

# DAILY SCIENCE LOG BOOK

MISSION  
NUMBER

2011-01

DATE:

From: 8 FEBRUARY

to: 22 FEBRUARY 2011

VESSEL:

JOHN P TULLY

PROJECT(S):

LING P

Water Properties Group  
Fisheries and Oceans Canada  
Institute of Ocean Sciences  
Ocean Sciences Division  
North Saanich, BC, Canada

**WaterProperties.ca**

Captain: MURRAY MCGREGOR First Officer: ALAN YOUNG

Second Officer: RONALD LETAU Third Officer: JODY HESKE

Fishing Master: \_\_\_\_\_

Mission Participants / Agencies: IOS/DFP U3C Uvic, UAT, CUNY, BIOS, UW

**Scientific Personnel:**

| Name               | Watch | Cabin | Name            | Watch | Cabin |
|--------------------|-------|-------|-----------------|-------|-------|
| CHRISTINA SCHALLER | B     | 00-06 | IAN BEVERIDGE   | H     | 06-12 |
| JANE EERT          | C     | 12-24 | HUGH MACLEAN    | 00-12 | 3     |
| KEITH JOHNSON      | D     | 12-18 | MICHAEL ARYCHUK | DMS   | 4     |
| CASSIE SCHWANGER   | E     | 18-24 |                 |       |       |
| HUI YAN CHOI       | F     | 06-12 |                 |       |       |
| STEVEN BELL        | F     | 00-06 |                 |       |       |
| ROGER PAT KELLY    | F     | 18-24 |                 |       |       |
| CRAIG HEWIS        | G     | 00-06 |                 |       |       |
| EVAN HOWARD        | G     | 12-18 |                 |       |       |
| KYLE SIMPSON       | H     | 18-24 |                 |       |       |

## Second leg of Mission:

[illegible]

## Data logging computer:

Data acquisition program: \_\_\_\_\_  
 CTD deck unit make: \_\_\_\_\_ model: \_\_\_\_\_ serial number: \_\_\_\_\_

## Primary CTD

Make: model: serial number:

Primary temperature serial number:

Primary conductivity serial number:

Secondary temperature serial number:

Secondary conductivity serial number:

Transmissometer: \_\_\_\_\_ Model: \_\_\_\_\_ s/n: \_\_\_\_\_

Fluorometer: Model \_\_\_\_\_ Cable gain: \_\_\_\_\_ s/n: \_\_\_\_\_

Oxygen sensor: \_\_\_\_\_ Model: \_\_\_\_\_ s/n: \_\_\_\_\_

PAR sensor: \_\_\_\_\_ Model: \_\_\_\_\_ s/n: \_\_\_\_\_

Other sensors: \_\_\_\_\_ s/n: \_\_\_\_\_

Other sensors: \_\_\_\_\_ s/n: \_\_\_\_\_

Other sensors: \_\_\_\_\_ s/n: \_\_\_\_\_

Other sensors: \_\_\_\_\_ s/n: \_\_\_\_\_

## Secondary CTD

Make: \_\_\_\_\_ model: \_\_\_\_\_ serial number: \_\_\_\_\_

**Primary temperature serial number:**

Primary conductivity serial number:

Secondary temperature serial number:

Secondary conductivity serial number:

|                  |        |             |                  |
|------------------|--------|-------------|------------------|
| Transmissometer: | Model: | s/n:        |                  |
| Fluorometer:     | Model  | Cable gain: | s/n:             |
| Oxygen sensor:   | Model: | s/n:        | P, S or NO pump? |
| PAR sensor:      | Model: | s/n:        | P, S or NO pump? |
| Other sensors:   |        | s/n:        | P, S or NO pump? |
| Other sensors:   |        | s/n:        | P, S or NO pump? |
| Other sensors:   |        | s/n:        | P, S or NO pump? |
| Other sensors:   |        | s/n:        | P, S or NO pump? |

CTD calibration bottle location (height above CTD in metres):

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| Month <u>Février</u> |              |            |           | Year <u>2011</u> |               |              | Ship <u>TULLY</u>      |            |              |           | Cruise ID <u>2011-01</u> |              |               |                |                             |
|----------------------|--------------|------------|-----------|------------------|---------------|--------------|------------------------|------------|--------------|-----------|--------------------------|--------------|---------------|----------------|-----------------------------|
| Day                  | Station Name | Time (UTC) | Time Code | Cast Type        | Firing Method | Event Number | Positional Information |            | Bottom Depth | Max Depth | Sample Numbers           | # of Bottles | Watch Keepers | Trans. Cleaned | Comments                    |
|                      |              |            |           |                  |               |              | Latitude               | Longitude  |              |           |                          |              |               |                |                             |
| 09                   | S103         | 6308       | BE        | ROS              | US            | 1/2          | 48 35.59               | 123 29.99  | 224          | 215(19)   | 1-11                     | 11           | SE/MR         | ✓              | fluorometer not working * → |
|                      |              | 0319       | BO        |                  |               |              | 48 35.54               | 123 29.97  |              |           |                          |              |               |                |                             |
|                      |              | 0334       | EN        |                  |               |              | 48 35.47               | 123 29.93  |              |           |                          |              |               |                | PAR on.                     |
| 09                   | JF 01        | 0851       |           | USW              |               |              | 48° 16.13              | 123° 30.11 |              |           |                          |              |               |                |                             |
| 09                   | JF 02        | 1048       |           | USW              |               |              | 48° 18.06              | 123° 59.98 |              |           |                          |              |               |                |                             |
| 09                   | JF 03        | 1307       |           | USW              |               |              | 48° 26.77              | 124° 30.29 |              |           |                          |              |               |                |                             |
| 09                   | JF 04        | 1514       |           | USW              |               |              | 48° 32.03              | 125° 00.07 |              |           |                          |              |               |                |                             |
| 9                    | P1           | 1726       | BE        | ROS              | US            | 3            | 48 34.43               | 125° 29.98 | 134          |           | 12-14                    | 3            | MR            | ✓              |                             |
|                      |              | 1730       | BO        |                  |               |              | 48 34.43               | 125° 29.96 |              | 125       |                          |              |               |                |                             |
|                      |              | 1734       | EN        |                  |               |              | 48 34.40               | 125° 29.96 |              |           |                          |              |               |                |                             |
|                      | P2           | 1945       | BE        | ROS              | US            | 4            |                        |            | 115          |           | 15-28                    | 14           | HM/SE         |                | DMS cast                    |
|                      |              | 1947       | BO        |                  |               |              | 48 35.99               | 126 00.024 |              | 105       |                          |              |               |                |                             |
|                      |              | 2000       | EN        |                  |               |              | 48 36.02               | 126 00.01  |              |           |                          |              |               |                |                             |
|                      | P2           | 2017       | BE        | NET              |               | 5            | 48 36.16               | 126 00.06  | 117          |           |                          |              | HM/SE         |                | Bongo                       |
|                      |              | 2021       | BO        |                  |               |              | 48 36.21               | 126 00.11  |              | 100       |                          |              |               |                |                             |
|                      |              | 2024       | EN        |                  |               |              | 48 36.25               | 126 00.12  |              |           |                          |              |               |                |                             |
|                      | P2           | 2125       | BE        | ROS              |               | 6            | 48 36.01               | 126 00.06  | 116          |           | 29-36                    | 8            | SE            | ✓              | Deep cast.                  |
|                      |              | 2128       | BO        |                  |               |              | 48 36.01               | 126 00.08  |              | 106       |                          |              |               |                |                             |
|                      |              | 2136       | EN        |                  |               |              | 48 36.00               | 126 00.12  |              |           |                          |              |               |                |                             |

