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12 November 2014

VANCOUVER DRYDOCK COMPANY LTD.

CCGS JOHN P. TULLY – SHELL THICKNESS TESTING AND WATER BALLAST TANK CONDITION SURVEY

COMPLETED BY: 3GA MARINE LTD. PROJECT NO. : 14-39

SUBMITTED TO: VANCOUVER DRYDOCK COMPANY LTD REVISION NO.: 0

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1. EXECUTIVE SUMMARY

This survey was performed as requested by the Vancouver Drydock company Ltd (VDD). 3GA Marine Ltd. (3GA) as directed by VDD, conducted a condition survey of the ballast tanks and a hull thickness determination for the "CCGS John P. Tully" an offshore oceanographic science vessel on October 29th to November 4th, 2014. The goal of the survey was to determine the shell plating thickness of the hull structure and to conduct a condition survey for the water ballast tanks.

The shell plating of the "CCGS J.P Tully" was found in general to be in accordance with the original as built scantlings with a small number of minor diminutions in local areas.

The ballast tanks were found to be in a good structural condition with some paint degradation and scaling. Small areas of severe pitting were discovered in the Number 6 Centre Water Ballast tank. This may be the result of microbial corrosion. Although this would not impact on the structural integrity, this should be addressed and measures taken to prevent this local corrosion phenomena. The other Water Ballast tanks did not exhibit this phenomena.

2. INTRODUCTION

Vessel:	"CCGS John P. Tully"
Survey Date:	October 29th – November 4th, 2014
Location:	On board vessel at Vancouver Drydock Company Ltd, BC
Surveyed by:	Ray Moon, Amelia Adams and Frederick Gadd – 3GA Marine Ltd.
Description of Vessel:	Offshore oceanographic science vessel, built in 1984 at Bel-Air Shipyards, Vancouver BC. The vessel has been employed on science and research operations.

Table 1: Ship's Particulars

Name of Vessel:	"CCGS John P. Tully "
Official No.:	8320420
Identification:	CG2958
Port of Registry:	Ottawa, Ontario.
Classed	Unclassed
Gross Tonnage	2021
Deadweight	636 t^e
Length Overall:	68.90 m
Draft:	4.5 m
Depth:	7.3 m
Construction Material:	Steel
Type of Propulsion:	Geared Diesel
Maine Engines	(2) x Deutz 628
Total Horsepower	2757 kW
Crew Capacity:	21
Built:	1984
Builder:	Bel-Air Shipyard Ltd.

3. TERMINOLOGY:

The following terminology is used throughout this report to describe the condition of inspected parts of the vessel:

GOOD:	Condition better than average in all respects; original strength/performance unimpaired; no maintenance or repairs required
SATISFACTORY:	Condition average; minor deficiencies not in need of correction; wear and tear evident, but original strength/performance not significantly affected
SERVICEABLE:	Condition below average; wear and tear evident and original strength/performance affected, but not in need of immediate maintenance or repairs
POOR:	Condition deteriorated in all respects; beyond practical repair; requires renewal or replacement
SUBJECT TO FURTHER SURVEY:	Condition of the item could not be ascertained and further inspection recommended.

4. HULL SHELL PLATING THICKNESS SURVEY

4.1 General

The thickness measurement survey was limited to the outer shell of the hull. The intent was to do a thickness measurement using a 600 mm x 600 mm grid wherever possible. Because the John P. Tully was in a state of repair, there were a number of areas which were inaccessible due to re-fit activities, staging or dock blocks. When an area was difficult to assess, thickness measurements were taken to cover as much of the area that was available using man lift, portable staging or ladders.

4.2 Equipment

The equipment used for the thickness measurement survey was a Dakota Ultrasonics CMX DL. The mode employed was the thru paint Echo – Echo which results in a metal thickness only. The instrument has an accuracy of +/- 0.01mm. Periodically during the survey, the operator would check the instrument against a calibration block to ensure the instrument was reading accurately. Throughout the survey, there was no variance between the calibration block and the instrument.

4.3 Results

Appendix A is a summary of all the thickness measurement results. The results were compared against the values shown in the shell expansion plan in Appendix A. The results indicate out of 3,148 measurements taken, 3,136 indicated less than 10% diminution (99.6%). The remaining 0.4% of the readings indicated a diminution between 10% and 20%, all 12 readings trended towards the 10% value. The 12 readings were scattered over the hull as shown in Figures 1 through 3. The readings above the 10% diminution are shown as red squares. It should be noted, one reading is located on the transom. The transom is not included in Figures 1 to 3.

The readings confirm the hull shell scantlings are in good condition.

