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MEMORANDUM

To: Gord Closson, South Coast Standing Stem
From: Iain Mill, Senior Navel Architect
Prepared By: Shaun Wallis, Junior Marine Systems Engineer
Date: 2019-04-08
RE: **JB McCarron Barge Stabilization Refit Review**

The purpose of this memo is to acknowledge that South Coast Standing Stem have completed the recommended modification in accordance with the attached report “18-107-079-01 J.B. McCarron Barge Stability Assessment”. With this work completed, the vessel will now continue to float level with all the hull voids flooded.

South Coast Standing Stem has filled Voids B, C, G and H with closed cell foam blocks wrapped in plastic. The work has been completed to the satisfaction of 3GA Marine Ltd.

Figure 1 Foam block installation

3GA Marine also recommended South Coast Standing Stem flood the voids after installing the foam. 3GA is satisfied that this work has also been completed and the Barge is now in floating as predicted by the stability model. The below pictures below show the vessel before and after the refit.

Figure 2 J.B. McCarron Barge prior to refit

Figure 3 J.B. McCarron Barge after refit

3GA Marine Ltd is satisfied that the modifications to the barge have been carried out as described in the attached report, that the vessel is floating in a stable upright condition, and that the condition of the vessel is suitable for the intended operations.

3GA Marine Ltd
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SOUTH COAST STANDING STEM

J.B. MCCARRON BARGE

STABILITY ASSESSMENT

Document No. 18-107-079-01
Revision No. 1
Date 2018-11-07

3GA Marine Limited Contact: Iain Mill
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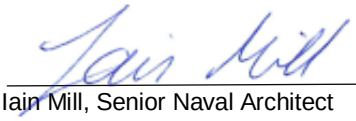
Submitted to:
South Coast Standing Stem

Prepared by:



Iain Mill, Senior Naval Architect

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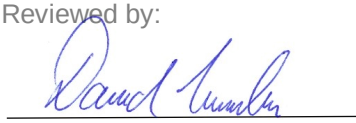
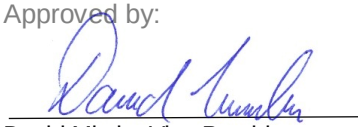
Reviewed by:



David Mietla, Vice President

Approved by:



David Mietla, Vice President

REVISION HISTORY

Revision No.	Date of Issue	Description of Change	By | App
0	2018-10-23	Initial submission.	IGM | DM
1	2018-11-07	Updated to remove concrete ballast and revise foam arrangement	IGM | DM

DISCLAIMER

TABLE OF CONTENTS

1. INTRODUCTION

3GA Marine was contacted by Mr Gord Closson of South Coast Standing Stem (SCSS) to request a stability review of the J.B. McCarron barge (ex Seaspan 156). The J.B. McCarron barge is used as a floating logging camp, with an accommodation module at the aft end and a helicopter landing area at the forward end.

The barge has ten (10) void spaces in the hull. The previous owner fill two of the void spaces (D and I) with spray foam. SCSS filled two of the voids (E and J) with closed cell foam blocks, and partially filled two other voids (A and F, inboard half of each) with closed cell foam blocks.

SCSS is aware that the foam filled voids have taken on water, and that the barge is relying on the foam to provide buoyancy. There is concern that the other void spaces could start taking on water. SCSS would like to install foam in the other void spaces to minimise the quantity of water that can enter the space.

This report only considers the stability of the vessel, and does not assess the strength of any components of the vessel.

This report should be read in conjunction with the Insurance Survey Report for the vessel developed by Allen E. Waugh of Accurate Appraisals and Marine Surveys Ltd in June 2017.

2. VESSEL ARRANGEMENT

The void spaces in the vessel are arranged as shown in the following image

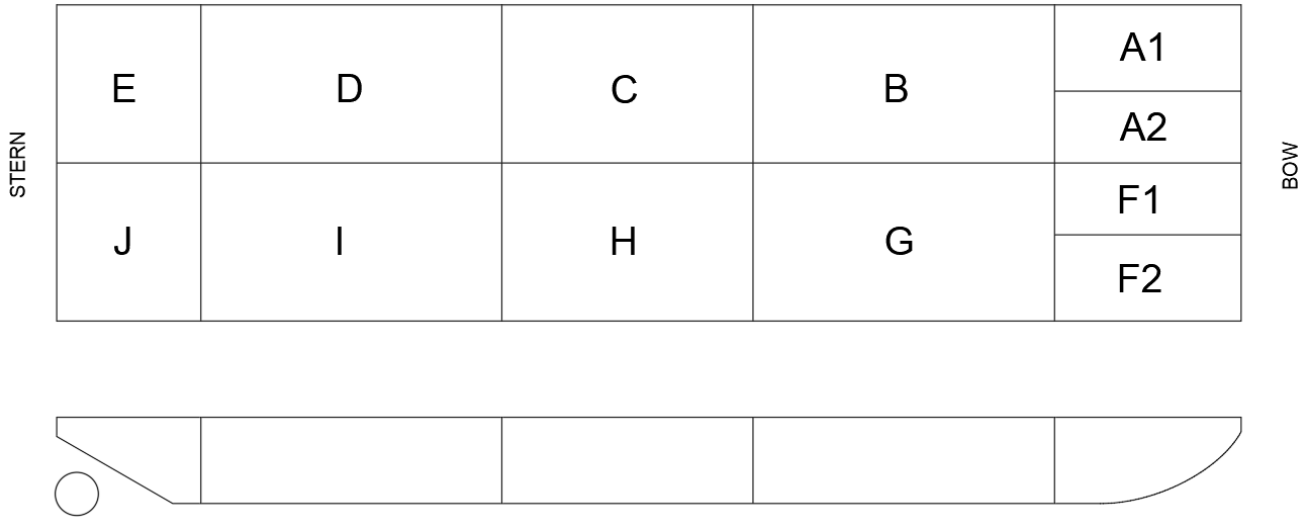


Figure 1 - Hull void spaces. Note the submerged cylindrical tank attached to the aft end of the vessel.

3. INSPECTION

3GA Marine inspected the barge at the former pulp mill in Campbell River on September 26th, 2018. The barge is currently sitting with a substantial trim by the stern. The void spaces were inspected as far as possible. The vessel's freeboards were measured at all four corners of the vessel.

