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EX HMCS CORMORANT

Condition Survey, Pollution Risk Assessment & Towage Assessment

At Bridgewater, Nova Scotia
10 & 27 July 2019

Date: 14 October 2019

Our Ref: 20989.00/LOCC/CCG/R001/0

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APPENDICES

EXECUTIVE SUMMARY

The vessel, CORMORANT is an all-steel vessel which was built in Italy in 1963 as a stern trawler named the ASPA QUATRO.

It was acquired by Canadian Department of National Defense in July 1975 and converted into a dive support vessel. It was renamed HMCS CORMORANT and given the designation ASL 20. The vessel was decommissioned in July 1997 and declared surplus in October of the same year.

In June 1998 the vessel was purchased from the Government of Canada by Dominion Shipping Inc. of Brownsville, Texas. It is understood that they intended to convert the vessel for use in the offshore industry as a dive support vessel. It is unclear what, if any, work was carried out but around 2000 the vessel was moored up in its current location in Bridgewater.

In 2009 it appears that the vessel was sold to Cormorant Marine Services Corporation a company based in Nevada. The new owner started work to re-activate the vessel but it appears that all efforts were stopped circa 2013. News articles suggest that around this time the vessel was sold to the Port of Bridgewater for a nominal sum.

In March 2015, whilst moored at its current location, the vessel took on a starboard (stbd) list and sank alongside. The stbd bridge wing ended up resting on the jetty causing damage to both the bridge wing and the jetty. Initially the Port of Bridgewater engaged a private company to salvage the vessel but due to uncertainties over official ownership of the vessel the company was unable to start the operation. The Canadian Coast Guard (CCG) Emergency Response (ER) responded to the incident and contracted a local dive and salvage contractor, to re-float the vessel.

At the time of the initial survey on 10 July 2019, the vessel was moored stbd side to at the jetty with access via a gangway. The vessel was found to have a notable list to stbd (later calculated to be around 4 degrees) and was trimmed approximately 3m by the stern.

A total of 12 mooring lines were noted to be in place. All were noted to be in poor condition and only one bow line and one stern line appeared to be taking any load. During the course of the survey the vessel was noted to move a considerable distance off the jetty under the influence of the changes in tide and wind.

The jetty consists of wooden piles fitted with a concrete cap. The jetty face is fitted only with wooden rubbing strips. The wooden fendering near the forward section of the vessel was missing, allowing the hull plating to make contact with the concrete apron. There is evidence of recent damage to the concrete as result of contact with the vessel; at present damage to the vessel is limited to paint scuffing. The jetty area where it was contacted by the stbd bridge wing in 2015 shows evidence of cracking and has been marked up at some point “Do Not Load”.

Security for the jetty was discussed with Rick Welsford, Port of Bridgewater. He confirmed that the gate to the jetty is locked but that there is no onsite security, video surveillance, nor any security firm employed to monitor the facility. It was noted that all access doors on the vessel were padlocked. Whilst the locked gate and secured access doors do prevent the general public from accessing the vessel, they have not prevented persons with malicious intent getting onboard. The sinking in 2015 was alleged to have been due to a deliberate act of sabotage. It was reported that somebody released the port anchor at some point in the past.

In addition to the CORMORANT there are two other vessels moored on the same jetty astern of the CORMORANT. Both of these vessels are clearly not being maintained and their moorings are also in poor condition.

During our second attendance, on 27 July 2019, Connors Diving also attended to conduct an underwater inspection of the hull and to take thickness measurements of the hull plating.

Overall the vessel itself is in poor cosmetic condition. Although thickness measurements of the hull taken during the dive survey do not indicate any major loss due to corrosion, deck fittings such as sounding pipes and tank vents are badly corroded and several have already broken off. It is apparent that there is no active maintenance of the vessel.

Internally the vessel is in poor condition. It is clear that no remedial work was carried out post re-floating. There is mold evident in a number of locations and free water in several locations on deck 2 towards the stern of the vessel.

In the machinery spaces it was noted that efforts had been made to drain machinery and system pipework of oil. All filters had been removed and various sections of pipework disconnected.

It was evident from the inspection that bulk oil was removed from a number of fuel tanks which still contained contaminated oily water mixture and a number of smaller tanks that contained oil without any evidence of water. Refer to Table 1 for details

It was noted that a large section of the bulkhead between the Propulsion Machinery Room and the Gas Mixing Compartment has been removed for access. Therefore, these two spaces should be considered common. In addition, it was noted that the port and stbd main sea suction valves were in the open position. During the dive survey it was noted that there were two plywood patches in locations that appear to correspond with the location of the sea suctions. The integrity of internal sea water pipework connected to the sea chests cannot be verified. In addition, the vent cocks on the top of the main sea strainers were showing signs of corrosion. Should these fail, or if the internal pipework is compromised, in the current situation there is only the plywood patch preventing water ingress.

Based on the survey, we would consider that conservatively there is approximately 6,500ltrs of oil remaining in tanks. and at least 8,500ltrs of contaminated water on the vessel located in the Diesel Generator Compartment, Propulsion Machinery Room, Gas Mixing Compartment and various common spaces aft end of deck 2.

A total of 116,694ltrs of water was contained within tanks identified. Most of these tanks are designated as fuel tanks. The quality of this water cannot be verified. For costing purposes all the water contained within tanks is assumed to be contaminated with oil until proven otherwise.

If consideration is being given to towage of the vessel to another location for disposal, the towage should be carefully planned. Some preparation work will be required to ensure the outer shell is fully watertight, as well as to establish safe main and emergency towing connections.

Separate to this report LOC has undertaken a stability assessment and a technical note has been issued.

Based on our surveys we would consider the vessel to pose a significant risk of polluting unless remedial action is taken in the short term due to the following:

- Plywood patches have been fitted to the sea suctions in way of Propulsion Machinery Room, these would be considered a temporary solution to prevent water ingress but have now been in place since 2015. Both main sea suctions were found open and the integrity of the internal piping systems could not be verified during our survey.

