and modifications must be considered acceptable in relation to the latest ship building and repair practices.
2.2.2 The Coast Guard's ISM hot work, confined space entry, lock-out, and fall protection must be strictly adhered to.
2.2.3 The contractor shall obtain a hot work permit prior to performing hot work, and ensure proper fire watch is maintained on both sides of the bulkhead before welding the main back in place.

2.3 Regulations
2.3.1 This ship falls under the Canada Shipping Act and is regulated by Transport Canada Marine Safety. All repairs must be authorized and inspected by the attending Marine Surveyor.

2.4 Owner Furnished Equipment
2.4.1 The Contractor shall supply all materials and equipment to perform this task unless clearly stated otherwise.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor shall isolate the fire main at station #4, the water supply and the electrical heat trace supply.
3.2.1 The fire station is located on the boat deck, port side, at frame 70.

Spec Item: **H-21**	**SPECIFICATION**	TC/MS Field #:
Repairs to Fire Station #4		

3.3.1 The insulation has to be removed and the heat trace disconnected from the junction box and removed, to expose the pipe work required.

3.4.1 The contractor shall crop off the existing 2" fire main supply line and 1" fire main drain and valve. The contractor shall fabricate a new main with drain, made from 2" schedule 80 and 1" schedule 80 drain. The contractor must take care not to misplace the fittings threaded onto the fire main, as they will be reused to ensure correct threads for our fire hose.

3.5.1 The contractor shall supply and install a new 1" 90 degree drain valve and can reuse the camlock fittings at the end of the drain.

3.6.1 The contractor shall weld the new fire main to the bulkhead where it was removed.

3.7.1 The contractor shall coat all new and heat affected steel with two coats of marine grade metal primer.

3.8.1 The contractor shall install the heat trace and connect to the junction box.

3.9.1 The contractor shall install and secure foam type insulation on top of the heat trace and around the pipe work to prevent freezing.

3.10.1

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

Spec Item: **H-21**	**SPECIFICATION**	TC/MS Field #:
Repairs to Fire Station #4		

4.1.1 All welds will be subjected to 100% visual inspection.

4.1.2 The Contractor is responsible for the scheduling of inspection by TCMS and following the direction and tests required by TC to get authorization to proceed.

4.2 Testing

4.2.1 The fire main will be run up and the station inspected and tested for leaks. All deficiencies in the weld must be repaired at the owner's expense.

4.3 Certification

4.3.1 All welders must be CWB certified and be able to produce their certificate upon request.

Spec Item: **ED-01**	**SPECIFICATION**	TC/MS 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 weardown 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**	TC/MS Field #:
PROPELLER SURVEYS, PORT AND STBD		

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 (TC/MS) credit. This work will be in conjunction with item ED-03, 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. Upon completion of all work the lifting arrangements shall be removed and areas ground flush and recoated as per HD-04.

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 mark both shafts with the location of the propellers prior to any removals. 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. The Contractor shall measure the keys and keyways in the shafts and propellers in 3 locations, measuring width and thickness and depth of keyways. This to be witnessed by TC/MS, the Technical Authority and the Inspection Authority.

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 TC/MS 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 TC/MS, 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:

5.1 The contractor shall supply a copy of the NDT test reports and a report of all measurements taken.

Spec Item: **ED-03**	**SPECIFICATION**	TC/MS Field #:
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 TC/MS credit. This inspection is to include shaft bearings and all associated fittings. The stern tube Bushings 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 shafts 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 gears and brake assemblies 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.

3.4 The Wartsila mechanical stern tube seals shall be disassembled prior to removal of the shafts to prevent damage to the seal components. A Wartsila 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 Wartsila-FSR.

3.5 Upon completion of the seal removal, the tail shafts 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 shafts 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 "Rematck" 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 $10,000 for repairs to the "Rematek" coating – the actual cost for replacing the coating will be adjusted up or down using 1379 action.

3.10 The tail shafts 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.

Spec Item: **ED-03**	**SPECIFICATION**	TC/MS Field #:
TAILSHAFT AND SHAFT BEARING SURVEY PORT AND STBD		

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 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.

3.13 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.

3.14 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.

3.15 Contractor to "freeze" the bushings to allow proper installation. Contractor is to supply dry ice as required.

3.16 Upon completion contractor is to take new clearance measurements to ensure the proper clearances have been achieved.

3.17 Cooling water lines to the sterntube shall be proven clear and water flow to the sterntube to be proven adequate.

3.18 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.

3.19 Contractor is to dress the 18 fitted coupling bolts as required prior to reinstallation to ensure a proper fit.

3.20 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 Wartsila FSR shall be present for the reinstallation and set up of the mechanical seals.

3.21 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 TC/MS, 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 2 hours 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, an 8 hour sea trial shall be conducted; various revolutions 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**	TC/MS Field #:
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 (TC/MS) credit. This item shall be performed in conjunction with Item HD-04, 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.

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 & ground flush. The plugs are to be reinstalled, using new ⅛" 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.

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 TC/MS Surveyor prior to securing manhole covers. Two covers removed by the Contractor are to be fitted with new ¼" neoprene gaskets prior to installation.

Part 4: PROOF OF PERFORMANCE:

4.1 The Contractor is to be responsible for all inspections and is to consult with TC/MS, 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: **ED-04**	**SPECIFICATION**	TC/MS Field #:
RUDDER AND RUDDER STOCK		

4.2 Upon refloating the ship, the steering system to be tested in the presence of the Technical Authority (or designate) and the attending TC/MS 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	TC/MS Field #:
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 (TC/MS) 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

Spec Item: ED-05	**SPECIFICATION**	TC/MS Field #:
SEA CONNECTION INSPECTIONS		

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	21/2” 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

Spec Item: ED-05	**SPECIFICATION**	TC/MS Field #:
SEA CONNECTION INSPECTIONS		

Location	Description	Application
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

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 Contractor-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 TC/MS 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.

Spec Item: ED-05	**SPECIFICATION**	TC/MS Field #:
SEA CONNECTION INSPECTIONS		

Part 4: PROOF OF PERFORMANCE:

4.1 The Contractor is to be responsible for all inspections and is to consult with TC/MS, 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**	TC/MS Field #:
SEA CONNECTION INSPECTIONS		

ED-06 SEA CONNECTION 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 (TC/MS) 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

Spec Item: **ED-06**	**SPECIFICATION**	TC/MS Field #:
SEA CONNECTION INSPECTIONS		

Location	**Description**	**Application**
Frame 13 port, bosun stores	2"SDNR globe	Av. Cofferdam
Frame –4 port, engineer stores	2" SDNR globe	Bilge pump

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 TC/MS 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 TC/MS, 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**	TC/MS 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

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.

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.

Spec Item: **ED-07**	**SPECIFICATION**	TC/MS Field #:
BOWTHRUSTER OIL CHANGE		

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: **ED-08**	**SPECIFICATION**	TC/MS Field #:
NEW REVERSE OSMOSIS SEA WATER SUCTION		

ED-08 NEW REVERSE OSMOSIS SEA WATER SUCTION

Part 1: SCOPE:

1.1 The intention of this specification is for the Contractor to cut a new hole into the sea bay, weld in an insert plate, install an owner supplied valve, and weld in a new 1-1/4" stainless steel line to the lower reverse osmosis unit located on the starboard side of the lower engine room.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

Tank Top Composite 70-30-01
Sea Bay and Sea Chest Arrangement 71-20-01

2.2 Standards

2.2.1 The contractor must install the new valve to the sea bay in a manner acceptable to Transport Canada Marine Safety.
2.2.2 The new stainless steel line must be welded and secured in a manner acceptable to Transport Canada and be leak free.
2.2.3 The bilge area must be protected from welding sparks and all unused materials must be removed once complete.
2.2.4 All new and heat affected steel must be coated with metal primer to the same schedule as existing.

2.3 Regulations

2.3.1 The new sea bay penetration must be done in accordance with the Canada Shipping Act in relation to ship construction and repair.
2.3.2 Hot work permits must be obtained prior to commencing.
2.3.3 NDT testing must be performed on the welded connections to the sea bay and be water tight.
2.3.4 The new valve must be secured in accordance with TC regulations, new contractor supplied gaskets approved for sea water, and the suction line must be leak free.

2.4 Owner Furnished Equipment

2.4.1 The Owner will supply the Lloyds approved valve while the contractor must supply the insert material, the bolts, gaskets, elbows, flanges, and 100' of 1-1/4" schedule 40, 316 stainless steel pipe and socket elbows to complete the connection.

Spec Item: **ED-08**	**SPECIFICATION**	TC/MS Field #:
NEW REVERSE OSMOSIS SEA WATER SUCTION		

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 Once the ship is on in dry dock, the contractor can commence. The exact location of the penetration into the sea bay must be agreed upon by the contractor, Owner's Representative, and TCMS.

3.1.2 The penetration can be cut into the sea bay and an insert installed with four tapped holes or studs to secure the Owner supplied valve.

3.1.3 The valve must be installed with new, contractor supplied hardware and gaskets in a direction making the flow to the reverse osmosis obtainable.

3.1.4 The valve wheel must be removed from the bonnet of the valve and the contractor shall fabricate and install an extended spindle of approximately 4 feet high to enable proper operation of the valve.

3.1.5 Once the valve is installed, the contractor can install the socket flange and necessary stainless steel piping to connect the lower reverse osmosis unit.

3.1.6 The route taken for the new 1-1/4" stainless line must be agreed upon by the Owner's Representative and the Contractor and must not interfere with other machinery operation and maintenance.

3.1.7 The new stainless steel line must be connected directly to the lower reverse osmosis unit and secured to the existing frames and pipes to ensure integrity.

3.2 Location

3.2.1 This new suction line shall be taken from the sea bay and run about 50' to starboard and connect to the lower reverse osmosis unit. This is in the lower engine room spaces on the tank top.

3.3 Interferences

3.3.1 The Contractor is responsible for routing the new line in a manner not to interfere with existing equipment and pipes in the tank top area.