The following table describes the void spaces as observed during the inspection:

Table 1 - Condition of the void spaces as inspected

Void Space	Description
A	The inner portion of the space (A2) is filled with foam blocks. The outer portion of the space was partially flooded with water. Any water added to this space is reported to drain out of the space. The water level inside the space is consistent with the water level outside the vessel. It is assumed there is a leak in the hull below the foam.
B	This space was dry. There is sediment in the bottom of the space, and a poor condition wooden walkway/floor within the space. This space also contains a large cylindrical tank. It was reported that this tank is empty, and only fitted for the purpose of draining the aviation fuel into in the case of a helicopter incident on the main deck.
C	This space was inaccessible, but was reported to be dry. None of the data observed contradicted this statement.
D	This space was inaccessible. It was reported that the previous owner filled this space with spray foam. It is assumed that the spray foam used was closed cell foam.
E	This space was inaccessible. This space is filled with expanded polystyrene foam blocks.
F	The inner portion of the space (F1) is filled with foam blocks. The outer portion of the space was partially flooded with water. Any water added to this space is reported to drain out of the space. The water level inside the space is consistent with the water level outside the vessel. It is assumed there is a leak in the hull below the foam.
G	This space was dry. There is sediment in the bottom of the space, and a poor condition wooden walkway/floor within the space. This space also contains four large cylindrical fresh water tanks. It was reported that these tanks were 3/4 full. This space also contains the desalination equipment for generating fresh water from sea water.
H	This space was empty aside from a small quantity of water in the bottom of the space. There appeared to be a small leak from Void Space I in to this space. The bilge pump is used to control the volume of fluid in the space.
I	This space was inaccessible. It was reported that the previous owner partially filled this space with spray foam. It is assumed that the spray foam used was closed cell foam. SCSS later filled the remainder of the space with expanded polystyrene foam blocks.
J	This space was inaccessible; however, the manhole cover was removed. This space is filled with expanded polystyrene foam blocks. A tube leading through the foam allowed the water level to be inspected. The water level inside the space was equal to the water level outside the space, indicating that the space has a leak to the outside.

The following table shows the freeboards and corresponding drafts of the vessel as recorded during the inspection:

Table 2 - Freeboards and drafts recorded.

	Freeboard Aft	Freeboard Forward		Draft Aft	Draft Forward
Port	48" (4' 0", 1.219m)	114" (9' 6", 2.896m)		96" (8' 0", 2.438m)	30" (2' 6", 0.762m)
Starboard	43" (3' 7", 1.092m)	110" (9' 2", 2.794m)		101" (8' 5", 2.565m)	34" (2' 10", 0.864m)

SCSS provided details of the foam blocks that were purchased and installed. The blocks measured 96" x 24" x12", and there were 572 blocks installed.

The volume of the blocks installed was calculated, and this was compared to the volume of the spaces that the blocks were installed in to determine the percentage of airspace between the foam blocks. This was calculated as follows:

Foam installed		
Length of block (in, m)	96	2.44
Width of block (in, m)	24	0.61
Height of block (in, m)	12	0.30
Volume of block (cu.ft, m3)	16	0.453
No of blocks	572	572
Total volume (cu.ft, m3)	9152	259.2
Density (lb/cu.ft, MT/m3)	2	0.032
Total mass (lb, MT)	18304	8.3
Total volume of spaces with foam installed (m3)		338.00
Total volume of foam installed (m3)		259.2
percentage fill with foam		77%
Permeability (air space)		23%
Foam water absorption[1]		5%
Total permeability		28%

It should be noted that the above calculation is based on only the volumes of voids E, J, A2, and F1. In reality, an unspecified quantity of the foam was also added to void I, so the permeability will be higher than calculated. To reflect this, the permeability of voids E, J, A2 and F1 has been assumed as 35%.

[1] Long term immersion testing of EPS foam shows that the water absorption is around 5%. https://www.sciencedirect.com/science/article/pii/S2214509514000060

4. STABILITY IN THE CURRENT CONDITION

Measurements of the hull and internal structure were taken and used to develop a model of the barge hull. Weight estimates were completed for the hull structure, foam, superstructure, and discrete weight items such as concrete decks and concrete ballast blocks. The stability software GHS version 14.66B was then used to model the floating attitude of the vessel with all of the known weights and flooded spaces on the vessel. The software calculated the weight and centre of gravity of the 'unknown' weight items.

The vessel was assessed against the Transport Canada stability criteria of TP 7301 Stab 5 – Standard for the intact stability of passenger vessels carrying more than 12 passengers. The vessel passes all the criteria in this standard in its current condition. The analysis of this condition is provided in Appendix A.

5. BALLASTING THE VESSEL

The vessel was ballasted in the model by adding foam in voids B, C, G and H per the owners requirements and these voids were then flooded. (It should be noted that voids A and F are known to have leaks, so will fill with water to match the exterior waterplane). The concrete blocks were also removed from the deck, and the fresh water tanks were filled to 50% full. The vessel floats with a slight trim to the stern, and a slight heel to port. The trim and heel will vary depending on the fresh water usage.

The foam added to the vessel is as follows:

5.1. Voids B and G

Voids B and G are each to be fitted with 130m3 (4600 cu.ft) of closed cell foam with a density of 2lb per cu.ft. The foam is to be fitted from the bottom shell to the deckhead, and from 10 feet outboard (12 feet from the shell plate) to 20 feet outboard (2 feet from the shell plate). The foam is to be fitted to within 2 feet of the transverse bulkheads at either end of the space. The area where the fuel dump tank is installed does not need to be filled with foam.

5.2. Voids C and H

Voids C and H are each to be fitted with 190m3 (6700 cu.ft) of closed cell foam with a density of 2lb per cu.ft. The foam is to be fitted from the bottom shell to the deckhead, and to 2 feet from the bulkheads and shell plate in each direction.

6. STABILITY IN THE BALLASTED CONDITION

The vessel was again assessed against TP 7301 Stab 5. The vessel passes all the criteria in this condition. The analysis of this condition is provided in Appendix B.

In this condition, the barge is fully flooded and all buoyancy is provided by the foam existing in voids A, D, E, F, I and J, and the foam recommended to be added to voids B, C, G, and H.

7. CONCLUSIONS AND RECOMMENDATIONS

Based on the observed condition of the vessel and the calculations carried out, it is possible to ballast the vessel and install foam to bring the vessel approximately level, and for the vessel to continue to float level with all the hull voids flooded.

To achieve this, it is recommended that the following procedure be followed:

1. Fill the fresh water tanks to approximately 50% full.
2. Remove the sediment from the bottom of the accessible void spaces. Remove any garbage and unnecessary equipment from the spaces.
3. Remove and relocate the equipment from the void spaces. If the water and fuel tanks are to remain in the void spaces, the connections to these tanks should be made as directly as possible with as few fittings as possible. Any valves should be located outside of the spaces to be filled with foam. It should be noted that the piping to and from these tanks, as well as the tanks themselves, will be inaccessible once the spaces are filled with foam and the spaces flooded.
4. Fill Voids B, C, G and H with foam.
5. Remove the concrete blocks from the main deck forward.

It is recommended that the void spaces be filled with spray (or pour) foam rather than foam blocks. Spray foam will achieve a higher fill rate than foam blocks, and be easier to secure than foam blocks. Foam blocks will also tend to try to float on top of any water in the space. Thus, as the space fills with water, the foam blocks will be compressed against each other and the deckhead (top) of the space, leaving a gap at the bottom of the space which will be filled with water. This will not occur with the spray foam as the foam will adhere to the structure in the space, preventing it from moving.