- There are pollutants on board, conservatively we would estimate 6,500ltrs of oil plus another 8,500ltrs of oil contaminated water in machinery spaces bilges and other compartments. In addition, the ballast water placed in the fuel tanks may contain oil in excess of 15ppm as we can find no record of the fuel tanks having been cleaning prior to ballasting.
- The absence of any security at the jetty apart from a locked gate means any access could go un-noticed. Although the vessel access doors are locked it would be easy for someone with malicious intent to gain access.
- There is no active maintenance of the vessel and its condition will continue to deteriorate.
- Moorings and fendering are not adequate and given the condition of the other two vessels astern, there is an increased risk of CORMORANT's moorings failing due to the condition of the moorings or from one of the other vessels breaking loose and impacting the CORMORANT.
- At present with the main sea valves open in the Propulsion Machinery Room there is only the plywood patches on the sea chests preventing water ingress should there be an internal leak. In addition, as the watertight bulkhead between the Propulsion Machinery Room and the Gas Mixing Compartment has been opened up then any ingress of water would fill both of these spaces and likely migrate further through the vessel resulting in the vessel again sinking.
- It is clear that there has not been any active maintenance of the vessel for some considerable time. Given the uncertainty of the vessel's ownership it is unlikely that there will be any maintenance in the future and so therefore the vessel's condition will continue to deteriorate.

In addition to the risk of pollution there is a significant risk to public safety The air quality in several areas makes these areas unsafe for entry. Should any members of the public access the vessel and enter these spaces there is a risk that they could be overcome.

Considering the following terms of reference provided for assessment of the vessel:

1. Grave and immediate threat of pollution
2. May pollute
3. No immediate risk of pollution – vessel is being managed

We would consider that the vessel in its current condition would be categorized as "1.Grave and Immediate Threat of Pollution" unless immediate remedial action is taken.

Based on an assumed vessel lightship of 1,442MT[1] we would estimate a budget of between $1,906,125 and $2,661,804 for removal of pollutants, towage of the vessel within Nova Scotia, and demolition.

[1] The lightship is based on the limited information available as no documents stating actual lightship were available.

1 SCOPE OF WORK

1.1 Instructions Received

1.1.1 LOC, acting on behalf of Canadian Coast Guard (CCG), was requested to attend onboard the vessel CORMORANT at Bridgewater, Nova Scotia and survey the vessel to collect information on the vessel's current condition with respect to structural condition, watertight integrity, quantity and location of any pollutants, and, suitability for towage.

1.2 Scope of the Summary Report

1.2.1 This report details the findings of the survey with respect to overall condition of the vessel, presence of pollutants and offers recommendations regarding vessel towage for disposal.

1.2.2 It also includes comments on the dive survey and hull thickness gauging survey carried out during attendance on 27 July 2019. The full dive report is attached as "Appendix B".

1.2.3 The stability assessment will be the subject of a separate technical note.

1.3 Limitations of Survey

1.3.1 No ceilings, claddings or sheathings were removed for examination of underlying structure.

1.3.2 Thickness gauging was carried out on the hull below the waterline only.

1.3.3 No tanks, other than those open, were opened for inspection.

1.3.4 Comments are based on conditions observed and documents presented.

1.3.5 Only areas of the vessel deemed safe for access were examined.

2 VESSEL DETAILS

Name:	CORMORANT
Previous Names:	ASPA QUATRO
Builder:	Cantiere Navale Apuania, Marine-Carrara, Italy
Built:	1963 / launched 1965
IMO Number:	6516881
Port of Registry:	Not Registered
Length overall:	74.7m
Breadth Moulded:	11.9m
Depth Moulded:	5.18m
Displacement:	2,388MT after conversion to DSV
Material:	Steel
Owner:	In dispute (CORMORANT Marine Services Corporation / Port of Bridgewater)

Figure 1 GHS Model Showing Sub-Division

3 VESSEL CONDITION ASSESSMENT

3.1 Jetty Condition

3.1.1 The jetty consists of wooden piles fitted with a concrete cap. Fendering consists of wooden rubbing strips. No rubber fendering is fitted. We did note a number of commercial tires in the vicinity of the vessel but none of these have been utilized to provide additional fendering.

3.1.2 In way of the forward section of the vessel the wooden fendering was missing allowing the hull plating to make contact with the concrete apron. There is evidence of recent damage to the concrete as result of contact with the vessel; at present damage to the vessel is limited to paint scuffing. See Photograph #7.

3.1.3 The jetty area where it was contacted by the stbd bridge wing in 2015 shows evidence of cracking and is displaced vertically downwards. This area has been marked up “Do Not Load” at some point in the past.

3.2 Jetty Security

3.2.1 Security for the jetty was discussed with Rick Welsford, Port of Bridgewater. He confirmed that the gate to the jetty is locked but that there is no onsite security, video surveillance, nor any security firm employed to monitor the facility.

3.2.2 It was noted that all access doors on the vessel were padlocked. Whilst the locked gate and secured access doors do prevent the general public from accessing the vessel, they have not prevented persons with malicious intent getting onboard. The sinking in 2015 was alleged to have been due to a deliberate act of sabotage. It was also reported that somebody released the port anchor at some point in the past.

3.2.3 Whilst there are other vessels at the facility there did not appear to be any personnel onsite. From conversations with Rick Welsford there is generally nobody onsite during normal working hours.

3.2.4 Access to the facility from the water side would also be straightforward.

3.3 Vessel Moorings

3.3.1 A total of 12 mooring lines were noted to be in place. One of these was noted to have failed at some point in the past.

3.3.2 All were noted to be in poor condition and only one bow line and one stern line appeared to be taking any load.

3.3.3 During the course of the survey the vessel was noted to move a considerable distance off the jetty under the influence of the changes in tide and wind.

3.4 Vessel Hull Above the Waterline

3.4.1 The hull above the waterline was noted to be cosmetically poor but there was no evidence of major corrosion.

3.4.2 These is one plywood patch on the stbd hull towards the stern but is located well above the waterline.

3.4.3 It was noted that there have been wooden plugs fitted to overboard hull penetrations at and above the waterline. Many of these appear in poor condition.