3.3.2 The Contractor is responsible for identifying, removing, storing, and replacing all items which interfere with the completion of this item.

Part 4: PROOF OF PERFORMANCE:

Spec Item: **ED-08**	**SPECIFICATION**	TC/MS Field #:
NEW REVERSE OSMOSIS SEA WATER SUCTION		

4.1 Inspection

4.1.1 All welds will be subjected to 100% visual inspection.

4.1.2 The insert and welding completed to the sea bay tank top shall be tested in accordance with the attending TCMS, which will be UT or X-ray. Any deficiencies resulting in repairs will be at the contractor's expense.

4.1.3 The Contractor is responsible for the scheduling of inspection by TCMS and following the direction and tests required by TC to get authorization to proceed.

4.2 Testing

4.2.1 The new suction line shall be pressure tested to 100 psi and saturated with soapy water to confirm leak free.

4.2.2 The contractor must supply the blanks and plugs to perform this test. It must be witnessed by the Owner's Representative and approved by TCMS.

4.2.3 Once the ship is refloated, the valve will be opened to flood the new line and shall be leak free.

4.3 Certification

4.3.1 All welders must be CWB certified and be able to produce their certificate upon request.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall provide the UT/X-ray reports to the Owner's Representative indicating no deficiencies.

Spec Item: **E-01**	**SPECIFICATION**	TC/MS Field #:
OIL TANK CLEANING AND SURVEY		

E-01 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 (TC/MS). These tanks are considered as confined spaces under the Coast Guard's Safety Management System.

Part 2: REFERENCES:

Tank	**Location**	**Capacity**	**Field #**
Fuel Overflow	Fr 106-110		3L102

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 residues. The Contractor shall quote on removing and disposing of a total of 1000 litres of waste oil residue from these tanks. Residue shall be considered 100% fuel/oil.

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 (approx .5 M2). 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.

Spec Item: **E-01**	**SPECIFICATION**	TC/MS Field #:
OIL TANK CLEANING AND SURVEY		

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 TC/MS 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.

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 all tanks, covers, vents and piping connections have been returned to operating conditions and the attending TCMS Surveyor has completed all inspections.

Spec Item: **E-02**	**SPECIFICATION**	TC/MS Field #:
WASTE OIL TANK CLEANING AND SURVEY		

E-02 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 (TC/MS). These tanks are considered as confined spaces under the Coast Guard's Safety Management System.

Part 2: REFERENCES:

Tank	**Location**	**Capacity**	**Field #**
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.

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 (approx .5 M2). 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 TC/MS 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-03**	**SPECIFICATION**	TC/MS Field #:
EMERGENCY D/G F.O. TANK SURVEY		

E-03 EMERGENCY D/G F.O. TANK SURVEY

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 (TC/MS). This tank is considered as a confined space under the Coast Guard's Safety Management System.

Part 2: REFERENCES:

Tank	**Location**	**Capacity**	**Field #**
Emergency Gen Tank	Fr 60-63.5 (S)	1.9 M^3	3L130

Emergency Gen Tank Drawing 64-90-01

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.

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 (approx .5M2). All vent, sounding and overflow pipes are to be proven clear.

Spec Item: **E-03**	**SPECIFICATION**	TC/MS Field #:
EMERGENCY D/G F.O. TANK SURVEY		

3.5 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 Following the cleaning of the tanks, the tank and vent will then be inspected by the Owner's representative and the attending TCMS Surveyor.

3.7 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.

3.8 The Contractor shall bid on the pneumatic testing of the tank. 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).

3.9 All tests shall be witnessed by the attending TC/MS 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.

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.

Spec Item: **E-04**	**SPECIFICATION**	TC/MS Field #:
HELICOPTER FUELLING SYSTEM SERVICING		

E-04 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. Contractor shall provide services of qualified Service technician as per Part 2; an allowance of $10,000.00 to be adjusted by 1379 for their services upon proof of invoice.

Part 2: REFERENCES:

Nameplate Data: Newmar Refueling System

Reference: AB1703 – M036

Represented by: National Energy Equipment , 18 Dundee Avenue, Mount Pearl)

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, and replaced with contractor supplied new.
- 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)

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.

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.

Spec Item: **E-04**	**SPECIFICATION**	TC/MS Field #:
HELICOPTER FUELLING SYSTEM SERVICING		

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-05**	**SPECIFICATION**	TC/MS Field #:
ANCHOR WINDLASS SURVEY		

E-05 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 TC/MS 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-09 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 TC/MS 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.

Spec Item: **E-05**	**SPECIFICATION**	TC/MS Field #:
ANCHOR WINDLASS SURVEY		

3.5 The main shaft and remaining fittings are to be removed to the Contractor's facility for cleaning, disassembly and TC/MS 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 renewed; the Contractor is to quote unit cost per section to renew brake material with non-asbestos friction material. Each brake requires approx 72" of 6" x ½" material attached with copper rivets.

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. New grease nipples will be contractor supply. 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. Contractor must note the location and orientation of each grease nipple and ensure they are returned in the correct position to enable access and proper greasing.

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 TC/MS 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 TC/MS, 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:

5.1 Upon completion of items HD-09, Anchors and Chains, the Anchor Windlass shall be tested as directed by the attending TC/MS Inspector; these tests shall be witnessed by the Technical Authority.

Spec Item: **E-06**	**SPECIFICATION**	TC/MS Field #:
RELIEF VALVE CERTIFICATION		

E-06 RELIEF VALVE CERTIFICATION

Part 1: SCOPE:

1.1 There are 23 air, steam and fuel system safety relief valves which require recertification for TC/MS. 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-G01-MG	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 56051-1	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 12V-03476	Kunkle	110 PSI	¾"
Main Starting Air (upper)	D/G Room Flat (A)	31481D01	Kunkle 6010EEM01-KM0165	165 PSI	1"

Spec Item: **E-06**	**SPECIFICATION**	TC/MS Field #:
RELIEF VALVE CERTIFICATION		

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 4424-14-2	Kunkle	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 56051	Aquatrol 88	55 PSI	1”
Auxiliary Steam	D/G Room Flat (A)	15428841LE	Apollo 19MGGK055	55 PSI	1½”
Emergency Air Comp (2)	D/G Room Flat (A)	NV 5057 NV 3652	FIG 118CSS Kunkle 82.4	100 psi 200 psi	½” ½”
Stbd Boiler Feed Water	D/G Room Flat (A)	C7000157131085	Anderson Greenwood	600 psi	1/2”
Valve	**Location**	**S/N**	**Type**	**Set Point**	**Size**
Stbd Boiler Steam	D/G Room Flat (A)	NV30814	Apollo 19GFA125	125 psi	1-¼”
Port Boiler Feed Water	D/G Room Flat (A)	NV B11-27343	Anderson Greenwood	600 psi	½”
Port Boiler Steam	D/G Room Flat (A)	NV 4395	Kunkle 6010HGM01-AM	125 psi	1-1/2”
#1 Air Compressor (2)	Lwr D/G Room (S)	NV-5067 NV-5069	Seetru Seetru	31.5 bar 9 bar	½”

Spec Item: **E-06**	**SPECIFICATION**	TC/MS Field #:
RELIEF VALVE CERTIFICATION		

#2 Air Compressor (2)	Lwr D/G Room (S)	NV-5068 NV-5070	Seetru Seetru	31.5 bar 9 bar	½"

Part 3: TECHNICAL DESCRIPTION:

3.1 The Contractor is to be responsible for all inspections and is to consult with TC/MS, 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.

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**	TC/MS Field #:
AUXILIARY D/G OVERHAUL & SURVEY		

E-07 AUXILIARY D/G OVERHAUL & SURVEY

Part 1: SCOPE:

1.1 The Auxiliary D/G engine and Aux Alternator are due for TC/MS survey. The Contractor is to retain the services of Caterpillar to assist & provide detailed technical guidance for the duration of this specification.

Part 2: REFERENCES:

2.1 Owner Furnished Equipment

All replacement Caterpillar parts shall be GSM; any additional materials shall be Contractor supplied.

Nameplate Data:

Caterpillar 3508 P3559

S/N 84M43076-01-1

2.2 The Auxiliary D/G & the associated heaters and. circulating pumps shall be isolated and locked out by the ship's crew.

Part 3: TECHNICAL DESCRIPTION:

3.1 The Contractor is to liaise with Caterpillar and receive a quotation for the basic overhaul and TC/MS survey; this price (including any "shadow" personnel) is to form the base price for this specification item.

3.2 Caterpillar's hourly charge-out rate (again including any "shadow" personnel) is to form the basis for any extra work required; this work (once approved by the Owner's Representative) will be covered by the issuing of an all-encompassing extra upon the successful test-run of the Auxiliary D/G.

3.3 The Contractor, in consultation with the Owner's Representative, is to ensure an approved inspection and test regime is approved by TC/MS; the Contractor is to ensure the attendance of TC/MS Inspectors at all required evolutions.

Part 4: PROOF OF PERFORMANCE:

4.1 Upon the successful completion of the overhaul (including all repairs and testing), the Contractor is to ensure all readings & measurements required by TC/MS are provided to the Owner's Representative; three bound copies are required.

Spec Item: **E-08**	**SPECIFICATION**	TC/MS Field #:
REPAIRS TO #2 WATERTIGHT DOOR AND FRAME		

E-08 REPAIRS TO #2 WATERTIGHT DOOR AND FRAME

Part 1: SCOPE:

1.1 The intention of this specification is for the Contractor to remove the watertight door #2, complete with frame, renew the brass sealing strips, machine the door and frame true and flat, and then re-installed and credited by TCMS.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 Manufacturer Eurocana and made by Mantle Industries.

2.1.2 Door opening of 1854 mm X 760 Mm

2.1.3 Contractor to follow the work instructions provided by MSI for WT door #3, report labeled 2830-01-01 GRP WT DOOR REMOVAL, obtained from the Chief Engineer in refit 2017 Folder.