If foam blocks are used, these should be secured in place to prevent lateral movement, and these should be install so that they are pressed against the deckhead so that they are prevented from floating free.

It is also recommended that a pipe be installed at each manhole or access below the deck, so that the space can be monitored for water ingress.

Finally, it is recommended that the above work is carried out under the guidance of a qualified Naval Architect.

Appendix 1 Current Condition

3GA Marine Limited
18-107 JB McCarron Barge
AS SURVEYED

WEIGHT STATUS

Part	Weight(MT)	LCG	TCG	VCG
UNIDENTIFIED	45.15	19.262f	1.073p	3.880
+Hull Structure	277.70	24.769f	0.000	1.917
+Concrete Deck	164.50	25.146f	0.000	3.658
+Accom structure	89.70	13.430f	0.000	8.658
+Accom concrete deck	72.90	13.430f	0.000	9.658
Total Light Ship	**649.95**	**21.645f**	**0.075p**	**4.293**

Distances in METERS.

WEIGHT and DISPLACEMENT STATUS

USK draft: 0.932 @ 50.29f, 2.395 @ 0.00
Trim: Aft 1.463/50.292, Heel: Stbd 0.40 deg.

Part	Weight(MT)	LCG	TCG	VCG
LIGHT SHIP+	649.95	21.645f	0.075p	4.293
Foam VOID J	2.40	4.702f	3.353s	2.110
Foam VOID E	2.40	4.702f	3.353p	2.110
Foam VOID I	6.50	13.411f	3.353s	1.829
Foam VOID D	6.50	13.411f	3.353p	1.829
Foam VOID F (Inboard)	1.80	45.791f	1.524s	2.031
Foam VOID A (Inboard)	1.80	45.791f	1.524p	2.031
concrete blocks port	12.00	47.854f	4.267p	4.158
concrete blocks stbd	10.00	47.854f	4.267s	4.158
Sediment	60.30	25.305f	0.000	0.025
Total Fixed	**753.65**	**22.568f**	**0.076p**	**3.880**

	Load	SpGr	Weight(MT)	LCG	TCG	VCG	FSM
VOID_H1.S	0.188	1.025	13.60	23.601f	3.424s	0.353	138.78
FW_1.S	0.750	1.025	7.77	31.314f	1.509s	1.500	1.91
FW_2.S	0.750	1.025	7.77	34.120f	1.508s	1.500	1.91
FW_3.S	0.750	1.025	7.77	37.103f	1.508s	1.500	1.91
FW_4.S	0.750	1.025	7.77	40.010f	1.508s	1.500	1.91
Total Tanks			**44.67**	**31.973f**	**2.092s**	**1.151**	**146.43**
Deadweight Loaded			**148.37**	**29.445f**	**0.572s**	**1.251**	
Total Weight			**798.32**	**23.095f**	**0.046s**	**3.727**	

		Displ(MT)	LCB	TCB	VCB	RefHt
HULL	1.025	1,028.62	21.623f	0.067s	0.903	-2.386
VOID_J.S Flooded	1.025	-17.76	4.266f	3.375s	1.398	-2.386
VOID_E.P Flooded	1.025	-17.16	4.294f	3.332p	1.367	-2.386
VOID_I.S Flooded	1.025	-62.89	12.318f	3.366s	1.026	-2.386
VOID_D.P Flooded	1.025	-61.45	12.313f	3.340p	1.003	-2.386
VOID_F_R.S Flooded	1.025	-19.43	44.770f	4.886s	0.614	-2.386
VOID_A_L.P Flooded	1.025	-17.96	44.724f	4.867p	0.577	-2.386
VOID_F_L.S Flooded	1.025	-5.63	44.754f	1.531s	0.602	-2.386
VOID_A_R.P Flooded	1.025	-5.49	44.740f	1.517p	0.590	-2.386
TANK_AFT.C Flooded	1.025	-22.51	0.854f	0.000	0.949	-2.386
Total Displacement	**1.025**	**798.32**	**23.012f**	**0.066s**	**0.882**	
Righting Arms:			0.000	0.000s		

Distances in METERS. Moments in m.-MT.

HYDROSTATIC PROPERTIES with FLOODING

Trim: Aft 1.463/50.292, No Heel, Fixed VCG = 3.880

LCF Draft	Displacement Weight(MT)	Buoyancy-Ctr. LCB	VCB	Weight/ cm	LCF	Moment/ cm trim	KML	KMT
1.675	798.19	23.014f	0.882	5.09	24.757f	14.78	96.97	10.089

Distances in METERS. Specific Gravity = 1.025. Moment in m.-MT.
Trim is per 50.29m.
Draft is from USK.

HYDROSTATIC PROPERTIES with FLOODING

Trim: Aft 1.463/50.292, Heel: Stbd 0.40 deg., VCG = 3.727

LCF Draft	Displacement Weight(MT)	Buoyancy-Ctr. LCB	VCB	Weight/ cm	LCF	Moment/ cm trim	GML	GMT
1.673	798.32	23.012f	0.882	5.09	24.838f	14.79	93.17	6.179

Distances in METERS. Specific Gravity = 1.025. Moment in m.-MT.
Trim is per 50.29m.
Draft is from USK. True Free Surface included.

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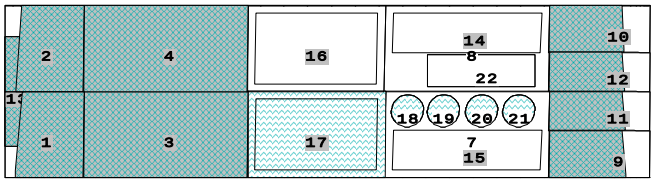
GHS 14.66B

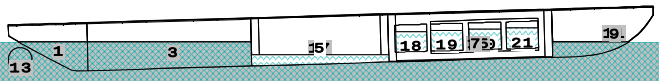
3GA Marine Limited
18-107 JB McCarron Barge
AS SURVEYED

CG - Draft: 0.932 @ 50.292f, 2.395 @ 0.000 Heel: stbd 0.40 deg.