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Produced by the Water Properties Group, IOS

WaterProperties.ca  
Version: 16 April 2010

*This page is for any notes or observations*

- ~~was~~ - fired bottles 1&2 by accident on downcast.
- restarted with cast 2 for upcast, bottles fired out of sequence.

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| Month |              | FEBRUARY   |           | Year      |               | 2011         |                        | Ship      |              | TULLY               |                | Cruise ID    |               | 2011-01        |                              | Page 2 of 12 |  |
|-------|--------------|------------|-----------|-----------|---------------|--------------|------------------------|-----------|--------------|---------------------|----------------|--------------|---------------|----------------|------------------------------|--------------|--|
| Day   | Station Name | Time (UTC) | Time Code | Cast Type | Firing Method | Event Number | Positional Information |           | Bottom Depth | Max Depth           | Sample Numbers | # of Bottles | Watch Keepers | Trans. Cleaned | Comments                     |              |  |
|       |              |            |           |           |               |              | Latitude               | Longitude |              |                     |                |              |               |                |                              |              |  |
| 09    | P3           | 2312       | BE        | ROS       | US            | 07           | 48 37.59               | 126 19.77 | 796          |                     | 37-39          | 3            | SE            | ✓              | saltspike - lost             |              |  |
|       |              | 2326       | BO        |           |               |              | 48 37.60               | 126 19.82 |              | 795 <sup>+10</sup>  |                |              |               |                | pri. cand cell @ 500m ↓      |              |  |
|       |              | 2343       | EN        |           |               |              | 48 37.64               | 126 19.85 |              |                     |                |              |               |                | + oxy * →                    |              |  |
| 10    | P4           | 0120       | BE        | ROS       | US            | 08           | 48 38.98               | 126 39.94 | 1312         |                     | 40-55          | 16           | SE/MR         | ✓              | DMS cast                     |              |  |
|       |              | 0125       | BO        |           |               |              | 48 38.95               | 126 39.98 |              | 200                 |                |              |               |                | secondary flux probe @       |              |  |
|       |              | 0144       | EN        |           |               |              | 48 39.06               | 126 39.88 |              |                     |                |              |               |                | 65m. * →                     |              |  |
| 10    | P4           | 0155       | BE        | NET       |               | 09           | 48 39.12               | 126 39.76 | 1295         |                     |                |              |               |                |                              |              |  |
|       |              | 0203       | BO        |           |               |              | 48 39.12               | 126 39.77 |              | 250                 |                |              |               |                |                              |              |  |
|       |              | 0211       | EN        |           |               |              | 48 39.10               | 126 39.78 |              |                     |                |              |               |                |                              |              |  |
| 10    | P4           | 0226       | BE        | ROS       | US            | 10           | 48 39.07               | 126 39.83 | 1297         |                     | 56-74          | 19           | M/SE          | ✓              | PAR OFF ☺                    |              |  |
|       |              | 0243       | BO        |           |               | 11           | 48 39.04               | 126 39.90 |              |                     |                |              |               |                | Deep Cast →                  |              |  |
|       |              | 0257       | BO        |           |               |              | 48 39.04               | 126 39.95 |              | 1300 <sup>+20</sup> |                |              |               |                |                              |              |  |
|       |              | 0330       | BE        |           |               | 12           | 48 38.96               | 126 39.99 |              |                     |                |              |               |                |                              |              |  |
|       |              | 0336       | EN        |           |               |              | 48 38.95               | 126 39.97 |              |                     |                |              |               |                | computer froze at 100m       |              |  |
| 10    | P4           | 0356       | BE        | BOT       |               | 13           | 48 38.89               | 126 39.95 | 100          |                     |                | 3            | CS            |                | an upcast                    |              |  |
|       |              | 0417       | MR        |           |               |              | 48 38.84               | 126 39.94 |              | 105                 |                |              |               |                | goflo cast                   |              |  |
|       |              | 0427       | EN        |           |               |              | 48 38.84               | 126 39.97 |              |                     |                |              |               |                | sample depths<br>100, 50, 25 |              |  |

Cast Type:

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Bottle Firing Method:

Time Code:

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Produced by the Water Properties Group, IOS

WaterProperties.ca  
 Version: 16 April 2010

Winch lost power @ ~370 m on upcast - start up after 45s or so.

at end of cast, left CTD at surface - stopped acq., rebooted PC, cycled power on deck unit.

Restarted Seesave, all OK w/ SBE43 & primary cond.

