

Suspect Samples

Color Key

To be checked
 Checked
 Bad Niskin
 Flag for bad sample: e
 Flag for questionable sample: q
 Not collected: nc

Bad Niskin?	Sample#	Cast #	Niskin #	Salt	Oxygen	Nitrate	Silicate	Phosphate	Alkalinity	Comment - SZ	Analyst's Comment
	6	1	6	ok	odd	ok	ok	ok		Oxygen is good - verified with CTD. Nuts likely fine as well.	
	30	2	8		ok	ok	ok	ok			
Bad	52	3	8	e	e	e	e	e		Looks like niskin closed at shallower depth, one that matches silicate and phosphate so they don't actually look bad, though they will be labelled 'e' in anycase.	
Bad	76	4	8	e	e	e	e	e			
Bad	154	11	8	e	e	e	removed	removed	e		
	101, 102	5	8	Pop 101/102	102	q	q	q		Are 101-N and 102-N OK? Swapped?	we're applying
	170	12	1	ok	ok	ok	odd	odd		Oxygen is good - verified on CTD	I agree
?	241	16	7	ok	ok	e	e	e		Have analysts check if 241-243 are correctly numbered. Looks like nut samples had been swapped?	no as an - duplicate from bottle
?	242	16	8	e	e	ok	ok	ok			
Bad	266	17	8	e	e	e	e	e		But 8 order. 253 between 253 & 254?	
	224	15	15	e							
	336	20	10	ok	ok	odd	odd	ok		oxygen corrected (typo) Has this been corrected in oxy file yet?	
	354	21	4	ok	ok	ok	ok	ok		oxygen corrected (typo) Has this been corrected in oxy file yet?	
	555	29	14	e (low)							
	590	31	1				e				

	594, 595	31	5,6	ok									These are in Eddy - Salt looks good compared to CTD	
	651	33	14	e (low)	e	e	e	e						
	658	33	21											
	699	35	14	e	e	e	e	e						
	734-757	37												
Bad	839	41	14	e	e	e	e	e					Nitrate looks out of order relative to P and S based on plots v. Salt and plots NO3 v. PO4	747 Nitr is dupl. core cut.
	874	42											This looks like a duplicate value?	I agree
	1057	51				ok	ok	q (high)					1058 is ok; want replicate for 1058	may not be there
	1087-1089	52	out labels correct										1089 looks bad, but is this because 1087 is really a duplicate of 1086 and is offsetting the other samples?	Samples from wrong skin?
	1347-1348	63	14,15	labels correct	q	q	q	q					Are these duplicates? This might affect alignment of labels saved. 1400-1405 labeling appears correct	! ->
	1398-1399	65	17,18			q	q	q					Phosphate looks suspicious when plotted v. salt and v. pin slipped out nitrate. encore - should repeat this scan	
	1421	66	16					q					Please review these nuts - order? Value? If no changes, then mark 1447 P and S as suspect.	
	1442-1448	67	Fix 108 using rep. P1442 used repl. ✓			q	q	q					Please review these nuts, particularly N and P are misaligned. Plots v. Salt suggest Nitrate is the culprit.	bad (N) w/ N
	whole cast	69	Fixed re 1488			q							N and P are misaligned. In particular sample 1518 (or maybe N is bad?). Are 1515-1516 duplicates?	bad pt (N)
	1502-1518?	70	not dupl. according to labels.			q	q	q					These samples are really interesting (exciting!) - could you check that all looks right with these (ex. Alignment, values)?	
	1526-1537	71	Apparent re ok			q	q	q					These samples are really interesting (exciting!) - could you check that all looks right with these (ex. Alignment, values)?	
	1550-1553	72	Apparent OK			q	q	q					These samples are really interesting (exciting!) - could you check that all looks right with these (ex. Alignment, values)?	

Deep Water Comparisons with other JOIS cruises

WCCP
Water
comparison
s (Casts 1-
27)

Cast 22 CB27

no data
(need to
update
chem)

good after
fix to thio
normality

good good good

low? low? low?

Nutrient Analysis Log

NOMINAL

Analyst:		Gain		Standard Ranges ($\mu\text{m/L}$)		
Date:	Sept 17, 2010	Chemistry	$T(^{\circ}\text{C}): 30^{\circ}\text{C}$	NO_3^-	1.00	
Cruise:	2010-07	Thaw time:	none	SiO_4	4.00	
Project:	J015		170910.000	PO_4	7.00	
				L:	8	16
				M:	20	32
				H:	24	50

Tray #	Sample ID	Comments
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1	DHD	
2	DMR	Conditioned Cd cal. w/ 24um/L N
3	0	
4	0	N Adjusted Gains
5	Wako 20 N	929
6	20 N	921
7	920 20 N	935
8	20 N	938
9	Linear 20 N	930
10	20 N	926
11	925 20 N	924
12	20 N	920
13	Wako 50 Si	941
14	50 Si	940
15	50 Si	942
16	50 Si	945
17	Linear	PO_4 1.61
18		1.61
19		1.61
20		1.61
21	Linear	PO_4 1.60
22		1.60
23		1.60
24		N 1.60
25	Linear's 20 NO2	940
26	20 NO2	942
27	943 20 NO2	942
28	20 NO2	945
29	Linear H	24 N
30	H	24 N
31	H	24 N
32	H	24 N
33	0	
34	0	
35	Wako N 0	+2
36	N 0	+2
37	Wako Si 0	
38	Si 0	
39	0	
40	KAN30	292 AY 0653

According to Comparability of nutrients 2009
in world ocean, Michigan Ocean

Nutrient Analysis Log

Analyst:		Gain		Standard Ranges (µm/L)		
Date:	Chemistry T (°C):	NO ₃ :		NO ₃	SiO ₄	PO ₄
Cruise:	Thaw time:	SiO ₄ :		L		
Project:		PO ₄ :		M		
				H		
Tray #	Sample ID	Si		Comments	P	
1	KANSO	290	567		145	
2	KANSO	295	570		148	
3	KANSO	295	570		148	
4	O					
5	O			Si	P	
6	L	382	8N		243	
7	L	380			247	
8	L	380			248	
9	M	929	20N	610	486	
10	M	930		606	489	
11	M	936		608	491	
12	H	1115	24N	934	734	
13	H	1118		935	736	
14	H	1115		936	737	
15	O					
16	O	N		Si	P	
17	DMQ	-8		-8	-17	
18						
19	Acid cleaned w/ 10% HCl then, Nephene water 30 min.					
20						
21					P/L ±0.03	
22	KANSO				148 x 1.62 = 0.48N	
23					495	
24						
25					P/T ±0.03	
26					148 x 1.60 = 0.502	
27					471	
28						
29						
30						
31						
32	CALCULATIONS					
33				L	M	H
34	P		0.81		1.61	2.41
35						
36	N	99.46%	8 = 7.96		15.93	23.98
37				L	M	H
38	Si	79.71%	16 = 15.95		31.9	47.9 µm/L
39						
40						

17.