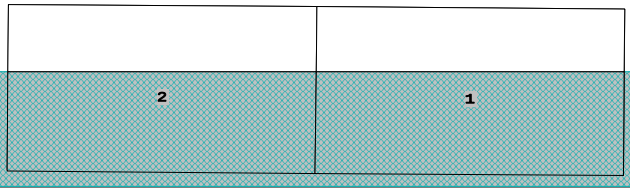
Plan View



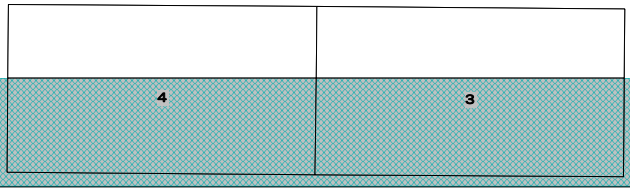
Profile View



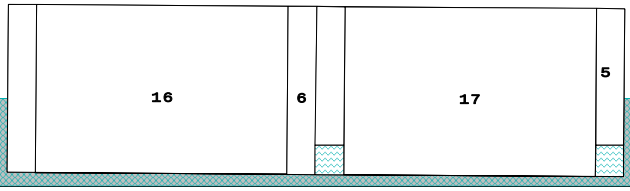
Body @ 5.000f



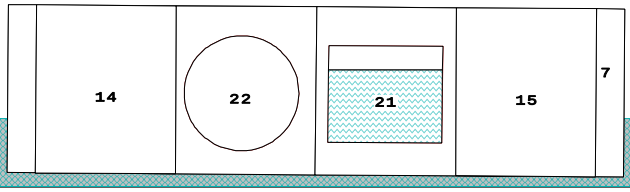
Body @ 10.000f



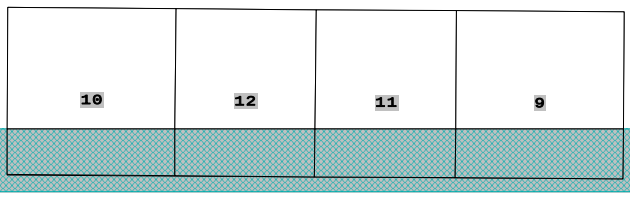
Body @ 25.000f



Body @ 40.000f



Body @ 45.000f



Tanks

1 VOID_J.S	4 VOID_D.P	8 VOID_B1.P	12 VOID_A_R.P	16 VOID_C2.P	20 FW_3.S
2 VOID_E.P	5 VOID_H1.S	9 VOID_F_R.S	13 TANK_AFT.C	17 VOID_H2.S	21 FW_4.S
3 VOID_I.S	6 VOID_C1.P	10 VOID_A_L.P	14 VOID_B2.P	18 FW_1.S	22 DUMP.P
	7 VOID_G1.S	11 VOID_F_L.S	15 VOID_G2.S	19 FW_2.S	

3GA Marine Limited
18-107 JB McCarron Barge
AS SURVEYED

RIGHTING ARMS vs HEEL ANGLE with FLOODING

Fixed CG: LCG = 22.568f TCG = 0.076p VCG = 3.880

Origin Depth	Degrees of Trim	Heel	Displacement Weight(MT)	Righting Arms in Trim	in Heel	Area	Freebd (Extra)
2.387	1.67a	0.00	798.32	0.000	-0.044	0.0000	
2.387	1.67a	0.40s	798.32	0.000	0.000	-0.0002	
2.367	1.65a	5.40s	798.32	0.000	0.546	0.0237	
2.318	1.59a	10.40s	798.31	0.000	1.095	0.0953	
2.273	1.61a	15.40s	798.33	0.000	1.597	0.2131	
2.287	1.85a	20.40s	798.29	0.000	1.835	0.3647	
2.297	1.98a	22.54s	798.33	0.000	**1.852**	0.4337	
2.307	2.16a	25.40s	798.32	0.000	1.822	0.5257	
2.315	2.45a	30.00s	798.32	0.000	1.692	0.6678	
2.315	2.47a	30.40s	798.33	0.000	1.677	0.6795	
2.311	2.77a	35.40s	798.48	0.000	1.462	0.8170	
2.295	3.04a	40.00s	798.50	0.000	1.226	0.9251	
2.293	3.06a	40.40s	798.31	0.000	1.205	0.9336	
2.261	3.33a	45.40s	798.49	0.000	0.920	1.0265	
2.214	3.59a	50.40s	798.35	0.000	0.618	1.0938	
2.151	3.82a	55.40s	798.35	0.000	0.303	1.1340	
2.079	4.02a	60.12s	798.32	0.000	0.000	1.1465	

Distances in METERS. Specific Gravity = 1.025. Area in m.-Rad.

Note: The Center of Gravity shown above is for the Fixed Weight of 753.65 MT. As the tank load centers shift with heel and trim, the total Center of Gravity varies. The righting arms shown above include the effect of the C.G. variation.

LIM	TP7301 STAB 5 CRITERION		Min/Max		Attained	
(1)	Area from Equilibrium to abs 30 deg or Flood	>	0.0550	m.-Rad	0.6679	P
(2)	Area from Equilibrium to abs 40 deg or Flood	>	0.0900	m.-Rad	0.9253	P
(3)	Area from abs 30 deg to abs 40 or Flood	>	0.0300	m.-Rad	0.2573	P
(4)	Righting Arm at 30 deg or MaxRA	>	0.200	m.	1.677	P
(5)	GM at Equilibrium	>	0.150	m.	6.179	P
(6)	Angle from abs 0 deg to MaxRA	>	15.00	deg	22.54	P
(7)	Area from abs 0 deg to MaxRA	>	0.0625	m.-Rad	0.4337	P
(8)	Angle from Equilibrium to RAzero	>	15.00	deg	59.72	P