P4 DMS - lost winch power at 175m on upcast for ~1 minute & again at 100m & 40m & 15m

Cast 10: Long time @ surface @ start, winch problems.

Lost O + S<sub>0</sub> @ 504 ↓ Reboot. Did not solve problem?

Sensors back @ 550 ↓.

Out @ 640 ↓, back @ 1000 ↓  
ex, out @ 350 ↑ + cond (primary)

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| Month FEBRUARY |              |            |           | Year 2011 |               |              |                        | Ship TULLY |              |           |                | Cruise ID 2011-01 |               |                |                                                  |
|----------------|--------------|------------|-----------|-----------|---------------|--------------|------------------------|------------|--------------|-----------|----------------|-------------------|---------------|----------------|--------------------------------------------------|
| Day            | Station Name | Time (UTC) | Time Code | Cast Type | Firing Method | Event Number | Positional Information |            | Bottom Depth | Max Depth | Sample Numbers | # of Bottles      | Watch Keepers | Trans. Cleaned | Comments                                         |
|                |              |            |           |           |               |              | Latitude               | Longitude  |              |           |                |                   |               |                |                                                  |
| 10             | P4           | 0429       | BE        | BOT       |               | 14           | 48 38.84               | 126 39.99  | 15           |           |                | 1                 | CS            |                | Go Flo                                           |
|                |              | 0431       | MR        |           |               |              | 48 38.84               | 126 39.99  |              |           |                |                   |               |                |                                                  |
|                |              | 0438       | EN        |           |               |              | "                      | "          |              |           |                |                   |               |                |                                                  |
| 10             | P4           | 0455       | BE        | ROS       | US            | 15           | 48 38.85               | 126 40.02  | 1318         |           |                |                   | MR/JS         | ✓              | UBC CAST                                         |
|                |              | 0519       | BO        |           |               |              | 48 38.84               | 126 40.01  |              | 1300      | 75-86          | 12                |               |                | * →                                              |
|                |              | 0546       | EN        |           |               |              | 48 38.79               | 126 39.96  |              |           |                |                   |               |                |                                                  |
| 10             | P4           | 0617       | BE        | BOT       |               | 16           | 48 38.78               | 126 39.96  | 825          |           |                | 4                 | CS            |                | Go Flo                                           |
|                |              | 0700       | MR        |           |               |              | 48 38.88               | 126 39.76  |              | 800       |                |                   |               |                |                                                  |
|                |              | 0747       | EN        |           |               |              | 48 38.55               | 126 40.10  |              |           |                |                   |               |                |                                                  |
| 10             | P5           | 1001       | BE        | ROS       |               | 17           | 48° 41.48              | 127° 10.03 | 2086         |           | 87-88          | 2                 | H.M.          | ✓              | O <sub>2</sub> & PRACTICAL SAL                   |
|                |              | 1025       | BO        |           |               |              | 48° 41.52              | 127° 10.00 |              | 2005      |                |                   |               |                | DIES @ 458 m / BACK                              |
|                |              | 1055       | EN        |           |               |              | 48° 41.52              | 127° 10.01 |              |           |                |                   |               |                | @ 1025 m / OFF @ 400 f                           |
| 10             | P6           | 1321       | BE        | ROS       |               | 18           | 48° 44.60              | 127° 40.07 | 2543         |           |                | 2                 | H.M.          | ✓              |                                                  |
|                |              | 1354       | BO        |           |               |              | 48° 44.57              | 127° 39.98 |              | 2005      | 89-90          |                   |               |                | O <sub>2</sub> on @ 50 m / OFF 400 f             |
|                |              | 1422       | EN        |           |               |              | 48° 44.61              | 127° 39.98 |              |           |                |                   |               |                | ONE 1240 f / OFF 310 f                           |
| 10             | P7           | 1631       | BE        | ROS       |               | 19           | 48° 46.62              | 128° 09.98 | 2502         |           | 91-92          | 2                 | H.M.          | ✓              | O <sub>2</sub> on @ 23 f / OFF 400 f / ON @ 83 f |
|                |              | 1703       | BO        |           |               |              | 48° 46.62              | 128° 10.04 |              |           |                |                   |               |                | OUT @ 320 f                                      |
|                |              | 1735       | EN        |           |               |              | 48° 46.58              | 128° 10.01 |              |           |                |                   |               |                |                                                  |

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CAST 0015: Lost sensors @ 43 ↓, S<sub>0</sub> and O<sub>17</sub>.  
back ~ 50  
out ~ 380 ↓ back ~ 770 ↑  
out ~ 630 ↑

\* JANE AND I SWITCHED THE CABLES FROM THE 2 COND. SENSORS - PRIM → SECONDARY, SEC → PRIMARY  
ALSO SWITCHED TO BACKUP DECK UNIT - WHEN TURNED ON, NUMBERS LOOKED OK - WILL TRY CAST  
@ P8 TO CONFIRM  
HUGH