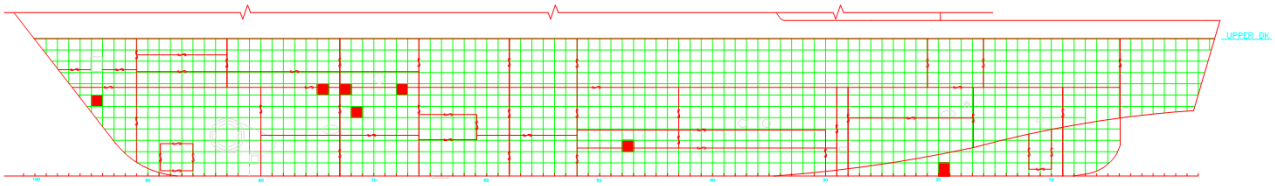


Figure 1. Port Profile

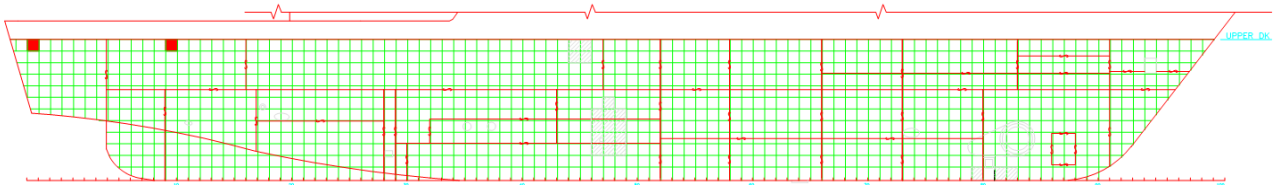


Figure 2. Starboard Profile

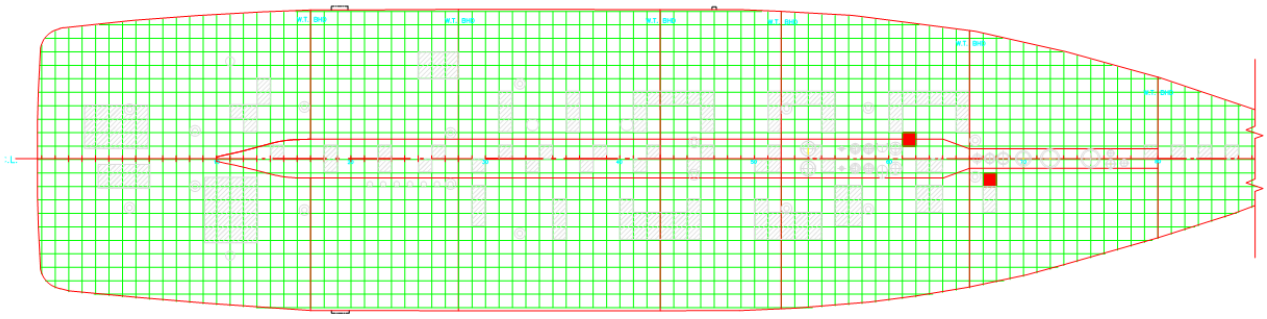


Figure 3 Bottom Plan

5. WATER BALLAST TANK SURVEY

5.1 General

Figure 4 below indicates the location of all ballast tanks. The number 6 center and the number 7 port and starboard tanks are double bottom tanks, the remainder of the ballast tanks are wing tanks.

The condition survey was limited to the water ballast tanks Number 2 port and starboard, number 6 center, number 7 port and starboard and number 10 port and starboard. All the tanks were open and accessible at the time of the survey. The shipyard procedure for confined space entry was rigorous and testing of the tanks was witnessed prior to entering the tank.

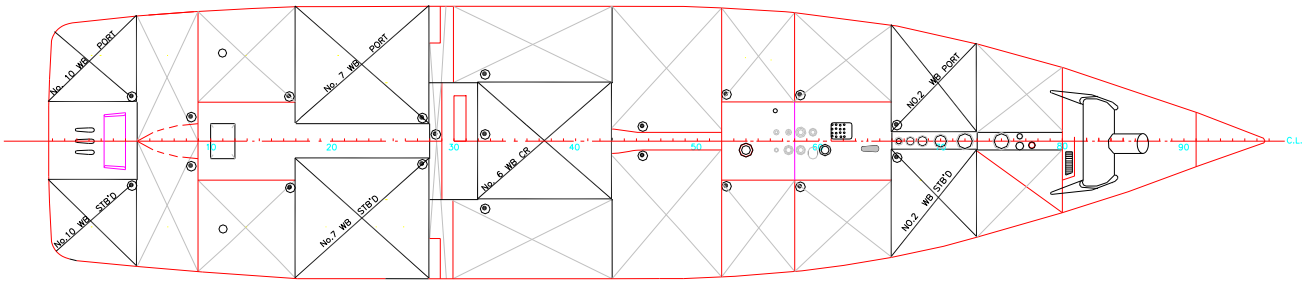


Figure 4.

A visual inspection of each water ballast tank was conducted. Spot checking of plate thickness was performed on the internal structure including bulkheads, web frames, floors and girders using Ultrasonics.

5.1.1 No 6 Center Water Ballast Tank.

At the time of the survey on October 30th 2014 at 7:30am, the space was dry. The tank coatings were breaking down in many places throughout the tank. The structure of the center tank was found to be in satisfactory

condition, with little or no loss of metal. The bottom shell had a small amount of pitting and had been repainted in the past which protected the shell from further corrosion. The paint on the bottom shell of the tank was found to be in satisfactory condition.

The tank top coatings were flaking in many locations and rust and scaling was evidenced throughout the tank. The tank top was in a satisfactory condition.

The girders and floors had areas where the paint was compromised. Although not common throughout the tank, there were a few locations where severe local corrosion had occurred. In some cases, the steel had deep pits up to 75% of the thickness of the structure. This was localized, the corrosion occurring in the corners in way of the floor and girder intersections. Waterways were located in the floors and girders although some were poorly constructed. The tank was clean at the time of survey and there was no evidence of mud, however, it is reasonable to assume mud or silt may have been present prior to cleaning the tank. The pitting evidenced may be a result of microbial corrosion as the corrosion took the form of a deep thumbprint type of pit. Although the local corrosion is severe, the overall structural condition of the floors and girders was good. The girders and floors are in a serviceable condition.

It should be noted, the bottom shell did not exhibit the kind of corrosion observed on the floors and girders.

The coatings on the floors and girders were 25% broken down. The deck head coatings were 75% broken down and the coatings on the hull bottom were broken down in local areas only.

5.1.1.1 No 6 WB center tank Photographs

1. No 6 Water Ballast tank access.

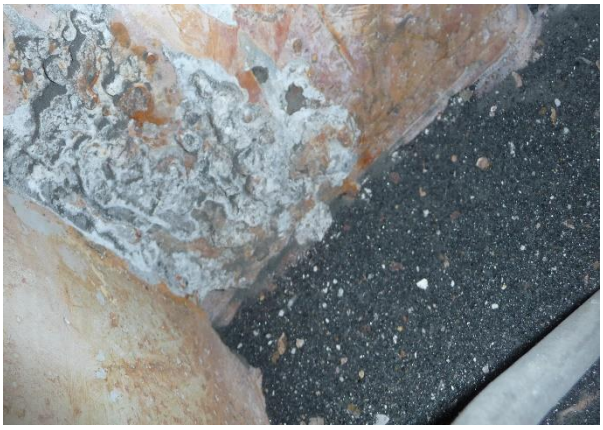
2. Typical bulkhead condition..

3. Corrosion in way of access coamings (typical)

4. Typical tank top corrosion.

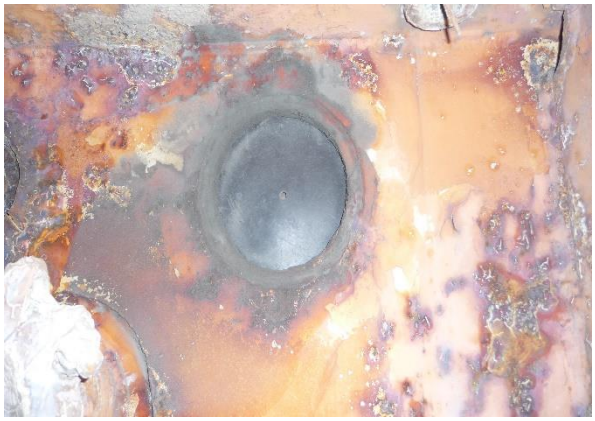
5. Severe pitting in port aft floor

6. Severe pitting in port side girder.



7. Typical paint deterioration in way of pitting.

8. Example of pitting and poor quality water way.



9. Bottom tank fwd port in way of pipe and transducer penetration.

10. Typical corrosion in center tank (looking to stb'd)

Ultrasonic thickness testing results in the compartment are as indicated in Table 1. Attempts were made to get a thickness reading on the pits, however, an accurate reading could not be acquired except where noted in Table 1 because of the location and size of the pits.