7:20a.m
9:30PM

1/6

Nutrient Analysis Log

Analyst: <i>L. White</i>		Gain	Standard Ranges (µm/L)		
Date: <i>Sept. 18/2010</i>	Chemistry T (°C):	NO ₃ : 1.00	NO ₃	SiO ₄	PO ₄
Cruise: 2010-07	Thaw time:	SiO ₄ : 4.00	L: 7.96	15.95	0.81
Project: <i>TOIC</i>	<i>180910.963</i>	PO ₄ : 7.00	M: 15.93	31.9	1.62
			H: 23.98	47.9	2.41
Tray #	Sample ID	Comments			
1	D110	<i>New Cd cal. - Conditioned w/ 2 µm/l N</i>			
2	D110				
3	8				
4	0				
5	L				
6	L				
7	L	<i>Si replaced sample connection to flow cell - hopefully to stop noise in baseline</i>			
8	M				
9	M				
10	M	<i>Si - some digital noise but not on analog</i>			
11	H				
12	H				
13	H	<i>30.3°C (cells)</i>			
14	0				
15	0				
16	0	<i>w/ fan blowing</i>			
17	<i>Wako N20</i>				
18	<i>N20</i>				
19	<i>Wako Si 50</i>				
20	<i>Si 50</i>				
21	0				
22	<i>AY0653</i>				
23	<i>AY0653</i>				
24	0				
25	21	<i>Samples</i>	<i>AG-5 CAST #1</i>		
26	20				
27	19				
28	18				
29	17				
30	16				
31	15				
32	14				
33	13				
34	12	<i>Repeat for N</i>			
35	11				
36	10				
37	9				
38	8				
39	7				
40	6	<i>965</i>			

Nutrient Analysis Log

Analyst:		Chemistry	Gain	Standard Ranges ($\mu\text{m/L}$)		
Date:	T ($^{\circ}\text{C}$):	NO ₃ :	NO ₃ :	SiO ₄ :	PO ₄ :	
Cruise:	Thaw time:	SiO ₄ :	L:			
Project:		PO ₄ :	M:			
			H:			
Tray #	Sample ID	Comments				
1	5					
2	4					
3	3					
4	2	no sample				
5	1					
6	0					
7	17					
8	4	repeat for N - peak top spiked				
9	0					
10	MCK					
11	MCK					
12	MCK					
13	0					
14	AY 0653	27°C on deck w/ fan blowing				
15	AY 0653					
16	AY 0653					
17	0					
18	0					
19	L					
20	L					
21	L					
22	M					
23	M					
24	M					
25	H					
26	H					
27	H					
28	0					
29	0					
30	0	Samples. CALOS CAST #2				
31	41					
32	40					
33	39					
34	38					
35	37					
36	36					
37	35					
38	34					
39	33					
40	32					

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Nutrient Analysis Log

Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$)		
Date: <i>Sept 18</i>	Chemistry T ($^{\circ}\text{C}$):	NO ₃ : <i>1.00</i>	NO ₃	SiO ₄	PO ₄
Cruise: <i>2010-07</i>	Thaw time:	SiO ₄ : <i>4.00</i>	L:		
Project: <i>J015</i>		PO ₄ : <i>7.00</i>	M:		
	<i>180910.003</i>		H:		

Tray #	Sample ID	Comments
1	<i>31</i>	<i>Time: 13:46</i>
2	<i>30</i>	
3	<i>29</i>	
4	<i>28</i>	
5	<i>27</i>	
6	<i>26</i>	
7	<i>25</i>	
8	<i>24</i>	
9	<i>23</i>	
10	<i>0</i>	
11	<i>MCK sld</i>	
12	<i>MCK</i>	
13	<i>MCK</i>	
14	<i>0</i>	
15	<i>AY 0653</i>	
16	<i>0653</i>	
17	<i>0653</i>	
18	<i>/</i>	
19	<i>0</i>	<i>Chemistry 34.3°C</i>
20	<i>0</i>	<i>Temp - coils about 29°C</i>
21	<i>0</i>	
22	<i>L</i>	
23	<i>L</i>	
24	<i>M</i>	
25	<i>M</i>	
26	<i>M</i>	
27	<i>H</i>	
28	<i>H</i>	
29	<i>H</i>	
30	<i>0</i>	
31	<i>0</i>	
32	<i>0</i>	
33	<i>68</i>	<i>Samples CB 316 CAST # 3</i>
34	<i>67</i>	
35	<i>66</i> ✓	
36	<i>65</i>	
37	<i>64</i> ✓	
38	<i>63</i>	
39	<i>62</i>	
40	<i>61</i> ✓	

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Nutrient Analysis Log

Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$)		
Date:	Chemistry $T(^{\circ}\text{C})$:	NO_3 :	NO_3	SiO_4	PO_4
Cruise:	Thaw time:	SiO_4 :	L:		
Project:		PO_4 :	M:		
			H:		
Tray #	Sample ID	Comments			
1	60				
2	59				
3	58				
4	57				
5	56				
6	55				
7	54				
8	53				
9	52 x				
10	51				
11	50				
12	49				
13	48				
14	47				
15	46				
16	45				
17	0				
18	64	Replicates			
19	59				
20	50				
21		Re-run 66 } for P Re-run 64 } 61 } 52 - for N			
22					
23	0				
24	HCHK				
25	MCK				
26	MCK				
27	0				
28	AY 0653				
29	AY 0653				
30	AY 0653				
31	0				
32	0				
33	0				
34	L				
35	L				
36	L				
37	M				
38	M				
39	M				
40	H				

