APPLICATION NOTE NO. 39   **Revised February 2010**

CALCULATING CALIBRATION COEFFICIENTS
FOR THE CHELSEA AQUATRACKA FLUOROMETER

The Chelsea Aquatracka fluorometer measures Chlorophyll-*a* concentrations in the approximate range of 0.01 µg/l to 100 µg/l with a logarithmic output of nominally 0 to +4 volts.

In our SEASOFT V2 suite of programs, edit the CTD configuration (.con or .xmlcon) file using the Configure Inputs menu in Seasave V7 (real-time data acquisition software) or the Configure menu in SBE Data Processing (data processing software). Select *Fluorometer, Chelsea Aqua 3* as a voltage sensor when editing the configuration file; the software prompts for VB, V1, Vacetone, scale factor, slope, and offset. SEASOFT calculates chlorophyll concentration as:

$$\text{concentration [µg/l]} \quad = \quad slope * (10^{V/sf} - 10^{VB}) / (10^{V1} - 10^{Vacetone}) + offset$$

where

V	=	fluorometer output voltage *in-situ*
slope	=	nominally 1.0; user may adjust to fit field data [1]
sf	=	scale factor (1.0 except as follows; 2.0 for versions of the SBE 9 having input amplifiers with a gain of 2)
VB	=	electrical zero (from Chelsea calibration sheet) [2]
V1	=	fluorometer output voltage at 1 µg/l (from Chelsea calibration sheet)
Vacetone	=	fluorometer output voltage at zero chlorophyll (from Chelsea calibration sheet) [3]
offset	=	nominally 0.0; user may adjust to fit field data [1]

[1] Users may wish to *adjust* the fluorometer readings to conform to measured concentrations. For example, from two *in-situ* samples and with the slope and offset set to 1.0 and 0.0 respectively, a user might observe that the software indicated a concentration of 0.390 when the concentration determined from a water sample was 0.450, and 0.028 when the concentration determined from a water sample was 0.020. A linear regression to these data would give *slope* = 1.188 and *offset* = -0.013. The introduction of these *fit* coefficients in the instrument configuration (.con or .xmlcon) file would then correct the indicated concentrations. In general, VB, V1, and Vacetone as listed on the original Chelsea factory calibration sheet can be used throughout the life of the instrument, with subsequent calibrations used to adjust slope and offset alone.

[2] Chelsea defines VB as ideally being equal to the *clean water* response of the fluorometer. They suggest substituting the *electrical zero* (also referred to as *VBdefault*) when the *clean water* reading is unknown and hard to obtain - as is usually the case.

[3] Vacetone is determined with acetone in a special calibration cell (available from Chelsea Instruments), **NOT WITH THE FLUOROMETER IMMERSED IN ACETONE**. **Exposing the fluorometer lenses to acetone will PERMANENTLY DAMAGE THE FLUOROMETER LENSES.**