2.2 Standards

2.2.1 All work performed to be in accordance with today's standard ship building and repair practices.

2.3 Regulations

2.3.1 The work performed must be to the satisfaction of the attending TCMS Surveyor, in accordance to the Canada Shipping Act relating to hull construction and repair.

2.3.2 This ship is regulated by Transport Canada and is subjected to the inspection by the attending Surveyor.

2.3.3 The system must be totally locked out prior to commencing and hot work permits must be obtained and adhered to in execution of this spec item.

2.3.4 All lifting appliances used by the contractor must be certified and the contractor shall produce the certificate upon request.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials and tools to complete the task described below.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor must obtain the services of a local hydraulic company to disconnect/reconnect and cap the hydraulics for #2 water tight door and remove the hydraulic ram to be stored in a safe place to be re-installed once the work is completed.

Spec Item: **E-08**	**SPECIFICATION**	TC/MS Field #:
REPAIRS TO #2 WATERTIGHT DOOR AND FRAME		

3.1.2 The two limit switches must be disconnected by the contractor and secured in a manner to prevent damage when working at the door.

3.1.3 The water tight door must then be lifted from the tracks and sent ashore through the soft patch in the funnel above #2 main engine.

3.1.4 The old brass sealing strips must then be removed from the door by removing approximately 70 countersunk spiral securing rivets.

3.1.5 The holes must then be drilled and tapped to accept new countersunk allen head screws, supplied by the contractor.

3.1.6 The brass strips must be replaced, drilled and countersunk in way of the securing screws, contractor supplied, and with additional thickness, the same amount as removed from the door frame. The current brass strips are about ¼" X 1" X 30' in length.

3.1.7 Once the brass strips are renewed, they are to be soldered at the joining seams to ensure water tight. The door must then be secured and machined true and flat.

3.1.8 The contractor shall stiffen the bulkhead in a manner to prevent distortion during the removal of the frame, while the frame is removed, and during the re-installation.

3.1.9 The contractor shall remove the door frame from the water tight bulkhead and bring it to a milling table large enough to skim the face true and flat.

3.1.10 The contractor is responsible for scheduling the inspection of TCMS before removing the door and frame, discussing the schedule of the work and setting up appropriate times and locations for the inspector to witness the procedures.

3.1.11 The door and frame must be placed on a lapping table and feeler gauges inserted around the perimeter of the milled surface to determine the imperfections and allowances. The opportunity to witness this test must be offered to the attending TC surveyor.

3.1.12 Once the door and frame are milled, the door and frame must be returned to the engine room space and welded in place according to the procedures described in the Eurocana Manual during initial installation. The weld procedure and process must be posted next to the watertight door for the welder and inspector to view.

3.1.13 Once the frame is welded, UT shots are to be taken of the weld and any deficiencies corrected at the contractors expense. The door must be installed and operated back and forth during the welding process to ensure no binding and free movement.

Spec Item: **E-08**	**SPECIFICATION**	TC/MS Field #:
REPAIRS TO #2 WATERTIGHT DOOR AND FRAME		

3.1.14 The contractor shall include an allowance of $10,000.00 to obtain the Schoenrok FSR out of Germany to complete the final adjustments on the watertight door, rejecting the .003" feeler gauge.

3.1.15 The contractor must procure the services of the hydraulic company to reconnect the hydraulics and function test the door with the ram.

3.1.16 The contractor must remove all welded stiffeners and carry ashore.

3.1.17 The limit switches shall be re-installed in good working order.

3.1.18 The contractor must coat the new and heat affected steel with primer and finally white paint, following the same scheme as exists.

3.1.19 The contractor is responsible for smoke extractors and ventilation to ensure fumes are exhausted from the engine room space while performing hotwork.

3.1.20 The contractor is responsible for protecting all equipment in the area from gouging, welding, and grinding sparks and dust.

3.2 Location

3.2.1 #2 watertight door is located at the center line of the ship at the upper landing in the main engine room, directly behind the boilers.

3.3 Interferences

3.3.1 The contractor is responsible for identifying, removing, storing, and replacing any and all interference items to perform this task

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 The weld is subjected to 100% visual inspection.

4.1.2 The contractor is responsible for UT or X-ray testing of the welds as determined by TCMS.

4.1.3 The contractor must discuss the schedule with TC, during the entire process, and allow the Inspector to view the critical steps as deemed appropriate by the attending Surveyor.

4.2 Testing

4.2.1 The door shall be tested for TCMS, to be fully operational, and tight as determined by the feeler gauge test and report from the FSR.

Spec Item: **E-08**	**SPECIFICATION**	TC/MS Field #:
REPAIRS TO #2 WATERTIGHT DOOR AND FRAME		

4.3 Certification

4.3.1 All welders must be CWB certified and be able to produce their certificate upon request.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall provide the UT/X-ray reports to the Owner's Representative indicating no deficiencies.

5.1.2 The contractor shall provide the results of water tight integrity of the door and work report performed by Schoenrok FSR, and milling company.

Spec Item: **E-09**	**SPECIFICATION**	TC/MS Field #:
REPAIRS TO PORT HAWSE PIPE WASH NOZZLES		

E-09 REPAIRS TO PORT HAWSE PIPE WASH NOZZLES

Part 1: SCOPE:

1.1 The intention of this specification is for the Contractor to replace the ¾" piping supplying sea water to the port hawse pipe cleaning nozzles, and the clear the nozzles of debris.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data
Fire and wash deck diagram 66-40-01.

2.2 Standards
2.2.1 All work performed to be in accordance with today's standard ship building and repair practices.

2.3 Regulations
2.3.1 The work performed must be to the satisfaction of the attending TCMS Surveyor, in accordance to the Canada Shipping Act relating to hull construction and repair.
2.3.2 This ship is regulated by Transport Canada and is subjected to inspection by the attending Surveyor.
2.3.3 The system must be totally locked out prior to commencing and hot work permits must be obtained and adhered to in execution of this spec item.

2.4 Owner Furnished Equipment
2.4.1 The contractor shall supply all materials and tools to complete the task described below.

Part 3: TECHNICAL DESCRIPTION:

3.1 General
3.1.1 The contractor must disconnect the (5) ¾" unions connecting the water pipes to the port hawse pipe.

3.1.2 The contractor must remove the existing ¾" pipe, elbows, and couplings, to clean out the 4 nozzles penetrating the port hawse pipe.

3.1.3 Once it is all proven free and clear, the contractor must replace the two 90 degree street elbows, (5) ¾" T's, (5) unions, and about 10' of ¾" pipe.

3.1.4 The contractor can either bend two sections of pipe to go around the hawse pipe or use 90 degree elbows to make the turns.

Spec Item: **E-09**	**SPECIFICATION**	TC/MS Field #:
REPAIRS TO PORT HAWSE PIPE WASH NOZZLES		

3.1.5 All threaded connections must be sealed and leak free.

3.2 Location

3.2.1 The water to the port hawse pipe is accessible through the foc'sle and directly forward..

3.3 Interferences

3.3.1 The contractor is responsible for identifying, removing, storing, and replacing any and all interference items to perform this task

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All connections will be subjected to 100% visual inspection and all runs of pipe shall be in the proper plane and not protrude abnormally into the space.

4.2 Testing

4.2.1 The fire main pump will be started and water allowed to flow through the nozzles to ensure leak free into the foc'sle. Any loose pipes or fittings and leaks will have to be repaired at the contractor's expense.

4.3 Certification

4.3.1 All welders must be CWB certified and be able to produce their certificate upon request.

Spec Item: **E-10**	**SPECIFICATION**	TC/MS Field #:
#3 PROPULSION GENERATOR AIR COOLER REPLACEMENT		

E-10 #3 PROPULSION GENERATOR AIR COOLER REPLACEMENT

Part 1: SCOPE:

1.1 The intent of this specification is for the Contractor to replace the generator air cooler on #3 D/G with the owner supplied spare and the one in service shall be placed on the dock.

1.2 The unit removed shall be carried to the Contractors facility, pressure tested, repair the leaking tube (by plugging), and then return to Fleet Technical Spares for the CCGS George R. Pearkes.

Part 2: REFERENCES:

Nameplate Data:

Generators: General Electric, AC Generators
2900 HP @ 900 RPM

Coolers: Unifin – Water Cooled Air Cooler
Air Flow – 9000 CFM
Water Flow – 40 Imp. GPM

2.1 Unless otherwise stated all required materials to be Contractor supply.

Part 3: TECHNICAL DESCRIPTION:

3.1 The CO_2 system for the affected generator is to be disconnected/reconnected by an authorized technician to prevent accidental discharge and to meet worker safety requirements. (H-07)

3.2 The Contractor shall install locks along with the Ship's crew and totally isolate #3 DG prior to commencing any work.

3.3 The Contractor shall collect all cooling water leaking from the cooler when the plumbing is let go and dispose of properly.

3.4 The Contractor shall remove all piping, brackets, gauges, sensors, and wiring to gain access to the work. All items are to be installed in good order upon completion of all work. The Contractor shall supply and use all new gasket materials on all disturbed piping and cover joints.

Spec Item: **E-10**	**SPECIFICATION**	TC/MS Field #:
#3 PROPULSION GENERATOR AIR COOLER REPLACEMENT		

3.5 The Contractor shall remove the top covers on the propulsion generator to expose the cooler.

3.6 The contractor shall remove from service and the ship, the cooler on #3 D/G and replace it with the owner supplied spare. The contractor shall include in the cost to pressure test this one for TC as well for credits. The contractor shall schedule the visit by TCMS.

3.7 Following the installation of replacement cooler, the cooler headers shall be replaced with new gaskets. The Contractor shall perform a hydrostatic test at a pressure 113 PSI for one hour. Calibrated pressure gauge(s) of a suitable range are to be used for pressure testing and a copy of the calibration certificate(s) to be provided to the Chief Engineer. Care is to be exercised at all times to prevent moisture from entering the generator internals.

