

# **CCGS LOUIS S. ST. LAURENT**

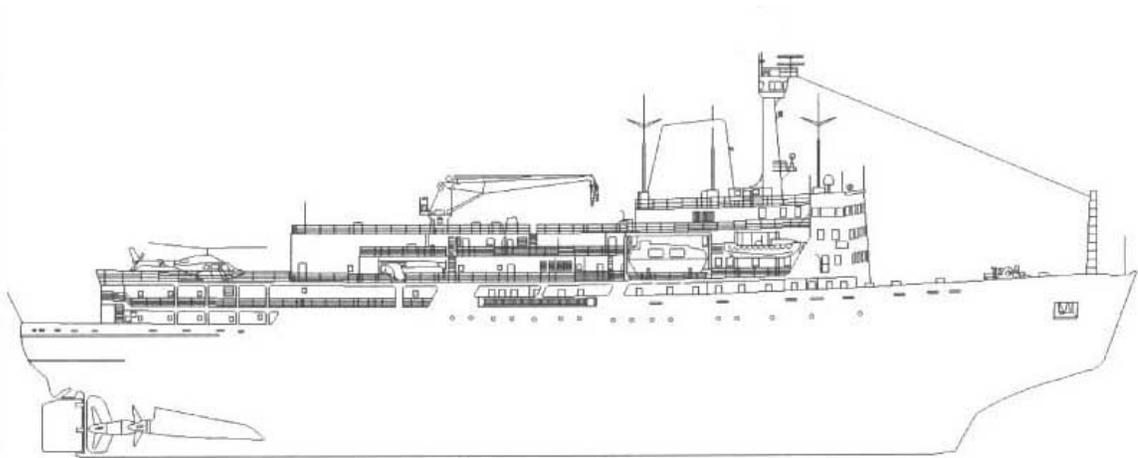


## **ALONGSIDE ANNUAL REFIT 2013**

### **CANADIAN COAST GUARD Newfoundland Region**

**Version- March 19, 2013**

## CCGS LOUIS S. ST LAURENT



### VESSEL PARTICULARS FT/IN M

LOA: 392'- 6"	119.63
LBP: 356'- 6"	108.66
Breadth(Mld): 80'- 0"	24.34
Depth(Mld): 43'- 0"	13.11
Design WL Fwd: 30'- 0"	9.14
Aft: 32'- 6"	9.91
Displacement: 14,504 LT	14,737 MT

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## PREAMBLE

1. **Owner's Representative:** All the following work shall be completed to the satisfaction of the Owner's Representative, who, unless otherwise advised, will be the Chief Engineer of the ship or his designated representative. Upon completion of each item of the specification, the Owner's Representative shall be notified so that he may inspect the work prior to final closing up and after complete closing up. Failure to give notification does not absolve the Contractor of the responsibility of providing the Owner's Representative the opportunity to inspect any item. Inspection of any item by the Owner's Representative does not substitute for any required inspection by Transport Canada Marine Safety Branch (TCMSB), Lloyds Register, or Health and Welfare Canada (HWC).
2. **Welding Standards:** The Contractor shall be certified by the Canadian Welding Bureau according to CSA Standard W47.1-1983 "Certification of companies for Fusion Welding of Steel Structures," Division 1, 2.1 or 2.2. Where welding is required on aluminium superstructure Canadian Coast Guard (CCG) specification for ALUMINIUM WELDING (TP 9415E) will apply and Contractor shall be qualified to CWB 47.2 for aluminium welding. The Canadian Welding Bureau shall approve all personnel performing welding. Any welding near bearings or electronic equipment shall have its work locally grounded. Welding is to be in accordance with the Canadian Coast Guard Welding Specifications for Ferrous Materials, Rev 4. A copy of the Welding Specifications is available upon request from the Owner's Representative.
3. **Service Conditions:** All work carried out shall be designed to meet the following service conditions:
  - Outside air temperature of minus (-) 40 degrees C to plus (+) 35 degrees C;
  - Wind velocity of 50 knots;
  - Water temperature of minus (-) 2 degrees C to plus (+) 30 degrees C;
  - Shock loading of 2.5 g horizontal, 1.5 g vertical.
4. **Staging:** Contractor shall supply labour and material to erect staging for access as necessary to carry out specified work and additional work as agreed, and remove same after completion. Staging shall be included in quotation.
5. **Equipment:** The Contractor shall include in quotation the costs of all transportation, rigging, slinging, crange, removals and installations of parts and equipment required to carry out work.
6. **Hotwork:** Any item of work involving the use of heat in its execution requires that the Contractor advise the Owners' Representative before starting such heating and upon its completion. The Contractor shall provide sufficient suitable fire extinguishers and a fire watch during any such heating 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 Ship's extinguishers shall not be used except in an emergency. The Contractor shall service and to refill any ship's

extinguisher used under such conditions. The Contractor shall provide suitable fire retardant coverings to protect wire ways, cables, equipment and structure from welding slag, splatter etc. The Contractor shall abide by the Coast Guard Hot Work Policy outlined in the Safety Annex of the Appendix.

7. **Access and Interference Items:** Any piping, manholes, parts and/or equipment requiring removal to carry out specified work and/or to gain access shall be refitted upon completion with new jointing, anti-seize compound, clamps and brackets as applicable (Contractor supplied) and secured in original condition. Any removals shall be jointly inspected by both the Contractor and the Owner's Representative prior to removal.
8. **Temporary Lighting/Ventilation:** Temporary lighting and/or temporary ventilation required by Contractor to carry out any item of this specification shall be Contractor supplied CSA approved equipment in good repair. This equipment shall be maintained in safe working condition during the work and removed upon completion.
9. **Cleanliness:** The Contractor shall ensure that all spaces, compartments and areas, both internal and external, are left in as clean a condition as found. The Contractor is fully responsible for the containment and removal of all debris and dust created by work arising from this contract. The Contractor shall be responsible for all costs associated with the containment and removal of such debris. All areas affected by the work are to be sealed and mechanically vented to an area well clear of the ship's interior, especially during removals and steel deck preparations.
10. **Chemist's Certificates:** The Contractor shall supply the Owner's Representative with marine chemists' or other qualified persons, certificates according to Transport Canada Marine Safety Bulletin (TCMSB) TP 3177E before any entry, cleaning, painting or hot work is commenced in confined spaces or machinery compartments. Certificates shall clearly state the type of work allowed and be renewed as required by the regulations. Copies of all certificates are required as follows: one to Owner's Representative, one posted outside each entrance to the space in question and one copy for the Fire Control Plan, located at the Gangway.
11. **Fire Fighting Systems:** Whenever any work is being carried out involving a ship's fire fighting or fire detecting system, it shall be done in a way that leaves the vessel and any persons aboard with adequate protection against fire at all times. This shall be accomplished by removal or disarming of only part of the system at a time, by replacement with spares while work is in progress or by other means acceptable to the Owner's Representative.
12. **Primers:** Unless specified otherwise, any replacement and/or disturbed steel work shall be given a minimum of two (2) coats of Contractor supplied marine primer, acceptable to Owner's Representative, immediately upon completion of work. **Lead-based paints shall not be used.** All welds shall be chipped and cleaned prior to priming.
13. **Tools and Materiel:** All materials, unless otherwise specified, shall be supplied by the Contractor. The Contractor to supply all necessary tools to do specified work

14. **Inspection:** The Contractor shall be responsible for calling in the services of Transport Canada Marine Safety Branch (TCMSB), Lloyds Register and Health and Welfare Canada (HWC) Inspectors as required for surveys and inspections. The Contractor shall provide as much notice as is practical prior to inspections. The Owner's Representative reserves the right to attend such inspections. Such inspections do not replace the requirement to have the Owner's Representative inspect the work.
15. **Crown Access/Activities:** During the period that this vessel is in refit, members of the ship's crew, ship's engineers, Regional staff and service specialists will be carrying out repairs and maintenance to various ship's equipment not covered in this specification. The Contractor shall not deny access to the vessel to these persons. Every effort will be taken to ensure that this self-maintenance will not interfere or conflict with work being carried out by Contractor's personnel.
16. **Scheduling:** The successful Contractor shall provide at Pre-Refit Meeting a Production Bar Chart showing commencement and completion dates for each item in this specification. This document shall highlight any critical dates and show the effects of late completion of the work plan. Updated Production Schedules shall be presented by the Contractor at each refit meeting or more frequently if requested by the Owner's Representative.
17. **Test Results:** All test results, calibrations, measurements, trials and readings shall be properly tabulated and compiled into three typewritten copies and distributed as follows; two copies to Coast Guard Technical Services and one to the PWGSC contract officer. All test and trials shall be performed to the satisfaction of the owner's representatives and the TCMSB and Lloyds inspectors prior to completion of the Contract.
18. **Instructions:** The overhaul and installation of all machinery and equipment specified herein shall be as per the Manufacturers' applicable instructions, drawings and specifications.
19. **Equipment Calibration:** The Contractor shall be responsible to ensure all testing and measurement equipment (mechanical or electronic) required to complete the specified work is calibrated and that calibration certificates for said devices are submitted to the Chief Engineer prior to final inspection or witnessing of tests.
20. **Workmanship:** The Contractor shall use fully qualified, certified and competent tradesmen and supervision to ensure a uniform and high level of workmanship as judged by normally accepted shipbuilding standards to the Owner's Representative's satisfaction.
21. **Supervision:** During all phases of the contract, the Contractor will ensure appropriate supervision of both Contractor's and subcontractor's personnel.

Supervisory personnel are to accompany employees at all times while working in the vessel's accommodation areas and cabins.

22. **Equipment Inspection:** Any items or equipment removed and subsequently reinstalled in order to carry out the work specified or arising shall be jointly inspected for damages prior to removal by both the Contractor and Owners representative.
23. **Protection:** 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, paint, sand grit or shot blasting, welding, 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.
24. **Asbestos Containing Materials:** Contractor shall ensure all materials supplied are asbestos free. An onboard asbestos materials survey conducted in 2006 has determined that there are small quantities of non-friable ACMs (Asbestos Containing Materials) onboard the Canadian Coast Guard Ship (CCGS) Louis S. St-Laurent. The ACMs were found to be in some:
  - Window caulking / linings, dark grey in colour.
  - Conduit penetrations, fire-stop grey, beige, and brown in colour.
  - A black insulating sink underside coating in science labs No. 426

All other materials onboard the CCGS Louis S. St. Laurent have been found to be asbestos free. Contractors must follow the vessel's Asbestos Management Plan when handling, disturbing, or working in the direct vicinity of these identified ACMs. Type 1 Work Procedures are necessary when working with these materials. Contractors must employ workers specifically trained and certified in dealing with ACMs or subcontract to parties that have personnel certified and trained to work with these materials.

There is a comprehensive list onboard of spaces and materials regarding their ACM composition. The Contractor shall obtain specific job site information from the Owner's Representative to determine if these ACMs are present.

All necessary documentation of compliance with these standards shall be completed and given to the Owner's Representative prior to, during, and after completion of all work as applicable to the process. Air quality testing shall be carried out prior to and after completion of work by certified personnel with the proper equipment. Copies of all air quality testing shall be given to the Owner's Representative.

25. **Smoking:** The Public Service Smoking Policy forbids smoking in Government ships in all areas inside the ship where shipyard personnel shall be working. The Contractor shall inform employees of this policy and ensure it is complied with in all cases.

