DF-95 TECHNICAL CRUISE REPORT
SEDIMENT TRAP RECOVERY/DEPLOYMENT CRUISE
ROSS SEA ANTARCTICA
M/N ITALICA AND U.S.C.G. POLAR STAR (JAN. 08 TO FEB. 09)

by

David A. Mucciarone

Cruise Participant: David A. Mucciarone (S-216), Mariangela Ravaioli, and Lele Marozzi (IGM)

Logistics:

I departed Houston IAH at 1300 on 1/08/95 and arrived in Christchurch, NZ (CHCH) at 1230 on 1/10/95. After a 5 day delay due to LC-130 mechanical problems, I arrived in McMurdo Station at 2300 on 1/15/95. I spent just over 2 days in McMurdo coordinating and preparing mooring operations for this season. The objectives of the Ross Sea cruises this year were to recover three moorings, two in the southwestern Ross Sea and one in McMurdo Sound (Fig. 1). The SW Ross Sea moorings consist of a Ross Sea Flux Experiment (RSFE) left over labeled Site A, and a joint U.S./Italian mooring labeled Site A'. The RSFE mooring Site A was deployed on 11 February 1992 and the joint mooring Site A' was deployed on 31 January 1994, both from the U.S.C.G. Polar Sea. The McMurdo Sound mooring was deployed through the ice on 15 December 1992. Only the joint mooring at Site A' was scheduled to be redeployed this season.

Attempt were made last year to retrieve the RSFE mooring located at Site A, but due to extensive pack ice cover a recovery was not possible (Fig. 1). This season Site A still has high pack ice cover, however, on 1/28/95 Site A was in open water until 2/01/95. On average about 30% to 70% ice cover has been over the mooring location since 1/25/95. Last season the McMurdo Sound mooring was scheduled for retrieval, but was abandoned due to lack of ship time. This season it will remain once again due to 100% ice cover.

At 1130 on 1/18/95 via Navy huey I arrived on the ice edge off of Cape Roberts to join the M/N Italica. Group leader for the Italians was Dr. Mariangela Ravaioli and Chief scientist was Dr. Giancarlo Spezie both with Programma Nazionale di Ricerche in Antartide, Instituto di Geologia Marina (IGM). My tour upon the M/N Italica lasted until 1945 on 1/21/95 with the recovery of Site A' mooring completed at 0015 1/21/95 (See M/N Italica, Leg 1 below for details). Late last year, 10 & 12 December 1994, IGM deployed 2 moorings in the western Ross Sea labeled as Site B and C (Appendix A). These moorings have a similar configuration as Site A', both using Seabird CTD units, AAnderaa current meters, and Billings floatation. The exceptions are McLane 21 cup sediment traps and EG&G acoustic releases instead of OSU 15 cup sediment traps and InterOcean releases.

I returned to McMurdo from M/N Italica on the evening of 1/21/95 at 2130 by U.S.C.G. helo. While in McMurdo I arranged meetings with Dwight Fisher (NSF Representative) and Lt. Cmdr. Wayne Roberts (U.S.C.G. Ship Operations Officer) to obtain ice breaker time for mooring Site A recovery. In addition, I arranged lab space at CSEC for our group and staged equipment for Charlotte Kelchner in preparation for her cruise on the R/V Palmer with John Anderson (S-083). I also sampled 10 ml of supernatant from each sediment trap cup from the Site A' for Jim McManus and Jack Dymond at Oregon State University on 1/27/95.

Miscellaneous tasks while in McMurdo included organizing the remainder of our cargo line and checking up on the Nodwell and mobile lab unit. The cargo line items remaining are (1) mooring weights 1- 2000 lbs., 1-1400 lbs., 2-950 lbs., (2) 3-radar reflectors, (3) WHOI core barrel, and (4) 1-empty spool with stand. I also check on the status of the Nodwell (T-rex) and its peripherals (crane, winch, auger, and bits), and the mobile lab unit (Club Mud) in the event we are funded for next years project. T-rex and its

components were in good condition, Club Mud has been removed from its 5 ton sled. If needed a 5 ton sled can be made available. This information was confirmed by Charley Hanson (Heavy Shop) and Ron Nugent (Science Support Shop).

My return stay in McMurdo lasted over 13 days (1/22/95 to 2/04/95) waiting for one of the ice breakers to become available. Both ice breakers were present in Antarctica this season, the U.S.C.G. Polar Star and Polar Sea. Polar Star had official duty, but when they experienced computer problems which regulate their drive system, Polar Sea was called in to assist. The computer system on the Polar Star kept shutting down the drive system while breaking ice. This problem persisted to the point they could not cut an adequate channel for the supply vessels to reach the pier at McMurdo Station. The Polar Sea arrived and was able to prepare a channel for ship off load operations. However, it also sustained damage to one of the shafts and required repairs.