3.8 The Contractor shall replace the cooler assemblies as per original, using new gaskets and seals.

Part 4: PROOF OF PERFORMANCE:

4.1 Upon reinstallation ships cooling pumps shall apply pressure to the coolers for 1 hour to ensure there is no leakage. All leakages shall be repaired by the contractor.

Spec Item: **E-11**	**SPECIFICATION**	TC/MS Field #:
CENTRAL COOLING HEAT EXCHANGERS		

E-11 Central Cooling Heat Exchangers

Part 1: Scope

1.1 The intent of this specification shall be to remove the two (2) existing Alfa Laval plate heat exchangers and replace with two (2) Owner supplied Sondex units.

Part 2: References

2.1 Guidance Drawings/Nameplate Data

2.1.1	General Arrangement	Dwg. 2588-01
2.1.2	Central Cooling Diagram	Dwg. 71-10-01
2.1.3	Capacity Plan	Dwg. 555-H-0026
2.1.4	Sondex Cooler	Dwg. S41-S42-IS-PN10-DN150
2.1.5	Plate Arrgt SW Inlet (F3)	Dwg. 71931
2.1.6	Plate Arrgt. SW Inlet (F4)	Dwg. 71932
2.1.7	Follower Plate Port Template	Dwg. 171071615000
2.1.8	Follower Plate w/ Connections	Dwg. 104111201315/306
2.1.9	Inline Filter	
2.1.10	Sondex – Operation and Maintenance Manual	

2.2 Standards

2.2.1 Fleet Safety and Security Manual (DFO/5737)

2.2.2 CSA W47.1 1983 – Canadian Welding Bureau Standards for the fusion welding of steel

2.2.3 CSA W47.2 – M1987(R1998) – Canadian Welding Bureau Standard for the fusion welding of aluminum and aluminum alloys

2.2.4 Society for Protective Coatings (SSPC) Standards

2.2.6.1 SP1 – Solvent Cleaning

2.2.6.2 SP3 – Power Tool Cleaning

2.3 Regulations

2.3.1 Canada Shipping Act 2001 – Marine Machinery Regulations

2.4 Owner Furnished Equipment

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

Part 3: Technical Description

3.1 General

3.1.1 The Contractor shall supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings and shackles necessary to perform the work. All lifting 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 specification shall be welded into place by CWB-certified welders certified to welding Std. W47.1, Div. 1 and 2.

3.1.2 Prior to any hotwork taking place, the Contractor shall ensure that the area of work and all equipment, wiring, transits, etc. have been sufficiently protected from any sparks or metal filings. The Contractor shall also ensure that the area of work, the system, and the adjacent space is certified as gas free and suitable for hotwork as per the Fleet Safety and Security Manual.

3.1.3 The Contractor shall be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from the performance of this specification item.

3.1.4 The Contractor shall include for all temporary and permanent removals for the completion of this specification item. All permanent removals are to be disposed of by the Contractor unless otherwise directed by the Owner.

3.1.5 The Contractor shall remove weld splatter, smooth weld seams and sharp edges, and remove grease, smoke, and soot marks as per SSPC-SP1. All welds shall be power tool cleaned to SSPC-SP3.

3.1.6 The Contractor shall recoat all heat affected and new steel with two coats of Amercoat Red Oxide Primer followed by two topcoats of Amercoat 5450 of the appropriate colour on all surfaces for a final DFT of 3.5 mils. All coatings shall be Contractor supplied.

3.1.7 The Contractor shall provide all WHIMIS data sheets for all chemicals, coatings, solvents, etc. which are being used during the course of this specification item. All containers of such are to be removed from the work site at the end of each work day.

3.1.8 The Contractor shall ensure that all identified valves for the central cooling system are closed and are secured using the established lock-out / tagout system as outlined in the Fleet Safety and Security Manual. Isolations shall be completed under the direction of the Chief Engineer or delegate.

3.1.9 Valve isolations are as follows:

3.1.9.1 Main Sea Water Pump #1 Discharge

3.1.9.2 Main Sea Water Pump #2 Discharge

3.1.9.3 Aux Sea Water Pump Discharge
3.1.9.4 Central Cooling Overboard Discharge
3.1.9.5 Additional remaining valves as directed by Chief Engineer to preserve operational capability of auxiliary systems.

3.1.10 The Contractor shall be responsible for the disposal of all surplus equipment which has been removed from the performance of this specification item unless otherwise noted. All disposals shall be in accordance with municipal, provincial, and federal regulations.

3.1.11 The Contractor shall not be permitted to make any additional openings in the vessel for the purpose of conducting this work. The Contractor shall utilize the existing doors, alleyways, and hatches as they currently exist in the structure of the vessel. Should the Contractor wish to do so, the hatch located on the Officers deck, aft of the wheelhouse, may be used to remove and lower equipment to the main engine room level. This will require the partial disassembly of the equipment prior to installation.

3.1.12 All piping references made shall be to the Central Cooling Diagram (Dwg. 71-10-01).

3.2 Removal

3.2.1 Prior to disassembly, the Contractor shall completely drain the central cooling system at its lowest possible point. The Contractor will be responsible for the disposal of all treated water and raw water released from the central cooling system. Contractor shall allow for a disposal of 15 m^3.

3.2.2 The Contractor shall quote a unit price per m^3 of disposal of water for the purpose of adjustment.

3.2.3 The Contractor shall remove the existing manifold, 9CW, located on the discharge side of the sea water pumps. All monitoring points shall have instrumentation removed and retained for reuse.

3.2.4 All piping and valves attached to the existing plate coolers shall be removed back to the flanges in way of the Leslie valves on both the raw and treated water sides. All existing 200/150 reducers fitted to the inlet and discharge sides of the coolers shall also be removed.

3.2.5 The Contractor shall disassemble and remove the existing plate coolers. Disposal of the coolers will not be permitted until the new units have been installed and verified in operation for integrity.

3.2.6 Any equipment identified for reuse that has been damaged during the performance of this specification item shall be replaced at the Contractor's expense.

3.3 Installation

3.3.1 The Contractor shall modify or remove and replace top plate of the existing plate cooler seating arrangement to suit the installation of the new units. Material shall be 12.5 mm 44W Steel or better.

3.3.2 Final location of the new coolers shall be such that it allows for the full opening of the coolers for the purpose of cleaning, inspection and maintenance while respecting the installation guidelines set forth by the manufacturer as much as possible and within the space constraints of the vessel.

3.3.3 The Contractor shall supply all securing hardware for the final mounting of the new coolers to the newly installed seats. All fasteners shall be Grade 8 or better of the size identified by the manufacturer. All mounting holes have a diameter of 18 mm and six (6) fasteners are required per cooler.

3.3.4 The Contractor shall be responsible to mirror both coolers from their supplied arrangement. Piping connections on the fixed plate will be in the same plane as the existing units and will require the modification of the pressure / follower plate on both coolers. Modification to the pressure plate will be as per Sondex drawings 171071615000 and 104111201315. The new ports shall be fitted with eight (8) ¾" UNC studs as per the original port and fitted with an Owner supplied port sleeve. The Contractor shall also fit a Contractor supplied 316 Stainless Steel blank, rated for 13 bar, to cover the original port in the modified pressure plates. One additional, Owner supplied, titanium plate and gasket shall be added to each modified cooler for the correct port alignment of the sea water strainer.

3.4 Piping & Valves

3.4.1 The Contractor shall supply and install eight (8) new butterfly isolation valves. Valves shall be as per original installation – ductile iron, wafer lug type. Seats shall be compatible with both sea water and treating cooling water utilizing MaxiGard® as the agent.

3.4.2 The Contractor shall be responsible to align the existing piping to the ports on the new coolers so as to remove all connection stresses when final piping and connections have taken place. It will be the responsibility of the Contractor to position all piping and valves in a manner that a single design of reducing spool shall be compatible in all eight (8) spool locations.

3.4.3 The Contractor shall be responsible to fabricate and install eight (8) reducing spool pieces for the purpose of connecting the new coolers to the Contractor modified piping, including all necessary fasteners and gaskets. The spool pieces shall be fabricated from ASTM A53 Grade B schedule 40, ERW and flanged 150 ASA.

3.4.4 The Contractor shall fabricate four (4) additional spool pieces and supply to the Owner to be used as spares complete with an AutoCAD drawing which can be used for the purpose of fabrication.

3.5 Location

3.5.1 Engine Room - Port

3.6 Interferences

3.6.1 The Contractor shall be responsible for the identification of interference items, their temporary removal, storage, and refitting to vessel.

Part 4: Proof of Performance

4.1 Inspection

4.1.1 All work shall be subject to witness by the Chief Engineer or delegate and the attending TCMS surveyor.

4.2 Testing

4.2.1 The Contractor shall be responsible to pressure test all new and modified pipe sections prior to commissioning at a pressure of 6 bar for a minimum of one (1) hour.

4.2.2 During commissioning, each isolation valve shall be tested individually to ensure they are functioning as per their intended purpose. Once all four (4) isolation valves per cooler have been verified, each plate cooler can be opened to the system and filled.

4.2.3 Each cooler shall be pressure tested to the maximum working pressure of 13.0 Bar upon final mounting and reassembly.

4.2.4 Valves fitted to the fresh water side of the cooler must be tested prior to admitting water into the raw water side of the cooler. During testing of the fresh water valves, the port strainer must be removed to ensure no leakage exists between the fresh water side and the raw water side for each cooler. This test shall be

completed with the central cooling system filled to capacity. Prior to testing the raw water isolation valves, these port strainers shall be retightened.

4.2.5 Should any leaks exist, the contractor shall be responsible for their repair and subsequent disposal of any water arising as a result.

4.2.6 Once the system has been verified as leak free under static pressure tests, the system pumps for both fresh and raw water shall be placed into service and further leak checks performed.

4.3 Certification

4.3.1 All original Class approval certificates for all system components shall be submitted to the Owner prior to the acceptance of this item.