Table 1: No 6 Center WB tank NDT Summary

Structure measured	UT reading
2nd Longitudinal girder - starboard	15.95 mm
Access coaming	12.55 mm
Port side floor	12.50 mm
Loss of thickness in way of pits	4 – 5 mm

The shipyard was in the process of blasting the No 6 tank at the time of the survey and it is recommended the tank be checked periodically to ensure the local corrosion has been ameliorated by the new paint. It is also recommended not to leave partial water in the tanks especially if they have a high content of mud. The tanks should be flushed with fresh water when the vessel is docked for periods of time.

5.1.2 No 2 Stb'd Water Ballast Tank.

At the time of the survey on November 3rd 2014 at 7:30am, the space was partially dry with standing water on the inboard (lowest point) side of the tank. Although the tank was painted, the paint was showing deterioration in various places throughout the tank. The structure of the tank was found to be in satisfactory condition. The bottom shell was in good condition, corrosion occurring at the lowest points where standing water was evident. The paint on the bottom shell of the tank was found to be in satisfactory condition.

The deck head paint was in good condition with some local deterioration of the paint and associated scaling and rusting on the deck beams. The deck head plate and framing was in a satisfactory condition.

The girders and floors had areas where the paint was compromised. Although not common throughout the tank, there were a few locations where some moderate local corrosion had occurred particularly on the webs and on the underside of the face flats of the floors and girders. The girders and floors are in a satisfactory condition.

The coatings on the floors and girders were 25% broken down. The deck head coatings were 15% broken down and the coatings on the hull bottom were broken down predominately in the low point areas only. Anodes were fitted on the webs of the floors at the lowest points of the tank. The anodes were partially sacrificed by about 30%.

5.1.2.1 No 2 Stb'd WB tank Photographs

11 No 2 Stb'd WB tank shell and framing.

2. Typical bulkhead condition.

3. Deck head corrosion (typical)

12. Typical tank bottom corrosion.

13 Example of standing water in the tank.

6. Corrosion at bottom half of Web of floors

14 Typical paint deterioration and associated corrosion in way of frames.

8. Example of spalling of paint.

9. Example of web and face flat corrosion

Ultrasonic thickness testing results in the compartment are as indicated in Table 2.

Table 2: No 2 Stb'd WB tank NDT Summary

Structure measured	UT reading
Fwd Bulkhead	7.67 mm
Face flat	12.56 mm
Side shell transverse frame (photo7)	12.39 mm

It is recommended the tank be checked periodically to monitor the local corrosion Overall the tank is in a good condition. The face flats are prone to corrosion on the underside and edges and these are areas where future corrosion should be mitigated. This can be achieved by removing all the rust and applying a protective coating. It is also recommended not to leave partial water in the tanks especially if they have a high content of mud. All free standing water should be pumped out if possible. In case this is impractical, monitoring of the areas should occur at regular intervals and any further corrosion should be inhibited by protective coatings.

5.1.3 No 2 Port Water Ballast Tank.

At the time of the survey on November 3rd 2014 at 8:30am, the space was partially dry with standing water on the inboard (lowest point) side of the tank. Although the tank was painted, the paint was showing deterioration in various places throughout the tank. The structure of the tank was found to be in satisfactory condition. The bottom shell was in good condition, corrosion occurring at the lowest points where standing water was evident. The paint on the bottom shell of the tank was found to be in satisfactory condition.

The deck head paint was in good condition with some local deterioration of the paint and associated scaling and rusting on the deck beams (photo 2). The deck head plate and framing was in a satisfactory condition.

The girders and floors had areas where the paint was compromised. Although not common throughout the tank, there were a few locations where some moderate local corrosion had occurred particularly on the webs and on the underside and edges of the floor and girder face flats (photo 3). Blistering of the paint was observed on the web of the floor (photo 4). When investigated further, once the blister was removed (photo 5), it was observed light corrosion had occurred and pitting was not evidenced. The girders and floors are in a satisfactory condition.

The coatings on the floors and girders were 25% broken down. The deck head coatings were 15% broken down and the coatings on the hull bottom were broken down predominately in the low point areas only.

5.1.3.1 No 2 Port WB tank Photographs

1. No 2 Port WB tank shell and framing

15 Stringer flat and bulkhead stiffeners..

3. Framing corrosion (typical)

16. Web blister corrosion.

5. Photo 4 with blister removed..

6. Typical bulkhead condition

17 Example of standing water in tank..

Ultrasonic thickness testing results in the compartment are as indicated in Table 3.

Table 3: No 2 Port WB tank NDT Summary

Structure measured		Nominal thickness	UT reading
Fwd Bulkhead			7.74 mm
Web of floor			9.2 mm
Aft Bulkhead			8.87 mm
Diminution (general)			1.00 mm

It is recommended the tank be checked periodically to monitor the local corrosion Overall the tank is in a good condition although the face flats are an area where future corrosion should be mitigated. It is also recommended not to leave partial water in the tanks especially if they have a high content of mud. All free standing water should be pumped out if possible. In case this is impractical, monitoring of the areas should occur at regular intervals and any further corrosion should be inhibited by the application of a protective coating.

5.1.4 No 7 Starboard Water Ballast Tank.

No 7 WB tanks are typical double bottom tanks with floors intercostal to the girders. At the time of the survey on November 3rd 2014 at 9:30am, the space was dry with a slight sheen of mud on the bottom shell. Although the tank was painted, the paint was showing deterioration in various places throughout the tank. The structure of the tank was found to be in satisfactory condition. The bottom shell indicated minor pitting in locations throughout the tank, however the paint was in good condition which has inhibited further corrosion from occurring. The paint on the bottom shell of the tank was found to be in satisfactory condition. Corrosion was limited to the lower areas of the tank. The bottom shell towards the turn of the bilge was in good condition as illustrated in photo No. 7.

The deck head paint was in poor condition with local deterioration of the paint and associated scaling and rusting throughout. The deck head plate and framing was in a serviceable condition.

The girders and floors had areas where the paint was compromised and surface rust had erupted. Photo 4 illustrates the general condition of the floors and girders. The floors and girders were found to be in a satisfactory condition.