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| Month FEBRUARY |              |            |           | Year 2011 |               |              | Ship TULLY             |           |              |           | Cruise ID 2011-01 |              |               |                |                                 |
|----------------|--------------|------------|-----------|-----------|---------------|--------------|------------------------|-----------|--------------|-----------|-------------------|--------------|---------------|----------------|---------------------------------|
| Day            | Station Name | Time (UTC) | Time Code | Cast Type | Firing Method | Event Number | Positional Information |           | Bottom Depth | Max Depth | Sample Numbers    | # of Bottles | Watch Keepers | Trans. Cleaned | Comments                        |
|                |              |            |           |           |               |              | Latitude               | Longitude |              |           |                   |              |               |                |                                 |
| 10             | P8           | 2003       | BE        | NET       |               | 20           | 48 48.92               | 128 40.14 | 2516         |           |                   |              |               |                | BONGO 6820                      |
|                |              | 2012       | BO        |           |               |              | 48 48.96               | 128 40.26 |              | 250       |                   |              |               |                |                                 |
|                |              | 2017       | EN        |           |               |              | 48 49.01               | 128 40.35 |              |           |                   |              |               |                |                                 |
| 10             | P8           | 2031       | BE        | ROS       | US            | 21           | 48 49.04               | 128 40.51 | 2515         |           |                   |              |               |                | DECK UNIT OSCP                  |
|                |              | 2103       | BO        |           |               |              | 48 49.03               | 128 40.38 |              | 2005      | 93-116            | 24           | MR/SE         |                | Cond 1 ↔ Cond 2                 |
|                |              | 2153       | EN        |           |               |              | 48 48.96               | 128 40.10 |              |           |                   |              |               |                | WRONG CON FILE →                |
| 11             | P9           | 0019       | BE        | ROS       | US            | 22           | 48 51.41               | 129 09.50 | 2337         |           | 122-125           | 9            | JE            | ✓              | note #117 → 121 moved to        |
|                |              | 0057       | BO        |           |               |              | 48 51.29               | 129 09.65 |              | 2005      |                   |              |               |                | CAST 23 at P10.                 |
|                |              | 0138       | EN        |           |               |              | 48 50.99               | 129 09.22 |              |           |                   |              |               |                | 5 bottles closed, but no sample |
| 11             | P10          | 0403       | BE        | ROS       | US            | 23           | 48 53.70               | 129 39.81 | 2652         |           | 117-121, 126-129  | 9            | JE            | ✓              | * →                             |
|                |              | 0429       | BO        |           |               |              | 48 53.71               | 129 39.28 |              | 2005      |                   |              |               |                |                                 |
|                |              | 0455       | EN        |           |               |              | 48 53.71               | 129 39.14 |              |           |                   |              |               |                |                                 |
| 11             | P11          | 0731       | BE        | ROS       | US            | 24           | 48 56.07               | 130 09.76 | 2754         |           | 130-131           | 2            | JE/HM         | ✓              | wind ~29kts                     |
|                |              | 0811       | BO        |           |               |              | 48 56.03               | 130 09.57 |              | 2005      |                   |              |               |                | enough swell to slow            |
|                |              | 0848       | EN        |           |               |              | 48 55.97               | 130 09.86 |              |           |                   |              |               |                | descent.                        |

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before cast 21/P8

- switch CTD/DATA serial feed to native serial port on PC instead of LAVA com port
- swap deck units
- swap cables to conductivity cells - 1  $\leftrightarrow$  2

Results: serial + deck unit swaps, no difference, still no DO, S=1995. After cable swap, all OK.

Lost data @ 200  $\downarrow$       Lost cond 1 1 1  
back @ 1030  $\downarrow$   
lost @ 380  $\uparrow$

Cast 21 Note: CT pairs are mismatched

Physical T1 is paired with physical C1 <sup>but C1 is</sup> going through channel B C2.  
same for T2 is being processed with C1

After P8: change C1 cable only, we'll see

\* P9 - Winch fault at 1874 m  $\uparrow$  for a few minutes.

\* P10 High-DO, low Sal layer ~ 50 m thick nr. 350 m      Why?

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| Month FEBRUARY |              |            |           | Year 2011 |               |              | Ship TULLY             |            |              |           | Cruise ID 2011-01 |              |               |                |            |
|----------------|--------------|------------|-----------|-----------|---------------|--------------|------------------------|------------|--------------|-----------|-------------------|--------------|---------------|----------------|------------|
| Day            | Station Name | Time (UTC) | Time Code | Cast Type | Firing Method | Event Number | Positional Information |            | Bottom Depth | Max Depth | Sample Numbers    | # of Bottles | Watch Keepers | Trans. Cleaned | Comments   |
|                |              |            |           |           |               |              | Latitude               | Longitude  |              |           |                   |              |               |                |            |
| 11             | P12          | 1049       | BE        | Go-Flo    |               | 25           | 48° 58.97              | 130° 39.86 | 125          |           |                   | 4            | C.S.          |                |            |
|                |              | 1116       | MR        |           |               |              | 48° 58.26              | 130° 39.92 |              | 100       |                   |              |               |                |            |
|                |              | 1227       | GN        |           |               |              | 48° 58.26              | 130° 39.87 |              |           |                   |              |               |                |            |
| 11             | P12          | 1243       | BE        | ROS       | US            | 26           | 48° 58.25              | 130° 39.85 | 3237         |           |                   |              | H.M.          |                | VBC CAST   |
|                |              | 1322       | BO        |           |               |              | 48° 58.20              | 130° 39.90 |              | 2005      | 132-143           | 12           |               | ✓              |            |
|                |              | 1354       | GN        |           |               |              | 48° 58.20              | 130° 39.97 |              |           |                   |              |               |                |            |
| 11             | P12          | 1407       | BE        | GoRO      |               | 27           | 48° 58.33              | 130° 40.09 | 630          |           |                   | 3            | CS            |                |            |
|                |              | 1456       | MR        |           |               |              | 48° 58.10              | 130° 40.02 |              | 600       |                   |              |               |                |            |
|                |              | 1528       | EN        |           |               |              | 48° 58.03              | 130° 39.88 |              |           |                   |              |               |                |            |
| 11             | P12          | 1555       | BE        | ROS       | US            | 28           | 48° 58.06              | 130° 40.02 | 3260         |           |                   |              |               |                | PAR ON ↓   |
|                |              | 1603       | BO        |           |               |              | 48° 58.03              | 130° 40.07 |              | 500       |                   |              |               |                | Th+Po CAST |
|                |              | 1625       | GN        |           |               |              | 48° 58.03              | 130° 40.22 |              |           |                   |              |               |                |            |
| 11             | P12          |            | BE        | NET       |               | 29           | 48° 58.21              | 130° 40.09 | 3260         |           |                   |              |               |                | URI Bongo  |
|                |              | 1645       | BO        |           |               |              | 48° 58.18              | 130° 40.11 |              | 100       |                   |              |               |                |            |
|                |              | 1648       | GN        |           |               |              | 48° 58.17              | 130° 40.11 |              |           |                   |              |               |                |            |
| 11             | P12          | 1656       | BE        | NET       |               | 30           | 48° 58.19              | 130° 40.06 | 3260         |           |                   |              |               |                | IOS Bongo  |
|                |              | 1702       | BO        |           |               |              | 48° 58.18              | 130° 40.10 |              | 250       |                   |              |               |                |            |
|                |              | 1707       | EN        |           |               |              | 48° 58.13              | 130° 40.14 |              |           |                   |              |               |                |            |