4.3.2 All certificates related to the pressure testing of all new pipe sections shall be supplied.

4.3.3 All documentation for new flexible joints, thermowells, dual mode thermometers, and valves shall be supplied including the supplier for each.

4.3.4 All certification for any new valve or pipe section shall be supplied.

Part 5: Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor shall provide the Chief Engineer with a typewritten report of the Contractors work in both electronic and hardcopy formats outlining the details of the inspection and any alterations / repairs made prior to the acceptance of this item.

5.2 Spares

5.2.1 All spares which have been supplied with this item and have not been used in the installation shall be returned to the Owner prior to the acceptance of this item.

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 The Contractor shall ensure that all operation, maintenance, and installation manuals supplied with the new equipment unit are submitted to the Owner prior to the acceptance of this item.

Spec Item: **E-12**	**SPECIFICATION**	TC/MS Field #:
SEWAGE SYSTEM UPGRADES		

E-12 SEWAGE SYSTEM UPGRADES

Part 1: Scope:

1.1 The intent of this specification shall be to perform upgrades to various components of the sewage system.

1.2 This work shall be carried out in conjunction with the following: HD 01- Services item 1.14.

Part 2: References:

2.1 Guidance Drawings/Nameplate Data

2.1.1. Jetvac Manual Job#Q-2288D

2.1.2. Jetvac Drawings:

2.1.2.1 2288-A3-RO
2.1.2.2 2288-E1-R2
2.1.2.3 2288-MF1-RO
2.1.2.4 2288-MF2-RO
2.1.2.5 2288 -MF4-RO
2.1.2.6 2288-MF15RA
2.1.2.7 2288-MF16RB
2.1.2.8 2288-MF17-RA
2.1.2.9 Chlor-Dechlor Electrical Nodes
2.1.2.10 Q-2082S01R1
2.1.2.11 Q-2082S01R0

As-fitted drawings:
50-00-01Machinery Arrangement
555-H-0023-0025 General Arrangement

2.2 Standards

2.2.1 Canadian Coast Guard Fleet Safety Manual
2.2.2 Canadian Coast Guard ISM Confined Space Entry
2.2.3 Canadian Coast Guard ISM Hotwork Procedures
2.2.4 Canadian Coast Guard ISM Lock out Tag out Procedures
2.2.5 Canadian Coast Guard ISM Fall Protection procedures
2.2.6 CWB CSA 47.1 latest revision Division I, II or III
2.2.7 TC TP 127e
2.2.8 IEC 60332-3, 60364-5-52, 60754-0,1,2
2.2.9 IEEE 60332-3

2.3 Regulations

2.3.1. CSA Marine Machinery Regulations
2.3.2. CSA Vessel Pollution and Dangerous Chemical Regulations

2.4 Owner Furnished Equipment

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

2.4.2 The following is a list of owner supplied materials:

2.4.2.1 Media tank replacement material(media, support grating, support angles, hold down angles, spill over piping, air drop hose and associated fittings, level switch for wet well).

2.4.2.2 2 blower assemblies (2 roots blowers,2 electric motors,2 motor slide bases, sheaves, belts and belt guards).

2.4.2.3 Control panel (panel complete with duplex pump controls and run light. Duplex blower controls and run light. Chlorination/De-chlorination controls. Power "ON" light. Alarm and alarm contacts.)

2.4.2.4 Chlorination-dechlorination system (dechlorination assembly, chlorination-dechlorination chemical pumps, chlorination-dechlorination plastic feed tanks).

2.4.2.5 Jetvac Automatic Sludge reduction system (control panel, mini doser assembly, air actuated control valves, No-flex digester compound).

Part 3: Technical Description:

3.1.1 The contractor shall arrange the services of a Jetvac Contractor Field Service Representative (FSR) to provide technical support, and guidance to the contractor and to supervise the commissioning of the sewage treatment plant upgrades. The scheduling of the FSR's attendance on the vessel for commissioning shall be done in consultation with the Project Authority.

3.1.2 The contact information for the Jetvac FSR is as follows:

Mr. Alan Russell
Jetvac Inc.
4280 Harvester Road Unit 15
Burlington, ON
L7L 5Z5
Tel: (905)639-8240

Email:alan.russell@jetvac.ca

3.1.3 In consultation with the Chief Engineer the contractor shall install a temporary bypass hose connection from the media tank inlet to the sewage overboard discharge. This connection will entail removal of pipe spools and blanking of media tank inlet. The contractor shall arrange for the provision of two (2) heated portable toilets for the duration of the bypass connection work. Upon completion of the bypass connection the ship toilets will be returned to service. The contractor shall arrange collection of untreated sewage as per HD -01 Services.

3.1.4 In consultation with the Chief Engineer the contractor shall de- energize power to sewage treatment plant and perform lockout/tagout procedures accordingly.

3.1.5 In consultation with the Chief Engineer the contractor shall isolate sewage treatment plant inlet/outlet lines, and perform lockout/tagout procedures accordingly.

3.1.6 The contractor shall dispose of the entire contents of the media tank. The tank internals shall be cleaned with high pressure water only. All solid residue and water from the disposal and cleaning process shall be pumped to collection tank arranged by the Contractor. For quotation purposes the residual amount shall be bid at one thousand (1000) litres. The total shall be adjusted up or down by 1379 action

3.1.7 The contractor shall gas free the media tank prior to hotwork tank as per ISM procedures.

3.1.8 Contractor shall provide milestone date as to when sewage the media tank will be cleaned and gas freed for entry.

3.1.9 The contractor shall remove the tablet chlorinator and pipe spill-over directly into wet well.

3.1.10 The contractor shall remove and dispose of old media from media tank.

3.1.11 The contractor shall install access hatch as per drawing # 2288-MF1-RO

3.1.12 The contractor shall install six new brackets at new height in tank to fix support angles.

3.1.13 The contractor shall install two new brackets to fix media hold-down angles.

3.1.14 The contractor shall cut PVC air-lifts and spill-over pipes to new height.

3.1.15 The contractor shall fit ¾ inch half coupling in top of transfer tank for mini-doser inlet.

3.1.16 The contractor shall install Mini-doser assembly and associated control panel. The panel dimensions are 16 inches wide X 20 inches high X 8 inches deep.

3.1.17 Contractor shall make an allowance of 20 bead feet of clad welding to repair any pitting found on the internal surfaces on the media tank.

3.1.18 Contractor shall quote an allowance for labour and materials to weld in five (5) square metres of steel plating and a unit cost per square metre to address any wasted sections of the media tank. The total shall be adjusted up or down by 1379 action.

3.1.19 The contractor shall recoat the entire internal surface of the media tank with Interline 944 epoxy. The steel surface profile shall be prepared in accordance with the coating data sheet.

3.1.20 Contractor shall provide milestone date as for completion of coating media tank to be included in the production chart.

3.1.21 The contractor shall fit ½ inch stainless steel 316 alloy half coupling in top of wet well for chlorine input

3.1.22 The contractor shall install new float switch in wet well.

3.1.23 The contractor shall disconnect electrical and piping connections and remove the 2 existing blowers and motors from the existing brackets.

3.1.24 The contractor shall install 2 new blowers and motors on the existing brackets and make electrical and piping connections.

3.1.25 The contractor shall install the de-chlorination assy. In a suitable location to be determined.

3.1.26 The contractor shall install chlorination/de- chlorination pump and tank assembly in suitable location to be determined in the sewage compartment.

3.1.27 The contractor shall install the control panel as referenced in 2.4.2.3

3.1.28 New fasteners and gaskets shall be used on all new or disturbed piping.

3.1.29 Following the sewage upgrade work the contractor shall remove the temporarily fitted bypass hose connection from the media tank inlet to sewage overboard discharge and reinstall associated piping as per the original configuration. The contractor shall arrange for the provision of two (2) heated portable toilets to be used for the duration of the

commissioning and pipe reinstallation work. Upon satisfactory reinstallation of original pipe configuration the ship's toilets will be returned to service.

3.1.30 Contractor shall provide milestone date for completion of sewage upgrades to be included in the production chart.

3.2 Location

3.2.1. Media tank and associated equipment is located in the sewage compartment frames 13 to 30.

3.3 Interferences

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

Part 4: Proof of Performance:

4.1 Inspection

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

4.2 Testing

4.2.1. As per test and trials included in Jetvac field service representative commissioning.

4.3 Certification

N/A

Part 5: Deliverables:

5.1 Drawings/Reports

5.1.1. The Contactor shall provide copies of any NDT and hot work permits to the Chief Engineer upon completion of work.

5.1.2. Two (2) typewritten copies and one (1) electronic copy shall be presented to the Chief Engineer after completion.

Spec Item: **E-13**	**SPECIFICATION**	TC/MS Field #:
Sludge Tank Mounting		

E-13 Sludge Tank Mounting

Part 1: Scope

1.1 The intent of this specification is to mount the sludge tank for the incinerator.

Part 2: References

2.1 Guidance Drawings/Nameplate Data

General Arrangement	Dwg. H-0016-21
Machinery Arrangement	Dwg. 50-00-03 2 of 2

2.2 Standards

2.2.1 Fleet Safety and Security Manual (DFO/5737)
2.2.2 TP127 – Ship's Electrical Standar
2.2.3 IEEE 45:2002 – Recommended Practice for Electrical Installation on Ships
2.2.4 CSA W47.1 1983 – Canadian Welding Bureau Standards for the fusion welding of steel
2.2.5 CSA W47.2 – M1987(R1998) – Canadian Welding Bureau Standard for the fusion welding of aluminum and aluminum alloys
2.2.6 Society for Protective Coatings (SSPC) Standard
2.2.7 SP1 – Solvent Cleaning
2.2.8 SP3 – Power Tool Cleaning

2.3 Regulations
2.3.1 Canada Shipping Act 2001 – Marine Machinery Regulations

2.4 Owner Furnished Equipment
2.4.1 The Contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3: Technical Description

3.1 General

3.1.1 The Contractor shall supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings and shackles necessary to perform the work. All lifting 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 specification shall be welded into place by CWB-certified welders certified to welding Std. W47.1, Div. 1 and 2.