4/6

Nutrient Analysis Log

Analyst:

Gain

Standard Ranges ($\mu\text{m/L}$)

Date: *Sep 18/2010*

Chemistry
T ($^{\circ}\text{C}$):

NO₃:

NO₃

SiO₄

PO₄

Cruise: *2010-07*

Thaw time: *0*

SiO₄:

L

M

H

PO₄:

Project: *J015*

180910 243

Tray #

Sample ID

Comments

1 *H*

2 *H*

3 *0*

4 *0*

5 *0*

6 *91*

7 *90*

8 *89*

9 *88*

10 *87*

11 *86*

12 *85*

13 *84*

14 *83*

15 *82*

16 *81*

17 *80*

18 *79*

19 *78*

20 *77*

21 *76*

22 *75*

23 *74*

24 *73*

25 *72*

26 *71*

27 *70*

28 *69*

29 *0*

30 *McK*

31 *McK*

32 *McK*

33 *0*

34

35

36

37

38 *0*

39 *0*

40 *0*

Samples

CB60 CAST #4

Temp 26.6°C Si conc

*86
79
73*

no Al analysed

5
6

Nutrient Analysis Log

Analyst:		Chemistry	Gain	Standard Ranges ($\mu\text{m/L}$)		
Date:	T ($^{\circ}\text{C}$):	NO ₃ :	NO ₃ :	SiO ₄ :	PO ₄ :	
Cruise: 2010-07	Thaw time: 0	SiO ₄ :	L			
Project: JOIS	180910.003	PO ₄ :	M			
			H			
Tray #	Sample ID	Comments				
1	L					
2	L					
3	L					
4	M					
5	M					
6	M					
7	H					
8	H					
9	H					
10	O					
11	O					
12	O					
13	DMQ					
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

6/6

213 samples & standards.

8:30am - 11:00pm 1/6

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$) 1-10 Epp		
Date:	Chemistry	NO_3^-	NO_3^-	SiO_4^{2-}	PO_4^{3-}
2010-07	T ($^{\circ}\text{C}$):	1.00	L 8.10	16.0	0.81
Cruise: 2010-07	Thaw time:	SiO_4^{2-} 4.00	M 16.0	31.9	1.62
Project: J015	200910.223	PO_4^{3-} 7.00	H 32.0	47.9	2.41
Tray #	Sample ID	Comments			
1	DMQ	* Prepare a 16 $\mu\text{m/L}$ NO_3^- blank			
2	H	Col Col Eff.			
3	H	Wakeup			
4	H				
5	O	" 20 $\mu\text{M N}$			
6	O	11:17a.m 27 $^{\circ}\text{C}$ coils			
7	O	Abc.			
8	Linda's 20N	936			
9	20N	944			
10	20N	938			
11	20N	938			
12	Wako 20N	NEW 941 opened Sep 20 ALN 9352			
13	20N	946 #033-10221			
14	20N	939 Exp. 2011.04.			
15	20N	944			
16	Wako 20N	opened Sep 17th 938			
17	20N	942			
18	20N	940			
19		NO ₂ 16.2 $\mu\text{m/L N}$			
20	O	NO ₂			
21	O	NO ₂			
22	O				
23	L				
24	L	C2 .02077			
25	L				
26	M				
27	M				
28	M				
29	H				
30	H				
31	H				
32	O				
33	O				
34	O				
35	AY 1269	NEW			
36	AY 1369				
37	AY 1369				
38	O				
39	114	CP-61 CAST 3			
40	113				

Nutrient Analysis Log

Analyst:		Chemistry	Gain	Standard Ranges ($\mu\text{m/L}$)		
Date:	T ($^{\circ}\text{C}$):	NO ₃ :	NO ₃	SiO ₄	PO ₄	
Cruise:	Thaw time:	SiO ₄ :	L			
Project:		PO ₄ :	M			
			H			
Tray #	Sample ID	Comments				
1	112					
2	111					
3	110					
4	109					
5	108					
6	107					
7	106					
8	105					
9	104					
10	103					
11	102					
12	101					
13	100					
14	99					
15	98					
16	97					
17	96					
18	95	13:57 26.4°C w/fer (Si calc)				
19	94					
20	93					
21	92					
22	0					
23	106	Reps				
24	101					
25	96					
26	0					
27	MCHK					
28	MCHK					
29	MCHK					
30	0					
31	AY 1369	14:36 25.8°C (Si calc)				
32	AY 1369					
33	AY 1369					
34	0					
35	0					
36	0					
37	L	C2 0.02093				
38	L					
39	L					
40	M					

276

Nutrient Analysis Log

3/16

Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$)		
Date:	Chemistry T ($^{\circ}\text{C}$):	NO_3^-	NO_3^-	SiO_4	PO_4
Cruise: 2010-07	Thaw time:	SiO_4	L		
Project:	200910.243	PO_4	M		
			H		
Tray #	Sample ID	Comments			
1	M				
2	M	17:27 26.6°C			
3	H				
4	H				
5	H				
6	O				
7	O				
8	O				
9	169	MK-3 CAST II			
10	168				
11	167				
12	166				
13	165				
14	164				
15	163				
16	162				
17	161				
18	160				
19	159				
20	158				
21	157				
22	156				
23	155				
24	154	- put by order?			
25	153				
26	152				
27	151				
28	150				
29	149				
30	148				
31	147				
32	0				
33	162	Repl.			
34	159				
35	153				
36	0				
37	McK				
38	McK				
39	McK				
40	0				