Relative angles measured from 0.400s

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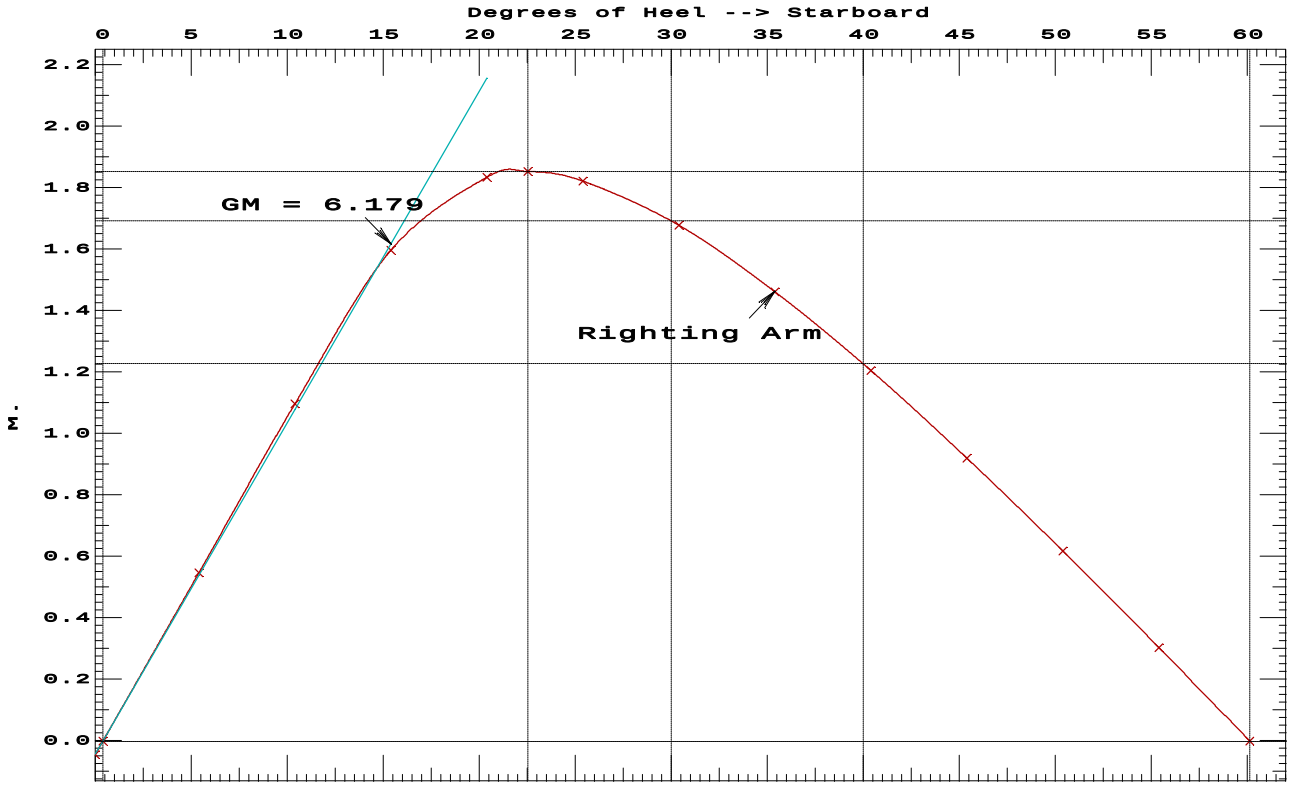
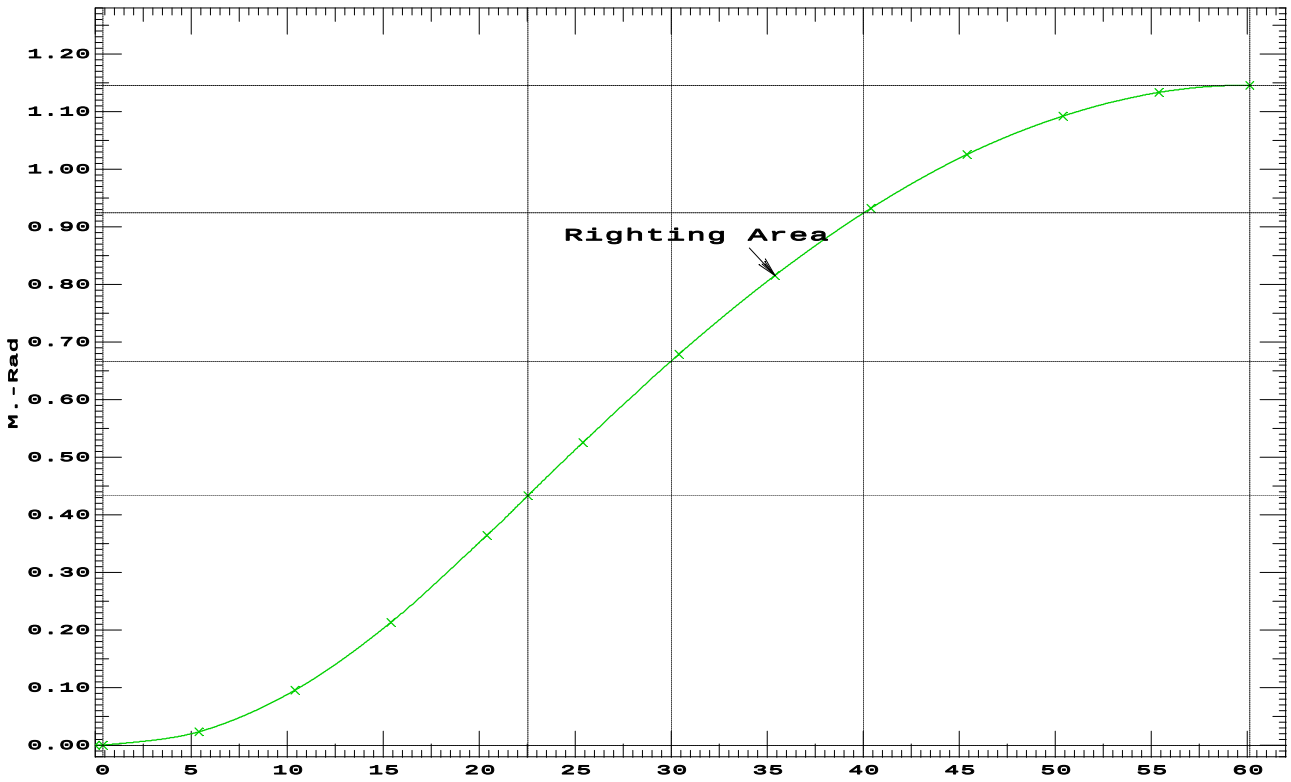
GHS 14.66B

3GA Marine Limited
18-107 JB McCarron Barge
AS SURVEYED





Appendix 2 Ballasted Vessel

Foam installed in voids B, C, G, and H, and these spaces flooded.

3GA Marine Limited
18-107 JB McCarron Barge
FOAMED & FLOODED

WEIGHT STATUS

Part	Weight(MT)	LCG	TCG	VCG
UNIDENTIFIED	45.15	19.262f	1.073p	3.880
+Hull Structure	277.70	24.769f	0.000	1.917
+Concrete Deck	164.50	25.146f	0.000	3.658
+Accom structure	89.70	13.430f	0.000	8.658
+Accom concrete deck	72.90	13.430f	0.000	9.658
Total Light Ship	**649.95**	**21.645f**	**0.075p**	**4.293**

Distances in METERS.

WEIGHT and DISPLACEMENT STATUS

USK draft: 2.395 @ 50.29f, 2.533 @ 0.00
Trim: Aft 0.138/50.292, Heel: Port 0.25 deg.