26. **Restricted Areas:** The following areas are out of bounds to Contractor's and Sub-Contractors' personnel except to do work as required by the specifications: all cabins, offices, wheelhouse, control room, converter room, transformer room, gym area, public washrooms, cafeteria, dining room and lounge areas. The Contractor shall cover any carpeted areas before commencement of any work. The Contractor shall ensure that no employees bring meals on board the ship.
27. **Drawings:** All drawings and drawing revisions that the Contractor is requested to do, in the execution of this contract are to 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 are not to be updated using a freehand scrawl. Prints and reproducible that a Contractor is required to provide are to be made on one sheet of paper as opposed to gluing, taping and stapling smaller pieces
28. **Halocarbon Policy-** The Contractor is to note that the Coast Guard has a Policy for Controlling Halocarbon Use Aboard Ships in place. The policy is section 7.F.10. of the Fleet Safety Manual, a copy of which is in the attached Safety Annex. The Contractor will be responsible to ensure the Contractor's personnel, including subcontractors, follow this policy.
29. **Waste Oil Disposal:** Disposal of waste oil products shall be carried out by the Contractor, or subcontractors, who have 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.F.1. a copy of which is in the attached safety annex.
30. **Waste Products Disposal:** Similarly, the disposal of waste products from blasting and mechanical cleaning is to be carried out by the Contractor, or subcontractor, who have been licensed by provincial authorities for the disposal of such products and is to abide by provincial and municipal regulations. Copies of certificates must be produced upon request.
31. **Safety Standards:** All requirements of Canadian Labour Code Part 2 and applicable provincial regulations, Marine Occupational Health and Safety Regulations and Canadian Coast Guard Fleet Safety Manual are to be satisfied by all contractual activities undertaken onboard the CCGS Louis S. St. Laurent.
32. **Electrical Installations:** All electrical installations or renewals shall be in accordance with the latest edition of the following Marine standards:
- TP 127 - Ship Safety Electrical Standards
  - IEEE Standard 45 - Recommended Practice for Electrical Installation on Shipboard.
33. **Safety:** Prior to the pre-refit meeting, the successful Contractor is to provide his company Safety Plan pertaining to this contract and addressing the CCG Safety Regulations and relevant Federal and Provincial Government Regulations. The Contractor shall note that Canadian Coast Guard ships are presently working

under the ISM code and each ship has a Fleet Safety Manual onboard. The Fleet Safety Manual will be adhered to when contract work involves CCG personnel and any other Public Service Employee during the contract period. This is considered a Federal Workplace to which the Canada Labour Code Part II will apply. Crew will be living aboard for the duration of this contract. Following are the listings of the applicable work instructions found in the Safety Annex of the Appendix:

- 7.B.2 Fall Protection
- 7.D.9 Entry Into Enclosed Spaces
- 7.D.11 Hotwork
- 7.D.19 Lockout And Tag Out
- 7.F.1 Handling Fuel, Oil And Waste Oil Products
- 7.F.6 Handling Storage And Disposal Of Hazardous Materials
- 7.F.9 Paint And Other Coatings
- 7.F.10 Controlling Halocarbon Use Aboard Ships
- 7.F.12 Potable Water Quality Policy

**\*\* Note\*\*\***

**1)The Contractor shall maintain a log recording all personnel entering confined spaces. The log shall record times of entry, departure and names of all persons involved.**

**2)The Contractor is to ensure that their rescue equipment is aboard ship as stated in the Contractor's Safety Plan.**

## **SPECIAL CONDITIONS**

Contractor shall be aware that at the award of this Contract there may be several other Contracts in place on the vessel. Contractor shall not have use of any staging, equipment or crange that other Contractors have in place.

Contractors shall be aware that the CCGS Louis S St Laurent is ISPS certified and as such, the winning Contractor shall have to participate in a vessel orientation prior to Contract work beginning. This will take approximately 1 hour and all Contractor Personal shall attend. Scheduling will be by Vessel Personnel as soon as Contract is let and will not cause Contractor a delay to start of work. Contractor is to note that all personnel are expected to conform to the ship's security policies that will be presented during this orientation period. Further to this, Contractor's employees are not permitted in the cafeteria, messes, washrooms and/or other accommodation areas unless required to complete work items identified. A designated washroom will be assigned for contract personnel use and must be maintained in a neat and clean condition.

## **H-01 SERVICES**

1. The following services shall be supplied and connected upon arrival at St. John's Port Authority property, Pier 17, maintained throughout the contract period and removed from the vessel on completion of the work period.
2. **Fire Main:** Water shall be supplied to the vessels fire main system at a pressure of 550 kPa (80 psi) and be continuous supply 24 hours per day. The hose shall be connected to the ship's international shore connection located on the Upper Deck. A pressure reducing station with isolation valve and pressure gauge shall be fitted before the shore connection on board the ship.
3. **Fresh Water (Potable):** Potable water shall be supplied through a fresh water filling line (minimum 1 ½") with a pressure reducing station, isolation valve and gauge. The pressure reducing station shall be capable of maintaining the potable water pressure between a minimum 50 psi to a maximum of 70 psi. The line shall be fitted to the ship's fresh water system via the port tank suction valve located on the main deck adjacent to the tank. The suction valve shall be released from the tank and associated deck connection, rotated 90° and re-secured to the deck connection. The tank connection shall be blanked and the potable water hose connected to the valve with the use of a flange. Approximately eight (8) cubic meters of fresh water per day shall be provided.  
The Contractor shall supply any fresh water used for cleaning, testing or flushing of tanks as required by the specification.
4. **Garbage Removal:** One garbage container of 215 cu. ft. (6 m<sup>3</sup>) minimum capacity shall be provided for the Ship's use. The Contractor shall remove garbage from the container on a daily basis. Cost of crantage and disposal to be included in quotation. The Garbage container shall be placed in a suitable location agreed upon by the Contractor and the Chief Engineer.
5. **Oily Bilge Water:** the Contractor shall quote on removing from the ship's bilges approximately forty (40) cubic meters of oil/water mixture. He shall also quote the price per additional litres to dispose. The quotation shall include crantage, pumping, trucking and disposal of waste mixture. The Contractor shall provide documents identifying the licensed firms subcontracted for pumping and disposal of waste oil.
6. **Cleaning:** The Contractor shall ensure all spaces, compartments and areas of the ship where work was done are left in an "as clean as found condition." The cost of clean up shall be included in each specification item.
7. **Equipment / Machinery Survey Reports:** Contractor shall prepare three (3) bound reports of all specified readings and measurements during this refit period and one electronic copy of documentation in Adobe PDF format. Readings shall be indexed by specification number. Volume shall have page numbers and be dated on every page.  
The copies shall be delivered to the Chief Engineer.

## **H-02- DECK SURFACE RENEWAL – Vinyl Plank Flooring**

1. The deck covering in the following spaces is to be removed and new underlay and vinyl plank flooring installed:
  - Forward Lounge, Upper Deck
  - Cabin 418
  - Cabin 419
  - Cabin 422
2. The Contractor is responsible for notifying the vessel's Duty Officer of the area in which they are removing deck covering and underlay material, prior to commencing that aspect of the contract, so that smoke detectors may be isolated. The Contractor shall ensure that existing heat and smoke fire detection devices are protected from ingress of air borne dust and debris. All protective coverings are to be removed by the Contractor prior to departure from the vessel.

All detection equipment shall be inspected and proved to be in working order prior to completion of the contract. Any cleaning/replacement of detectors required in disturbed areas shall be at the Contractor's expense.
3. The Contractor shall temporarily seal each doorway to adjoining spaces with 6 mil plastic and tape to prevent the ingress of dust and debris from the removal of the flooring and substrate. Work area is to be sealed and ventilated such that a negative pressure is established in areas in which material is being removed. Extraction arrangement is to be sufficient to ensure no dust from removal process migrates to adjoining areas of the ship. This preparation is to be completed and ventilation established prior to commencement of material removal.
4. The existing, carpet and tile systems, cove, and underlayment are to be released, in their entirety, from the steel deck and removed from the vessel. Exposed steel area is to be cleaned and prepared as necessary for the new flooring.
5. New underlayment and top coating(s) of required material and thickness as specified by product manufacturer are to be applied and leveled as necessary for the proper application of the new finished flooring material. Quote on 25 mm thickness. The areas quoted are estimates, to be verified by Contractor as all material is to be Contractor supplied.

Contractor shall supply approximately 50 extra square feet (rounded up to the next full box) of each colour of flooring tile to the vessel to be used for future repairs.

6. The finished flooring material is to be applied as per manufacturer's recommendations. Any proposed deviation from the stated product is to be pre-approved by the Owners' Representative prior to its use. All new flooring products offered are to be marine approved and fire rated for specific locations.
7. Flooring in noted spaces is presently a combination of vinyl tile and carpet over laticecrete underlay. This is to be removed as per para. #4 above.
8. New Dexotex Subkote #1 is to be applied as per OEM specification and instruction and subsequently leveled and smoothed with suitable product.
9. Floor is to be finished with "Amtico", "Mirra Wood Plank", 4" x 36" vinyl plank flooring system in Red Maple color pattern, #WP-004 and complete with Mirra accent Strip/Bande-s, 3/16" X 36", black in color. System is to be installed as per OEM specification and instruction. Adhesive is to be as per manufacturers recommendation for application. (Product available through Centura). Floor is to be trimmed with new black rubber base cove.
10. Once new floor system is laid, it is to be protected from damage or degradation at all times up until contract completion.
11. Total area to be dealt with is approximately 560 square feet with approximately 200 lineal feet of base cove required.
12. Ship's crew will remove and replace necessary furniture.

## **H-03-DECK SURFACING RENEWAL – QUARTZITE**

1. The quartz epoxy deck covering system in the following spaces is to be repaired and resurfaced:
  - Washroom Cabin 202 - 35 sq ft
  - Washroom Cabin 206 - 35 sq ft
  - Washroom Cabin 208 - 35 sq ft
  - Washroom Cabin 303 - 35 sq ft
  - Washroom Cabin 317 - 9 sq ft
  - Washroom Cabin 408 - 35 sq ft
  - Washroom Cabin 409 - 35 sq ft
  - Washroom Cabin 410 - 35 sq ft
  - Washroom 505, Main Deck Forward (Male)
  - Washroom 534, Main Deck Aft, Stbd (Techs)
  - Officers Mess Pantry 537A - 320 sq ft

### **CABIN WASHROOMS**

2. Washroom deck surfaces are presently Dexotex quartz/epoxy system over concrete base and underlay.

3. The Contractor is to carefully remove all toilet fixtures, bases and any other interference items in way of the flooring renewal including vanities where fitted. The Contractor will note that the toilet fixtures, bases and associated components are no longer in production and must be handled with due care. The Contractor will be held accountable for any damage to the outfit and fixtures during this process.

All toilet drain lines are to be plugged with tapered wooden plugs prior to flooring repairs commencing. No foreign material is to be allowed to enter drain lines throughout repairs.

4. All scupper and drain screens are to be removed and drain and scupper lines are to be plugged with tapered wooden plugs prior to flooring repairs commencing. No foreign material is to be allowed to enter drain lines throughout repairs.

5. The existing floor covering, including shower stalls and base cove is to be sanded, in its entirety. Material around all deck scuppers and drains is to be chipped back a minimum of 4" all around to a depth sufficient to allow adequate slope from deck serviced such that proper drainage is achieved on completion of flooring repairs.

6. Any cracked or loose material encountered is to be chipped back to solid, intact material. For bidding purposes, contractor to allow for removal of 30 sq ft of quartz/epoxy top coat and execute proper repair prior to application of new overall finish. Contractor to assume, for bidding purposes, that all underlay is in tact.

7. All flooring areas are to be resurfaced with Dexotex quartzite/epoxy system,

including base covers up to joint with bulkhead panels. This is to include the top horizontal surface of base covers. Colour charts to be made available as soon as possible after contract award so that colour applications can be confirmed by Owner.

8. On completion of flooring repairs, toilets and any other removed or disturbed fittings are to be reinstalled and proven in satisfactory working order. Toilets are to be cleaned. All residual paint etc on toilets is to be removed. Toilet base components are to be sandblasted to remove any rust, loose paint, and debris. Prior to installation the bases are to be given two (2) coats of a good quality marine epoxy coating, gloss black in color. Toilet hold-down studs are to be chased to ensure threads are in good condition for toilet re-installation. Toilets are to be sealed to deck and drain connections.