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$)			
Date:	Chemistry T ($^{\circ}\text{C}$):	NO ₃ :	NO ₃	SiO ₄	PO ₄	
Cruise:	Thaw time:	SiO ₄ :	L			
Project:		PO ₄ :	M			
			H			
Tray #	Sample ID	Comments				
1	A/1369					
2	A/1369					
3	A/1369					
4	0					
5	0					
6	0					
7	L	C2 0.0208				
8	L					
9	M					
10	M					
11	M					
12	H					
13	H					
14	H					
15	0					
16	0					
17	0					
18	191	MK-2 CAST 12				
19	190					
20	189					
21	188					
22	187					
23	186					
24	185					
25	184					
26	183					
27	182					
28	181					
29	180					
30	179					
31	178					
32	177	no sample				
33	176					
34	175					
35	174					
36	173					
37	172					
38	171					
39	170					
40	0					

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Nutrient Analysis Log

Analyst:

Date:

Sept 20/10

Cruise:

2010-07

Project:

Jo15

Chemistry

T (°C):

Thaw time:

200910443

Gain

NO₃:

SiO₄:

PO₄:

Standard Ranges (µm/L)

NO₃

SiO₄

PO₄

L

M

H

Comments

19:11

25.7°C

- near in edge

- colder outside

- ships still colder too, calm

Clean tubes for reverses - N wobbly here

MR-1

CAST 13

CB 28aa

CAST 14

Tray #

Sample ID

1

181

2

178

3

174

4

0

5

Mck

6

Mck

7

Mck

8

0

9

AY1369

10

1369

11

1369

12

0

13

0

14

0

15

L

16

L

17

L

18

M

19

M

20

M

21

H

22

H

23

H

24

0

25

0

26

0

27

203

28

202

29

201

30

200

31

199

32

198

33

197

34

196

35

195

36

194

37

193

38

192

39

0

40

209

11a.m - ~~8a.m~~
hooked up

1/6

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$)		
Date: <u>Sept 21, 2010</u>	Chemistry T ($^{\circ}\text{C}$):	NO ₃ :	NO ₃	SiO ₄	PO ₄
Cruise: <u>2010-07</u>	Thaw time: <u>0</u>	SiO ₄ :	L		
Project: <u>JOIS</u>	<u>210910.003</u>	PO ₄ :	M		
			H		

Tray #	Sample ID	Comments
1	DMR	
2	0	
3	0	
4	0	
5	L	
6	L	
7	L	
8	M	
9	M	
10	M	
11	H	
12	H	
13	H	
14	0	
15	0	
16	0	
17	AY 1369	
18	AY 1369	
19	AY 1369	
20	0	
21	233	
22	232	
23	231	
24	230	
25	229	
26	228	
27	227	
28	226	
29	225	
30	224	
31	223	
32	222	
33	221	
34	220	
35	219	
36	218	
37	217	
38	216	
39	215	
40	214	

Wakeup/ H x3

No for on today

23.2°C (Si coils)

Samples MK3a CAST 18

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges (µm/L)		
Date:	Chemistry T (°C):	NO ₃ :	NO ₃	SiO ₄	PO ₄
Cruise:	Thaw time:	SiO ₄ :	L:		
Project:		PO ₄ :	M:		
			H:		
Tray #	Sample ID	Comments			
1	213				
2	212				
3	211				
4	210				
5	0				
6	226	Reps			
7	219				
8	0				
9	MCK				
10	MCK				
11	MCK				
12	0				
13	AY 1772	NEW Bottle			
14	AY 1772				
15	AY 1772				
16	0	←			
17	0				
18	0				
19	L				
20	L				
21	L				
22	M				
23	M				
24	M				
25	H				
26	H				
27	H				
28	0				
29	0				
30	0				
31	258	MK-4 CAST #16		13:46	23.6 °C
32	257				
33	256				
34	255				
35	254				
36	253				
37	252				
38	251				
39	250				
40	249				

2/0

3/6

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges (µm/L)		
Date: <u>Sep. 21/10</u>	Chemistry T (°C):	NO ₃ :		NO ₃	SiO ₄
Cruise: <u>2010-07</u>	Thaw time: <u>0</u>	SiO ₄ :	L:		
Project: <u>Jo15</u>	<u>210910.923</u>	PO ₄ :	M:		
			H:		

Tray #	Sample ID	Comments
1	248	
2	247	
3	246	
4	245	244
5	241	243
6	240	242
7	239	
8	238	
9	237	
10	236	
11	235	
12	0	
13	253	
14	245	
15	236	
16	0	
17	MCKK	
18	MCK	
19	MCK	
20	0	
21	A-1	
22	A-1	
23	A-1	
24	0	
25	0	
26	0	
27	L	
28	L	
29	L	
30	M	
31	M	
32	M	
33	H	
34	H	
35	H	
36	0	
37	0	
38	0	
39	282	MK6 CAST 17
40	281	

2870
281
217

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges (µm/L)		
Date:	Chemistry T (°C):	NO ₃ :	NO ₃	SiO ₄	PO ₄
Cruise:	Thaw time:	SiO ₄ :	L		
Project:		PO ₄ :	M		
			H		
Tray #	Sample ID	Comments			
1	280				
2	279				
3	278				
4	277				
5	276				
6	275				
7	274				
8	273				
9	272				
10	271				
11	270				
12	269				
13	268				
14	267				
15	266				
16	265				
17	264				
18	263				
19	262				
20	261				
21	260				
22	259				
23	0				
24	278	Repeat			
25	274				
26	261				
27	0				
28	MCK				
29	MCK				
30	MCK				
31					
32	AY 1772				
33	AY 1772				
34	AY 1772				
35	0	19:35 24.4°C in the ice			
36	0	lots of multi-packs			
37	0				
38	L				
39	L				
40	L				

4/6

5/6

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$)		
Date: <i>Sep 21/10</i>	Chemistry T ($^{\circ}\text{C}$):	NO_3 :	NO_3	SiO_4	PO_4
Cruise: <i>2010-07</i>	Thaw time: <i>0</i>	SiO_4 :	L		
Project: <i>JOIS</i>	<i>210910.443</i>	PO_4 :	M		
			H		

