

**EXECUTIVE SUMMARY OF EVALUATION TRIALS OF FUEL ADDITIVE FUEL OX
CONDUCTED ONBOARD UASC VESSEL “AL HILAL” 11-16 SEPT 2014**

1. This report is based on the evaluation trials of FUEL OX fuel additive conducted onboard the vessel “AL HILAL” of United Arab Shipping company (UASC) undertaken by the undersigned Mr. Subrata Basu Roy Choudhury , Chief Engineer ,along with the ship’s crew of the vessel , witnessed and certified by the Chief Engineer of the vessel Mr. Naguib Eldesoulky.

2. The trials were conducted from 11 September 2014 to 16th September 2014 onboard the vessel “AL HILAL” during its voyage from Port Klang Malaysia to Shanghai China.

3. I would like to thank the vessel’s Captain Vinay Karkarey, the Chief Engineer Naguib Eldesoulky,4th Engineer (Mr. Mohammad B. Alshawawreh) and all engine room officers and crew for their help to conduct the trials onboard.

4. The evaluation trial report is placed at ANNEXURE 1 along with all relevant Appendices. Details of Engines, fuel systems and instrumentation used for monitoring are also indicated at Appendices.

5. Details of the trials conducted:

- a) The Fuel oil system of this vessel is as follows – Bunker oil remains in the double bottom storage tank. From there, by fuel oil transfer pump, it transfers automatically to FO settling tank. After that, via purifier, it delivers into service tank and service tank keeps always full. When service tank becomes full, it overflows into settling tank.
- b) This vessel has no heating system in FO double bottom storage tank. One shifter pump is fitted, which takes suction from the settling tank and delivers fuel into double bottom storage tank by auto start and stop mode (Fitted timer and level mode).This is for transfer pump’s suction area to keep hot oil for taking suction, as in cold areas, transfer pump may not take suction. This shifter pump and transfer pump are operated by timer and level mode. When in any mode one pump starts, then automatically the other pump stops and vice versa. According to our request, ship’s staff set the pump mode, so that all the time both settling and service tanks maintains near about maximum requirement capacity as design.
- c) The settling tank has a float level switch, which operates level and operates pump cut in and cut out also, if everything is in auto mode. Both settling and service tank has sounding pipes. If additives are added from the sounding pipe, most of the additives will remain inside sounding pipe, and very little percentage of additives will mix in whole oil in the service tank, (as liquid

stays in same level) unless, oil level comes down, that is not possible in service tank.

- d) If somehow, by any other means, additives are added through from the top directly into the service tank, then also, initially, additives will remain in top, and, very little will mix with oil and very little mixed oil will go into main and aux engines, as service tank is continuously filled up by FO purifier, and purified oil is continuously overflowing into settling tank after that from bottom. Same oil is discharged by shifter pump into double bottom storage tank for keeping storage tank oil hot for transfer pump's suction. Therefore additives mixed oil will go into double bottom storage tank
- e) Last time, the ship staff has added the additive into service tank, through sounding pipe, so most of the additives remained in the sounding pipe. There is a blank flange on top of the settling tank float switch. This time, the blank flange was removed and additive was added through it by funnel and after that again blank flange was fitted back. From 11th noon to 12th noon the FO consumed measured by main engine and auxiliary engines flow meter, as boiler was stopped. The Vessel Chief Engineer also agreed for adding additives through blank flanges and also agreed to stop FO transfer pump and shifter pump, so that oil and additives will not go into storage tank and the oil consumption will remain from service tank and very little quantity of oil will overflow into the settling tank. During this evaluation period vessel has Maintained 65 to 66 rpm
- f) Initially additive FUEL OX was added at 1: 5000 ratio was undertaken initially considered remaining fuel in sett tank, adding fuel from storage tank and service tank fuel. After that, additive at 1: 10000 ratio of was undertaken. But large variation of consumption was seen, due to very rough sea conditions from 15th To 16th Sept and the ship had to pass by a typhoon condition.
- g) The vessel is on unmanned monitoring (0800 to 1700 hrs is the working time) and fuel oil consumption and other parameters are recorded at noon to noon that is 1200 to 1200 o'clock on a 24hrly basis using automatic flowmeters as detailed in the Appendix.
- h) Where a shifter pump is fitted; it is not advisable for testing this additive, as it will drain into storage tank. But during evaluation time, the Chief Engineer and ship staff had kept off the transfer pump and the shifter pump. However, the last three days from 15th pm to 16th September, the sea was very rough, as Captain has avoided one typhoon. This is also documented in the data table 1-3. During that period, the consumption was high though the RPM was maintained at 65 to 66 rpm and the high waves and winds gave a different load leading to higher consumption.
- i) Based on the readings of the first four days where sea conditions were similar, It is observed that on adding the additive FUEL OX, a clear advantage in fuel savings were resulted. This was observed from the three days average fuel consumption with additive, which was compared to the reference fuel consumption without additive. For calculations please refer the table below:

