Karabanov/ VERESHCHAGIN Lake
Colman/Hearn VRSH 91-1 Baikal
July 13-August 5, 1991
NAVIGATION LOG
LINE LIST

91022
VRSH 91-1
104824

Line	Date	Start (Wpt#,time,Lat,Long)	End (Wpt#,time,Lat,Long)
001	071391	L94 2016 51 33.68N; 104 05.12E	L95 0013 51 46.86N; 104 20.74E
002	071491	L95 0112 51 47.20N; 104 20.76E	L94 0456 51 34.36N; 104 04.94E
003	071491	L96 0814 51 46.64N; 104 07.84E	L97 1100 51 38.13N; 104 30.06E
004	071591	L1 1336 52 01.71N; 105 36.50E	L2 1913 52 25.06N; 10~~4~~5 56.70E
005	071591	L2 1913 52 25.06N; 104 56.70E	C3 2041 (30) 52 29.05N; 106 07.35E
006	071591	C3 2041	2214
007	071691	L18 1245 52 22.86N; 10~~8~~6 09.17E	L19 1511 52 25.88N; 106 19.10E
008	071691	L19 1511	L20 1648 52 28.34N; 106 28.51E
009	071691	L20 164~~7~~8	L32 1847 52 38.19N; 106 30.49E
010	071691	L32 1847	C3 2133 52 29.22N; 106 07.22E
011	071791	C2 1921 52 16.49N; 10~~9~~5 49.74E	L10 2103 52 11.36N; 106 03.89E
012	071791	L10 2103	L9 2216 52 05.18N; 106 03.15E
013	071791	L9 2216	L8 0111 52 09.02N; 105 42.91E
014	071891	L8 0111	C2 0240 52 16.59N; 105 48.36E
015		L27A 1454 52 21.56N; 106 13.10E	L26 1622 52 16.30N; 106 03.75E
016		L26 1622	L2 1803 52 24.62N; 105 56.05E
017		L2 1803	L13A 2155 52 04.92N; 105 38.79E
018		L13A 2155	L12 0043 52 00.96N; 106 05.39E
019	071991	L5 1000 52 09.38N; 105 50.20	L6 1245 51 53.05N; 105 54.91E
020		L6 1245	L7 1323 51 55.51N; 105 50.24E
021		L7 1323	L8 1545 52 09.00N; 105 42.44E
022		L8 1545	L13 1628 52 06.32N; 105 36.71E
023		L13 1628	L14 1810 51 56.48N; 105 42.75E
024		L14 1810	L15 2005 51 57.80N; 106 02.78E
025	072091	L15 1337 51 57.86N; 106 03.18E	L16 1535 52 08.99N; 105 56.22E
026		L16 1535	L17 1624 52 14.19N; 105 58.04E

Line	Date	Start (Wpt#,time,Lat,Long)	End (Wpt#,time,Lat,Long)
027		L17 1624	L18 1807 52 22.63N; 106 09.15E
028		L18 1807	L19 1911 52 26.20N; 106 18.75E
029		L19 1911	L20 2008 52 28.31N; 106 27.88E
030		L20 2008	L21 2236 52 31.64N; 106 52.65E
031		L21 2236	L32A 0120 52 41.04N; 106 33.18E
032	72191	L32A 0120 52 41.24N; 106 33.33E	C5A 0323 52°39.98'N 106°42.52'E
033	72191	L32 1341 52 38.04N; 106 30.73E	L31 1537 52 27.04N; 106 35.09E
034		L31 1537	L30 1658 52 24.93N; 106 23.33E
035	72391	L57 0213 53 47.48N; 107 58.74E	L56 0819 53 19.~~34~~16N; 108 ~~24.30~~38.38E
036		L69 1645 54 21.36N; 108 58.26E	L70A 2300 54 56.02N; 109 14.85E
037	72491	L70A 1513 54 56.00N; 109 14.70E	L72 1900 55 16.70N; 109 26.23E
038		L72 1900	L73 2146 55 32.70N; 109 31.85E
039		L73 2146	L74 2343 55 42.62N; 109 44.10E
040	72591	L75A 1511 55 28.03N; 109 46.04E	L76A 1612 55 34.06N; 109 45.94E
041		L76A 1612	L77A 1753 55 41.26N; 109 34.07E
042		L77A 1753	L78A 1857 55 34.90N; 109 31.40E
043		L78A 1857	L79A 1947 55 31.48N; 109 24.41E
044		L79A 1947	L80A 2036 55 35.48N; 109 21.98E
045		L80A 2036	L81A 2345 55 22.94N; 109 47.13E
046	72691	L82A 1242	L83A 1459 55 03.58N; 109 24.08E
047	72691	L83A 1459	L84A 1554 54 57.94N; 109 27.11E
048		L84A 1554	L85A 1651 54 56.96N; 109 37.86E
049		L85A 1651	L86A 1930 54 53.57N; 109 09.20E
050		L86A 1930	L87A 2116 55 04.73N; 109 12.97E
051		L87A 2116	L88A 2350 54 56.00N; 109 02.00E
052	72791	L86A 1706 54 53.55N; 109 09.09E	L88A 1754 54 55.93N; 109 02.02E

Line	Date	Start (Wpt#,time,Lat,Long)	End (Wpt#,time,Lat,Long)
053		L88A 1754	L89A 2000 54 44.60N; 108 52.41E
054		L89A 2000	L90A 2101 54 50.35N; 108 53.39E
055		L90A 2101	L91A 0101 54 44.97N; 109 35.25E
056	72891	L96A 1302 54 29.90N; 108 37.63E	L95A 1719 54 32.99N; 109 25.81E
057		L95A 1719	L94A 1910 54 27.59N; 109 08.08E
058		L94A 1910	L93A 2044 54 37.09N; 109 13.03E
059		L93A 2044	L92A 2238 54 47.99N; 109 20.96E
060	73091	L35 1311 53 49.96N; 108 47.68E	L36A 1628 54 05.47N; 108 25.20E
061		L36A 1628	L36B 1722 54 10.16N; 108 30.85E
062		L36B 1722	L37A 1808 54 14.47N; 108 34.44E
063		L37A 1808	L37B 1857 54 13.55N; 108 26.09E
064		L37B 1857	L37A 1949 54 14.44N; 108 34.45E
065		L37A 1949	L50 2159 54 04.73N; 108 50.75E
066		L50 2159	L51 0045 53 51.86N; 109 08.72E
067	73191	L49A 1221 54 01.73N; 109 04.82E	329 1309 53 58.14N; 108 59.24E
068		329 1309	L49 1420 53 59.09N; 108 47.10E
069		L49 1420	C14 1831 53 43.46N; 108 16.53E
070		C14 1831	L47 2029 53 35.34N; 108 03.55E
071		L47 2029	L46A 0140 53 17.00N; 107 19.98E
072	080191	L39A 1319 53 23.68N; 107 41.05	L40 1421 53 28.54N; 107 41.05E
073		L40 1421	L41 1528 53 34.68N; 107 38.28E
074		L41 1528	331 1654 53 28.19N; 107 47.38E
075		331 1654	L42A 2036 53 13.93N; 108 06.20E
076		L42A 2036	L44A 2141 53° 18.02'N 108° 15.03'E ~~2219 53 18.11N; 108 14.78E~~
077		L44A 2219 53° 18.11'N 108° 14.78'E	L45 0345 53 39.43N; 107 44.44E
078	80291	L58A 1324 53 51.99N; 108 10.97E	L59A 1452 53 59.08N; 108 19.69E

079		L59A	1452						L60A	1800	53	45.08N;	108	41.83E
080		L60A	1800						L61A	1935	53	37.57N;	108	32.96E
081		L61A	1935						L58A	2308	53	52.71N;	108	10.13E
082	80391	328	1418	54	22.90N;	108	58.56E		L69	0303	53°	26.86'N	107°	36.76E ~~1437 54 21.02N; 108 58.56E~~
083	80491	L30	1845	52	24.89N;	106	23.48E		L29	2040	52	34.00N;	106	12.62E
084		L29	2040						L28	2133	52	31.59N;	106	05.73E
085		L28	2133						~C3	2206	52	28.20N;	106	07.90E