Tray #	Sample ID	Comments
1	M	
2	M	
3	M	
4	H	
5	H	
6	H	
7	0	
8	0	
9	0	
10	326	<i>repaired CB-286 CAST #19</i>
11	325	
12	324	
13	323	
14	322	
15	321	
16	320	
17	319	
18	318	
19	317 312	<i>Too many interruptions order in cereal goes like this</i> <i>It is late too.</i>
20	316 311	
21	315 310	
22	314 309	
23	313 308	
24	312 307	
25	311 306	
26	310 305	
27	309 304	
28	308 317	
29	307 316	
30	306 315	
31	305 0	
32	304 314	
33	303 313	
34	0 303	
35	MCKK	<i>21:34 24.2°C</i>
36	MCKK	
37	MCK	
38	0	
39	AY1772	
40	AY1772	

4/6

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges (µm/L)		
Date:	Chemistry T (°C):	NO ₃ :	NO ₃	SiO ₄	PO ₄
Cruise: 2010-07	Thaw time:	SiO ₄ :	L		
Project: JORS	210910.243	PO ₄ :	M		
			H		
Tray #	Sample ID	Comments			
1	NY1772				
2	0				
3	0				
4	0				
5	L				
6	L				
7	L				
8	M				
9	M				
10	M				
11	H				
12	H				
13	H				
14	0				
15	0				
16	0				
17	DMQ	22.36 23.8°C (Si coils)			
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					

217 stds & samples

Nutrient Analysis Log

Analyst: <i>Linda</i>		Gain	Standard Ranges ($\mu\text{m/L}$)		
Date: <i>22/09/10</i>	Chemistry T ($^{\circ}\text{C}$):	NO_3 :	NO_3	SiO_4	PO_4
Cruise: <i>2010-07</i>	Thaw time: <i>0</i>	SiO_4 :	L		0.81
Project: <i>J015</i>		PO_4 :	M		1.62
	<i>220910.a03</i>		H		2.41

Tray #	Sample ID	Comments
1	DMQ	8:30am - Connected AA
2	0	
3	0	
4	0	Waterup/samp - mixture
5	L	
6	L	
7	L	
8	M	
9	M	
10	M	
11	H	
12	H	
13	H	
14	0	
15	0	
16	0	
17	AY1772	
18	1772	
19	1772	
20	0	
21	MK-7 #352	DEEPWATER REFERENCE FROZEN
22	DW #352	2,600m
23	DW #352	
24	DW #352	
25	DW #352	shaken, shaken well. - medium temperature
26	0	
27	350	sampled CB 29 CAST #20
28	349	
29	348	
30	347	
31	346	
32	345	
33	344	
34	343	
35	342	
36	341	
37	340	
38	339	
39	338	
40	337	

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges (µm/L)		
Date:	Chemistry T (°C):	NO ₃ :	NO ₃	SiO ₄	PO ₄
Cruise:	Thaw time:	SiO ₄ :	L		
Project:		PO ₄ :	M		
			H		
Tray #	Sample ID	Comments			
1	338	336			
2	359	335			
3	334				
4	333				
5	332				
6	331				
7	330				
8	329				
9	328				
10	327	25.4°C Si cuts			
11	0				
12	331	Reps - Redacted - here			
13	338	- Si Asc. not drawing up properly - air in Si line			
14	345				
15	0				
16	MCK	Si - hard to turn lamp off, connection to flowcell came apart.			
17	MCK				
18	MCK				
19	0	- flowcell alignment different from before this week!			
20	DA 352	- checking a bit lower.			
21	352				
22	352				
23	0				
24	0				
25	0				
26	L				
27	L				
28	L				
29	M				
30	M				
31	M				
32	H				
33	H				
34	H				
35	0				
36	0				
37	0				
38	374	Samples MK-7 Red 21			
39	373				
40	372				

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$)		
Date:	Chemistry T ($^{\circ}\text{C}$):	NO ₃ :	NO ₃	SiO ₄	PO ₄
Cruise:	Thaw time:	SiO ₄ :	L:		
Project:		PO ₄ :	M:		
			H:		
Tray #	Sample ID	Comments			
1	371				
2	370	23°C 16:02			
3	369				
4	368				
5	367				
6	366				
7	365				
8	364				
9	363				
10	362				
11	361				
12	360				
13	359				
14	358				
15	357				
16	356				
17	355				
18	354				
19	353				
20	352				
21	351				
22	0				
23	370	Reps			
24	362				
25	354				
26	0				
27	MCNK				
28	MCNK				
29	MCNK				
30	0				
31	DW. 352	Ref frozen			
32	352	Ref			
33	352	Ref			
34	0				
35	0				
36	0				
37	L				
38	L	(3)			
39	L				
40	M				

3/6

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$)		
Date:	Chemistry $T(^{\circ}\text{C})$:	NO_3^- :	NO_3^-	SiO_4	PO_4
Cruise:	Thaw time:	SiO_4 :	L		
Project:		PO_4 :	M		
	220910.		H		

Tray #	Sample ID	Comments
1	M	
2	H	
3	H	
4	H	
5	O	
6	O	
7	O	
8	398	CB27 CAST 22
9	397	
10	396	
11	395	
12	394	
13	393	
14	392	
15	391	
16	390	
17	389	
18	388	
19	387	
20	386	
21	385	
22	384	
23	383	
24	382	no sample here.
25	381	
26	380	
27	379	
28	378	
29	377	
30	376	Analysis before next profile?
31	375	may have been sampled?
32	O	
33	398	Reps. } include.
34	381	
35	380	Not put in tray - see later in run.
36	O	
37	DW 352	Ref
38	DW 352	Ref
39	DW 352	Ref
40	O	



Nutrient Analysis Log

Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$)		
Date:	Chemistry $T(^{\circ}\text{C})$:	NO_3 :		NO_3	SiO_4
Cruise: 2010-07	Thaw time:	SiO_4 :	L		
Project: JoIS	220910 2109.113	PO_4 :	M		
			H		

Tray #	Sample ID	Comments
1	Mck	
2	Mck	
3	Mck	
4	0	
5	0	
6	0	
7	L	
8	L	
9	L	
10	M	
11	M	
12	M	
13	H	
14	H	
15	H	
16	0	
17	0	
18	0	
19	422	
20	421	
21	420	
22	419	
23	418	
24	417	
25	416	
26	415	
27	414	
28	413	
29	412	
30	411	
31	410	
32	409	
33	408	
34	407	
35	406	
36	405	
37	404	
38	403	
39	402	
40	401	

