Trim and Stability Report
for
F/V DESTINATION
October 1993

Project No. 231

Prepared for:
F/V DESTINATION, Inc.
Sand Point, AK

By:
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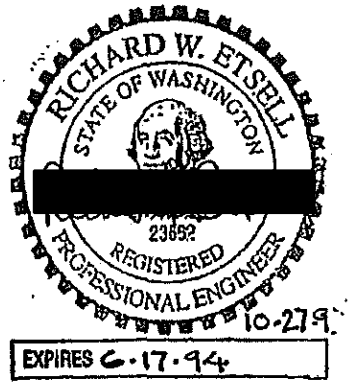
[redacted]



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PART 1 - DISCUSSION

INTRODUCTION

Based on an inclining test performed at Seattle on October 17, 1993, the light ship particulars of "DESTINATION" have been determined. With these data as a basis, the trim and stability characteristics have been computed for the vessel as configured for operations in Alaska waters. "DESTINATION" has adequate stability in all normal operating conditions, provided the recommendations and cautions below are adhered to.

This report contains information needed by the Master to assess the trim and stability of the vessel under normal operating conditions. A copy should be kept aboard and reviewed by anyone who will be operating the vessel. In addition, a copy of the Stability Letter included at the end of the report should be posted aboard the vessel. This report applies to "DESTINATION" and only to that vessel. The information contained herein is not valid for any other vessel. Also, if the vessel is modified or its service changed, this report would become invalid.

Uninspected commercial fishing industry vessels (without Loadlines) are regulated under the provisions of 46 CFR Part 28. The stability regulations therein are used as the basis for comparison in this report. (Note: Since the vessel is an alteration, rather than a new construction, the damage stability provisions of §28.580 are not applicable.)

The fishing vessel regulations require owners to have stability checked whenever substantial alterations are made to the vessel. These may be in the form of a major modification, or may be the result of a series of minor changes. The magnitude of changes that would constitute a "substantial alteration" for "DESTINATION" is identified in Part 3 of this report, along with instructions for tracking changes. The owner is responsible for complying with the stability regulations, and must keep track of changes made to the vessel so that the applicable calculations can be made if the "substantial alteration" limits are exceeded.

INSTRUCTIONS FOR USING THIS REPORT

Part 1 is a discussion of loading and operating recommendations for the vessel, and includes general precautions for maintaining adequate stability. This is the most important section for the Master to read and understand, since it covers factors that the Master has some control over.

Part 2 presents a series of loading conditions, each showing the vessel's immersion, trim and stability characteristics. The loadings included are intended to cover a range of conditions that encompass all of the normal operating conditions for the vessel. There is no need to perform any calculations in order to determine safe loadings -- the procedure is to refer to the loading sheet closest to the actual or planned loading, and observe the cautions listed, if any.

The sketch included on each loading sheet shows the trimmed waterline, the location of the center of gravity, and cross-hatching to illustrate the various loads. The center of gravity mark (⊕) can be useful for determining the effect on stability from adding or removing weights.

For example, if the vessel matches a particular condition, but an additional load is placed forward and above the center of gravity mark, the vessel's trim will change toward the bow and the center of gravity will rise. In general, weights added above the mark will decrease stability while weights added below the mark will improve stability.

Part 3 contains the inclining test data, and all subsequent calculations used in determining the light ship particulars of the vessel. This information establishes the baseline vessel weight and location of center of gravity. It is not necessary for the Master to review or understand this information before operating the vessel. Also included in Part 3 is space for keeping track of changes to the vessel for determining compliance with stability regulations, as noted above.

Part 4 contains supporting data and calculations, including detailed particulars for each loading condition. It is also not necessary for the Master to review or understand the information in this part.

Part 5 is an excerpt from the North Pacific Fishing Vessel Owners Association publication "VESSEL SAFETY MANUAL". It is an excellent overview of fish boat stability, and is highly recommended reading. The "VESSEL SAFETY MANUAL" covers all aspects of fishing vessel safety in a similar manner, and can be purchased by contacting NPFVOA at the address given.

Part 6 is a copy of the "STABILITY LETTER" for "DESTINATION". Another copy has been laminated and should be posted aboard the vessel.

GENERAL NOTES

1. All weights and displacements are in long tons (L.T.), unless otherwise noted. 1 L.T. = 2240 pounds.

2. Longitudinal positions are referenced from midship. Positive values are aft and negative values are forward of midship. For purposes of this report, midship is located 3 inches aft of the bulkhead between No. 1 and No. 2 fish holds.

3. Vertical positions are referenced from baseline unless otherwise noted.

4. Trim (in feet) is calculated as the difference between the baseline drafts forward and aft. Note that at zero trim, the vessel is considered level, even though the bottom of the keel slopes (drags) aft. So, when floating level, the keel draft forward is less than the keel draft aft, but the trim is zero.

5. Forward drafts are at frame 0; aft drafts are at frame 17.

6. Liquid densities used herein, unless otherwise specified:
   Salt Water.....8.54 Pounds per gallon.
   Fresh Water.....8.33 "
   Diesel Oil.....7.25 "
   Lube Oil & Waste Oil.....7.36 "
   Sewage.....8.54 "

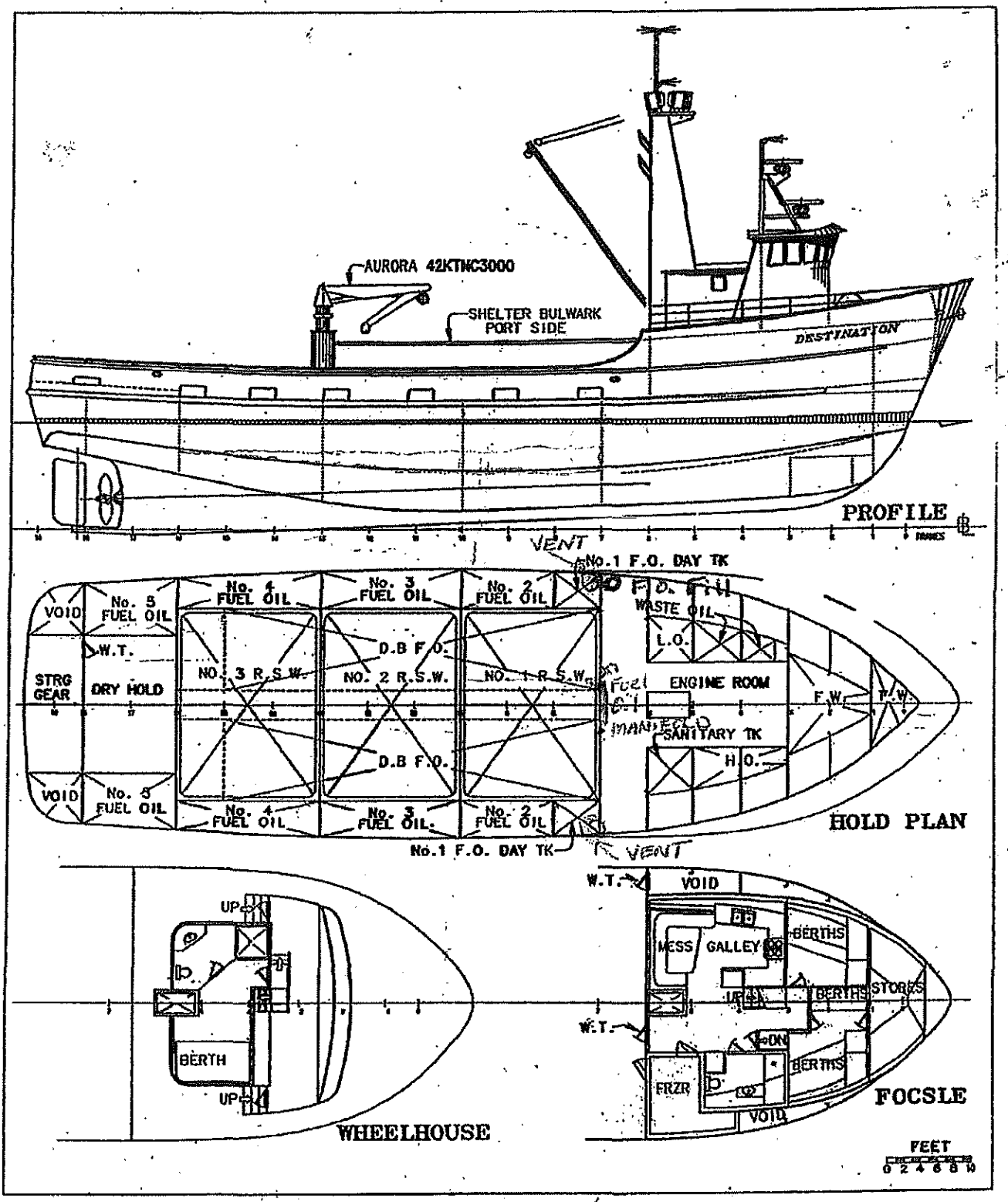
ABBREVIATIONS

ABL.....Above Baseline.
BL.....Baseline.
CFR.....Code of Federal Regulations.
CG.....Center of Gravity.
D.B.....Double Bottom.
E.R.....Engine Room
F.O.....Fuel Oil (Diesel).
FSM.....Free Surface Moment.
F/V.....Fishing Vessel.
F.W.....Fresh Water
GM .....Metacentric Height (Measure of initial stability).
H.O.....Hydraulic Oil
IMO.....International Maritime Organization.
LCG.....Longitudinal Center of Gravity.
L.O.....Lube Oil
L.T.....Long Tons (2240 pounds).
RA .....Righting Arm.
VCG.....Vertical Center of Gravity. Also called KG).

PRINCIPAL PARTICULARS

Length Overall	110'-0"
Length on Waterline	102'-6"
Breadth, Max. molded	32'-2"
Depth, molded	12'-3"
Draft at DLWL	12'-9"
No. 1 RSW 100% Capacity	2872 c.f.
No. 2 RSW 100% Capacity	2752 c.f.
No. 3 RSW 100% Capacity	2763 c.f.
TOTAL RSW CAPACITY	8387 c.f.
No. 1 F.O. Day Tank P&S 98% Capacity	1077 g. each.
No. 2 F.O. Tank P&S 98% Capacity	2511 g. each.
No. 3 F.O. Tank P&S 98% Capacity	3782 g. each.
No. 4 F.O. Tank P&S 98% Capacity	2803 g. each.
No. 5 F.O. Tank P&S 98% Capacity	3375 g. each.
No. 6 F.O. D.B. Tank P&S 98% Capacity	4180 g. each.
TOTAL FUEL CAPACITY (98%)	35456 g. total.
Forepeak Fresh Water 100% Capacity	900 g.
Fresh Water D.B. 100% Capacity	1500 g.
TOTAL FRESH WATER CAPACITY	2400 g. total.
Lube Oil Tank Capacity	500 g.
Hydraulic Oil Tank Capacity	500 g. *Approx.
Waste Oil Tank Capacity	500 g. *Approx.
Sanitary Tank Capacity	500 g.
Main Engine, Cummins KTA 2300	940 SHP
Generators, (2) Caterpillar 3306	180 KW
(1) Isuzu	40 KW

PROFILE & ARRANGEMENT



CONDITIONS OF LOADING

"DESTINATION" is configured for crabbing, with three RSW fish holds. The following loading conditions have been included in this report:

1.....Light Ship; vessel dry except for operating fluids. This condition is not a normal operating condition, but is included in Part 3 with inclining test data.

2-4...Full Load Departure Conditions; Pots Aboard; One, Two, or Three holds; Full consumables; Summer or Winter

5-6...Low on Consumables; Pots Aboard; Holds full or empty, Summer or Winter

(Note: Many other conditions of loading have been calculated, but not illustrated in this report. The results from these intermediate conditions have been taken into consideration during preparation of the recommendations that follow.)

USE OF TANKS AND HOLDS

There are no general restrictions on the use of tanks and holds. In general only one port and starboard pair of fuel tanks, in addition to the day tanks, should be slack at any time.

CRAB POTS AND OTHER DECK LOADS

The following table gives the maximum number of crab pots that can be safely carried under a variety of conditions:

Cond No.	Holds Tanked	Dry Hold	Wtr & Fuel	Pots Allowed Summer	Pots Allowed Winter
	1	11K #	100%	249 - 5 tiers	249 - 5 tiers
2	2	11K #	100%	208 - 4 tiers	208 - 4 tiers
	3	11K #	100%	200 - 4 tiers	167 - 3 tiers
3	1 & 2	11K #	100%	249 - 5 tiers	224 - 5 tiers
	1 & 3	11K #	100%	200 - 4 tiers	146 - 3 tiers
	2 & 3	11K #	100%	146 - 3 tiers	95 - 2 tiers
4	1, 2, & 3	11K #	100%	126 - 2 tiers	95 - 2 tiers
5	1, 2, & 3	11K #	10%	208 - 4 tiers	200 - 4 tiers
6	None	11K #	10%	212 - 5 tiers	200 - 4 tiers

When not carrying crab pots, an equivalent amount of deck cargo may be carried. The amount of such cargo should not exceed the total weight or cargo height for crab pots in a similar loading. In general, keep all loads stowed as low in the vessel as practicable.

In the above table, Summer means non-icing conditions, and Winter means whenever icing conditions may be anticipated (north of 42. north latitude between November 15 and April 15.)

• LIFTING WEIGHTS

DESTINATION's deck crane is a 42' telescoping knuckle crane, capacity 3000# at 42 feet. (Aurora Model 42KTNC3000.) In most conditions of loading, the maximum capacity of the crane may be utilized under calm conditions. However, when the freeboard amidship is less than about 1 foot, maximum lifts should be restricted to 700 pounds at the 42' extension, or 3000 pounds at 10 foot reach.

Caution should alway be used when lifting heavy loads. Keep in mind that when a weight is lifted off the deck, the effect on stability is the same as if the weight were actually located at the tip of the boom. Lifts at sea under heavy or adverse conditions should be restricted to moving pots around -- up to 750 pounds each pick.

• FREE SURFACES

Free surfaces due to slack liquids in holds, tanks, bilges, or on deck have the same effect as raising the center of gravity of the vessel. For this reason, free surfaces must be kept to a minimum at all times. For each of the loading conditions in this report, the maximum free surface effect for each of the tanks that may be slack are included in the calculations.

Port and starboard tank pairs may cause substantially higher free surface effects if cross-connections are left open. Although the effect may not be immediately noticable, it could contribute to low stability in the event of an emergency -- a grounding, or uncontrolled flooding, for example. Therefore, keep all cross connections closed, especially while at sea. Keep bilges pumped to minimum content at all times.

Extreme care must be taken to ensure that empty RSW tanks *remain empty*, and that pressed full ones *remain pressed full*. Fill or empty only one hold at a time -- never allow more than one RSW hold to be slack at the same time.

• ICING CONDITIONS

The ice buildup used in this report is in accordance with USCG regulations for operation in the Bering Sea (1.3" on all horizontal surfaces, and 0.65" on all vertical surfaces.) Larger accumulations can occur, however, and *all* icing situations should be treated seriously. Possible actions to take to reduce ice buildup are a change in speed or heading (to reduce spray), and physical removal of the ice.

In the event of heavy icing, extreme caution must be used when deciding whether to turn away from the wind and run with the seas to avoid further ice buildup. The already-topheavy vessel will then be exposed to beam seas and heeling inertias during the turn, and then following seas after the turn. The following seas will not pass as quickly as head seas, leaving the vessel perched on wave crests at times, causing a potentially serious reduction in stability. (See page 5-14 concerning the effects of following seas.)

• DOWNFLOODING

The stability data presented in this report are based on the assumption that the vessel is watertight up to the main and focsle decks. The downflooding angle is the angle at which uncontrolled flooding will occur. If all watertight doors and hatches are secured, the first downflood point will be the engine room vents in the stack, above the focsle deck, which would not flood until about 80-85. of heel. However, if hatches or weather doors are left open, downflooding could occur much sooner. (See page 5-9 concerning the effects of downflooding.)

• WATER ON DECK

Water on deck has four detrimental effects on stability: It adds to the weight of the vessel and reduces freeboard, raises the center of gravity, creates a free surface, and can cause increased roll acceleration and angles. Therefore, it is important to keep all freeing ports clear and operable at all times, and to avoid excessive trim by the stern.

The size and number of freeing ports on "DESTINATION" meet the Coast Guard regulations for fishing vessels (46 CFR 28.555), and must not be blocked or reduced in size in any way. The Coast Guard criterion for water on deck (46 CFR 28.565) is also satisfied.

• BEAM WINDS AND ROLLING

Operation in beam seas can have two adverse effects on the vessel. One is that the vessel ships water on deck more readily. The other is that a vessel can be rolled past its range of positive stability. "DESTINATION" passes the Coast Guard criteria for Severe Wind and Roll (46 CFR 28.575) for operation on open waters, in all conditions of loading in this report.

• UNINTENTIONAL FLOODING

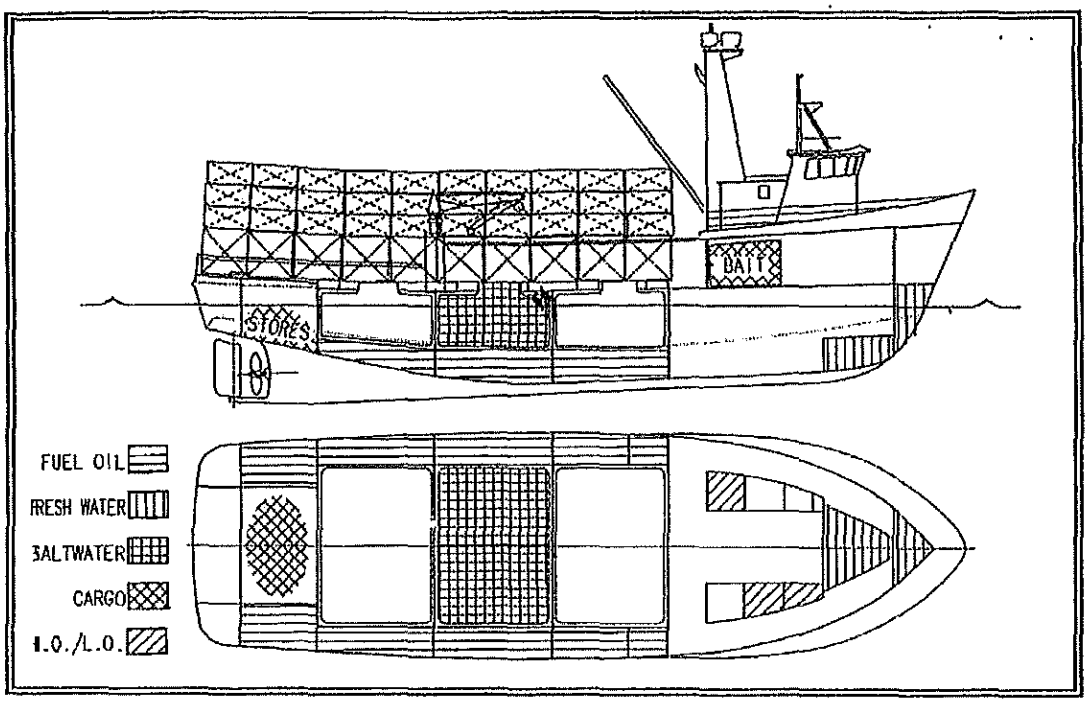
"DESTINATION" is *NOT* designed to meet any particular standards for uncontrolled flooding of the vessel. (The Coast Guard criterion in 46 CFR 28.580 is only applicable to new vessels.) In the event of damage to the hull, it is imperative to determine the extent and location of damage in order to stop or reduce the rate of flooding.

RESPONSIBILITY OF MASTER

These recommendations and instructions should ensure adequate stability under normal conditions. They are not, however, intended to override the judgement of the Master, who must use every means at his disposal to ensure that the stability of the vessel is adequate to meet the sea and weather conditions encountered.