3.5 Bridge

3.5.1 The Bridge was noted to be cosmetically poor with ribbons of paint hanging from deckhead fixtures.

3.5.2 Standing water noted in some areas suggesting water ingress during periods of rain.

3.6 Vessel Main Deck (Deck No.1)

3.6.1 The deck is in cosmetically poor condition but there are no areas of major corrosion.

3.6.2 Many of the deck fittings, such as tank sounding pipes and tank air vents, are in poor condition, particularly where they penetrate the deck. Several of these were noted to have broken off.

3.6.3 In addition to the submersible vehicle, the hanger area was noted to contain a large number of stores, spares and general rubbish, all of which was covered in bird droppings.

3.7 Vessel Deck No.2

3.7.1 Generally, this area was in very poor condition with evidence of mould in many areas. There were a number of black plastic garbage bags in several locations which appeared to be filled with water and oil sodden materials.

3.7.2 Towards the stern of the vessel, standing water was noted; it was up to 100mm in some areas.

3.7.3 The header tank for the controllable pitch propeller (CPP) system was located in the Engineer's Workshop and, from the sight glass, appeared to be approximately 50% full. If correct this would suggest that the CPP system is still charged with oil.

3.8 Diesel Generator Compartment

3.8.1 There was clear evidence of efforts to remove all pollutants in this area. Fuel and lube oil filters on the generators had been removed and sections of pipework released in order to drain the contents. Several tanks were noted to have been opened.

3.8.2 We did find a number of tanks still containing oil that appear to have been missed during the pollutant removal post re-floating.

3.8.3 Water with oil on top was noted in the bilge. Due to the vessel's list and trim, this had collected in the stbd aft corner of the space.

3.9 Gas Mixing Compartment

3.9.1 Access to the space was via the open hatch on deck No.2.

3.9.2 Access to this space was not possible during the first attendance due to poor air quality. For the second attendance the space was ventilated for a number of hours with forced air blowers and tested to ensure oxygen levels were adequate for entry.

3.9.3 Much of the equipment had been removed from this space and there is a large opening in the aft watertight bulkhead allowing access directly into the Propulsion Machinery Room.

3.9.4 Standing water noted in the space on the stbd side up to 150mm.

3.10 Propulsion Machinery Room

3.10.1 Access to this space was not possible during the first attendance due to poor air quality. For the second attendance the space was ventilated for a number of hours with forced air blowers and tested to ensure oxygen levels were adequate for entry.

3.10.2 Access was made to this space via the hole made in the bulkhead at the aft end of the Gas Mixing Compartment.

3.10.3 The bilges were noted to contain significant amounts of water and we noted a layer of approximately 50mm of emulsified oil on top of approximately 400mm water.

3.10.4 Three sounding pipes aft of the main gear box on the centre line were check for contents and found to contain clean lubricating oil which would suggest that they were not pumped out following the vessel's re-floating in 2015.

3.11 General Comments on Vessel

3.11.1 Internally many of the watertight hatches are open. For those that are closed it was not possible to ascertain whether they were "dogged" closed nor if they were watertight. For the purposes of our analysis we have assumed that all internal access hatches are not watertight.

3.11.2 It is clear that no preservation works were carried out post re-floating.

3.11.3 With the exception of the Diesel Generator Compartment which appears to be well ventilated, all spaces in decks below #2 deck should be considered unsafe for access unless ventilated prior to entry.

3.12 Other Vessels Secured at the Same Facility

3.12.1 In addition to the CORMORANT there are two other vessels moored on the same jetty astern of the CORMORANT.

- HANNAH ATLANTIC
- RYAN ATLANTIC II (ex CAPE ROUGE) – Had previously sunk in its current location

3.12.2 Both of these vessels are in poor condition and are clearly not being maintained.

3.12.3 Moorings for both vessels are in poor condition.

3.12.4 Should there be a failure of the moorings of one of these vessels there is a risk of contact with the CORMORANT.

4 TANK SOUNDING / TANK CONTENTS

4.1 *Table 21* below details the known tanks, the sounding readings and the estimated quantity based on the available soundings tables onboard and results from the GHS modelling. Sounding pipes for a number of tanks couldn't be located.

4.2 Tank contents quantified in the GHS model are marked with *.

Item	Tank/Item Name	Sounding	Estimated Quantity of oil	Estimated Quantity of oil contaminated water	Comments
1.	Fore Peak FW Ballast Tank	Unknown	Unable to locate sounding pipe		
2.	No.1 Fuel Oil Deep Tank (S)	113cm		5,625ltrs	Water
3.	No.2 Fuel Oil Deep Tank (P)	Empty		0	
4.	No.3 Fuel Oil Deep Tank (S)	20cm		831ltrs	Water
5.	No.4 Fuel Oil Deep Tank (P)	115cm		7,688ltrs*	Water
6.	No.5 Fuel Oil DB Tank (S)	Empty		0	
7.	No.6 Fuel Oil DB Tank (P)	Empty		0	
8.	No.7 Fuel Oil Deep Tank (S)	Empty		0	
9.	No.8 Fuel Oil Deep Tank (P)	144cm		1,980ltrs*	Water
10.	No.9 Fuel Oil DB Tank (S)	Unknown	Unable to locate sounding pipe		
11.	No.10 Fuel Oil DB Tank (P)	Unknown	Unable to locate sounding pipe		
12.	Fuel Oil Service Tank (S)	Empty		0	
13.	Fuel Oil Service Tank (P)	Empty		0	
14.	Fuel Oil Drain Tank (C)	5cm	50ltrs		Oil
15.	Lube Oil Tank No.1 (S)	Empty	0		
16.	Lube Oil Tank No.2 (P)	3cm	100ltrs		Oil