4

CB27 Reps 398
376
375

CB23 CB22 Rest 23

5/6

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges (µm/L)		
Date: <i>Apr 22</i>	Chemistry T (°C):	NO ₃ :		NO ₃	SiO ₄
Cruise: <i>2010-07</i>	Thaw time:	SiO ₄ :	L:		
Project:		PO ₄ :	M:		
	<i>220910.003</i>		H:		
Tray #	Sample ID	Comments			
1	<i>400</i>				
2	<i>399</i>				
3	<i>0</i>				
4	<i>414</i>	<i>Repd.</i>			
5	<i>408</i>				
6	<i>403</i>				
7	<i>0</i>				
8	<i>DW 352</i>	<i>Ref. Ref. Ref.</i>			
9	<i>DW 352</i>				
10	<i>DW 352</i>				
11	<i>0</i>				
12	<i>Mck</i>	<i>5</i>			
13	<i>Mck</i>				
14	<i>Mck</i>				
15	<i>0</i>				
16	<i>0</i>				
17	<i>0</i>				
18	<i>L</i>				
19	<i>L</i>				
20	<i>L</i>				
21	<i>M</i>				
22	<i>M</i>				
23	<i>M</i>				
24	<i>H</i>				
25	<i>H</i>				
26	<i>H</i>				
27	<i>0</i>				
28	<i>0</i>				
29	<i>0</i>	<i>23.2°C 23:27</i>			
30	<i>DMP</i>				
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					

6/6

231 5x5

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$)		
Date:	Chemistry T ($^{\circ}\text{C}$):	NO ₃ :	NO ₃	SiO ₄	PO ₄
Cruise:	Thaw time:	SiO ₄ :	L	16	
Project:		PO ₄ :	M	31.9	
			H	47.9	
Tray #	Sample ID	Comments			
1	DMQ				
2	0	11:42 22.6°C			
3	0				
4	0				
5	L	Wake-up w/ sample			
6	L				
7	L				
8	M				
9	M				
10	M				
11	H				
12	H				
13	H				
14	0				
15	0				
16	0				
17	AY 1961				
18	AY 1961				
19	AY 1961				
20	0				
21	DW 352	Lef. frozen			
22	352	446			
23	352	445			
24	0	444			
25	443	CB23a Dist #24			
26	442				
27	441				
28	440				
29	439				
30	438				
31	437				
32	436				
33	435				
34	434				
35	433				
36	432				
37	431				
38	430				
39	429				
40	428				

Nutrient Analysis Log

Analyst:		Chemistry	Gain	Standard Ranges ($\mu\text{m/L}$)		
Date:	T ($^{\circ}\text{C}$):	NO ₃ :	NO ₃	SiO ₄	PO ₄	
Cruise:	Thaw time:	SiO ₄ :	L			
Project:		PO ₄ :	M			
			H			
Tray #	Sample ID	Comments				
1	427					
2	426					
3	425					
4	424					
5	423					
6	0					
7	445	Replicates				
8	441					
9	438					
10	424					
11	0	13:57 23°C				
12	DW 352	14x3				
13	352					
14	352					
15	0					
16	McK					
17	McK					
18	McK					
19	0					
20	0					
21	0					
22	L					
23	L					
24	L					
25	M					
26	M					
27	M					
28	H					
29	H					
30	H					
31	0					
32	0					
33	0					
34	439 493	CB-50 Last #26				
35	492					
36	491					
37	490					
38	489					
39	488					
40	487					

2
5

Nutrient Analysis Log

Analyst:		Chemistry	Gain	Standard Ranges (µm/L)		
Date:	T (°C):	NO ₃ :	NO ₃	SiO ₄	PO ₄	
Sep. 23		SiO ₄ :	L			
Cruise: 2010-07	Thaw time: 0	PO ₄ :	M			
Project: Jois	230910		H			
Tray #	Sample ID	Comments				
1	486					
2	485	15:36 23.2°C				
3	484					
4	483					
5	482					
6	481					
7	480					
8	479					
9	478					
10	477					
11	476					
12	475					
13	474					
14	473					
15	472					
16	471					
17	470					
18	0					
19	482	Rep				
20	481					
21	472 471					
22	0					
23	471	DLW Ref #352				
24	471	DLW Ref				
25	471	DLW Ref				
26	0					
27	McK					
28	McK					
29	McK					
30	0					
31	0					
32	0					
33	L					
34	L					
35	L					
36	M					
37	M					
38	M					
39	H					
40	H					

3/5

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges (µm/L)		
Date:	Chemistry T (°C):	NO ₃ :	NO ₃	SiO ₄	PO ₄
Cruise:	Thaw time:	SiO ₄ :	L:		
Project:		PO ₄ :	M:		
			H:		
Tray #	Sample ID	Comments			
1	H				
2	O				
3	O				
4	O				
5	DW / Refeena MK7 Niskin#2 2,600m				
6	DW				
7	DW				
8	O				
9	ut				
10	ut				
11	MeK				
12	O				
13	O				
14	O				
15	L				
16	L				
17	L				
18	M				
19	M				
20	M				
21	H				
22	H				
23	H				
24	O				
25	O				
26	O				
27	517	CB51 Rest 27			
28	516				
29	515				
30	514				
31	513				
32	512				
33	511				
34	510				
35	509				
36	508				
37	507				
38	506				
39	505				
40	504				

4/5

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges (µm/L)		
Date:	Chemistry T (°C):	NO ₃ :	NO ₃	SiO ₄	PO ₄
Cruise:	Thaw time:	SiO ₄ :	L		
Project:	230910003	PO ₄ :	M		
			H		
Tray #	Sample ID	Comments			
1	503				
2	502				
3	501				
4	500				
5	499				
6	498				
7	497				
8	496				
9	495				
10	494				
11	0				
12	511	Replicates			
13	504				
14	499				
15	0	1 mck			
16	AY 1961	mck			
17	AY 1961	mck			
18	AY 1960				
19	0				
20	DW Ref	MK7 21600m Nisk #2			
21	DW Ref	L			
22	DW Ref				
23	0				
24	0				
25	0				
26	L				
27	L				
28	L				
29	M				
30	M				
31	M				
32	H				
33	H				
34	H				
35	0				
36	0				
37	0	20:57 24.2°C			
38	DMQ				
39					
40					

5/5

8:20am - 1
20:05pm

Nutrient Analysis Log

Analyst:

Date:

Sept 27, 2010

Chemistry

T (°C):

Thaw time: ~ 50°C

Gain

NO₃:

SiO₄:

PO₄:

Standard Ranges (µm/L)

NO₃

SiO₄

PO₄

L

8

16

0.81

M

16

31.9

1.62

H

24

47.9

2.41

Project:

J015

270910.00

Tray #

Sample ID

DMQK2

Comments

Time

8:59:50 a.m.

