Sub-Surface Monitoring of CDOM Fluorometers at the Deepwater Horizon Site
By the National Incident Command's Joint Analysis Group (JAG)

The National Incident Command (NIC) set up the Joint Analysis Group (JAG) with the goals of analyzing spill-related data, including sub-surface oil, dispersant, and oxygen data and to encourage coordinated action among groups. The JAG is examining monitoring and research data collected to study releases from the Deep Water Horizon (DWH) Mississippi Canyon (MC-252) wellhead that could be entrained in subsurface waters. This quick-response data report presents information thought to be useful for shaping ongoing observing efforts. It is time-sensitive due to the need to provide such guidance for at-sea operations in near-real-time to optimize Federal response to this evolving event. Some vessels monitoring subsurface oil from MC252 use a WetLabs Eco CDOM instrument to obtain a vertical profile of water column fluorescence. This instrument can be useful in estimating the presence or absence of oil. Best practices require that operators check for instrument drift before and after use. Therefore, as a service to the Unified Command, agency scientists, and the broader oceanographic community conducting research in the vicinity of the DWH MC252 incident, the JAG advises that operators carry out a WetLabs Eco CDOM Instrument Check Procedure.[1] The JAG also recommends that users of other optical instruments conduct similar instrument checks before and after each cruise. However a specific protocol for the check has not yet been developed for each instrument currently in use.

This procedure is a check against instrument drift. It is not a calibration, but is a check to determine if the instrument's response to a known quantity of dissolved fluorescing material is changing over time. Vessels monitoring the subsurface plume of oil resulting from the Deepwater Horizon MS252 are requested to complete this procedure at the beginning and end of each cruise. Attached is a form to record the data.

Supplies:

Black static cling material
1 liter Standard solution (quinine sulfate dihydrate)
Computer with serial port
9 volt transistor battery
ECOView software or terminal emulator program
1 liter glass beaker
Eco test cable
Black electrical tape

The standard solution used in this procedure is acidic and light and heat sensitive. Proper PPE should be worn when using it and the solution should be stored in the refrigerator in the dark. The shelf life of the solution is about 30 days. Standard stock solutions of 50 ppb can be

[1] The procedure is a hybrid of ideas and tests contained in Cetinić et al. 2009 Optics Express Vol. 17, No. 18 and a procedure distributed by Ian Walsh, Wet Labs Inc. Philomath, Oregon (541 929-5650; unpublished).

supplied by Department of Environmental Sciences at Louisiana State University under contract to NOAA.

Take the standard solution out of the refrigerator and allow to slowly heat to room temperature. Use the black electrical tape to completely cover the sides and bottom of the beaker so that no light enters from the sides or bottom.

Cover the emitter and detector windows of the instrument with the black static cling stickers that came with the instrument so that no light can pass through the window (see attached FAQ from WET labs).

Attach the test cable to the instrument, battery, and computer. Open a terminal emulator or use WET Labs ECOView software (free download at http://www.wetlabs.com/support/software.htm) to see the instrument data. Make sure that the instrument is set for the highest analog resolution (ASV = 1). If not, follow the recommended procedure on the manufacturer's web site (http://www.wetlabs.com/technicalnotes/asvsettings.htm). Suspend the instrument face down in the beaker and measure the number of raw counts for one minute. Average the counts and record the average on the attached form (dark current value). Remove the instrument from the beaker and remove the black static cling material over the windows. Gently pour the standard solution into the beaker so as to avoid bubbles. Suspend the instrument and measure the fluorescence for one minute in the standard. Record the average number of raw counts on the attached data sheet. If there is a large change in the raw counts since the last time the procedure was performed (50 counts or more), then you should contact Wet Labs Support to discuss the result. Note that the CDOM fluorometers are sensitive to radio frequency (RF) interference; if you get an anomalous result, you should look around the test location to see if RF interference could be an issue.

The formula for calculating the concentration of the standard from the raw counts is:

CDOM (ppb QSDE) = Scale Factor * (Standard Solution Counts – Dark Current Offset)

where the Scale Factor is provided by the manufacturer during the most recent factory calibration.

As with any waste, wastes generated from the CDOM check procedure should be disposed of properly.

CDOM Fluorometer Drift Check Data

Vessel Name:

Instrument Manufacturer:_____Model #:_____

Serial #:_____

Last known calibration by manufacturer:_____

Calibration equation from manufacturer:_____

#	Cruise #	Date	Dark Current Counts	Standard Solution Counts	Operator
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					

WET Labs
PO Box 518 Philomath, OR 97370 (541) 929-5650 FAX 929-5277

Determining the Offset on Your ECO Instrument

To determine a 'dark count' value or 'offset' for your ECO we recommend that the instrument be deployed in as close a manner to the actual deployment mode as possible, e.g. attached to the CTD or other data system or using the internal batteries.

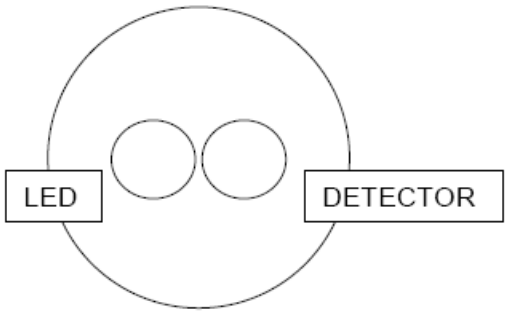
1) Cover the LED and Detector with black electrical tape and turn the system on.

2) Record the ECO's output. Use the minimum or average value as your offset.

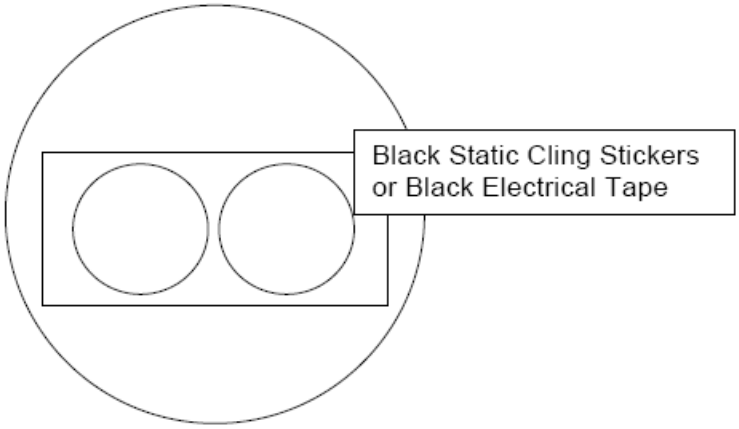
WET Labs records sixty seconds of data at 1 Hz and reports the minimum value on the calibration worksheet.

We commonly see variability of 1 to 2 counts.

Please contact WET Labs' support team if your variability is more than 10 counts.
Please contact WET Labs' support team if your offset value is more than 20 counts from the calibration value.



Black static cling placement



Smooth the tape to remove bubbles