Part	Weight(MT)	LCG	TCG	VCG
LIGHT SHIP+	649.95	21.645f	0.075p	4.293
Foam VOID J	2.40	4.702f	3.353s	2.110
Foam VOID E	2.40	4.702f	3.353p	2.110
Foam VOID I	6.50	13.411f	3.353s	1.829
Foam VOID D	6.50	13.411f	3.353p	1.829
Foam VOID F (Inboard)	1.80	45.791f	1.524s	2.031
Foam VOID A (Inboard)	1.80	45.791f	1.524p	2.031
Sediment	60.30	25.305f	0.000	0.025
Foam Void C	4.05	24.232f	3.353p	2.200
Foam Void H	4.05	24.232f	3.353s	2.200
Cribbing C&H	4.00	24.232f	0.000	2.100
Foam Void B	4.14	35.967f	3.353p	2.200
Foam Void G	4.14	35.967f	3.353s	2.200
Cribbing B&G	5.00	35.967f	0.000	2.100
Total Fixed	**757.02**	**22.095f**	**0.064p**	**3.814**

	Load	SpGr	Weight(MT)	LCG	TCG	VCG	FSM
FW_1.S	0.500	1.025	5.18	31.320f	1.505s	1.238	1.91
FW_2.S	0.500	1.025	5.18	34.127f	1.505s	1.238	1.91
FW_3.S	0.500	1.025	5.18	37.109f	1.505s	1.238	1.91
FW_4.S	0.500	1.025	5.18	40.016f	1.505s	1.238	1.91
Total Tanks			**20.72**	**35.643f**	**1.505s**	**1.238**	**7.65**
Deadweight Loaded			**127.79**	**26.580f**	**0.244s**	**0.965**	
Total Weight			**777.74**	**22.456f**	**0.022p**	**3.746**	

		Displ(MT)	LCB	TCB	VCB	RefHt
HULL	1.025	1,557.05	24.945f	0.029p	1.263	-2.525
VOID_J.S	Flooded 1.025	-20.22	4.205f	3.341s	1.520	-2.525
VOID_E.P	Flooded 1.025	-20.61	4.189f	3.364p	1.539	-2.525
VOID_I.S	Flooded 1.025	-76.07	12.496f	3.346s	1.238	-2.525
VOID_D.P	Flooded 1.025	-76.98	12.496f	3.359p	1.253	-2.525
VOID_H1.S	Flooded 1.025	-48.43	24.216f	3.340s	1.222	-2.525
VOID_C1.P	Flooded 1.025	-49.02	24.216f	3.365p	1.237	-2.525
VOID_G1.S	Flooded 1.025	-88.40	36.074f	2.876s	1.069	-2.525
VOID_B1.P	Flooded 1.025	-89.03	35.515f	2.856p	1.082	-2.525
VOID_F_R.S	Flooded 1.025	-51.48	45.440f	4.874s	1.327	-2.525
VOID_A_L.P	Flooded 1.025	-52.66	45.455f	4.879p	1.351	-2.525
VOID_F_L.S	Flooded 1.025	-15.44	45.445f	1.522s	1.335	-2.525
VOID_A_R.P	Flooded 1.025	-15.55	45.449f	1.526p	1.343	-2.525
TANK_AFT.C	Flooded 1.025	-22.51	0.854f	0.000	0.949	-2.525

continued next page

STATUS, continued

Part		SpGr	Displ(MT)	LCB	TCB	VCB	RefHt
VOID_B2.P	Flooded	1.025	-30.98	35.954f	4.573p	1.223	-2.525
VOID_G2.S	Flooded	1.025	-30.47	35.954f	4.571s	1.203	-2.525
VOID_C2.P	Flooded	1.025	-46.00	24.223f	3.357p	1.237	-2.525
VOID_H2.S	Flooded	1.025	-45.45	24.223f	3.348s	1.222	-2.525
Total Displacement		**1.025**	**777.74**	**22.450f**	**0.033p**	**1.303**	
	Righting Arms:			0.001	0.000p		

Distances in METERS. Moments in m.-MT.

HYDROSTATIC PROPERTIES with FLOODING

Trim: Aft 0.138/50.292, No Heel, Fixed VCG = 3.814

LCF Draft	Displacement Weight(MT)	Buoyancy-Ctr. LCB	VCB	Weight/ cm	LCF	Moment/ cm trim	KML	KMT
2.471	777.71	22.449f	1.303	3.52	22.385f	12.90	87.22	7.334

Distances in METERS. Specific Gravity = 1.025. Moment in m.-MT.
Trim is per 50.29m.
Draft is from USK.

HYDROSTATIC PROPERTIES with FLOODING

Trim: Aft 0.138/50.292, Heel: Port 0.25 deg., VCG = 3.746

LCF Draft	Displacement Weight(MT)	Buoyancy-Ctr. LCB	VCB	Weight/ cm	LCF	Moment/ cm trim	GML	GMT
2.472	777.74	22.450f	1.303	3.52	22.279f	12.81	82.86	3.565

Distances in METERS. Specific Gravity = 1.025. Moment in m.-MT.
Trim is per 50.29m.
Draft is from USK. True Free Surface included.

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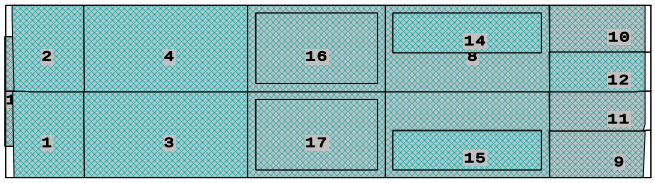
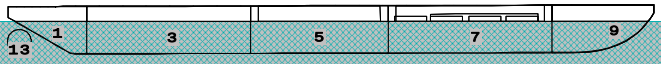
3GA Marine Limited
18-107 JB McCarron Barge
FOAMED & FLOODED

CG - Draft: 2.395 @ 50.292f, 2.533 @ 0.000 Heel: port 0.25 deg.

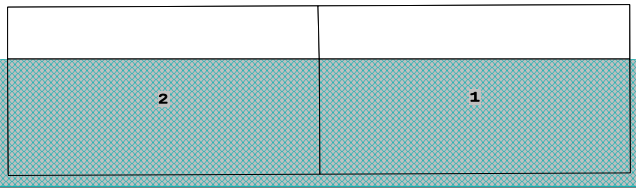
Plan View



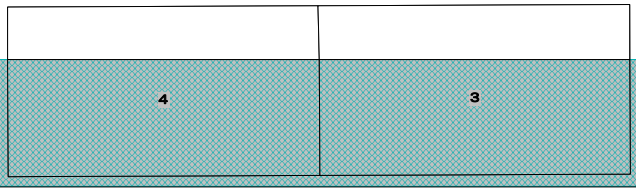
Profile View



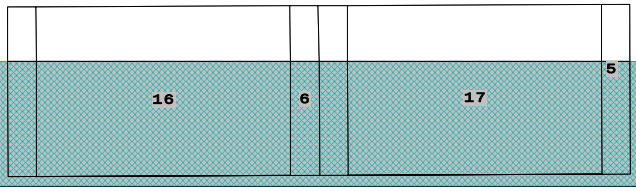
Body @ 5.000f



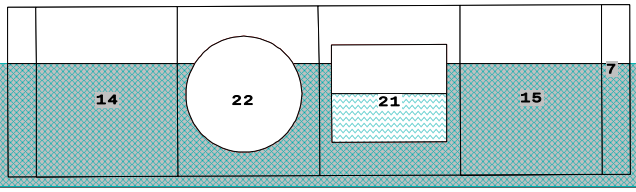
Body @ 10.000f



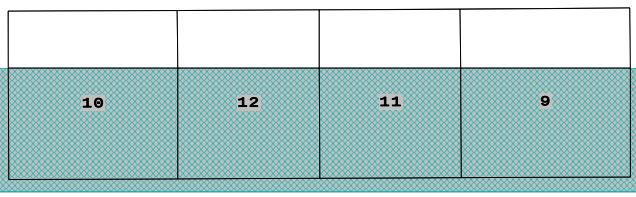
Body @ 25.000f



Body @ 40.000f



Body @ 45.000f



Tanks

1 VOID_J.S	4 VOID_D.P	8 VOID_B1.P	12 VOID_A_R.P	16 VOID_C2.P	20 FW_3.S
2 VOID_E.P	5 VOID_H1.S	9 VOID_F_R.S	13 TANK_AFT.C	17 VOID_H2.S	21 FW_4.S
3 VOID_I.S	6 VOID_C1.P	10 VOID_A_L.P	14 VOID_B2.P	18 FW_1.S	22 DUMP.P
	7 VOID_G1.S	11 VOID_F_L.S	15 VOID_G2.S	19 FW_2.S	