1

0

2

0

3

0

4

L

5

L

6

L

7

M

8

M

9

M

10

H

11

H

12

H

13

0

14

0

15

0

16

AY 0765

17

AY 0765

18

AY 0765

19

0

20

352 DW

21

352 DW

22

352 DW

23

0

24

38 CABOS (2)

25

31 CABOS (2)

26

27 CABO (2)

27

474 CB50 (26)

28

388 CB27 (22)

29

337 CB29 (20)

30

313 CB286 (19)

31

304 CB286 (19)

32

214 MK3a (15)

33

201 MK1 (13)

34

195 MK1 (13)

35

0

36

201 MK1 (13)

37

0

38

MCK

39

MCK

40

MCK

Wakeup sample x3

24.4°C 9:09:22 a.m.
above Si coils

Wavy conditions all day
Ship rolling

Sample - Replicates from previous
+ Costs not analyzed

Lid Loose

Repl

Nutrient Analysis Log

Analyst:

Gain

Standard Ranges ($\mu\text{m/L}$)

Date:

Sept 27/10

Chemistry

T ($^{\circ}\text{C}$):

NO_3^-

NO_3^-

SiO_4

PO_4

Cruise:

2010-07

Thaw time:

SiO_4

L

M

H

Project:

JOIS

270910.243

PO_4

Tray #

Sample ID

Comments

1

0

2

352 Ref

3

352 Ref

4

352 Ref

5

0

6

122

FROM FROZEN

CB65

Cast 9

7

121

CB65

Cast 9

8

0

9

120

CB64

Cast 8

10

119

CB64

Cast 8

11

0

12

118

CB62

Cast 7

13

117

CB63

Cast 7

14

0

15

116

CB62

Cast 6

16

115

CB62

Cast 6

17

0

18

118 Repl.

19

0

20

McK

21

McK

22

McK

23

0

24

352 Reference

25

352 Reference

26

350 Reference

27

0

28

0

29

0

30

L

31

L

32

L

33

M

34

M

35

M

36

H

37

H

38

H

39

0

40

0

Nutrient Analysis Log

Analyst:

Gain

Standard Ranges ($\mu\text{m/L}$)

Date:

Sept 27/2010

Chemistry

T ($^{\circ}\text{C}$):

NO_3 :

NO_3

SiO_4

PO_4

L

M

H

Cruise:

2010-07

Thaw time:

0

SiO_4 :

Project:

JOPS

270910.003

PO_4 :

Tray #

Sample ID

Comments

1

0

2

565

STA-A CAST #29

FRESH

3

564

4

563

5

562

6

561

7

560

8

559

9

558

10

557

11

556

12

555

13

554

14

553

15

552

16

551

17

550

18

549

19

548

20

547

21

546

22

545

23

544

24

543

25

542

26

0

27

557

Reps

28

549

29

545

30

0

31

MeK

32

MeK

33

MeK

34

0

35

352 Ref

36

352

RESTART SAMPLES HERE

37

352

15:10

24.20C

38

0

39

0

40

0

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges (µm/L)			
Date: <i>Apr 27/10</i>	Chemistry T (°C):	NO ₃ :		NO ₃	SiO ₄	PO ₄
Cruise:	Thaw time:	SiO ₄ :	L:			
Project:	<i>270910</i>	PO ₄ :	M:			
			H:			
Tray #	Sample ID	Comments				
1	<i>L</i>					
2	<i>L</i>					
3	<i>L</i>					
4	<i>M</i>					
5	<i>M</i>					
6	<i>M</i>					
7	<i>H</i>					
8	<i>H</i>					
9	<i>H</i>					
10	<i>O</i>					
11	<i>O</i>					
12	<i>O</i>					
13	<i>589</i>	<i>CB-2a CAST # 30 FRESH</i>				
14	<i>588</i>					
15	<i>587</i>					
16	<i>586</i>					
17	<i>585</i>					
18	<i>584</i>					
19	<i>583</i>					
20	<i>582</i>					
21	<i>581</i>					
22	<i>580</i>					
23	<i>579</i>					
24	<i>578</i>					
25	<i>577</i>					
26	<i>576</i>					
27	<i>575 -</i>					
28	<i>574</i>					
29	<i>573</i>					
30	<i>572</i>					
31	<i>571</i>					
32	<i>570</i>					
33	<i>569</i>					
34	<i>568</i>					
35	<i>567</i>					
36	<i>566</i>					
37	<i>0</i>					
38	<i>581</i>	<i>Reps</i>				
39	<i>575</i>					
40	<i>570</i>					

Nutrient Analysis Log

Analyst:		Chemistry	Gain	Standard Ranges ($\mu\text{m/L}$)		
Date: <i>Sep 27/10</i>		T ($^{\circ}\text{C}$):	NO_3 :	NO_3	SiO_4	PO_4
Cruise:		Thaw time:	SiO_4 :	L		
Project: <i>J015</i>			PO_4 :	M		
				H		

Tray #	Sample ID	Comments
1	0	
2	Mck	
3	Mck	
4	Mck	
5	0	
6	0 -1	
7	0 -2	DETECTION LIMIT
8	0 -3	
9	0 -4	
10	0 -5	
11	0 -6	
12	0 -7	<i>added 3 more 0's - reserve</i>
13	0 -8	<i>mont dry, so air was sucked in</i>
14	0 -9	<i>- take that out of sel'n.</i>
15	0 -10	
16	0	<i>CB2a Cast 30 report</i>
17	L	<i>575 report N peak painty</i>
18	L	
19	L	
20	M	
21	M	
22	M	
23	H	
24	H	
25	H	
26	0	<i>Still many outside white caps</i>
27	0	<i>18:55 24.4°C</i>
28	0	<i>Nothing seen.</i>
29	DMQ	
30	#446 +8	DISCONNECT ALL EXCEPT NaCl & P ASC
31	#422 +2	PHOSPHATE TURBIDITY.
32	398 0	
33	374 -1	
34	350 -2	
35	326 0	
36	282 +1	
37	258 -2	
38	169 +1	
39	DMQ	
40	0.	