91022nav

U.S.G.S.
INTEGRATED NAVIGATION SYSTEM
AND
NORTHSTAR LORAN-C NAVIGATION LOG

SHIP Vereshagin

CRUISE NO. Ver 91

DATE 7/13/91 -

CHIEF SCIENTIST Hearn/Colman

Lats/Longs in digital

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD (Kn/hr)	FIX TIME	NAVIGATION LATITUDE ± DEGREES	LATITUDE MINUTES	LONGITUDE ± DEGREES	LONGITUDE MINUTES	TYPE	QUAL.
91	07	13	0600		246	15.4			.		.		
			0630		246	15.3		51	4880	104	44.74		
			0700		248	18.5		51	4722	104	38.95		
			0730		264	18.5		51	4629	104	31.20		
			0800		263	18.8		51	4547	104	23.18		
			0834		260	10.5		51	4480	104	13.80		
			0903		---	--		51	4480	103	13.16		
			1000		---	--		51	4474	103	13.15		
			1100					51	4467	104	13.06		
			1333		208	18.2		51	4408	104	12.27		
			1400		188	18.5		51	3981	104	11.60		
			1430		013	4.2		51	3591	104	10.87		
			1601		---	—		51	3584	104	10.87		
			2016	001	SOL	#1		51	3368	104	05.12		
			2043	001	041	7.8		51	3487	104	07.16		
			2104	001	036	7.9		51	3599	104	08.75		
			2156	001	040	8.0		51	3892	104	12.60		
			2304	001	045	8.0		51	4260	104	17.68		
			2354	001	022	7.7		51	4559	104	20.47		
91	07	14	0013	001	EOL	#1		51	4686	104	20.74		
			0112	002	SOL	#2		51	4720	104	20.76		
			0115	002	232	6.7			.		.		
			0200						.		.		
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Times UT Local - 8hrs

TAPE #	START	END	COMMENTS AND OBSERVATIONS	PAGE Ø2
			7/13/91	
0600			Leave Dock at Listryanka. Head 246° to southern Basin to	
			collect box cores. Primary computer down (bad com port)	
			Using NEC with NAV Program with No steer screen on bridge	
			Will meet Obrucher near old L90. Flower + student will request	
			site for box cores.	
0710			Start Data logging using Magellan software on B: Nav14a	
0835			stop to stream wire from Main Winch	
1111			Benthos core 312 51° 44.66 N 104° 13.04 E Winch meter Depth 1390 M	
			Obrucher arrives with Likoshway + Flower ~ 1105 UT	
1219				
1330			New wire on winch << 2000 M (!?) probably < 1300 M. Large Box	
			core failed to reach bottom at L90. Heading south (208°)	
			to 1000 M isobath. Will take benthos core + then	
			box core to mark 1000M on main winch cable.	
1430			arrive at 1000M isobath (based on corrected fathometer)	
1530			~~Benthos core 313 depth/meter 1020M 51° 35.90N 104° 10.84E~~	
1601			Lg core 313 depth from Hydrowinch 1020M 51° 35.84N 104° 10.87E	
			Estimate ~1250 meters cable on winch	
1745			underway to WPØ2 51° 33.75' 104° 04.5'. Plan to test water	
			gun + 3.5 KHz on profile from (L94) WPØ2 to (L95) WPØ3	
			51° 47.20 104° 04.5 WPØ2 → 15 inch gun depth WPØ3 / change 40 inch gun depth	
			then → (L95) WPØ3 to (L94) WPØ4	
1826			3.5 KHz in Water - Looks Good! Compressor charging to 3 KPSI.	
1842			Water Gun in Water - Looks Good!	
2006			3.5 system. H^2O Gun & Streamer Looks Good!	
* 2016			SOL Test 1 51° 33.68 N - 104° 05.12 E 7-14-91 (L94-L95)	
2202			51° 39° 30N - 104° 13.11 E	
* 2200			3.5 KHz Down - SATS Down 2216	
2304			51° 42.00 104° 17.68	
2330			SATS Down 2	

EOL 20:13:51 51° 46.86 104° 20.74

YR	MO	DAY	UT TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES	LATITUDE ± MINUTES	LONGITUDE ± DEGREES	LONGITUDE ± MINUTES	TYPE	QUAL
91	07	14	0200	002	225	8.4		51	4463	104	17.07		
			0231	002	222	8.5		51	4282	104	14.71		
			0301	002	219	8.3		51	4107	104	12.50		
			0332	002	216	8.3		51	3927	104	10.36		
			0417	002	222	8.6		51	3719	104	07.80		
			0440	002	222	8.6		51	3509	104	05.12		
			0600		037	18.2		51	3981	104	10.32		
			0630		—	—		51	4026	104	11.81		
			0736		—	—		51	4151	104	06.43		
			0830	003	129	8.9		51	4093	104	09.39		
			0900	003	122	9.4		51	3969	104	12.76		
			0935	003	099	9.8		51	3886	104	17.63		
			1004	003	094	10.0		51	3869	104	21.88		
			1039	003	102	10.6		51	3837	104	26.88		
			1100	003	097	10.4		51	3813	104	30.06		
91	07	15	0303	LST	—	—		51	5102	104	52.29		
			0406	LST	—	—		51	5101	104	52.29		
			0958	—	078	18.2		51	5129	104	58.18		
			1034		063	18.3		51	5278	105	07.08		
			1137		058	18.2		51	5855	105	20.64		
			1219		—	—		52	0239	105	29.40		
			1258		102	7.7		52	0212	105	31.99		
			1331		094	8.1		52	0161	105	35.68		
			1343	004	028	7.9		52	0183	105	36.32		
			1401	004	029	8.3		52	0330	105	37.72		
			1432	004	068	8.6		52	2453	106	14.70		

TAPE #	START	END	COMMENTS AND OBSERVATIONS PAGE 03
			7/14/91
2			Test Line 2 - Deep H^2O Gun Config.
0112			SOL #2 WP03 (L95) -> WP02 (L94) 51° 47.20 N 104° 20.76
			depth 1350 M
			after EOL#2 will head to C314 to take benthos
			core at intersection of L2
0456			EOL#2 (L95-L94) 51 34 36 @ 04:56:42
			104 04 94
			Sat NAV off
0550			Nav on - change to ship power to oil & rest generator
			heading to station C314 51° 40.3' N 104° 11.83' E
			logging to B:NAV14b
0628			arrive stn C314 51° 40.29' N 104° 11.81 E 1310 M wire depth
			SatNav down temporarily due to ship power problem
0645			took benthos core ~ 1310M (wire) only ~ 15 cm fine
			sand/silt poor recovery no sample taken
0710			Replace batteries in Magellan - go to battery power
			Head to L96 to try another core
0745			back on generator Log to B:NAV14C (NAV14b lost ?!)
0750			Benthos core C315 51° 41.99 N 104° 06.59 E
814			SOL #3 L96 -> L97 51° 46.64' 104° 07.84'
1100			EOL #3 51° 38.13 N 104° 30.06 E
			return to Listuyanka
			7/15/91
0300			SATNAV on at Dock logging to NEC B:NAV15A
0556			Log to B:NAV15B
0530			Leave Listryanka head towards Bolshoe Goloustnoe -
			Will Drop Gun & fish there & tune - then to L1 to begin
			Line 3 DICK NOSE CHEATER L99 52° 02.20 N 105° 29.50 E
1219			Arrive at Drop point for beginning of tune-up line L99 to
			L1.* Water Gun & 3.5 Both in 1145 Hrs - tuning -

*Line 4 SOL #4 1336 appx(wpt) 52° 01.71 N 105° 36.50 E

YR	MO	DAY	UT TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES	LATITUDE ± MINUTES	LONGITUDE ± DEGREES	LONGITUDE ± MINUTES	TYPE	QUAL.
91	07	15	1431	004	028	8.3		52	0531	105	39.32		
			1508	004	029	8.6		52	0776	105	41.16		
			1539	004	031	6.4		52	0981	105	42.42		
			1631	004	029	9.6		52	1386	105	49.85		
			1700	004	029	9.5		52	1610	105	47.87		
			1735	004	042	6.0		52	1843	105	50.11		
			1800	004	034	8.5		52	2003	105	51.65		
			1830	004	033	8.6		52	2201	105	53.55		
			1845	004	034	9.0		52	2313	105	54.63		
			1901	004	033	9.3		52	2425	105	55.76		
			1913	005	060	8.7		52	2506	105	56.70		
			1930	005	062	9.8		52	2581	105	58.64		
			2000	005	061	9.8		52	2719	106	02.31		
			2030	005	060	9.8		52	2862	106	06.00		
			2049	006	164	10.1		52	2834	106	07.74		
			2100	006	166	10.2		52	2749	106	08.19		
			2130	006	165	10.0		52	2489	106	09.58		
			2200	006	160	9.7		52	2234	106	10.97		
			2255	---	343	17.5		52	2044	106	12.38		
			2323	---	337	18.1		52	2449	106	09.51		
91	07	16	0100					52	2969	106	06.09		
			0225		170	18.5		52	2761	106	08.33		
			0311					52	2666	106	08.72		
			0359					52	2648	106	08.42		
			0500					52	2648	106	08.16		
			0552		101	12.6		52	2676	106	08.65		
			0558					52	2685	106	08.97		
			0615					52	2687	106	08.84		
			0630					52	2683	106	08.75		
			0645					52	2688	106	08.65		

