

## 2007-15 Nutrients duplicates - page 1

### Nitrate\_plus\_Nitrite:Bottle

#### Precision statement for replicate samples drawn from a single Niskin bottle:

The pooled standard deviation for Nitrate\_plus\_Nitrite:Bottle for the range 0.0 to 43.1  $\mu\text{mol/l}$  was 0.17,  
k = 24 (2 outliers removed) where k is the number of pairs of duplicates.

The pooled standard deviation of pairs of samples ( $S_p$ ) was calculated by:

$$S_p = \text{SQRT}\{\text{sum}(d^2)/2k\}$$

where k is the number of pairs and d is the difference between pairs.

Nitrate data from 1000 to 4000 m agrees with results averaged over 16 profiles at P26 from 1995 to 2001 to within 0.13 %.

#### Duplicate samples from a single Niskin bottle

| Event Number | Sample Number | Station | Pressure dbar | Nitrate 1 $\mu\text{mol/l}$ | Nitrate 2 $\mu\text{mol/l}$ | Rejected yes / no | Comment                   |
|--------------|---------------|---------|---------------|-----------------------------|-----------------------------|-------------------|---------------------------|
| 1            | 8             | SI03    | 52.0          | 28.5                        | 28.4                        |                   |                           |
| 4            | 42            | P2      | 24.9          | 22.2                        | 22.4                        |                   |                           |
| 8            | 60            | P4      | 15.7          | 0.1                         | 0.0                         |                   |                           |
| 14           | 108           | P8      | 150.9         | 26.8                        | 26.9                        |                   |                           |
| 19           | 129           | P12     | 1250.9        | 46.3                        | 44.9                        | yes               | Bad duplicate for nitrate |
| 22           | 164           | P12     | 30.5          | 7.5                         | 7.4                         |                   |                           |
| 27           | 194           | P16     | 174.7         | 27.9                        | 27.9                        |                   |                           |
| 28           | 217           | P16     | 2.5           | 4.7                         | 4.7                         |                   |                           |
| 35           | 238           | P20     | 198.7         | 31.4                        | 33.3                        | yes               | Bad duplicate for nitrate |
| 47           | 319           | P26     | 19.9          | 10.7                        | 10.6                        |                   |                           |
| 48           | 344           | P26     | 126.8         | 30.4                        | 30.6                        |                   |                           |
| 51           | 351           | P26     | 300.4         | 43.1                        | 43.1                        |                   |                           |
| 55           | 397           | P26     | 75.1          | 17.4                        | 17.5                        |                   |                           |
| 59           | 448           | P33     | 123.9         | 32.9                        | 32.1                        |                   |                           |
| 64           | 470           | R17     | 125.1         | 29.6                        | 29.8                        |                   |                           |
| 69           | 491           | R13     | 151.4         | 25.6                        | 25.5                        |                   |                           |
| 76           | 508           | R9N     | 400.0         | 36.5                        | 36.2                        |                   |                           |
| 85           | 573           | SS1     | 245.3         | 34.1                        | 34.1                        |                   |                           |
| 88           | 590           | SS3     | 124.4         | 20.5                        | 20.6                        |                   |                           |
| 90           | 601           | SS5     | 127.0         | 29.8                        | 29.8                        |                   |                           |
| 93           | 612           | SS7     | 75.7          | 28.2                        | 28.3                        |                   |                           |
| 94           | 620           | Ri1     | 200.4         | 29.2                        | 29.1                        |                   |                           |
| 101          | 635           | Ri4     | 175.3         | 28.4                        | 29.0                        |                   |                           |
| 106          | 649           | M2      | 100.1         | 29.9                        | 30.1                        |                   |                           |
| 107          | 658           | M3      | 200.1         | 31.4                        | 31.5                        |                   |                           |
| 108          | 679           | M4      | 25.2          | 21.2                        | 21.0                        |                   |                           |

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### Phosphate:Bottle

#### Precision statement for replicate samples drawn from a single Niskin bottle:

The pooled standard deviation for Phosphate:Bottle for the range 0.30 to 3.31  $\mu\text{mol/l}$  was 0.005,  
 $k = 26$  (0 outlier removed) where  $k$  is the number of pairs of duplicates.

The pooled standard deviation of pairs of samples ( $S_p$ ) was calculated by:

$$S_p = \text{SQRT}\{\text{sum } (d^2)/2k\}$$

where  $k$  is the number of pairs and  $d$  is the difference between pairs.

Phosphate data from 1000 to 4000 m agrees with results averaged over 16 profiles at P26 from 1995 to 2001  
to within 1.78 %.