Prior to repairs, both ice breakers were required to escort the tanker (M/V Richard Matthiesen) to the McMurdo pier on 1/25/95. On 1/28/95, the tanker finished off load but the Polar Sea was not through making repairs. On 1/30/95, around 1600, both the tanker and Polar Sea headed to Terra Nova Bay to refuel the Italian Base. The Polar Sea was required to cut a channel into the base and perform escort duties. Polar Sea arrived back in McMurdo Sound on 2/03/95 around 0800.

Polar Star remained in McMurdo Sound to complete repairs, and was scheduled to escort the M/V Green Wave on 2/04/95. On 2/04/95, at 1945 the Green Wave arrived and docked at the McMurdo pier. Polar Star was then released for our mooring recovery (See U.S.C.G. Polar Star, Leg 2 below for details). The search for the mooring at Site A was called off at 0400 on 2/06/95. The Polar Star departed the mooring location for fuel off load operations at Cape Byrd. The Cape Byrd operation began at 0930 and ended at 1530. I departed the Polar Star at 1530 on a U.S.C.G. helo to McMurdo and arrived at 1600.

Bag drag was 1500 on 2/07/95 with check-in at 1800 on 2/09/95. The LC-130 departed McMurdo at 2115 and arrived in Christchurch, NZ at 0445 on 2/10/95. I departed CHCH at 1340 and arrived in IAH at 2345 on 2/10/95.

M/N Italica, Leg 1:

Upon my arrival to M/N Italica, the Italian Antarctic group was performing a ship off load of coring equipment in conjunction with the New Zealand Antarctic Program at Cape Roberts. On 1/19/95 at 1700 off load operations were complete and we began science operations. Time spent aboard the M/N Italica prior to Site A' mooring recovery was used for mooring logistic meetings, mooring line preparations, sediment trap interface testing. A layout of mooring A' is illustrated in Figure 2. After the recovery, time was spent down loading data and/or reserving the Seabird units, AAnderaa current meters, sediment trap interfaces, and acoustic releases. The 2-1 Kevlar line was spooled and hardware on floats and releases changed.

The ship arrived at the location of the joint Rice/Italian mooring, Site A' at 0815 on 1/20/95 with no pack ice in the area (Fig 3). However, due to weather and sea conditions the Site A' mooring recovery was delayed until 1900 the same day. The recovery operation took just over 5 hours to complete. Mooring was on deck at 0015 on 1/21/95. An outline of the mooring recovery from the M/N Italica is locaded in Appendix B. Mooring preparations and data acquisition took place immediately after the recovery and were completed by 1500 on 1/21/95. A mooring modification was made with respect to the float packages above the bottom sediment trap and equipment array. Instead of a three and two package of floats the three became one and the two became four (Fig. 4).

The performance of the mooring was successful and as follows:

1. All floats in very good condition. VLS Duron line in good condition. All line replaced with 2 in 1 Kevlar.

2. Top sediment trap stopped after 6 cups. Failure due to trap interface.
3. Bottom Sediment trap performed as expected, 13 cups collected. Baffle experienced major damage on recovery. Repairs were performed using tie wraps (‘zip ties’).
4. Both top and bottom Seabird CTD units performed well all data collected, no failures
5. Both AAnderaa current meters performed without failure.
6. One of the two transmissometers had a battery failure causing loss of data approximately half way through the deployment.
7. Both acoustic releases were in very good condition. Bottom release "ROBYN" was used to release the mooring.
8. Shackle hardware in very good condition, only one stainless steel shackle had signs of corrosion. All hardware was replaced.

Due to time constraints in conjunction with present weather and sea conditions a deployment of the joint mooring was delayed until 1/22/95 (see Mooring A’ Deployment information below). At 1000 on 1/21/95, the M/N Italica departed Site A' for a meeting with the U.S.C.G. helo in the area of Cape Byrd for my transport to McMurdo. With the assistance of the U.S.C.G. helo a location south of Cape Byrd was located. Using a small boat from the M/N Italica, I was transported 5 miles to shore to meet with the U.S.C.G. helo. I returned to McMurdo at 2130 on 1/21/95.

The M/N Italica after my departure returned to Site A'. Weather and Sea conditions were good and the mooring deployment was performed. Mooring operation began at 0720 and ended at 0840 on 1/22/95. Site location 76° 41.025'S 169° 00.230E in 817 m of water. This information was confirmed at 0900 on 1/23/95 by radio communication with M/N Italica from McMurdo. See Figure 4 for the final mooring Site A’ configuration.

MOORING A' RECOVERY: (January 20 - 21, 1995)

Information on the mooring equipment at Site A'. The mooring recovery was supervised by David A. Mucciarone and performed on the M/N Italica (Fig. 2). Acquisition of data and samples was a joint effort between Rice and IGM.

Launched small 10 m boat @	1900 (1/20/95)
Sent release command to “ROBYN” @	1930
Top float at surface @	1933
Top float attached to boat and in tow @	1945
Top float on deck @	2050
Top trap and instrument package on deck @	2100
Triple package of floats on deck @	2140
Double package of floats on deck @	2255
Bottom trap on deck @	2330
Bottom instrument package on deck @	2345
Bottom float on deck @	2355
Releases on deck @	0015 (1/21/95)

Trap Recovery Performance: **(TOP)**

Trap Cups Expected/Recovered:	13/6 (Trap stopped at cup 6)
Recovery Filename:	N/A
Program Error:	Dead trap interface
Battery Condition:	6.40 VDC (3-Micro 9v alkaline)
	3.19 VDC (1-RAM 3v lithium)
	16.30 VDC (4-Motor 9v alkaline)

Sample cup preservative:	10% Na-borate solution of formaline with filtered sea water.
Sediment Trap Sampling:	10 ml/cup of supernatant was sampled for Jim McManus and Jack Dymond at Oregon State University.
Trap History:	None - dead interface

*** DATA RECOVERY ENTRY INFORMATION FROM TOP TATTLE TALE ***

CUP	EVENT	DATE	TIME	TURN	MOTOR	LOGIC	ROT	TEMP
6	5	5/01/94	11:57:59	29.7	17.53	7.87	537	6551.5
5	4	3/31/94	11:59:37	28.8	17.57	7.88	386	6551.9
4	3	3/14/94	11:57:00	28.4	17.57	7.90	209	6552.3
3	2	2/26/94	11:56:31	27.9	17.76	7.90	280	6551.8
2	1	2/10/94	11:56:03	27.2	17.83	7.92	552	6551.5
1	0	1/31/94	14:49:29	-	18.23	9.21	-	-

Trap Recovery Performance: **(BOTTOM)**

Trap Cups Expected/Recovered:	13/13
Recovery Filename:	BOT94A.TXT
Program Error:	No errors
Battery Condition:	7.58 VDC (3-Micro 9v alkaline) 3.22 VDC (1-RAM 3v lithium) 17.35 VDC (4-Motor 9v alkaline)
Sample cup preservative:	10% Na-borate solution of formaline with filtered sea water.
Sediment Trap Sampling:	10 ml/cup of supernatant was sampled for Jim McManus and Jack Dymond at Oregon State University.
Trap History:	As follows

*** DATA RECOVERY ENTRY INFORMATION FROM BOTTOM TATTLE TALE ***

CUP	EVENT	DATE	TIME	TURN	MOTOR	LOGIC	ROT	TEMP
15	14	1/04/95	12:26:44	161.5	12.69	8.00	543	6552.7
14	13	1/04/95	12:16:31	161.5	13.17	8.00	543	6552.3
13	12	1/04/95	12:06:18	161.5	13.65	7.99	543	6551.5
12	11	12/20/95	12:06:45	161.5	13.69	7.96	543	6551.5
11	10	11/20/94	12:00:48	161.5	13.54	7.92	543	6551.5
10	9	10/10/94	11:56:59	161.5	15.35	8.14	543	6552.6
9	8	9/01/94	11:57:26	161.5	17.39	7.85	543	6551.5
8	7	7/15/94	11:56:54	31.5	17.46	7.86	543	6551.5
7	6	6/01/94	11:56:22	30.7	17.53	7.87	541	6551.5
6	5	5/01/94	11:57:59	29.7	17.53	7.87	537	6551.5
5	4	3/31/94	11:59:37	28.8	17.57	7.88	386	6551.9
4	3	3/14/94	11:57:00	28.4	17.57	7.90	209	6552.3
3	2	2/26/94	11:56:31	27.9	17.76	7.90	280	6551.8
2	1	2/10/94	11:56:03	27.2	17.83	7.92	552	6551.5
1	0	1/31/94	14:49:29	-	18.23	9.21	-	-