Nutrient Analysis Log					
Analyst:		Gain		Standard Ranges ($\mu\text{m/L}$)	
Date: <u>Sep 28/2010</u>	Chemistry T ($^{\circ}\text{C}$):	NO ₃ : <u>1.00</u>	NO ₃	SiO ₄	PO ₄
Cruise: <u>2010-07</u>	Thaw time: <u>0</u>	SiO ₄ : <u>4.00</u>	L 8	16.0	0.81
Project: <u>JOIS</u>	<u>280910.453</u>	PO ₄ : <u>7.00</u>	M 16	31.9	1.62
Tray #	Sample ID	DMQ x2	H 24	47.9	2.41
1	0	12:34:30	Comments Hookup at 10:30a.m		
2	0				
3	0		Wakeup w H+ samples		
4	L				
5	L				
6	L				
7	M				
8	M				
9	M		Near in edge - calm		
10	H		- pancake ice		
11	H		- some fog		
12	H				
13	0				
14	0				
15	0				
16	AY0765				
17	AY0765				
18	AY0765				
19	0				
20	Wako 20N		Bottle #2 opened Sep 20/10		
21	20N				
22	20N	13:43	24.4 $^{\circ}\text{C}$		
23	Wako Si 50		Bottle #2 opened Sep 20/10		
24	Si 50				
25	Si 50				
26	0				
27	#352 MK7	Ref			
28	#352 MK7	Ref			
29	#352 MK7	Ref			
30	0				
31	613	SAMPLES	CB2- CAST #31		
32	612				
33	611				
34	610				
35	609				
36	608	L no 607			
37	606				
38	605				
39	604				
40	603				

Nutrient Analysis Log

Analyst:

Gain

Standard Ranges ($\mu\text{m/L}$)

Date: *Sep 28*

Chemistry
T ($^{\circ}\text{C}$):

NO_3^- :

NO_3^-

SiO_4

PO_4

Cruise: *2010-07*

Thaw time:

SiO_4 :

L:

M:

H:

Project: *Jois*

280910.243

PO_4 :

Tray #

Sample ID

Comments

1 *602*

2 *601*

3 *600*

4 *599*

5 *598*

6 *597*

7 *596*

8 *595*

9 *594*

10 *593*

11 *592*

12 *591*

13 *590*

14 *0*

15 *601*

16 *595*

17 *0*

18 *MCHK*

19 *MCHK*

20 *MCK*

21 *0*

22 *352 MK7 ref frozen*

23 *352 MK7 ref*

24 *352 MK7 ref*

25 *0* *15:59 24.8°C*

26 *0*

27 *0*

28 *L*

29 *L*

30 *L*

31 *M*

32 *M*

33 *M*

34 *H*

35 *H*

36 *H*

37 *0*

38 *0*

39 *0*

40 *637*

CB3 CAST #32

3/5

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$)		
Date: <i>Sept. 28/10</i>	Chemistry T ($^{\circ}\text{C}$):	NO_3^-	NO_3^-	SiO_4	PO_4
Cruise:	Thaw time:	SiO_4	L		
Project: <i>JOIS</i>	<i>280910</i>	PO_4	M		
			H		

Tray #	Sample ID	Comments
1	636	
2	635	
3	634	
4	633	
5	632	
6	631	
7	630	
8	629	
9	628	
10	627	
11	626	
12	625	
13	624	
14	623	
15	621	
16	620	
17	619	
18	618	
19	617	
20	616	
21	615	
22	614	
23	0	
24	633	<i>Rep</i>
25	629	
26	616	
27	0	
28	McK	
29	McK	
30	McK	
31	0	
32	352 <i>Rep</i>	18.17 24°C
33	352	
34	352	
35	0	
36	0	
37	0	
38	L	
39	L	
40	L	

4/5

Nutrient Analysis Log					
Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$)		
Date:	Chemistry T ($^{\circ}\text{C}$):	NO ₃ :	NO ₃	SiO ₄	PO ₄
Cruise:	Thaw time:	SiO ₄ :	L		
Project:		PO ₄ :	M		
			H		
Tray #	Sample ID	Comments			
1	M				
2	M				
3	M				
4	H				
5	H				
6	H				
7	O				
8	O				
9	O				
10	661	CB4 CAST #33			
11	660				
12	659				
13	658				
14	657				
15	656				
16	655				
17	654				
18	653				
19	652				
20	651				
21	650				
22	649				
23	648				
24	647				
25	646				
26	645				
27	644				
28	643				
29	642				
30	641				
31	640				
32	639				
33	638				
34	O				
35	656	Rep			
36	652				
37	644				
38	O				
39	nick				
40	nick				

181575.

5/5

Nutrient Analysis Log

Analyst:		Gain	Standard Ranges ($\mu\text{m/L}$)		
Date:	Chemistry T ($^{\circ}\text{C}$):	NO ₃ :	NO ₃	SiO ₄	PO ₄
Cruise:	Thaw time:	SiO ₄ :	L:		
Project:		PO ₄ :	M:		
			H:		
Tray #	Sample ID	Comments			
1	MW				
2	0				
3	352 Ref				
4	382				
5	352				
6	0				
7	0				
8	0				
9	L				
10	L				
11	L				
12	M				
13	M				
14	M				
15	H				
16	H				
17	H				
18	0				
19	0				
20	0				
21	DMQ				
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					