Spec Item: **E-13**	**SPECIFICATION**	TC/MS Field #:
Sludge Tank Mounting		

3.1.2 Prior to any hotwork taking place, the Contractor shall ensure that the area of work and all equipment, wiring, transits, etc. have been sufficiently protected from any sparks or metal filings. The Contractor shall also ensure that the area of work, the system, and the adjacent space is certified as gas free and suitable for hotwork as per the Fleet Safety and Security Manual.

3.1.3 The Contractor shall be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from the performance of this specification item.

3.1.4 The Contractor shall include for all temporary and permanent removals for the completion of this specification item. All permanent removals are to be disposed of by the Contractor unless otherwise directed by the Owner.

3.1.5 The Contractor shall remove weld splatter, smooth weld seams and sharp edges, and remove grease, smoke, and soot marks as per SSPC-SP1. All welds shall be power tool cleaned to SSPC-SP3.

3.1.6 The Contractor shall recoat all heat affected and new steel with two coats of Amercoat Red Oxide Primer followed by two topcoats of Amercoat 5450 of the appropriate colour on all surfaces for a final DFT of 3.5 mils. All coatings shall be Contractor supplied.

3.1.7 The Contractor shall provide all WHIMIS data sheets for all chemicals, coatings, solvents, etc. which are being used during the course of this specification item. All containers of such are to be removed from the work site at the end of each work day.

3.1.8 The Contractor shall not be permitted to make any additional openings in the vessel for the purpose of conducting this work. The Contractor shall utilize the existing doors, alleyways, and hatches as they currently exist in the structure of the vessel.

3.2 Sludge Tank Mounting and Installation

3.2.1 The Contractor will install the new sludge tank (Dwg. 2007132) within the funnel at the Officers Deck level aft of frame 70. The new tank shall have to be moved into position through the existing door on the after end of the funnel and shall be placed as close as practical to the afterside of the uptakes.

3.2.2 The final installed location of this tank shall permit access to all ancillary equipment which currently is fitted in the area – piping, valves, etc. – and will permit access for the purpose of maintenance to any of the newly installed equipment resulting from this specification item.

Spec Item: **E-13**	**SPECIFICATION**	TC/MS Field #:
Sludge Tank Mounting		

3.2.3 The Contractor shall fabricate a suitable mounting arrangement to have the tank supported on the deck and securely bracketed at the top to the existing uptake support beams. The Contractor shall design the support for a minimum of 2000 kg as per the requirements of TeamTec.

3.3 Location

3.3.1 Incinerator Flat – Main Deck
3.3.2 Engine Room
3.3.3 Motor Room

3.4 Interferences

3.4.1 The Contractor shall be responsible for the identification of interference items, their temporary removal, storage, and refitting to vessel.

Part 4: Proof of Performance

4.1 Inspection

4.1.1 All work shall be subject to witness by the Chief Engineer or delegate and the attending TCMS surveyor.

4.2 Testing

4.3 Certification

Part 5: Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor shall provide the Chief Engineer with a typewritten report of the Contractors work in both electronic and hardcopy formats outlining the details of the inspection and any alterations / repairs made prior to the acceptance of this item.

Spec Item: **L-01**	**SPECIFICATION**	TC/MS Field #:
THERMOGRAPHY INSPECTIONS		

L-01 THERMOGRAPHY INSPECTIONS

Part 1: SCOPE:

1.1 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:

3.1 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.

3.2 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.

3.3 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 (TC/MS) Surveyor.

Spec Item: **L-02**	**SPECIFICATION**	TC/MS Field #:
OVERHAUL MOTOR/GENERATOR SET		

L-02 OVERHAUL MOTOR/GENERATOR SET

Part 1: SCOPE:

1.1 The intention of this specification is for the Contractor to disconnect and remove from the ship to the Contractor's repair facility and perform a complete over-haul on the MG set. It has to be then returned and re-connected in good working order onboard the ship.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data
MG set supplied by A. VanKaick.
Type DSS34/25.4/4TS, 25 KVA, 1800 rpm
Serial # 2441531
Amps 30 Primary, 120 Secondary, 600 volts/3 phase/60Hz

2.2 Standards
2.2.1 All work performed to be in accordance with today's standard ship building and repair practices.

2.3 Regulations
2.3.1 The work performed must be to the satisfaction of the attending TCMS Surveyor, in accordance to the Canada Shipping Act relating to hull construction and repair.
2.3.2 This ship is regulated by Transport Canada and is subjected to inspection by the attending Surveyor.
2.3.3 The system must be totally locked out prior to commencing and ship's equipment powered from the normal emergency bus. This switch will be performed by the ship's Electrical Officer.

2.4 Owner Furnished Equipment
2.4.1 The contractor shall supply all materials and tools to complete the task described below.

Part 3: TECHNICAL DESCRIPTION:

3.1 General
3.1.1 The contractor shall coordinate this work with the ship's Electrical Officer prior to commencing. The unit shall be totally isolated and inspected before removing from the ship. The ship's Electrical Officer will switch the power from the MG set to the regular emergency bus.

Spec Item: **L-02**	**SPECIFICATION**	TC/MS Field #:
OVERHAUL MOTOR/GENERATOR SET		

3.1.2 The contractor shall record megger readings @500 volts for both the motor and generator.

3.1.3 The MG set must then be removed from the ship and taken to the contractor's facility for complete inspection and overhaul.

3.1.4 The contractor shall completely dismantle, in an orderly fashion, both the motor and generator.

3.1.5 All the windings are to be steam cleaned and oven dried.

3.1.6 The contractor shall supply and install new bearings at both ends (6212 ZZC3).

3.1.7 The rotor shall be dynamically balanced at or near the rated speed.

3.1.8 The contractor shall subject the motor and generator stator windings to a surge comparison test at 2500 vac.

3.1.9 The unit shall then be reassembled and test run at no load, to confirm and measure the voltage and currents.

3.1.10 The contractor shall provide and install new vibration dampers on the control box.

3.1.11 The unit shall then be painted and returned to the vessel.

3.1.12 The unit shall be re-installed as per original orientation and securing arrangement, connected electrically and test run at rated voltage.

3.1.13 The Electrical Officer shall be contacted to return the switch on the MG set to supply the emergency bus equipment.

3.2 Location

3.2.1 The Motor/Generator set is located on the boat deck on the starboard side, inside the emergency generator room.

3.3 Interferences

3.3.1 The contractor is responsible for identifying, removing, storing, and replacing any and all interference items to perform this task

Spec Item: **L-02**	**SPECIFICATION**	TC/MS Field #:
OVERHAUL MOTOR/GENERATOR SET		

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work completed will be subjected to an inspection by the Owners Representative and any unusual noise or heat will have to be corrected at the contractors expense.

4.2 Testing

4.2.1 The Motor/Generator set will be switched back to power the emergency bus equipment by the Electrical Officer and verified for normal operation.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall provide the vessel with a detailed report on the condition as found, the work completed, including parts used, and the condition as left such as megger, voltage, and current readings.

Spec Item: **L-03**	**SPECIFICATION**	TC/MS Field #:
KICK PIPES/WIRE PENETRATIONS RENEWAL		

L-03 KICK PIPES/WIRE PENETRATIONS RENEWAL

Part 1: SCOPE:

1.1 The intention of this specification is for the Contractor to disconnect four electrical items from the aft mast, pull the wires back through the rotted kick pipes and glands, replace the kick pipes and glands, and reconnect the electrical equipment through new glands.

1.2 In addition to the above mentioned kick pipes there are 8 more to be replaced at the helicopter refueling station, outboard side, on the flight deck.

1.3 One additional kick pipe to be replaced on the port side where the gangway limit switch passes through the upper deck to the main deck.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data
Power Deck Plan Officers and Boat Deck Dwg # 80-25
Navigation and Flood light System Dwg # 85-16
Newmar Helicopter refueling manual 600 V Electrical Schematic Motor Control Panel OP1557-8
Newmar Helicopter refueling manual 600 V Elect. Schematic External Wiring Connection OP1557-19

2.2 Standards
2.2.1 All work performed to be in accordance with today's standard ship building and repair practices.

2.3 Regulations
2.3.1 The work performed must be to the satisfaction of the attending TCMS Surveyor, in accordance to the Canada Shipping Act relating to hull construction and repair.
2.3.2 This ship is regulated by Transport Canada and is subjected to inspection by the attending Surveyor.
2.3.3 The system must be totally locked out prior to commencing.

2.4 Owner Furnished Equipment
2.4.1 The contractor shall supply all materials and tools to complete the task described below.

Part 3: TECHNICAL DESCRIPTION:

Spec Item: **L-03**	**SPECIFICATION**	TC/MS Field #:
KICK PIPES/WIRE PENETRATIONS RENEWAL		

3.1 General

3.1.1 The contractor shall coordinate this work with the ship's Electrical Officer prior to commencing. The four power supplies shall be isolated and locked out. 1. EP-101circuit #16 EC Pins, 2. L-106 circuit #5 Floodlights, 3. NL-10 and 5 Nav Panel circuits L-108 Feed from auxiliary and emergency switchboard, and 4. IC-101 circuit #20 Escort Radar. The Electrical Officer will isolate and lock out the power supply to the helicopter refueling system to enable work to be performed on the eight kick pipes there.

3.1.2 Once isolated and locked out, the Contractor must scale the aft mast and disconnect the power supply to the associated equipment. The cabling will have to be unsecured. The contractor shall clearly mark the cables to prevent mixing them up when re-installed.

3.1.3 Once disconnected, the contractor shall pull the cables back into the HVAC room and temporarily secure while the kick pipes are being renewed. The contractor shall disconnect all the necessary terminations in the helicopter refueling station to enable the cables to be pulled back from the breezeway on the deck below.

3.1.4 The contractor shall protect the area and equipment in the HVAC room and lower breezeway from welding sparks and grinding dust.