TAPE #	START	END	COMMENTS AND OBSERVATIONS	PAGE 04
1535			Pulled gun to check seal for problem 52° 09.89 N	
			Label waypoint P1 for reshoot → 105° 42.50 E	
1729			slow to ~ 5 cm/hr to drop GUN	
1733			Gun in 52° 18.39 105° 50.04E	
1845			. Gun functional P2 - (end of reshoot) ~1830 Hearn off watch Carter ON	
1913			begin line 5 L2 → C3 SOL#5	
2035			Nav disc NAV.3 NAV.4 Full (?) put in NAV.5	
2041			Start line 6 - nav program not up + REBOOT SYSTEM C3 → WP06 (on 100 m isobath)	
2049			NAV 5 UP + LOGGING File b:\nav16a	
2210			Satellite down	
2214			at 100 m depth - slow/stop to pull gear EOL#6	
2250			begin steaming to C3 344°	
0215			heading to C4 52° 26.71 N 106° 8.75E	
0247			Benthos core taken Stat. 316GC 52° 26.66 106 08.72 300m	
0320			Piston core 316PC 52° 26.54 106° 08.55	
0342			core up - no trip - down again w/more speed	
0353			core up - no trip again	
0547			underway back to C4.	
0554			end nav16a begin nav16b. Reach C4.	
			Computer loses power with winch operating	

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES ±	LATITUDE MINUTES	LONGITUDE ± DEGREES ±	LONGITUDE MINUTES	TYPE	QUAL.
91	07	16	0700					52	2690	106	0862		
			0715					52	2684	106	0895		
			0725					52	2685	106	0896		
			0735					52	2685	106	0893		
			0745					52	2685	106	0892		
			0805					52	2683	106	0886		
			0831					52	2680	106	0880		
			0900					52	2678	106	0876		
			0930					52	2674	106	0864		
			1000					52	2675	106	0855		
			1101		162	18.8		52	2287	106	1096		
			1132		163	5.8		52	1849	106	1340		
			1210		333	18.2		52	2290	106	0937		
			1234		045	8.7		52	2328	106	1064		
			1304	0007	064	8.2		52	2382	106	1105		
			1404	0007	065	9.0		52	2355	106	1148		
			1500	0007	066	8.8		52	2556	106	1787		
			1535										
			1559		070	9.0		52	2686	106	2334		
			1630		067	8.1		52	2791	106	2668		
			1700		359	9.0		52	2936	106	2870		
			1738		010	9.3		52	3240	106	2879		
			1800		010	9.3		52	3434	106	2967		
			1830	0009	012	9.2		52	3685	106	2979		
			1847	010				52	3819	106	3049		
			1900	0010	274	11.3		52	3826	106	2853		
			1910	0010				52	3818	106	2668		
			1930	0010	246	12.4		52	3699	106	2355		
			1940	0010	234	11.9		52	3643	106	2206		
			2000	0010	233	11.1		52	3514	106	1931		

TAPE #	START	END	COMMENTS AND OBSERVATIONS PAGE 5
0700			Underway back to C4.
0725			Piston core 316 PCC. Winch trouble on way down
0747			Computer off, unplugged to protect from power surges
0805			R.T.R. winch time after time problem after problem...
0955			Winch functional. Core pretripped, brought up/cut Bait → Restart
1100			underway to L27 to resume seismic.
			Logging to Disc B:NAV16D
1132			arrive L27 await Obrycher
			No Obrycher – return to L18 – change planned Line
1210			arrive L18 Depth 210 meters Gun + fish in
			planned seismic sequence: Line 7 (L18→L19) 12.8 km
			Line 8 (L19-L20) 11.5 km; Line 9 (L20-L32) 18.1 km; Line 10
			(L32-C3) 30.9 km; END of sequence at C3; Pull up
			gear and steam to C4 to resume coring. Estimated
			sequence length 73 km (~ 8 hrs at 9 km/hr)
1234			circle to replace compressor switch
1245			SOL line 7. Mate at helm 52° 22.56 109° 08.17
1511			arrive at L19 52° 25.88' 106° 19.10' EOL#7
			SOL#8
1538			Gun off to pull in streamer – Obrycher to ferry captain
1558			Gun on – Captain on board
1648			EOL#8 SOL#9
1801			Log off checked disc – not logging data – checked
			transfer on test files – seems to be working. Not clear
			why no data transferred to disc. Log on to
			B: NAV16D
1847			EOL #9 SOL #10 at L32
1857			check b:nav16d – it's working. change to b:nav16e
1910			Course alteration. Magellan on bridge has altitude = 438 m; bad nav.
1939			minor course alteration

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES	LATITUDE ± MINUTES	LONGITUDE ± DEGREES	LONGITUDE ± MINUTES	TYPE	QUAL.
91	07	16	2030	010	235	11.4		52	3331	106	1595		
			2100	010	230	11.0		52	3142	106	1108		
			2130	010	236	11.1		52	2943	106	0756		
			2207					52	2826	106	0581		
			2307					52	2770	106	0563		
			2333		114	17.8		52	2711	106	0741		
91	07	17	0007					52	2672	106	0893		
			0032					52	2658	106	0887		
			0100					52	2640	106	0887		
			0132					52	2617	106	0898		
			0204					52	2605	106	0892		
			0230					52	2574	106	0890		
			0300		003	15.0		52	2639	106	0880		
			0308					52	2685	106	0895		
			0341					52	2661	106	0936		
			0410					52	2660	106	0936		
			0451					52	2622	106	0988		
			0609					52	2638	106	0985		
			1858		035	87		52	1759	105	4753		

TAPE #	START	END	COMMENTS AND OBSERVATIONS PAGE 6
2002			b:nav16e ok. begin b:nav16f. Steering consistently >+5°.
2105			b:nav16f ok begin b:nav16g.
2133			EOL #10 52° 29.22 106° 07.22 Disk full. Begin b:nav16h
2155			Computer off. ~~Begin steaming to C4~~ waiting...
2324			Under way to C4 ?!?! Return to "Station from Hell"
2339			On station C4 52° 26.76 106° 08.71, rigging core
0045			Piston core 316PC1 "C4" 52° 26.42 106° 08.91
0100			Core trips on 2nd impact 52° 26.40 106° 08.87 Success!
0251			Under way to C4
0308			return to station C4
0330			coring 316PC2 at C4
0341			contact - trip. Poor penetration into hard silt
0525			piston core 52° 26.40 106° 09.01 - 316PC3 0.16 km
			from 316PC1 - Good penetration - 3 sections
			buried to weight stand
0723			on station C3A 52° 23.64 N 106° 11.12 E
			Problem with winch again - power cable burnt out -
1045			Box core 317BC1 52° 23.47 N 106° 11.42 E
			Depth 240 M
1201			return to station C3A
1225			Piston core ~~317PC1~~ 52° 23.86 N 106° 11.02 E
			Dept 260 M NO-trip at high speed
1314			Piston core 317PC1 52° 24.24 N 106° 11.28 E
			second NO-trip
1345			underway to Bukhta Peschanaya (Sandy Bay) to
			Drop off Brada - will be met by Obruchev
1800			underway from Bukhta Peschanaya
1813			log on b.nav18a
1828			b:nav18a ok → start b:nav18b
1900			turning towards C2

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES ±	LATITUDE MINUTES	LONGITUDE ± DEGREES ±	LONGITUDE MINUTES	TYPE	QUAL.
91	07	17	1921	011	123	9.8		52	1649	105	4974		
			2003	011	126	10.9		52	1441	105	5536		
			2030	011	122	11.5		52	1308	105	5906		
			2100	011	138	11.1		52	1156	106	0349		
			2103	011		10.6		52	1136	106	0389		
TAPE 8			2130	012	177	13.8		52	0899	106	0377		
TAPE 9 21.50			2152	012	185	9.3		52	0713	106	0367		
			2200	012	194	9.0		52	0651	106	0361		
			2216	012		7.9		52	0518	106	0315		
			2230	013	300	7.8		52	0548	106	0153		
			2300	013	296	8.4		52	0629	105	5847		
			2330	013	294	8.3		52	0699	105	5520		
91	07	18	0000	013	299	8.5		52	0779	105	5185		
			0030	013	286	9.1		52	0836	105	4814		
			0100	013	286	8.6		52	0882	105	4429		
			0111	013		8.6		52	0902	105	4291		
			0130	014	029	10.5		52	1061	105	4402		
			0200	014	029	11.2		52	1325	105	4609		
			0230	014	042	10.6		52	1584	105	4836		
			0240	014				52	1659	105	4949		
			0300					52	1677	105	5093		
			0430					52	1697	105	4948		