PART 2 - LOADING EXAMPLES

Condition No. 2 — Full Consumables - Full Pot Load - One Hold Tanked



Particulars Of Loading

No. 1 F.O. Day Tank (P&S)	98%
No. 2 F.O. Wing Tank (P&S)	98%
No. 3 F.O. Wing Tank (P&S)	98%
No. 4 F.O. Wing Tank (P&S)	98%
No. 5 F.O. Wing Tank (P&S)	98%
No. 6 F.O. D.B. Tank (P&S)	98%
Forepeak F.W. Tank	100%
F.W. D.B. Tank	100%
No. 1 RSW HOLD	Empty
No. 2 RSW HOLD	100%
No. 3 RSW HOLD	Empty
Dry Stores	Normal Oper.
Crew & Effects	Normal Oper.
Bait in freezer	100%
1st Tier Pots	85
2nd Tier Pots	41
3rd Tier Pots	41
4th Tier Pots	33
Total Pots	200

Total Weight: 495.71 L.T. VCG:14.41 LCG: 1.27
Total Free Surface of All Slack Tanks = 32.06
(Effect of Free Surface Raises VCG by 0.8 inches)

Trim:

Trim	0.40 ft by the Stern (0.25 deg.)
Fwd draft	10.09 ft (to keel)
Mid draft	13.25 ft (to baseline)
Aft draft	14.09 ft (to keel)
Mid Freeboard	2.25 ft
Downflood Angle:	>60°

Intact Righting Energy Criteria (46 CFR 28.570):

Initial Metacentric Height: 5.88	Pass✓
Righting Arm (GZ) at 30°or more: 1.44	Pass✓
Angle of Max. Righting Arm: 23°	Pass✓
Righting Energy 0 to 23° 22.2	Pass✓
Righting Energy 0 to 40° 45.2	Pass✓
Righting Energy 0 to 30° 32.2	Pass✓
Righting Energy 30 to 40° 13.0	Pass✓
Range of Stability: >60°	Pass✓

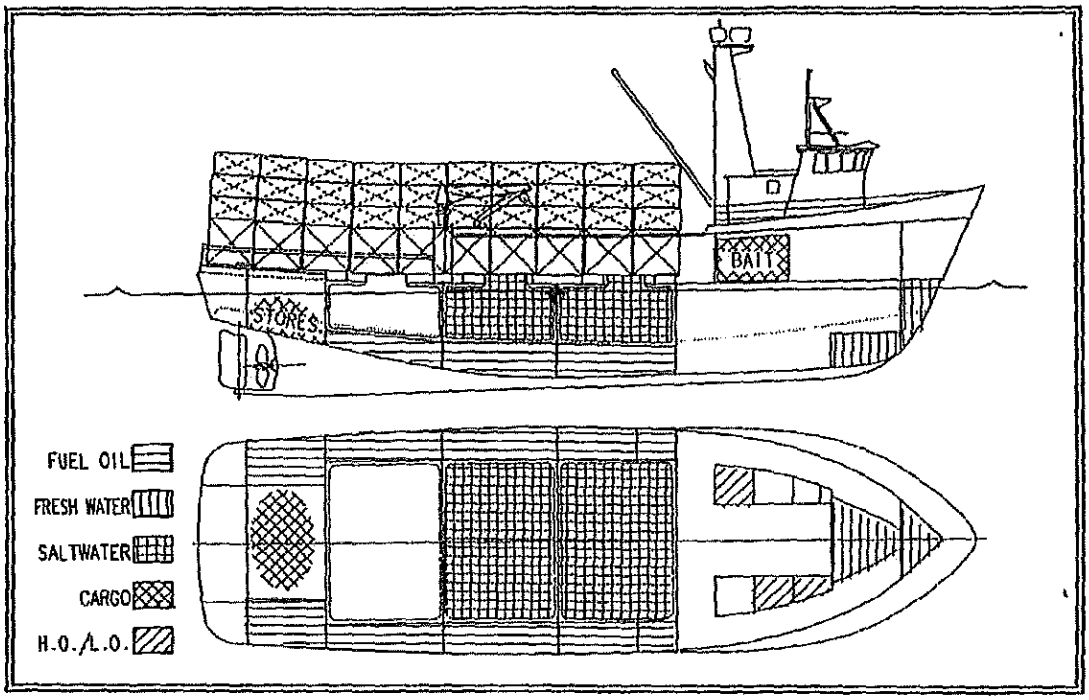
Severe Wind & Roll (46 CFR 28.575): - Open Waters

Angle of Equilibrium: 2°	Pass✓
Residual Righting Energy: 29.9	Pass✓

Comments:

- Maximum pot limits for this loading condition are as follows:
  Hold No. 1 Full..... 249 pots in 5 tiers, Summer or Winter
  Hold No. 2 Full..... 208 pots in 4 tiers, Summer or Winter
  Hold No. 3 Full..... 200 pots in 4 tiers, Summer
  ..... 167 pots in 3 tiers, Winter

Condition No. 3 Full Consumables - Full Pot Load - Two Holds Tanked



Particulars Of Loading

No. 1 F.O. Day Tank (P&S)	98%
No. 2 F.O. Wing Tank (P&S)	98%
No. 3 F.O. Wing Tank (P&S)	98%
No. 4 F.O. Wing Tank (P&S)	98%
No. 5 F.O. Wing Tank (P&S)	98%
No. 6 F.O. D.B. Tank (P&S)	98%
Forepeak F.W. Tank	100%
F.W. D.B. Tank	100%
No. 1 RSW HOLD	100%
No. 2 RSW HOLD	100%
No. 3 RSW HOLD	Empty
Dry Stores	Normal Oper.
Crew & Effects	Normal Oper.
Bait in freezer	100%
1st Tier Pots	85
2nd Tier Pots	41
3rd Tier Pots	41
4th Tier Pots	33
Total Pots	200

Total Weight: 577.57 L.T. VCG:13.98 LCG: -0.13
Total Free Surface of All Slack Tanks = 32.06
(Effect of Free Surface Raises VCG by 0.7 inches)

Trim:

Trim	1.28 ft by the Head (0.91 deg.)
Fwd draft	12.17 ft (to keel)
Mid draft	14.35 ft (to baseline)
Aft draft	14.48 ft (to keel)
Mid Freeboard	1.15 ft
Downflood Angle:	>60°

Intact Righting Energy Criteria (46 CFR 28.570):

Initial Metacentric Height: 5.97	Pass✓
Righting Arm (GZ) at 30°or more: 1.16	Pass✓
Angle of Max. Righting Arm: 28°	Pass✓
Righting Energy 0 to 40° 36.4	Pass✓
Righting Energy 0 to 30° 25.4	Pass✓
Righting Energy 30 to 40° 11.0	Pass✓
Range of Stability: >60°	Pass✓

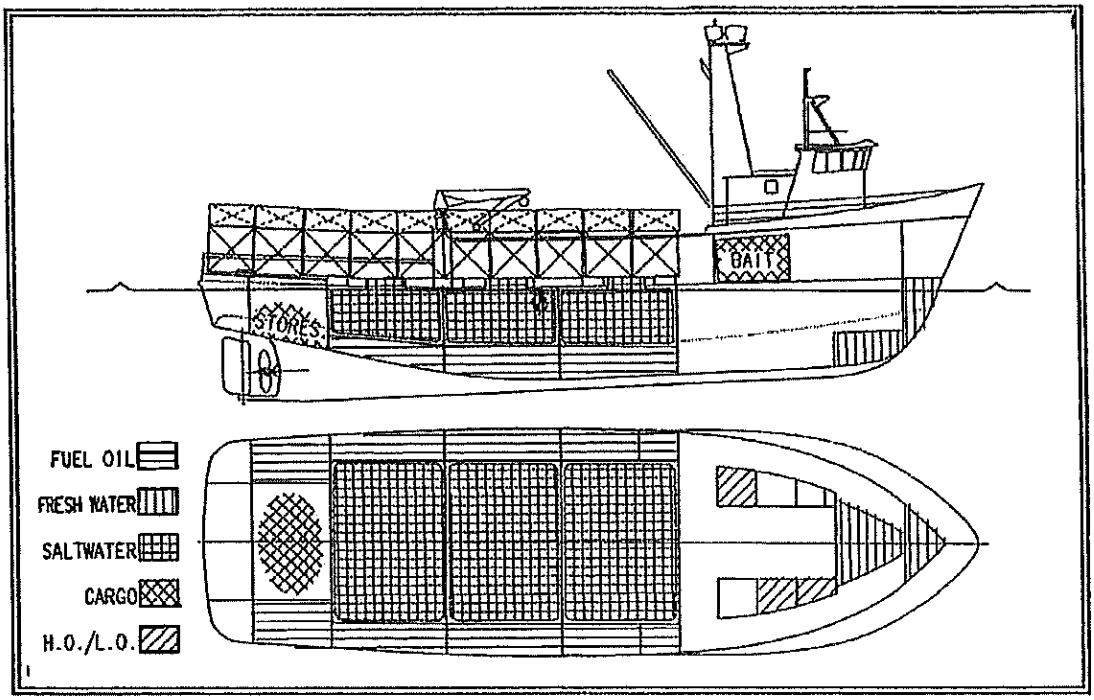
Severe Wind & Roll (46 CFR 28.575): - Open Waters

Angle of Equilibrium: 1.4°	Pass✓
Residual Righting Energy: 27.2	Pass✓

Comments:

- Maximum pot limits for this loading condition are as follows:
  Holds No. 1 & 2 Full ..... 249 pots in 5 tiers, Summer..... 224 pots in 5 tiers, Winter
  Holds No. 1 & 3 Full ..... 200 pots in 4 tiers, Summer..... 146 pots in 3 tiers, Winter
  Holds No. 2 & 3 Full ..... 146 pots in 3 tiers, Summer..... 95 pots in 2 tiers, Winter

Condition No. 4 Full Consumables - Full Pot Load - Three Holds Tanked



Particulars Of Loading

No. 1 F.O. Day Tank (P&S)	98%
No. 2 F.O. Wing Tank (P&S)	98%
No. 3 F.O. Wing Tank (P&S)	98%
No. 4 F.O. Wing Tank (P&S)	98%
No. 5 F.O. Wing Tank (P&S)	98%
No. 6 F.O. D.B. Tank (P&S)	98%
Forepeak F.W. Tank	100%
F.W. D.B. Tank	100%
No. 1 RSW HOLD	100%
No. 2 RSW HOLD	100%
No. 3 RSW HOLD	100%
Dry Stores	Normal Oper.
Crew & Effects	Normal Oper.
Bait in freezer	100%
1st Tier Pots	85
2nd Tier Pots	41
3rd Tier Pots	0
4th Tier Pots	0
Total Pots	126

Total Weight: 633.20 L.T. VCG:13.19 LCG: 2.42
Total Free Surface of All Slack Tanks = 32.06
(Effect of Free Surface Raises VCG by 0.6inches)

Trim:

Trim	0.80 ft by the Stern (0.50 deg.)
Fwd draft	11.55 ft (to keel)
Mid draft	14.93 ft (to baseline)
Aft draft	15.93 ft (to keel)
Mid Freeboard	0.57 ft
Downflood Angle:	>60°

Intact Righting Energy Criteria (46 CFR 28.570):

Initial Metacentric Height: 6.58	Pass✓
Righting Arm (GZ) at 30°or more: 0.76	Pass✓
Angle of Max. Righting Arm: 29°	Pass✓
Righting Energy 0 to 40° 25.8	Pass✓
Righting Energy 0 to 30° 18.4	Pass✓
Righting Energy 30 to 40° 7.4	Pass✓
Range of Stability: >60°	Pass✓

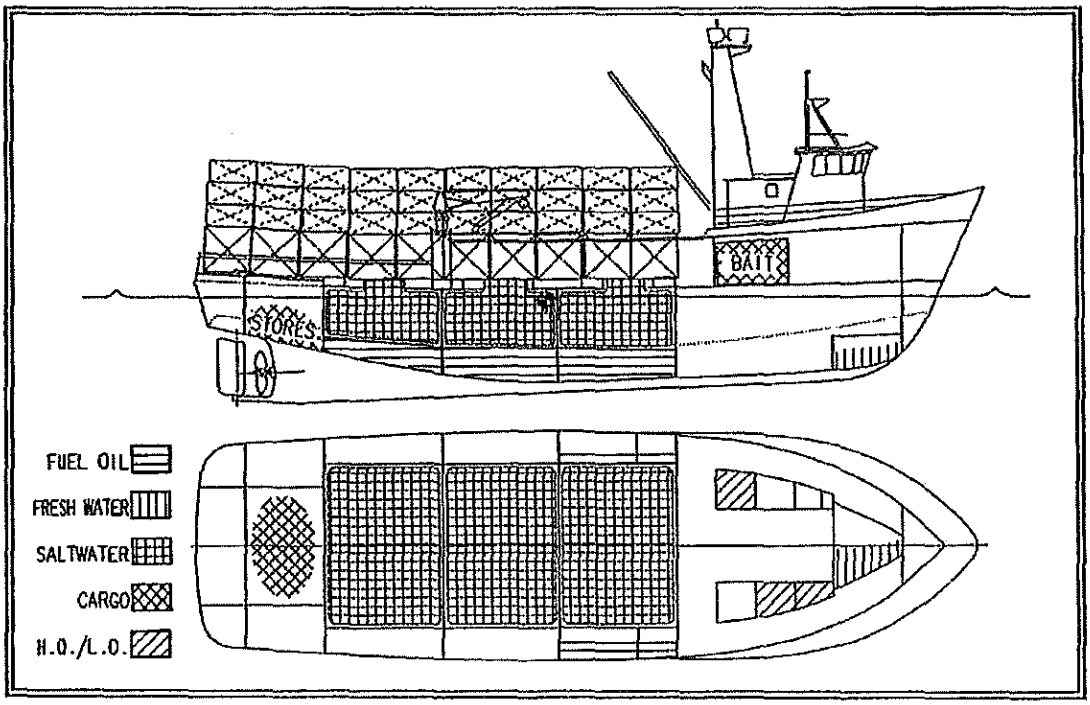
Severe Wind & Roll (46 CFR 28.575): - Open Waters

Angle of Equilibrium: 1°	Pass✓
Residual Righting Energy: 17.6	Pass✓

Comments:

- Maximum pot limits for this loading condition are as follows:
  Holds No. 1, 2 & 3 Full ..... 126 pots in 2 tiers, Summer..... (95) pots in 2 tiers, Winter

Condition No. 5 — Low Consumables - Full Pot Load - Holds Full



Particulars Of Loading

No. 1 F.O. Day Tank (P&S)	50%
No. 2 F.O. Wing Tank (P&S)	50%
No. 3 F.O. Wing Tank (P&S)	0%
No. 4 F.O. Wing Tank (P&S)	0%
No. 5 F.O. Wing Tank (P&S)	0%
No. 6 F.O. D.B. Tank (P&S)	96%
Forepeak F.W. Tank	0%
F.W. D.B. Tank	50%
No. 1 RSW HOLD	Empty
No. 2 RSW HOLD	Empty
No. 3 RSW HOLD	Empty
Dry Stores	Normal Oper.
Crew & Effects	Normal Oper.
Bait in freezer	100%
1st Tier Pots	85
2nd Tier Pots	41
3rd Tier Pots	41
4th Tier Pots	33
Total Pots	200

Total Weight: 574.34 L.T. VCG:13.86 LCG: 1.38
Total Free Surface of All Slack Tanks = 20.56
(Effect of Free Surface Raises VCG by 0.5 inches)

Trim:

Trim	0.07 ft by the Stern (0.04 deg.)
Fwd draft	11.29 ft (to keel)
Mid draft	14.25 ft (to baseline)
Aft draft	14.94 ft (to keel)
Mid Freeboard	1.25 ft
Downflood Angle:	>60°

Intact Righting Energy Criteria (46 CFR 28.570):

Initial Metacentric Height: 6.07	Pass✓
Righting Arm (GZ) at 30° or more: 1.08	Pass✓
Angle of Max. Righting Arm: 29°	Pass✓
Righting Energy 0 to 40° 35.3	Pass✓
Righting Energy 0 to 30° 25.1	Pass✓
Righting Energy 30 to 40° 10.2	Pass✓
Range of Stability: >80°	Pass✓

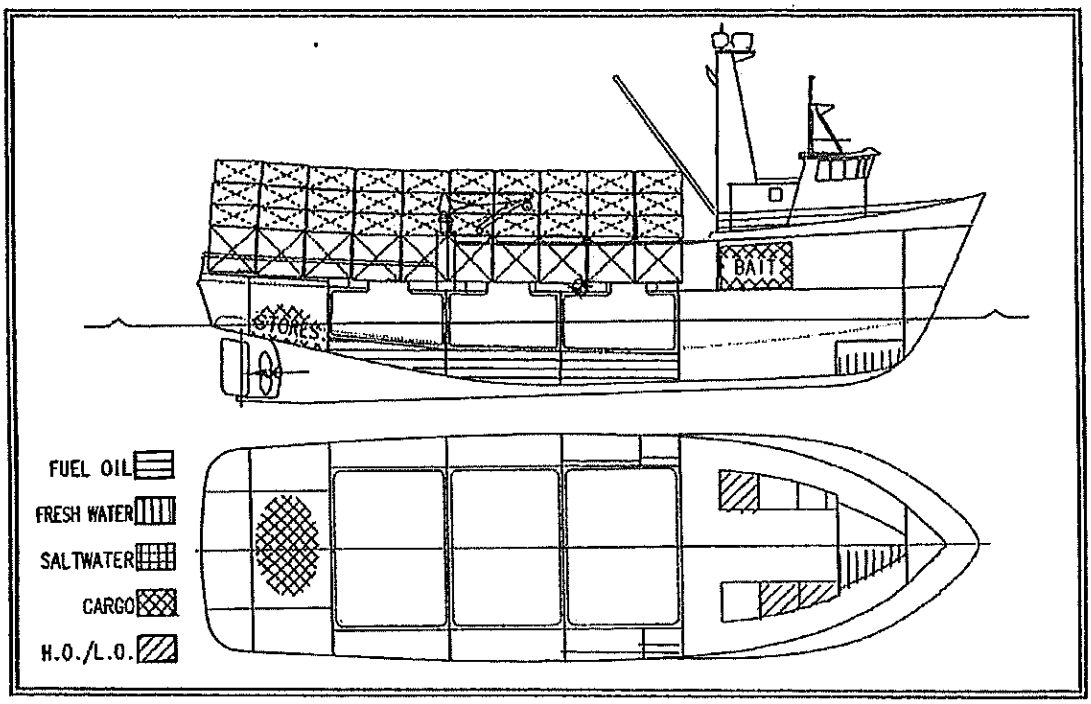
Severe Wind & Roll (46 CFR 28.575): - Open Waters

Angle of Equilibrium: 1°	Pass✓
Residual Righting Energy: 24.9	Pass✓

Comments:

- Maximum pot limits for this loading condition are as follows:
  Holds No. 1, 2 & 3 Full ..... 208 pots in 4 tiers, Summer..... 200 pots in 4 tiers, Winter
- The above pot limits are only applicable with the amount of fuel and fresh water indicated on this page, or less. If more than this is present, see Condition No. 4.
- Fuel in the No. 6 double bottom tank should only be used in emergencies. If used, pots are restricted to 167 in 3 tiers, Summer or Winter.

Condition No. 6 — Low Consumables - Full Pot Load - Holds Empty



Particulars Of Loading

No. 1 F.O. Day Tank (P&S)	50%
No. 2 F.O. Wing Tank (P&S)	10%
No. 3 F.O. Wing Tank (P&S)	0%
No. 4 F.O. Wing Tank (P&S)	0%
No. 5 F.O. Wing Tank (P&S)	0%
No. 6 F.O. D.B. Tank (P&S)	98%
Forepeak F.W. Tank	0%
F.W. D.B. Tank	50%
No. 1 RSW HOLD	Empty
No. 2 RSW HOLD	Empty
No. 3 RSW HOLD	Empty
Dry Stores	Normal Oper.
Crew & Effects	Normal Oper.
Bait in freezer	100%
1st Tier Pots	85
2nd Tier Pots	41
3rd Tier Pots	41
4th Tier Pots	33
Total Pots	200

Total Weight: 328.63 L.T. VCG:16.15 LCG: -3.10
Total Free Surface of All Slack Tanks = 16.78
(Effect of Free Surface Raises VCG by 0.6 inches)

Trim:

Trim	1.34 ft by the Head (1.34 deg.)
Fwd draft	8.97 ft (to keel)
Mid draft	11.11 ft (to baseline)
Aft draft	11.22 ft (to keel)
Mid Freeboard	4.39 ft
Downflood Angle:	>60°

Intact Righting Energy Criteria (46 CFR 28.570):

Initial Metacentric Height: 5.94	Pass✓
Righting Arm (GZ) at 30°or more: 1.85	Pass✓
Angle of Max. Righting Arm: 24°	Pass✓
Righting Energy 0 to 24° 27.4	Pass✓
Righting Energy 0 to 40° 56.0	Pass✓
Righting Energy 0 to 30° 38.8	Pass✓
Righting Energy 30 to 40° 17.1	Pass✓
Range of Stability: >60°	Pass✓

Severe Wind & Roll (46 CFR 28.575): - Open Waters

Angle of Equilibrium: 4°	Pass✓
Residual Righting Energy: 33.1	Pass✓

Comments:

- Vessel has a high center of gravity in this condition, but there is also adequate freeboard so vessel passes the criteria under all conditions. However, good practice would be to keep at least one hold tanked while pots are on deck.
- Fuel in the No. 6 double bottom tank should only be used in emergencies. If used, pots are restricted to 167 in 3 tiers, Summer or Winter.