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18-107 JB McCarron Barge
FOAMED & FLOODED

RIGHTING ARMS vs HEEL ANGLE with FLOODING

Fixed CG: LCG = 22.095f TCG = 0.064p VCG = 3.814

Origin Depth	Degrees of Trim	Heel	Displacement Weight(MT)	Righting Arms in Trim	in Heel	Area	Freebd (Extra)
2.525	0.16a	0.00	777.71	0.000	-0.017	0.0000	
2.525	0.16a	0.25p	777.72	0.000	0.000	-0.0000	
2.505	0.14a	5.25p	777.74	0.000	0.315	0.0137	
2.455	0.10a	10.25p	777.74	0.000	0.631	0.0550	
2.457	0.11a	15.25p	777.74	0.000	0.829	0.1196	
2.510	0.14a	18.91p	777.74	0.000	**0.860**	0.1741	
2.536	0.15a	20.25p	777.74	0.000	0.856	0.1941	
2.650	0.17a	25.25p	777.75	0.000	0.795	0.2670	
2.749	0.20a	30.00p	777.74	0.000	0.669	0.3281	
2.754	0.20a	30.25p	777.74	0.000	0.661	0.3310	
2.841	0.23a	35.25p	777.74	0.000	0.481	0.3812	
2.903	0.25a	40.00p	777.74	0.000	0.287	0.4131	
2.905	0.25a	40.25p	777.74	0.000	0.276	0.4144	
2.944	0.28a	45.25p	777.74	0.000	0.058	0.4291	
2.950	0.28a	46.56p	777.74	0.000	0.000	0.4297	

Distances in METERS. Specific Gravity = 1.025. Area in m.-Rad.

Note: The Center of Gravity shown above is for the Fixed Weight of 757.02 MT. As the tank load centers shift with heel and trim, the total Center of Gravity varies. The righting arms shown above include the effect of the C.G. variation.

LIM	TP7301 STAB 5 CRITERION		Min/Max		Attained	
(1)	**Area from Equilibrium to abs 30 deg or Flood**	**>**	**0.0550**	**m.-Rad**	**0.3281**	**P**
(2)	**Area from Equilibrium to abs 40 deg or Flood**	**>**	**0.0900**	**m.-Rad**	**0.4132**	**P**
(3)	**Area from abs 30 deg to abs 40 or Flood**	**>**	**0.0300**	**m.-Rad**	**0.0850**	**P**
(4)	**Righting Arm at 30 deg or MaxRA**	**>**	**0.200**	**m.**	**0.661**	**P**
(5)	**GM at Equilibrium**	**>**	**0.150**	**m.**	**3.566**	**P**
(6)	**Angle from abs 0 deg to MaxRA**	**>**	**15.00**	**deg**	**18.91**	**P**
(7)	**Area from abs 0 deg to MaxRA**	**>**	**0.0661**	**m.-Rad**	**0.1741**	**P**
(8)	**Angle from Equilibrium to RAzero**	**>**	**15.00**	**deg**	**46.30**	**P**

Relative angles measured from 0.253p

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18-107 JB McCarron Barge
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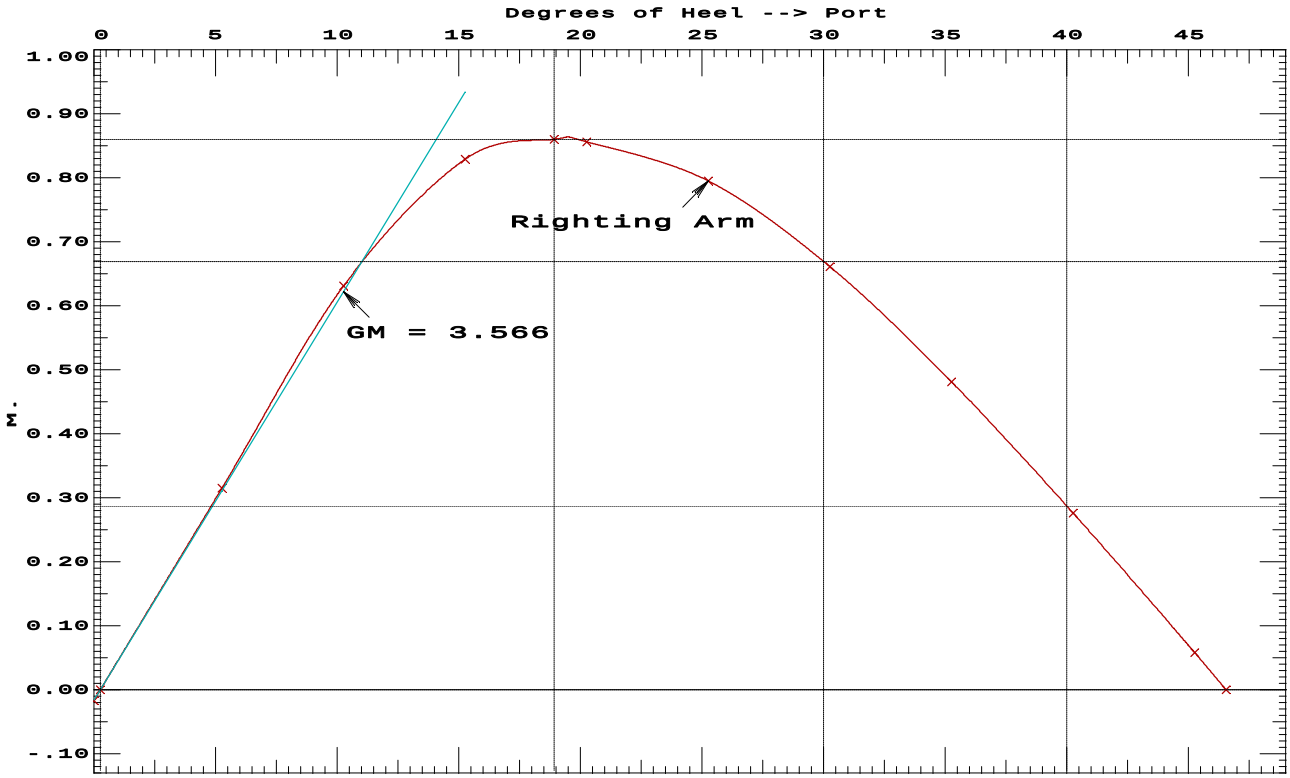