Contractor to quote on 50 % replacement, and unit cost, by welding of stripped or broken toilet studs. Studs are to be replaced as determined by the Chief Engineer before any new flooring or underlay is installed.

9. Contractor is fully responsible for containment and removal of all debris and dust created by the deck preparation effort. Work areas are to be sealed off and ventilated to exterior of ship to prevent dust and debris permeating into other areas.

#### **WASHROOMS 505 & 534**

10. Washroom deck surfaces are presently Dexotex quartz/epoxy system over concrete base and underlay.

11. The Contractor is to carefully remove all toilet fixtures, bases and any other interference items in way of the flooring renewal including vanities where fitted. The Contractor will note that the toilet fixtures, bases and associated components are no longer in production and must be handled with due care. The Contractor will be held accountable for any damage to the outfit and fixtures during this process. All toilet drain lines are to be plugged with tapered wooden plugs prior to flooring repairs commencing. No foreign material is to be allowed to enter drain lines throughout repairs.

12. All scupper and drain screens are to be removed and drain and scupper lines are to be plugged with tapered wooden plugs prior to flooring repairs commencing. No foreign material is to be allowed to enter drain lines throughout repairs.

13. Entire flooring system is to be removed to steel deck. Concrete sub-floor is 4" thick on average and is secured to deck by expanded metal sheet welded to deck surface over which concrete was laid. All of this material is to be removed.

14. New expanded metal sheet is to be supplied, installed and tack welded to deck.

15. New concrete sub-floor is to be poured with suitable framing and form work, as required, to create new shower stall sills as per original lay out and profile.
16. Concrete sub-floor is to be surfaced with Dexotex sub-kote #1 underlayment as per manufacturers specifications.
17. Contractor to quote on 50 % replacement by welding of broken or stripped toilet studs.
18. Floor is to be finished with quartzite epoxy coating system in accordance with product manufacturer's specifications. Including base coves up to joint with bulkhead panels. This is to include the top horizontal surface of base coves.
19. On completion of flooring repairs, toilets and any other removed or disturbed fittings are to be reinstalled and proven in satisfactory working order. Toilet base components are to be sandblasted to remove any rust, loose paint, and debris. Prior to installation the bases are to be given two (2) coats of a good quality marine epoxy coating, gloss black in color. Toilet hold-down studs are to be chased to ensure threads are in good condition for toilet re-installation. Studs are to be replaced as determined by the Chief Engineer before any new flooring or underlay is installed.  
Toilets are to be sealed to deck and drain connections.
20. Contractor is fully responsible for containment and removal of all debris and dust created by the deck preparation effort. Work areas are to be sealed off and ventilated to exterior of ship to prevent dust and debris permeating into other areas.

#### **OFFICER'S MESS PANTRY DECK**

21. Officers Mess Pantry deck is presently surfaced with quartzite/epoxy system top coated with epoxy paint.
22. Access to full floor area is hindered by outfit of shelving and counter units which are all bolted to raised pads at a level above deck surface.
23. Contractor responsible to release, lift clear and support all outfitting in pantry, including dishwasher and sink, as required, to allow access to floor surface for repairs.
24. Entire floor surface is to be ground and sanded to remove all paint top coating. Original quartzite/epoxy system is to be prepared for resurfacing.
25. Any cracked and/or loose original quartzite system is to be removed back to sound, in tact material. Contractor to bid on removal of 50 square ft of original quartzite epoxy system and proper repair of same area prior to application of new overall finish. Contractor to assume, for bidding purposes, that all underlay is intact.
26. Areas of removed, loose quartzite are to be built up flush with remainder of floor

and then entire area to be resurfaced with new quartzite/epoxy system in accordance with the manufacturer's specifications.. Colour charts to be made available as soon as possible after contract award so that colour applications can be confirmed/chosen by Chief Engineer. This is to include base covers up to the bulkhead panel joints and the top horizontal surface of the base covers.

27. On completion of floor resurfacing all disturbed outfitting is to be re-installed and returned to an as found condition.

28. Contractor is fully responsible for containment and removal of all debris and dust created by the deck preparation effort. Work areas are to be sealed off and ventilated to exterior of ship to prevent dust and debris permeating into other areas.

#### **H-04 POTABLE WATER TANKS- PORT & STARBOARD**

1. The vessel's potable water tanks shall have the following work carried out to allow proper cleaning, inspection, preservation and sterilization.
2. Tanks shall be drained, opened, vented to atmosphere and certified gas free for entry. Initial draining will be accomplished by the vessel's Engineering staff using the vessel's pumps. Removal of remaining standing water (approximately 1000 liters per tank) after pumping operations are complete, will require the contractor to use a portable pump or other manual means. The Contractor will be responsible to complete the removal of any remaining standing water.
3. Manholes shall be opened by contractor and an initial tank inspection will be carried out to identify and confirm the extent of work required. This will be accomplished by the Contractor and CG personnel.
4. All tank interior surfaces (including fittings, pipe openings, frames, brackets, etc.) shall be grit blasted to provide a suitable profile for new coating application. Identified areas of loose coating, rusted steel, and/or rust penetration shall be cleaned to near white metal standard (SA 21/2) in preparation for new coating application. Where original coating is well adhered and in good condition, coating edges shall be suitably profiled to any adjacent bare areas. Particular attention shall be paid to blind areas of tanks and stiffeners to ensure they are adequately cleaned. Any internal tank surfaces that cannot be blasted due to particular configuration shall be cleaned to near white metal by means of hand and/or power tools.
5. Upon completion of blasting, cleaning, and inspection of the tanks by the vessel Chief Engineer, coating application can commence. The sounding tubes and suction piping shall be proven clean of dirt and debris.
6. Tanks shall be treated with three (3) in number coats of Devoe 233 or equivalent, by spray, and brush, where necessary in accordance with the manufacturer's instructions particularly concerning proper surface preparation, application, cleanliness, humidity, etc. Tank coating, normally 3-5 mls per coats shall produce a total dry film thickness of 15mls. The manufacturer's instructions regarding drying time between coats and the final curing of the system shall be strictly adhered to.
7. On completion of all coating application and subsequent final inspection, the tanks shall be closed-up using new gaskets and hydrostatically tested, with clean potable water, to the satisfaction of TCMSB , Lloyds and the Chief Engineer.
8. Following completion of the testing the vessel's Engineering personnel will lower the tanks to a suitable level to allow addition of the sodium hypochlorite and the Contractor will commence to sterilize the potable water tanks, equipment, and associated plumbing by superchlorination. This process will be in accordance with the Fleet Safety Manual directive 7.A.12. Disposal of waste water following the sterilization process will be as per the above quoted directive.
9. After completion of sterilization, the tanks, piping, and associated equipment shall be thoroughly flushed with clean potable water. This flushing will include filling and draining of the fresh water tanks twice as well as running system.

10. Following tank and system sterilization, sterile samples shall be taken for both an analytical (28 parameter) and microbiological analysis as per quoted Fleet Safety Manual directive. Samples shall be taken from each tank as well as a random tap in the galley/scullery area and bridge deck accommodation. The water from these tanks shall not be used for domestic consumption prior to the receipt of satisfactory reports.

11. Potable Water tank data:

Port Tank:

Capacity: 97.6 cubic meters

Estimated Total Tank Internal Area: 2150 square feet

Estimated Area to be Cleaned to Bare Metal: 860 square feet

Starboard Tank

Capacity: 92.0 cubic meters

Estimated Tank Internal Area: 2100 square feet

Estimated Area to be Cleaned to Bare Metal: 840 square feet.

They are both internal tanks.

**H-05 VENTILATION SYSTEM CLEANING**

1. Contractor shall clean all ductwork, fans, intake plenums, recirculation plenums, louvers and dampers associated with the following shipboard ventilation systems:

Accommodation Supply	Fan #1, Upper Boat & Bridge Decks - Port	
Accommodation Supply	Fan #2, Upper Boat & Bridge Decks, Stbd	
Officer's Lounge Supply	Fan #3	
Hospital Supply	Fan #4	
Accommodation Supply	Fan #5,	Lower & Main Decks, Port
Accommodation Supply	Fan #6,	Lower & Main Decks, Stbd
Crew's Mess Supply	Fan #7	
Crew's Laundry Supply	Fan #8	
Galley & Pantry Supply	Fan #9	
Toilet Exhaust Fan,		Main & Lower Deck
Toilet Exhaust Fan,		Upper, Boat & Bridge Deck
Laundry & Bosun's Stores Exhaust,	Fan #15	
Galley and Pantry Exhaust,	Fan #14	

2. All systems are to be cleaned to National Air Duct Cleaners Association Assessment, Cleaning and Restoration 2006 Standard by individuals certified by NADCA to do so.
3. This specified requirement is to commence and be completed only after completion of any exterior grit blasting associated with this specification
4. In conjunction with Item L-02, all supply duct electric re-heaters shall be electrically isolated and ductwork shall be disconnected from them prior to and during cleaning of respective ductwork. Disturbed dust, dirt or debris, is not to be allowed to pass through or deposit in the re-heaters as a result of cleaning operation. Ducting shall be re-connected to re-heaters and electrical supply shall be re-established upon completion of cleaning operations. All affected electrical circuits, motors, and electric controls lock-outs are to be coordinated and implemented by the vessel's Senior Electrical Officer.
5. Ductwork between re-heaters and space outlets shall be cleaned as well as all other ductwork associated with the above noted systems.
6. All intake and discharge fixtures shall be removed and cleaned.
7. All internal areas of fan air intake plenums shall be cleaned. Re-circulating air intake screens shall be removed and cleaned.
8. All re-circulating and fresh air intake louvers shall be cleaned and free operation proven. Re-circulating air intake screens shall be removed and cleaned where possible. All louver hinge pins and linkages are to be lubricated with suitable aerosol lubricant product. Any defects with operation of louvers is to be brought to the attention of the Owners' Representative
9. Operation of all fire dampers complete with fusible links, in all ductwork, shall be proven correct and witnessed by Owners' Representative. Signage for each fire

damper shall be verified as correctly identifying open and closed position of each respective damper.

10. All galley exhaust ductwork, including range hood itself and exhaust fan, shall be completely degreased by suitable means. Any removed sludge/residues shall be properly disposed of by the Contractor. Fan shall be electrically isolated, disconnected and removed from air ducting to facilitate cleaning and inspection. Cleaning through exhaust mushroom will not be accepted. Galley vents and ductwork will be cleaned during the evening hours when galley is normally shut-down and must be completed and fully operational before 0530 the following morning.
11. All other ductwork shall be cleaned by a combination of mechanical/pneumatic/vacuum methods in full conformance with applicable industry standards, NADC 2002 or better.
12. Existing access patches in ductwork shall be used. If additional access openings are required to enable a full and proper job, Contractor will be responsible for making same. All new and disturbed openings in ductwork, on completion of cleaning, shall be closed and sealed with approved fire rated materials. Plastic plugs and/or flammable sealants are not to be used. Any existing, non-fire rated materials found in use for such applications shall be replaced with proper, approved materials.
13. Contractor shall ensure cleanliness of all work and accommodation spaces affected by cleaning process is maintained in an as found condition during and upon completion of duct cleaning.

**Drawing #CV-331, sheets 1-4, apply and will be provided to the successful bidder.**

## **H-06 LIFERAFTS- (SURVEY)**

1. Except where noted, inflatable life rafts, as listed in Appendix A, shall be removed from the ship and delivered to certified service facilities for the specific make and type of rafts dealt with.
2. Contractor shall arrange for rafts to be inspected and serviced as required for annual recertification. Costs for this service to be included in bid.
3. The contractor shall supply all necessary cranes, labour and transportation to remove life rafts from the vessel, deliver to applicable service facilities, return to and replace back onboard the vessel in allocated positions.