Item	Tank/Item Name	Sounding	Estimated Quantity of oil	Estimated Quantity of oil contaminated water	Comments
17.	Lube Oil Tank No.3 (C)	57cm	3,233ltrs*		Oil / Water
18.	No.11 Fuel Oil Deep Tank (S)	Full		12,780ltrs*	Water
19.	No.12 Fuel Oil Deep Tank (P)	Empty		0	
20.	No.13 Fuel Oil Deep Tank (S)	Unknown		9,190ltrs	Water – Sounding pipe blocked but suspect full as water sighted at plug on manhole cover
21.	No.14 Fuel Oil Deep Tank (P)	117cm		2,840ltrs*	Water
22.	No.15 Fuel Oil Deep Tank (S)	Empty		0	
23.	No.16 Fuel Oil Deep Tank (P)	204cm		7,430ltrs*	Water
24.	No.17 Fuel Oil Deep Tank (S)	45cm		550ltrs*	Water
25.	No.18 Fuel Oil Deep Tank (P)	247cm		27,890ltrs*	Water – Probably full
26.	No.2 Water ballast tank (S)	219cm		10,630ltrs*	Water
27.	No.3 Water Ballast tank (P)	157cm		9,990ltrs*	Water
28.	No.1 FW Tank in Gas Mixing room (S)	85cm		6,750ltrs*	Water
29.	No.2 FW Tank in Gas Mixing room (P)	135cm		12,520ltrs*	Water
30.	Gear Oil Storage Tank	117cm	1,393ltrs*		Clean Oil
31.	CPP Reserve Tank	81cm	573ltrs*		Clean Oil
32.	Gear Oil Reserve Tank	Full	943ltrs*		Clean Oil
33.	No.1 Fuel Oil / Ballast DB Tank (S)	Unknown	Unable to locate sounding pipe		
34.	No.2 Fuel Oil / Ballast DB Tank (P)	Unknown	Unable to locate sounding pipe		

Item	Tank/Item Name	Sounding	Estimated Quantity of oil	Estimated Quantity of oil contaminated water	Comments
35.	No.3 Fuel Oil / Ballast DB Tank (S)	Unknown	Unable to locate sounding pipe		
36.	No.4 Fuel Oil / Ballast DB Tank (P)	Unknown	Unable to locate sounding pipe		
37.	No.5 Fuel Oil / Ballast DB Tank (S)	Unknown	Unable to locate sounding pipe		
38.	No.6 Fuel Oil / Ballast DB Tank (P)	Unknown	Unable to locate sounding pipe		
39.	Fuel Oil Purifier Sludge Tank	70cm	300ltrs		Oil
40.	Lube Oil Purifier Sludge Tank	68cm		300ltrs	Water
41.	Generator Engine Room Bilge	Approx 20cm on tank top in a wedge		2,000ltrs (estimated)	Oil and water
42.	Propulsion Machinery Room Bilge	50cm		3,000trs (estimated)	Approx 5cm emulsified oil
43.	Accommodation Decks	Various		3,200ltrs (estimated)	Visible oil sheen
Total Estimated Volume			**6,592ltrs**	**125,194ltrs**	

Table 1: Tank Contents

4.3 A total of 116,649ltrs of water was calculated as being contained within tanks. Some of these thanks are designated as fuel tanks. We can find no record of the tanks having been cleaned prior to being ballasted. It is probable that the water in these tanks contains oil in quantities above 15ppm. In addition, the quality of the water contained within the ballast and fresh water tanks cannot be confirmed as oil free. Testing of individual tanks will be needed to confirm if the water in these tanks could be discharged without being processed.