The coatings on the floors and girders were 40% broken down. The deck head coatings were 75% broken down and the coatings on the hull bottom were broken down predominately in the low point areas only.

5.1.4.1 No 7 Stb'd WB tank Photographs

1. No 7 Stb'd WB tank typical condition

2. Typical tank top paint deterioration..

3. Example of standing water in tank..

4. Typical Girder- Floor corrosion.

5. Paint flakes trapped in way of drainage point.

6. Typical bottom shell condition showing minor pitting.

7. Typical condition in way of side shell.

Ultrasonic thickness testing results in the compartment are as indicated in Table 4.

Table 4: No 7 Stb'd WB tank NDT Summary

Structure measured		UT reading
Floor (aft)		7.63 mm
Edge of girder - floor opening		7.01 mm
Typical Girder – floor		8.00 mm
Diminution (general)		1.00 mm

It is recommended the tank be checked periodically to monitor the local corrosion Overall the tank is in a good condition. It is also recommended not to leave partial water in the tanks especially if they have a high content of mud. All free standing water should be pumped out if possible. In case this is impractical, monitoring of the areas should occur at regular intervals and any further corrosion should be inhibited by the re - application of a protective coating.

5.1.5 No 7 Port Water Ballast Tank.

No 7 WB tanks are typical double bottom tanks with floors intercostal to the girders. At the time of the survey on November 3rd 2014 at 10:30am, the space was dry with a slight sheen of mud on the bottom shell. Although the tank was painted, the paint was showing deterioration in various places throughout the tank. The structure of the tank was found to be in satisfactory condition. The bottom shell paint was in satisfactory condition Photo No 4 illustrates blistering, which was observed on the bottom of the shell in a couple of places. The bottom shell towards the turn of the bilge was in good condition as illustrated in photo No. 6.

The deck head paint was in poor condition with local deterioration of the paint and associated scaling and rusting throughout. The deck head plate and framing was in a serviceable condition. There was one area where a tank top carling was badly corroded, as shown in Photo No 5. Although this is a tertiary structural member, it would be prudent to clean the carling of all surface rust and apply a coating or rust inhibitor to limit further deterioration.

The girders and floors were in a satisfactory condition with small amounts of corrosion occurring, generally in way of the openings. Photo 1 illustrates the general condition of the floors and girders. The floors and girders were found to be in a satisfactory condition.

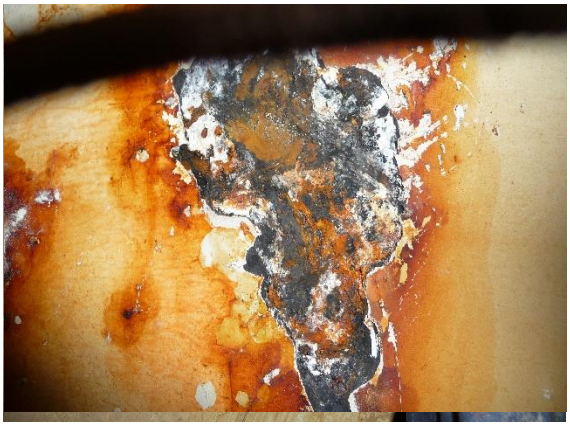
The coatings on the floors and girders were 10% broken down. The deck head coatings were 75% broken down and the coatings on the hull bottom were broken down in local areas only as indicated in photos 1,3 and 4.

5.1.5.1 No 7 Port WB tank Photographs

1. No 7 Port WB tank typical condition

2.Typical tank top paint deterioration..

7. Blistering on web of Floor.



8. Blister removed showing typical corrosion on web of Floor.

5. Badly corroded carling at tank top.

6. Typical condition in way of side shell.

Ultrasonic thickness testing results in the compartment are as indicated in Table 5.

Table 5: No 7 Port WB tank NDT Summary

Structure measured	UT reading
Tank top	9.00 mm
Tank top in way of corrosion	7.00 mm
Floor stiffener	5.00 mm
Floor stiffener in way of corrosion	4.00 mm

It is recommended the tank be checked periodically to monitor the local corrosion Overall the tank is in a good condition. It is also recommended not to leave partial water in the tanks especially if they have a high content of mud. All free standing water should be pumped out if possible. In case this is impractical, monitoring of the areas should occur at regular intervals and any further corrosion should be inhibited by the re - application of a protective coating.

5.1.6 No 10 Stb'd Water Ballast Tank.

At the time of the survey on November 3rd 2014 at 11:30am, the space was partially dry with standing water on the inboard (lowest point) side of the tank. Although the tank was painted, the paint was showing deterioration in various places throughout the tank. The structure of the tank was found to be in satisfactory condition with little or no diminution of the parent metal. The bottom shell was in good condition, corrosion occurring at the lowest points where standing water was evident. The paint on the bottom shell of the tank was found to be in satisfactory condition.

The deck head paint was in good condition with some local deterioration of the paint and associated scaling and rusting on the deck beams. The deck head plate and framing was in a satisfactory condition.

The girders and floors had areas where the paint was compromised. Although not common throughout the tank, there were a few locations where some moderate local corrosion had occurred particularly on the webs and on the underside of the face flats of the floors and girders. The girders and floors are in a satisfactory condition.

The coatings on the floors and girders were 25% broken down. The deck head coatings were 15% broken down and the coatings on the hull bottom were broken down predominately in the low point areas only. Anodes were fitted on the webs of the floors at the lowest points of the tank. The anodes were partially sacrificed by about 30%.

5.1.6.1 No 10 Stb'd WB tank Photographs

1. No 10 Stb'd WB tank shell and framing

2. Typical tank bottom condition..

3. Side shell corrosion (typical)

18. Bottom brackets corrosion (typical).

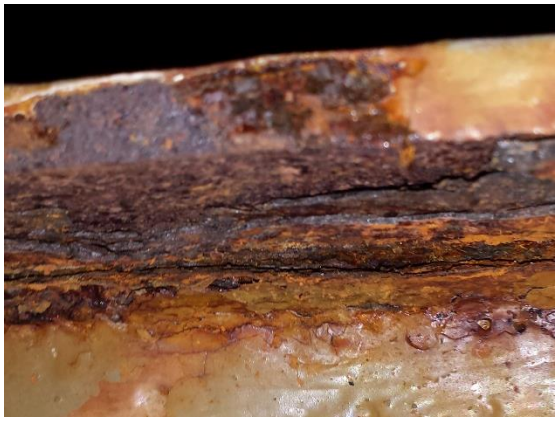
5. Typical Floor corrosion and new anode.