## **H-07 DECK RAILING RENEWALS**

Flight and boat deck railings (P & S) to be modified and/or replaced in following locations:

### **At Former Lifeboat/Workboat- Approx. Locations Frame 167 to 192**

1. Existing railing stanchions, braces and associated deck attachment doubler plates shall be released from deck. Four (4 per side) in number eye pads previously used for Jacob's Ladder installation are to also be removed.
2. Contractor to fabricate and install a new continuous railing system, similar to existing design, outboard, and adjacent to the ships side. All piping used to be galvanized steel. New teak top rail to be supplier and installed by contractor.
3. The new railing system is to provide a secure installation and span the distance between the vessel's forward superstructure and lifeboat davit arm. Sufficient clearance is to be provided to allow proper davit arm maintenance. (i.e. cable sheave removal)
4. Scope of work includes railing modifications on both port and stbd side of F&B deck.
5. Total of 60 feet of railing to be dealt with.
6. Stanchions are 1 ¼" nominal steel pipe and are attached to deck with 4 ½" diameter x ½" thick steel plate doublers. Stanchion braces are ¾" steel round bar/pipe and are attached directly to deck. New installation will locate braces inboard of railing. Original railing detail is indicated on pictures from drawing #CV-364, Appendix D. New railings to replicate original arrangement as close as possible.
7. Two (2) in number new stanchions (1 P & 1S) complete with doubler pads and braces are to be fabricated and fitted to the deck, inboard and in line with the fitted square tubing provided to mount lifeboat launching controls. The port stanchion is to be placed 41" inboard of the support square tubing and the starboard set at 32" inboard.
8. The new stanchions and braces are to conform to existing design and be fabricated from galvanized steel piping. Stanchions are to be fitted with four (4) in number steel eyes suitable to accept attachment of safety chain shackles from lifeboat forward chock and square tubing lifeboat controls support.
9. New stanchion shackle eyes are to be positioned at 24" and 34" from the deck level. Corresponding shackle eyes (2 P & 2 S) are to be fabricated and fitted to the square tubing mount (lifeboat controls) to provide a termination point for the required safety chain.
10. All galvanized coating affected by heat (welding, cutting, etc.) is to be thoroughly cleaned and given one coat of an approved marine cold galvanizing compound. Steel deck areas affected by hot work are to be thoroughly cleaned and given one coat of an approved marine primer.

11. Area beneath F&B deck in way of existing position of railing attachment is accommodation spaces with insulated deck head and is fully outfitted with dropped ceiling panel system.
12. Area beneath deck in way of new position of railings is open deck passageway with clear and free access to underside of deck plating above.

#### **Port Side - Outboard of Av Gas Fueling Station**

13. Existing railing sections from flight deck net forward to life raft embarkation ladder position are to be removed in their entirety. Deck doubler plates to be left in place.
14. New, continuous railing to be fabricated and installed similarly to detail in section above and as per general arrangement indicated and shown on drawing #CV-364. Approximately 45' of railing to be dealt with. New teak top rail to be supplied and installed by contractor.

#### **Stbd Side Aft Outboard of Stbd Stores Crane**

15. Existing railing sections from flight deck net forward, including sections of solid bulwark at crane location, are to be removed in their entirety. Deck doubler plates to be left in place.
16. New continuous railing to be fabricated and installed similarly to detail described in section above and as per general arrangement indicated and shown on drawing #CV-364. Two 5' removable sections are to be arranged in way of life raft launching and embarkation positions. These sections are not to be in any way connected to deck but rather are to be pinned to adjoining railing sections with all stainless steel hardware. New teak top rail to be supplied and installed by contractor.

#### **Bridge Deck**

17. Aluminum / steel bonding bars (formally stair supports) fitted to the aluminum deck are to be removed in their entirety with deck ground flush with surrounding surface. Four in total to be dealt with, all are 2" wide X 12" long.
18. Six, 5" diameter aluminum doubler pads are to be removed from deck.

Upon completion of above railings, all new and disturbed steelwork is to be given two (2) coats of contractor supplied primer and two (2) coats of ship supplied paint.

## **H-08 CONVERTER ROOM DOOR RENEWAL (Total 2)**

1. Forward and aft passageway doors presently fitted at converter room are to be removed and new fire doors installed. Doors will be supplied by Owner.
2. Both doors are fitted in conjunction with existing watertight doors at these locations.
3. Contractor to remove and dispose of existing doors.
4. Existing doors are of wood construction, frames are screwed to adjoining insulation sheathing.
5. Insulation and sheathing in area of door mounting is to be removed and frame structure of water tight doors is to be exposed.
6. New doors are to have windows installed as per supplier instructions attached. All material Owner supplied.
7. New door frames are fully flanged. Contractor to fit and weld in place 2" X 2" X ¼" angle bar frame within existing structure of watertight doors. This frame to be sized and configured to mate with frame flange of new doors.
8. New doors are to be bolted to bulkheads by means of 3/8" flat head stainless steel machine bolts countersunk flush with frame surface on 10" centers. New door frames are to be templated and drilled as required for bolting pattern.
9. New doors are to be fitted in rough opening and new framing scribed, drilled and tapped to accept fastening hardware.
10. Doors to be installed with A-60 rated and approved, non-asbestos, fire retardant gasket between door and bulkhead.
11. All disturbed steel and associated painted coatings are to be hand tooled clean. Adjacent, in tact coatings are to be feathered back and all bare steel and discoloured paint is to be painted with one coat primer (Contractor supply) and one topcoat (CG supply).
12. All removed items of outfit are to be reinstalled in good order to an as found condition. Bulkhead insulation and sheathing is to be reworked and reinstalled, as required to mate with new doors.
13. Doors are to be fitted with LCI 4010 automatic closers, Owner supply. Closers are to be installed as per manufacturer's instructions and adjusted to satisfaction of Chief Engineer.
14. Doors and function are to be inspected by Chief Engineer.

## **H-09 DECK COATING RENEWAL – EXTERIOR DECKS**

1. The following deck areas are to be UHP blasted:

<b>AREA</b>	<b>FRAME REFERENCE</b>	<b>Sq. Ft.</b>
Upper Deck Stbd Breezeway	5-208 (House Front)	1300
Flight & Boat Deck, Port Aft	55-144	1700

2. Total area is 3000 ft<sup>2</sup>. Deck areas shall be Ultra High Pressure water blasted (UHP = 40,000 psi minimum) to prepare the entire surface area. All piping penetrating decks, bulwarks and bulkheads adjoining decks and all machinery seats and coamings are to be similarly blasted to a height of 12" above the deck.
3. Contractor responsible for all work and precautions to ensure that all existing coating and debris removed from the decks is captured and disposed of ashore. No liquid or solids run off from deck surface is to be permitted.
4. Contractor to quote separately a unit cost per square foot for UHP blasting for adjustment purposes.
5. The Contractor shall ensure the edges of all blasted areas are feathered to provide a smooth transition to the intact deck coating.

The Contractor shall take necessary precautions to prevent the ingress of the high-pressure wash and removed debris into the ship's interior and/or into any piece of machinery, vent, or opening that could cause damage or injury to the ship, personnel, outfit and machinery.

## **H-10 FUNNEL TOP CLEANING**

1. Top plate of funnel is to be cleaned.
2. Top of funnel is presently coated with an accumulation of oily soot.
3. All areas of funnel top plate are to be scraped and all accumulated sludge collected and removed ashore for disposal by contractor.
4. On completion of sludge removal, all areas are to be degreased with a suitable solvent and high pressure water washing. The area is fitted with a working drain line to ships waste water retention tank. This will be available to facilitate washing effort.
5. Access to funnel top is via forward engine room upper casing at bridge deck or wheelhouse top levels. A series of internal ladders extend from either of these levels to a hatch in funnel top.
6. Contractor shall insure all dirt and debris is contained during clean up and removal ashore. Dirt from cleaning effort is not to be transmitted or tracked through other areas or transmitted to exterior sides of funnel. Any dirt that is tracked or transmitted beyond work area is to be cleaned up to satisfaction of Chief Engineer.
7. Contractor to ensure no loose gear or foreign material is dropped down any exhaust uptake pipes. Exhaust uptake covers will be made available by the ship and are to be installed by the contractor.

## **H-11 LAUNDRY ROOM BULKHEAD REPAIR**

Contractor shall repair a section of broken weld located on the port side of the ship's main laundry room. Located in area around frame 217.

The broken weld is at the top corner of the aft bulkhead where the bracket is welded. The contractor shall remove broken vertical weld back to sound metal and re-weld the seam from both sides. The crack is approximately 10 inches in length.

The contractor shall remove the bracket from the bulkhead to the beam and remove all existing weld.

Contractor is to fabricate and weld a new bracket of the same dimension to the bulkhead and beam. Bracket is approximately 10x8x8 inches x ¼ inch thick.

Contractor to prime disturbed work area, and apply two coats of owner supplied paint.

## **H-12 DECK CRANES QUINQUENNIAL INSPECTIONS- Total Six**

The following items of deck cranes are to undergo a component disassembly, inspection and testing as per TCSSB and Lloyd's requirements for quinquennial inspection and certification:

<b>Equipment Name</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Safe Working Load</b>
Port Foredeck Crane	ARVA	HER12010	12 Tons
Starboard Foredeck Crane	ARVA	HER12010	12 Tons (presently rated at 7 Tons with single whip) To be rigged and tested for 12 Tons.
Center Crane	Allied	DT-150-55	25 Ton
Port F & B Deck Crane	HIAB 60	60	Full Outreach – 1950 lbs.
Stbd. Quarter Deck	HIAB 180	HS M050	.96 Tonne
Stbd. F & B Deck Crane	EFFER		2,75 Tonne

1. In addition to the work to be done on all (6) cranes the two ARVA Cranes and one Allied Crane (3 cranes in total) shall have the following work performed.
  - 1.1 Before any lockout and/or disassembly the contractor is to use the manufacturers' approved method of measuring slew bearing clearance. This testing and measurement is to be such to satisfy Lloyd's and TCMS requirements. These tests are usually in the form of a "rocking" test as per attached from National Oilwell, TSUJI, and Mac-Gregor, but may be different for each manufacturer or crane model. It is the contractor's responsibility to solicit approval from manufactures for their procedure as well as that of Lloyds and TCMS. These tests shall be preformed before each individual crane is taken out of service and before any other work is started on each individual crane. Results of tests, measurements and approvals shall be given to Chief Engineer within 24-hours of testing. Contractor is responsible for any weights and measuring tools required to perform these tests.
  - 1.2 Allied 25 Ton Crane shall be out of service for as short a time period as possible. It should be out of service for a maximum of 5 calendar days.
  - 1.3 The starboard foredeck ARVA crane is presently rigged in a 7-ton, single whip configuration. For testing and certification, the starboard foredeck

crane shall be re-rigged by the contractor with its spare block to 12-ton configuration, identical to the port foredeck ARVA crane. When spec item is completed it shall be fully certified for 12-ton SWL and remain in the 12-ton configuration.

1.4 Contractor shall also calibrate the load cells of main and secondary hoists on 25 t Allied Crane.

1.5 For inspection, testing and certification of the Allied 25-ton crane and both 12-ton ARVA cranes the Contractor shall hire the services of manufacturers Field Service Representatives (FSR's). The contractor shall allow \$20,000.00 for the services of an Allied service representative and \$25,000 for an ARVA service representative. This shall be adjusted following proof of invoices by 1379.