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Transmissometer to be cleaned before each cast, do not use Ammonia products

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# DAILY SCIENCE LOG

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| Month <u>FEBRUARY</u> |              |            |           | Year <u>2011</u> |               |              | Ship <u>TULLY</u>      |            |              |           | Cruise ID <u>2011-01</u> |              |               |                | Page <u>6</u> of <u>12</u> |  |
|-----------------------|--------------|------------|-----------|------------------|---------------|--------------|------------------------|------------|--------------|-----------|--------------------------|--------------|---------------|----------------|----------------------------|--|
| Day                   | Station Name | Time (UTC) | Time Code | Cast Type        | Firing Method | Event Number | Positional Information |            | Bottom Depth | Max Depth | Sample Numbers           | # of Bottles | Watch Keepers | Trans. Cleaned | Comments                   |  |
|                       |              |            |           |                  |               |              | Latitude               | Longitude  |              |           |                          |              |               |                |                            |  |
| 10                    | P12          | 1721       | BE        | ROS              | US            | 31           | 48° 58.18              | 130° 40.12 | 3233         | 100       | 206-212                  | 7            | HM/CM         | ✓              | Stevens cast               |  |
|                       |              | 1723       | BO        |                  |               |              | 48° 58.16              | 130° 40.14 |              |           |                          |              |               |                |                            |  |
|                       |              | 1731       | EN        |                  |               |              | 48° 58.14              | 130° 40.16 |              |           |                          |              |               |                |                            |  |
| 11                    | P12          | 1805       | BE        | ROS              | US            | 32           | 48° 58.14              | 130° 40.44 | 3000         |           | 168-190                  | 24           | 4m/JE         | ✓              | PAR OFF                    |  |
|                       |              | 1850       | BO        |                  |               |              | 48° 58.07              | 130° 40.21 |              | 3000      | +213                     |              |               |                | Same prob. w/ fluo.        |  |
|                       |              | 1957       | EN        |                  |               |              | 48° 58.10              | 130° 40.08 |              |           |                          |              |               |                |                            |  |
| 11                    | P12          | 2103       | BE        | ROS              | US            | 33           | 48° 58.23              | 130° 40.02 | 3234         |           |                          | 15           | JE            | ✓              | PAR ON                     |  |
|                       |              | 2108       | BO        |                  |               |              | 48° 58.23              | 130° 40.00 |              | 200       | 191-205                  |              |               |                | DMO CAST                   |  |
|                       |              | 2123       | EN        |                  |               |              | 48° 58.23              | 130° 40.00 |              |           |                          |              |               |                |                            |  |
| 12                    | P13          | 0158       | BE        | ROS              | US            | 34           | 49° 02.63              | 131° 39.80 | 2984         |           | 214-216                  | 3            | JE            | ✓              | PAR OFF                    |  |
|                       |              | 0227       | BO        |                  |               |              | 49° 02.69              | 131° 39.72 |              | 2005      |                          |              |               |                | TSG off during             |  |
|                       |              | 0301       | EN        |                  |               |              | 49° 02.72              | 131° 39.72 |              |           |                          |              |               |                | str to work on valve       |  |
| 12                    | P14          | 0759       | BE        | ROS              | US            | 35           | 49° 07.45              | 132° 39.88 | 3315         |           | 217-218                  | 2            | JE/HM         | ✓              |                            |  |
|                       |              | 0825       | BO        |                  |               |              | 49° 07.41              | 132° 39.99 |              | 2005      |                          |              |               |                |                            |  |
|                       |              | 0858       | EN        |                  |               |              | 49° 07.40              | 132° 40.01 |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |
|                       |              |            |           |                  |               |              |                        |            |              |           |                          |              |               |                |                            |  |

## Cast Type:

BOT = Bottle cast, no CTD  
CTD = CTD without Rosette  
ROS = Rosette plus CTD  
SET = Fish Set

USW = Sea Water Loop  
MOR = Mooring  
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DRF = Drifter

## Bottle Firing Method:

US = Up / Stop  
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RE = Recover Mooring Time

Transmissometer to be cleaned before each cast, do not use Ammonia products

## Notes:

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*This page is for any notes or observations*