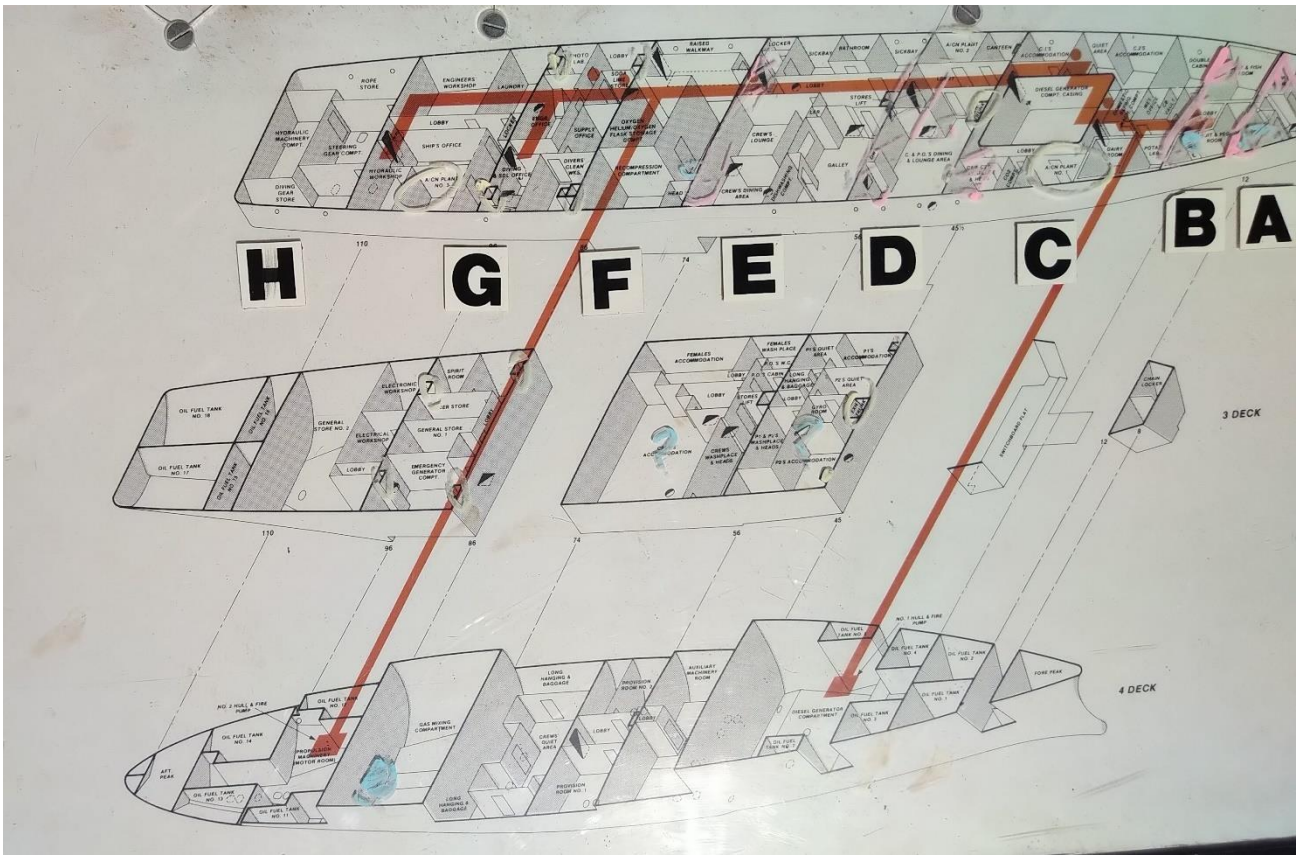


Figure 2 Tank Location on Damage Control Plan

5 DIVE SURVEY AND THICKNESS GAUGING

5.1 On 27 July 2019 Connors Diving attended the vessel to carry out an underwater inspection and thickness gauging of the hull below the waterline.

5.2 Scope of work was as follows:

5.2.1 Overall inspection of the vessel's underwater area to identify any patches, areas of suspected corrosion and confirm the integrity of the propeller and rudder.

5.2.2 Assess level of marine growth on the hull.

5.2.3 Thickness gauging of the hull at predetermined locations to provide an overall picture of the hull plating.

5.2.4 Thickness gauging in way of any areas of excessive corrosion.

5.2.5 Visual examination of horizontal and vertical weld seems in several locations to check for localized corrosion.

5.3 A copy of the full dive report is attached as "Appendix B". Copies of the dive video are available on request.

5.4 Summary of the dive survey findings:

5.4.1 Propeller and rudder are secure.

5.4.2 There is no evidence of damage to the hull.

5.4.3 Plywood patches were noted on port and stbd in the aft section. Given the location of the patches and lack of any visible sea chests it is concluded that these patches are over the Propulsion Machinery Room sea suctions.

5.4.4 A steel patch was noted forward in way of the diesel generator compartment sea chest.

5.4.5 There is 100% heavy marine growth coverage of the hull underwater consisting of 75mm – 150mm depth of mainly mussels and barnacles.

5.4.6 Inspection of weld seams showed the original coating still intact with no evidence of localised wastage.

5.4.7 UT readings of the hull did not identify any areas of concern. Based on the consistency of the readings in specific locations we would consider that the hull plating is at or close to original thicknesses.

5.4.8 Thickness gauging of some areas on the stbd side was not possible. Due to lack of fendering and the movement of the vessel it was considered unsafe.

6 CONSIDERATIONS FOR TOWAGE

6.1 The lack of watertight subdivision between the Propulsion Machinery Room and the Gas Mixing Compartment raises questions regarding damaged stability. This will need to be assessed prior to towage.

6.2 With some preparations it is considered that the vessel could be towed to another location for disposal subject to the following:

6.2.1 To move the vessel, it is suggested that a tug with a minimum bollard pull of around 20MT.

6.2.2 We would recommend that the environmental conditions are limited to a sea state of 2.5m Hs and winds of 25 knots.

6.2.3 Prior to towage efforts should be made to remove all bulk pollutants from the vessel.

6.2.4 Prior to towage efforts should be made to remove or secure all loose items.

6.3 Tow preparations should include the following:

6.3.1 Establishing a tow connection forward. Given the limited breadth of the vessel a single leg bridle may be the best option.

6.3.2 An emergency back-up tow connection should be fitted complete with floating messenger line and pick-up buoy.

6.3.3 All side shell penetrations should be sealed.

6.3.4 Propeller should be locked and rudder should be secured at midships position.

6.3.5 Submersible pumps should be located in the major compartments and rigged ready for use. If electrically powered, then a suitably sized generator should be provided and the pumps connected.

6.3.6 Paint marks or similar should be placed on the hull just above the waterline forward so that any change in draft can be readily seen from the tug during the tow.

6.3.7 The tug should be equipped with a work boat to allow tug crew to board during the tow to activate the pumps if leakage is detected. There should also be sufficient crew to allow for a boarding party as well as crew to operate the tug safely whilst the boarding party are on board the tow should it be necessary to operate the pumps.

6.3.8 Access points to allow easy boarding from a work boat should be established on both sides of the vessel.

6.3.9 A tow plan should include, at minimum: towing arrangement, appropriate towing gear certificates, voyage plan, and contingencies

7 DISPOSAL COST ESTIMATE

7.1 The following section provides a cost estimate for vessel disposal. The costs have been divided in to the following categories:

- Removal of pollutants
- Preparation of vessel for tow
- Vessel tow
- Vessel recycling

7.2 Costs associated with the categories above are based on assumptions that, where possible, have been baselined against industry averages.

7.3 Removal of pollutants

Cost for removing pollutants has two elements. The first being mobilisation, travel and subsistence costs and the second is the charge for handling and disposing of the waste. The latter is estimated at $0.35 - $0.45 per litre.

Table 2 details the estimated volume of pollutants on board the vessel.

Item	Description	Volume, litres
FO Purifier Sludge Tank	Dirty Diesel Oil	300
Fuel Oil Drain Tank	Diesel Oil	50
No.2 Lube Oil Tank	Clean Lube Oil	100
No.3 Lube Oil Tank	Mixture of Lube Oil and Water	3,233
Gear Oil Service Tank	Clean Lube Oil	1,393
CPP Oil Storage Tank	Clean Lube Oil	573
Gear Oil Reserve Tank	Clean Lube Oil	943
Ballast, fresh water and fuel oil tanks	Potentially oil contaminated ballast water	116,694
Free water in bilges and decks	Contaminated oily water	8,500
	Total	**131,786**

Table 2: Estimated volume of pollutants

The above table includes ballast water contained in fuel, ballast and fresh water tanks that may have an oil content greater than 15ppm.