3.1.5 The contractor shall crop off the four rotted kick pipes for the aft mast and 8 transits for the helicopter refueling station and weld in new kick pipes with glands. If the contractor chooses a transit block for the aft mast area, the block must be fitted with a minimum of four knock outs to pass the four cables.

3.1.6 If a transit block is used, it must be placed in a manner to eliminate the four existing holes, such as crop out and insert.

Figure 1 Kick Pipes beside the Aft Mast

Spec Item: **L-03**	**SPECIFICATION**	TC/MS Field #:
KICK PIPES/WIRE PENETRATIONS RENEWAL		

Figure 2 Kick Pipes beside Helicopter Fuelling Station

3.1.7 If kick pipes are installed, they are to be of the same length and schedule as existing. The contractor must install new glands at the top and ensure they are properly packed and sealed to prevent the ingress of water.

3.1.8 Once the glands are fitted, the cables must be pulled back through and reconnected to the associated pieces of equipment.

3.1.9 The cables shall be secured in the same manner prior to removal.

3.1.10 All new and heat affected steel shall be coated with two coats of metal primer and HVAC room cleaned of all fire blankets, grinding dust, and welding debris.

3.1.11 The contractor shall be responsible for contacting and arranging the site visits by TC and schedule all return visits according to the Inspectors requirements.

3.2 Location

3.2.1 The kick pipes are mounted on top of the HVAC room accessible from the starboard side, at the after end, adjacent to the ladder leading to the after mast. As for interference items and removals, the main delivery Plenum and several individual air outlets from Stbd HVAC unit will have to be removed in order to gain access to the area for (4 or 8) upper kick pipes

3.2.2 The second kick pipes are fitted on the port side of the helicopter fuelling station on the flight deck.

Spec Item: **L-03**	**SPECIFICATION**	TC/MS Field #:
KICK PIPES/WIRE PENETRATIONS RENEWAL		

3.2.3 The third kick pipe is located on the upper deck, port side frame 80, and extends downwards into the deck head of washroom #124 on Main Deck. Deck head tiles, a heat lamp and vent and shower rods are only interference items there. Insulation removal and reinstall on completion obviously required

3.3 Interferences

3.3.1 The contractor is responsible for identifying, removing, storing, and replacing any and all interference items to perform this task

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work completed will be subjected to an inspection by the Owners Representative.

Spec Item: **L-03**	**SPECIFICATION**	TC/MS Field #:
KICK PIPES/WIRE PENETRATIONS RENEWAL		

4.1.2 All welding will be subjected to 100% visual inspection and meet the approval of the attending TCMS surveyor.

4.2 Testing

4.2.1 The new kick pipes and gland shall be sprayed with water from a garden hose for 10 minutes and the inside of the HVAC room will be checked for leaks.

4.2.2 Any deficiencies found will have to be repaired at the contractor's expense.

4.2.3 Any testing required by TC will be conducted through 1379, over and above the hose test.

4.2.4 The final test will be performed by the Ship's Crew to ensure the correct equipment is powered from the same cable as before.

Spec Item: **L-04**	**SPECIFICATION**	TC/MS Field #:
REPLACE FOUR FLOODLIGHTS W/H FRONT		

L-04 REPLACE FOUR FLOODLIGHTS W/H FRONT

Part 1: SCOPE:

1.1 The intention of this specification is for the Contractor to disconnect and remove from the ship the four floodlight fixtures in front of the wheelhouse with owner supplied lights.

1.2 The contractor must disconnect and remove the old lights and mount the new lights with new stainless steel mounting brackets and connect electrically.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data
New lights are Glamox FL-60.

2.2 Standards
2.2.1 All work performed to be in accordance with today's standard ship building and repair practices.
2.2.2 The Coast Guard's ISM policies regarding hot work, fall arrest, confined space entry, pre job safety, and lock out must be followed to the letter while performing this task.

2.3 Regulations
2.3.1 The work performed must be to the satisfaction of the attending TCMS Surveyor, in accordance to the Canada Shipping Act relating to hull construction and repair.
2.3.2 This ship is regulated by Transport Canada and is subjected to inspection by the attending Surveyor.

2.4 Owner Furnished Equipment
2.4.1 The contractor shall supply all materials and tools to complete the task described below.
2.4.2 The Owner will supply the 4 new fixtures which are kept onboard.

Part 3: TECHNICAL DESCRIPTION:

3.1 General
3.1.1 The contractor shall coordinate this work with the ship's Electrical Officer prior to commencing. The power supply to the 4 flood lightsshall be locked out and tagged by the crew and contractor.

3.1.2 The contractor shall proceed to remove the 4 old flood lights, disconnect the lights electrically, and unsecure the units and lower to the dock.

Spec Item: **L-04**	**SPECIFICATION**	TC/MS Field #:
REPLACE FOUR FLOODLIGHTS W/H FRONT		

3.1.3 The contractor shall mount the new lights in the same location as the ones removed, with the new stainless steel bracket supplied with the lights.

3.1.4 The contractor shall connect the new lights and ensure a proper weather tight seal in the packing gland.

3.1.5 The contractor shall install the new light brackets with stainless steel hardware to eliminate corrosion.

3.1.6 Once secured, the Electrical Officer shall be contacted to return the power and test the lights.

3.1.7 The contractor shall adjust the tilt on the lights to maximize the illumination on the well deck below. The Contractor shall then harden the bolts to lock in place.

3.2 Location

3.2.1 The flood lights are below the cat walk for window cleaning on the bridge, across the front.

3.3 Interferences

3.3.1 The contractor is responsible for identifying, removing, storing, and replacing any and all interference items to perform this task

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work completed will be subjected to an inspection by the Owners Representative, and be adjusted according to the wishes of the Chief Officer.

4.2 Testing

4.2.1 The lights shall be switched on after dark to determine the effectiveness and angle of projection.

Spec Item: **L-05**	**SPECIFICATION**	TC/MS Field #:
GPS/ DGPS Upgrade		

L-05 GPS/ DGPS Upgrade

Part: 1 SCOPE:

1.1 The intent of this specification is to remove the existing Northstar 952X GPS system and replace with a new Dual Furuno GP-170D GPS/DGPS system.

1.2 Contractor must supply all materials, and parts required to perform the specified work unless otherwise stated.

Part: 2 REFERENCES:

2.1 Guidance Drawings and Documents

Drawing Number	Description	Electronic Number
Preliminary	CCGS George R. Pearkes Dual Furuno GP-170D GPS/DGPS System Block Diagram	
63900601	CCGS George R. Pearkes Northstar DGPS System	
639010AL	George R. Pearkes Antenna Arrangement	

2.2 Standards

2.2.1 Fleet Safety and Security Manual (DFO/5737)
2.2.2 TP127E – Ships Electrical Standards
2.2.3 IEEE 45:2002 – Recommended Practice for Electrical Installations on Ships
2.2.4 Specification for the Installation of Shipboard Electronic Equipment (70-000-000-EU-JA-001)

2.2.5 General Information for the Rules and Regulations for the Classification of Ships.
2.2.6 CWB, Welding Procedures

2.3 Regulations

2.3.1 Canada Shipping Act, 2001

2.4 Owner Furnished Equipment

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

Part: 3 TECHNICAL DESCRIPTION

3.1 General

3.1.1 The contractor must supply all equipment, enclosures, ventilation, staging, chain falls, carnage, slings, and shackles necessary to perform the work. All lifting equipment must be appropriate for the expected duties, and be accompanied by current certification indicating, or be permanently marked as to being, or a safe working load for the expected duties. Any brackets, mounts, or any other welded attachments required in the performance of this specification must be welded into place by certified welders.

3.1.2 Prior to any hotwork taking place, the contractor must ensure that the area of work and all equipment, wiring, transits, etc. have been sufficiently protected from any sparks or metal filings.

3.1.3 All cabling, once installed, must be marked with a stamped stainless steel metal tag for all outside cabling and an appropriate label type for all inside cabling. The labels are to be securely affixed to the cable at each end and through any deck, deck heads, and/or gland penetrations with the designation for each cable as provided in this specification.

3.1.4 Contractor responsible for the temporary removal and reinstallation of any deck heads, bulkheads, paneling, insulation, and any items that is deemed to be interfering to the running of any cables and mounting of any equipment.

3.1.5 All cabling must follow existing cable trays throughout the vessel where fitted. Once installed, all cabling must be secured as per TP127.

3.1.6 The contractor must be responsible to ensure that all areas have been cleaned and free of any debris resulting from the performance of this specification item.

3.1.7 Prior to the commencement of any electrical work, the contractor must ensure that all electrical supplies feeding the systems have been isolated at the source following an established lockout/tagout procedure. Contractor must ensure that Chief Engineer or Senior Electrical Officer is notified of any lockout/tag out completed.

3.1.8 Electrical Isolations for AC power are as follows:

3.1.8.1 IC-101-13 (115 VAC 15A)
3.1.8.2 IC-101-17 (115 VAC 15A)

3.1.9 Upon final installation, testing must be carried out as per Section 4.2 of this specification item.

3.1.10 The contractor must work in conjunction with a Coast Guard Electronic Technician to oversee the installation of the new GPS/DGPS system to ensure compliance with applicable Coast Guard standards. Terminations of all equipment must be completed by CCG technicians with the exception of those for electrical supply which must be the contractor's responsibility as well as any grounding requirements.

3.1.11 Contractor must disconnect and remove the following equipment listed in table below.

3.1.12 Equipment Removal

Equipment	Location

Spec Item: **L-05**	**SPECIFICATION**	TC/MS Field #:
GPS/ DGPS Upgrade		

Northstar Antenna	W.H. Top forward rail in front of the AC Hut

3.1.13 Contractor must be responsible for the removal of the following cables listed in table below.

3.1.14 Cable Removal

Cable Label	**From**	**To**
? RF	Nav. Bridge Nav. Console Back of Northstar 952X	Northstar antenna located on W.H. Top forward rail

3.1.15 Contractor must be responsible for all AC Power terminations in panels.

3.1.16 Contractor must be responsible for the supply and installation of a new 5" Gooseneck complete with Rotex transit and 16 20mm selectable size blocks. Gooseneck to be installed on the Wheelhouse Top on the forward side of the AC Hut in the area of the existing kick pipes with the opening facing down. Contractor must be responsible for the priming and painting of all steel surfaces affected with two (2) coats of primer and two (2) coats of marine white.

