

## **TECHNICAL MEMO**

**DATE:** May, 2012

**SUBJECT:** USE OF EXCEL SPREADSHEETS FOR ORB RECORDING

ORB entries have been highlighted as time consuming, as sometimes confusing and the source of frustration through discussion of shipboard experience and through conference exercises.

Furthermore it is noted that there is a general industry trend to make an IOPP tank sounding log a shipboard requirement.

This led to discussions as to what form the IOPP tank sounding book should take.

An official log book would be bound, but the sounding log is not an official log.

In response to operator direction to produce a sounding log for their vessel, the crew of one vessel developed a spreadsheet approach with the aim of producing consistent, accurate and efficient sounding entries. The spreadsheet requires manual entry of tank soundings, OWS and pump operation times and vessel positions but then also, subsequently, automatically generates the correct ORB entries in a spreadsheet format.

The tank sounding portion of the spreadsheet was printed and kept as an IOPP tank sounding log and these spreadsheet generated ORB entries were then copied by hand into the vessel's ORB.

This document details the background to the issue, the spreadsheet function as it currently stands and proposes future development to work towards a spreadsheet approach to ORB entries for IOPP vessels that would reduce crew workload, improve the consistency and quality of ORB entries and which will meet MARPOL and USCG requirements.

### **SPREADSHEET DESCRIPTION:**

The spreadsheet developed by the C/E is very specific to the vessel, despite the vessel being one of three sister ships. It comprises two sheets, the first sheet titled "ORB Daily Entries Info" contains data entry fields for bilge and sludge tanks, showing tank volumes before and after pumping, sludge incineration, bilge water evaporation and OWS operations. In this case, operations detailed on the spreadsheet are:

- Transfer of bilge water to bilge holding tanks.
- Transfer of bilge water between bilge holding tanks.
- Operation of the OWS 15ppm equipment.
- Transfer of sludge to sludge tanks.
- Transfer of sludge between sludge tanks.
- Transfer of sludge to incinerators for burning.
- Water drain from sludge tanks.

At present the spreadsheet does not include all of the vessel's sludge tanks<sup>1</sup> and it is not up to date in terms of tank names that have been subject to review and update through other tech memo (see the tank naming memo).

Additionally, the structure and terminology of the data recording in Sheet 1 is more characteristic of the crew's knowledge and understanding of processing of bilge water and sludge waste streams aboard the vessel than it is of correct ORB terminology and operation codes. In other words, Sheet 1 has been designed and formatted by the crew for use by crew as they know, understand and manage the bilge and sludge waste streams aboard the vessel.

However, the output from Sheet 1 to Sheet 2 is the important step. Here, effort and attention has been paid to developing automatic generation of the required ORB entries for the bilge water and sludge processing operations recorded in Sheet 1, removing the need to refer back to MEPC 1/Circ.736/Rev.1 or ORB documentation type guidance. The result is a spreadsheet version of the required ORB entries for the daily operations that can be copied by the C/E into the ORB in the knowledge that the copied entries will be correct (assuming correct soundings and data entry into Sheet 1, and good copying skills).

Examples of Sheet 1 and Sheet 2 of the spreadsheet follow:

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<sup>1</sup> The vessel is fitted with seven small purifier sludge tanks. These tanks were not originally considered to be part of the IOPP. These tanks all drain into a larger sludge holding tank. Recording the tank levels in these small tanks and recording these tank transfers into the ORB is a significant manpower burden. There was significant discussion about the need to record these tank volumes in the ORB. To prevent having to engage in this recording activity, the ship operator could choose to eliminate these tanks and drain everything directly into the larger holding tank. This would simplify record keeping, but it would reduce the crew's ability to rationally and optimally manage waste oils. It was agreed that these tanks would be drained in the morning and the drained total content would be recorded in the larger collection tank.

Sheet 1 as completed on May 03, 2011:

ORB ENTRIES DAILY INFO													
SLUDGE AGITATING TANK													
DATE	BEFORE DRAINING		AFTER DRAINING		BEFORE PUMPING OUT		AFTER PUMPING OUT		BEFORE PUMPING TO		AFTER PUMPING TO		SLUDGE SERV
	M	M <sup>3</sup>	M	M <sup>3</sup>	M	M <sup>3</sup>	M	M <sup>3</sup>	M	M <sup>3</sup>	M	M <sup>3</sup>	M <sup>3</sup>
5/3/11		1.46		1.12		1.12		0.21		0.21		0.86	2.60
BURNING SLUDGE FROM SLUDGE SERVICE TANK													
DATE	START BURNING	STOP BURNING	TOTAL BURN TIME (HOURS)										
	M <sup>3</sup>	M <sup>3</sup>	By Quarter Hour										
NOTE: IF TWO BURNS IN ONE DAY PUT IN TOTAL BURNED AND TOTAL TIME.													
EVAPORATING WATER FROM MIXING TANK and REFILLING FROM ENGINE ROOM BILGES													
DATE	START OF EVAPORATION	END OF EVAPORATION	END OF REFILL	PUMP START TIME	PUMP STOP TIME								
	M <sup>3</sup>	M <sup>3</sup>	M <sup>3</sup>	0000	0000								
OPERATING OWS FROM BILGE SETTLING TANK													
DATE	START VOLUME	STOP VOLUME	START TIME	STOP TIME									
	M <sup>3</sup>	M <sup>3</sup>	0000	0000									
TRANSFER FROM BILGE HOLDING TO BILGE SETTLING													
DATE	HOLDING TANK VOLUME M <sup>3</sup>		SETTLING TANK VOLUME M <sup>3</sup>		PUMP TIME								
	START	STOP	START	STOP	START	STOP	START	STOP					

Sheet 2 (currently untitled) then automatically generates the required ORB entries in the proper current format, using simple cell formulae to process the data entered in Sheet 1 with formatted text and fields for date and signature below the entry.

Sheet 2 as generated by data entry in Sheet 1 on May 03, 2011:

1	<b>Draining water from Sludge Agitating tank to Bilge Settling Tank</b>					Ex. #4
	5/3/11	C	12.2	0.3 m <sup>3</sup> drained from sludge agitating tank,		
				1.1 m <sup>3</sup> retained,		
				to bilge settling tank		
				Signature, Position, 5/3/11		
2	<b>Transfer from Sludge Agitating Tank to Sludge Service Tank</b>					Ex. #5
	5/3/11	C	12.2	0.9 m <sup>3</sup> sludge transferred from Sludge Agitating Tank,		
				0.2 m <sup>3</sup> retained, to Sludge Service Tank,		
				2.6 m <sup>3</sup> retained.		
				Signature, Position, 5/3/11		
3	<b>Collecting from purifier sludge tanks or DG sumps to Bilge Agitating Tank</b>					Ex. #2
	5/3/11	C	11.1	Sludge Agitating Tank		
			11.2	3.5 m <sup>3</sup> capacity.		
			11.3	0.9 m <sup>3</sup> retained.		
			11.4	0.7 m <sup>3</sup> collected from purifier sludge tanks (OR DG SUMP).		
				Signature, Position, 5/3/11		
4	<b>Burning sludge in Auxiliary Boiler.</b>					Ex. #7
	1/0/00	C	12.4	0.0 m <sup>3</sup> sludge from Sludge Service Tank,		
				0.0 m <sup>3</sup> retained,		
				Burned in boiler for 0.00 hours		
				Signature, Position, 1/0/00		
5	<b>Evaporation of water from Mixing Tank</b>					Ex. #8
	1/0/00	C	12.4	0.0 m <sup>3</sup> water evaporated from Mixing Tank,		
				0.0 m <sup>3</sup> retained.		
				Signature, Position, 1/0/00		
6	<b>Pumping from engine room bilges to Mixing Tank</b>					Ex. #10
	1/0/00	D	13	0.0 m <sup>3</sup> bilge water from engine room bilge wells		
			14	start: 0 stop: 0		
			15.3	To mixing tank, retained in tank 0.0 m <sup>3</sup>		
				Signature, Position, 1/0/00		
7	<b>Processing water from Bilge Settling Tank through OWS.</b>					Ex. #12
	1/0/00	D	13	0.0 m <sup>3</sup> bilge water from Bilge Settling Tank		
				Capacity 17.1 m <sup>3</sup> , 0.0 m <sup>3</sup> retained		
			14	start: 0 stop: 0		
			15.1	Through 15 ppm equipment overboard		
				Position start: 0.0		
				Position stop: 0.0		
				Signature, Position, 1/0/00		
8	<b>Transfer from Bilge Holding Tank to Bilge Settling Tank</b>					Ex. #11
	1/0/00	D	13	0.0 m <sup>3</sup> bilge water from bilge holding tank,		
				0.0 m <sup>3</sup> retained,		
			14	start: 0 stop: 0		
			15.3	to bilge settling tank, retained in tank 0.0 m <sup>3</sup>		
				Signature, Position, 1/0/00		

Some of the spreadsheet generated entries are not quite in conformance with the latest standards, but this is simply a matter of spreadsheet modification.