## **2. All Cranes In the List (6)**

- 2.1 All hydraulic hoses are to be inspected for deterioration and replaced where necessary. In such cases fittings are to be new. New and existing fittings shall be covered with Denso tape or equivalent upon reassembly. Hose and fitting replacement will be done by 1379 action.
- 2.2 Wire ropes are to be inspected and satisfy Lloyds and TCMS for quinquennial survey and certification purposes or be replaced. New wire ropes, if required, are to be owner supplied.
- 2.3 Wire ropes are to be slackened off to allow for removal of blocks and sheaves.
- 2.4 All boom sheaves are to be removed and components thoroughly cleaned and inspected. All wear components including pins, bushing, bearings, sleeves and sheaves are to be measured, clearances verified and data recorded for record retention. All grease ways are to be proven clear. Upon completion of inspection and any remedial action necessary the sheaves are to be reinstalled in good order.
- 2.5 All crane hooks, block and hook and block assemblies, complete with associated shackles, are to be disassembled, thoroughly cleaned and inspected for wear and other abnormalities. In addition to those blocks fitted to the cranes, this is to include the spare 12-tonne block (located in the Cargo hold) for the starboard forward ARVA crane. All wear components including pins, bushing, bearings, sleeves and sheaves are to be disassembled, measured, clearances verified and data recorded for record retention. All grease ways are to be proven clear. Upon completion of inspection and any remedial action necessary, the blocks are to be fully re-assembled and transported to an accredited test facility where load testing is to be performed. Load testing is to be in accordance with issuing of certificates for applicable rated safe working load as per regulation. Inspections and testing is to be witnessed by the owner's representative, Transport Canada and Lloyd's inspectors. Upon completion of load testing and certification, the blocks are to be

dismantled again for inspection and measurement to verify components have maintained a satisfactory condition. Upon completion of load testing and certification, the hook/block and shackles are to be returned to the vessel in good order and installed on applicable cranes. Care shall be taken not to mix components between cranes.

**Note: starboard Foredeck crane shall be re-rigged by the contractor with its spare block to 12-ton configuration.**

- 2.6 Luffing, knuckle and boom extension hydraulic rams and hydraulic controls are to be disconnected with all ram and hose fittings properly capped to seal against leakage and ingress of foreign material. Hoses to be suitably marked to ensure accurate re-connection. Rags, wood plugs, and other such materials will not be acceptable as hose and fitting caps and plugs.
- 2.7 Hydraulic cylinder pivot pins are to be released and removed from the frame allowing removal of the hydraulic cylinders. Contractor is to expect some difficulty in pin removal that may require the use of heat and considerable force. Contractor to allow for machining and renewal of two (2) cylinder pivot pins per crane.
- 2.8 Hydraulic cylinders and control units are to be removed from the vessel and transported to a recognized hydraulic repair shop where the units are to be thoroughly disassembled for, cleaning, inspection, and part renewal. Contractor to assume that all normal wearing parts will require renewal. This will include any seals, O rings, bushings, etc. All areas of coating failure are to be blasted (grit, UHP water or soda) to near white condition. All blasted areas are to be coated with one coat of a marine epoxy coating system approved by Chief Engineer. All areas of these components to then be coated with one full coat of same coating system. Finish coat to be buff in color. Associated hydraulic fittings are to be inspected for condition assessment to assure dependable service if reused.
- 2.9 Hydraulic cylinder end yoke bushings and ram end yoke bushings are to be thoroughly cleaned and inspected for condition. Contractor to allow for machining and renewal of three (3) cylinder yoke/end bushings per crane.
- 2.10 Crane boom structures are to be suitably supported and boom pivot/hinge bearings and pins released and removed. All wearing surfaces of bearings, pins, and bushings are to be thoroughly cleaned and inspected. Any part renewal will be determined at time of inspection and dealt with through PWGSC 1379 action.
- 2.11 Where required, the contractor will be responsible for the cleaning and laying out of any disassembled parts for inspection by TCMS and Lloyds inspectors.

- 2.12** Upon completion of all inspections and part renewal as necessary. All removed parts and components are to be reassembled in good order, installed and hydraulically connected as required. Any disturbed fasteners are to be renewed using equivalent size and grade. A copper based anti-seize compound is to be used on all exposed fasteners. Denso tape or equivalent is to be applied to all exposed hydraulic fittings and hose ends. Cranes are to be subjected to multiple operations to assure proper operation.
- 2.13** Any lifting or supporting of crane booms to complete this work is the responsibility of contractor.
- 2.14** Hydraulic relief valves are to be tested and proven to lift at specified pressure. This is to be witnessed by Lloyds and TCMS inspectors.
- 2.15** Crane shall also be surveyed for hydraulic leaks and any found, repaired.
- 2.16** Hydraulic power units are to be drained, opened, cleaned, oil replenished, filters serviced.
- 2.17** Following reinstallation of all components on the cranes, the contractor is to arrange for crane load testing as per that required for quinquennial certification from TCSSB and Lloyd's to achieve the noted SWL. This will include supply, transportation, and handling of certified weights and load cell required to complete the noted testing. The starboard Foredeck crane shall be re-rigged by the contractor with spare its block to 12 T configuration for testing.
- 2.18** Contractor shall also test all crane safety devices as per that required for quinquennial certification from TCSSB and Lloyd's to achieve the noted SWL. This shall include but not be limited to all anti-too block devices, travel limit switches, sensors etc... that are required as part of the survey to be issued a certificate by TCMS. Contractor will be responsible for supply, transportation, and handling of certified weights and load cell required to complete the noted testing.
- 2.19** Note all cranes on the vessel are part of this spec item except for the Palfinger crane on the Port quarter.
- 2.20** Contractor will be responsible for all craneage required, in addition to the vessels capabilities, to carry out contracted work.
- 2.21** Additional parts not in this spec item but identified for renewal following the disassembly and inspection will be dealt with using PWGSC 1379 action at that time.
- 2.22** The vessel's crew will provide one equipment operator as required.

- 2.23** Three (3) copies of all measurements and readings are to be presented to the Chief Engineer in typed format.
- 2.24** Two (2) copies plus originals of all certificates shall be presented to the Chief Engineer.
- 2.25** Contractor shall exercise proper care in way of limit switches and other electrical components.
- 2.26** Certificates and tags, where necessary, are to accompany all equipment and/or components sent for testing
- 2.27** Where a crane has a secondary hoist and main hoist, both are to be inspected, tested and certified.
- 2.28** Appropriate care and diligence is to be exercised to ensure all hydraulic oil is properly captured during component disconnection. No oil is to be allowed to drain to the vessel deck. All grease nipples and passages are to be proven clear prior to re-assembly. A generous amount of good quality exterior grade grease is to be injected in all grease fittings subsequent to unit reassembly.
- 2.29** Inspections, tests, and measurements applicable to this spec item shall be as per, but not limited to, attached list of points from Lloyds.

## **H-13 Officers Lounge Deadlight Renewal**

The contractor shall fabricate 8 exterior window deadlight shutters to replace the 8 steel shutters currently in service. The contractor shall be provided with a steel shutter for pattern and duplication purposes.

The shutters shall be constructed of  $\frac{1}{4}$  inch thick marine grade aluminum plate. The shutters are approximately 29 inches wide x 40 inches in length.

The shutters are to be cross braced using  $\frac{1}{4}$  thick x 2 inch wide marine grade aluminum welded to plate.

The fabrication shall include 2 lifting handles and 4 dogging ears per shutter welded to plate. The lifting handles shall match the handles on the steel shutters and are to be marine grade aluminum  $\frac{3}{4}$  diameter rod.

The dogging ears are to be marine grade aluminum **3/8** thick x 2 inch wide x 3.25 long. The aluminum shutters are to given one coat of aluminum primer and two coats of white paint, contractor supplied.

## **H-14 BULWARK REPAIRS**

### **Scope:**

Damaged bulwark structure to be removed and replaced with new.

This damage involves the following;

- Portable bulwark, Fr. 230 to Fr.235, in way of 'A' Frame.
- Two (2) stanchions, immediately aft of portable bulwarks noted above.

### **STRIP-OUT:**

**Bulwarks:** Contractor shall remove, in its entirety, the portable section of bulwarks, frame 230 to frame 235 on the starboard side of the Upper Deck. Section is held in place with four (4) locking pins. Pins may have to be destroyed to enable bulwark section to be removed.

**Stanchions:** Contractor shall remove three (3) damaged stanchions, one at frame 227,228 and one at frame 229. Stanchions shall be removed from deck and bulwarks and area ground flush and smooth. Existing stanchions are 3/8" grade 'A' steel plate, 13" wide at the base and 6" wide at the rail with a 2 1/2" flange, approximately 53" long. Insulation and sheathing beneath stanchions is to be removed to allow for hotwork.

### **INSTALLATION:**

**Bulwarks:** Contractor to fabricate and install new portable bulwarks, complete with top rail, support and stiffening structure, as per existing. Bulwark section is approximately 12 feet long at top rail, 8 feet long at deck level and 4 feet high. Bulwark is constructed of 8mm grade 'A' plate with 1/2" x 6" flat bar mounting faces, 6" x 3 1/2" angle bar top rail capped with a partial section of 8" schedule 40 pipe, 3/8" plate stiffeners and brackets. New bulwarks shall have freeing port and lifting holes as per existing and be installed fair and true to pre-damaged form. Contractor to supply new steel locking pins and install, as per existing arrangement.

**Stanchions:** New stanchions to be fabricated from 3/8" grade 'A' plate. Prior to installing new stanchions, contractor to ensure existing bulwarks is fair and true. Adjustments to line of bulwarks to be made and stanchions installed to ensure line is maintained. Alignment of new webs and existing under deck structure must be maintained during installation. Insulation and sheathing below deck is to be reinstalled.

**NDT:** Twenty five percent of all stanchions welding to be inspected with NDT, (MPI or Ultrasonic) as directed by TC and Lloyds. Any defects shall be repaired at Contractors expense and the repair retested. Results of all tested to be forwarded to the Technical Authority.

**Painting:** New section of portable bulwark to be grit blasted to SA 2 1/2 and painted as per top side hull coating system, two coats of primer and two top coats, CCG supplied paint. All other new and disturbed steel shall be primed as per section 12 of the preamble.

## **E-01 FUEL TANK CLEANING, INSPECTION & TESTING (SURVEY)**

1. The following tanks, which have contained Naval Distillate Fuel Oil shall be opened, high pressure washed and cleaned for inspection:
  - Day Tank Stbd, Fr. 184-208 190 Cubic Meters
  - Settling Tank Port Fr. 184 -208 190 Cubic Meters
2. Tank Schedule shall be provided by Contractor to allow tanks to be pumped down to lowest level by ships crew before work is started.
3. The ship's crew will pump the tanks down to the suction levels. The contractor shall remove the manhole covers from the tanks and remove the residual fuel oil for disposal ashore.
4. The Contractor shall quote of the removal and disposal of 10 Cubic Meters per tank. Contractor to quote separately a unit cost per litre and the total shall be adjusted up or down by 1379 action. The contractor will provide fuel metering or reception tank soundings to accurately measure fuel removed.
5. The contractor shall thoroughly clean the internal surfaces of each tank as listed in para. #1. In addition each tank, as listed in para. #1, shall be hot water cleaned to ensure all microbiological contaminants are killed. The required water temperature shall be 70 degrees Celsius, minimum. The contractor shall supply the hot water source. Hot water from the ship's supply is not to be used. All material and liquids remaining in tank shall be removed ashore by contractor. Rusty areas shall be wire brushed clean.
6. Following the stripping and cleaning of the tanks, the tanks shall be inspected by Chief Engineer.
7. After successful inspection and securing of tanks, the contractor shall clean the sealing surfaces around the manhole and cover and install the cover using new fuel oil compatible gaskets. Any studs found missing or broken or missing shall be replaced. The contractor shall quote on the unit cost of stud renewal.