PART 3 - INCLINING TEST DATA & LIGHT SHIP CONDITION

• GENERAL INFORMATION

Vessel Name.....DESTINATION

Official Number.....632 374

Keel Laid.....1981

Designer.....B. F. Jensen & Assoc., Inc., Seattle

Builder.....RYBCO

Builder's Hull Number.....

Place of Build.....Rockport, Texas

Gross Tonnage..... International Tonnage Certificate
U.S. Regulatory Tonnage

Net Tonnage..... I.T.C.
U.S. Regulatory

Registered L *(unofficial)*.....104.00'

B *(unofficial)*..... 32.18'

D *(unofficial)*..... 8.55'

Type . . ..Steel hull, single chine, single screw, house fwd, raked stem, transom stern.

Bilge Keels .....Yes, full length

Stabilizers .....No

Test Location.....West Wall, Fisherman's Terminal, Seattle, WA

Date of Test.....10-17-93

Weather, Tide, Mooring.....Calm, vessel free to incline.

Test Conducted by.....Richard W. Etsell, P.E.

Owner Represented by.....David Wilson, owner/skipper
Jarl Knutsen, skipper

Modifications .....New stern section, lengthen & widen.

Route . .....Ocean

Condition of Vessel.....Vessel essentially ready for sea, tanks as listed.

Owner.....F/V DESTINATION, Inc.
PO BOX 273
Sand Point, AK 99661

Molded Length.....110.00 feet

Molded Breadth..... 32.18 feet

Molded Depth..... 12.44 feet

INTACT HULL ENVELOPE AND DOWNFLOOD POINTS

The diagram below indicates the portions of the hull that were considered to be watertight for all calculations in this report.

"Downflooding points" are through-hull openings located such that they would permit unrestricted water entry into the hull at an angle of heel less than 40 degrees, if left open while at sea. The following special closures represent potential downflooding points and must be kept closed at all times while at sea.

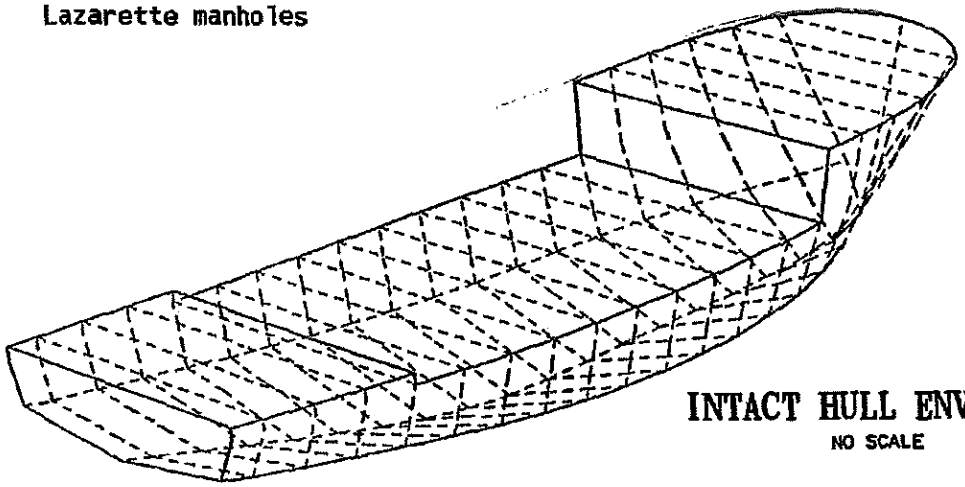
W.T. Door to Focsle

Weather door to freezer

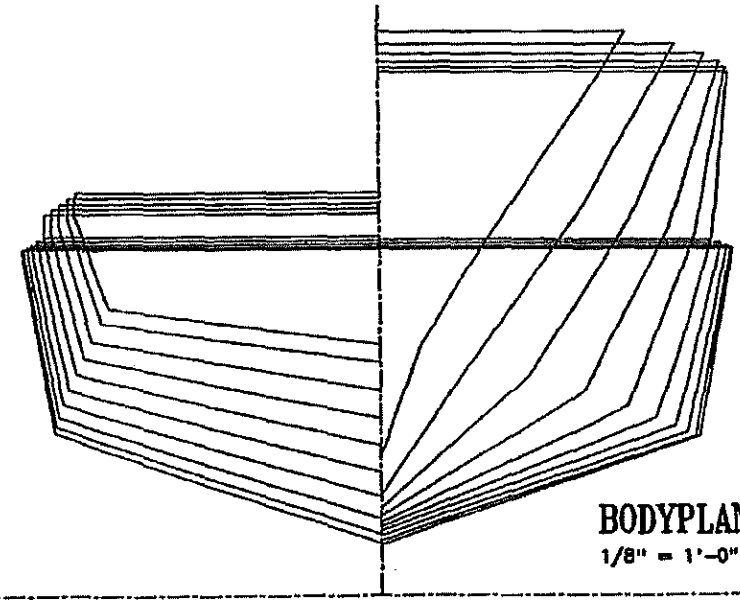
W.T. Door to port side void space

Hatch Covers and manholes into Holds and drystores space

Lazarette manholes



INTACT HULL ENVELOPE
NO SCALE



BODYPLAN
1/8" = 1'-0"

• VESSEL AS INCLINED

Baseline Draft at Forward Draft Marks..... 12.04 ft.

Draft at Midships..... 11.39 ft.

Baseline Draft at Aft Draft Marks..... 10.74 ft.

Trim:..... 1.31 feet by the head
(0.71 degrees)

Volume of Displacement.....12,229 C.F.

Specific Gravity of Water.....1.0000

Weight of Vessel.....348.59 L.T. <---Displ.
at inclining

• INCLINING TEST DATA

A) Pendulums: 1 Length: 105.06 In. Location: No. 1 Fish Hold

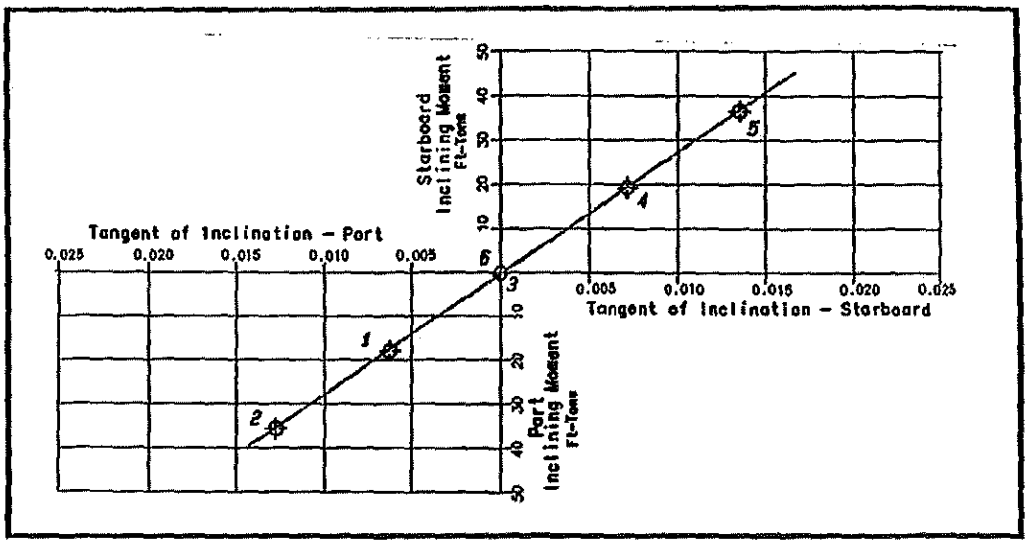
Weights:.....(1) 3360# Concrete Block
(2) 3420# " "

Total Weight: 3.03 L.T. VCG: 17.65 LCG: 21.00

b) Inclinations:

Trial No.	Wt. No.	Distance Moved	Total Moment	Pendulum Deflections	Tangents
1	1	11.958 P	17.94 P	0.65 P	.00619 P
2	1	23.625 P	35.44 P	1.33 P	.01266 P
3	-	0.00 -	0.00 -	0.00 -	.00000 -
4	2	12.542 S	19.15 S	0.75 S	.00714 S
5	2	23.958 S	36.58 S	1.42 S	.01352 S
6	-	0.00 -	0.00 -	0.00 -	.00000 -

PLOT OF TANGENTS:



CENTER OF GRAVITY DETERMINATION FOR AS INCLINED CONDITION

Slope of Plot of Tangents:.....	2756.7 by Linear Regression)	
GM = Slope/Displacement:.....	7.91 ft.	
Free Surface Moment at Inclining:.....	0.00 ft-tons.	
Free Surface Correction to GM:.....	0.00 ft.	
GM, Corrected for Free Surface:.....	7.91 ft.	
KM:.....	21.40 ft.	
KG = KM – GM:.....	13.49 ft.	<---Vertical C.G.
KB:.....	8.42 ft.	
LCB:.....	-2.59 ft.	
LCG:.....	-2.53 ft.	<------Long'l C.G.

LIGHT SHIP CONDITION (CONDITION NO. 1)

a) Weights to Adjust for Light Ship:

	CAP.	F.S.M.	Weight	VCG	LCG
AS-INCLINED CONDITION 10-17-93		0.00	348.59	13.49	-2.53
No. 1 F.O. Day Tank -Port	98	0.00	-3.49	11.63	-13.77
No. 1 F.O. Day Tank -Stbd	98	0.00	-3.49	11.63	-13.77
No. 2 F.O. Wing Tank -Port	98	0.00	-8.13	11.28	-5.56
No. 2 F.O. Wing Tank -Stbd	98	0.00	-8.13	11.28	-5.56
No. 3 F.O. Wing Tank -Port	98	0.00	-12.24	11.32	7.75
No. 3 F.O. Wing Tank -Stbd	98	0.00	-12.24	11.32	7.75
No. 4 F.O. Wing Tank -Port	98	0.00	-9.07	12.19	23.64
No. 4 F.O. Wing Tank -Stbd	98	0.00	-9.07	12.19	23.64
No. 5 F.O. Wing Tank -Port	98	0.00	-10.93	13.63	37.77
No. 5 F.O. Wing Tank -Stbd	98	0.00	-10.93	13.63	37.77
No. 6 F.O. D.B. Tank -Port	98	0.00	-13.53	5.33	1.62
No. 6 F.O. D.B. Tank -Stbd	98	0.00	-13.53	5.33	1.62
Forepeak F.W. Tank	100	0.00	-3.35	18.50	-50.75
F.W. D.B. Tank	100	0.00	-5.58	8.50	-42.70
Inclining weights		0.00	-3.03	17.65	21.00
Light Ship Condition		0.00	221.85	15.03	-8.29

Note: Light Ship Condition includes liquids in the hydraulic oil and L.O. tanks at their normal operating level (approx. 3/4 full H.O., 98% full L.O.), but all other tanks empty. A nominal amount of deck equipment, crew stores, tools, and spares are included in Light Ship.

b) Trim in Light Ship Condition:

KM, height of transverse metacenter..... 22.67 Feet

GM, metacentric height (KM-KG) . ..... 7.64 Feet

Total trim, by the Stern..... 4.00 Feet
..... 2.52 Degrees

Keel draft at fwd draft marks (X= 52.75).... 8.79 Feet

Baseline Draft at fwd draft marks..... 11.71 Feet

Baseline draft amidships (Rise)..... 9.39 Feet

Keel draft at aft draft marks (X= 38.25)..... 8.38 Feet

Baseline draft at aft draft marks..... 7.71 Feet

Freeboard to main deck amidship ..... 6.11 Feet

TRACKING CHANGES TO THE LIGHT SHIP CONDITION

Under the provisions of 46 CFR (Code of Federal Requirements) Part 28, "Requirements for Commercial Fishing Industry Vessels", stability instructions for the vessel may need to be revised if the vessel either:

a) undergoes a major conversion;
b) undergoes alterations to the fishing or processing equipment for the purpose of catching, landing, or processing fish in a manner different than has previously been done on the vessel; or
c) is "substantially altered".

A "substantial alteration" may be due to a single change, or it may be due to an accumulation of small changes over a period of time. Specific guidance is included in the regulation to tell when an accumulation of changes constitutes a "substantial alteration", as follows:

a) Vertical Center of Gravity (VCG) raised 2" or more. (For "DESTINATION", the lightship VCG is 15.03'. An example of the amount of weight that would raise the ship's VCG 2" would be the removal of 10,000 lbs at the height of the engine room grating.)

b) 3% change in lightship displacement. (The current lightship displacement is 221.85 long tons. 3% of this is 14,908 lbs.)

c) Longitudinal Center of Gravity (LCG) changed more than 1% of the vessel length. (On "DESTINATION", this amounts to a shift of approx. 12 inches.)

If any of these limits are exceeded, then the owner is required to have the stability reviewed by a "qualified individual". In order to keep track of changes to the vessel, the following table may be used to record individual changes:

Date	Description	Amount of weight	Vertical Location	Longitudinal Location

PART 4 - SUPPORTING DATA

DETAILED PARTICULARS OF LOADING

CONDITION OF LOADING NO. 2
Full Consumables
Full Pot Load
One Hold Tanked

Item	% Cap.	F.S.M. Ft-Tons	Weight L.T.	VCG Ft.	LCG Ft.
Light Ship After Mods		0.00	221.85	15.03	-8.29
No. 1 F.O. Day Tank -Port	98	0.79	3.49	11.63	-13.77
No. 1 F.O. Day Tank -Stbd	98	0.79	3.49	11.63	-13.77
No. 2 F.O. Wing Tank -Port	98	0.00	8.13	11.28	-5.56
No. 2 F.O. Wing Tank -Stbd	98	0.00	8.13	11.28	-5.56
No. 3 F.O. Wing Tank -Port	98	0.00	12.24	11.32	7.75
No. 3 F.O. Wing Tank -Stbd	98	0.00	12.24	11.32	7.75
No. 4 F.O. Wing Tank -Port	98	0.00	9.07	12.19	23.64
No. 4 F.O. Wing Tank -Stbd	98	0.00	9.07	12.19	23.64
No. 5 F.O. Wing Tank -Port	98	6.01	10.93	13.63	37.77
No. 5 F.O. Wing Tank -Stbd	98	6.01	10.93	13.63	37.77
No. 6 F.O. D.B. Tank -Port	98	0.00	13.53	5.33	1.62
No. 6 F.O. D.B. Tank -Stbd	98	0.00	13.53	5.33	1.62
Forepeak F.W. Tank	100	3.26	3.35	18.50	-50.75
F.W. D.B. Tank	100	15.20	5.58	8.50	-42.70
No. 1 RSW HOLD - tanked			--	--	--
No. 2 RSW HOLD - tanked	100	0.00	78.44	11.45	7.97
No. 3 RSW HOLD - tanked			--	--	--
Dry Stores		0.00	5.00	11.00	36.50
Crew & Effects		0.00	1.50	17.50	-25.00
Bait in freezer	100	0.00	2.70	19.25	-25.50
1st Tier Pots (85)		0.00	26.56	19.15	14.00
2nd Tier Pots (41)		0.00	12.81	23.98	14.00
3rd Tier Pots (41)		0.00	12.81	26.65	14.00
4th Tier Pots (33)		0.00	10.33	29.48	14.00
TOTAL SUMMER		32.06	495.71	14.41	1.27
Ice Buildup on vessel & pots		0.00	11.61	30.25	-2.37
TOTAL WINTER		32.06	507.32	14.77	1.19

CONDITION OF LOADING NO. 2 — Full Consumables, Full Pot Load, One Hold Tanked

Displacement	495.71 Long Tons
VCG, above baseline	14.41 Feet
LCG, from midships	1.27 Feet
Free Surface Moment	32.06 Ft-Tons
Correction to VCG due to FSM	0.06 Feet
Corrected VCG	14.47 Feet
KM, height of transverse metacenter	20.35 Feet
GM, metacentric height	5.88 Feet
Total trim, by the Stern	0.40 Feet
	0.25 Degrees
Keel draft at fwd draft marks (X= 52.75)	10.09 Feet
Baseline Draft at fwd draft marks	13.01 Feet
Baseline draft amidships (Rise)	13.25 Feet
Keel draft at aft draft marks (X= 38.25)	14.08 Feet
Baseline draft at aft draft marks	13.41 Feet
Freeboard to main deck amidship	2.25 Feet

STATICAL STABILITY:

Heel Angle: (Degrees)	0	10	20	30	40	50	60
Righting Arm: (Feet)	0.00	1.01	1.41	1.41	1.16	0.67	0.06

INTACT RIGHTING ENERGY:	Actual	46 CFR 28.570
Righting Energy, 0-30 degrees:	32.23 ft-deg	10.30 ft-deg
Righting Energy, 0-40 degrees:	45.23 ft-deg	16.90 ft-deg
Righting Energy, 30-40 degrees:	13.00 ft-deg	5.60 ft-deg

Max. Righting Arm at heel of 30 deg or greater:	1.41 ft	0.66 ft, Minimum
Angle of Maximum Righting Arm:	23 deg	15 deg, or above (170.173c)
Righting Energy, 0 to 23 deg:	22.20 ft-deg	11.61 ft-deg (170.173c)
Metacentric Height, GM:	5.88 ft	1.15 ft
Range of Stability:	>60 deg	60 deg

SEVERE WIND & ROLL CRITERIA (46 CFR 28.575) - Calculated for OPEN WATERS

Total Profile Area:	3607.00 S.F.	
Vertical Center of Area:	17.17 ft	
Bilge + Bar Keel Area:	110.50 S.F.	
Block Coefficient, Cb:	0.37	
Gust Wind-Heeling Arm:	0.20 ft	
Angle of Equilibrium:	1.91 degrees	14.0 deg., Maximum
Angle of Roll to Windward:	17.30 degrees	
Heeling Energy (Area 'a')	14.18 ft-deg	
Heeling Energy (Area 'b')	44.05 ft-deg	
Ratio (Area b)/(Area a):	3.11	1.00 Minimum

CONDITION OF LOADING NO. 2

Full Consumables
Full Pot Load
One Hold Tanked
WINTER CONDITIONS

Displacement	507.32 Long Tons
VCG, above baseline	14.77 Feet
LCG, from midships	1.19 Feet
Free Surface Moment	32.06 Ft-Tons
Correction to VCG due to FSM	0.06 Feet
Corrected VCG	14.83 Feet
KM, height of transverse metacenter	20.28 Feet
GM, metacentric height	5.44 Feet
Total trim, by the Stern	0.26 Feet
	0.1664 Degrees
Keel draft at fwd draft marks (X= 52.75)	10.33 Feet
Baseline Draft at fwd draft marks	13.25 Feet
Baseline draft amidships (Rise)	13.40 Feet
Keel draft at aft draft marks (X= 38.25)	14.18 Feet
Baseline draft at aft draft marks	13.51 Feet
Freeboard to main deck amidship	2.10 Feet

STATICAL STABILITY:

Heel Angle: (Degrees)	0	10	20	30	40	50	60
Righting Arm: (Feet)	0.00	0.91	1.21	1.15	0.85	0.32	-0.32

INTACT RIGHTING ENERGY:	Actual	46 CFR 28.570
Righting Energy, 0-30 degrees:	27.92 ft-deg	10.30 ft-deg
Righting Energy, 0-40 degrees:	38.07 ft-deg	16.90 ft-deg
Righting Energy, 30-40 degrees:	10.16 ft-deg	5.60 ft-deg

Max. Righting Arm at heel of 30 deg or greater:	1.15 ft	0.66 ft, Minimum
Angle of Maximum Righting Arm:	23 deg	15 deg, or above (170.173c)
Righting Energy, 0 to 23 deg:	19.59 ft-deg	11.61 ft-deg (170.173c)
Metacentric Height, GM:	5.44 ft	1.15 ft
Range of Stability:	55 deg	50 deg (170.173c)

SEVERE WIND & ROLL CRITERIA (46 CFR 28.575) - Calculated for OPEN WATERS

Total Profile Area:	3607.00 S.F.	
Vertical Center of Area:	17.17 ft	
Bilge + Bar Keel Area:	110.50 S.F.	
Block Coefficient, Cb:	0.38	
Gust Wind-Heeling Arm:	0.19 ft	
Angle of Equilibrium:	1.97 degrees	14.0 deg., Maximum
Angle of Roll to Windward:	17.50 degrees	
Heeling Energy (Area 'a')	12.96 ft-deg	
Heeling Energy (Area 'b')	34.42 ft-deg	
Ratio (Area b)/(Area a):	2.66	1.00 Minimum