6. Crane pedestal

19 Corrosion under crane pedestal.

8. Typical corrosion of bottom shell and intermediate bottom transverse.

9. Corrosion in way of bulkhead.



10. Face Flat corrosion.

Spot check Ultrasonic thickness testing results in the compartment are as indicated in Table 6.

Table 6: No 10 Stb'd WB tank NDT Summary

Structure measured	UT reading
Floor webs	8.86 mm
Floor web at bottom in way of corrosion	8.41 mm

It is recommended the tank be checked periodically to monitor the local corrosion Overall the tank is in a good condition although the face flats are an area where future corrosion should be mitigated. It is also recommended not to leave partial water in the tanks especially if they have a high content of mud. All free standing water should be pumped out if possible. In case this is impractical, monitoring of the areas should occur at regular intervals and any further corrosion should be inhibited by protective coatings.

5.1.7 No 10 Port Water Ballast Tank.

At the time of the survey on November 3rd 2014 at 12:00am, the space was dry. Although the tank was painted, the paint was showing deterioration in various places throughout the tank. Overall, the structure of the tank was found to be in satisfactory condition. The bottom shell was in good condition, corrosion occurring at the lowest points of the tank as depicted in Photo No 3. The paint on the bottom shell of the tank was found to be in satisfactory condition.

The deck head paint was in good condition with some local deterioration of the paint and associated scaling and rusting on the deck beams particularly along the edges of the face flats as indicated on photo No 2. The deck head plate and framing was in a satisfactory condition.

The girders and floors had areas where the paint was compromised. Although not common throughout the tank, there were a few locations where some moderate local corrosion had occurred particularly on the webs and on the underside of the face flats (see Photo No 7) of the floors and girders. By observation, the worst case corrosion on the face flat was measured and 1.5mm of diminution had occurred. This is local corrosion, however, it is recommended to mitigate further corrosion by cleaning to remove all rust and re-application of a suitable coating. The girders and floors are in a satisfactory condition.

The coatings on the floors and girders were 25% broken down. The deck head coatings were 15% broken down and the coatings on the hull bottom were broken down predominately in the low point areas only. Anodes were fitted on the webs of the floors at the lowest points of the tank. The anodes were slightly sacrificed.

5.1.7.1 No 10 Port WB tank Photographs

1. No 10 Port WB tank shell and framing

2. Typical Deck head condition..

3. Bottom shell corrosion (typical)

20. Webs of Floor corrosion (typical).

5. Typical Bottom Shell corrosion

21 Typical anode.

22 Corrosion under Face flat.

8. Typical corrosion of bottom shell and Floors.

9. Typical scaing on webs and face flats.

Spot check Ultrasonic thickness testing results in the compartment are as indicated in Table 7.

Table 7: No 10 Port WB tank NDT Summary

Structure measured	UT reading
Floor Face flat	7.90 mm
Floor Face Flat in way of corrosion	6.40 mm

It is recommended the tank be checked periodically to monitor the local corrosion Overall the tank is in a good condition although the face flats are an area where future corrosion should be mitigated. It is also recommended not to leave partial water in the tanks especially if they have a high content of mud. All free standing water should be pumped out if possible. In case this is impractical, monitoring of the areas should occur at regular intervals and any further corrosion should be inhibited by protective coatings.

6. CONDITION ASSESSMENT EVALUATION CATEGORIES

6.1 Objective and Approach

The objective of the Water Ballast tank condition assessment process is to establish the condition of the tanks. The condition process is based on a visual survey supported by ultrasonic plate thickness testing.

6.1.1 Form for "Condition Survey of Major Items".

This form is divided into the following columns:

Column 1: "Survey Item No."
These are the sequential numbers of the items that were surveyed.

Column 2: "Primary System Name"
This describes the system, be it structural, mechanical or electrical. Depending upon the item, a "*Primary System*" may or may not have a "*Sub System*".

If the "*Primary System*" has a "*Sub System*", the "*Sub System*" will then have a "*Component*".

Column 3: "Main Compartment"
The vessel is divided into main compartment groupings consisting of layers, such as:

- Hull space below main deck;

Column 4: "Compartment Name"
This describes the actual compartment in the layered location, such as:

- Fore Peak Tank;
- Void space #1;
- Void space #2, and so on.

Column 5: "Sub System"
This identifies a part of the "*Primary System*" that provides a specific function or service within the "*Primary System"*.

Column 6: "Component"
The "*Components*" for each "*Primary System*" or the "*Sub System*" is the focus of the survey evaluation.

The "*Component*" for structural "*Primary System*" falls under the following categories:

- "Shell and First Level Support" comprising frames and longitudinals.
- "2nd Level Support" comprising webs, stringers and pillars.
- "Bulkheads" comprising plates and stiffeners.
- "Side Shell Structure" comprising plates and stiffeners.
- "Bottom Shell Structure" comprising plates and stiffeners.
- "Deckhead" comprising plates and stiffeners.

Column 7, 8, 9, 10: "Evaluation Categories"

- Column 7 evaluates the "Corrosion" state of the "Component".
- Column 8 evaluates the "Damage" state of the "Component".
- Column 9 evaluates "Integrity" state of the "Component".
- Column 10 evaluates the "Function" state of the "Component".

The "evaluation" of each "*Component*" is designated with a letter which signifies the severity rating of the category. The criteria assigned to each severity rating for category is described in a chart below.

Column 11: "Comments"
These are brief comments on the "*Component*".

Column 12: "Action"
Brief description of the 'action' suggested to rectify any issues.

Table 2: Hull Structural (H) – Evaluation Definitions

Category	Rating	A	B	C	D	E
Life Expectancy		Unlimited	> 7 years	> 5 years if no maintenance.	< 5 years, if no maintenance.	< 1 year, if no maintenance.
Corrosion		New or "as new" welds good, coating intact	Minor surface corrosion or in welds, coating generally intact	Surface Corrosion, minor pitting, coatings or insulation breaking down, No significant wastage or cracks	Significant local wastage or loss of weld metal	Significant wastage of structure and welds, loose or flaking rust, significant local pitting, pitted overall, structural integrity at risk
	Action	None	None, document in notes	Renew coating, may recommend further UT measurements	Renewal of local steel weld, coatings required at first opportunity, UT measurements required	Immediate renewal of steelwork
Damage		Minor or non-existent	Minor surface damage	Structural deformation, possible hazard	Significant local deformation, structural integrity at risk	Severely damaged elements missing structural integrity compromised
	Action	None	None: document in notes	Repair at next opportunity prior to heavy deployment	Repair at next opportunity	Repair immediately
System Integrity		New or "as new"	Good, minor deterioration with age.	Limited corrosion or damage but fully functional	Minor elements missing or damaged: structural integrity impaired.	Structure incomplete; major components wasted or failed.
	Action	None	None	Specify in notes	Specify in notes	Renew/repair/replace immediately
Function		New or "as new"	Good	Fair; meets requirements	Poor, does not meet requirements	Unsafe
	Action	None	None	Specify limitations in Notes	Specify limitations in Notes	Renew/repair/replace immediately