3.1.17 Contractor must be responsible for the supply and installation of 24 cable hangers on the Wheelhouse Top forward section.

3.1.18 Contractor must supply and install the following cables listed in table below.

3.1.19 Cable List

Spec Item: **L-05**	**SPECIFICATION**	TC/MS Field #:
GPS/ DGPS Upgrade		

Cable Label	Cable Type	From	To	Signal	Length (m)
GPS1-ANT	LMR-400-UF-FR RF Coaxial Cable	Nav. Bridge Nav. Chart Console Center	W.H. Top forward rail Port Side Antenna #39	RF	30
GPS2-ANT	LMR-400-UF-FR RF Coaxial Cable	Nav. Bridge Nav. Chart Console Center	W.H. Top forward rail Starboard Side Antenna #31	RF	30
IC-101-13	14/3 Marine AC Cable	Panel IC-101 Nav. Bridge Nav. Chart Console	Nav. Bridge Nav. Chart Console Center	AC Power	5
GPS-DATA-FOG1	Belden 9328	Nav. Bridge Nav. Chart Console Center	Boat Deck Electronic Equipment Room	Data	25
GPS-DATA-FOG2	Belden 9328	Nav. Bridge Nav. Chart Console Center	Boat Deck Electronic Equipment Room	Data	25
SDL-PORT	Belden 9369	Nav. Bridge Nav. Chart Console Center	Nav. Bridge Port Side Deck Head	Data	20
SDL-STBD	Belden 9369	Nav. Bridge Nav. Chart Console	Nav. Bridge Starboard Side Deck Head	Data	20

		Center			
SDL-CENTER	Belden 9369	Nav. Bridge Nav. Chart Console Center	Nav. Bridge Forward Center Console	Data	10

3.2 Location

3.2.1 Navigation Bridge Deck
3.2.2 Boat Deck

3.3 Interferences

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

Part: 4 PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work must be subject to witness by the Chief Engineer of delegate and the attending surveyor.

4.2 Testing

4.2.1 All cables are to be checked for continuity after installation to ensure operational capability. Should any cable run fail to pass testing, the cable must be replaced at the contractor's expense.

4.2.2 All cable testing must be verified by a Coast Guard Technician.

4.2.3 New AC/DC circuits must be proven operational.

4.2.4 Electronic equipment which has been removed for the performance of this specification item must be returned to operational condition as it will be used as spares for similar equipment used in CCG fleet.

4.3 Certification

4.3.1 All original Class approval certificates for all system components must be submitted to the owner prior to acceptance of this item.

Part: 5 DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor must provide the Chief Engineer with a typewritten report of the contractors work in both electronic and hardcopy formats outlining the details of the inspections and any alterations / repairs to the acceptance of this item.

Spec Item: **L-06**	**SPECIFICATION**	TC/MS Field #:
Seatel Antenna Upgrade		

L-06 SEATEL ANTENNA UPGRADE

Part: 1 SCOPE

1.1 The intent of this specification is to remove the old Telesat Antenna Dome from the top of the main mast and install new owner supplied Antenna Dome in its place.

1.2 Contractor must supply all materials, and parts required to perform the specified work unless otherwise stated.

Part: 2 REFERENCES:

2.1 Guidance Drawings/Documents

Drawing/Document Number	**Description**	**Electronic Number**
	Sea Tel 4009MK3-36 Installation Manual	

2.2 Standards

Spec Item: **L-06**	**SPECIFICATION**	TC/MS Field #:
Seatel Antenna Upgrade		

2.2.1 Fleet Safety and Security Manual (DFO/5737)
2.2.2 TP127E – Ships Electrical Standards
2.2.3 IEEE 45:2002 – Recommended Practice for Electrical Installations on Ships
2.2.4 Specification for the Installation of Shipboard Electronic Equipment (70-000-000-EU-JA-001)
2.2.5 General Information for the Rules and Regulations for the Classification of Ships.

2.3 Regulations

2.3.1 Canada Shipping Act, 2001

2.4 Owner Furnished Equipment

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

PART: 3 TECHNICAL DESCRIPTION

3.1 General

3.1.1 The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings and shackles necessary to perform the work. All lifting equipment must 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 specification must be welded into place by CWB-certified welders certified to welding Std. W47.1, Div. 1 and 2.

3.1.2 Prior to the commencement of any electrical work, the contractor must ensure that all electrical supplies feeding the systems have been isolated at the source following an established lockout/tagout procedure, and as per ISM fleet safety manual.

3.1.3 Contractor must disconnect and remove two Antenna Cables (LMR600) and two AC Cables from the existing antenna dome. These cables must be retained for the new Antenna Dome.

Spec Item: **L-06**	**SPECIFICATION**	TC/MS Field #:
Seatel Antenna Upgrade		

3.1.4 Contractor must remove the Telesat Seatel Dome from the top of the vessels main mast.

3.1.5 Contractor must install the new Cobham Seatel Antenna in the same space as the one removed.

3.1.6 Contractor must re-gland/repack the four cables that were removed from the old antenna and reconnect the AC Cable only as CCG techs will reconnect the two antenna cables.

3.2 Location

3.2.1 Vessel Main Mast

3.3 Interferences

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

PART: 4 PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work must be subject to witness by the Chief Engineer of delegate and the attending TCMS surveyor.

4.2 Testing

4.2.1 All cables are to be checked for continuity after installation to ensure operational capability. Should any cable run fail to pass testing, the cable must be replaced at the contractor's expense.

4.2.2 All cable testing must be verified by a Coast Guard Technician.

Spec Item: **L-06**	**SPECIFICATION**	TC/MS Field #:
Seatel Antenna Upgrade		

4.2.3 New AC/DC circuits must be proven operational.

4.2.4 Electronic equipment which has been removed for the performance of this specification item must be returned to operational condition.

4.3 Certification

N/A

PART: 5 DELIVERABLES:

5.1 Drawings/Reports

N/A

5.2 Spares

5.2.1 All owner supplied cable which has not been used must be returned to the owner prior to the acceptance of the item.

5.3 Training

N/A

5.4 Manuals

N/A

Spec Item: **Annex A**	**SPECIFICATION**	TC/MS Field #:
Drawings and Technical info / manuals		

Annex A

Drawings and Technical Information / Manuals

Drawings

Docking Plan	555-H-0022
Shell Expansion	555-H-0001
Extended Spindles	60-00-01 sheet 1 of 2
Ballast Diagram	67-10-01 sheet 2 of 2
Capacity Plan	555-H-0026
General Arrangement	555-H-0023-0025, H-0016
Ventilation Dwgs	H-3810 through H-3840
Air and Sounding	67-30-01
Arrangement of Deck Drains and Scuppers	65-40-01
Arrangement of Main Deck Scuppers	65-40-02
Fire and Wash Deck	66-40-01
Tailshaft	3591-10
Arrangement of Shafting	3591-400
Tank Top Composite	70-30-01
Sea Bay and Sea Chest Arrangement	71-20-01
Anchor Windlass Shaft & Motor Assembly	900-400-351
Machinery Arrangement	50-00-01 / 03
Power Deck Plan Officers and Boat Deck	80-25
Navigation and Flood light System	85-16

Spec Item: **Annex A**	**SPECIFICATION**	TC/MS Field #:
Drawings and Technical info / manuals		

Newmar Helicopter refueling manual 600 V Electrical Schematic Motor Control Panel OP1557-8

Newmar Helicopter refueling manual 600 V Elect. Schematic External Wiring Connection OP1557-19

Joiner door info
Joiner Systems Drawing Aluminum Door 160229-002Rc
Joiner Systems Drawing Steel Door 160229-001Rc
Joiner Systems Weld Procedure for Steel plate doors
Lloyds Cert Aluminum Door MTL1600758
TC Component Cert Steel Door 2016-07618-301

Joiner Hatch info
Guidance Drawings 160358-001

Central Cooler info
General Arrangement Dwg. 2588-01
Central Cooling Diagram Dwg. 71-10-01
Sondex Cooler Dwg. S41-S42-IS-PN10-DN150
Plate Arrgt SW Inlet (F3) Dwg. 71931
Plate Arrgt. SW Inlet (F4) Dwg. 71932
Follower Plate Port Template Dwg. 171071615000
Follower Plate w/ Connections Dwg. 104111201315/306
Inline Filter
Sondex – Operation and Maintenance Manual

Sewage Plant info
Jetvac Manual Job#Q-2288D
Jetvac Drawings:
- 2288-A3-RO
- 2288-E1-R2
- 2288-MF1-RO
- 2288-MF2-RO
- 2288 -MF4-RO
- 2288-MF15RA
- 2288-MF16RB
- 2288-MF17-RA
- Chlor-Dechlor Electrical Nodes
- Q-2082S01R1
- Q-2082S01R0

Gyro Compass Info

Spec Item: **Annex A**	**SPECIFICATION**	TC/MS Field #:
Drawings and Technical info / manuals		

CCGS George R. Pearkes Dual Furuno GP-170D GPS/DGPS System Block Diagram

CCGS George R. Pearkes Northstar DGPS System 63900601

George R. Pearkes Antenna Arrangement 639010AL

Technical info / manuals

Anfomatic Instruction Manual- Installation and Commissioning, section 3.3

International Marine Coatings Intershield 163 Inerta

Kitchen Knight PCL-460 Wet Chemical

MSI Report for WT door #3, report labeled 2830-01-01 GRP WT DOOR REMOVAL

MG set supplied by A. VanKaick.

Sea Tel 4009MK3-36 Installation Manual