## **E-02 BILGE CLEANING**

1. The following bilge areas are to be cleaned:
  - Upper forward engine room around and beneath #1& #2 ship service generator sets, and around and beneath #1 and #2 main generator sets.
  - Lower forward engine room – all areas beneath deck plate level
  - Aft engine room – all areas beneath deck plate level
  - Fwd motor room – all areas beneath deck plate level and beneath motor seats
  - Aft motor room – all areas beneath deck plate level out to ships side including area beneath motor seat
2. All of the above noted areas are to be high pressure (3000 psi minimum), hot water washed and degreased.
3. All areas of loose scale or accumulated sludge are to be hand scraped as required to facilitate removal of same.
4. Contractor responsible for removal of all wash water and debris found in bilge areas.
5. Any free liquid in bilges at commencement of this item is to be removed by Contractor. Cost for doing so will be dealt with by 1379 action. Contractor to quote separately, unit cost for removal and disposal of oily water.
6. Contractor is to take all necessary precautions to protect electrical machinery and equipment, junction boxes and other all machinery and equipment from ingress of water during the washing process. Any ingress of water or damage to any equipment caused thereby will be corrected by the Contractor at their expense.

Any splashing of dirt, debris, oily sludge or other substance onto any area above or beyond areas dealt with is to be contained and limited to as great a degree as is reasonably practical. Any areas so affected are to be cleaned by the Contractor. All areas are to be left in a clean condition.

## **E-03 SAFETY VALVE RECERTIFICATION**

1. Contractor to arrange for testing and recertification of safety relief valves as listed in Appendix B.
2. Contractor responsible for removal and reinstallation of valves # 21, #22 and #23 associated with AV gas system, as listed below. Access to valves is via AV gas tank cofferdam and will require confined space entry. The AV Gas – Fire Engulfment valve #21 is heavy and will require a crane to move it to and from the aft deck. While open, piping is to be blanked and gasketed.
3. All other valves will be removed and made available to the contractor by ship's crew. Valves will be reinstalled by ships crew. Boiler and Air Compressor valves are to be done on a rotational basis, so as to maintain steam and compressed air.

## **E-04 TRANSFER HOSE RECERTIFICATION**

1. Hoses as listed in Appendix C are to be removed from ship and sent to recognized service provider for hydrostatic testing and certification.
2. Hoses “in service” will be disconnected by crew.
3. On successful completion of testing, hoses are to be returned to ship.
4. Contractor shall ensure that hoses are empty when returned to ship.
5. 4” fueling hoses are located in ship’s steering gear compartment. 2” lube oil hoses are located in steering gear compartment. All others will be placed on flight and boat deck by crew.

## **E-05 PIPING RENEWALS**

1. Contractor shall renew sections of piping listed below
2. Contractor to release and remove existing pipe sections from vessel, fabricate and reinstall with new gaskets appropriate for the service. Interference items shall be removed, as required, for access and returned to an as found arrangement and condition on completion of pipe renewal and testing.
3. New sections of piping shall be seamless, schedule 80 black iron, unless otherwise noted, complete with new flanges of required size. Sizes noted are nominal.
4. All new piping sections are to be hot dipped galvanized, unless otherwise noted, on completion of fabrication.
5. Contractor to supply new fasteners and anti-seize compound to be applied to threads upon installation

### **SECTIONS TO BE RENEWED**

1. **General Service Pump:**  
A 6 inch diameter, approximately 9 feet discharge to overboard piping shall be renewed. The pipe is located in the forward lower motor room, port side, outboard of the general service pump valve manifold. The section of pipe begins at the overboard discharge valve and ends at the next flange. Pipe to be hydrostatically tested to 100 psi at contractor's facility.
2. **Aft Sewage Tank- 2 sections:**  
A 6 inch diameter reduced to 4 inch diameter, approximately 6 feet port inlet pipe shall be renewed. The pipe is located in the upper aft motor room above the sewage tank. The section of pipe begins at an 8-bolt flange and ends at an 8-bolt flange. **Note.** The system pipe work is to be blanked at both ends immediately after pipe sections are removed. Blanks are to be blind steel flanges
3. **Aft Sewage Tank**  
A 6 inch diameter, approximately 30 inches in length stbd inlet pipe shall be renewed. The pipe is located in the upper aft motor room above the sewage tank. The section of pipe passes through the bulkhead into the electrical workshop. **Note.** The system pipe work is to be blanked at both ends immediately after pipe sections are removed. Blanks are to be blind steel flanges
4. **Foam Pump:**  
A 6 inch diameter, approximately 20 feet of discharge from pump to helicopter deck monitors shall be renewed. The renewal includes the 2 inch diameter foam concentrate pipe. The main pipe run is reduced to 4 inch diameter at either end. The pipe is located in the stbd side of the AV gas compartment. The section of pipe begins at the butterfly isolation valves and ends at the upper tee flanges. The renewal shall include the 2

of- ½ diameter welded pipe couplings (schedule 80) one coupling on the 6 inch diameter pipe and one on the 2 inch diameter foam concentrate line. Pipe to be tested hydrostatically to 100 psi at contractor's facility

5. **Sanitary Water Supply:** A 2 inch, approximately 16 feet of discharge pipe from the sanitary tanks. The pipe is located on the stbd bulkhead in the incinerator compartment. The section begins at the flange below the catwalk to the forward expansion tank and ends at the next vertical flange. There is one horizontal branch next to the vertical flange. Pipe is to be hydrostatically tested to 100 psi at contractor's facility. Once pipe is pressured tested in service, the pipe shall be re-insulated.
6. **Grey Water Drain :** A 2 inch diameter, approximately 4.5 feet grey water drain to be renewed. The pipe is located in the tech's washroom # 534. The section starts at the port aft corner above the toilet and ends before the 2 inch pipe bracket. The pipe shall be connected to the existing 2 inch pipe using contractor supplied style 99 Victaulic coupling
7. **Aft Lab Drain:**  
A 2.5 inch diameter, approximately 18 feet from the aft lab to be re-newed including the 3 branch pipes, 2 inch diameter approximately 14 feet. The pipe is located in the deckhead of the officer's mess room, alleyway and Tech's washroom. The section starts from the flange in the Tech's washroom to the branch for the lab sink drain.  
There are 3 branch pipes welded to the main 2.5 diameter pipe  
The first branch is 2 inch in diameter, approximately 2 feet and is welded to the 2.5 diameter pipe close to the cleanout and flanged at the other end. The second branch is 2 inches in diameter, approximately 6 feet in length and is welded to the 2.5 inch diameter pipe after the 90 degree turn aft towards the sink drain. This pipe is flanged at the other end. The third branch is 2 inches in diameter and approximately 6 feet and runs parallel to the second branch. This pipe is welded to the 2.5 inch diameter pipe and flanged at the other end.  
The 2.5 inch diameter pipe approximately 7 feet after the 90 degree bend is to be connected to lab sink drain pipe using a Style 99 Victaulic coupling, contractor supplied. Pipe is to be hydrostatically tested to 60 psi at contractor's facility
8. **Grey Water Drain:**  
2 inch diameter, approximately 2 feet grey water drain. Flange to welded 90 degree elbow shall be renewed. Pipe in located behind beam in aft motor room deckhead, aft bulkhead above vent for purifier sludge tanks
9. **Science Sample Water Supply:**  
A 1.25 inch diameter pipe, approximately 24 feet to be renewed. Pipe in located on 300 deck stbd alleyway in deckhead.  
The pipe starts at a flange across from fire main isolation # 4 and continues aft to a tee connection above the door to the Tech's washroom, from tee aft and across the alleyway to a flange above the watertight door hand crank station. The pipe material shall be 1.25 diameter, schedule 40, seamless 316 stainless. Renewal to include tee connection to

**10. Carpenter Shop Deck Scupper:** A 2 inch diameter pipe, approximately 2 feet to be renewed. Pipe is located at frame 250, stbd side bosun's stores. The pipe starts at a welded 90 degree elbow on the bottom of the scupper well and ends at the first flange. Galvanized pipe not required

## **E-06 PORT & STARBOARD AFT SHAFT BEARING INSPECTION**

1. The vessel's port and starboard propulsion shaft aft bearings, two (2) in total, shall be opened for inspection.
2. Inspections shall be witnessed by TCMS inspector and Lloyds surveyor.
3. Bearings are Michell type 26MAT/44769/2, 26 inch shaft diameter (port and stbd).
4. The top cover of the shaft plummer blocks shall be released and lifted clear.
5. Each bearing is arranged with five segments, two in upper casing, and three in lower casing. Upper bearing segments are secured to casing and will be lifted clear with casing. The shaft shall be suitably supported and the three lower bearing segments removed for inspection.
6. The shaft journals and bearings shall be thoroughly cleaned and examined. Journals shall be lightly hand stoned and white metal bearing pads shall be lightly dressed.
7. Sumps shall be drained and the oil disposed of. Sumps to be cleaned. Contractor to note that access to lower areas of bearing sumps is difficult. Contractor to provide adequate means to wash, flush and vacuum sumps.
8. Upon completion of cleaning and inspections, bearings shall be re-assembled in good order and casings closed-up. Sumps to be refilled with new oil, ships supply.
9. Bearings are to be function tested to satisfaction of Chief Engineer at dock and sea trials.

**Note: It is critical that the Slinger Ring is reinstalled exactly as per the drawing.**

## **E-07 AFT BOILER (Survey)**

1. Aft boiler is to be isolated, opened, cleaned and inspected for TCMSB and Lloyds survey.
2. Ship's crew will isolate boiler control electrical supply as well as all valves as required to isolate from steam range and all other connected systems. Contractor to witness and verify isolation and shall install own lock-out locks as required.
3. Burner assembly to be disconnected and lifted clear of mounting. Unit is to be adequately suspended and secured clear of mounting area.
4. Smoke box inspection hatch to be opened. Smoke tubes and combustion chamber to be water washed as described in service manual.
5. Water side access holes to be opened. Boiler internals are to be inspected by Owners' Representative on initial opening.
6. Water side internals to be wiped clean with any sludge or loose debris removed.
7. The following external boiler fittings are to be opened for inspection by Transport Canada Marine Safety and Lloyds Register
  - a. Main steam stop valve – DN150
  - b. Intermediate stop valve – DN 150
  - c. Blow-down valves X 2 – DN40
  - d. Scum blow-down valve – DN40
  - e. Feed water valves X 5 – DN40
  - f. Heating oil valves X 2 – DN25
  - g. Feed water regulating valve – DN20
  - h. Fire side drain valve – DN50
  - i. Pressure gauge supply line isolating valve – DN8
  - j. Water sampling line isolation – DN8
  - k. Vent valve – DN8
  - l. Gauge Glass valves X 4 – DN25
  - m. Heating Coil valves X 2 – DN25
8. All valves are to have bonnets released, removed, and spindles removed from bonnets. All components are to be cleaned and valve discs lapped to seats. Following valve lapping, disc and seat contact is to be witnessed and proven satisfactory.
9. Boiler internals and all fittings are to be inspected by Transport Canada and Lloyds.
10. All fittings are to be reassembled with new packing and suitable gasket material.
11. Boiler to be closed up, filled, vented and hydrostatically tested to 10 bar. Test to be witnessed by Transport Canada and Lloyds.
12. Boiler to be drained to working level.

13. Safety valves will be dealt with separately.
14. On completion of all specified service, boiler will be fired by ship's crew and all operational functions proven. Any defects associated with service here specified, to be corrected by contractor.