TAPE #	START	END	COMMENTS AND OBSERVATIONS	PAGE 7
1921			SOL #11 At C2. 52° 16.49 105° 49.74	
			Planned Sequence Line 11 (C2 → *L10); Line 12 (L10 → *L9); Line 13	
			(L9 → L8); Line 14 (L8 - C2) Note: L10 changed	
			from original position to 52° 11.32 N 106° 4.0 E; L9	
			changed to 52° 5.078 N 106° 3.0 E (old points too shallow)	
2021			b:nav18b ok - beginning b:nav18c	
2103			EOL #11 SOL #12 at L10	
2119			b:nav18c ok - beginning b:nav18d	
2150			Tape 8 ends tape 9 begins	
2155			Bridge Magellan not working. gave helm course to steer 197°	
2205			Satellites down. Twig asked helm to slow down.	
2216			EOL #12 SOL #13 (Sats. back up) at (L9) 52° 05.18 106° 03.15	
2223			b:nav18d ok Begin b:nav18e	
0001			b:nav18e ok begin b:nav18f	
0111			EOL #13 SOL #14 at L8 52° 09.02 105° 42.91	
0115			b:nav18f ok. start b:nav18g.	
0200			Tape change 9 → 10	
0229			b:nav18g ok begin b:nav18h	
0240			reach station C2 EOL #14 and b:nav18h computer off	
			Seismic gear off, on board. - move back to C2	
0324			arrive on stn 52° 16.62 105° 49.36 E * Depth 1020 w/corr.	
0407			Benthos core 318GC1 970M on winch	
			52° 16.49° N 105° 49.65 E ~ 270 meters from actual C2	
~0450			Box core 318BC1 52° 16.74 105° 49.57 - poor recovery	
0539			Log on B:NAV18I	
0615			reach Sta C2/318 for piston core	
0701			return to Sta C2/318 - drifted during piston core digging	
0715			reach Sta C2/318 for piston core	
			52° 16.42 N 105° 49.10 E	

Prior fathometer depths uncorrected

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES	LATITUDE ± MINUTES	LONGITUDE ± DEGREES	LONGITUDE ± MINUTES	TYPE	QUAL.
91	07	18	0450					52	1674	105	4957		
			0745					52	1643	105	4926		
			1015					52	1646	105	4960		
			1100					52	1640	105	5014		
			1205					52	1641	105	4947		
			1300		093	14.0		52	1643	105	5059		
			1338		071	18.4		52	1879	105	5986		
			1401		072	18.4		52	2016	106	0554		
			1454	015				52	2156	106	1360		
			1507	015	232	9.9		52	1705	106	0551		
			1657	015	335	11.2		52	1918	106	0134		
		line 16	1730	015	339	10.7		52	2203	105	5885		
			1839	015	214	11.0		52	2210	105	5360		
		line 17	1900	015	215	11.6		52	2035	105	5186		
			1930	017	209	11.3		52	1765	105	4936		
			2000	017	207	11.2		52	1506	105	4694		
			2030	017	212	11.0		52	1277	105	4489		
			2100	017	213	11.2		52	1015	105	4255		
			2130	017	208	10.4		52	0719	105	4033		
			2155	017		9.8		52	0492	105	3879		
			2200	018	113	10.2		52	0471	105	3898		
			2230	018	097	11.0		52	0388	105	4363		
			2300	018	107	11.2		52	0319	105	4851		
			2330	018	104	10.8		52	0253	105	5312		
91	07	19	0000	018	110	10.7		52	0182	105	5770		
			0030	018	104	11.8		52	0113	106	0262		
			0900					52	0446	105	5224		
			~~1000~~	~~019~~	012	10.5		52	0938	105	5012		
			~~1039~~	~~019~~	175	11.3		52	0608	105	5125		
			~~1101~~	~~019~~	176	11.3		52	0354	105	5159		

TAPE #	START	END	18/7/91 COMMENTS AND OBSERVATIONS	PAGE 8
0813			Piston core 318 PC1 contact w/ bottom	
			52° 16.47 N 105° 49.69 E ; 970m	
0845			318 PC1 on deck	
0953			Return to station C2/318	
			52° 16.54 N 105° 49.35 E	
1050			Obrucher alongside to drop off Alec Badardinov	
1054			contact 52° 16.40 105° 50.06 318 PC 2 (C2)	
1113			computer off end of nav 18i	
1205			318 BC 2 going down 52° 16.41 N 105° 49.47 E	
1220			318 BC 2 contact 52° 16.41 N 105° 49.57 E	
1256			underway (to L27A) Planned seismic line sequence	
			for night Line 15 (L27A → L26) 14.2 KM; Line 16	
			(L26 → L2) 18.4 KM; Line 17 (L2 → L13a) 42.6 KM	
			Line 18 (L13a → L12) 29 KM	
1349			nav log on b: nav18j	
1357			b: nav18j ok begin b: nav18k	
1454			SOL #15 turning on L27a 52° 21.56N 106 13.10E	
1622			turning on L26 EOL #15 SOL #16	
			52° 16.30 N 106° 03.75' E	
1803			turning on L2 EOL #16 SOL #17	
			52° 24.62' 105° 56.05'	
1924			b: nav18k ok begin b: nav18l	
2155			EOL #17 SOL #18 turning at L13A. On Magellan in	
			the lab, L13A was entered as 105° 40.00'. We changed to 105° 39.00	
			to agree with the bridge and with the notes down here.	
2210			Disk full - begin new disk, b: nav 19a	
~2200			Tape change 11 → 12	
2325			b: nav19a ok begin b: nav19b	
0030			Bad seal in airgun discovered	

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES ±	LATITUDE MINUTES	LONGITUDE ± DEGREES ±	LONGITUDE MINUTES	TYPE	QUAL.
91	07	19	0043	018	099	10.8		52	0096	106	0483		
			0100		279	16.5		52	0107	106	0539		
			0130		285	18.1		52	0213	105	5758		
			0200					52	0391	105	5064		
			0900					52	0446	105	5246		
			1000	019	012	10.5		52	0938	105	5020		
			1039	019	175	11.3		52	0608	105	5142		
			1101	019	176	11.3		52	0354	105	5198		
			1130	019	173	11.5		52	0058	105	5272		
			1200	019	177	11.7		51	5746	105	5343		
			1237	019	170	11.7		51	5388	105	5462		
			1303	020	314	11.2		51	5411	105	5279		
			1400	021	342	11.7		51	5876	105	4807		
			1430	021	342	11.6		52	0168	105	4631		
			1500	021	340	11.8		52	0455	105	4432		
			1530	021	340	11.9		52	0757	105	4222		
			1600	022	237	11.9		52	0831	105	4058		
			1638	023	167	11.7		52	0550	105	3779		
			1708	023	169	11.4		52	0247	105	3907		
			1740	023	162	11.5		51	5937	105	4067		
			1800	023	160	11.5		51	5750	105	4183		
			1830	024	088	12.0		51	5670	105	4589		
			1900	024	086	12.0		51	5713	105	5102		
			1930	024	087	12.3		51	5750	105	5634		
			2000	024	091	12.3		51	5773	106	0184		

TAPE #	START	END	COMMENTS AND OBSERVATIONS	PAGE 9
0043			EOL #18 pull seismic gear	
0100			Log off. Steaming to C1 52°02.90' 105°50.70'	
0200			Ina visits on Obruchev ♡♡	
0258			log on B:NAV19C positioning stop to	
			sample station C1	
0334			tape on to log 3.5 KHZ	
5:52			Disk overflow on B: Drive	
			restart log	
0626			Piston core 319PC1 52° 05.10	
			Depth 150M 105° 51.69	
0834			Piston core 319PC2 contacts bottom 52°04.50 105°51.41	
			depth 125m contact shows on 3.5 record	
0900			Under way to L5 to begin seismics. At L8 2 students will	
			get onto the Obruchev.	
1000			SOL #19 (L5-L6) begin tape 14	Sequence for 7/19-7/20 AM/PM
1044			b:nav19e ok begin b:nav19f	(L5-L6) #19 - (L6-L7) #20 - (L7-L8) #21
1110			Water gun off for repairs	(L8-L13) #22 - (L13-L14) #23
1130			Water gun back on	
1218			begin NAV19G	#24 (L14-L15)
1245			EOL #19 SOL#20 (L6-L7) 51°53.05N 105°54.91'E	
1323			EOL #20 SOL21 (L7-L8) 51°55.51N 105°50.24'E	
1545			EOL #21 SOL #22 (L8-L13) 52°09.00N 105°42.44E	
1550			begin b:NAV19H	
1628			EOL #22 SOL #23 some confusion about course	
			on bridge - corrected misplotted point	
1743			begin b:NAV19I new disk	
1810			EOL#23 SOL# 24 (L14-L15) 51°56.48' 105°42.75'	
1901			Begin B:NAV19J	
2009			EOL#24 51°57.8N 106°02.78E	

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES	LATITUDE ± MINUTES	LONGITUDE ± DEGREES	LONGITUDE ± MINUTES	TYPE	QUAL.
91	07	19	2311					52	2342	106	1089		
			2332					52	2360	106	1112		
91	07	20	0103					52	2430	106	1251		
			0152					52	2388	106	1133		
			0200					52	2397	106	1144		
			0402					52	2349	106	1120		
			0409					52	2354	106	1129		
			0503					52	2654	106	0901		
91	07	20	1337	025				51	5786	106	0318		
			1400	025	340	11.8		51	5979	106	0235		
			1436	025	341	11.7		52	0334	105	5989		
			1500	025	340	11.3		52	0547	105	5843		
			1530	025	343	11.6		52	0849	105	5653		
			1535	025	351	11.3		52	0899	105	5622		
			1600	026	016	11.9		52	1154	105	5698		
			1624	026	024	11.9		52	1419	105	5804		
			1632	027	040	11.9		52	1481	105	5878		
			1700	027	040	11.9		52	1712	106	0184		
			1730	027	046	11.8		52	1962	106	0502		
			1800	027	044	11.7		52	2295	106	0834		
			1807	027		11.6		52	2263	106	0915		
			1832	028	059	11.9		52	2404	106	1292		
			1901	028	061	11.8		52	2563	106	1715		
			1911	028		11.7		52	2620	106	1875		
			1930	029	070	11.6		52	2691	106	2169		
			2000	029	080	11.4		52	2804	106	2651		