after cast 33, replace air valve O-rings on bottles 1, 3, 24

# DAILY SCIENCE LOG

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| Month FEBRUARY |              |            |           | Year 2011 |               |              | Ship TULLY             |            |              | Cruise ID 2011-01 |                |              |               |                | Page 7 of 12    |  |
|----------------|--------------|------------|-----------|-----------|---------------|--------------|------------------------|------------|--------------|-------------------|----------------|--------------|---------------|----------------|-----------------|--|
| Day            | Station Name | Time (UTC) | Time Code | Cast Type | Firing Method | Event Number | Positional Information |            | Bottom Depth | Max Depth         | Sample Numbers | # of Bottles | Watch Keepers | Trans. Cleaned | Comments        |  |
|                |              |            |           |           |               |              | Latitude               | Longitude  |              |                   |                |              |               |                |                 |  |
| 12             | P15          | 1347       | BE        | ROS       | US            | 36           | 49° 12.00              | 133° 39.90 | 3407         |                   | 219-220        | 2            | H.M           | ✓              |                 |  |
|                |              | 1416       | BO        |           |               |              | 49° 12.04              | 133° 39.97 |              | 2005              |                |              |               |                |                 |  |
|                |              | 1442       | EH        |           |               |              | 49° 12.03              | 133 39.98  |              |                   |                |              |               |                |                 |  |
| 12             | P16          | 1957       | BE        | ROS       | V.S.          | 37           | 49° 16.99              | 134° 40.00 | 3634         |                   | 221-242        | 22           | H.M/IE        | ✓              | PAR / JON       |  |
|                |              | 1959       | BO        |           |               |              | 49 16.99               | 134 40.06  |              | 200               |                |              |               |                | DMS / STEVE     |  |
|                |              | 2025       | EH        |           |               |              | 49 16.98               | 134 40.07  |              |                   |                |              |               |                | * →             |  |
|                |              |            |           |           |               |              |                        |            |              |                   |                |              |               |                | Aborted with 2  |  |
| 12             | P16          | 2040       | BE        | Pump      |               | 38           | 49 16.98               | 134 40.07  | 3635         |                   |                |              |               |                | bottles fired - |  |
|                |              | 2115       | EN        |           |               |              | 49 16.45               | 134 40.02  |              |                   |                |              |               |                | winch trouble.  |  |
|                |              |            |           |           |               |              |                        |            |              |                   |                |              |               |                |                 |  |
| 12             | P16          | 2125       | BE        | ROS       |               | 39           | 49 16.29               | 134 40.03  | 3636         |                   | 221-242        | 22           | IE            | ✓              |                 |  |
|                |              | 2132       | BO        |           |               |              | 49 16.22               | 134 40.02  |              | 200               |                |              |               |                |                 |  |
|                |              | 2151       | EN        |           |               |              | 49 15.96               | 134 40.09  |              |                   |                |              |               |                |                 |  |
|                |              |            |           |           |               |              |                        |            |              |                   |                |              |               |                |                 |  |
| 12             | P16          | 2202       | BE        | Net       |               | 40           | 49 16.06               | 134 39.98  | 3637         |                   |                |              |               |                |                 |  |
|                |              | 2207       | BO        |           |               |              | 49 15.97               | 134 39.89  |              | 100               |                |              |               |                | URI             |  |
|                |              | 2211       | EN        |           |               |              | 49 15.87               | 134 39.68  |              |                   |                |              |               |                |                 |  |
|                |              |            |           |           |               |              |                        |            |              |                   |                |              |               |                |                 |  |
|                |              |            |           |           |               |              |                        |            |              |                   |                |              |               |                |                 |  |

Cast Type:

ROS = Bottle cast, no STD

USW

= Sea Water Loop

Bottle Firing Method:

Time Code:

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winch lost power @ 128m ↑

cast aborted for winch repair

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| Month <i>FEVRIER</i> |              |            |           | Year <i>2011</i> |               |              | Ship <i>TULLY</i>      |           |              |                    | Cruise ID <i>2011-01</i> |              |               |                |              |
|----------------------|--------------|------------|-----------|------------------|---------------|--------------|------------------------|-----------|--------------|--------------------|--------------------------|--------------|---------------|----------------|--------------|
| Day                  | Station Name | Time (UTC) | Time Code | Cast Type        | Firing Method | Event Number | Positional Information |           | Bottom Depth | Max Depth          | Sample Numbers           | # of Bottles | Watch Keepers | Trans. Cleaned | Comments     |
|                      |              |            |           |                  |               |              | Latitude               | Longitude |              |                    |                          |              |               |                |              |
| 12                   | P16          | 22:22      | BE        | Net              |               | 41           | 49 15.85               | 134 39.72 | 3637         |                    |                          |              |               |                |              |
|                      |              | 22:28      | BO        |                  |               |              | 49 15.81               | 134 39.74 |              | 250                |                          |              |               |                |              |
|                      |              | 22:32      | EN        |                  |               |              | 49 15.77               | 134 39.73 |              |                    |                          |              |               |                |              |
| 12                   | P16          | 22:46      | BE        | ROS              | US            | 42           | 49 15.99               | 134 39.76 | 3636         |                    |                          |              |               |                |              |
|                      |              | 22:57      | BO        |                  |               |              | 49 15.96               | 134 39.86 |              | 500                | 243-266                  | 24           | MR/SE         |                |              |
|                      |              | 23:17      | EN        |                  |               |              | 49 15.90               | 134 40.07 |              |                    |                          |              |               |                |              |
| 12                   | P16          |            | BE        | GoFlo            |               | 43           | 49                     |           | 3636         |                    |                          | 4            | CS            |                |              |
| 13                   |              | 00:09      | MR        |                  |               |              | 49 15.48               | 134 39.94 |              | 125                |                          |              |               |                |              |
|                      |              | 00:24      | EN        |                  |               |              | 49 15.50               | 134 40.03 |              |                    |                          |              |               |                |              |
| 13                   | P16          | 00:31      | BE        | ROS              | US            | 44           | 49 15.57               | 134 39.99 | 3637         |                    | 267-290                  | 24           | SE            | ✓              | wind ~30kts. |
|                      |              | 01:26      | BO        |                  |               |              | 49 15.81               | 134 39.99 |              | 3652 <sup>17</sup> |                          |              |               |                |              |
|                      |              | 02:49      | EN        |                  |               |              | 49 15.49               | 134 40.39 |              |                    |                          |              |               |                |              |
| 13                   | P16          | 03:13      | BE        | BOT              |               | 45           | 49 15.70               | 134 40.36 | 3637         | 800                |                          | 4            | CS            |                | Go-FLO's 4   |
| 13                   | P16          | 03:41      | MR        |                  | MR            |              | 49 15.49               | 134 40.39 |              |                    |                          |              |               |                |              |
|                      |              | 04:13      | EN        | EN               |               |              | 49 15.66               | 134 40.36 |              |                    |                          |              |               |                |              |
| 13                   | P18          | 18:50      | BE        | ROS              | US            | 46           | 49 25.96               | 136 39.92 | 3834         |                    | 291-292                  |              | H.M.          | ✓              | 1000m CAST   |
| 13                   |              | 19:08      | BO        |                  | ✱             | 47           | 49 25.91               | 136 40.02 |              | 1000               |                          |              |               |                | ✱            |
|                      |              | 19:23      | EN        |                  |               |              | 49 25.95               | 136 40.07 |              |                    |                          |              |               |                |              |

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*This page is for any notes or observations*

(MODEM FFFFF)

\* DATA ACQUISITION STOPPED - CAROUSEL ERROR @ 306m RESTART CAST 47

after cast 47 - replace air valve O-ring Niskin 22

move Niskin 20 up ~ 2".