CONDITION OF LOADING NO. 3
Full Consumables
Full Pot Load
Two Holds Tanked

Item	% Cap.	F.S.M. Ft-Tons	Weight L.T.	VCG Ft.	LCG Ft.
Light Ship After Mods		0.00	221.85	15.03	-8.29
No. 1 F.O. Day Tank -Port	98	0.79	3.49	11.63	-13.77
No. 1 F.O. Day Tank -Stbd	98	0.79	3.49	11.63	-13.77
No. 2 F.O. Wing Tank -Port	98	0.00	8.13	11.28	-5.56
No. 2 F.O. Wing Tank -Stbd	98	0.00	8.13	11.28	-5.56
No. 3 F.O. Wing Tank -Port	98	0.00	12.24	11.32	7.75
No. 3 F.O. Wing Tank -Stbd	98	0.00	12.24	11.32	7.75
No. 4 F.O. Wing Tank -Port	98	0.00	9.07	12.19	23.64
No. 4 F.O. Wing Tank -Stbd	98	0.00	9.07	12.19	23.64
No. 5 F.O. Wing Tank -Port	98	6.01	10.93	13.63	37.77
No. 5 F.O. Wing Tank -Stbd	98	6.01	10.93	13.63	37.77
No. 6 F.O. D.B. Tank -Port	98	0.00	13.53	5.33	1.62
No. 6 F.O. D.B. Tank -Stbd	98	0.00	13.53	5.33	1.62
Forepeak F.W. Tank	100	3.26	3.35	18.50	-50.75
F.W. D.B. Tank	100	15.20	5.58	8.50	-42.70
No. 1 RSW HOLD - tanked	100	0.00	81.86	11.36	-8.59
No. 2 RSW HOLD - tanked	100	0.00	78.44	11.45	7.97
No. 3 RSW HOLD - tanked			--	--	--
Dry Stores		0.00	5.00	11.00	36.50
Crew & Effects		0.00	1.50	17.50	-25.00
Bait in freezer	100	0.00	2.70	19.25	-25.50
1st Tier Pots (85)		0.00	26.56	19.15	14.00
2nd Tier Pots (41)		0.00	12.81	23.98	14.00
3rd Tier Pots (41)		0.00	12.81	26.65	14.00
4th Tier Pots (33)		0.00	10.33	29.48	14.00
TOTAL SUMMER		32.06	577.57	13.98	-0.13
Ice Buildup on vessel & pots		0.00	11.61	30.25	-2.37
TOTAL WINTER		32.06	589.18	14.30	-0.17

CONDITION OF LOADING NO. 3

Full Consumables
Full Pot Load
Two Holds Tanked

Displacement	577.57 Long Tons
VCG, above baseline	13.98 Feet
LCG, from midships	-0.13 Feet
Free Surface Moment	32.06 Ft-Tons
Correction to VCG due to FSM	0.06 Feet
Corrected VCG	14.03 Feet
KM, height of transverse metacenter	20.00 Feet
GM, metacentric height	5.97 Feet
Total trim, by the Head	1.28 Feet
	0.81 Degrees
Keel draft at fwd draft marks (X= 52.75)	12.17 Feet
Baseline Draft at fwd draft marks	15.09 Feet
Baseline draft amidships (Rise)	14.35 Feet
Keel draft at aft draft marks (X= 38.25)	14.48 Feet
Baseline draft at aft draft marks	13.81 Feet
Freeboard to main deck amidship	1.15 Feet

STATICAL STABILITY:

Heel Angle: (Degrees)	0	10	20	30	40	50	60
Righting Arm: (Feet)	0.00	0.79	1.08	1.16	1.00	0.61	0.10

INTACT RIGHTING ENERGY:	Actual	46 CFR 28.570
Righting Energy, 0-30 degrees:	25.38 ft-deg	10.30 ft-deg
Righting Energy, 0-40 degrees:	36.38 ft-deg	16.90 ft-deg
Righting Energy, 30-40 degrees:	11.00 ft-deg	5.60 ft-deg
Max. Righting Arm at heel of 30 deg or greater:	1.16 ft	0.66 ft, Minimum
Angle of Maximum Righting Arm:	28 deg	25 deg, or above
Metacentric Height, GM:	5.97 ft	1.15 ft
Range of Stability:	>60 deg	60 deg

SEVERE WIND & ROLL CRITERIA (46 CFR 28.575) - Calculated for OPEN WATERS

Total Profile Area:	3607.00 S.F.	
Vertical Center of Area:	17.17 ft	
Bilge + Bar Keel Area:	110.50 S.F.	
Block Coefficient, Cb:	0.40	
Gust Wind-Heeling Arm:	0.14 ft	
Angle of Equilibrium:	1.39 degrees	14.0 deg., Maximum
Angle of Roll to Windward:	16.06 degrees	
Heeling Energy (Area 'a')	9.94 ft-deg	
Heeling Energy (Area 'b')	37.16 ft-deg	
Ratio (Area b)/(Area a):	3.74	1.00 Minimum

CONDITION OF LOADING NO. 3

Full Consumables
Full Pot Load
Two Holds Tanked
WINTER CONDITIONS

Displacement	589.18 Long Tons
VCG, above baseline	14.30 Feet
LCG, from midships	-0.17 Feet
Free Surface Moment	32.06 Ft-Tons
Correction to VCG due to FSM	0.05 Feet
Corrected VCG	14.35 Feet
KM, height of transverse metacenter	19.97 Feet
GM, metacentric height	5.62 Feet
Total trim, by the Head	1.40 Feet
	0.88 Degrees
Keel draft at fwd draft marks (X= 52.75)	12.39 Feet
Baseline Draft at fwd draft marks	15.31 Feet
Baseline draft amidships (Rise)	14.50 Feet
Keel draft at aft draft marks (X= 38.25)	14.58 Feet
Baseline draft at aft draft marks	13.91 Feet
Freeboard to main deck amidship	1.00 Feet

STATICAL STABILITY:

Heel Angle: (Degrees)	0	10	20	30	40	50	60
Righting Arm: (Feet)	0.00	0.69	0.90	0.92	0.71	0.29	-0.24

INTACT RIGHTING ENERGY:	Actual	46 CFR 28.570
Righting Energy, 0-30 degrees:	21.36 ft-deg	10.30 ft-deg
Righting Energy, 0-40 degrees:	29.72 ft-deg	16.90 ft-deg
Righting Energy, 30-40 degrees:	8.36 ft-deg	5.60 ft-deg
Max. Righting Arm at heel of 30 deg or greater:	0.92 ft	0.66 ft, Minimum
Angle of Maximum Righting Arm:	27 deg	25 deg, or above
Metacentric Height, GM:	5.62 ft	1.15 ft
Range of Stability:	55 deg	50 deg (170.173c)

SEVERE WIND & ROLL CRITERIA (46 CFR 28.575) - Calculated for OPEN WATERS

Total Profile Area:	3607.00 S.F.	
Vertical Center of Area:	17.17 ft	
Bilge + Bar Keel Area:	110.50 S.F.	
Block Coefficient, Cb:	0.40	
Gust Wind-Heeling Arm:	0.13 ft	
Angle of Equilibrium:	1.42 degrees	14.0 deg., Maximum
Angle of Roll to Windward:	16.74 degrees	
Heeling Energy (Area 'a')	9.81 ft-deg	
Heeling Energy (Area 'b')	28.12 ft-deg	
Ratio (Area b)/(Area a):	2.87	1.00 Minimum

CONDITION OF LOADING NO. 4
Full Consumables
Maximum Pot Load Restricted
Three Holds Tanked

Item	% Cap.	F.S.M. Ft-Tons	Weight L.T.	VCG Ft.	LCG Ft.
Light Ship After Mods		0.00	221.85	15.03	-8.29
No. 1 F.O. Day Tank -Port	98	0.79	3.49	11.63	-13.77
No. 1 F.O. Day Tank -Stbd	98	0.79	3.49	11.63	-13.77
No. 2 F.O. Wing Tank -Port	98	0.00	8.13	11.28	-5.56
No. 2 F.O. Wing Tank -Stbd	98	0.00	8.13	11.28	-5.56
No. 3 F.O. Wing Tank -Port	98	0.00	12.24	11.32	7.75
No. 3 F.O. Wing Tank -Stbd	98	0.00	12.24	11.32	7.75
No. 4 F.O. Wing Tank -Port	98	0.00	9.07	12.19	23.64
No. 4 F.O. Wing Tank -Stbd	98	0.00	9.07	12.19	23.64
No. 5 F.O. Wing Tank -Port	98	6.01	10.93	13.63	37.77
No. 5 F.O. Wing Tank -Stbd	98	6.01	10.93	13.63	37.77
No. 6 F.O. D.B. Tank -Port	98	0.00	13.53	5.33	1.62
No. 6 F.O. D.B. Tank -Stbd	98	0.00	13.53	5.33	1.62
Forepeak F.W. Tank	100	3.26	3.35	18.50	-50.75
F.W. D.B. Tank	100	15.20	5.58	8.50	-42.70
No. 1 RSW HOLD - tanked	100	0.00	81.86	11.36	-8.59
No. 2 RSW HOLD - tanked	100	0.00	78.44	11.45	7.97
No. 3 RSW HOLD - tanked	100	0.00	78.77	11.73	24.46
Dry Stores		0.00	5.00	11.00	36.50
Crew & Effects		0.00	1.50	17.50	-25.00
Bait in freezer	100	0.00	2.70	19.25	-25.50
1st Tier Pots (85)		0.00	26.56	19.15	14.00
2nd Tier Pots (41)		0.00	12.81	23.98	14.00
TOTAL SUMMER		32.06	633.20	13.19	2.42
Ice Buildup on vessel & pots		0.00	11.61	30.25	-2.37
TOTAL WINTER		32.06	635.13	13.33	2.15

CONDITION OF LOADING NO. 4 — Full Consumables
Maximum Pot Load Restricted
Three Holds Tanked

Displacement	633.20 Long Tons
VCG, above baseline	13.19 Feet
LCG, from midships	2.42 Feet
Free Surface Moment	32.06 Ft-Tons
Correction to VCG due to FSM	0.05 Feet
Corrected VCG	13.24 Feet
KM, height of transverse metacenter	19.82 Feet
GM, metacentric height	6.58 Feet
Total trim, by the Stern	0.80 Feet
	0.50 Degrees
Keel draft at fwd draft marks (X= 52.75)	11.55 Feet
Baseline Draft at fwd draft marks	14.47 Feet
Baseline draft amidships (Rise)	14.93 Feet
Keel draft at aft draft marks (X= 38.25)	15.93 Feet
Baseline draft at aft draft marks	15.27 Feet
Freeboard to main deck amidship	0.57 Feet

STATICAL STABILITY:

Heel Angle: (Degrees)	0	10	20	30	40	50	60
Righting Arm: (Feet)	0.00	0.63	0.74	0.76	0.69	0.47	0.16

INTACT RIGHTING ENERGY:	Actual	46 CFR 28.570
Righting Energy, 0-30 degrees:	18.44 ft-deg	10.30 ft-deg
Righting Energy, 0-40 degrees:	25.84 ft-deg	16.90 ft-deg
Righting Energy, 30-40 degrees:	7.40 ft-deg	5.60 ft-deg
Max. Righting Arm at heel of 30 deg or greater:	0.76 ft	0.66 ft, Minimum
Angle of Maximum Righting Arm:	29 deg	25 deg, or above
Metacentric Height, GM:	6.58 ft	1.15 ft
Range of Stability:	>60 deg	60 deg

SEVERE WIND & ROLL CRITERIA (46 CFR 28.575) - Calculated for OPEN WATERS		
Total Profile Area:	3607.00 S.F.	
Vertical Center of Area:	17.17 ft	
Bilge + Bar Keel Area:	110.50 S.F.	
Block Coefficient, Cb:	0.42	
Gust Wind-Heeling Arm:	0.11 ft	
Angle of Equilibrium:	1.03 degrees	14.0 deg., Maximum
Angle of Roll to Windward:	15.44 degrees	
Heeling Energy (Area 'a')	8.14 ft-deg	
Heeling Energy (Area 'b')	25.90 ft-deg	
Ratio (Area b)/(Area a):	3.18	1.00 Minimum

CONDITION OF LOADING NO. 4

Full Consumables
Maximum Pot Load Restricted
Three Holds Tanked
WINTER CONDITIONS

Displacement	635.13 Long Tons
VCG, above baseline	13.33 Feet
LCG, from midships	2.15 Feet
Free Surface Moment	32.06 Ft-Tons
Correction to VCG due to FSM	0.05 Feet
Corrected VCG	13.38 Feet
KM, height of transverse metacenter	19.82 Feet
GM, metacentric height	6.43 Feet
Total trim, by the Stern	0.54 Feet
	0.34 Degrees
Keel draft at fwd draft marks (X= 52.75)	11.74 Feet
Baseline Draft at fwd draft marks	14.66 Feet
Baseline draft amidships (Rise)	14.97 Feet
Keel draft at aft draft marks (X= 38.25)	15.86 Feet
Baseline draft at aft draft marks	15.20 Feet
Freeboard to main deck amidship	0.53 Feet

STATICAL STABILITY:

Heel Angle: (Degrees)	0	10	20	30	40	50	60
Righting Arm: (Feet)	0.00	0.60	0.71	0.72	0.62	0.38	0.05

INTACT RIGHTING ENERGY:	Actual	46 CFR 28.570
Righting Energy, 0-30 degrees:	17.59 ft-deg	10.30 ft-deg
Righting Energy, 0-40 degrees:	24.41 ft-deg	16.90 ft-deg
Righting Energy, 30-40 degrees:	6.82 ft-deg	5.60 ft-deg
Max. Righting Arm at heel of 30 deg or greater:	0.72 ft	0.66 ft, Minimum
Angle of Maximum Righting Arm:	26 deg	25 deg, or above
Metacentric Height, GM:	6.43 ft	1.15 ft
Range of Stability:	>60 deg	60 deg

SEVERE WIND & ROLL CRITERIA (46 CFR 28.575) - Calculated for OPEN WATERS

Total Profile Area:	3607.00 S.F.	
Vertical Center of Area:	17.17 ft	
Bilge + Bar Keel Area:	110.50 S.F.	
Block Coefficient, Cb:	0.42	
Gust Wind-Heeling Arm:	0.11 ft	
Angle of Equilibrium:	1.04 degrees	14.0 deg., Maximum
Angle of Roll to Windward:	15.49 degrees	
Heeling Energy (Area 'a')	7.87 ft-deg	
Heeling Energy (Area 'b')	23.83 ft-deg	
Ratio (Area b)/(Area a):	3.03	1.00 Minimum

CONDITION OF LOADING NO. 5
Low Consumables
Full Pot Load
Holds ~~dry~~ FULL

Item	% Cap.	F.S.M. Ft-Tons	Weight L.T.	VCG Ft.	LCG Ft.
Light Ship After Mods		0.00	221.85	15.03	-8.29
No. 1 F.O. Day Tank -Port	50	0.79	1.78	9.61	-13.66
No. 1 F.O. Day Tank -Stbd	50	0.79	1.78	9.61	-13.66
No. 2 F.O. Wing Tank -Port	50	1.89	4.15	9.18	-5.47
No. 2 F.O. Wing Tank -Stbd	50	1.89	4.15	9.18	-5.47
No. 3 F.O. Wing Tank -Port			--	--	--
No. 3 F.O. Wing Tank -Stbd			--	--	--
No. 4 F.O. Wing Tank -Port			--	--	--
No. 4 F.O. Wing Tank -Stbd			--	--	--
No. 5 F.O. Wing Tank -Port			--	--	--
No. 5 F.O. Wing Tank -Stbd			--	--	--
No. 6 F.O. D.B. Tank -Port	98	0.00	13.53	5.33	1.62
No. 6 F.O. D.B. Tank -Stbd	98	0.00	13.53	5.33	1.62
Forepeak F.W. Tank			--	--	--
F.W. D.B. Tank	50	15.20	2.79	8.50	-42.70
No. 1 RSW HOLD - tanked	100	0.00	81.86	11.36	-8.59
No. 2 RSW HOLD - tanked	100	0.00	78.44	11.45	7.97
No. 3 RSW HOLD - tanked	100	0.00	78.77	11.73	24.46
Dry Stores		0.00	5.00	11.00	36.50
Crew & Effects		0.00	1.50	17.50	-25.00
Bait in freezer	100	0.00	2.70	19.25	-25.50
1st Tier Pots (85)		0.00	26.56	19.15	14.00
2nd Tier Pots (41)		0.00	12.81	23.98	14.00
3rd Tier Pots (41)		0.00	12.81	26.65	14.00
4th Tier Pots (33)		0.00	10.33	29.48	14.00
TOTAL SUMMER		20.56	574.34	13.86	1.38
Ice Buildup on vessel & pots		0.00	11.61	30.25	-2.37
TOTAL WINTER		20.56	585.95	14.18	1.30

CONDITION OF LOADING NO. 5 — Low Consumables, Full Pot Load, Holds ~~dep~~ Full

Displacement	574.34 Long Tons
VCG, above baseline	13.86 Feet
LCG, from midships	1.38 Feet
Free Surface Moment	20.56 Ft-Tons
Correction to VCG due to FSM	0.04 Feet
Corrected VCG	13.90 Feet
KM, height of transverse metacenter	19.97 Feet
GM, metacentric height	6.07 Feet
Total trim, by the Stern	0.07 Feet
	0.04 Degrees
Keel draft at fwd draft marks (X= 52.75)	11.29 Feet
Baseline Draft at fwd draft marks	14.21 Feet
Baseline draft amidships (Rise)	14.25 Feet
Keel draft at aft draft marks (X= 38.25)	14.94 Feet
Baseline draft at aft draft marks	14.28 Feet
Freeboard to main deck amidship	1.25 Feet

STATICAL STABILITY:

Heel Angle: (Degrees)	0	10	20	30	40	50	60
Righting Arm: (Feet)	0.00	0.83	1.05	1.08	0.92	0.55	0.08

INTACT RIGHTING ENERGY:	Actual	46 CFR 28.570
Righting Energy, 0-30 degrees:	25.07 ft-deg	10.30 ft-deg
Righting Energy, 0-40 degrees:	35.26 ft-deg	16.90 ft-deg
Righting Energy, 30-40 degrees:	10.19 ft-deg	5.60 ft-deg
Max. Righting Arm at heel of 30 deg or greater:	1.08 ft	0.66 ft, Minimum
Angle of Maximum Righting Arm:	29 deg	25 deg, or above
Metacentric Height, GM:	6.07 ft	1.15 ft
Range of Stability:	>60 deg	60 deg

SEVERE WIND & ROLL CRITERIA (46 CFR 28.575) - Calculated for OPEN WATERS

Total Profile Area:	3607.00 S.F.	
Vertical Center of Area:	17.17 ft	
Bilge + Bar Keel Area:	110.50 S.F.	
Block Coefficient, Cb:	0.40	
Gust Wind-Heeling Arm:	0.14 ft	
Angle of Equilibrium:	1.39 degrees	14.0 deg., Maximum
Angle of Roll to Windward:	16.06 degrees	
Heeling Energy (Area 'a')	10.29 ft-deg	
Heeling Energy (Area 'b')	35.22 ft-deg	
Ratio (Area b)/(Area a):	3.42	1.00 Minimum

CONDITION OF LOADING NO. 5

Low Consumables
Full Pot Load
Holds ~~dry~~ full
WINTER CONDITIONS

Displacement	585.95	Long Tons
VCG, above baseline	14.18	Feet
LCG, from midships	1.30	Feet
Free Surface Moment	20.56	Ft-Tons
Correction to VCG due to FSM	0.04	Feet
Corrected VCG	14.22	Feet
KM, height of transverse metacenter	19.93	Feet
GM, metacentric height	5.71	Feet
Total trim, by the Head	0.05	Feet
	0.03	Degrees
Keel draft at fwd draft marks (X= 52.75)	11.50	Feet
Baseline Draft at fwd draft marks	14.42	Feet
Baseline draft amidships (Rise)	14.39	Feet
Keel draft at aft draft marks (X= 38.25)	15.04	Feet
Baseline draft at aft draft marks	14.37	Feet
Freeboard to main deck amidship	1.11	Feet

STATICAL STABILITY:

Heel Angle: (Degrees)	0	10	20	30	40	50	60
Righting Arm: (Feet)	0.00	0.72	0.86	0.84	0.63	0.23	-0.27

INTACT RIGHTING ENERGY:	Actual	46 CFR 28.570
Righting Energy, 0-30 degrees:	20.88 ft-deg	10.30 ft-deg
Righting Energy, 0-40 degrees:	28.37 ft-deg	16.90 ft-deg
Righting Energy, 30-40 degrees:	7.49 ft-deg	5.60 ft-deg
Max. Righting Arm at heel of 30 deg or greater:	0.84 ft	0.66 ft, Minimum
Angle of Maximum Righting Arm:	21 deg	15 deg, or above (170.173c)
Righting Energy, 0 to 21 deg:	13.17 ft-deg	11.98 ft-deg (170.173c)
Metacentric Height, GM:	5.71 ft	1.15 ft
Range of Stability:	54 deg	50 deg (170.173c)