#### Duplicate samples from a single Niskin bottle

| Event<br>Number | Sample<br>Number | Station | Pressure<br>dbar | Phosphate 1<br>$\mu\text{mol/l}$ | Phosphate 2<br>$\mu\text{mol/l}$ | Rejected<br>yes / no | Comment |
|-----------------|------------------|---------|------------------|----------------------------------|----------------------------------|----------------------|---------|
| 1               | 8                | SI03    | 52.0             | 2.35                             | 2.35                             |                      |         |
| 4               | 42               | P2      | 24.9             | 1.77                             | 1.78                             |                      |         |
| 8               | 60               | P4      | 15.7             | 0.31                             | 0.30                             |                      |         |
| 14              | 108              | P8      | 150.9            | 2.04                             | 2.04                             |                      |         |
| 19              | 129              | P12     | 1250.9           | 3.29                             | 3.31                             |                      |         |
| 22              | 164              | P12     | 30.5             | 0.98                             | 0.98                             |                      |         |
| 27              | 194              | P16     | 174.7            | 1.97                             | 1.96                             |                      |         |
| 28              | 217              | P16     | 2.5              | 0.72                             | 0.72                             |                      |         |
| 35              | 238              | P20     | 198.7            | 2.41                             | 2.42                             |                      |         |
| 47              | 319              | P26     | 19.9             | 1.07                             | 1.07                             |                      |         |
| 48              | 344              | P26     | 126.8            | 2.19                             | 2.20                             |                      |         |
| 51              | 351              | P26     | 300.4            | 2.93                             | 2.93                             |                      |         |
| 55              | 397              | P26     | 75.1             | 1.48                             | 1.48                             |                      |         |
| 59              | 448              | P33     | 123.9            | 2.27                             | 2.27                             |                      |         |
| 64              | 470              | R17     | 125.1            | 2.20                             | 2.21                             |                      |         |
| 69              | 491              | R13     | 151.4            | 1.93                             | 1.93                             |                      |         |
| 76              | 508              | R9N     | 400.0            | 2.64                             | 2.64                             |                      |         |
| 85              | 573              | SS1     | 245.3            | 2.59                             | 2.58                             |                      |         |
| 88              | 590              | SS3     | 124.4            | 1.71                             | 1.71                             |                      |         |
| 90              | 601              | SS5     | 127.0            | 2.37                             | 2.37                             |                      |         |
| 93              | 612              | SS7     | 75.7             | 2.38                             | 2.38                             |                      |         |
| 94              | 620              | Ri1     | 200.4            | 2.56                             | 2.56                             |                      |         |
| 101             | 635              | Ri4     | 175.3            | 2.54                             | 2.55                             |                      |         |
| 106             | 649              | M2      | 100.1            | 2.44                             | 2.43                             |                      |         |
| 107             | 658              | M3      | 200.1            | 2.48                             | 2.48                             |                      |         |
| 108             | 679              | M4      | 25.2             | 1.71                             | 1.71                             |                      |         |

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### Silicate:Bottle

#### Precision statement for replicate samples drawn from a single Niskin bottle:

The pooled standard deviation for Silicate:Bottle for the range 9.4 to 158.1  $\mu\text{mol/l}$  was 0.45,  
 $k = 26$  (0 outlier removed) where  $k$  is the number of pairs of duplicates.

The pooled standard deviation of pairs of samples ( $S_p$ ) was calculated by:

$$S_p = \text{SQRT}\{\text{sum}(d^2)/2k\}$$

where  $k$  is the number of pairs and  $d$  is the difference between pairs.

Silicate data from 1000 to 4000 m agrees with results averaged over 16 profiles at P26 from 1995 to 2001 to within 0.59 %

#### Duplicate samples from a single Niskin bottle

| Event Number | Sample Number | Station | Pressure dbar | Silicate 1 $\mu\text{mol/l}$ | Silicate 2 $\mu\text{mol/l}$ | Rejected yes / no | Comment |
|--------------|---------------|---------|---------------|------------------------------|------------------------------|-------------------|---------|
| 1            | 8             | SI03    | 52.0          | 51.7                         | 51.7                         |                   |         |
| 4            | 42            | P2      | 24.9          | 33.4                         | 33.3                         |                   |         |
| 8            | 60            | P4      | 15.7          | 10.0                         | 10.0                         |                   |         |
| 14           | 108           | P8      | 150.9         | 34.4                         | 34.4                         |                   |         |
| 19           | 129           | P12     | 1250.9        | 158.1                        | 158.1                        |                   |         |
| 22           | 164           | P12     | 30.5          | 9.5                          | 9.4                          |                   |         |
| 27           | 194           | P16     | 174.7         | 46.8                         | 46.7                         |                   |         |
| 28           | 217           | P16     | 2.5           | 10.9                         | 10.8                         |                   |         |
| 35           | 238           | P20     | 198.7         | 61.7                         | 61.8                         |                   |         |
| 47           | 319           | P26     | 19.9          | 16.8                         | 16.9                         |                   |         |
| 48           | 344           | P26     | 126.8         | 50.1                         | 50.2                         |                   |         |
| 51           | 351           | P26     | 300.4         | 85.7                         | 86.9                         |                   |         |
| 55           | 397           | P26     | 75.1          | 25.6                         | 25.7                         |                   |         |
| 59           | 448           | P33     | 123.9         | 49.7                         | 50.8                         |                   |         |
| 64           | 470           | R17     | 125.1         | 50.8                         | 49.3                         |                   |         |
| 69           | 491           | R13     | 151.4         | 39.8                         | 40.5                         |                   |         |
| 76           | 508           | R9N     | 400.0         | 60.7                         | 60.9                         |                   |         |
| 85           | 573           | SS1     | 245.3         | 57.7                         | 57.0                         |                   |         |
| 88           | 590           | SS3     | 124.4         | 31.4                         | 29.4                         |                   |         |
| 90           | 601           | SS5     | 127.0         | 51.6                         | 51.9                         |                   |         |
| 93           | 612           | SS7     | 75.7          | 52.8                         | 52.8                         |                   |         |
| 94           | 620           | Ri1     | 200.4         | 58.7                         | 58.7                         |                   |         |
| 101          | 635           | Ri4     | 175.3         | 58.4                         | 58.8                         |                   |         |
| 106          | 649           | M2      | 100.1         | 55.7                         | 55.1                         |                   |         |
| 107          | 658           | M3      | 200.1         | 57.9                         | 58.0                         |                   |         |
| 108          | 679           | M4      | 25.2          | 39.7                         | 39.7                         |                   |         |