# DAILY SCIENCE LOG

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| Month FEBRUARY |              |            |           | Year 2011 |               |              | Ship TULLY             |            |              |           | Cruise ID 2011-01 |              |               |                |                                           |
|----------------|--------------|------------|-----------|-----------|---------------|--------------|------------------------|------------|--------------|-----------|-------------------|--------------|---------------|----------------|-------------------------------------------|
| Day            | Station Name | Time (UTC) | Time Code | Cast Type | Firing Method | Event Number | Positional Information |            | Bottom Depth | Max Depth | Sample Numbers    | # of Bottles | Watch Keepers | Trans. Cleaned | Comments                                  |
|                |              |            |           |           |               |              | Latitude               | Longitude  |              |           |                   |              |               |                |                                           |
| 14             | P19          | 0127       | BE        | ROS       | US            | 48           | 49 30.03               | 137 39.71  | 3925         |           | 293-294           | 2            | JE            | ✓              | unhappy for now from PC or deck unit 0508 |
|                |              | 0144       | BO        |           |               |              | 49 30.10               | 137 39.75  |              | 1005      |                   |              |               |                |                                           |
|                |              | 0203       | EN        |           |               |              | 49 30.18               | 137 39.78  |              |           |                   |              |               |                |                                           |
|                |              |            |           |           |               |              |                        |            |              |           |                   |              |               |                |                                           |
| 14             | P20          | 0710       | BE        | Go-Fl     |               | 49           | 49 34.01               | 138 40.02  | 3966         |           |                   | 4            | C-C-I         |                |                                           |
|                |              | 0728       | MR        |           |               |              | 49 34.07               | 138 40.13  |              | 120       |                   |              |               |                |                                           |
|                |              | 0739       | EN        |           |               |              | 49 34.10               | 138 40.19  |              |           |                   |              |               |                |                                           |
| 14             | P20          | 0756       | BE        | Pump      |               | 50           | 49° 34.11              | 138° 40.14 | 3966         |           |                   |              | KJ            |                |                                           |
|                |              | 0835       | EN        |           |               |              | 49° 34.21              | 138° 39.90 |              | 20        |                   |              |               |                |                                           |
| 14             | P20          | 0839       | BE        | Go Fl     |               | 51           | 49° 34.21              | 138° 39.93 | 3965         |           |                   |              | C-C-I         |                |                                           |
|                |              | 0915       | MR        |           |               |              | 49° 34.18              | 138° 39.98 |              | 800       |                   |              |               |                |                                           |
|                |              | 0948       | EN        |           |               |              | 49° 34.16              | 138° 40.05 |              |           |                   |              |               |                |                                           |
| 14             | P20          | 0959       | BE        | ROS       |               | 52           | 49° 34.15              | 138° 40.06 |              |           |                   |              |               |                |                                           |
|                |              | 1007       | BO        |           |               |              | 49° 34.16              | 138° 40.08 |              |           |                   |              |               |                |                                           |
|                |              | 1030       | EN        |           |               |              | 49° 34.14              | 138° 40.13 |              |           |                   |              |               |                |                                           |
| 14             | P20          | 1047       | BE        | NET       |               | 53           | 49° 34.18              | 138° 40.17 | 3966         |           |                   |              | H.M.          |                | URI Bongo                                 |
|                |              | 1051       | BO        |           |               |              | 49° 34.18              | 138° 40.18 |              | 100       |                   |              |               |                |                                           |
|                |              | 1100       | EN        |           |               |              | 49° 34.20              | 138 40.00  |              |           |                   |              |               |                |                                           |
|                |              |            |           |           |               |              |                        |            |              |           |                   |              |               |                |                                           |

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Notes:

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| Month FEBRUARY |              |            |           | Year 2011 |               |              |                        | Ship TULLY |              |           |                | Cruise ID 2011-01 |               |                |                   | Page 10 of 12 |  |
|----------------|--------------|------------|-----------|-----------|---------------|--------------|------------------------|------------|--------------|-----------|----------------|-------------------|---------------|----------------|-------------------|---------------|--|
| Day            | Station Name | Time (UTC) | Time Code | Cast Type | Firing Method | Event Number | Positional Information |            | Bottom Depth | Max Depth | Sample Numbers | # of Bottles      | Watch Keepers | Trans. Cleaned | Comments          |               |  |
|                |              |            |           |           |               |              | Latitude               | Longitude  |              |           |                |                   |               |                |                   |               |  |
| 14             | P 20         | 1105       | BE        | NET       |               | 54           | 49° 34.20              | 138° 39.99 | 3966         |           | 295-318        | 24                | H.M           | ✓              | 10S BONGO         |               |  |
|                |              | 1111       | BO        |           |               |              | 49° 34.21              | 138° 39.98 |              | 250       |                |                   |               |                |                   |               |  |
|                |              | 1120       | EN        |           |               |              | 49° 34.07              | 138° 40.11 |              |           |                |                   |               |                |                   |               |  |
| 14             | P 20         | 1202       | BE        | ROS       |               | 55           | 49° 34.05              | 138° 40.08 | 3966         |           | 319-342        | 24                | H.M           | ✓              | 10S DEEP CAST     |               |  |
|                |              | 1314       | BO        |           |               |              | 49° 34.05              | 138° 40.03 |              | 4023      |                |                   |               |                |                   |               |  |
|                |              | 1442       | EN        |           |               |              | 49 34.09               | 138 40.09  |              |           |                |                   |               |                |                   |               |  |
| 14             | P 20         | 1621       | BE        | ROS       |               | 56           | 49° 34.07              | 138° 39.79 | 3966         |           | 343-357        | 15                | H.M           | ✓              | AM.S CAST         |               |  |
|                |              | 1626       | BO        |           |               |              | 49° 34.06              | 138° 39.77 |              | 200       |                |                   |               |                |                   |               |  |
|                |              | 1642       | EN        |           |               |              | 49° 34.08              | 138° 39.83 |              |           |                |                   |               |                |                   |               |  |
| 14             | P 20 1/2     | 1737       | BE        | ROS       |               | 57           | 49° 34.68              | 138° 49.03 | 3952         |           | 358-364        | 7                 | H.M           | ✓              | STEVE'S 9:30 CAST |               |  |
|                |              | 1745       | BO        |           |               |              | 49° 34.76              | 138° 49.06 |              | 200       |                |                   |               |                |                   |               |  |
|                |              | 1750       | EN        |           |               |              | 49° 34.76              | 138° 49.10 |              |           |                |                   |               |                |                   |               |  |
|                | LOOP 1       | 2052       | EN        | UWS       |               | LOOP 1       | 49 38.21               | 139 30.14  | 3957         |           |                |                   | JE            |                | SAL, NUT, CHL     |               |  |
| 15             | LOOP 2       | 0207       | EN        | UWS       |               | LOOP 2       | 49 42.09               | 140 38.47  | 3878         |           |                |                   |               |                |                   |               |  |
|                | LOOP 3       | 0924       | EN        | USW       |               | LOOP 3       | 49° 48.99              | 142° 14.55 | 4021         |           |                |                   | H.M           |                | SAL/NUT/CHL       |               |  |
|                | LOOP 4       | 1425       | EN        | USW       |               | LOOP 4       | 49° 52.94              | 143° 18.99 |              |           |                |                   |               |                |                   |               |  |
|                | LOOP 5       | 2003       | EN        | USW       |               | LOOP 5       | 49 57.54               | 144 25.93  | 4190         |           |                |                   |               |                |                   |               |  |