## **E-08 SCIENCE A-FRAMES SURVEY- Total- Two (2)**

1. Contractor to inspect and overhaul two (2) in number science A-frame units. Subject A-frames are located on the vessel's starboard side at the foredeck and midship positions.
2. Hydraulic rams and A-frame controls are to be hydraulically disconnected with all ram and hose fittings properly capped to seal against leakage and ingress of foreign material. Hoses to be suitable marked to ensure accurate re-connection. Rags, wood plugs, and other such materials will not be acceptable as hose and fitting seals.
3. Hydraulic ram lower bearings are to be unbolted from the frame support and removed from situation. This will include the associated ram end yoke pivot pins. Components are to be thoroughly disassembled and cleaned for inspection and assessment.
4. Hydraulic cylinder upper pivot pins are to be released and removed from the frame allowing removal of the hydraulic cylinders. Contractor is to expect some difficulty in pin removal that may require the use of heat and considerable force. Contractor to allow for machining and renewal of four (4) cylinder pivot pins.
5. Hydraulic cylinders and control units are to be removed from the vessel and transported to a recognized hydraulic repair shop where the units are to be thoroughly disassembled for, cleaning, inspection, and part renewal. Contractor to assume that all normal wearing parts will require renewal. This will include any seals, O rings, bushings, etc. Associated hydraulic fittings are to be inspected for condition assessment to assure dependable service if reused.
6. Hydraulic cylinder end yoke bushings and ram end yoke bushings are to be thoroughly cleaned and inspected for condition. Contractor to allow for machining and renewal of three (3) cylinder yoke bushings.
7. The A-frame structures are to be suitably supported and frame pivot bearings and pins released and removed. The A-frame structures are to be carefully lower to the vessel's deck. All wearing surfaces of bearings, pins, and bushings are to be thoroughly cleaned and inspected. Any part renewal will be determined at time of inspection and dealt with through PWGSC 1379 action. The vessel's cranes and operator can be made available to assist the Contractor in this action, if required.
8. Upon completion of all inspections and part renewal as necessary. The A frames are to be re-installed on the vessel and reassembled in good order. All removed parts and components are to be installed and hydraulically connected as required. Any disturbed fasteners are to be renewed using equivalent size and grade. A copper based anti-seize compound is to be used on all exposed fasteners. Denso tape or equivalent is to be applied to all exposed hydraulic fittings and hose ends. The A frames will be subjected to multiple operations to assure proper operation.
9. Appropriate care and diligence is to be exercised to ensure all hydraulic oil is properly captured during component disconnection. No oil is to be allowed to drain to the vessel deck. All grease nipples and passages are to be proven clear

prior to re-assembly. A generous amount of good quality exterior grade grease is to be injected in all grease fittings subsequent to unit reassembly.

10. Following all work, reassembly and testing the A-frames are to be subjected to a proof load test to provide certification for a safe working load of 4.5 long tons. The Contractor will be responsible for all aspects of the load testing. Issued original certificates of testing are to be turned over to the vessel's Chief Engineer upon completion of testing.

## **E-09 FUEL OIL PURIFIER REPLACEMENT**

**Total – Two (2))**

### **Part 1: SCOPE:**

- 1.1 The intent of this specification shall be to replace the two existing Alpha-Laval MOPX309TGT-24-60 oil centrifuges and feed pumps with new Westfaila OSE 20 Centrifuges and feed pumps. This item shall include:
- a. The strip out and removal of existing centrifuges, control panels, feed pumps, necessary pipe work and wiring.
  - b. Removal of striped out equipment to Helicopter Hanger.
  - c. Transport of new purifiers and equipment to Fwd engine room, lower level.
  - d. The piping and electrical modifications required to install the new centrifuges, feed pumps, and control panels.
- 1.2 This work shall be carried out in Conjunction with the following:
- a. Vessel Crane Surveys
  - b. Fuel Tank Cleaning, new centrifuges shall be fully operational and commissioned before the emptying of the Day And Settling tanks for cleaning.

### **Part 2: REFERENCES:**

#### **2.1 Guidance Drawings/Nameplate Data**

- 2.1.1. GEA  
Revised Installation Drawings  
Customer: Department of Fisheries and Oceans  
Hull/Project: Louis St. Laurent  
WS-Order number: 1.451090.008
- 2.1.2. Fuel Oil Purifier Arrangement Drawing
- 2.1.3. **GEA Technical Documentation**  
Department Of Fisheries and Oceans  
Louis S. St. Laurent  
Order No. 451.090.008  
Model 2xCU/OSE 20-91-067
- 2.1.4. **GEA Project Manager:**  
Steven B. Kadden  
Project Engineer
- GEA Mechanical Equipment US, Inc.

GEA Westfalia Separator Division  
Systems Division  
100 Fairway Court  
Northvale, New Jersey 07647  
Phone: 201-784-4384  
Fax: 201-767-3416  
E-mail: [steven.kadden@geagroup.com](mailto:steven.kadden@geagroup.com)  
[www.wsus.com](http://www.wsus.com)

## **2.2 Standards**

2.2.1. CWB, Special weld procedures.

## **2.3 Regulations**

2.3.1. Electrical standards TP 127 – Ship Safety electrical Standards

2.3.2. IEEE Standard 45- Recommended practices for Electrical Installation on Shipboard

2.3.3. Canada Shipping Act 2001 Hull Insp.

2.3.4. Marine Safety Regulatory Authority

## **2.4 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 contractor shall allow \$15,000.00 for the purchase of flex lines, expansion joints, valves and other required plumbing and electrical fittings. This shall be adjusted following proof of invoice by 1379.

2.4.3. Each centrifuge will be supplied with the following components; See Technical Documents.

## **Part 3: TECHNICAL DESCRIPTION:**

### **3.1 General**

3.1.1. For commissioning of new centrifuges, the contractor shall allow \$20,000.00 for the services of a GEA service representative. This shall be adjusted following proof of invoice by 1379.

3.1.2. Contractor shall supply all material required to return the fuel oil purification system to complete and satisfactory operation. CFM materials shall be new and suitable quality for their intended purpose.

3.1.3. Contractor shall supply and install all new valves, basket strainers , flex hoses and gauges, necessary to ensure system integration and operation.

- 3.1.4.** Prior to starting work on the crane the ships staff and contractor shall ensure that existing purifiers and purifier sludge tank are fully isolated and locked out.
- 3.1.5.** Each separator has a Settling Tank suction and return as well as a discharge to Day tank. Suction pipe also goes to drains tank.
- 3.1.6.** Existing fuel oil purifiers, control panels, feed pumps, associated fittings and controls shall be stripped out and removed to vessels helicopter hanger. Care should be taken with these components as they will be retained by the owner to be used as spares.
- 3.1.7.** When stripping out and disconnecting electrically. Conductors shall be retained as attached to ship as long as possible. Care must be taken to avoid damage to these conductors as some will be reused for new centrifuges.
- 3.1.8.** Existing centrifuges and associated fittings shall be removed to Hanger before vessels 25T crane is removed from service for survey and day tank is removed from service for cleaning. Suggested route is by way of 25 T crane through aft cargo hatch to Aft Motor Room. To pass from Forward engine room to Aft Motor room centrifuges will have to be disassembled enough to fit through opening 2'-5" wide. Contractor is responsible for required disassembly and subsequent reassembly.
- 3.1.9.** New Centrifuges shall be delivered and moved into engine room before vessels 25T crane is removed from service for survey and day tank is removed from service for cleaning. Suggested route is by way of 25 T crane through aft cargo hatch to Aft Motor Room. To pass from Aft Motor room to Forward engine room centrifuges will have to be disassembled enough to fit through opening 2'-5" wide. Contractor is responsible for required disassembly and subsequent reassembly.
- 3.1.10.** New centrifuges and feed pumps are presently in Coast Guard Fleet stores, St. John's. Contractor shall be responsible for delivery to vessel.
- 3.1.11.** Contractor will be responsible for the removal and refitting of any interference items. Contractor shall note that the centrifuge movement to the forward engine room may require the removal and refitting of engine room handrails and stairs.
- 3.1.12.** Mounting arrangement of existing centrifuges, pumps and control panel shall be stripped down so that 4-inch channel remains fitted to centrifuge sludge tank. This 4-inch channel shall become the mounting foundation for new centrifuges. Existing foundations shall be modified to suit new units.
- 3.1.13.** The Contractor shall be responsible for any disassembly required for fitment onboard.

- 3.1.14.** Purifier sludge tanks (2 x 1.5 cubic meter capacity) shall be emptied and cleaned. Purifier sludge tank and surrounding area shall be certified safe for hotwork. Contractor will be responsible for ventilation and services of a Marine Chemist. Tank will be drained to extend possible through existing plumbing by ships crew. Contractor will be responsible for stripping and final clean out.
- 3.1.15.** Contractor will be responsible for the removal and refitting of tanks' manhole covers, renewal of manhole cover gaskets, tank ventilation, as well as tank certifications by a marine chemist for entry and hotwork.
- 3.1.16.** Existing centrifuges sludge drains fitted through top of sludge tank shall be cropped of and blanked with welded insert plates. These shall be welded both interior and exterior of tank.
- 3.1.17.** Tank shall be fitted with new sludge and water drain line fittings in accordance with:
- 3.1.17.1** GEA  
Revised Installation Drawings  
Customer: Department of Fisheries and Oceans  
Hull/Project: Louis St. Laurent  
WS-Order number: 1.451090.008
- 3.1.18.** Slight variation from Fuel Purifier Arrangement Drawing may be necessary due to sludge tanks internal structure interfering with placement of pipe fittings. Any variation necessary and final placement of centrifuges, feed pumps and control panels shall be determined by contractor and approved by Chief Engineer prior to commencing any pipework or tank modification.
- Sludge solids discharge shall be straight as per fig 51, page 55 of GEA Revised Installation Drawings.
- 3.1.19.** Fuel Oil Purifier Arrangement Drawing does not show sludge discharge, compressed air inlet, water inlet, or water discharge piping. It also does not show all valves, valve arrangement, pipe adapters, flex hoses and expansion joints. Its intent is to only show the general physical arrangement of the new purifiers, control cabinets, feed pumps, and fuel oil pipework in relation to existing centrifuge foundation.
- 3.1.20.** New pipework shall be welded both interior and exterior of tank.
- 3.1.21.** Tanks top and centrifuge supporting structure shall be cleaned, wire brushed and coated with 1 coat of marine primer and 2-coats of owner supplied paint.
- 3.1.22.** Interior tank coating damaged by hotwork shall be repaired accordingly.

- 3.1.23.** Feed pumps and strainer assemblies shall be modified to provide straight through flow with it inlet and outlet at opposite sides of assemblies rather than on the same side as originally fitted.
- 3.1.24.** Centrifuge skids, feed pump and control panel mounting brackets are to be welded directly to the 4-inch channel fitted to sludge tank top. Control Panels shall be additionally supported from deck head structure through the fabrication and fitting of suitable steel angle brackets, two per panel.

### **Electrical connection**

- 3.1.25.** New Centrifuges, feed pumps and control panels are to be connected electrically as per GEA Revised Installation Drawings and powered from the same circuits as existing centrifuges and pumps.
- 3.1.26.** Control Panels are to also be connected to vessels Alarm and Monitoring system.
- 3.1.27.** New Purifiers and feed pumps shall be powered from the same circuits. Contractor shall reconnect existing cables to new units. If new cable is required cost shall be subject to 1379 action.
- Fuel oil Purifier # 1 – MCC #16 P77-1-1 50A breaker
  - Fuel oil Purifier # 2 – MCC #16 P77-1-2 50A breaker
- 3.1.28.** Contractor shall connect the alarm outputs to the vessels alarm and monitoring system.