TAPE #	START	END	COMMENTS AND OBSERVATIONS
2311			At station C3A. Everyone else is asleep.....
2344			log on binav19k
0103			steaming back to C3A
0152			stat C3A 317 PC1 down
0200			core 317 PC1 hits bottom. 1.00 km from real C3A
0315			underway back to C3A
0402			C3A 317 PC2 down
0409			C3A 317 PC2 hits bottom 0.34 km from C3A
0420			underway to C4
0503			Box core 316 BC1 contacts bottom 0.30 km from C4
			7/20/91
1312			NAV19K zeroed out (?) restart log
			to D:NAV20A
			Planned seismic sequence for 7/20 PM - 7/21 AM:
			Line 25 (L15-L16) 22.2 KM; Line 26 (L16-L17) 9.9 KM;
			Line 27 (L17-L18) 20.2 KM; Line 28 (L18-L19) 12.8 KM;
			Line 29 (L19-L20) 11.5 KM; Line 30 (L20-L21) 28.0 KM;
			Line 31 (L21-L32a) 28.3 KM
1337			SOL # 25 (L15-L16) 21° 57.56 N 106° 03.18 E
1411			nav20a ok - begin nav20b
1532			end of tape 16
1535			EOL #25 SOL #26 at L16
1538			Begin tape 17
1624			EOL #26 SOL #27 at L17
1640			nav20b ok begin nav20c
1807			EOL #27 SOL #28 at L18
1820			nav20c ok begin nav20d
1911			EOL #28 SOL #29 at L19
1945			End tape 17
1947			begin tape 18

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES	LATITUDE ± MINUTES	LONGITUDE ± DEGREES	LONGITUDE ± MINUTES	TYPE	QUAL.
91	07	20	2008			11.4		52	2831	106	2788		
			2043	030	081	11.4		52	2908	106	3365		
			2100	030	081	11.4		52	2939	106	3615		
			2130	030	080	11.4		52	3008	106	4135		
			2201	030	081	11.7		52	3073	106	4560		
			2230	030	081	12.0		52	3142	106	5133		
			2300	031	313	11.4		52	3313	106	5033		
			2330	031	312	11.1		52	3500	106	4631		
			2400	031	309	11.2		52	3673	106	4230		
91	07	21	0033	031	312	11.5		52	3889	106	3753		
			0130	032	103	12.5		52	4117	106	3406		
			0200	032	102	12.4		52	4069	106	3951		
			0231	032	104	12.6		52	4014	106	4531		
			0400					52	3999	106	4227		
			0417					52	3993	106	4223		
			0435					52	3988	106	4221		
			0500					52	3979	106	4210		
			0532		043	14.0		52	3999	106	4205		
			0552					52	4020	106	4248		
			0635					52	4003	106	4224		
			0800					52	3986	106	4171		
			0856					52	4012	106	4237		
			0940					52	4019	106	4228		
91	07	21	1344	033	172	10.6		52	3773	106	3084		
			1400	033	173	11.1		52	3632	106	3130		
			1430	033	169	11.0		52	3348	106	3236		
			1500	033	170	10.7		52	3055	106	3352		
			1530	033	167	11.1		52	2782	106	3472		
			1600	033	257	10.4		52	2640	106	3189		

TAPE #	START	END	COMMENTS AND OBSERVATIONS PAGE 11
2008			EOL #29 SOL #30 at L 20
2013			nav 20d OK begin nav20e
2120			Nav20e OK begin NAV20F
			NAV20F OK New disk log to NAV 20G
2236			EOL # 30 SOL # 31 52° 31.64' 106° 52.65'
0108			EOL #31 52° 41.04 106° 33.18'
0120			SOL#32 pulled Gun running on 3.5 only
			Line#31 too close to mouth of canyon feeding
			fan. #32 plotted to find better site on
			fan SOL #32 52° 41.24N 106° 33.33'E
0250			stop on Line#32a RUN back to site picked
			by Karabanov & Nelson target 52° 40' N 106° 40.5 E
0323			stop on Line #32 at 52° 40.65N 106° 42.32
			station 320
0348			log off NAV computer NAV 20 G OK
0339			Benthos core 320 GC1 taken at CSA 52°40.07 106°42.33
			wire stuck - no core
0417			Box core over side at CSA
0435			Box core contacts bottom
0438			Log on nav20h
0540			on station CSA more or less 52°40.28' 106°42.49'
0552			320 PC1 at CSA over the side
0635			320 PC1 trip
0845			On station CSA 52°40.27 106°42.33
0856			320 PC2 at CSA over the side
0940			320 PC2 Contacts bottom - 5 confined fly Kille (R³)
0945			Winch blows fuse
0955			Winch fixed
1100			Benthos core 320 GC1 for Karabanov

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES ± MINUTES	LONGITUDE ± DEGREES ± MINUTES	TYPE	QUAL.
91	07	21	1632	034	260	10.3		52 256.3	106 271.1		
			170	034							
91	07	23	0200	---	049	9.8		53 465.4	107 571.2		
			0234	035	149	10.9		53 458.5	108 009.4		
			0302	035	148	10.8		53 437.5	108 037.8		
			0335	035	147	10.6		53 412.1	108 072.0		
			0400	035	144	10.7		53 393.5	108 095.9		
			0430	035	139	10.8		53 371.8	108 128.6		
			0504	035	145	11.2		53 344.4	108 166.2		
			0610	035	145	11.7		53 294.9	108 237.9		
			0630	035	147	11.1		53 278.9	108 259.2		
			0702	035	142	11.5		53 254.7	108 295.6		
			0733	035	145	11.7		53 230.1	108 331.5		
			0800	035	145	12.0		53 209.2	108 360.3		

TAPE #	START	END	COMMENTS AND OBSERVATIONS	PAGE 12
1226			Stop for BENTHOS GC for Karabanov - Station #?!	
			52° 32.31 N 106° 35.01 E	
1236			GC contact - 190m	
			52° 32.36'N 106° 34.96'E	
1243			Underway to Line #33	
1340			Reach beg. line #33	
			Log ON B:NAV21A	
			sequence Line #33 (L32-L31) 23.8km; Line #34 (L31-L30)	
1341			SOL #33 52° 38.04'N 106° 30.73'E	
1426			NAV21A OK log to B:NAV21B	
1537			EOL #33 52° 27.04'N 106° 35.09'E	
			SOL #34	
1658			EOL #34 52° 24.93'N 106° 23.33'E	
			Log off NAV21B OK	
			7/23/91	
0146			Log on to NAV23A enroute to L57 to	
			begin Line #35 (L57-L56)	
0213			turning on L57 SOL#35 53° 47.48 N 107° 58.34 E	
0433			end of tape 20 begin 21	
0542			Disk full - buffer overflow	
0544			log on to B:NAV23B	
0614			Mark start of line segment requested by Zonenshain	
			for Pisces work 53° 29.00N 108° 24.30E	
0819			EOL #35 53° 19.34'N 108° 36.38'E	
			Log off - transit to L69	
1604			Logon to NAV23D -	
1616			GUN in, fish in - problems with gun -	
			possible leak -	

6 13

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	FIX TIME	LATITUDE ± DEGREES	LATITUDE ± MINUTES	LONGITUDE ± DEGREES	LONGITUDE ± MINUTES	TYPE	QUAL.
			1700	036	016	11.6		54	22.3	108	58.6		
			1832	036	019	11.0		54	31.9	109	02.0		
			1855	036	019	11.0		54	34.9	109	03.6		
			1909	036	019	11.0		54	35.4	109	03.0		
			1944	036	017	11.0		54	38.4	109	05.2		
			2000	036	018	10.2		54	40.1	109	05.4		
			2030	036	023	10.5		54	43.0	109	07.5		
			2100	036	026	10.4		54	45.6	109	08.2		
			2130	036	024	10.6		54	48.2	109	10.5		
			2200	036	024	10.2		54	51.0	109	11.1		
			2230	036	025	9.6		54	53.1	109	13.7		
			2300	036	040	9.1		54	55.6	109	14.9		
91	07	24	0145					54	40.7	109	05.0		
			0159					54	40.2	109	05.9		
			0248					54	40.5	109	05.5		
			0324					54	40.4	109	05.0		
			0448					54	40.5	109	05.0		
			0524					54	40.5	109	05.4		
			0709		015	15.8		54	41.8	109	06.1		
			0730		017	17.1		54	43.3	109	07.8		
									.		.		
			1535	037	013	11.3		54	58.9	109	15.5		
			1600	037	016	11.3		55	00.3	109	16.8		
			1630	037	017	11.3		55	03.5	109	17.2		
			1700	037	021	11.3		55	06.9	109	18.5		
			1730	037	021	10.8		55	09.0	109	20.9		
			1800	037	019	9.9		55	11.0	109	22.0		
			1830	037	034	9.5		55	14.1	109	23.9		
			1900	037	035	10.2		55	16.0	109	26.3		
									.		.		

