

## EX USS THOMAS GATES (CG-51) Ballasting Plan & Stability Evaluation

### References:

- (a) STABILITY OF DD963, DDG993, AND CG 47 CLASS SHIPS DURING INDUSTRIAL AVAILABILITY PERIODS AND WHEN DEWATERING OR DEFUELING TANKS (USN)
- (b) NDI Engineering Company report, "USS THOMAS GATES (CG 51) Stability Calculations in support of Undocking", Aug 29, 2012
- (c) NSWCCD TASKER 400FR3-11-21 CORRECTED 12-9-11 (HII)
- (d) Email of 07 Mar 2013 from Ferguson Ashley A CIV NSWCCD Philadelphia, 9330 Subj: RE: CG-51 Stability Report

Tom Deegan, Navy Inactive Ships Maintenance Office, requested a stability evaluation for the EX USS THOMAS GATES (CG-51)

The information provided for the evaluation is as follows;

- The ship is to have adequate stability for an open ocean tow.
- All loads are assumed removed from the ship, including, but not limited to crew and effects, aircraft and support, ammunition, provisions and stores.
- Liquid loads have been changed to reflect the freshwater ballast in the compensated fuel system as described in Reference (d)
- Lightship Items are removed and relocated in accordance with References (b) and (c).
- USN Towing Manual recommendations for 1 foot of trim per 100 feet length imply a trim of 5.29 feet by the stern.

### Current Condition Stability

The FCCS model was revised to reflect the hull after harvesting of parts and removal of all after appendages with the exception of the PORT rudder. Lightship and loads reflect the changes in References (b) and (c). FCCS used the draft adjustment function to match the stated drafts and list angle of reference (b): This resulted in a 266.49 ton weight removal which was centered vertically at 17.00 feet above keel and at the LCG and TCG required to obtain the draft and trim values below. Because it is a weight removal, the lower center of 17.00 feet was chosen as resulting in a conservative stability estimate. The following drafts, as adjusted by FCCS during application of the draft adjustment tool, are those as read from the pictures provided in reference (d).

Draft, Fwd Stbd:	20.42	Feet
Draft, Mid Stbd:	20.92	Feet
Draft, Aft Stbd:	21.41	Feet
List:	0.03	Degrees, Port

All tanks levels used were as defined in reference (b). The following Forward Bank tank levels apply to the current condition:

Compensated FO Tank	6-58-1-F	Empty
Compensated FO Tank	6-58-2-F	Empty
Compensated FO Tank	6-94-1-F	Mostly Full
Compensated FO Tank	6-94-2-F	Mostly Full
Compensated FO Tank	6-138-1-F	Mostly Full
Compensated FO Tank	6-138-2-F	Mostly Full
Compensated FO Tank	6-174-1-F	Mostly Full
Compensated FO Tank	6-174-2-F	Mostly Full
Compensated FO Tank	6-220-3-F	Mostly Full
Compensated FO Tank	6-220-4-F	Mostly Full

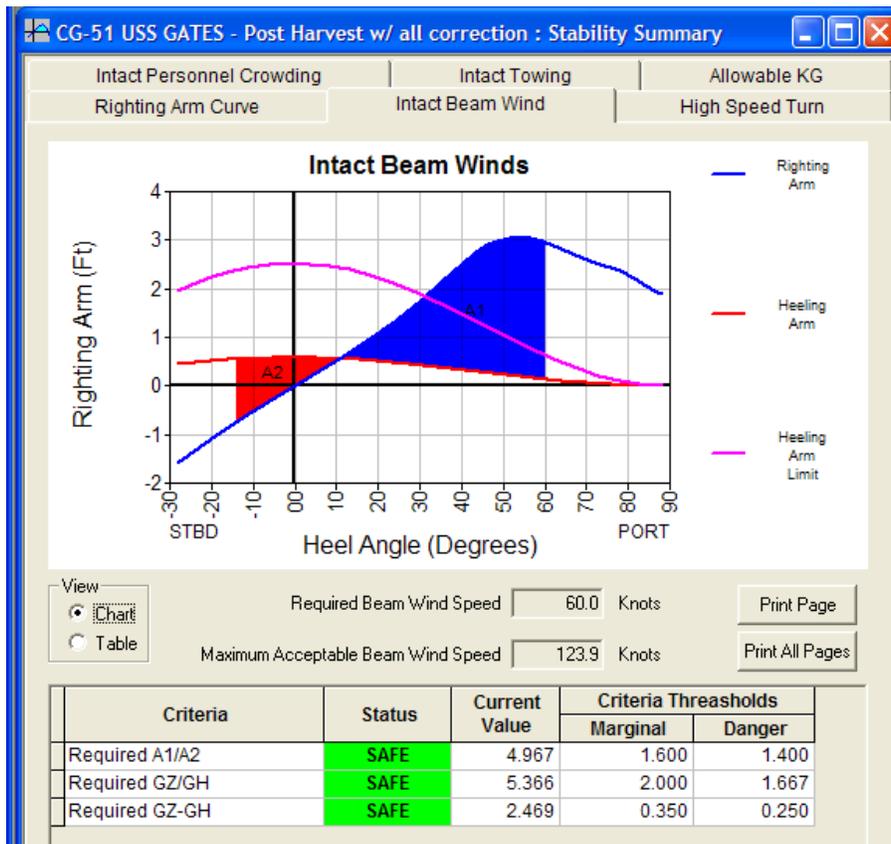
The **USN Towing Manual Appendix H** information calculated for the ship in the current, harvested condition with the weight adjustment is as follows:

Length Between Perp: 529.00 Feet  
 Beam: 55.60 Feet  
 Displacement: 8568.58 Tons  
 Draft fwd: 20.42 Feet  
 Draft aft: 21.41 Feet  
 Midship draft: 20.92 Feet  
 MTI: 1662.11 Ft-tons/inch  
 TPI: 50.43 Tons/Inch  
 KG: 23.02 Ft above keel  
 GM: 2.92 Feet  
 List: 0.03 degrees (PORT)  
 LCG: 12.08 Feet aft midships  
 Trim: 1.04 Feet by the Stern

Note that:

- KG is virtual (includes the virtual rise in KG due to the effect of free surface).
- GM is 'corrected' (reduced for the effects of free surface).

**Stability Evaluation:** Based on the above we calculate that the EX USS THOMAS GATES has adequate stability for tow in open ocean conditions and is capable of withstanding the effects of a 100 knot beam wind combined with rolling. However, the ship does not meet trim criteria for tow with only 1.04 feet stern trim.



FCCS Produced Intact Beam Wind Stability Evaluation for EX CG 51 at Current Condition