HAZARD AND OPERABILITY STUDY (HAZOP) REPORT
CONCLUSIONS AND ACTIONS

Subject:	**OLED TANK SENDER REV A**
Project:	OLED Diver Products.
Site:	St.Petersburg Design Centre
Date:	28th May 2008.
Time:	13:00 -18:00
Participants:	Deep Life team: Alex Deas, Marat Evtuhov, Sergei Belousov, Sergei Pyko, Vitali.Ivanov
Study leader:	Vladimir Komarov .

General summary:
Terms of reference and scope of the study is the Tank Sender in the OLED Diver Product family described by Green Book: GreenB_OLED_Diverinterface_071220.pdf.

The meeting was presented with a circuit diagram, pcb layout and mechanical drawing.

Circuit: This has been reviewed by 3 Principal Engineers – Sergei Pyko, Igor Abrosimov and Marat Evtukov. There is one hour of changes needed, from these reviews. The changes will be implemented by Alexei Pankratov (Design Authority), and checked b Sergei Pyko and Marat Evtukov.

PCB: Once the circuit has been changed (today), Vitali will implement the changes in the circuit layout and present a package for sign off review tomorrow.

Mechanics: The design should be changed to reflect:

1. DL policy of using double O-Rings on all surfaces where there is an O-ring, except for standard interfaces. In this case the standard interface is the HP Port on the first stage regulator which takes one O ring. All other locations should have double O rings, of the largest cross-section possible.
2. Board is fixed with 4 screws.
3. It appears open and easy to assemble.
4. We will redesign it for volume. The present unit requires manual polishing after machining.
5. The end cap will be changed to use a UK one pence piece: this works with 50c Euro, 1 cent US and one rouble coins.
6. Thread on USB port should increase to 2mm, as a 16mm metric thread is too fine and will be damaged by the user.

The keywords combinations:

Primarily keywords:	Secondary keywords:
Pressure; Temperature; Corrode; O2 compatibility, Absence.	No; Under; Over; Reverse; Other.

Pressure: the device can accidentally pressurise if the pressure sensor seal fails. The pressure will be up to 400 bar.: the sensor and tank sender is rated to 400 bar. The shell is stainless steel contained, so the failure will be either the window or the USB cap.
The coin slot should be increased such that the cap becomes a weak point that bursts into two, if the unit is pressurized. It should withstand 30 bar reliably but burst with 120 bar.
The tank sender uses a Lithium Mixed Oxide Gel battery. It has been tested in pure helium at 142 bar, with rapid compression and decompression. It operates at 1 ATM in normal use.

SS is not O2 compatible. Part should be marine bronze, diamond coated. Prototype accepted in SS 321 stainless steel.

For main production, Grilamid 3V plastic will be used, which is UV resistant and tough.

HAZOP Study leader: V. Komarov