Site A' Estimated Accumulation Rate/Cup:

CUP	EVENT	DAYS	DATE	TIME	TOP TRAP(CM)	BOTTOM TRAP(CM)
Recovery on			1/21/95	00:15:00		
15	14	17	1/04/95	12:26:44	-	6.50
14	13	<1	1/04/95	12:16:31	-	<1.00
13	12	<1	1/04/95	12:06:18	-	<1.00
12	11	15	12/20/95	12:06:45	-	<1.00
11	10	30	11/20/94	12:00:48	-	1.75
10	9	41	10/10/94	11:56:59	-	2.25
9	8	39	9/01/94	11:57:26	-	2.50
8	7	48	7/15/94	11:56:54	-	5.75
7	6	44	6/01/94	11:56:22	-	10.50
6	5	31	5/01/94	11:57:59	16.00	18.00
5	4	31	3/31/94	11:59:37	20.50	24.50
4	3	17	3/14/94	11:57:00	19.50	11.50
3	2	16	2/26/94	11:56:31	2.50	4.00
2	1	16	2/10/94	11:56:03	3.50	5.00
1	0	8.5	1/31/94	13:00:00	3.00	4.00

Acoustic Releases: Luisa-2 pk 7.24 VDC; 4 pk 7.25 VDC
Robyn-2 pk 7.26 VDC; 4 pk 7.25 VDC

Battery Type: Electrochem 3.9v D-cell lithium

Previous Deployment Coordinates: 76° 41.96'S 169° 00.90'E
Previous Water Depth: 810 meters

MOORING A' DEPLOYMENT: (January 22, 1995)

Information on the mooring equipment at Site A'. The mooring deployment was supervised by Mariangela Ravaioli and performed on the M/N Italica (Fig. 4). Preparation of all equipment was a joint effort between Rice and IGM. A detailed deployment report will be submitted to Rice by Mariangela Ravaioli.

Launched small 10 m boat @ 0700 (1/22/95)
Top float in water @ 0720
Anchor released @ 0840

Trap Deployment Statistics: **(TOP)**

Trap Cups Deployed: 15
Deployment Filename: TOP95A.TXT
Battery Condition: 9.30 VDC (3-Micro 9v alkaline)
3.25 VDC (1-RAM 3v lithium)
18.36 VDC (4-Motor 9v alkaline)
Tests performed: Motor - OK; Interface - OK
Sample cup preservative: 10% Na-borate solution of formaline with filtered sea water.
Trap History: Same as Bottom trap, see below

Trap Deployment Statistics: **(BOTTOM)**

Trap Cups Programmed: 15

Recovery Filename:	BOT95A.TXT
Battery Condition:	9.31 VDC (3-Micro 9v alkaline) 3.26 VDC (1-RAM 3v lithium) 18.40 VDC (4-Motor 9v alkaline)
Tests performed:	Motor - OK; Interface - OK
Sample cup preservative:	10% Na-borate solution of formaline with filtered sea water.
Trap History:	Same as Top and as follows

Mooring Site A' Top and Bottom Sediment Trap Deployment date- 22 January 1995 and Programming:

12 days at Position 1 for Site a' deployment beginning on 22 January 95 at 0840.

12 Days	Position 1	22 January 1995	@ 0840	Cup 1
14 Days	Position 2	01 February 1995	Event 1	Cup 2
14 Days	Position 3	15 February 1995	Event 2	Cup 3
31 Days	Position 4	01 March 1995	Event 3	Cup 4
61 Days	Position 5	01 April 1995	Event 4	Cup 5
61 Days	Position 6	01 June 1995	Event 5	Cup 6
61 Days	Position 7	01 August 1995	Event 6	Cup 7
37 Days	Position 8	01 October 1995	Event 7	Cup 8
24 Days	Position 9	07 November 1995	Event 8	Cup 9
15 Days	Position 10	01 December 1995	Event 9	Cup 10
16 Days	Position 11	16 December 1995	Event 10	Cup 11
15 Days	Position 12	01 January 1996	Event 11	Cup 12
16 Days	Position 13	16 January 1996	Event 12	Cup 13
29 Days	Position 14	01 February 1996	Event 13	Cup 14
?	Position 15	01 March 1996	Event 14	Cup 15

Site A' Mooring Statistics:

Top 30" steel float (+369 lbs.)	=	0.3 m
Top 30" steel float to top trap =	10 m	
Top trap w/ pendant (-20 lbs.)	=	25 m
Bottom of top trap to top CTD	=	5 m
Top CTD meter (-32 lbs.)	=	0.85 m
Top CTD meter to top current meter	=	5 m
Top current meter/transmissometer (-40 lbs.)	=	0.45 m
Bottom of top current meter to single 3 pack float	=	60 m
Single 3 pack float (+66 lbs.)	=	0.5 m
Single 3 pack float to quad 3 pack floats)	=	350 m
Quad 3 pack floats (+264 lbs.)	=	2.0 m
Quad 3 pack floats to bottom trap	=	100 m
Bottom trap w/ pendant (-20 lbs.)	=	25 m
Bottom of bottom trap to bottom CT	=	5 m
Bottom CT meter (-32 lbs.)	=	0.9 m
Bottom CT meter to bottom current meter	=	5 m
Bottom current meter/transmissometer (-40 lbs.)	=	0.45 m
Bottom of bottom current meter to single 3 pack float	=	10 m
Single 3 pack float (+66 lbs.)	=	0.5 m
Single 3 pack float to top release (LUISA)	=	10 m
Top release (-20 lbs.)	=	0.6 m
Top release to bottom release (1" & 9/16" SS shackle)	=	0.1 m
Bottom release (-20 lbs.)	=	0.6 m

Bottom release to 1400 lb. anchor (1/2” gal. chain) = 4 m

All rope is: 560- Meters 1/2" 2-1 Nylon and Kevlar w/ 1/2” nylon thimbles

Hardware:
- 12- 1/2” galvanized chain shackles (floats)
- 02- 1/2” stainless steel trap shackles
- 04- 1/2” stainless steel anchor shackles
- 01- 1/2” stainless steel swivel
- 02- 1/2” galvanized anchor shackles (chain to anchor)
- 04- 3/8” stainless steel chain shackles (CTD meters)
- 01- 1” stainless steel chain shackle
- 01- 1” galvanized chain shackle
- 01- 1/2” galvanized chain, 4 meters long
- 01- Steel 30” float (+369 lbs.) by Billings Industries
- 06- Single 3 packs of floats (+66 lbs./each) by Billings Industries.
- 02- CTD meters by Seabird Seacat model SBE-16
- 02- Current meters by AAnderaa model RCM-8
- 02- Transmissometers by Sea Tech w/ WS Ocean Systems interface kit.
- 02- Sediment traps w/ 15 cups each by Oregon St. Univ.
- 02- Acoustic releases by InterOcean model 1090ED (S/N: 0828007 and 0828008 from ASA/NSF)

Acoustic Releases: Luisa-2 pk 7.51 VDC; 4 pk 7.53 VDC
Robyn-2 pk 7.53 VDC; 4 pk 7.44 VDC

Battery Type: Electrochem 3.9v D-cell lithium

Release Command Codes	**Luisa**	**Robyn**
	Enable=DEF	**Enable=DEF**
	Release=BEFH	**Release=BEGH**
	Rearm=DEFH	**Rearm=DEFG**

New Mooring Location: 76° 41.025’S 169° 00.23’E
Water Depth: 817 meters

U.S.C.G. POLAR STAR, Leg 2:

Just over 13 days were spent in McMurdo waiting, coordinating and preparing for the Site A mooring recovery aboard the U.S.C.G. Polar Star. I had the trap pallets, float cages, and 1/2" chain loaded aboard Polar Star on 2/03/95. I joined Polar Star on 2/04/95 with personal rear and recovery equipment at 0710. Polar Star left the dock at 0800 to escort the M/V Green Wave to the McMurdo ice pier. Green Wave became bogged down during the escort to the pier. Trying to make head way, the Green Wave lost a valve on its engine which caused a 3 hour delay. At 1945 the Polar Star completed its escort and departed McMurdo Sound for science operations. We arrived on station at 0820 on 2/05/95 to begin mooring recovery attempt at Site A.

Upon arrival the site was found to be 30% to 70% ice cover, winds 20 to 30 knots with gust to 50 knots coming out of the SW, seas within the pack ice calm. The drift of the ice was 1 to 1.5 knots at 50°. A number of attempts were made to interrogate the releases from the Polar Star, with no avail. We then commenced a search using the 12 KHz echo sounder to locate the release. A grid was established with a resolution of 100 to 150 meters and was innitated at two locations, 76° 31.50’S 167° 23.42’E and 76°

31.60'S 167° 22.2'E. This effort produced no detection of the mooring at Site A (see Mooring A Recovery below for details).

The search was called off at 0400 on 2/06/95. The Polar Star departed the mooring location for fuel off load operations at Cape Byrd. The Cape Byrd operation began at 0930 and ended at 1530. I departed the Polar Star at 1530 on a U.S.C.G. helo to McMurdo and arrived at 1600.

Previous Mooring A Deployment Information from 11 February 92:

The releases, traps interfaces, and trap cups were prepared by David Mucciarone. Assembly of the mooring line to the equipment and deployment was performed by Robert Dunbar. Configuration of the RSFE mooring at Site A is illustrated in Figure 5.

Trap Deployment Statistics: **(TOP)**

Trap Cups Deployed:	15
Deployment Filename:	A-FEB92D.TOP
Battery Condition:	9.20 VDC/EA (3-Micro 9v alkaline) 3.23 VDC (1-RAM 3v lithium) 9.21 VDC/EA (4-Motor 9v alkaline)
Tests performed:	Motor - OK; Interface - OK
Sample cup preservative:	10% Na-borate solution of formaline with filtered sea water.
Trap History:	Same as Bottom trap, see below

Trap Deployment Statistics: **(BOTTOM)**

Trap Cups Expected/Recovered:	15
Recovery Filename:	A-FEB92D.BOT
Battery Condition:	9.23 VDC/EA (3-Micro 9v alkaline) 3.22 VDC (1-RAM 3v lithium) 9.21 VDC/EA (4-Motor 9v alkaline)
Tests performed:	Motor - OK; Interface - OK
Sample cup preservative:	10% Na-borate solution of formaline with filtered sea water.
Trap History:	Same as Top and as follows

Mooring Site A Top and Bottom Sediment Trap Deployment date- 11 February 1992 and Programming:

17 Days	Position 1	11 February 1992	@ 1013	Cup 1
30 Days	Position 2	01 March 1992	Event 1	Cup 2
30 Days	Position 3	31 March 1992	Event 2	Cup 3
61 Days	Position 4	01 May 1992	Event 3	Cup 4
62 Days	Position 5	01 July 1992	Event 4	Cup 5
61 Days	Position 6	01 September 1992	Event 5	Cup 6
61 Days	Position 7	01 November 1992	Event 6	Cup 7
14 Days	Position 8	01 January 1993	Event 7	Cup 8
17 Days	Position 9	15 January 1993	Event 8	Cup 9
14 Days	Position 10	01 February 1993	Event 9	Cup 10
14 Days	Position 11	15 February 1993	Event 10	Cup 11
75 Days	Position 12	01 March 1993	Event 11	Cup 12

61 Days	Position 13	15 June	1993	Event12	Cup13
78 Days	Position 14	15 October	1993	Event13	Cup14
400+ Days	Position 15	01 January	1994	Event14	Cup15

No Recovery made on 2/6/95

Acoustic Releases: Paul-2 pk 7.70 VDC; 4 pk 7.54 VDC
Carrie-2 pk 7.60 VDC; 4 pk 7.57 VDC

Battery Type: Electrochem 3.9v D-cell lithium

Site A Mooring Statistics:

Top package of 8 floats (+400 lbs.)	=	2.0 m
Top package of 8 floats to top of top trap	=	10 m
Top trap w/ pendant (-20 lbs.)	=	25 m
Bottom of top trap to package of 6 float	=	375 m
Bottom package of 6 floats (+300 lbs.)	=	1.5 m
Bottom package of 6 floats to top of bottom trap	=	80 m
Bottom trap w/ pendant (-20 lbs.)	=	25 m
Bottom of bottom trap to release float	=	25 m
Release float (+50 lbs.)	=	0.5 m
Release float to acoustic releases (Paul & Carrie)	=	10 m
Acoustic releases to 1400 lb. anchor (1/2" gal. chain)	=	4.5 m

(1.5 m SS sling hanging 0.5 m with 4 m galvanized chain)

All rope is: 490- Meters 3/8" Sampson VLS Duron with 5/8" nylon thimbles

Hardware:
- 10- 1/2" stainless steel chain shackles (floats)
- 02- 1/2" stainless steel trap shackles
- 03- 1/2" stainless steel chain shackles
- 01- 1/2" stainless steel swivel
- 01- 1/2" Crosby master link
- 02- 1/2" galvanized anchor shackles (chain to anchor)
- 01- 1/2" galvanized chain, 4 meters long
- 01- 1/2" stainless steel sling, 1.5 meters long
- 15- Single floats (+50 lbs./each) by Benthos
- 02- Sediment traps w/ 15 cups each by Oregon St. Univ.
- 02- Acoustic releases by InterOcean model 1090E