SEVERE WIND & ROLL CRITERIA (46 CFR 28.575) - Calculated for OPEN WATERS

Total Profile Area:	3607.00 S.F.	
Vertical Center of Area:	17.17 ft	
Bilge + Bar Keel Area:	110.50 S.F.	
Block Coefficient, Cb:	0.40	
Gust Wind-Heeling Arm:	0.14 ft	
Angle of Equilibrium:	1.42 degrees	14.0 deg., Maximum
Angle of Roll to Windward:	16.74 degrees	
Heeling Energy (Area 'a')	10.14 ft-deg	
Heeling Energy (Area 'b')	25.91 ft-deg	
Ratio (Area b)/(Area a):	2.55	1.00 Minimum

CONDITION OF LOADING NO. 6
Low Consumables
Full Pot Load
Holds Empty

Item	% Cap.	F.S.M. Ft-Tons	Weight L.T.	VCG Ft.	LCG Ft.
Light Ship After Mods		0.00	221.85	15.03	-8.29
No. 1 F.O. Day Tank -Port	50	0.79	1.78	9.61	-13.66
No. 1 F.O. Day Tank -Stbd	50	0.79	1.78	9.61	-13.66
No. 2 F.O. Wing Tank -Port	10	0.00	0.83	7.13	-5.14
No. 2 F.O. Wing Tank -Stbd	10	0.00	0.83	7.13	-5.14
No. 3 F.O. Wing Tank -Port			--	--	--
No. 3 F.O. Wing Tank -Stbd			--	--	--
No. 4 F.O. Wing Tank -Port			--	--	--
No. 4 F.O. Wing Tank -Stbd			--	--	--
No. 5 F.O. Wing Tank -Port			--	--	--
No. 5 F.O. Wing Tank -Stbd			--	--	--
No. 6 F.O. D.B. Tank -Port	98	0.00	13.53	5.33	1.62
No. 6 F.O. D.B. Tank -Stbd	98	0.00	13.53	5.33	1.62
Forepeak F.W. Tank			--	--	--
F.W. D.B. Tank	50	15.20	2.79	8.50	-42.70
No. 1 RSW HOLD - tanked			--	--	--
No. 2 RSW HOLD - tanked			--	--	--
No. 3 RSW HOLD - tanked			--	--	--
Dry Stores		0.00	5.00	11.00	36.50
Crew & Effects		0.00	1.50	17.50	-25.00
Bait in freezer	100	0.00	2.70	19.25	-25.50
1st Tier Pots (85)		0.00	26.56	19.15	14.00
2nd Tier Pots (41)		0.00	12.81	23.98	14.00
3rd Tier Pots (41)		0.00	12.81	26.65	14.00
4th Tier Pots (33)		0.00	10.33	29.48	14.00
TOTAL SUMMER		16.78	328.63	15.65	-3.10
Ice Buildup on vessel & pots		0.00	11.61	30.25	-2.37
TOTAL WINTER		16.78	340.24	16.15	-3.08

CONDITION OF LOADING NO. 6 — Low Consumables, Full Pot Load, Holds Empty

Displacement	328.63 Long Tons
VCG, above baseline	15.65 Feet
LCG, from midships	-3.10 Feet
Free Surface Moment	16.78 Ft-Tons
Correction to VCG due to FSM	0.05 Feet
Corrected VCG	15.70 Feet
KM, height of transverse metacenter	21.64 Feet
GM, metacentric height	5.94 Feet
Total trim, by the Head	1.34 Feet
	0.84 Degrees
Keel draft at fwd draft marks (X= 52.75)	8.97 Feet
Baseline Draft at fwd draft marks	11.89 Feet
Baseline draft amidships (Rise)	11.11 Feet
Keel draft at aft draft marks (X= 38.25)	11.22 Feet
Baseline draft at aft draft marks	10.55 Feet
Freeboard to main deck amidship	4.39 Feet

STATICAL STABILITY:

Heel Angle: (Degrees)	0	10	20	30	40	50	60
Righting Arm: (Feet)	0.00	1.02	1.84	1.85	1.55	1.04	0.30

INTACT RIGHTING ENERGY:	Actual	46 CFR 28.570
Righting Energy, 0-30 degrees:	38.82 ft-deg	10.30 ft-deg
Righting Energy, 0-40 degrees:	55.96 ft-deg	16.90 ft-deg
Righting Energy, 30-40 degrees:	17.13 ft-deg	5.60 ft-deg
Max. Righting Arm at heel of 30 deg or greater:	1.85 ft	0.66 ft, Minimum
Angle of Maximum Righting Arm:	24 deg	15 deg, or above (170.173c)
Righting Energy, 0 to 24 deg:	27.44 ft-deg	11.42 ft-deg (170.173c)
Metacentric Height, GM:	5.94 ft	1.15 ft
Range of Stability:	>60 deg	60 deg

SEVERE WIND & ROLL CRITERIA (46 CFR 28.575) - Calculated for OPEN WATERS

Total Profile Area:	3607.00 S.F.	
Vertical Center of Area:	17.17 ft	
Bilge + Bar Keel Area:	110.50 S.F.	
Block Coefficient, Cb:	0.29	
Gust Wind-Heeling Arm:	0.43 ft	
Angle of Equilibrium:	4.14 degrees	14.0 deg., Maximum
Angle of Roll to Windward:	17.61 degrees	
Heeling Energy (Area 'a')	14.98 ft-deg	
Heeling Energy (Area 'b')	48.09 ft-deg	
Ratio (Area b)/(Area a):	3.21	1.00 Minimum

CONDITION OF LOADING NO. 6

Low Consumables
Full Pot Load
Holds Empty
WINTER CONDITIONS

Displacement	340.24 Long Tons
VCG, above baseline	16.15 Feet
LCG, from midships	-3.08 Feet
Free Surface Moment	16.78 Ft-Tons
Correction to VCG due to FSM	0.05 Feet
Corrected VCG	16.20 Feet
KM, height of transverse metacenter	21.45 Feet
GM, metacentric height	5.25 Feet
Total trim, by the Head	1.45 Feet
	0.92 Degrees
Keel draft at fwd draft marks (X= 52.75)	9.20 Feet
Baseline Draft at fwd draft marks	12.12 Feet
Baseline draft amidships (Rise)	11.28 Feet
Keel draft at aft draft marks (X= 38.25)	11.33 Feet
Baseline draft at aft draft marks	10.67 Feet
Freeboard to main deck amidship	4.22 Feet

STATICAL STABILITY:

Heel Angle: (Degrees)	0	10	20	30	40	50	60
Righting Arm: (Feet)	0.00	0.91	1.62	1.54	1.19	0.59	-0.20

INTACT RIGHTING ENERGY:	Actual	46 CFR 28.570
Righting Energy, 0-30 degrees:	33.97 ft-deg	10.30 ft-deg
Righting Energy, 0-40 degrees:	47.75 ft-deg	16.90 ft-deg
Righting Energy, 30-40 degrees:	13.79 ft-deg	5.60 ft-deg
Max. Righting Arm at heel of 30 deg or greater:	1.54 ft	0.66 ft, Minimum
Angle of Maximum Righting Arm:	24 deg	15 deg, or above (170.173c)
Righting Energy, 0 to 24 deg:	24.27 ft-deg	11.42 ft-deg (170.173c)
Metacentric Height, GM:	5.25 ft	1.15 ft
Range of Stability:	57 deg	50 deg (170.173c)

SEVERE WIND & ROLL CRITERIA (46 CFR 28.575) - Calculated for OPEN WATERS

Total Profile Area:	3607.00 S.F.	
Vertical Center of Area:	17.17 ft	
Bilge + Bar Keel Area:	110.50 S.F.	
Block Coefficient, Cb:	0.30	
Gust Wind-Heeling Arm:	0.40 ft	
Angle of Equilibrium:	4.40 degrees	14.0 deg., Maximum
Angle of Roll to Windward:	17.92 degrees	
Heeling Energy (Area 'a')	13.63 ft-deg	
Heeling Energy (Area 'b')	37.43 ft-deg	
Ratio (Area b)/(Area a):	2.75	1.00 Minimum

TANK CAPACITIES AND SOUNDING TABLES

TANK- No. 1 F.O. Day Tank

Trim: 0 Deg Heel: 0 Deg Liquid Density: 41.3 CF/Ton
Height of Bottom of Tank: 6.38 Feet ABL Permeability: 0.980
Calculated Volumes are for: One side of C.L. Only. Long'l Bhd 11.5 Off C.L.
Striker Pl is 0 Ft abv Tk Bot. Vert. sounding tubes assumed.

SOUNDING (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
0.50	1.05	8	0.03	6.72	-11.35	0.02
1.00	5.25	39	0.13	7.07	-12.59	0.11
1.50	11.36	85	0.28	7.38	-13.15	0.15
2.00	17.85	134	0.43	7.65	-13.34	0.17
2.50	24.68	185	0.60	7.92	-13.44	0.20
3.00	31.85	238	0.77	8.19	-13.50	0.23
3.50	39.35	294	0.95	8.47	-13.55	0.26
4.00	47.20	353	1.14	8.75	-13.59	0.30
4.50	55.36	414	1.34	9.02	-13.62	0.33
5.00	63.83	477	1.55	9.30	-13.64	0.37
5.50	72.62	543	1.76	9.58	-13.66	0.41
6.00	81.73	611	1.98	9.87	-13.68	0.46
6.50	91.15	682	2.21	10.15	-13.70	0.50
7.00	100.88	755	2.44	10.44	-13.71	0.55
7.50	110.93	830	2.69	10.73	-13.73	0.61
8.00	121.29	907	2.94	11.02	-13.74	0.66
8.50	131.97	987	3.20	11.31	-13.75	0.72
9.00	142.96	1,069	3.46	11.61	-13.76	0.79
9.24	146.95	1,099	3.56	11.71	-13.79	0.00

INTERPOLATED CAPACITIES:

CAP %	SNDG (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
10	1.76	14.69	110	0.36	7.52	-13.25	0.16
25	3.33	36.74	275	0.89	8.37	-13.53	0.25
50	5.55	73.47	550	1.78	9.61	-13.66	0.42
75	7.46	110.21	824	2.67	10.71	-13.72	0.60
95	8.85	139.60	1,044	3.38	11.52	-13.76	0.77
98	9.06	144.01	1,077	3.49	11.63	-13.77	0.58
100	9.24	146.95	1,099	3.56	11.71	-13.79	0.00

TANK- No. 2 F.O. Wing Tank

Trim: 0 Deg Heel: 0 Deg Liquid Density: 41.3 CF/Ton
Height of Bottom of Tank: 6.02 Feet ABL Permeability: 0.980
Calculated Volumes are for: One side of C.L. Only. Long'l Bhd 11.5 Off C.L.
Striker Pl is 0 Ft abv Tk Bot. Vert. sounding tubes assumed.

SOUNDING (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
0.50	2.52	19	0.06	6.37	-3.68	0.04
1.00	12.77	96	0.31	6.72	-4.70	0.45
1.50	28.06	210	0.68	7.02	-5.09	0.55
2.00	44.00	329	1.07	7.29	-5.23	0.61
2.50	60.48	452	1.46	7.56	-5.30	0.67
3.00	77.51	580	1.88	7.83	-5.35	0.74
3.50	95.08	711	2.30	8.09	-5.38	0.81
4.00	113.19	847	2.74	8.36	-5.41	0.89
4.50	131.83	986	3.19	8.63	-5.43	0.96
5.00	151.01	1,130	3.66	8.90	-5.45	1.05
5.50	170.71	1,277	4.13	9.18	-5.46	1.13
6.00	190.94	1,428	4.62	9.45	-5.48	1.23
6.50	211.71	1,584	5.13	9.73	-5.49	1.32
7.00	233.00	1,743	5.64	10.01	-5.50	1.43
7.50	254.83	1,906	6.17	10.29	-5.51	1.53
8.00	277.19	2,073	6.71	10.57	-5.52	1.65
8.50	300.08	2,245	7.27	10.85	-5.53	1.76
9.00	323.50	2,420	7.83	11.13	-5.54	1.89
9.48	342.57	2,562	8.29	11.36	-5.57	0.00

INTERPOLATED CAPACITIES:

CAP %	SNDG (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
10	1.69	34.26	256	0.83	7.13	-5.14	0.58
25	3.23	85.64	641	2.07	7.95	-5.36	0.77
50	5.51	171.28	1,281	4.15	9.18	-5.47	1.14
75	7.55	256.93	1,922	6.22	10.31	-5.51	1.54
95	9.05	325.44	2,434	7.88	11.16	-5.54	1.70
98	9.31	335.72	2,511	8.13	11.28	-5.56	0.68
100	9.48	342.57	2,562	8.29	11.36	-5.57	0.00

TANK- No. 3 F.O. Wing Tank

Trim: 0 Deg Heel: 0 Deg Liquid Density: 41.3 CF/Ton
Height of Bottom of Tank: 6.02 Feet ABL Permeability: 0.980
Calculated Volumes are for: One side of C.L. Only. Long'l Bhd 11.5 Off C.L.
Striker Pl is 0 Ft abv Tk Bot. Vert. sounding tubes assumed.

SOUNDING (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
0.50	2.30	17	0.06	6.38	2.88	0.04
1.00	13.17	99	0.32	6.73	4.65	0.43
1.50	33.57	251	0.81	7.07	5.84	0.88
2.00	58.33	436	1.41	7.37	6.61	1.07
2.50	84.38	631	2.04	7.65	7.00	1.16
3.00	111.16	831	2.69	7.92	7.20	1.26
3.50	138.68	1,037	3.36	8.19	7.33	1.37
4.00	166.93	1,249	4.04	8.45	7.42	1.48
4.50	195.93	1,466	4.74	8.72	7.49	1.60
5.00	225.65	1,688	5.46	8.99	7.54	1.72
5.50	256.12	1,916	6.20	9.26	7.58	1.85
6.00	287.32	2,149	6.96	9.54	7.61	1.99
6.50	319.26	2,388	7.73	9.81	7.64	2.13
7.00	351.94	2,632	8.52	10.08	7.66	2.28
7.50	385.35	2,882	9.33	10.36	7.68	2.43
8.00	419.49	3,138	10.16	10.64	7.70	2.59
8.50	454.37	3,399	11.00	10.92	7.72	2.76
9.00	489.98	3,665	11.86	11.20	7.73	2.94
9.43	515.90	3,859	12.49	11.40	7.76	0.00

INTERPOLATED CAPACITIES:

CAP %	SNDG (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
10	1.86	51.59	386	1.25	7.29	6.40	1.02
25	3.32	128.98	965	3.12	8.09	7.29	1.33
50	5.53	257.95	1,929	6.25	9.28	7.58	1.86
75	7.52	386.93	2,894	9.37	10.37	7.68	2.44
95	9.00	490.11	3,666	11.87	11.20	7.73	2.92
98	9.26	505.58	3,782	12.24	11.32	7.75	1.17
100	9.43	515.90	3,859	12.49	11.40	7.76	0.00

TANK- No. 4 F.O. Wing Tank

Trim: 0 Deg Heel: 0 Deg Liquid Density: 41.3 CF/Ton
Height of Bottom of Tank: 6.97 Feet ABL Permeability: 0.980
Calculated Volumes are for: One side of C.L. Only. Long'l Bhd 11.5 Off C.L.
Striker Pl is 0 Ft abv Tk Bot. Vert. sounding tubes assumed.

SOUNDING (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
0.50	1.08	8	0.03	7.30	16.25	0.02
1.00	5.17	39	0.13	7.67	17.20	0.16
1.50	14.40	108	0.35	8.04	18.57	0.39
2.00	28.80	215	0.70	8.39	19.88	0.51
2.50	47.66	356	1.15	8.72	20.92	0.66
3.00	69.49	520	1.68	9.03	21.75	0.79
3.50	92.78	694	2.25	9.33	22.28	0.87
4.00	116.89	874	2.83	9.62	22.61	0.96
4.50	141.83	1,061	3.43	9.90	22.84	1.06
5.00	167.59	1,254	4.06	10.18	23.01	1.16
5.50	194.16	1,452	4.70	10.46	23.15	1.27
6.00	221.55	1,657	5.36	10.74	23.25	1.39
6.50	249.77	1,868	6.05	11.02	23.34	1.51
7.00	278.80	2,085	6.75	11.30	23.41	1.64
7.50	308.67	2,309	7.47	11.58	23.48	1.78
8.00	339.36	2,538	8.22	11.87	23.53	1.93
8.50	370.64	2,772	8.97	12.15	23.59	1.62
8.94	382.43	2,861	9.26	12.26	23.73	0.00

INTERPOLATED CAPACITIES:

CAP %	SNDG (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
10	2.25	38.24	286	0.93	8.55	20.40	0.59
25	3.56	95.61	715	2.31	9.37	22.32	0.88
50	5.44	191.22	1,430	4.63	10.43	23.13	1.26
75	7.13	286.82	2,145	6.94	11.38	23.43	1.68
95	8.38	363.31	2,718	8.80	12.08	23.57	1.70
98	8.65	374.78	2,803	9.07	12.19	23.64	1.05
100	8.94	382.43	2,861	9.26	12.26	23.73	0.00

TANK- No. 5 F.O. Wing Tank

Trim: 0 Deg Heel: 0 Deg Liquid Density: 41.3 CF/Ton
Height of Bottom of Tank: 8.54 Feet ABL Permeability: 0.98
Calculated Volumes are for: One side of C.L. Only. Long'l Bhd 8.25 Off C.L.
Striker Pl is 0 Ft abv Tk Bot. Vert. sounding tubes assumed.

SOUNDING (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
0.50	1.50	11	0.04	8.87	32.75	0.06
1.00	5.98	45	0.14	9.21	32.77	0.43
1.50	17.03	127	0.41	9.61	34.02	1.12
2.00	35.52	266	0.86	9.97	35.04	2.41
2.50	60.19	450	1.46	10.31	35.87	2.78
3.00	88.84	665	2.15	10.63	36.52	3.35
3.50	118.60	887	2.87	10.92	36.88	3.59
4.00	149.07	1,115	3.61	11.20	37.11	3.84
4.50	180.26	1,348	4.36	11.47	37.26	4.11
5.00	212.17	1,587	5.14	11.75	37.38	4.40
5.50	244.80	1,831	5.93	12.02	37.46	4.69
6.00	278.16	2,081	6.74	12.29	37.53	5.00
6.50	312.23	2,336	7.56	12.57	37.59	5.33
7.00	347.03	2,596	8.40	12.84	37.64	5.66
7.50	382.53	2,861	9.26	13.11	37.68	5.98
8.00	418.45	3,130	10.13	13.39	37.71	6.01
8.50	451.81	3,380	10.94	13.64	37.77	4.22
8.82	460.44	3,444	11.15	13.70	37.85	0.00

INTERPOLATED CAPACITIES:

CAP %	SNDG (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
10	2.21	46.04	344	1.11	10.12	35.39	2.57
25	3.44	115.11	861	2.79	10.88	36.84	3.56
50	5.28	230.22	1,722	5.57	11.90	37.42	4.56
75	6.98	345.33	2,583	8.36	12.83	37.63	5.64
95	8.28	437.42	3,272	10.59	13.53	37.75	4.99
98	8.49	451.23	3,375	10.93	13.63	37.77	4.25
100	8.82	460.44	3,444	11.15	13.70	37.85	0.00

TANK- No. 6 F.O. D.B. Tank

Trim: 0 Deg Heel: 0 Deg Liquid Density: 41.3 CF/Ton
Height of Bottom of Tank: 2.81 Feet ABL Permeability: 0.950
Calculated Volumes are for: One side of C.L. Only. Long'l Bhd 1.75 Off C.L.
Striker Pl is 0 Ft abv Tk Bot. Vert. sounding tubes assumed.