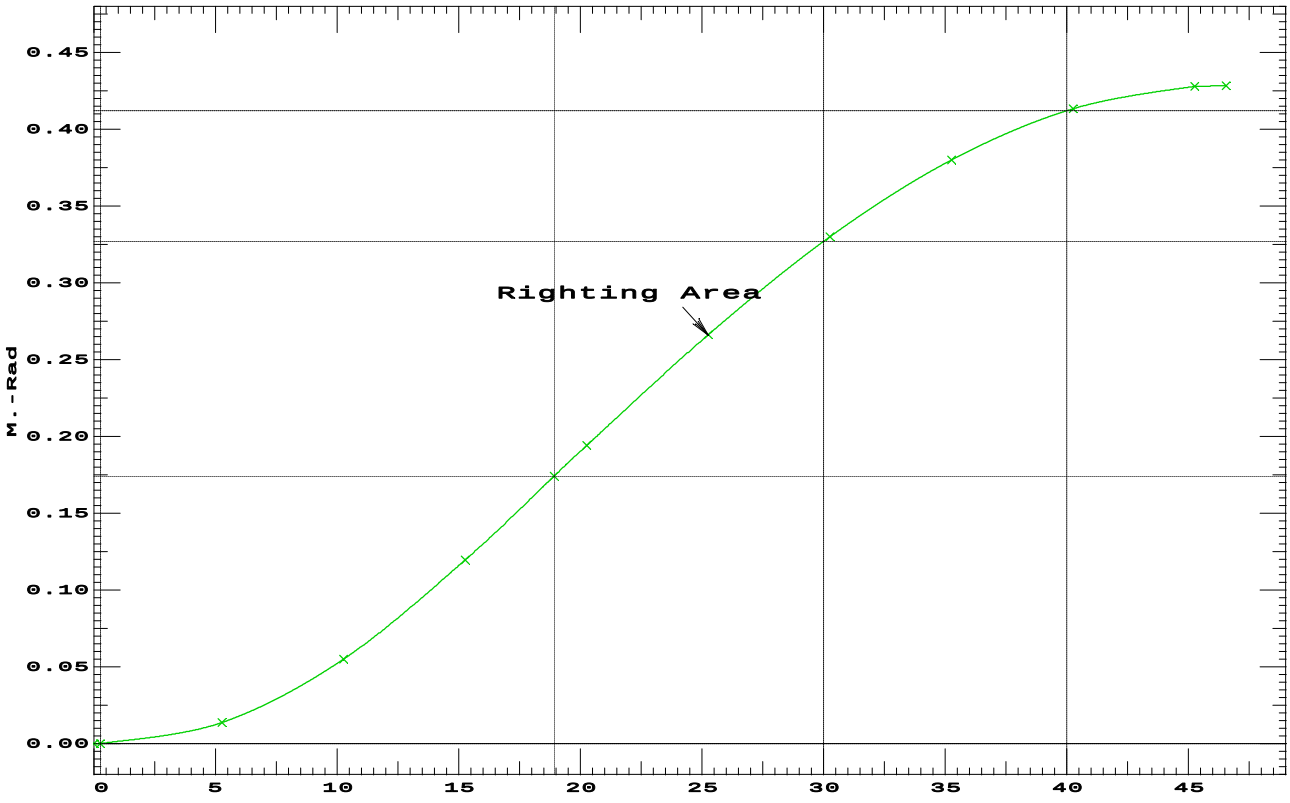

Appendix 3 Inspection Photos

Figure 2 - Exterior view of the barge

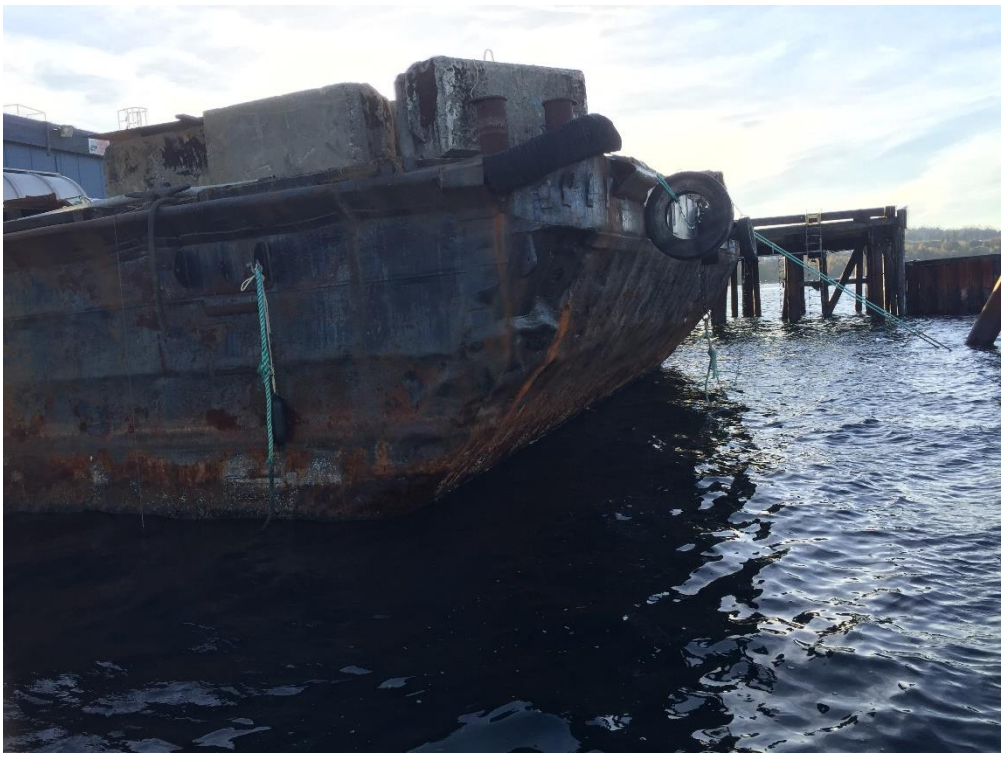

Figure 3 - view of the bow of the barge

Figure 4 - View of the stern of the barge

Figure 5 - View of the main deck of the barge

Figure 6 - View inside Void A, showing the foam installed in the inboard portion of the space

Figure 7 - View inside Void F, showing the foam installed in the inboard portion of the space

Figure 8 - View inside Void G, showing the FW tanks

Figure 9 - View inside Void B, showing the aviation fuel dump tanks

Figure 10 - View inside Void H