7.4 Preparation of vessel for tow

The main activities considered for vessel preparation are: the tow plan and any associated engineering required; rigging of main and emergency towing arrangements; and, re-establishing intercompartment watertight integrity. The cost for these activities is between $12,500 - $25,000 CAD. It is believed that the price for preparing the vessel for tow would be insignificant in the overall disposal costs.

7.5 Vessel Tow

The costs associated with chartering a tug have been estimated to be between $15,000 - $18,000 CAD per day. This is based on the current spot market rate for a 45-50MT bollard pull tug. It will depend on the market demand at the time of charter. The number of days required will depend on the tow vessel location and disposal location; at this stage it has been assumed to be 3 days.

7.6 Vessel Recycling

The cost associated with vessel breaking and recycling has been estimated to be between $1250 - $1750 CAD per MT. The cost associated with removing friable asbestos is considered on a case by case basis and has not been included within this estimate.

7.7 Cost Estimate

Estimated costs for vessel disposal are presented in *Table 3* below.

		Unit cost, $CAD		Total cost, $CAD	
Category	**Units**	**Lower**	**Upper**	**Lower**	**Upper**
Pollutants, litres[1]	131,786	$0.35	$0.45	$46,125.00	$59,304.00
Vessel preparation [2]	1	$12,500.00	$25,000.00	$12,500.00	$25,000.00
Vessel tow, days[3]	3	$15,000.00	$18,000.00	$45,000.00	$54,000.00
Vessel recycling, MT[4]	1,442	$1,250.00	$1,750.00	$1,802,500.00	$2,523,500.00
			Total	**$1,906,125.00**	**$2,661,804.00**

Notes

1 Cost does not include associated mobilisation, travel and subsistence
2 Cost indicated includes tow plan and on-site preparations but assumes all towing equipment provided by towing company
3 3 days have been assumed but is dependant on final location
4 Vessel lightship has been assumed to be 1,442MT

Table 3: Cost Estimate

8 CONCLUSION AND RECOMMENDATIONS

8.1 This report details the current condition of the vessel as well as recommendations for towage following survey performed by LOC. Separately a stability assessment has been undertaken and the results have been issued as a technical note.

8.2 Review of the thickness gauging carried out during the dive survey did not identify any areas of concern on the underwater area of the hull plating.

8.3 The dive survey did identify plywood patches on the hull port and stbd towards the stern. These appear to be in the location of the Propulsion Machinery Room sea suctions and were most likely fitted during the refloating operation in 2015 to prevent water ingress. Internally both main sea suction valves were found in the open position. We would consider plywood patches to be only a temporary measure and would recommend that these plywood patches are replaced with steel patches or that internally other means are employed to ensure the watertight integrity of the hull as a matter of urgency.

8.4 Given that the bulkhead between the Propulsion Machinery Room and the Gas Mixing Compartment has been compromised and that the access to the Propulsion Machinery Room from Deck No.3 cannot be confirmed as watertight it is likely that any flooding into either the Propulsion Machinery Room or the Gas Mixing Compartment would result in the water migrating into Deck No.3. Analysis suggests that this would result in the vessel sinking as water continued to migrate through the vessel.

8.5 From the results of the survey there are a number of tanks containing oil. Should the vessel sink again there is clear potential for the vessel to pollute. Conservatively and based on the tanks accessed, it is suggested the total quantity of oil and oil/water on board was approximately 6,500ltrs at the time of survey.

8.6 In addition, we would estimate that there is in the region of 8,500ltrs of oil contaminated water onboard the vessel located the Diesel Generator Compartment, Propulsion Machinery Room, Gas Mixing Compartment and various common spaces at the aft end of deck 2.

8.7 There are a number of tanks that contain water. We can find no record that these thanks were cleaned prior to being ballasted. It is also possible that contaminated water inside the vessel was pumped into tanks during the refloating process in 2015. We would therefore consider that the water in all tanks should be considered as contaminated with oil until proven otherwise. Based on the tanks that were identified there is a total of 116,694ltrs of potentially contaminated ballast water in tanks. Testing of each individual tank will be required to confirm that the water contained in the tank has an oil content of less than 15ppm.

8.8 Based on the survey's findings regarding the vessel's condition and apparent lack of any maintenance, the vessel's condition will only deteriorate further. Urgent remedial action is required to prevent the vessel from posing an immediate threat of pollution.

8.9 Nothing in the dive survey nor our observations would suggest that the previous sinking was caused by water ingress due to failure of the hull or internal pipework, but rather, it was most likely the result of a malicious act. Therefore, given the complete lack of security - other than a locked gate and locked access doors - there is a significant risk of a repeat incident.

8.10 If the vessel is to remain in its current location, the condition of the moorings is such that they should be replaced as soon as possible. At the same time, proper fendering should be placed between the vessel and jetty. As the jetty has been damaged, we would also recommend that an engineering assessment be carried out on the jetty to establish if any remedial work is required.

8.11 Given the age of the vessel it is highly likely that asbestos would have been used in the original construction. It is unknown if any sampling or remediation has been done during the life of the vessel and therefore it would be prudent to assume there is asbestos until proven otherwise.

Based on the vessel's lightship of 1,442MT we would estimate a budget of between $1,906,125 and $2,661804 for removal of pollutants, three-day towage of the vessel, and demolition. This assumes that all water on board is considered contaminated and will need to be discharged for treatment.

This report is based on surveys undertaken and / or documents reviewed and is prepared in good faith and without prejudice to any or all parties concerned.