TAPE #	START	END	COMMENTS AND OBSERVATIONS
1645			SOL #36 54° 21.36'N 108° 58.26'E
			GUN OK L#36→L69 to L70A (54° 56.00 N
			Line length 67 KM 109° 15.00E)
1900			sats DOWN
1930			sats DOWN
1944			sats back up
2117			NAV23D OK
			Log to NAV23E
2300			EOL #36 54° 56.02 N 109° 14.85'E
			NAV23E OK
			Log off - MR. BUNS - ON! and how! First, Benthos core. Surprise!
0145			on station C7. Box core 321BC1 over side, log on. ~~b:nav24a~~
0159			Box core 321BC1 hits bottom at C7
0248			321 PC1 over side
0324			321 PC1 contacts bottom
0448			321 PC2 over side
0524			321 PC2 contacts bottom
0709			underway to C8
0836			at C8 54° 53.88 109° 13.54E
0857			322 BC1 54° 53.90 109° 13.52'E
1003	322		GC1 54° 53.48'N 109° 13.24'E
1124	322		GC1 54° 53.85N 109° 13.46'E (no recovery)
1236	322		GC2 54° 53.64'N 109° 13.41'E
1130			322 PC1 54° 53.66'N 109° 13.40'E
1505			log on to NAV24A new disk - approaching L70A
			to begin Line #37 (L70A - L72)
1513			SOL#37 54° 56.00'N 109° 14.70'E
1600			Bridge sat NAV down due to sat loss - stack
			blocking sat from antenna - 2nd unit has

different placement & is not affected. ~10° course error 1600 - 1800Hrs

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES ± MINUTES	LONGITUDE ± DEGREES ± MINUTES	TYPE	QUAL.
91	07	24		038							
			1930	038	009	10.5		55 1963	109 2680		
			2000	038	006	10.8		55 2232	109 2709		
			2030	038	010	10.8		55 2519	109 2793		
			2100	038	022	11.1		55 2805	109 2930		
			2130	038	022	12.2		55 3111	109 3088		
			2141	038	023	11.7		55 3221	109 3150		
			2146	038	033	11.6		55 3270	109 3185		
			2200	039	034	11.5		55 3396	109 3309		
			2234	039	039	11.5		55 3704	109 3632		
			2300	039	044	11.6		55 3911	109 3914		
			2330	039	046	11.4		55 4161	109 4270		
			2343	039	041	8.6		55 4262	109 4410		
91	07	25	0000					55 4274	109 4450		
			0133					55 3210	109 3121		
			1530	040	003	11.1		55 2976	109 4603		
			1600	040	004	11.2		55 3279	109 4603		
			1630	041	320	11.3		55 3525	109 4386		
			1700	041	320	11.1		55 3753	109 4007		
			1730	041	324	11.0		55 3966	109 3664		
			1800	042	220	11.4		55 4088	109 3329		
			1830	042	195	11.7		55 3787	109 3184		
			1900	043	234	11.7		55 3471	109 3101		
			1930	043	233	11.7		55 3266	109 2694		
			2000	044	347	9.8		55 3240	109 2359		
			2030	044	344	10.2		55 3499	109 2208		
			2036	044		8.9		55 3548	109 2198		
			2100	045	136	11.3		55 3390	109 2517		

TAPE #	START	END	COMMENTS AND OBSERVATIONS
1243			Log off NAV24A OK Log on to NAV24B
1900			EOL # 37 turning on L72 SOL # 38 (L72-L73)
2119			end of tape 24 begin tape 25
2141			At L73
2146			EOL # 38 SOL #39
2343			EOL # 39 (L74) low - pull seismic gear
0007			log off b. nav24b OK. R3 AWAKE - LET'S WORK!
0133			on station L73 Butthead?
0142			L73 323GC1 55°32.11 109°31.31 washout
0152			L73 323GC2 55°32.12 109°31.42
0211			L73 323BC1 55°32.14 109°31.59
0329			323PC1 contact 55°32.08 109°31.28E
0558			323PC2 contact 55°32.07'N 109°31.31'E
0700			323BC2 contact 53°31.93'N 109°31.23'E
1451			Log on NAV25A - nearing L75A to begin
			Line #40 (L75A to L76A)
1511			SOL#40 55°28.03'N 109°46.04'E
1548			Crossing Frolicha Bay Vent site ~(55°31.50'N 109°46.00'E)
1612			EOL# 40
			SOL#41 55°34.06'N 109°45.94'E
1753			EOL#41 55°41.26'N 109°34.07'E SOL#42
1857			EOL#42 55°34.90N 109°31.40 E SOL# 43
1947			EOL#43 55°31.48N 109 24.41 E SOL# 44
2016			log off NAV25A OK Log on to NAV26A
2036			EOL#44 55°35.48 109°21.98 SOL#45
2105			end of tape 26
2107			Start tape 27

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES ±	LATITUDE MINUTES	LONGITUDE ± DEGREES ±	LONGITUDE MINUTES	TYPE	QUAL.
91	07	25	2130	045	139	10.8		55	3180	109	2904		
			2200	045	137	11.6		55	2969	109	3293		
			2230	045	133	11.4		55	2776	109	3712		
			2300	045	137	10.8		55	2590	109	4111		
			2332	045	137	11.1		55	2380	109	4540		
			2345	045	135	7.6		55	2294	109	4713		
91	07	26	0000					55	2280	109	4702		
			0054					55	3099	109	4801		
			0100					55	3103	109	4803		
			0130		227	18.7		55	3027	109	4650		
			0200		226	18.7		55	2663	109	4067		
			0230		222	18.9		55	2283	109	3486		
			0311		215	14.2		55	1748	109	2686		
			0318					55	1688	109	2649		
			0325					55	1685	109	2646		
91	07	26	1300	046	207	10.7		55	1454	109	3120		
			1330	046	208	10.7		55	1188	109	2932		
			1404	046	206	11.1		55	0866	109	2704		
			1432	046	209	11.1		55	0604	109	2522		
			1500	047	175	11.4		55	0341	109	2413		
			1530	047	171	11.8		55	0060	109	2529		
			1600	048	106	12.3		54	5776	109	2810		
			1630	048	103	12.1		54	5715	109	3367		
			1700	049	263	12.2		54	5674	109	3662		
			1730	049	263	11.9		54	5616	109	3107		
			1800	049	268	11.5		54	5559	109	2555		
			1830	049	264	11.9		54	5505	109	2009		

TAPE #	START	END	COMMENTS AND OBSERVATIONS	PAGE 15
2155			Miss May - June gets face lift	
2240			Nav26A ok - begin nav26b (approx. time)	
2345			EOL # 45 55° 22.94N 109° 47.13 E Pulling seismic gear	
			Pavil Danielovich knows the coordinates of the ventsite -	
			55° 31.0' N 109° 48.0 E PD1	
0000			Underway to PD1 - avoiding shallow spot.	
0047			Log off nav26b OK	
0054			At vent site PD1	
0103			Benthos core for Ted PD1GC1 55° 31.04 109° 48.04	
0115			Benthos core PD1GC2 55° 31.03 109° 48.04	
0123			underway to L72	
0318			At L72	
0325			324 GC(X) 55° 16.85 109° 26.46 no recovery	
0349			324 BC1 55° 16.77 109° 26.37	
0409			324 GC1 55° 16.69 106° 26.28	
1152			Log on to NAV26C steaming to L82a to	
			begin line 46	
			Sequence for 7/26 pm - 7/27 am seismics: Line 46 (L82a - L83a);	
			Line 47 (L83a - L84a); Line 48 (L84a - L85a); Line 49 (L85a - L86a);	
			Line 50 (L86a - L87a); Line 51 (L87a - L88a)	
1242			turning on L82a SOL#46 55° 15.98' N 109° 32.11 E	
1455			EOL#46 SOL#47 SATS DOWN	
1459			55° 03.58' N 109° 24.08' E	
1554			EOL# 47 54° 57.94N 109° 27.11 E SOL# 48	
1630			Disk full NAV26C lost - (?! 6*) Downloaded	
			Data buffer from Magellan into B: NAV26C	
1649			Log on to NAV26D	