SOUNDING (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
0.25	0.91	7	0.02	2.99	1.43	0.01
0.50	4.71	35	0.11	3.16	0.44	0.08
0.75	13.12	98	0.32	3.35	-0.05	0.33
1.00	26.91	201	0.65	3.52	-0.44	0.91
1.25	46.33	347	1.12	3.70	-0.63	1.97
1.50	72.15	540	1.75	3.87	-0.56	3.69
1.75	104.45	781	2.53	4.05	-0.43	6.27
2.00	143.23	1,071	3.47	4.22	-0.29	9.90
2.25	188.74	1,412	4.57	4.39	-0.13	14.78
2.50	241.29	1,805	5.84	4.57	0.04	21.12
2.75	300.89	2,251	7.29	4.74	0.22	29.07
3.00	367.44	2,748	8.90	4.91	0.38	38.70
3.25	440.90	3,298	10.68	5.08	0.54	49.94
3.50	513.46	3,841	12.43	5.24	0.87	45.57
3.75	557.50	4,170	13.50	5.33	1.58	18.16
3.98	570.21	4,265	13.81	5.36	1.92	0.00

INTERPOLATED CAPACITIES:

CAP %	SNDG (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
10	1.35	57.02	427	1.38	3.77	-0.60	2.68
25	2.00	142.55	1,066	3.45	4.22	-0.29	9.84
50	2.68	285.10	2,133	6.90	4.69	0.17	26.96
75	3.20	427.66	3,199	10.35	5.05	0.51	47.91
95	3.66	541.70	4,052	13.12	5.30	1.33	28.00
98	3.77	558.81	4,180	13.53	5.33	1.62	16.30
100	3.98	570.21	4,265	13.81	5.36	1.92	0.00

TANK- No. 1 RSW HOLD

Trim: 0 Deg Heel: 0 Deg Liquid Density: 35.08 CF/Ton
Height of Bottom of Tank: 6.91 Feet ABL Permeability: 1.000
Calculated Volumes are for: Both sides of C.L.
Striker Pl is 0 Ft abv Tk Bot. Vert. sounding tubes assumed.

SOUNDING (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
1.00	291.59	2,181	8.31	7.47	-8.95	365.94
2.00	624.84	4,674	17.81	7.97	-8.71	365.94
3.00	958.09	7,167	27.31	8.47	-8.64	365.94
4.00	1,291.34	9,659	36.81	8.97	-8.60	365.94
5.00	1,624.59	12,152	46.31	9.47	-8.58	365.94
6.00	1,957.84	14,645	55.81	9.97	-8.57	365.94
7.00	2,291.09	17,137	65.31	10.47	-8.56	365.94
8.00	2,624.34	19,630	74.81	10.97	-8.55	365.94
9.00	2,832.75	21,189	80.75	11.29	-8.59	3.08
10.00	2,868.75	21,458	81.78	11.35	-8.59	3.08
10.13	2,871.63	21,480	81.86	11.36	-8.59	0.00

INTERPOLATED CAPACITIES:

CAP %	SNDG (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
10	0.98	287.16	2,148	8.19	7.36	-8.81	360.38
25	2.28	717.91	5,370	20.46	8.11	-8.69	365.94
50	4.43	1,435.81	10,740	40.93	9.19	-8.59	365.94
75	6.59	2,153.72	16,110	61.39	10.27	-8.56	365.94
95	8.50	2,728.05	20,406	77.77	11.13	-8.57	185.38
98	8.91	2,814.20	21,050	80.22	11.26	-8.59	35.38
100	10.13	2,871.63	21,480	81.86	11.36	-8.59	0.00

TANK- No. 2 RSW HOLD

Trim: 0 Deg Heel: 0 Deg Liquid Density: 35.08 CF/Ton
Height of Bottom of Tank: 7.18 Feet ABL Permeability: 1.000
Calculated Volumes are for: Both sides of C.L.
Striker Pl is 0 Ft abv Tk Bot. Vert. sounding tubes assumed.

SOUNDING (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
1.00	289.93	2,169	8.26	7.74	7.53	365.94
2.00	623.18	4,661	17.76	8.24	7.78	365.94
3.00	956.43	7,154	27.26	8.74	7.86	365.94
4.00	1,289.68	9,647	36.76	9.24	7.89	365.94
5.00	1,622.93	12,139	46.26	9.74	7.92	365.94
6.00	1,956.18	14,632	55.76	10.24	7.93	365.94
7.00	2,289.43	17,125	65.26	10.74	7.94	365.94
8.00	2,622.68	19,618	74.76	11.24	7.95	365.94
9.00	2,725.56	20,387	77.70	11.40	7.97	3.08
9.74	2,751.66	20,582	78.44	11.45	7.97	0.00

INTERPOLATED CAPACITIES:

CAP %	SNDG (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
10	0.95	275.17	2,058	7.84	7.35	7.14	347.31
25	2.19	687.91	5,146	19.61	8.34	7.79	365.94
50	4.26	1,375.83	10,291	39.22	9.37	7.90	365.94
75	6.32	2,063.74	15,437	58.83	10.41	7.93	365.94
95	7.97	2,614.08	19,553	74.52	11.23	7.95	365.94
98	8.72	2,696.63	20,171	76.87	11.36	7.96	105.13
100	9.74	2,751.66	20,582	78.44	11.45	7.97	0.00

TANK- No. 3 RSW HOLD

Trim: 0 Deg Heel: 0 Deg Liquid Density: 35.08 CF/Ton
Height of Bottom of Tank: 7.45 Feet ABL Permeability: 1.000
Calculated Volumes are for: Both sides of C.L.
Striker Pl is 0 Ft abv Tk Bot. Vert. sounding tubes assumed.

SOUNDING (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
1.00	293.26	2,194	8.36	8.01	24.06	365.94
2.00	626.51	4,686	17.86	8.51	24.29	365.94
3.00	959.76	7,179	27.36	9.01	24.36	365.94
4.00	1,293.01	9,672	36.86	9.51	24.40	365.94
5.00	1,626.26	12,164	46.36	10.01	24.42	365.94
6.00	1,959.51	14,657	55.86	10.51	24.43	365.94
7.00	2,292.76	17,150	65.36	11.01	24.44	365.94
8.00	2,626.01	19,643	74.86	11.51	24.45	365.94
9.00	2,736.32	20,468	78.00	11.68	24.46	3.08
9.75	2,763.32	20,670	78.77	11.73	24.46	0.00

INTERPOLATED CAPACITIES:

CAP %	SNDG (Ft)	VOLUME (C.F.)	CAPACITY (US Gals)	WEIGHT (L.Tons)	VCG (Ft)	LCG (Ft)	F.S.M. (Ft-LT)
10	0.94	276.33	2,067	7.88	7.54	22.67	344.81
25	2.19	690.83	5,167	19.69	8.60	24.31	365.94
50	4.27	1,381.66	10,335	39.39	9.64	24.41	365.94
75	6.34	2,072.49	15,502	59.08	10.68	24.44	365.94
95	8.00	2,625.16	19,636	74.83	11.51	24.45	365.94
98	8.74	2,708.06	20,256	77.20	11.64	24.45	96.06
100	9.75	2,763.32	20,670	78.77	11.73	24.46	0.00

HYDROSTATIC PROPERTIES

Proj: 231 File: PR231.OFE Trim: 0.000 Deg. Water: 35.080 CF/LT

-DRAFT	--DISPL-	----VOL--	--LCB--	--LCF--	---MTI--	---TPI---
7.00	87.00	3051.8	-4.66	-3.64	11.37	3.67
8.00	135.86	4765.9	-4.06	-2.28	16.52	4.41
9.00	192.34	6747.2	-3.26	-0.53	22.06	4.97
10.00	255.12	8949.6	-2.30	1.62	28.47	5.48
11.00	323.59	11351.6	-1.27	3.52	35.14	5.94
12.00	397.33	13938.5	-0.24	4.87	41.50	6.33
13.00	474.72	16653.3	0.61	4.87	44.55	6.54
14.00	554.23	19442.4	1.19	4.50	46.55	6.71
15.00	635.69	22299.8	1.59	4.15	48.54	6.87

-DRAFT	---BMl---	---BMt---	---KB--	---WPA--	---KMl---	--KMt---
7.00	169.60	23.75	5.62	1545.43	175.22	29.37
8.00	157.79	21.53	6.30	1858.18	164.09	27.83
9.00	148.84	18.15	6.95	2090.81	155.79	25.10
10.00	144.79	15.64	7.58	2305.32	152.37	23.22
11.00	140.92	13.80	8.20	2498.85	149.12	22.00
12.00	135.53	12.40	8.81	2665.58	144.34	21.22
13.00	121.78	11.10	9.41	2755.08	131.19	20.52
14.00	109.00	10.04	10.00	2823.27	119.00	20.04
15.00	99.10	9.25	10.58	2891.54	109.67	19.82

DRAFT - Feet above baseline
DISPL - Displacement at specified waterline, LTSW
VOL - Displaced volume, cubic feet
LCB - Longitudinal center of buoyancy, feet aft of M.P.
LCF - Longitudinal center of flotation, feet aft of M.P.
MTI - Moment to trim one inch, foot-tons
TPI - Tons per inch immersion, long tons
KMl - Height of longitudinal metacenter, feet above baseline
KMt - Height of transverse metacenter, feet above baseline
BMl - Vertical distance between center of buoyancy and longitudinal metacenter, feet
BMt - Vertical distance between center of buoyancy and transverse metacenter, feet
KB - Height of center of buoyancy, feet above baseline
WPA - Waterplane area, square feet

PART 5 - STABILITY OF FISHING VESSELS

Note: The following discussion is from "VESSEL SAFETY MANUAL", John Sabella, Editor, Published by North Pacific Fishing Vessel Owner's Association, 1986. The manual covers all aspects of fishing vessel safety, and is endorsed by the U.S. Coast Guard. Copies may be obtained from NPFVOA, 1800 W. Emerson, Suite 101, Fishermen's Terminal, Seattle, WA 98119, (206) 285-3383, FAX (206) 286-9332.

Stability-A Joint Responsibility

Maintaining proper stability on fishing vessels is one of the most difficult tasks for the fisherman. Many of the decisions you must make in favor of your own safety directly reduce the size of the catch you can bring aboard. The more you learn about stability, especially the stability limit of your own boat, the safer you can be.

On a properly designed or evaluated vessel, the stability reserve *built into* your boat should permit you to survive a storm at sea provided you handle it prudently. Your vessel's stability is reduced when actually fishing - hauling nets or pots and opening hatches to stow the catch-so you must be the stability judge.

YOUR PART AS CAPTAIN

The most important concept for you to concern yourself with while fishing and stowing catch is to keep to a minimum the number of stability *hazards* present at the same time. For instance, while you are lifting the cod-end aboard, be aware of the hazards posed by an open hatch. Be aware of the effects of shifting fish on deck, or of a partially-filled fish well or ballast tank. Do your ballasting either after the catch is stowed or before it is lifted clear of the water. Complete fuel shifts, including topping off the tank, before lifting the catch on deck.

It is important to stress here that no design is *guaranteed* stable under all possible conditions, and that stability must be maintained by you, the operator. Stability changes continuously, as does the margin of extra stability needed for various situations. It is not sufficient just to get a *stability test* and assume your boat is safe for- evermore. Stability changes with every gallon of fuel burned or potable water used up. It changes with every shift in ballast or addition of cargo (fish). It makes a difference whether you put the cargo down low in the ship or on deck. Finally the stability of your boat is changed by every wave that passes under the boat, since the stability varies with the position of your vessel on the wave.

The tendency in commercial fishing is to use as small a boat as possible to carry a given payload, but in so doing, the safety margins inherent in a design may be reduced to unacceptable levels. Stability and load-carrying capacity are competing requirements which you must satisfy on a day-to-day basis. There is an increasing emphasis on stability assessments for commercial vessels by the insurance industry. This trend is sure to play a major role in the assignment of risk categories in the near future.

The other tendency in commercial fishing boats is for the boat to grow as it gets older. This growth occurs both in weight (displacement) and in the height of the center of gravity. Both of these changes result in a reduction in stability, so you must be aware of them at all times. Most fishermen understand that a stability evaluation is required for major modifications in a boat but tend to ignore the additive effect of numerous small changes. If you have any doubt about the effects of any modifications it's always best to get a professional opinion.

THE STABILITY TEST

Now lets go back to that important but often misunderstood *stability test. A stability test does not test stability.* It is more properly named an *inclining test* or experiment and is the first step in determining the stability of your boat.

Although a good inclining test provides information which can be used to determine the stability of your vessel, it does not guarantee that your vessel will be stable no matter how you load and fish with it.

In an inclining test, the naval architect is trying to determine the location of the center of gravity and the weight (displacement) of the boat. To obtain this information he moves a fixed amount of weight a precise distance so that he can measure how much your boat heels in response to that movement. This must be done in calm water on a carefully prepared vessel, and is really not black magic at all.

THE DESIGNER'S PART

The boat designer (or your naval architect in the case of an existing vessel) can help you determine the effects which each of your fishing and operating practices has on the stability of your vessel. In order to do this, he needs a frank and complete discussion with you which details things like:

- how much cargo (fish) you will carry at one time;
- whether you will carry it on a long or short voyage;
- when you will be exposed to seaways;
- whether you will operate during icing periods;
- when and where you expect to refuel and replenish stores;
- whether you will change rigs, etc.

With this information, the designer can produce a boat (or the naval architect can provide you with loading recommendations) which allow for a margin of safety in all these situations. With this information, he can also give you instructions on when to modify stability by shifting fuel or ballast, etc.

Once he has all of the information on fishing and operating conditions, he needs to combine it with accurate information on the weight and center of gravity obtained from the inclining.

THE DESIGNER'S PART (continued)

With these figures, he goes back to work to estimate the loads, fuel and consumables for the typical conditions encountered on most voyages. As a minimum, conditions prepared should include *departure for fishing grounds, fishing, departure for home port, arrival at home port* and *offloading.*

Once he has determined the location of the center of gravity in these loaded conditions, he combines that information with information he has in a computer model of your boat's hull and evaluates the stability against some standard. The standard currently recommended by the Coast Guard is the *IMO Fishing Vessel* or *Torremolinos* criteria. This standard not only covers initial stability with the boat on an even keel but also requires a range of stability and a minimum total righting energy (discussed in Figure 5). Details on this standard can be found in the Coast Guard's Navigation and Vessel Inspection Circular (NVIC) 5-86 for the reader who is interested. Keep in mind that whatever the standard, it is only useful if your vessel meets it in all conditions of operating, fishing and loading. To assure that this is the case, your naval architect must be intimately familiar with your fishing and operating practices, and any changes you make in your vessel or its rig.

PRESENTING THE STABILITY INFORMATION TO THE FISHERMAN

Once the designer has worked up the stability information the tough part of the job remains to be done. It is critical that he present the stability information in a manner which makes it usable to the fisherman. Stability is a technical subject, but it can be presented in a format that makes it useful to the fisherman. Varieties that have been successful for other types of vessels include a pictorial format, a tabular format and a simplified trim and stability booklet method which uses a graphic format. Some short examples follow:

Pictorial Format: *Figure 1. is a sample pictorial format which shows a recommended loading condition. A complete set of loading conditions must be provided so that you can fill in a blank form, then determine which of the conditions you come closest to at any time. You will need to work closely with your designer in developing this format, but the effort involved will be well worth it.*

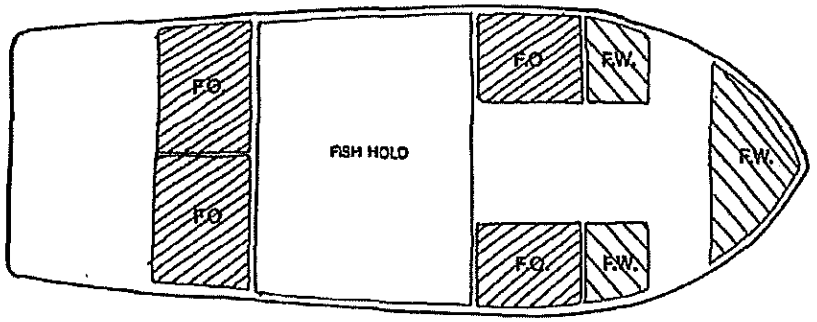
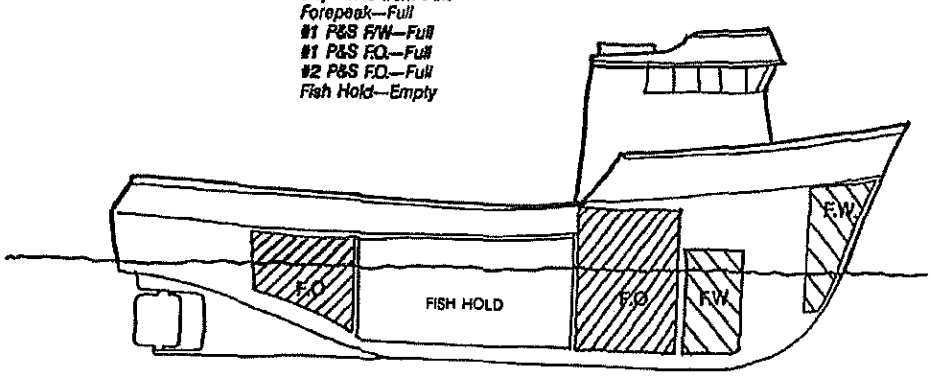


Figure 1.
F/V Diane L. (Loading Condition 1)
Departure from Port
Forepeak—Full
#1 P&S F/W—Full
#1 P&S F.O.—Full
#2 P&S F.O.—Full
Fish Hold—Empty



PRESENTING THE STABILITY INFORMATION TO THE FISHERMAN (continued)

Tabular Format: *Figure 2 is an example of a tabular format which is not as readily understood as the pictorial format, but can be used to cover a broader range of loading conditions on one page. Each column in the table is the equivalent of one figure in the pictorial format. Once again you will have to work out how the variations in your loading condition affect your stability at any time, but this table can provide the format in which to do it. This method has been used successfully on offshore supply vessels and is adaptable to fishing vessels if properly done.*

Figure 2: *Sample Tabular Format*

Sample Loading Table
F/V Diane L

Loading Condition	Hold	Fwd. Fuel Tanks	Aft Fuel Tanks	Fwd. F.W. Tanks	E.R.F.W. Tanks
1. Depart Port	empty	100%	100%	100%	100%
2. Arr. Fishing Grounds	empty	100%	60%	60%	100%
3. Fishing - 20% Catch on Board	20%	100%	20%	20%	100%
4. Fishing - 50% Catch on Board	50%	100%	empty	empty	100%
5. Dep. Fishing Grounds	100%	60%	empty	empty	60%
6. Arr. Port- 20% Reserve	100%	20%	empty	empty	20%

Simplified Trim and Stability Book Format: *This method is the most sophisticated of those presented, but also represents a tool by which you can determine for yourself quite accurately the location of the center of gravity and the resulting stability of your vessel. It involves tabulating the weights and centers of gravity of the variable loads on your vessel using a "cookbook" which is provided by the designer (Figure 3).*

Figure 3: *Simplified Trim and Stability Book Format*

Sample Loading Condition
F/V Diane L

	Weight	VCG	Vertical Moment
Lightship	98.2	6.2	608.8
#1 Fuel Oil P/S	25.0	5.5	137.5
#2 Fuel Oil P/S	5.0	5.0	25.0
#1 Fresh Water	7.5	10.0	75.0
#2 Fresh Water P/S	1.5	4.5	6.8
Fish Hold	9.0	3.0	27.0
Deck Load	5.0	14.0	70.0
Total	151.2	6.3	950.1

Once you get a final value for displacement and the center of gravity, you enter a graph (Figure 4) to determine whether or not you possess adequate stability. If you feel comfortable with this sort of thing, by all means, explore it with your designer. If you feel it's too much hassle, then look at one of the others above. The choice is up to you, but the more you know, the better your chances are.

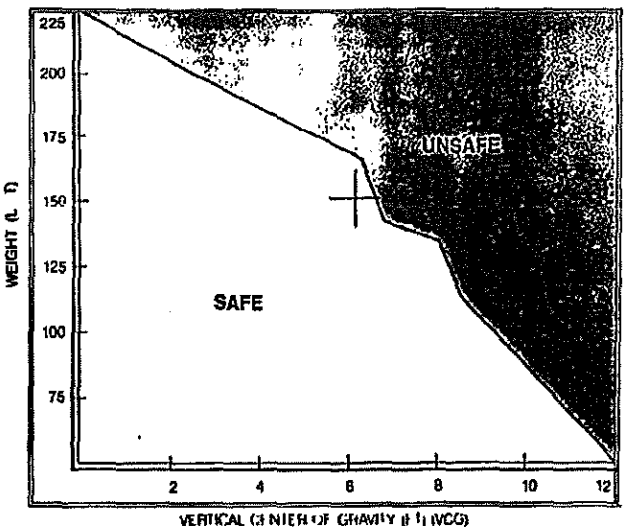


Figure 4: *Sample Graphical Format*

TOWARD UNDERSTANDING STABILITY- A PICTORIAL GUIDE

Veteran fishermen can teach naval architects and designers about fishing operations and fishing vessel economics. Similarly, designers can help fishermen understand the effects of their operating practices on the stability of their vessels. In this chapter, it is not our intention to make naval architects out of fishermen, but rather to expose fishermen to the effects that fishing and loading practices have on vessel stability.