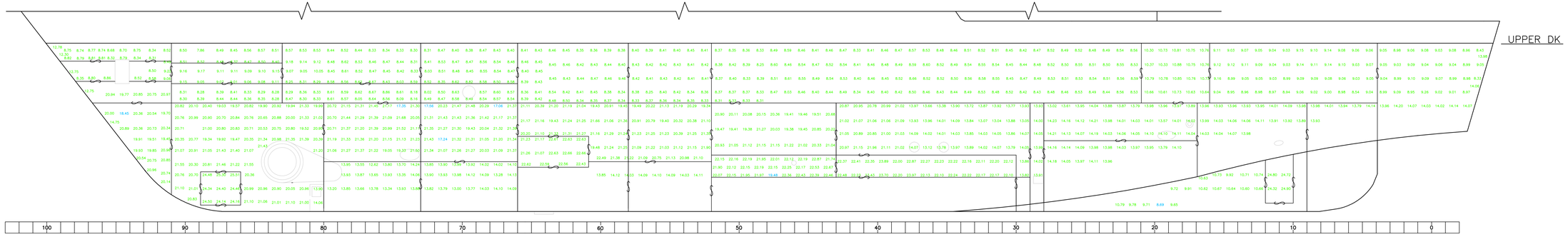
Table 3: Condition Survey of Major Items

Survey Item No.	Primary System Name	Main Compartment	Compartment Name	Sub-system Name	Component Name	Evaluation Categories					Comments	Action
						Corrosion	Damage	Integrity	Function	Not used		
1.	Main Hull	Water Ballast Tanks	No 6 Center WB tank	Transverse Frames	Shell and first level support	-	-	-	-	-	Not applicable	
2.				Webs, Girders, Stringers & Pillars	Second level support	D	A	C	B		Severe pitting on the webs in a few local areas.	Monitor (Tank being blasted and painted during this refit). Do not leave mud or standing water in tank.
3.				Plates & Stiffeners	Bulkheads	C	B	B	B			Regular inspections to check if new coat of paint is ameliorating corrosion.
4.					Side shell	C	B	B	B			Regular inspections to check if new coat of paint is ameliorating corrosion.
5.					Bottom shell	C	B	B	B			Regular inspections to check if new coat of paint is ameliorating corrosion.
6.					Deckhead	C	B	B	B		Surface corrosion throughout.	Regular inspections to check if new coat of paint is ameliorating corrosion.
7.	Main Hull		No 2 Stb'd WB tank	Transverse Frames	Shell and first level support	C	B	B	B		Corrosion on Transverse webs and face flats.	Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
8.				Webs, Girders, Stringers & Pillars	Second level support	C	B	C	B		Corrosion on bottom of webs and on underside and edges of face flats.	Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
9.				Plates & Stiffeners	Bulkheads	B	B	B	B			
10.					Side shell	B	B	B	B			
11.					Bottom shell structure	C	B	B	B		Corrosion at low drainage points in way of standing water	Do not leave mud or standing water in tank. Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
12.					Deckhead	C	B	B	B		Corrosion on deck beams.	Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
13.	Main Hull		No 2 Port WB tank	Transverse Frames	Shell and first level support	C	B	B	B		Corrosion on Transverse webs and face flats.	Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
14.				Webs, Girders, Stringers & Pillars	Second level support	C	B	C	B		Corrosion on webs and face flats.	Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
15.				Plates & Stiffeners	Bulkheads	B	B	B	B			
16.					Side shell	B	B	B	B			

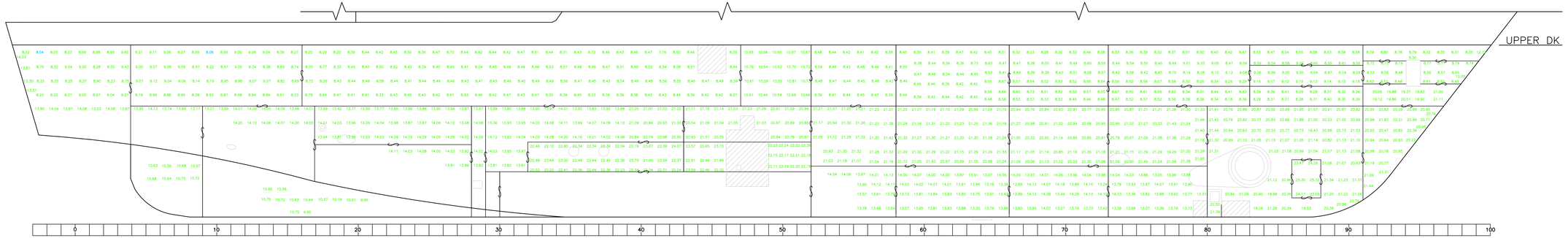
Survey Item No.	Primary System Name	Main Compartment	Compartment Name	Sub-system Name	Component Name	Evaluation Categories					Comments	Action
						Corrosion	Damage	Integrity	Function	Not used		
17.					Bottom shell structure	C	B	B	B		Corrosion at low drainage points in way of standing water	Do not leave mud or standing water in tank. Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
18.					Deckhead	C	B	B	B		Corrosion on deck beams.	Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
19.	Main Hull		No 7 Stb'd WB tank	Transverse Frames	Shell and first level support	-	-	-	-		Not applicable	
20.				Webs, Girders, Stringers & Pillars	Second level support	C	B	B	B		Surface corrosion in way of openings.	Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
21.				Plates & Stiffeners	Bulkheads	B	B	B	B			
22.					Side shell structure	B	B	B	B			
23.					Bottom shell structure	C	B	B	B		Corrosion at low drainage points in way of standing water	Do not leave mud or standing water in tank. Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
24.					Deckhead	C	B	B	B		Surface corrosion throughout.	Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
25.	Main Hull		No 7 Port WB tank	Transverse Frames	Shell and first level support	-	-	-	-		Not applicable	
26.				Webs, Girders, Stringers & Pillars	Second level support	C	B	B	B		Surface corrosion in way of openings and on webs.	Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
27.				Plates & Stiffeners	Bulkheads	B	B	B	B			
28.					Side shell structure	B	B	B	B			
29.					Bottom shell structure	C	B	B	B		Corrosion at low drainage points in way of standing water	Do not leave mud or standing water in tank. Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
30.					Deckhead	C	B	B	B		Surface corrosion throughout. Carling badly corroded.	Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy. Carling to be power tooled and provided with a protective coating.

