APPENDIX 6

STEP BY STEP GUIDE CALCULATION

STEP BY STEP GUIDE FOR CALCULATING ACTUAL LOADING CONDITIONS (KG).

1. Obtain calculated displacement (Δ_c) as follows :-

Weights	VCG	Vertical Moments	Free Surface
Tanks - - - Stores Crew & Effects Passengers			 - - - -
Sub Total (1)		Mt(1)	f_s
Cargo (Option 2 or any other chosen option) W_{C1} W_{C2} W_{C3} W_{C4} W_{C5}			 - - - - -
Sub Total (2)	x	Mt(2)	-
Deadweight Lightship		Mts(1) + (2) Mt(3)	f_s -
Displacement (Δ_c)	y	Mts(1) + (2) + (3)	f_s

2.(i). Obtain draughts (suitably corrected for S.W. specific gravity) from draught indicator system and calculate the mean of means draught (d_o) as follows:-

$$d_o = \frac{d_a + d_f + d_{mp} + d_{ms}}{4}$$

Where

d_a = draught aft d_f = draught forward
d_{mp} = draught midships (port) d_{ms} = draught midships (stbd)

2.(ii). Obtain trim from $d_f - d_a = t_o$

-ve by stern
+ve by head

3. From the trimmed Hydrostatics, using [d_o] and [t_o] obtain the observed displacement [Δ_o].

4.(i). If $\Delta_o > \Delta_c$ + (* tonnes) obtain $\Delta_o - \Delta_c$ and calculate the actual KG(fluid) as follows :-

* equivalent to 2cm immersion

Δ_c		Mt(1) + (2) + (3)
$\Delta_o - \Delta_c$	Z	Mt(4)
Δ_o	KG solid	Mt(1) + (2) + (3) + (4)

where Z = KG of total cargo weight (x) or ship as a whole (y), whichever is greater.

$$\text{actual KG(fluid)} = \text{KG(solid)} + \frac{f_s}{\Delta_o}$$

Obtain <u>maximum allowable KG(fluid)</u> from the curves at page .... by entering [d_o] (mean of means) and by interpolating (if necessary) at the appropriate [t_o]

4.(ii). If $\Delta_o < \Delta_c$ - (* tonnes)

then * equivalent to 2cm immersion

$$\text{actual KG(fluid)} = y + \frac{f_s}{\Delta_o}$$

Obtain <u>maximum allowable KG(fluid)</u> from the curves at page .... by entering [d_o] (mean of means) and by interpolating (if necessary) at the appropriate [t_o]

4.(iii). If $\Delta_o = \Delta_c$ or if the difference $\Delta_o - \Delta_c$ is less than (* tonnes)

then * equivalent to 2cm immersion

actual KG(fluid) = y + $\frac{f_s}{\Delta_c}$

Obtain maximum allowable KG(fluid) from the curves at page .... (as before)

In all cases 4(i), 4(ii) or 4(iii), for the vessel to comply with the required criteria, it must be shown that :-

actual KG(fluid) $\leq$ maximum allowable KG(fluid)

STEP BY STEP GUIDE TO CALCULATING ACTUAL LOADING CONDITIONS (GM).

1. Obtain calculated displacement (Δ_c) as follows :-

Weights	VCG	Vertical Moments	Free Surface
Tanks - - - Stores Crew & Effects Passengers			 - - - -
Sub Total (1)		Mt(1)	f_s
Cargo (Option 2 or any other chosen option) Wc_1 Wc_2 Wc_3 Wc_4 Wc_5			 - - - - -
Sub Total (2)	x	Mt(2)	-
Deadweight Lightship		Mts(1) + (2) Mt(3)	f_s -
Displacement (Δ_c)	y	Mts(1) + (2) + (3)	f_s

2.(i). Obtain draughts (suitably corrected for S.W. specific gravity) from draught indicator system and calculate the mean of means draught (d_o) as follows:-

$$d_o = \frac{d_a + d_f + d_{mp} + d_{ms}}{4}$$

Where

d_a = draught aft
d_f = draught forward
d_{mp} = draught midships (port)
d_{ms} = draught midships (stbd)

2.(ii). Obtain trim from $d_f - d_a = t_o$

-ve by stern
+ve by head

3. From the trimmed Hydrostatics, using [d_o] and [t_o] obtain the observed displacement [Δ_o] and the transverse metacentre KM_t.

4.(i). If $\Delta_o > \Delta_c$ + (* tonnes) obtain $\Delta_o - \Delta_c$ and calculate the actual GM(fluid) as follows :-

* equivalent to 2cm immersion

Δ_c		Mt(1) + (2) + (3)
$\Delta_o - \Delta_c$	Z	Mt(4)
Δ_o	KG solid	Mt(1) + (2) + (3) + (4)

where Z = KG of total cargo weight (x), or ship as a whole (y), whichever is greater.

$$\text{actual GM(fluid)} = KM_t - \text{KG(solid)} - \frac{f_s}{\Delta_o}$$

Obtain minimum required GM(fluid) from the curves at page .... by entering [d_o] (mean of means) and by interpolating (if necessary) at the appropriate [t_o]

4.(ii). If $\Delta_o < \Delta_c$ - (* tonnes)

then * equivalent to 2cm immersion

$$\text{actual GM(fluid)} = KM_t - y - \frac{f_s}{\Delta_o}$$

Obtain minimum required GM(fluid) from the curves at page .... by entering [d_o] (mean of means) and by interpolating (if necessary) at the appropriate [t_o]

4.(iii). If $\Delta_o = \Delta_c$ or if the difference $\Delta_o - \Delta_c$ is less than (* tonnes)

then * equivalent to 2cm immersion

$$\text{actual GM(fluid)} = KM_t - y - \frac{f_s}{\Delta_c}$$

Obtain minimum required GM(fluid) from the curves at page .... (as before)

In all cases 4(i), 4(ii) or 4(iii), for the vessel to comply with the required criteria, it must be shown that :-

actual GM(fluid) $\geq$ minimum required GM(fluid)