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES ±	LATITUDE MINUTES	LONGITUDE ± DEGREES ±	LONGITUDE MINUTES	TYPE	QUAL.
91	07	26	1900	0049	262	11.8		54	54.39	109	146.3		
			1930	0049	272	11.8		54	53.57	109	092.0		
			2000	0050	013	12.2		54	56.69	109	097.4		
			2030	0050	015	11.9		54	59.93	109	108.6		
			2100	0050	017	11.8		55	03.03	109	121.5		
			2116	050		9.6		55	04.73	109	129.7		
			2131	0051	088	11.7		55	05.10	109	156.4		
			2200	0051	088	12.1		55	05.53	109	209.3		
			2230	0051	090	11.9		55	05.93	109	265.7		
			2300	0051	090	12.2		55	06.28	109	321.2		
			2330	0051	086	11.8		55	06.66	109	376.6		
			2350	051									
			0101		261	18.7		55	05.32	109	265.0		
91	07	27	1700		265	10.8		54	53.62	109	101.6		
			1730	052	301	11.1		54	54.65	109	055.5		
			1800	053				54	55.65	109	013.0		
			1830	053	210	11.6		54	52.87	108	588.4		
			1900	053	207	11.1		54	50.24	108	565.9		
			1930	053	207	10.9		54	47.50	108	545.7		
			2000	053	289	9.3		54	44.60	108	524.1		
			2030	054	009	11.1		54	47.20	108	527.2		
			2100	054	012	11.1		54	50.14	108	532.9		

TAPE #	START	END	COMMENTS AND OBSERVATIONS PAGE 16
1651			EOL # 48 54° 56.96' N 109° 37.86'
			turning on L85a SOL #49
1930			EOL #49 SOL #50 at L86a 54°53.57N 109°09.20E
2030			nav26 d ok - log on to nav26e
2116			EOL #50 SOL #51 at L87a 55° 04.73'N 109°12.97'E
2232			tape 29 ends - begin tape 30
2350			EOL #51 at L88a Log off. satellites down.
			Last position in b:nav26e is probably good for EOL51.
0008			Seismic gear up. Underway to 325.
0125			at 325
0137			325 GC1 55°04.71 109°19.78
0156			325 BC1 55°04.69 109°19.73
0316			325 PC1 55°04.88' 109°19.93'
1330			Depart Khakusi for CB - time up paint
1624			log on to B:NAV27A
1650			Fish + Gun in
			Line sequence for 7/28/91 AM Line #52 (L86a - L88a);
			Line #53 (L88a - L89a); Line #54 (L89a - L90a); Line #55
			(L90a - L91a)
1706			SOL #52 54° 53.55N 109° 09.09E
1754			EOL #52 SOL#53 54° 55.93'N 109° 02.02
			Log off - NAV27A OK
1803			Log on to NAV27B
1922			log off NAV 27B OK
1923			log on to B:NAV27C
2000			EOL #53 SOL #54 - Hearn screwed up - picked
			Line #53 too close to slope - Ended line early to
			move on to L90a

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES ±	LATITUDE MINUTES	LONGITUDE ± DEGREES ±	LONGITUDE MINUTES	TYPE	QUAL.
91	07	27	2132	055	110	11.8		54	49.9	108	58.0		
			2200	055	113	11.4		54	48.2	109	04.7		
			2230	055	110	11.1		54	47.2	109	08.7		
			2301	055	106	11.2		54	47.9	109	13.0		
			2330	055	102	11.4		54	46.6	109	19.1		
91	07	28	0002	055	106	11.7		54	46.4	109	24.6		
			0030	055	107	11.6		54	45.5	109	29.3		
			0101					54	44.7	109	35.5		
									.		.		
91	07	28	1330	056	09	11.7		54	30.9	108	42.4		
			1400	056	085	12.3		54	30.8	108	48.6		
			1432	056	090	12.3		54	30.9	108	54.7		
			1500	056	086	12.1		54	31.3	108	59.4		
			1530	056	085	12.2		54	31.1	109	00.7		
			1600	056	086	12.3		54	32.8	109	10.8		
			1630	056	088	12.4		54	32.3	109	16.6		
			1700	056	094	12.5		54	32.9	109	22.9		
			1730	057	247	12.1		54	32.6	109	24.9		
			1800	057	247	11.2		54	31.0	109	19.2		
			1830	057	251	11.8		54	29.9	109	14.1		
			1900	057	242	11.7		54	28.7	109	09.1		
			1910	057		10.2		54	27.9	109	08.8		
			1930	058	018	11.8		54	29.4	109	08.9		
			2000	058	020	11.7		54	32.2	109	10.3		

TAPE #	START / END	COMMENTS AND OBSERVATIONS	PAGE 17
2101		EOL # 54 turning on L90A - SOL# 55	
		54° 50.35' N 108° 53.39' E	
2321		nav27c ok begin nav27d	
2352		end tape 31 begin tape 32	
0101		EOL #55 pulling seismic gear.	
0109		log off nav27d ok.	
0114		underway to 326	
0345		at 326	
0408		326 BC1 54° 31.51 109° 02.03	
0452		326 GC1 54° 31.49 109° 02.02	
0533		326 PC1 54° 31.48 109° 02.19 No recovery	
0725		326 PC2 54° 31.56 109° 02.06	
0914		326 PC3 54° 31.68 109° 01.93	
1054		327 GC1 54° 30.49 108° 46.46	
1136		327 PC1 54° 30.65 108° 48.84	
1238		logon to B: NAV28A	
		Sequence for 7/28 PM - 7/29 AM Line 56 (L96a - L95a);	
		Line 57 (L95a - L94a); Line 58 (L94a - L93a); Line 59	
		(L93a - L92a)	
1302		SOL# 56 54° 29.90' 108° 37.63'	
1619		logoff NAV28A OK	
1624		log on to NAV28B	
17:19		end 56 54° 32.99' N 109° 25.81 E	
1720		START 57	
1910		EOL#57 SOL#58 54° 27.59' N 109° 08.08' E	
2000		end tape 32 begin tape 33 approximate time	
2028		disk full - log off - formatting a disk	

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES ±	LATITUDE MINUTES	LONGITUDE ± DEGREES ±	LONGITUDE MINUTES	TYPE	QUAL.
91	07	28	2032	058	030	11.6		54	3582	109	1216		
			2044	058		11.7		54	3709	109	1303		
			2100	059	029	11.7		54	3739	109	1320		
			2130	059	028	11.3		54	4144	109	1603		
			2202	059	026	11.6		54	4450	109	1826		
			2230	059	027	11.8		54	4718	109	2028		
			2238	059	033	11.7		54	4799	109	2096		
91	07	29	0153					54	2281	109	5869		
91	07	30	1330	060	327	11.7		53	5129	108	4552		
			1400	060	324	11.3		53	5377	108	4232		
			1430	060	327	11.7		53	5611	108	3895		
			1500	060	326	11.4		53	5850	108	3568		
			1530	060	328	11.9		54	0097	108	3218		
			1600	060	326	11.9		54	0344	108	2858		
			1630	061				54	0565	108	2528		
			1700	061	043	12.0		54	0846	108	2848		
			1730	062	023	11.5		54	1100	108	3134		
			1800	062	030	11.7		54	1370	108	3353		
			1830	063	260	11.5		54	1424	108	3089		

TAPE #	START	END	COMMENTS AND OBSERVATIONS
2036			nav 29a begun. when I saw the disk full warning I replaced
			the b: disk before leaving the program. NAV 28b was saved to the
			replacement disk nav ver91-13 (B) but not to the original (primary).
2044			EOL #58 SOL #59 54°37.09'N 109°13.03'E
2059			Log not working - trying b:nav 29a again. Sats b.
2130			Log working
2238			EOL #59 54°47.99 109°20.96 Pull gear
2300			Underway to sta. 328
0153			at 328
0216			328 BC1 54°22.83 108°58.66
0242			328 GC(1) (washout) 54°22.90 108° 58.61
0253			328 GC1 54°22.90 108°58.60
0337			328 PC1 54°23.01 108°58.64
0528			328 PC2 54°23.06 108°58.66
			Underway to... who knows?
			NavDisk #14
1230			Log on to b:NAV30A underway to L35 to
			begin seismic for 7/30 pm - 7/31 am
			Planned sequence Line #60 (L35-L36a); Line 61 (L36a-L36b)
			Line 62 (L36b-L37a); Line 63 (37a-37b); Line 64 (37b-37a)
			Line 65 (37a - L50); Line 66 (L50-L51).
1311			53°49.96N 108°47.68E SOL#60
1430			log off NAV30A OK ~600 Kb left on Disk
1432			log on to NAV30B
1628			turning on L36a EOL#60,
			SOL#61 54°05.47' 108°25.20E
1722			EOL#61 SOL#62 54°10.16N 108°30.85E
			Note: bridge SATNAV DOWN - passed L36b by 2.6 km
1808			EOL#62 SOL#63 54°14.47'N 108°34.44'E
1828			log off NAV30B OK
1829			log on to NAV30C 389 Kb left on disk (~6 Hrs)