Survey Item No.	Primary System Name	Main Compartment	Compartment Name	Sub-system Name	Component Name	Evaluation Categories					Comments	Action
						Corrosion	Damage	Integrity	Function	Not used		
31.	Main Hull		No 10 Stb'd WB tank	Transverse Frames	Shell and first level support	B	B	B	B			
32.				Webs, Girders, Stringers & Pillars	Second level support	C	B	B	B		Corrosion on bottom of webs and on underside and edges of face flats.	Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
33.				Plates & Stiffeners	Bulkheads	B	B	B	B			
34.					Side shell structure	B	B	B	B			
35.					Bottom shell structure	C	B	B	B		Corrosion at low drainage points in way of standing water	Do not leave mud or standing water in tank. Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
36.					Deckhead	B	B	B	B			
37.	Main Hull		No 10 Port WB tank	Transverse Frames	Shell and first level support	C	B	B	B		Surface corrosion throughout.	Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
38.				Webs, Girders, Stringers & Pillars	Second level support	C	B	B	B		Corrosion on bottom of webs and on underside and edges of face flats.	Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
39.				Plates & Stiffeners	Bulkheads	B	B	B	B			
40.					Side shell structure	B	B	B	B			
41.					Bottom shell structure	C	B	B	B		Corrosion at low drainage points in way of standing water	Do not leave mud or standing water in tank. Regular inspections to monitor corrosion. If deterioration is rapid, develop a mitigation strategy.
42.					Deckhead	B	B	B	B			

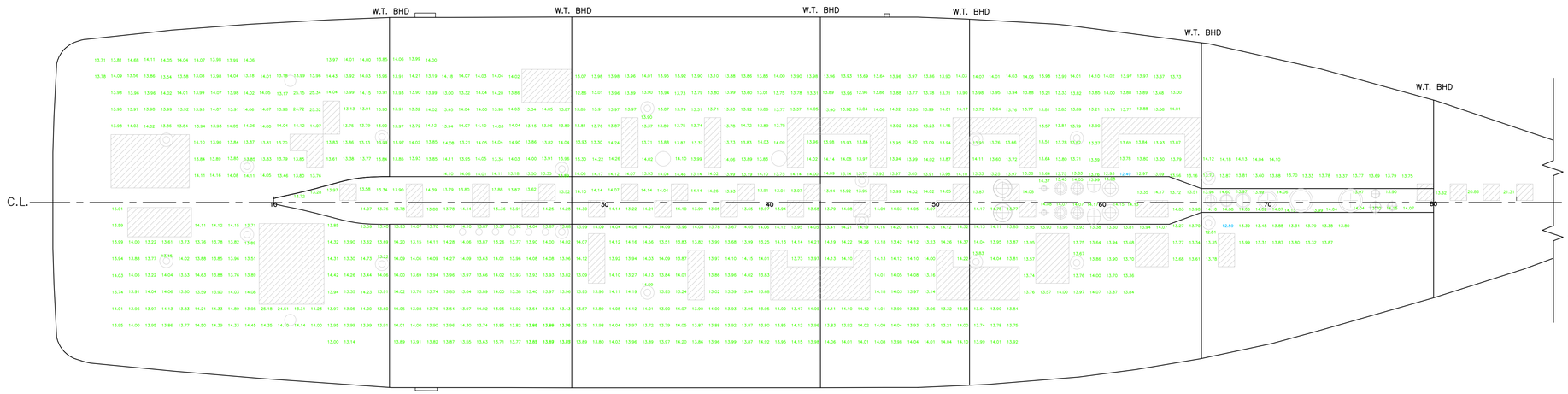
Appendix “A”
Plate Thickness Testing



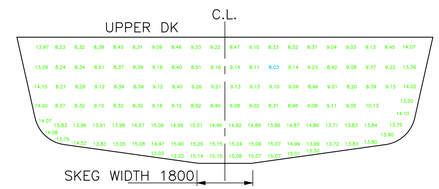
PORT PROFILE



STARBOARD PROFILE



BOTTOM HULL



8.5mm PLATE	9mm PLATE	10mm PLATE	12.7mm PLATE
0% TO 10% DIMINUTION: 8.50mm to 7.65mm	9.00mm to 8.10mm	10.00mm to 9.00mm	12.70mm to 11.43mm
10% TO 20% DIMINUTION: 7.64mm to 6.80mm	8.09mm to 7.20mm	8.99mm to 8.00mm	11.42mm to 10.16mm
20% TO 30% DIMINUTION: 6.79mm to 5.95mm	7.19mm to 6.30mm	7.99mm to 7.00mm	10.15mm to 8.89mm
> 30% DIMINUTION: 5.94 and less	6.29 and less	6.99 and less	8.88 and less

14mm PLATE	21mm PLATE	22mm PLATE	25mm PLATE
0% TO 10% DIMINUTION: 14.00mm to 12.60mm	21.00mm to 18.90mm	22.00mm to 19.80mm	25.00mm to 22.50mm
10% TO 20% DIMINUTION: 12.59mm to 11.20mm	18.89mm to 16.80mm	19.79mm to 17.60mm	22.49mm to 20.00mm
20% TO 30% DIMINUTION: 11.19mm to 9.80mm	16.79mm to 14.70mm	17.59mm to 15.40mm	19.99mm to 17.50mm
> 30% DIMINUTION: 9.79 and less	14.69 and less	15.39 and less	17.49 and less