For and on Behalf of
LONDON OFFSHORE CONSULTANTS (Canada), Ltd

Andrew Lund
Marine Engineer
14th October 2019

APPENDIX "A"

PHOTO REPORT

1. General view

2. Stbd side looking aft

3. Stern, stbd side – note list to stbd

4. Fwd draft – stbd

5. Aft draft - stbd

6. Stbd side looking forward – note condition of mooring ropes and minimal fendering

7. Stbd side fwd – missing fendering / vessel

8. Stern view – note slack mooring lines

9. Temporary plywood plug on ship's hull (stbd side)

10. General condition of mooring ropes and wires

11. Stern line outer cover

12. Midship mooring lines

13. General view of jetty looking aft - note vessels astern

14. HANNAH ATLANTIC Condition of Moorings (first vessel astern of CORMORANT)

15. Focsle deck

16. Bridge front

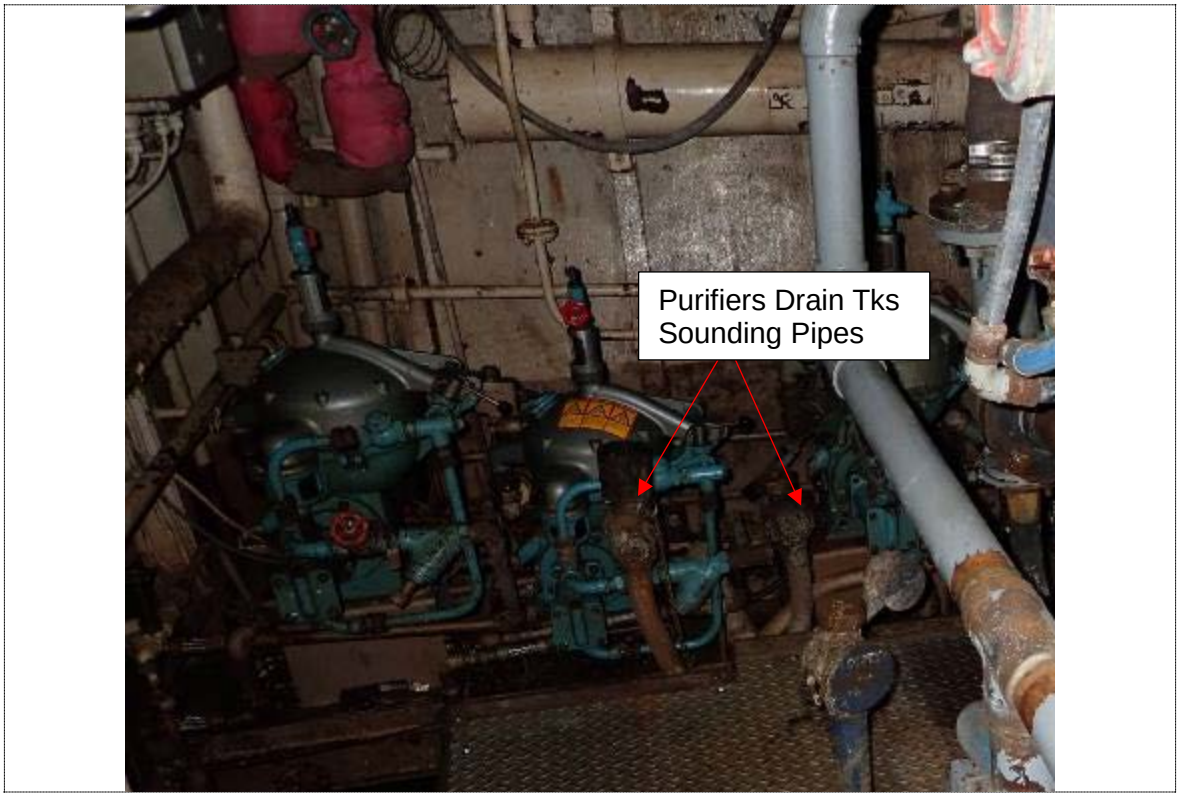
17. Stbd aft – emergency towing connection

18. Broken sounding pipe for No.13 stbd fuel oil tank

19. Aft deck looking towards hanger

20. Bridge

21. Diesel generator compartment bilge well – oil layer on top of water



22. Purifiers – note sounding pipes for sludge tanks. FO sludge tank 70cm oil

23. Lounge

24. Galley

25. PO's dining room and lounge

26. Bulkhead between gas mixing compartment and main propulsion room cut open

27. Main propulsion room bilges – approx. 50mm emulsified oil on top of water

28. Stbd main sea valve in propulsion room in open position - port side same

29. Sea strainer vent cock starting to corrode

30. CPP and gear oil storage tank sounding pipes – tanks found full of clean lube oil

31. Bags of oil and water soaked “garbage”

32. Decompression chamber compartment

33. Overboard drain non-return fitted with cement plug

34. Patched overboard line starting to weep

35. Submersible and general spares / stores in hanger

APPENDIX "B"

DIVE SURVEY REPORT

M/V CORMORANT
Underwater Survey / Ultrasonic Shell Plate Testing

Bridgewater, Nova Scotia

Prepared for:

London Offshore Consultants
Ibex House, Minories, London
EC3N 1DY, UK

Prepared by:

Cole Scarfe
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CDS Job #
6092

July 26, 2019

TABLE OF CONTENTS

General Information

Task:	Underwater Survey/Ultrasonic Testing of M/V Cormorant	
Reference:	London Offshore Consultants	
Personnel	Diving Supervisor	Cole Scarfe
	Diver #1	Max Mycka
	Diver #2	Matt Foster
	Diver #3	Brandon Emeneau
Date/Time Commenced:	0700 – July 26, 2019	
Date/Time Completed:	1300 – July 26, 2019	
Location:	Bridgewater, Nova Scotia	
Weather	Clear - Calm	
Sea Conditions	Light Current	
Visibility - Surface	Unlimited	
Visibility – U/W	5’ – 10’	

Introduction

As directed by London Offshore Consultant representatives on site, Connors Diving Services carried out an in-water survey of the M/V CORMORANT including Ultrasonic Thickness Testing of the Hull Shell Plate.

Procedure

As per the Provincial Occupational Diving Regulations a four-man dive team was dispatched to the work site.

Upon arriving, a hazard assessment of the area was conducted. This, in conjunction with a safe job plan, is reviewed by the diving team prior to starting any work. In addition, the scope of the work and procedures are discussed.

Divers used surfaced supplied diving equipment (SSDE) and closed circuit T.V. (CCTV). This gives the supervisor and client representative a real-time look at what the diver is experiencing. This ability also allows questions to be asked during the dive, eliminating the chance of missing valuable data.