These guidelines are a pictorial representation of the effects of numerous factors on vessel stability. Readers are cautioned that these are only examples of how each of these factors affect stability and may not be an exact representation of the effect it will have on their vessels. They should not be regarded as the actual effects of these factors on each and every fishing vessel. These illustrations address only intact stability, that is, stability of the vessel with the hull undamaged and with watertight and weathertight fittings closed. Any damage to or unintentional flooding of the hull results in impaired stability which should be further considered in determining the effect of any of the following on a vessel's stability.

THE RIGHTING ARM CURVE

Figure 5 is an illustration of a righting arm curve for a typical fishing vessel. The horizontal axis represents the heeling angle of the vessel and the height of the curved represents the amount of righting arm which the hull develops as it heels. The righting arm is a measure of the tendency of the hull to right itself when an outside heeling force such as wind or waves acts on it. The maximum height of the curve (the maximum righting arm, here 2.0 feet at 30 degrees), the range over which it is positive (the range of stability, shown here as 60 degrees), and the total area under the curve (the total righting energy which is shown here as the shaded area) are all used by naval architects and designers in assessing the stability of the vessel. It must be emphasized that these curves change for a given vessel as the loading changes and are presented here only to show trends rather than the exact effect of any of these factors.

For any given operating condition, *anything* that *reduces* the maximum height of the curve, *shortens* the range of stability, or *decreases* the area under the curve *will reduce the stability of your vessel.*

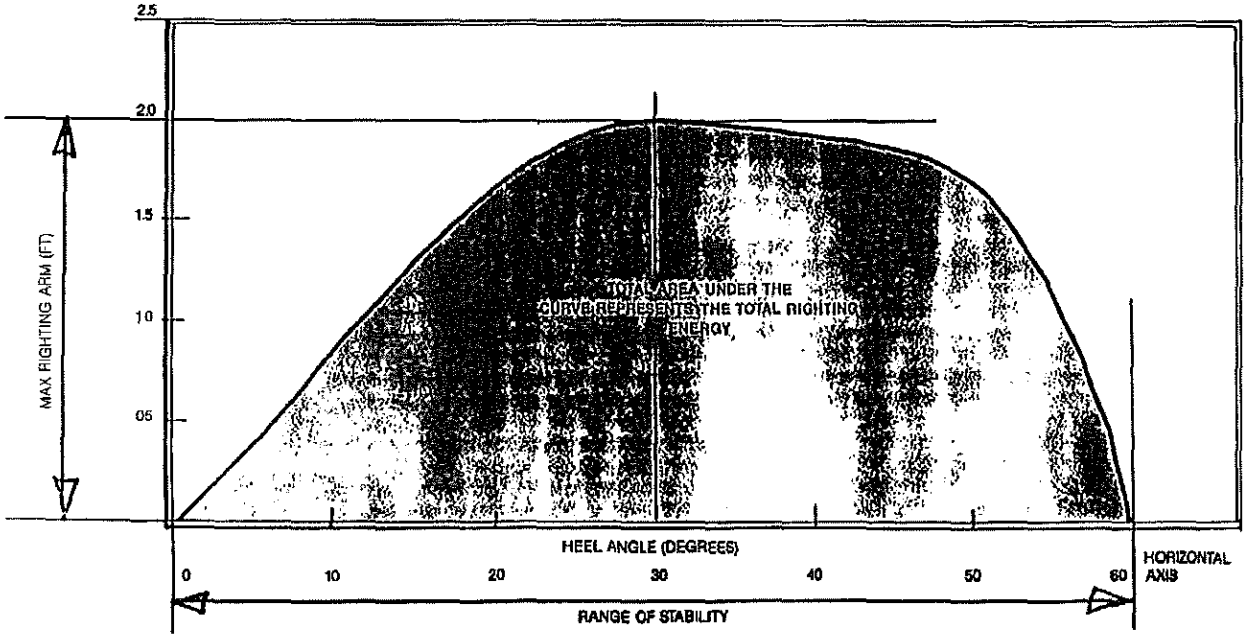


Figure 5. *The Righting Arm Curve*

FACTORS INFLUENCING STABILITY

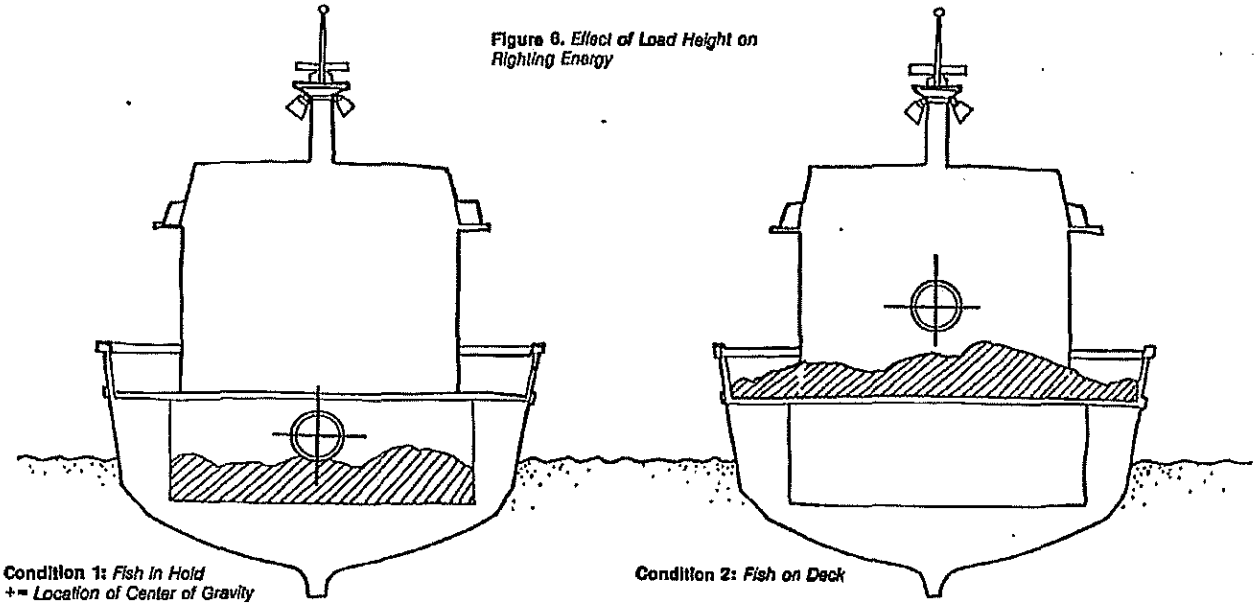
The following illustrations show how each of the factors which fishermen can control influence vessel stability. The illustrations show changes in righting energy, range of stability and maximum righting arm which occur in the normal operation of the vessel. By being aware of how actions affect stability, an operator can take precautionary measures to improve or maintain stability. Operators should also be aware that these effects can be cumulative, that is that they add together and can reduce your stability to unacceptable levels.

EFFECTS OF LOAD HEIGHT

Figure 6 shows a typical fishing vessel with its catch in the hold (Condition 1). The vessel is stable as indicated by the large total righting energy, range of stability and maximum righting arm. If the same catch is moved up on deck (Condition 2), notice the dramatic reduction in all of the important values. A vessel in this condition, would be extremely tender and might not recover from a minor roll.

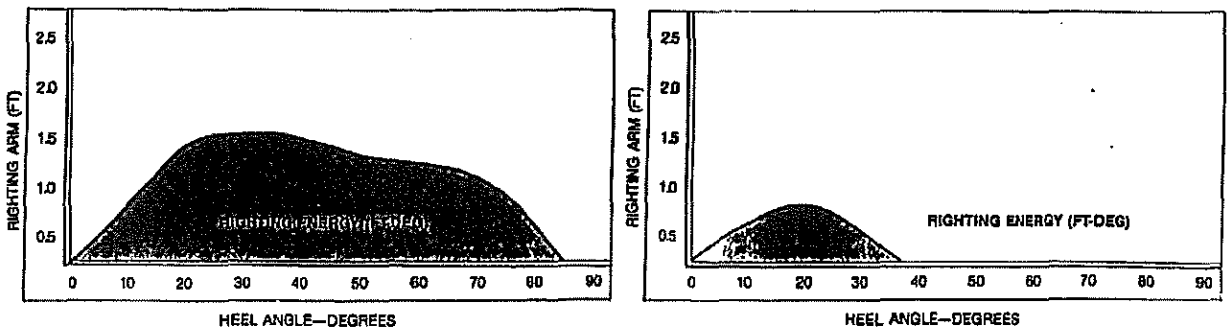
The cause of this dramatic reduction in righting energy, range of stability and maximum righting arm is a rise in the center of gravity caused by moving the catch from the hold onto the deck. This rise in the center of gravity can also occur as a result of many other actions, and not just from loading the catch on deck. These include adding or moving weight up higher in the vessel, burnout of fuel from bottom tanks, or the loading of a large weight onto the vessel. Operators should be aware that any rise in the center of gravity can and usually will adversely affect the stability of their vessels.

Figure 6. *Effect of Load Height on Righting Energy*



Condition 1: *Fish in Hold*
+= Location of Center of Gravity

Condition 2: *Fish on Deck*



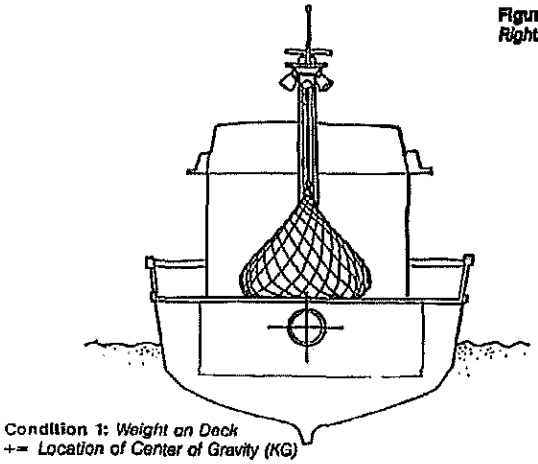
EFFECTS OF LIFTING WEIGHTS

Figure 7 shows how lifting a weight such as several crab pots or a net full of fish adversely affects the stability of our sample vessel. The lifting of any weight off the deck (on centerline) has the effect of raising the center of gravity and slightly reducing the area under the righting arm curve. The last part of the figure shows the more detrimental situation where a *substantial* weight is lifted *over the side* to be brought on board the vessel. Note that this action has two adverse effects on the stability of the vessel:

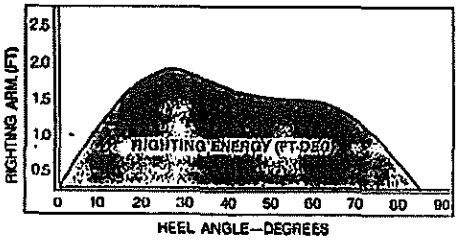
- The center of gravity is raised since the force acts at a point at the *top of the boom.*
- The center of gravity is also shifted to the side on which the hauling is being done.

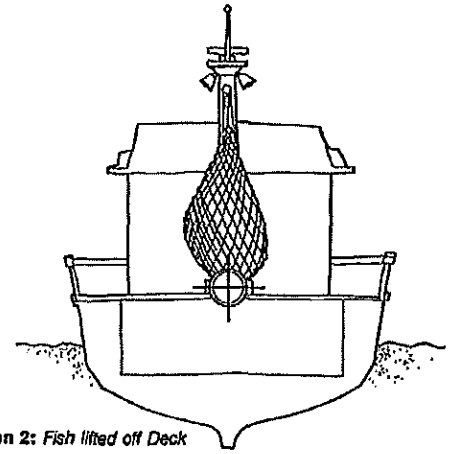
The end result is a reduction in righting energy accompanied by a list of several degrees. In the case illustrated, this small list angle is not a problem, but in a more heavily loaded condition, this small list could make the difference between survival and capsizing. Once again, operators should keep in mind the cumulative effects of all of their actions on the stability of the vessels.

Figure 7. *Effect of Lifted Weight on Righting Energy*

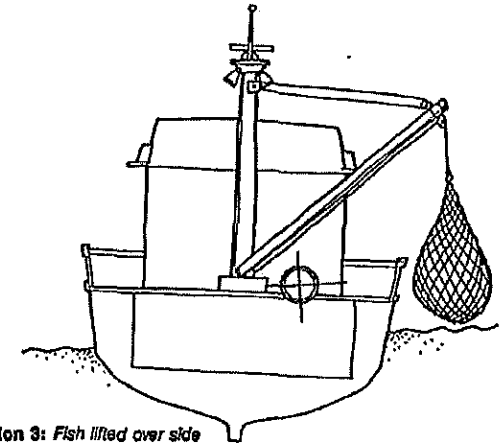


Condition 1: *Weight on Deck*
+= Location of Center of Gravity (KG)

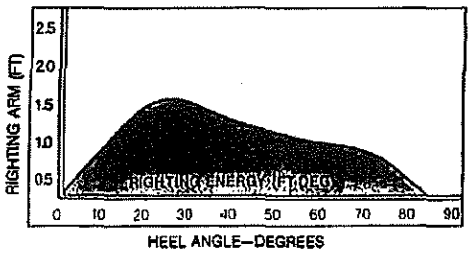


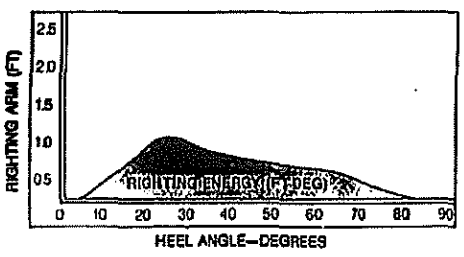


Condition 2: *Fish lifted off Deck*



Condition 3: *Fish lifted over side*





EFFECT OF FREE SURFACE

The term *free surface effect* refers to the detrimental effect which a partially-filled tank or compartment can have on the stability of a vessel. This effect is due to the shifting of liquids as the vessel heels and results in a rise in the center of gravity. In Figure 8, we show how a half-full fish well seriously reduces the righting energy developed by our vessel.. This reduction is for a very large compartment, but the effects of several small compartments are additive and must be considered in total.

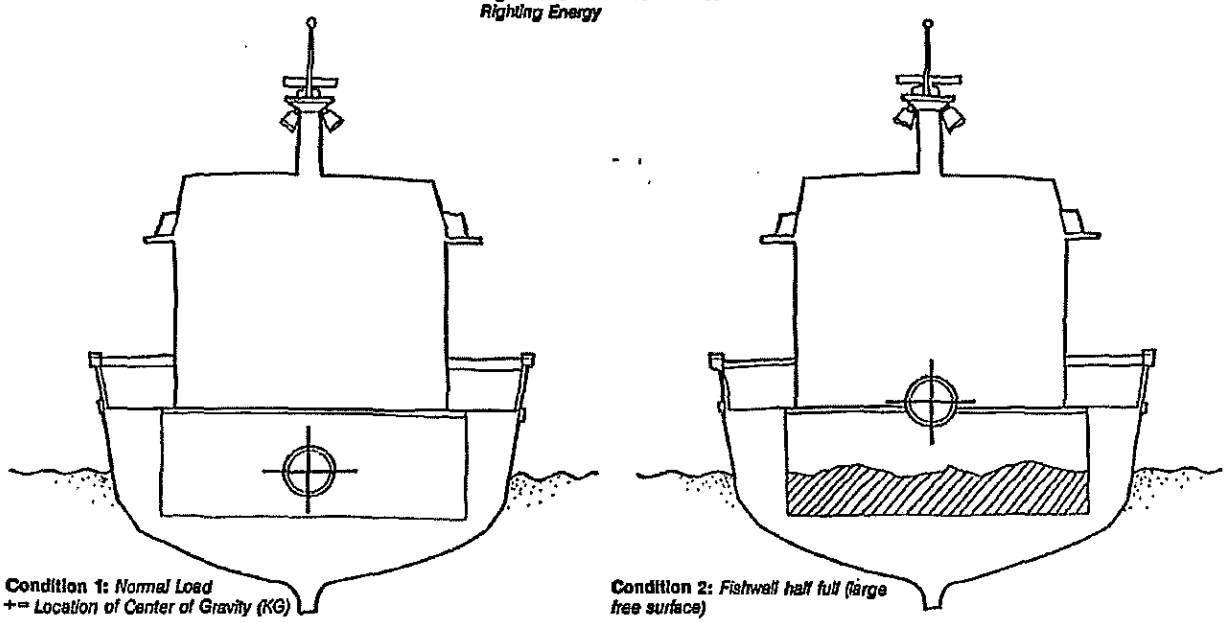
Operators should be aware that the free surface effect is controlled by the width of the tank much more than any other factor (including length, depth or volume of the tank). The free surface effect is also greater for a half-filled tank than for other tank levels. In an operational sense, free surface can be avoided or reduced by

- working with a minimum number of partially filled (slack) tanks at one time (fuel, fresh water, etc.)
- maintaining your fish wells completely empty or filled to overflowing at all times. The act of filling or emptying any large tank at sea causes a loss of stability during the transition period until the tank is either pressed up or completely emptied.

Catch which is free to move about can cause a similar effect. Binboards which break a hold up into several smaller compartments can be used to reduce this effect.

To get a feel for how free surface affects stability, consider carrying an ice cube tray across the kitchen. First remove the divider from the tray and then fill the tray with water. As the tray is carried across the room, water is likely to spill because it is free to move in the tray. If the divider is put back in, and the tray is moved again, the chances are good that no water will be spilled. Dividing a fishwell into small cells has exactly the same effect.

Figure 8. *Effect of Free Surface Righting Energy*



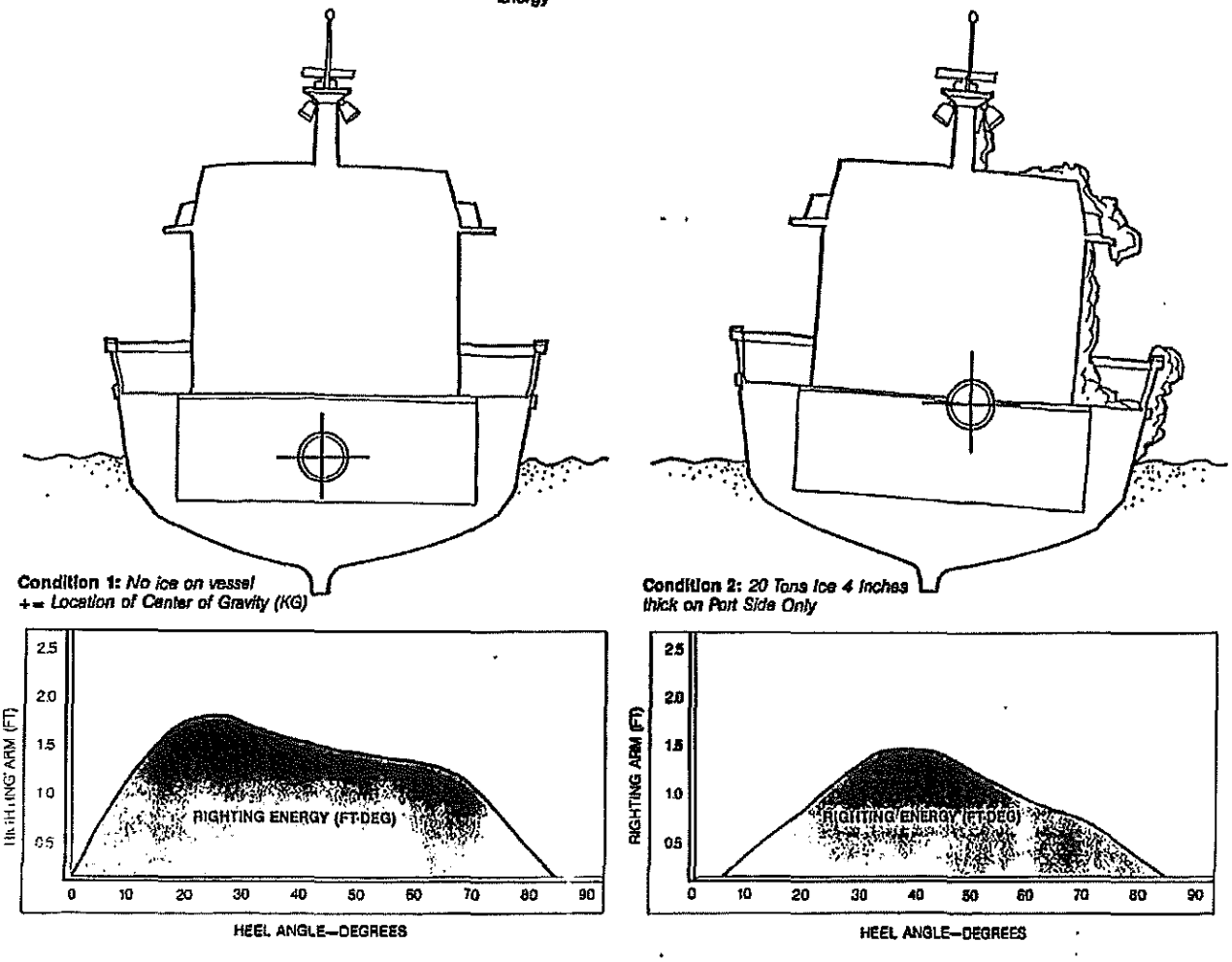
EFFECT OF ICING

Icing is another factor which can cause a rise in the center of gravity, as well as an increase in vessel displacement. Also, because ice build-up may not be symmetrical about the vessel, it may tend to heel the vessel. Figure 9 shows the effect of an accumulation of 20 tons of ice (a 4 inch buildup) on the sample vessel. Note the severe reduction in righting energy as well as the 4-degree list that results from this condition (the curve begins at 4 degrees, not at 0). In the example shown, icing does not cause as substantial a reduction in stability as some of the other factors. In actuality, its effect can vary from being annoying to being catastrophic.

