Nutrient Protocol

The nutrients were analyzed on a Lachat QuikChem 8500 Series 2 Flow Injection Analysis System.

Nitrate+nitrite principle: A filtered sample is reduced to nitrite by a copper-cadmium reductor column.  The nitrite then reacts with sulfanilamide under acidic conditions to form a diazo compound which then couples with N-1-naphthylethylenediamine dihydrochloride to form a purple azo dye which is then detected by a colorimeter at 540 nm. (Grasshoff 1976)  
Orthophosphate principle: Based on the colorimetric method in which a blue color is formed by the reaction of orthophosphate, molybdate ion and antimony ion followed by reduction with ascorbic acid at pH<1.  The reduced phospho-molybdenum complex is read at 880 nm (Murphy & Riley 1962, Grasshoff 1976).  
Silicate principle: Soluble silica species are also measured by reduction to a molybdenum blue complex by ascorbic acid.  Oxalic acid is added to remove phosphate interference. The molybdenum blue is read at 660nm (Grasshoff 1976).

GRASSHOFF, K. [ED.] 1976. Methods of seawater analysis. Verlag Chemie, Weinheim and New York, xv + 317 p.

**Nitrate:**

MDL = 0.036 µM

%RSD = 0.86 for 0.36 µM standard

%RSD = 0.33 for 7.14 µM standard

%RSD = 0.59 for 28.57 µM standard

Smith, P and K Bogren. 2003. Determination of nitrate and/or nitrite in brackish or seawater by flow injection analysis colorimetry. QuikChem Method 31-107-04-1-E. Lachat Instruments. Loveland, Colorado.

**Phosphate:**

MDL = 0.032 µM

%RSD = 0.86 for 3.22 µM standard

Knepel, K and K Bogren. 2008. Determination of orthophosphate by flow injection analysis. QuikChem Method 31-115-01-1-H. Lachat Instruments. Loveland, Colorado.

**Silicate:**

MDL = 0.1 µM

%RSD = 0.233 for 50 µM standard

%RSD = 0.126 for 20 µM standard

Tucker, S. 2010. Determination of silicate in brackish or seawater by flow injection analysis. QuikChem Method 31-114-27-2-A. Lachat Instruments. Loveland, Colorado.