Release Command Codes	**Paul**	**Carrie**
	Enable=DEF	**Enable=DEG**
	Release=ACEH	**Release=ADFG**
	Rearm=DEFH	**Rearm=DEGH**

Deployment Mooring Location: **76° 31.50'S 167° 23.42'E**
Water Depth: **800 meters**

MOORING A RECOVERY: (February 5-6, 1995)

Information on the mooring equipment at Site A. The mooring recovery attempt was supervised by David A. Mucciarone and performed on the U.S.C.G. Polar Star. No recovery attempt was performed because there was no verification of the moorings presence. During the interrogation attempts the ship would position the ship on the site and tranponding would commence. All interrogation was performed from the bow. The MSB could not be deployed because of ice and weather conditions.

Arrived at Site A @	0820 (2/05/95)
First interrogation attempt @	0840
Second interrogation attempt @	1025
Begin first search attempt with 12 KHz PDR @	1130
End search attempt with 12 KHz PDR @	1730
Third interrogation attempt @	1815
Begin second search attempt with 12 KHz PDR @	2000
End search attempt with 12 KHz PDR @	0030 (2/06/95)
Fourth interrogation attempt @	0045
End recovery attempt @	0400

Notes on the McMurdo Sound Mooring:

The McMurdo Sound mooring will remain deployed for another year. A recovery was not possible due to ice cover. Normally this area is in open water, but due to ice breaker problems only a channel for ship off load was accomplished. The mooring was deployed on 15 December 1992 by S-004 through the sea ice. The location is 77° 47.45'S 166° 02.33'E in 575 meters of water. The InterOcean acoustic release 1090ED is located at approximately 165 m and is attached to an InterOcean spool system. There is one single cup Rice sediment trap and two InterOcean S-4 current meters on this mooring array. Command codes for the release are: ENABLE = CDE, RELEASE = ABCD, REARM = CDEG.

APPENDIX A

Group leader for the Italians was Dr. Leonardo Langone and Dr. Mariangela Ravaioli with Programma Nazionale di Ricerche in Antartide, Instituto di Geologia Marina (IGM). Deployed two moorings in the Ross Sea on 12/10/94 and 12/12/94. The following are the cup timing for the traps at Site B and C. There are 22 days at Position 1 for Site C deployment beginning on 10 December 94 and 20 days at Position 1 for Site B deployment beginning on 12 December 94:

Mooring Site C Top and Bottom Sediment Trap Deployment date- 10 December 1994, Mooring Site B Top and Bottom Sediment Trap Deployment date- 12 December 1994, and Programming:

22 Days	Position 1	=	10 December 94	Begin Site C
20 Days	Position 1	=	12 December 94	Begin Site B
15 Days	Position 2	=	01 January 95	
16 Days	Position 3	=	16 January 95	
14 Days	Position 4	=	01 February 95	
14 Days	Position 5	=	15 February 95	
31 Days	Position 6	=	01 March 95	
61 Days	Position 7	=	01 April 95	
61 Days	Position 8	=	01 June 95	
61 Days	Position 9	=	01 August 95	
37 Days	Position 10	=	01 October 95	
21 Days	Position 11	=	07 November 95	
15 Days	Position 12	=	01 December 95	
16 Days	Position 13	=	16 December 95	
15 Days	Position 14	=	01 January 96	
16 Days	Position 15	=	16 January 96	
14 Days	Position 16	=	01 February 96	
15 Days	Position 17	=	15 February 96	
122 Day	Position 18	=	01 March 96	
123 Days	Position 19	=	01 July 96	
61 Days	Position 20	=	01 November 96	
?	Position 21	=	01 January 97	

APPENDIX B

Mooring Recovery of Site A' from M/N Italica

The following is a mooring recovery procedure similar to the one used on the M/N Italica.

1: Using a small boat, we will interrogate the acoustic release to locate the mooring. When the mooring has been located the release code will be transmitted to the acoustic release.

2: When the top float reaches the surface, the small boat will attach one end of the line to the float and tie a loop in the opposite end of line. The boat can either tow the float to the ship or attach the loop end of the line to the hook on the crane cable. At this time Mucciarone will be taken to the ship to supervise the recovery.

3: The crane will then pick up the float and rotate the crane boom to bring the float and sediment trap close to the ship. Depending on the length of the tow line, a tending line attached to the tow line may be required to make several picks with the crane until the float reaches the ship.

4: Once the float reaches the ship, the crane hook can be attached to the float. Pick up the float and swing in the crane boom to bring the sediment trap toward the ship. Again a tending line may be required to be attached to the mooring line, between the top float and trap ,until the sediment trap reaches the surface.