### **Pipework – General**

- 3.1.29.** Fuel pipe work is to be modified as per drawings. Where possible pipes should be located below deck plates so has to reduce tripping hazards. Where possible operating valves shall be located above deckplates in plain view. All valves and pipework shall be supported with sufficient bracketing. Fitting and fabrication of bracketing is the responsibility of the contractor. Contractor shall bid on the fabrication and fitting of 40 pipe brackets. Pipe brackets are to be welded to vessel structures and bolted to pipes. Additional brackets required will be actioned by 1379. Contractor shall include cost per additional pipe bracket fabrication and fitting in bid.
- 3.1.30.** All new piping shall be schedule 40 seamless black steel, socket welded, unless noted otherwise. Conveying distances shall be made as short as possible with number of pipe bends kept to a minimum. Bends in piping shall be long radius elbows. No short radius elbows shall be used. New piping shall be effectively supported to the satisfaction of the Chief Engineer.
- 3.1.31.** All piping connections to purifiers and feed pumps are to be done through flanged rubber expansion joints and stainless steel braided flex lines. Package will include these fittings

**3.1.32.** All pipe work is to be of flanged welded construction as per GEA Revised Installation Drawings. Flanged connections are to be made using new gaskets and hardware,

**Dirty Oil Inlet**

**3.1.33.** Existing Purifier suction change over valve pipework shall be cropped below deck plates and fuel system capped off by welded cap.

**3.1.34.** Forward of and to the port of purifier foundation a 1.5 – inch welded branch line shall be fitted to the existing 1.5-inch pipe. This branch line is to be fitted with a SDNR flanged isolating valve. This 1.5” branch line shall then split into two 1.5” branch lines and go to the inlet side of each feed pump/strainer module via new ball valves (2, one per pump), and expansion joints. Ball valves shall be easily accessible, near feed pumps and above deck plates.

**3.1.35.** Feed pumps have a two-inch inlet and outlet flanged connection so adapters will be required.

### **Clean oil Outlet**

- 3.1.36.** Existing clean fuel oil outlet pipe to Day Tank is 2-inch and passes under deck plates to the port of purifier foundation. This line should be cropped at flange forward of purifiers and modified so that one separate 1-inch line connects via a new ball valve to the clean oil outlet of each separator. This should be arranged so that only the branch line from each separator is reduced down from two – inch. That is, each branch line should connect to the two-inch existing pipe.

### **Dirt Oil Return**

- 3.1.37.** Existing Dirty oil return outlet pipe to Settling Tank is 1.5-inch and passes under deck plates to the port and forward of purifier foundation. This line should be cropped at flange forward of purifiers and modified so that a separate 1-inch line connects via a new ball valve Package includes butterfly valves to the dirty oil return of each separator. Ball valves shall be easily accessible, near centrifuge, and above deck plates.

### **Sludge Connections**

- 3.1.38.** Sludge discharge shall be connected via a shut-off flap as per GEA Revised Installation Drawings.
- 3.1.39.** Water outlets shall be connected to tank fittings as per GEA Revised Installation Drawings.

### **Air Connection**

- 3.1.40.** Air connection shall be made according to GEA Revised Installation Drawings with correct piping size and a new pressure regulator and shut off valve (ball) for each purifier. Sufficient bracketing and supports shall be used.

### **Water Inlet Connection**

- 3.1.41.** Water inlet connection shall be made according to GEA Revised Installation Drawings with correct piping size and a pressure regulator and shut off valve (ball) for each purifier. Sufficient bracketing and supports shall be used.

### **Lifting Points**

- 3.1.42.** Contractor shall fabricate, install lifting points directly above the center points of both centrifuge bowls and both centrifuge motors. These lifting points are to be used for service and maintenance and shall be certified for 1000lbs. Lifting points and new structural members shall be coated with one coat of primer and two coats of marine paint. All disturbed coatings shall be repaired. Drawings shall be provided that indicate certified rating of lifting points. Lifting points shall be located so as to provide a straight lift of the bowl and motor during maintenance routines.
- 3.1.43.** Contractor will be responsible for all Engineering cost associated with lifting points and certification.

**3.1.44.** All new brackets, pipework, and structural members shall be coated with one coat of marine primer and two coats of marine paint. All coatings damaged by hotwork shall be repaired in similar fashion.

**3.1.45.** Contractor is to ensure all new pipe work is clean and free from welding slag.

**3.1.46.** New pipe works shall be pressure tested to 100 psi.

### **3.2 Location**

**3.2.1.** Lower level of Forward Engine room, approximately frame 170 at tank top level.

### **3.3 Interferences**

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

## **Part 4: PROOF OF PERFORMANCE:**

### **4.1 Inspection**

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

**4.1.2.** For commissioning of new centrifuges, the contractor shall allow \$30,000.00 for the services of a GEA service representative. This shall be adjusted following proof of invoice by 1379.

**4.1.3.** Fuel Oil purifiers and piping shall be installed in strict accordance with manufacturer's recommendations and TCMS regulations.

**4.1.4.** The following inspections are required to be verified by the CCG Technical Authority and the TCMS Surveyor/Lloyd's. (Survey Items)

**4.1.5.** The witnessing of tests, verification of tests, verification measurements taken (pressure tests), certification of materials, recording of inspections, and sign off's.

### **4.2 Testing**

**4.2.1.** The contractor shall have TCMSB and Lloyds witness the running test including proof of all alarms, all sensors and emergency stop operation.

**4.2.2.** The Contractor shall hire the services of a manufacturer's FSR for commissioning.

**4.2.3.** New pipe works shall be hydrostatically pressure tested to 100 psi.

**4.2.4.** Purifiers, feed pumps, piping systems, alarms and shutdowns shall be demonstrated for correct operation to satisfaction of Chief Engineer, FSR, TCMS and Lloyd's surveyors. Contractor is responsible for scheduling surveyors.

### **4.3 Certification**

**4.3.1** Lifting points are to be certified for 1000lbs. Certificates are to be given to Chief Engineer in hard copy and electronic format.

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

**5.1.1** The Contractor shall supply the Chief Engineer with four type written copies and one electronic copy detailing the work undertaken, defects repairs made, measurements and readings taken. As Fitted Drawing Updates shall be presented in AutoCAD format. The report and drawings are to be delivered within a week of the completion of testing

**5.1.2** The Contractor shall provide a Quality Assurance report indicating that all disturbed components have been inspected by the Contractors QA Department for correct installation and fit.

**5.1.3** Contractor shall also provide a copy of TCMS Division III credit to Technical Authority.

**5.2 Spares**  
N/A

**5.3 Training**  
N/A

**5.4 Manuals**  
N/A

**L-01 Fan and Motor Overhauls (Survey)** - Total –nine (9)

1. The following axial and Centrifugal fans (Radial fans) are to be serviced:

No	ID	Location	Amps	Volts	MCC
1	Exhaust Fan #1 Converter Room	By Hangar, Stbd.	2.5/6.3	460	P3-3-6
2	Supply Fan #1 Converter Room	By Hangar, Port	3.2/10	460	P3-3-5
3	Exhaust Fan Forward Motor Room	By Hangar, Port	20/8	460	P1-2-3
4	Supply Fan Forward Motor Room	By Hangar, Stbd.	20/8	460	P1-2-4
5	Circ. Supply Fan Forward Mach Room	Forward Mach Room	25	460	P1-2-5
6	Exhaust Fan Aft Mach Room Aft (MG Supply Fan)	Bridge Deck Port side of 25 ton crane	19/7.5	460	P61-1-1
7	Supply Fan Aft Motor Room	By Hangar, Stbd.	7/3.5	460	P613-3
8	Exhaust Fan Aft Motor Room	By Hangar, Port	4.5/2.7	460	P61-3-4
9	Circ. Supply Fan Aft Mach Room	By Galley Entrance to E/R	25	460	P61-3-5

2. Fans are to be electrically isolated locked out and disconnected.

3. Access to these fans is restricted and difficult and may require modification to fan tubes to facilitate. Access requirements to be confirmed at viewing. Fan Locations are listed in the table

4. Where practical fan housings are to be released from adjacent air trunk and fan assemblies removed. Where not deemed practical, fan and motor assemblies are to be lifted out of tubes with tubes remaining in place.

5. Fan/motor assemblies are to be removed from housings with fan impellers removed from motor shafts. Fan impellers are to be thoroughly cleaned and examined for any defects.

6. Motors are to be disassembled, end bells removed from stator, and rotors removed. Stators and rotors are to be cleaned, inspected and tested.

7. New bearings are to be installed in end bells, motors assembled, impellers installed and motor/fan assembly dynamically balanced.

8. Axial fan housings are to be grit blasted to near white standard to remove all rust, paint, and other such debris. Housings are to be given two coats of a marine approved epoxy coating system in way of blasted areas using the coating manufacturer's recommended priming system.

9. Motors/fans are to be re-installed in housings and complete assemblies re- installed in air trunk as per original arrangement. New gaskets are to be supplied and installed at joints.

10. Fans are to re-connected electrically, electrical supply re-established and test run to satisfaction of Owners' Representative to prove proper operation and rotation.

## **L-02 ACCOMMODATION AIR REHEATER INSPECTION**

1. The following electric, supply air reheaters are to be opened, serviced and inspected:

All those on panel 5B - 14 heaters on this panel

All those on panel 6B - 11 heaters on this panel

All those on panel 4 - 8 heaters on this panel

Total of 33 heaters

Heaters serviced from panel 5B

Engineering Stores (Wallymart outboard)

Engineering Stores (Wallymart inboard)

Engineering change room (Aft)

Engineering change room (Fwd)

Engineering washroom

Storeroom L-02

Storeroom L-03 (Aft)

Storeroom L-07 (Fwd)

Cabin 614

Cabin 606

Cabin 605

Cabin608

Cabin 607

Gravimeter room – 615

Heaters serviced from panel 6B

Duty mess

Storeroom L-07 (Aft)

Washroom 618

Cabin 610

Cabin 609

Cabin 617

Cabin 612

Cabin 611

Storeroom L-04 (Aft)

Storeroom L-04 (Fwd)

Storeroom L-06

Heaters serviced from panel 4

Aft lounge

Hospital (#429A) Bathroom entrance

Hospital (#429A) Main entrance

Aft Lab Compartment "D"

Aft Lab Compartment "C"

Electrical Workshop (430)

Aft Lab Compartment "B"

## Aft Lab Compartment "A"

A detailed list of the re-heaters appears in the Charts and Table section of the Appendix.

2. Ships electrician will assist with identifying various electrical panels associated with heater electrical supply and control.
3. Full load current draw of each heater is to be taken and recorded prior to servicing.
4. Units to be electrically isolated and opened-up as required. (440 and 115 VAC supply)
5. Heaters are to be megger tested and recorded prior to servicing.
6. Heater elements, internal wiring, and associated components are to be inspected for damage or other such anomalies that would affect performance and safe operation.
7. Heating elements are to be disconnected, removed and cleaned. Insulation to be carefully inspected for any sign of cracking or failure.
8. Heater regulating thermostat is to be tested to ensure proper operation. Any thermostat that does not operate properly within 10% of its rated regulatory function is to be rejected.
9. Heater high-limit thermostat is to be tested to ensure proper operation. Any thermostat that does not operate properly within 10% of its rated regulatory function is to be rejected.
10. Fitted cabinet insulation is to be encapsulated with an approved product suitable to withstand generated heat and seal the insulation preventing introduction of material into the air stream. Product used to be applied in accordance with product manufacturer instructions.
11. Heaters are to be reassembled in good order, secured and function tested to satisfaction of Chief Engineer.
12. A written report (Excel or Word format) on disk, is to be presented to the Chief Engineer upon completion of the service work indicating:
  - Location of Heater
  - Feed Panel Number
  - Short narrative describing testing carried out and results and Summary of heater servicing.
13. All disturbed deck head panels are to be returned to an as found condition.
14. Contractor shall ensure cleanliness of all work and accommodation spaces affected by heater inspection is maintained in an as found condition during and

upon completion of the necessary work. Affected ceiling panels are to be wiped clean with a suitable surface cleaner to remove any soil, dirt, and/or finger prints.

15. Any deficiencies noted are to be brought to the attention of Chief Engineer as found and will be dealt with as "Work Arising".