Cast Type: BOT = Bottle Cast, USW = Sea Water Loop, Bottle Firing Method: Time Code:

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| Month <u>FEBRUARY</u> |              |            |           | Year <u>2011</u> |               |              | Ship <u>TULLY</u>      |           |              |                     | Cruise ID <u>2011-01</u> |              |               |                |                         |
|-----------------------|--------------|------------|-----------|------------------|---------------|--------------|------------------------|-----------|--------------|---------------------|--------------------------|--------------|---------------|----------------|-------------------------|
| Day                   | Station Name | Time (UTC) | Time Code | Cast Type        | Firing Method | Event Number | Positional Information |           | Bottom Depth | Max Depth           | Sample Numbers           | # of Bottles | Watch Keepers | Trans. Cleaned | Comments                |
|                       |              |            |           |                  |               |              | Latitude               | Longitude |              |                     |                          |              |               |                |                         |
| 15                    | P26          | 2345       | BE        | ROS              | US            | 58           | 49 59.72               | 144 59.98 | 4252         |                     | 387-410                  | 24           | JE            | ✓              | 30kts, bumpy            |
| 16                    |              | 0101       | BO        |                  |               |              | 49 59.69               | 145 00.04 |              | 4309 <sup>+15</sup> |                          |              |               |                |                         |
|                       |              | 0237       | EN        |                  |               |              | 49 59.86               | 144 59.97 |              |                     |                          |              |               |                | * →                     |
| 16                    | P26          | 0249       | BE        | BOT              |               | 59           | 49 59.86               | 144 59.99 |              | 800                 |                          | 4            |               |                |                         |
|                       |              | 0316       | MR        |                  |               |              | 49 59.82               | 145 00.06 |              |                     |                          |              |               |                |                         |
|                       |              | 0347       | EN        |                  |               |              | 49 59.81               | 145 00.03 |              |                     |                          |              |               |                |                         |
| 16                    | P26          | 0355       | BE        | NET              |               | 60           | 49 59.81               | 145 00.06 | 4253         |                     |                          |              |               |                |                         |
|                       |              | 0403       | BO        |                  |               |              | 49 59.82               | 145 00.13 |              | 250                 |                          |              |               |                | Ias Bongo               |
|                       |              | 0408       | EN        |                  |               |              | 49 59.82               | 145 00.20 |              |                     |                          |              |               |                |                         |
| 16                    | P26          | 0426       | BE        | PUMP             |               | 61           | 49 59.83               | 145 00.32 |              | 40                  |                          |              |               |                |                         |
|                       |              | 0533       | EN        |                  |               |              | 50 00.06               | 145 00.23 |              |                     |                          |              |               |                |                         |
| 16                    | P26          | 0545       | DE        | DRF              |               | 62           | 50 00.14               | 145 00.10 | 4252         |                     |                          |              |               |                | Deploy UW float 5069    |
| 16                    | Loop 6       | 0805       | EN        | USW              |               | Loop 6       | 49 58.15               | 144 27.71 | 4117         |                     |                          |              | H.M.          |                | Loop 6                  |
| 16                    | Loop 7       | 1400       | EN        | USW              |               | Loop 7       | 49 50.41               | 142 57.31 | 4016         |                     |                          |              | H.M.          |                | Loop 7                  |
|                       | Loop 8       | 2004       | EN        | USW              |               | Loop 8       | 49 44.66               | 141 26.03 | 4055         |                     |                          |              |               |                | Nut, Sal, 2xchl 2xHPLC  |
| 17                    | Loop 9       | 0201       | EN        | USW              |               | Loop 9       | 49 36.54               | 139 54.80 | 3955         |                     |                          |              |               |                | " "                     |
| 17                    | Loop 10      | 0734       | BE        | USW              |               | Loop 10      | 49 30.53               | 138 32.75 | 3982         |                     |                          |              |               |                | Nut, Sal, chl, 2xHPLC   |
| 17                    | Loop 11      | 1401       | BE        | USW              |               | Loop 10      | 49 23.61               | 136 57.13 | 3890         |                     |                          |              |               |                | "                       |
| 17                    | Loop 12      | 2025       | EN        | USW              |               | Loop 12      | 49 16.00               | 135 25.24 | 3618         |                     |                          |              |               |                | Nut, Sal, 2xchl, 2xHPLC |

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— FFFFFFFF Unsupported Modem message BC 73 7D from SBE Carousel  
displayed in status line on download, but file is updating.

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Page 12 of 12[illegible]**Cast Type:**

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