

CERTIFICATE OF CALIBRATION

Date of issue 11th June 2001

Description Mk III Aquatracka (Chlorophyll-a)

Serial Number 088216

REPORT

The fluorimeter was exposed to various concentrations of Chlorophyll-a dissolved in acetone in addition to pure water and pure acetone. The following formula was derived from the readings to relate instrument output to chlorophyll-a concentration.

$$\text{conc.} = (0.00945 \times 10^{\text{Output}}) - 0.0172$$

Where:-

conc. = fluorophor concentration in µg/l
Output = Aquatracka output in volts

The above formula can be used in the range 0 - 100 microgrammes per litre to an uncertainty of 0.01 microgrammes per litre plus 5% of value.

Notes

The above formula has been derived using Chlorophyll-a dissolved in acetone. No guarantee is given as to the performance of the instrument to biologically active chlorophyll in sea-water.

The zero offset has been determined in the laboratory using purified water from a reverse osmosis/ion exchange column. It is possible that purer water may be found in clean deep ocean conditions. Under these conditions, the offset shown in the above formula should be replaced by the antilogarithm of the Aquatracka output in the purest water found, multiplied by the scale factor.

Fluorimeter calibration readings

Ambient temperature 20°C

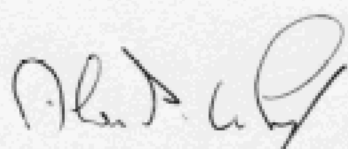
Output for detector mechanically blanked 0.1919 Volts

Output for pure water 0.2607 Volts

chlorophyll concentration in acetone ($\mu\text{g/l}$)	Output (volts)
Acetone (pure)	0.3263
0.1	1.1425
0.3	1.5323
1.0	2.0350
2.99	2.5026
9.9	3.0296
29.1	3.4913
90.9	3.9686

The uncertainty of the chlorophyll concentration is estimated not to exceed 3%. The uncertainty of output voltage measurement is estimated not to exceed 2mV.

Signed



Date

11/6/2001

TEST REPORT

This is to certify that **Aquatracka III (Titanium)**

Serial No. **088216** has been pressure tested for 1 hour at 60 bar. This is a leakage test.

The design itself has been verified by approval testing as suitable for use to a maximum depth of 6000 metres

Signed:



Date:

11/6/2001

CERTIFICATE OF CALIBRATION

Date of issue 7th January 2000

Description Mk III Aquatracka (Chlorophyll-a)

Serial Number 088216

REPORT

The fluorimeter was exposed to various concentrations of Chlorophyll-a dissolved in acetone in addition to pure water and pure acetone. The following formula was derived from the readings to relate instrument output to chlorophyll-a concentration.

$$\text{conc.} = 0.0094 \times 10^{\text{Output}} - 0.0296$$

Where:-

conc. = fluorophor concentration in $\mu\text{g/l}$

Output = Aquatracka output in volts

The above formula can be used in the range 0 - 100 microgrammes per litre to an uncertainty of 0.02 microgrammes per litre plus 7% of value.