5: With the sediment trap at the surface, attach a tending line to the mooring line to secure the trap at the surface. The other end of this tending line should be attached to the A-frame. Swing out the A-frame to keep the sediment trap away from the hull (side) of the ship.

6: Release the tension to the mooring line attached to the float and place float on deck of ship.

7: Using the small boat connect the hook from the crane to the loop on the sediment trap. Lift sediment trap with crane and bring in A-frame and release tending line.

8: Lift sediment trap to bring CTD and current meter/transmissometer to surface or out of the water.

9: Place sediment trap, CTD, and current meter/transmissometer on deck of ship.

10: Pull in line (60 meters) and package of 3 floats toward the ship either by hand or with a capstan.

11: Use small boat to connect hook from crane to package of 3 floats. Lift floats out of water and place on the deck of the ship.

12: Have small boat go to package of 2 floats, attach a line to the floats, like with the top float, and slowly tow the floats toward the ship. At the same time the 350 m of line is retrieved, either by hand or with a capstan, to the ship.

13: When all of the 350 meters of line between the floats has been recovered, attach the tow line to the hook from the crane.

14: Lift the package of 2 floats out of the water. A tending line will be used to make 6 or 7 lifts to bring the sediment trap to the surface.

15: With the sediment trap at the surface, attach a tending line to secure the trap at the surface. The other end of this tending line should be attached to the A-frame. Swing out the A-frame to keep the sediment trap away from the hull (side) of the ship.

16: Release the tension to the mooring line attached to the float and place float on deck of ship.

17: Using the small boat connect the hook from the crane to the loop on the sediment trap. Lift sediment trap with crane and bring in A-frame and release tending line.

18: Lift sediment trap to bring CTD and current meter/transmissometer to surface or out of the water.

19: Place sediment trap, CTD, and current meter/transmissometer on deck of ship.

20: The last single float should float to the surface. Again, using the small boat, connect the hook from the crane to the single float and lift single float and both acoustic releases out of the water and place on deck of ship.

a) If the single float does not float to surface, a tending line will be required to hold the mooring line and allow for the crane to bring the equipment (single float) to the surface and on to the deck of the ship

Mooring Recovery of Site A from U.S.C.G. Polar Star/Polar Sea

1. Attempt to interrogate the acoustic releases on the mooring from the Polar Sea.

2. Using the MSB, we will interrogate the acoustic release to locate the mooring. When the mooring has been located the release code will be transmitted to the acoustic release.

3. When the top set of floats reach the surface, they will be towed to the casting deck with the MSB, port side, where the hook from the large crane will be connected to the float.

4. A snatch block from the J-frame will be lowered to the MSB. At this time the crane will lift the floats and the mooring line is placed into the snatch block and secured. The snatch block then is lifted close to the cross bar of the J-frame. An alternative would be lift the floats with the crane and swing the crane boom in board and place the line into a snatch block attached to the J-bar next to the J-frame.

5. In either case when the mooring line is secure in the snatch block the crane boom will swing aft toward the flight deck. This motion will bring the top trap to the surface for capture.

6. Using another winch cable passed through a second snatch block on the J-frame, lower the cable and hook to the trap. Connect the hook to the trap using the MSB and lift the trap to the casting deck. The tension on the mooring line can be released and floats detached and slung back the flight deck.

7. A tending line from the aft capstan fed through a block on an aft J-bar to the block on the casting deck J-bar is attached to the mooring line at the base of the sediment. Disconnect the sediment trap and retrieve the mooring line (375 meters) until the next set of floats reaches the casting deck.

8. The crane hook will be attached to the floats using the MSB and lifted until the mooring line can be removed from the casting deck J-bar snatch block. Lift the floats in the same manner as the first set and insert the mooring line at the bottom of the floats into the snatch block and secure.

9. Attach a tending line or the mooring line just retrieved (disconnect from the top of the floats), to the line at the base of the floats. Disconnect the floats and swing up to flight deck. Retrieve the mooring line (100 meters) with the aft capstan until the second trap reaches the surface at the casting deck.

10. Using another winch cable passed through a second snatch block on the J-frame, lower the cable and hook to the trap. Connect the hook to the trap using the MSB and lift the trap to the casting deck. The tension on the mooring line can be released and trap line can be detached from the mooring line.

11. The release float and release can be retrieved by hand or another pick with crane on the float using the MSB. This will end the mooring recovery. Retrieve MSB and secure equipment on deck.