LEGEND

INACCESSIBLE

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Victoria, BC
V9A 2P8
Canada

PROJECT
"J.P. TULLY" HULL PLATING ULTRASONIC THICKNESS MEASUREMENTS

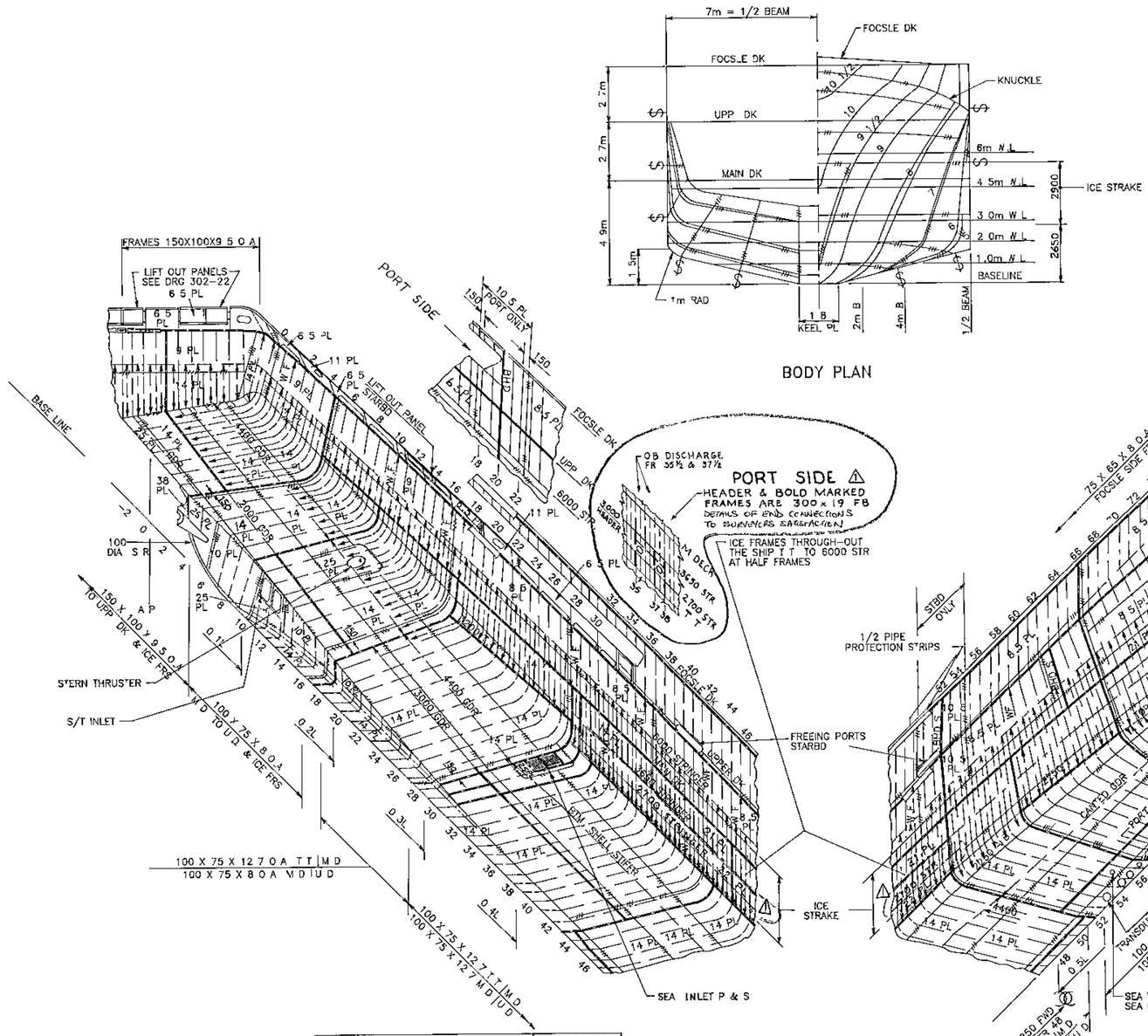
CLIENT
CANADIAN COASTGUARD

TITLE
C.C.G.S. "J.P. TULLY"
HULL PLATING ULTRASONIC THICKNESS MEASUREMENTS

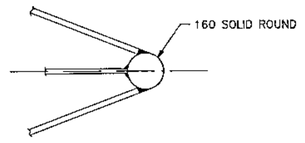
DRAWN BY	DATE DD MMM YY	CHECKED BY	DATE DD MMM YY	PROJECT NO.
AA	06 NOV 14	DM	07 NOV 14	14–39

SCALE	DRAWING NO.	SHEET NO.	REV
N.T.S	14–39–100–01	1 OF 1	0

SIZE D



BODY PLAN



STEM BAR
SCALE 1 10

	WEB FRS	LOCATION
FR 0	300 X 10 5W/100 X 12 F PL	MAIN TO UP DK
10		MAIN TO UP DK
16		MAIN TO UP DK
28		MAIN TO UP DK
32		T T TO MAIN DK
36		T T TO UP DK
40		T T TO MAIN DK
43		T T TO UP DK
59		MAIN TO UP DK
78		MAIN TO UP DK
87		MAIN TO UP DK
85	300 X 10 5W/175 X 15 F PL	T T TO MAIN DK

SHELL EXPANSION
FRAME SPACING = 625
ICE FRS AT HALF SPACING
SCANTLINGS AS MAIN FRAMES & AS MARKED

NOTE

1 ALL SHELL PLATING IS LLOYDS GRADE E
2 DOCKING PLUGS FITTED I A W DRG No 302 24
3 FOR WELDING DETAIL SEE DRG No 302-27

GENERAL PARTICULARS

LENGTH O A	68 65m
LENGTH W L	62 00m
BEAM	14 00m
DEPTH UPPER DK	7 60m
LOAD DRAFT	4 50m
SCANTLING DRAFT	4 90m
MINIMUM DRAFT IN ICE	3 85m
RULE LENGTH	60 50m

RECEIVED MAR - 9 1992

APPROVED FOR A TOTAL SHAFT POWER OF 2700 K W
CLASSIFICATION LLOYDS ICE CLASS 1*
EXAMINED & APPROVED FOR THE AREAS CIRCLED IN GREEN

LLOYD'S REGISTER OF SHIPPING
APPROVED
SIGNATURE/INITIALS OF AUTHORISED SURVEYOR SRL
DATE 21 NOVEMBER 1988
(SEE A/50 COVERING LETTER)
HULL DESIGN APPRAISAL AND PLAN APPROVAL DEPARTMENT
VANCOUVER

APPROVED	DATE	APPROVED	DATE
LLOYDS	16 NOV 83	OWNER	
C C G S S	23 JAN 84		

OWNER
GOVERNMENT OF CANADA
DEPARTMENT OF FISHERIES AND OCEANS

PROJECT
JOHN P TULLY

TITLE
SHELL EXPANSION

C&W	DATE	BY	DRAWING NO	REV
DRAWN	20 OCT 83	E McM	302-01 SHEET 1	⚠
CHECKED	10 JAN 84	WC		
APPROVED	10 JAN 84	DF		
SCALE	1 100			

Bel-Aire Shipyard
1667 COLUMBIA STREET
NORTH VANCOUVER B C
CANADA V7J 1A5
TELEPHONE (604) 985-8781
TELEX 043-52678

HULL NO 302

REV	DESCRIPTION	BY	DATE
⚠	STRINGER 2700 ABL F 29/53 SHELL PL 22 F 29/53	VPSI VIC DIV	87/03/17

302-01-1