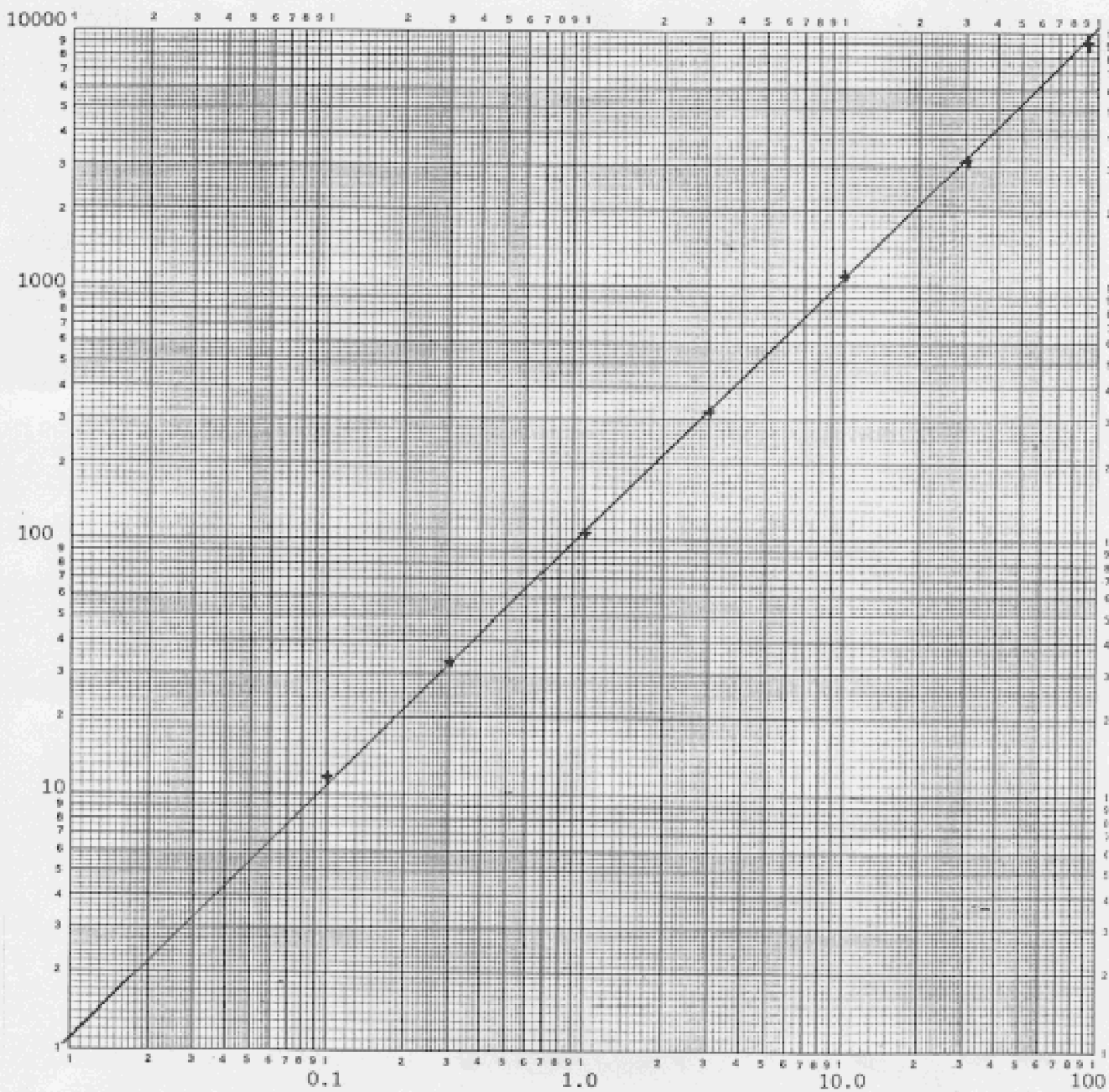
Notes

The above formula has been derived using Chlorophyll-a dissolved in acetone. No guarantee is given as to the performance of the instrument to biologically active chlorophyll in sea-water.

The zero offset has been determined in the laboratory using purified water from a reverse osmosis/ion exchange column. It is possible that purer water may be found in clean deep ocean conditions. Under these conditions, the offset shown in the above formula should be replaced by the antilogarithm of the Aquatracka output in the purest water found, multiplied by the scale factor.

Calibration graph for Aquatracka Mk III serial number 088216

$10^{\text{Output}} - 10^{\text{background}}$



Concentration (µg/l)

Fluorimeter calibration readings

Ambient temperature 20°C

Output for detector mechanically blanked 0.238 Volts

Output for pure water 0.4986 Volts

chlorophyll concentration in acetone ($\mu\text{g/l}$)	Output (volts)
Acetone (pure)	0.5652
0.1	1.1844
0.3	1.5670
1.0	2.0393
2.99	2.5101
9.9	3.0379
29.1	3.4925
90.9	3.9535

The uncertainty of the chlorophyll concentration is estimated not to exceed 3%. The uncertainty of output voltage measurement is estimated not to exceed 2mV.

Signed

Date

J.P. Vessey

7.1.00

TEST REPORT

This is to certify that Aquatracka III (Titanium)

Serial No. 088216 has been pressure tested for 1 hour at 60 bar. This is a leakage test.

The design itself has been verified by approval testing as suitable for use to a maximum depth of 6000 metres

Signed: *Christina*

Date: 7.1.00

APPLICATION NOTE NO. 39

Calculating SEASOFT Coefficients for the Chelsea Fluorometer*Revised August 1994*

The Chelsea fluorometer measures Chlorophyll-*a* concentrations in the approximate range of 0.01 mg/l to 100 mg/l with a logarithmic output of nominally 0 to +4 volts. SEASOFT interprets the fluorometer output voltage as:

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

where...

V	fluorometer output voltage in-situ
slope	nominally 1.0; user may adjust to fit field data ¹
sf	scale factor (1.0 for SBE 911plus, SBE 19, and SBE 25; 2.0 for versions of the of the SBE 9 having input amplifiers with a gain of 2; 1.0 for all other versions of the SBE 9)
VB	electrical zero (from Chelsea calibration sheet) ²
V1μg/l	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

¹Users 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 SEASOFT 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 via SEACON would then correct the indicated concentrations. In general, VB, V1mg/l, 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.

²Chelsea 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.

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

Last modified: 24-Feb-2000