The focus of the survey was to inspect all Underwater Hull Components with special attention to heavy deterioration to the Hull Shell.

The findings of this inspection are detailed in the following report and accompanying video.

M/V CORMORANT SURVEY

LONDON OFFSHORE CONSULTANTS

BRIDGEWATER, NOVA SCOTIA

JULY 26, 2019

Underwater Survey - Focal Points

1. **Running Gear –** Rudder, Propeller, Rope Guard, Stern Tube
2. **Sea Bays** – Gratings, Fasteners, Patches
3. **Bilge Keels** – Steel Deterioration, Weld Seams, Contact Marks, Deflections
4. **Hull Shell** – Steel Deterioration, Transverse Weld Seams, Longitudinal Weld Seams
5. **Hull Shell** – Location/Type of Marine Growth
6. **Ultrasonic Testing** – Testing of Shell Plate Thickness at Pre-determined locations

Running Gear

- **Rudder**
  90% Covered in Heavy Marine Growth (Mussels/Barnacles). All fastening components appeared to be in place. No abrasions at Pintle locations. No Contact marks, or deflections were located. Rudder appeared secure and in proper alignment.

- **Propeller**
  (4 Blades) 100% Covered in Heavy Marine Growth (Mussels). No obvious Contact or deflections were found throughout the leading/trailing blade edges. No Signs of Oil Leakage/Buildup were found. Propeller appeared secure and in proper alignment.

- **Rope Guard**
  90% Covered in Heavy Marine Growth (Mussels). Patches of Heavy Scaling/Steel Deterioration found on Upper Shell. Rope Guard appeared secure and in proper alignment.

- **Stern Tube/Skeg**
  100% Covered in Heavy Marine Growth (Mussels). No exposed areas of heavy steel deterioration. All located Transverse and Longitudinal weld Seams appeared in good condition with no major areas of surface corrosion/loss of material.

Sea Bays

- **Wooden Patches**
  All Wooden Sea Bay Patches were visually inspected and appeared secure and in place. Efforts were made to not disturb them during survey.

- **Steel Patches**
  All Steel Sea Bay Patches were inspected and appeared secure and in place. All weld seams appear to be in good condition with no signs of significant surface deterioration or loss of material.

Bilge Keels

- **Port Side Bilge Keel**
  100% covered in Heavy Marine Growth (Mussels/Barnacles). Weld seams show signs of light corrosion but minimal loss of material is present. No Sign of Major Contact or Deflection was found. Both Leading/Trailing edges are secure to the Hull with no Cracking/Separation found.

- **Starboard Side Bilge Keel**
  100% covered in Heavy Marine Growth (Mussels/Barnacles). Weld seams show signs of light corrosion but minimal loss of material is present. No Sign of Major Contact or Deflection was found. Both Leading/Trailing edges are secure to the Hull with no Cracking/Separation found.

Hull Shell

- **Marine Growth**
  Heavy Marine Growth coverage was found throughout the entirety of the Hull Shell (3-6" Mussel/Barnacle growth).

- **Longitudinal Weld Seams**
  Hull Coating easily removed. Light to Medium Surface Corrosion, Scaling found in majority of locations. Minimal material loss was found throughout. Heaviest visual deterioration was located within 1m below current waterline.

- **Transverse Weld Seams**
  Hull Coating easily removed. Light to Medium Surface Corrosion, Scaling found in majority of Locations. Minimal material loss was found throughout. Heaviest Visual Deterioration was found on the Rope Guard and at the Trailing edge of Vessel.

Ultrasonic Thickness Testing (Shell Plate)

- **Ultrasonic Testing** was completed at Regular Transverse Intervals throughout the entirety of the underwater Vessel Shell.

- **Transverse Testing Locations** - 0'(Stern), 0+50', 0+100', 0+150', 0+234'(Bow).

- **General Longitudinal Testing** was completed along the Port Side of the Vessel (1m below the current waterline). *This was not Completed on the Starboard side due to Vessel Movement/No Dock Fenders.*

- **Rope Guard Testing** – Upper Shell (0.208") / Lower Shell (0.212")

- **Rudder Testing** – Port Side (0.374") / Starboard Side (0.590")

- **Transverse/Longitudinal Results** of the Hull Shell Plating can be found in the Tables starting on the following page.

Ultrasonic Testing – 0'+234' (Forward Draught Mark Location)

	Port		Starboard
Waterline	0.632		0.626
1m Above Keel	0.308		0.522
		Keel	

Ultrasonic Testing – 0'+150'

	Port		Starboard
Waterline	0.476		0.420
1m Above Bilge Keel	0.422		0.466
1m Below Bilge Keel	0.426		0.460
1m Above Keel (Center Line of Hull)	0.450		0.450
		Keel	

Ultrasonic Testing – 0'+100'

	Port		Starboard
Waterline	0.406		0.516
1m Above Bilge Keel	0.428		0.408
1m Below Bilge Keel	0.522		0.492
1m Above Keel (Center Line of Hull)	0.586		0.434
		Keel	

Ultrasonic Testing – 0'+50'

	Port		Starboard
Waterline	0.416		0.418
3m Below Waterline	0.400		0.402
1m Above Keel (Center Line of Hull)	0.580		0.388
		Keel	

Ultrasonic Testing – 0' (Stern)

	Port			Starboard
Waterline	0.320	0.352	0.362	0.350

Longitudinal Ultrasonic Testing – Port Side Waterline
(Approximate 15' Increments Longitudinally)

Port Side Waterline	Thickness Readings (Inches)
240'(Bow)	0.632
225'	0.614
210'	0.602
195'	0.602
180'	0.600
165'	0.602
150'	0.416
135'	0.418
120'	0.422
105'	0.410
90'	0.420
75'	0.412
60'	0.380
45'	0.366
30'	0.344
15'	0.338
0' (Stern)	0.320

It was a pleasure working with London Offshore Consultants and we look forward to working with you again in the future.

If you have any further questions, please feel free to contact me at any time,

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ISO 9001 Registered