If the vessel is to be operated in an area where icing is likely to occur, the operator should ask the naval architect to conduct a stability analysis under conditions of icing, then limit the catch in accordance with the recommendations.

Operators should also be aware of the environmental conditions that increase the probability of icing and should take precautions to prevent or reduce ice buildup. As a general rule, any time the air temperature drops below 28° F (-2° C), icing can occur. Increased chances for icing go with lower temperatures, higher wind speeds, and more sea spray over the upper decks and deck houses. Fishing vessel operators are referred to NVIC 5-86 where graphs that can be used to assess the combined effects of these factors can be found. Possible actions operators can take to reduce ice buildup are a change in speed or heading and physical removal of the ice.

Figure 9. *Effect of Icing on Righting Energy*



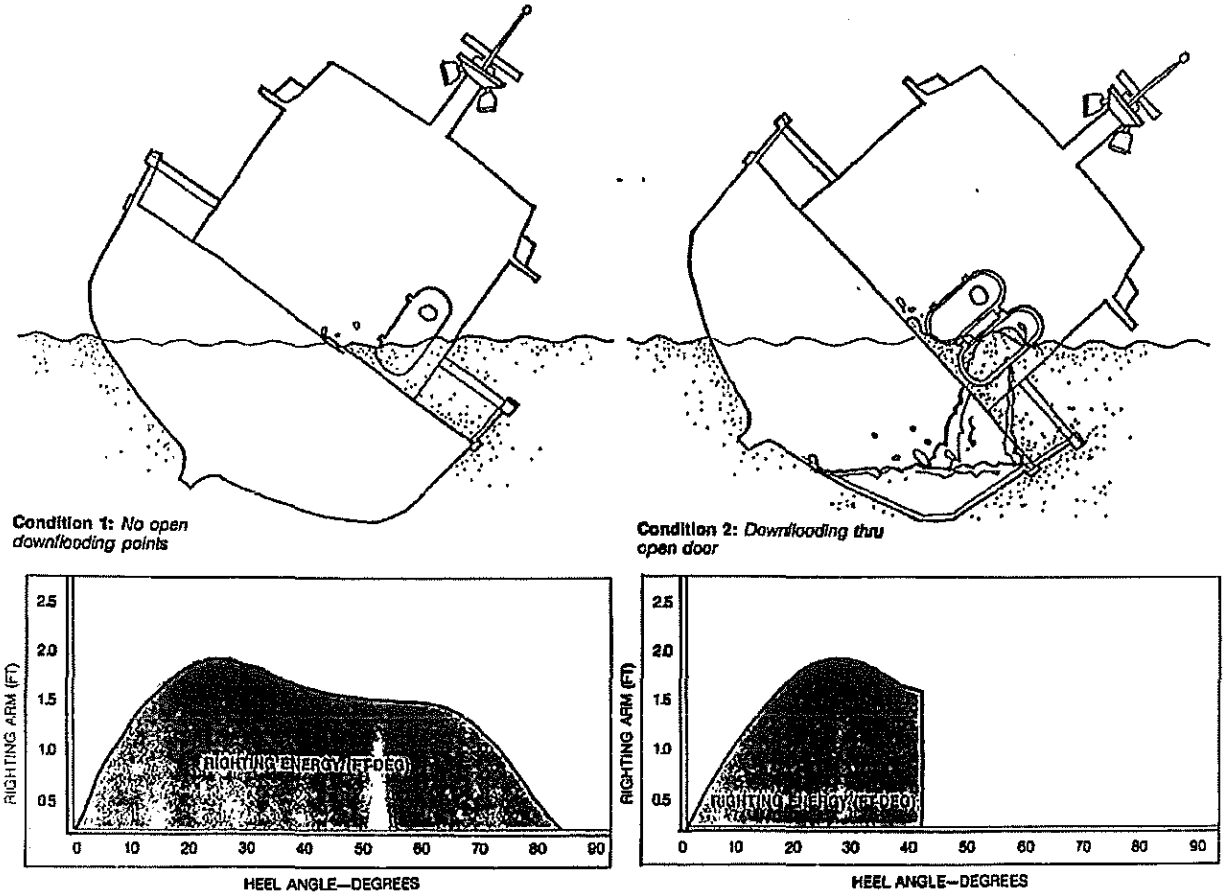
EFFECT OF DOWNFLOODING

A vessel can be designed with a substantial amount of righting energy and a broad range of stability. Yet, these design features may be all for nought if the fishing vessel operator doesn't maintain the watertight integrity of his vessel, and allows premature downflooding to occur. Downflooding is defined as the entry of water into the hull which results in progressive flooding and the loss of stability.

Figure 10 shows the sample vessel with two different downflooding points considered. In condition 1, all doors, hatches and vents are properly secured, thereby allowing the vessel to develop its full righting energy. Condition 2, on the other hand, shows a door left open allowing flooding to occur as soon as the door is immersed. Although the hull has significant righting energy available, it cannot be fully used if the vessel takes on water.

The importance of closing off openings, particularly in heavy weather cannot be overemphasized. If operators make it a practice to maintain this integrity, it really does become a habit, which significantly improves the chances of survival in heavy weather conditions. Operators should be aware of the status of all watertight closures at all times. They should be closed, except when actually being used, to maintain both the watertight integrity and the stability of the vessel. Potential downflooding points include doors into engineroom and crew spaces, hatches into fish wells or lazarettes, portholes and any other openings through which water can gain entry.

Figure 10. *Effect of Downflooding Height on Righting Energy*



EFFECT OF RESERVE BUOYANCY

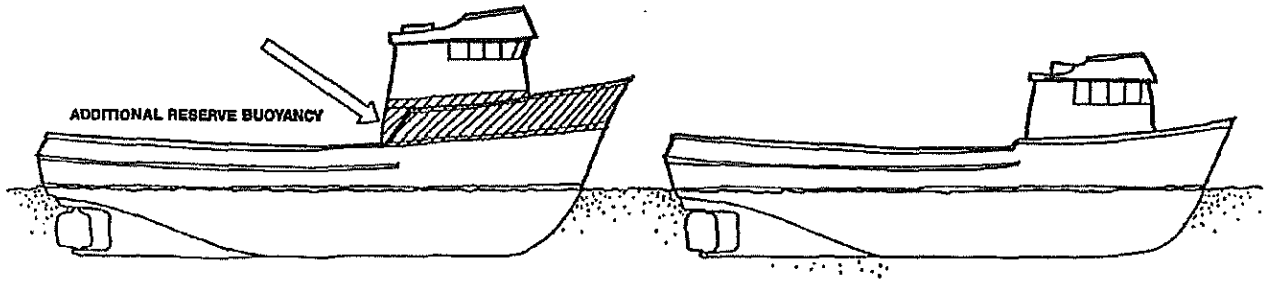
Figure 11 shows how reserve buoyancy can affect righting energy. In Condition 1, the designer included a two-level watertight deck house and a large forward compartment whose contributions to righting energy are substantial.

In Condition 2, the deck house is only one level high and the large forward compartment is not included.

The righting energy curve has a much smaller area under the curve, a smaller range of stability and a smaller maximum righting arm. Open doors and hatches can allow flooding of vital compartments and prevent the development of righting energy. Operators must therefore assure that watertight closures are maintained in good condition at all times. When water has access into any part of a hull, progressive flooding is likely to occur.

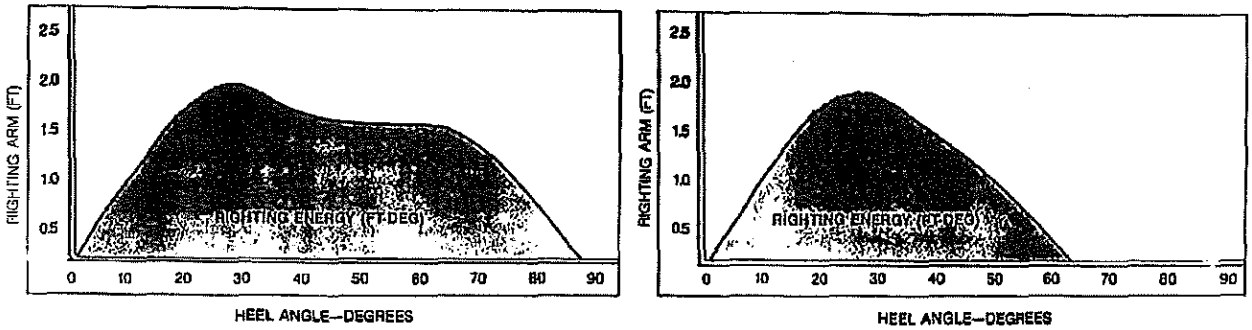
Reserve buoyancy should also be considered in terms of draft. Many operators tend to load a vessel low in the water because the vessel tends to roll more slowly. They believe that a slower roll means the vessel is more *seakindly. In fact, this is not the case.* Assuming that the center of gravity stays in the same place, a vessel which is operated at a lesser draft (i.e. high in the water) has better stability than a vessel operated at a deeper draft. The operator should always consult the stability information provided by the naval architect to insure the proper loading of the vessel.

Figure 11. *Effect of Reserve Buoyancy on Righting Energy*



Condition 1: *Two Level Deckhouse and large forward compartment*

Condition 2: *Single Level Deckhouse and small forward compartment*



PART 6 - STABILITY LETTER

STABILITY LETTER

Vessel: DESTINATION O.N.: 632 374

Reference: Trim and Stability Report for F/V DESTINATION, October 1993

Following modifications to the vessel, an inclining test was performed on October 17, 1993 in Seattle. Based on that test, the stability characteristics of "DESTINATION" have been found to meet or exceed the minimum criteria for intact stability of fishing vessels as found in 46 CFR Part 28, subject to the restrictions listed below.

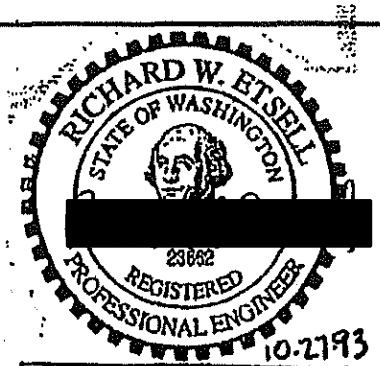
Detailed recommendations for loading and operating the vessel are contained in the referenced trim and stability report. A copy of that report should remain aboard the vessel, and should be reviewed by anyone who will be operating the vessel.

RESTRICTIONS:

- The maximum number of crab pots that can safely be carried depends on the condition of loading of the vessel. Refer to the referenced report (page 1-5) for maximum pot loads under various conditions.

GENERAL PRECAUTIONS:

- All deck hatches and weather doors must be kept closed and fully secured at all times when vessel is underway except when actually used.
- Freeing ports and scuppers must be kept clear and operable at all times.
- All cross connections between port and starboard tanks must be kept closed at all times when underway. Keep bilges pumped to minimum content at all times.
- Crab pots, as well as any other deck cargo must be positively secured to prevent shifting under all conditions.
- Fill or empty only one hold at a time, and then only under calm conditions. Once tanked, the water level in a hold must be maintained into the hatch coaming at all times. When empty, the overflow ducts must be kept closed to prevent water from accumulating in the holds. Maintain all high water alarms in operational condition at all times.



Richard W. Etsell, P.E.
Naval Architect and Marine Engineer

October 27, 1993

Project: **F/V DESTINATION** 3/21/2017

Weights

Item	Description		Unit Wt (Lbs)	Qty	Total Wt (L. Tons)	LCG (Feet)	TCG (Feet)	VCG (Feet)	L. Mom (LT-FT)	T. Mom (LT-FT)	V. Mom (LT-FT)
A	Condition no 3 from existing booklet				577.6	55.0	0.0	13.98	31766.4	0.0	8074.4
B	Weights Added				9.0	12.3	0.0	9.5	110.3	0.0	85.9
C	Weights Removed				-0.5	12.5	0.0	12.5	-6.6	0.0	-6.6
		New Light Ship (calculated)	**Total:**		**586.0**	**54.4**	**0.0**	**13.9**	**31870.1**	**0.0**	**8153.7**
					(LT)			VCG			

Weight difference	**9.0**	LT	LCG change =	**-0.6**	ft
Difference as percentage of LS	1.6	%	**Perc of Lpp =**	-0.60	%
			Lpp =	103	ft

Weights Added:

1	Bulb steel weight	Bulb added Dec 2012.	12900	1	5.8	2.0	0.0	7.8	11.5	0.0	44.6
2	Plate on bow sides	Plate for ice strengthening.	2631	1	1.2	12.5	0.0	12.5	14.7	0.0	14.7
3	New angle longs in sides	guess 320 ft	9.8	320	1.4	12.5	0.0	12.5	17.5	0.0	17.5
4	Stern structure additions	guess at amount	1500	1	0.7	99.5	0.0	13.5	66.6	0.0	9.0
5			0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6			0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Sub total:		**9.0**	**12.3**	**0.0**	**9.5**	**110.3**	**0.0**	**85.9**
					(LT)			VCG			

Weights Removed:

1	misc		1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	Removed flat bar longs in sides	Replaced by new angles.	3.7	320	0.5	12.5	0.0	12.5	6.6	0.0	6.6
3			0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Sub total:		**0.5**	**12.5**	**0.0**	**12.5**	**6.6**	**0.0**	**6.6**

Note:
Previous Light Ship shown and its vertical center of gravity are from the existing Trim and Stability Report.

KRAFTMAR DESIGN SERVICES
NAVAL ARCHITECTS AND MARINE ENGINEERS

Item	Description	Unit Wt (Lbs)	Qty	Total Wt (L. Tons)	LCG (Feet)	TCG (Feet)	VCG (Feet)	L. Mom (LT-FT)	T. Mom (LT-FT)	V. Mom (LT-FT)

Midships location is not marked on old drawings, exact location not known.

LCG shown here is a value not checked against midships in current booklet, midships is not shown there.

Weight of Bulb

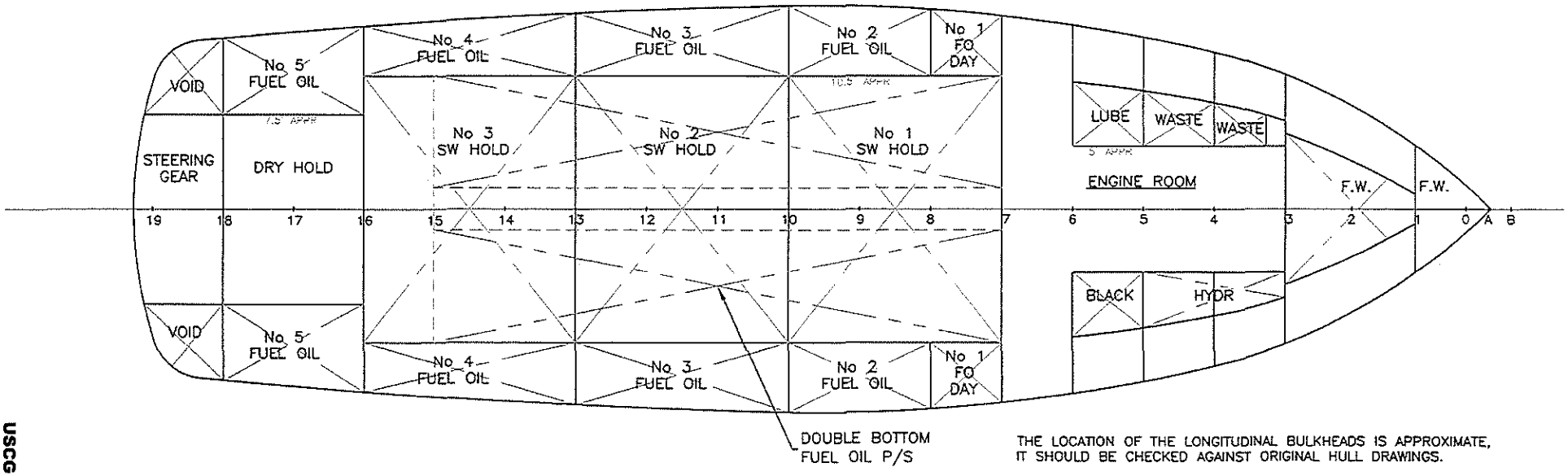
Skin plates:

hemisphere: $(4\pi r^2)\ \frac{4\pi\times(7.5/2)^2}{2} \times 25.7\ \#/ft^2 = 2271\ \#$

cylinder hem – fr1: $2\pi r \times 6' \times 15.4\ \#/ft^2 = 2177\ \#$

cylinder fr1 – fr3: $2\times 73\ ft^2 \times 15.4 = 2248\ \#$

frames B:	$\left[\pi\left(\frac{7.25}{2}\right)^2 - \pi\left(\frac{5.75}{2}\right)^2\right]$	× 15.42	=	236 #
A:	$\left[\pi\times(7.5/2)^2 - \pi\left(\frac{6}{2}\right)^2\right]$	× 15.42	=	245
0:	31	× 15.42	=	478
0.5:	same as A		=	245
1:	33	× 15.42		509
1.5:	A × 0.75		=	184
2:	6.75	× 20.5	=	138
2.5:		20.5	=	≈ 110
bulb stem ℄:	24.3	30.8	=	748
girder at 3/9 o'Clock:	16'×2×1'	× 30.8	=	986
bottom V-sides:	2×12'×2.3'	× 15.42	=	851
V-gussets:	6 × 0.8	× 15.42	=	74
top fairing cone:	22	× 20.6	=	453
top fairing sides:	2 × 16	× 15.42	=	493
misc:			=	450
		Total	=	12,896. LBS



KraftMar Design Services
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Seattle 01/28/2013
Page 1

Mr. David Wilson
Owner F/V Destination

Vessel: **F.V. DESTINATION**
O. N.: 632374
110' x 32'

Subject: **Stability**

Dear Mr. Wilson:

This letter confirms that based on current information the vessel Destination is safe to transit to fishing grounds and conduct fishing if operated in alignment with the conditions shown in the existing Stability Booklet prepared after the modifications in 1993.

The booklet shows the 32 foot wide vessel to have very proper stability with GM values in the range of **5.9 feet to 6.6 feet**. Lower GM values usually mean reduced stability and GM values below 2 feet would cause one to be extra careful.

We have created a new hull computer model to use in all stability calculations. We compared loading conditions with and without the bulb and we found your GM values to be reduced only about 2 inches which is totally negligible when considering the high GM values you have. You should therefore be totally safe to operate the vessel in accordance with the current booklet.

The captain should still be reminded to be careful as he gets used to how the vessel behaves with the new bulb. And as always he should be careful in icing conditions and he should always take good care of the door leading out to main deck.

The vessel had some ice damage repaired during a shipyard stay in December 2012 and it had a bulbous bow constructed and added at the same time. The vessel has not been otherwise altered significantly since the latest modifications in 1993.

Please report to me any planned future significant weight changes, such as a change of crane or any major relocations of exiting weights so we can record and track the changes properly until the next inclining test is performed. It is our understanding that you plan to perform a new inclining test sometime during the latter part of this year.

Please don't hesitate to call or e-mail at any time with your questions or any concern you may have.

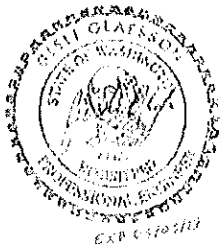
Sincerely,

KraftMar Design Services, [redacted]

KraftMar Design Services
Naval Architects & Marine Engineers

Gisli Olafsson P.E.
Naval Architect, owner
KraftMar Design Services
[redacted]
Cell: [redacted]
Office: [redacted]

c.c.:



KraftMar Design Services, [redacted]