However, once developed for a specific vessel, proper implementation of ORB policy is simply a matter of spreadsheet data entry and hand copying into the ORB.

#### OPERATIONAL CONSIDERATIONS:

1. IMO has issued MEPC. 1/Circ. 736/Rev.1 (25 August, 2011), which provides guidelines for the recording of operations in the ORB. While this circular contains errors, it tries to promulgate a uniform (or at least unified) approach.
2. This circular is meant to provide input for a new version of the USCG standard ORB. This ORB will probably correct some of the errors in the circular and will make some adjustments that save entry time beyond what MEPC. 1/Circ. 726 promulgates.
3. It has been surveyed and estimated that currently it can take up to 5 man-hours per day to properly sound tanks, manually record those soundings in a ship's sounding log, and calculate tank, transfer and disposal volumes to make and record the required entries in the ORB. Typically these ORB tasks take 2 man-hours split between the C/E and other engine room personnel.
4. It is also noted that with the man-hours required, and the multiple steps of recording data, the completion of daily ORB entries is not consistent with a human factors based approach to accurate and error-free data processing.
5. It is anticipated by the crew that if the hand-copied entries were replaced by the generated and printed spreadsheet but still signed and dated by the C/E (and the Master, say, on a weekly basis), significant time

savings and elimination of errors could be achieved. Due to the regulatory requirement that a preprinted and bound ORB needs to be used, this methodology is presently not acceptable.

6. At present, the spreadsheet approach has only been developed and trialed by one vessel crew to include bilge water and sludge waste stream processes.
7. Since fleets and individual vessel crews struggle to fill in the ORB in a unified fashion, a spreadsheet driven approach with automatically generated ORB entries (using a customized spreadsheet for each ship) would be beneficial.
8. It is anticipated that there is potential to increase the scope of the spreadsheet to incorporate additional ORB entries in a unified approach.
9. Since ORB recording is not a continuous activity, but rather is a once per day, or less frequent, activity, it may take a significant amount of time and effort before all shipboard personnel has developed the most uniform approach.
10. Instituting a unified approach requires a feedback loop (ORB recorders are directed to do one thing, and there are checkers who catch aberrations and return with feedback to the ORB recorders, which then modified the record keeper's process) or requires a recording system that resists variations that break the unified approach (as would be promoted by spreadsheets).
11. Hand copying computer generated information is wasteful, and results in its own source of inaccuracies and confusions.
12. The present spreadsheet system is a daily event approach; it does not perform a book keeping check where it checks to see if volumes add up over a longer period of time. It is not clear if a spreadsheet approach that performs a book keeping check is helpful aboard ships since it may cause ship's crews to have to deal with book keeping issues and consistency checks beyond what would be reasonably performed and achievable aboard ships (In other words why not let the consistency checks take place somewhere else?). This consistency burden is discussed in other tech memos such as the tank level accuracy memo.
13. Modern computerized maintenance and inspection systems such as ABS' NS-5 have a very rugged time stamping capability. As such, a chief engineer could simply submit a printout of spreadsheet pages into the system and they will be recorded as having been submitted by the Chief Engineer at a specific time and can no longer be modified after they have been submitted. This would be a more effective and reliable "log" than a handwritten log that can be "adjusted" over the course of multiple entries during the length of a voyage.

#### **PROPOSED SOLUTION APPROACH:**

The following solution approach is proposed:

1. Obtain full feedback, agreement and approval from all stake holders about the general approach (Ship Owners, Crews, ABS, Port State, Flag State, IMO?).
2. In order to be able to test this approach prior to international agreement, this approach could possibly be first applied for a single Flag State/Port State ship operator such as a Jones Act operator.
3. Upon release of the new USCG ORB, locate ship operators who will prepare spreadsheet sounding logs that automatically generate correct ORB entries in a format approved by the USCG.
4. Spreadsheet sounding logs will be produced for each ship. Spreadsheets will be specific to each vessel and reflect updated tank names on the vessel's IOPP and the OWS/ORB procedure and have a first page entry sheet that reflects agreed waste oil and bilge water handling processes for the specific vessel.
5. The spreadsheet would be security protected to only allow data entry to generate the printout sheets.
6. The automatic output from the sheets would be submitted through a NS-5 type integrated maintenance and inspection recording system.
7. Further processing and review tasks (such as long term volume book keeping checks) could be performed by additional software.
8. The submitted spreadsheet data can be reviewed by any stake holder the moment it is submitted.
9. This system could be conducive to further automation such as automated tank level/volume recording through further vessel automation, which in turn could generate more fully automated ORB style entries.