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	FIX TIME	NAVIGATION LATITUDE ± DEGREES	LATITUDE ± MINUTES	LONGITUDE ± DEGREES	LONGITUDE ± MINUTES	TYPE	QUAL.
91	07	30	1900	064	136	10.3		54	134.0	108	260.7		
91	07	30	1949	EOL 64 SOL 65	145	11.4		54	144.4	108	344.5		
91	07	30	2000	65	164	12.2		54	136.0	108	356.1		
			2030	65	138	11.9		54	114.3	108	394.3		
			2100	65	135	11.8		54	092.6	108	433.4		
			2131	65	141	11.8		54	069.2	108	473.1		
			2200	66	140	12.1		54	046.6	108	509.0		
			2231	66	145	12.0		54	019.9	108	543.4		
			2301	66	148	10.9		53	594.8	108	577.7		
			2330	66	143	10.5		53	573.6	109	006.6		
91	07	31	0000	66	144	10.0		53	551.9	109	038.0		
			0030	66	145	11.0		53	530.0	109	070.5		
			0045	66	end			53	518.6	109	087.2		
			1221	067	229	11.8		54	017.3	109	048.2		
			1229	067				54	011.5	109	039.4		
			1300	067	225	12.1		53	588.7	109	003.9		
			1330	068	282	11.5		53	585.1	108	555.2		
			1400	068	282	10.8		53	589.2	108	504.6		
			1430	069	238	10.8		53	585.3	108	459.4		
			1500	069	234	11.0		53	566.0	108	422.3		
			1530	069	241	10.8		53	543.3	108	384.2		
			1600	069	234	10.8		53	530.5	108	344.4		
			1630	069	231	10.7		53	510.3	108	308.9		
			1700	069	235	10.6		53	491.7	108	274.3		
			1730	069	236	10.5		53	473.8	108	238.5		
			1800	069	233	10.8		53	454.2	108	199.5		
			1830	069	225	10.3		53	434.6	108	165.3		
			1900	070	229	10.6		53	414.8	108	133.7		
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6 kts = 11.1 km/hr
5 kts = 9.25 km/hr

TAPE #	START / END	COMMENTS AND OBSERVATIONS (PAGE 19)
1857		EOL #63 SOL# 64
		54° 13.55'N 108° 26.09'E
1930		54° 14.11N 108 31.06 E
1949		EOL 64 / SOL 65 @ L50 54° 14.44 108° 34.45
2115		Sats down briefly (15 min?)
2136		End log NAV30C End disk 14 OK
2137		Start log NAV30D Start disk 15 OK
2159		EOL 65 / SOL 66 @L50 54° 04.73 108° 50.75
2250		request slow to < 11 Km/hr
0045		(7/31) – EOL 66 @L51 End Nav file NAV30D 53 51.86 109 08.72
		518 K left on Disk 15
0120		Underway to 329 (51)
0229		329 BC1 53° 58.24 108° 59.45
0247		329 GC1 53° 58.22 109° 59.52
0257		329 GC2 53° 58.22 108° 59.58
0332		329 PC1 53° 58.19 108° 59.76
0603		329 PC2 53° 58.04 108° 59.33
0743		329 PC3 53° 58.23 108° 59.56
0817		underway to station 330 54° 09.00N 108° 43.00E
~1000		330 GC1 54° 09.18 108° 42.95
1045		underway to L49A
1221		SOL #67 at L49A 54° 01.73 109° 04.82
1309		EOL # 67 @329 53° 58.14'N 108° 59.24 SOL#68
1325		log out to NAV31A (computer not turned on for line 67)
1420		EOL # 68 @L49 SOL #69 53° 59.09'N 108° 47.10E
1548		logoff NAV31A OK 391 kb on DISK
1549		logon to NAV31B
1831		EOL # 69 @ C14 53 43.46'N 108° 16.53'E
		SOL # 70
1850		log off NAV31B OK; END DISK 15 Start DISK 16
		logon NAV31C

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES ±	LATITUDE MINUTES	LONGITUDE ± DEGREES ±	LONGITUDE MINUTES	TYPE	QUAL.
91	07	31	1930	70				53	39.27	108	10.14		
			2000	70	231	10.8		53	27.21	108	06.89		
			2030	71	228	10.6		53	35.23	108	03.36		
			2100	71	242	10.8		53	33.41	107	59.55		
			2130	71	240	10.8		53	31.76	107	55.50		
			2200	71	238	11.3		53	30.91	107	51.43		
			2230	71	237	11.4		53	28.23	107	47.26		
			2300	71	238	11.6		53	26.48	107	43.00		
91	07	31	2330	71	235	11.8		53	24.70	107	38.55		
91	08	01	0000	71	239	11.5		53	22.90	107	34.15		
91	08	01	0030	71	239	11.8		53	21.08	107	29.86		
			0100	71	239	11.4		53	19.31	107	25.59		
			0130	71				53	17.62	107	21.29		
91	08	01	0140	71				53	17.00	107	19.98		
									.		.		
91	08	01	1332	72	324	11.0		53	24.65	107	39.77		
			1400	72	326	11.1		53	26.87	107	36.93		
			1430	73	022	11.1		53	29.32	107	35.14		
			1501	73	021	11.2		53	32.32	107	36.73		
			1531	74	144	10.6		53	34.15	107	38.50		
			1600	74	142	11.1		53	32.31	107	41.24		
			1630	74	143	11.2		53	30.03	107	44.47		
			1700	75	148	11.2		53	27.76	107	47.88		
			1732	75	151	11.2		53	25.24	107	50.76		
			1800	75	148	10.8		53	23.11	107	53.79		
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625 70
510 146
130
120

TAPE #	START	END	COMMENTS AND OBSERVATIONS	PAGE 20
2029			EOL 70 SOL 71 @ L47; 53° 35.34, 108° 03.55	
2202			End NAV 31C 207 K	
2203			Start NAV 31D 522 K left	
2245			~ abeam of N. end Olkhon I.	
0013			End NAV 31D 146 K	
0014			Start NAV 31E 375 K left	
0140			EOL 71 @ L46A	
0143			End Nav31E 89K - we're all sick + not gonna take it anymore! It's not worth $1/day to have this much fun!	
0430			331 GC1 53° 28.48 107° 47.24	
0436			331 BC1 53° 28.48 107° 47.18	
0528			331 PC1 53° 28.13 107° 47.38	
0646			331 PC2 53° 28.38 107° 47.37	
0715			underway to 332	
			site 332 = 53° 31.62 107° 54.60	
0844			Co-Nachalnik Heavn issues UKAZ # 332 - "All members of Scientific Party are to not worry and be happy. They are also to refrain herefurth from producing body noises, either real or simulated, in my presence."	
1318			log on to NAV801A New Disk NAV Ver 91-17	
1319			SOL #72 @ L39a 53° 23.68' N 107° 41.05' E	
1421			EOL #72 @ L40; Sol#73 53° 28.54' N 107° 34.81 E	
1528			EOL #73 @ L41; SOL #74 53° 34.68 107° 38.28	
1654			EOL #74 @ 331; SOL #75 53° 28.19 107° 47.38	
1718			log off NAV801A OK	
1719			log on to NAV801B 488 K left on Disk	
1722			Streamer up to check - getting noise in gun record	
1730			Streamer back in - No obvious problems. Noise abated somewhat - still present intermittently	

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES ±	LATITUDE MINUTES	LONGITUDE ± DEGREES ±	LONGITUDE MINUTES	TYPE	QUAL.
91	08	01	1830	075	149	11.2		53	20.74	107	56.14		
			1900	075	144	9.3		53	18.49	107	59.20		
			1930	75	141	9.1		53	16.68	108	01.88		
			2000	75	144	8.9		53	14.98	108	04.78		
			2030	75	164	5.0		53	14.26	108	06.00		
			2130	76	058	11.9		53	17.41	108	13.31		
			2141	76	EOL			53	18.02	108	15.03		
			2219	77	SOL			53	18.11	108	14.78		
			2230	77	324	9.7		53	18.90	108	13.67		
			2300	77	322	9.7		53	20.83	108	10.78		
91	08	01	2330	77	323	9.7		53	22.72	108	07.76		
91	08	02	0000	77	324	9.5		53	24.64	108	04.85		
91	08	02	0030	77	321	9.5		53	26.52	108	01.96		
			0100	77	322	9.5		53	28.39	107	59.01		
			0130	77	325	9.4		53	30.25	107	56.13		
			0200	77	326	9.6		53	32.24	107	53.39		
			0230	77	327	9.6		53	34.22	107	50.83		
			0300	77	330	9.4		53	36.29	107	47.98		
			0330	77	324	9.5		53	38.41	107	45.51		
			0345	77	EOL			53	39.43	107	44.08		

TAPE #	START	END	COMMENTS AND OBSERVATIONS	PAGE 21
1824			asked bridge to increase speed to 6 knots, RPM—	
			associated vibration suspected in gun record.	
1827			Problem appears to have disappeared	
1841			problem continues - asked bridge to drop speed	
			to 5.0 knots	
1848			seems ok at 5.0 (9.5 km/hr) noise gone	
1853			log off NAV801B OK	
1854			log on to NAV801C 338K left on DISK	
1955			H2O gun auto-fire ; off	
2010			Stop to pull hydrophone and gun 53° 14.30 108° 05.63	
2029			Resume line 75, 3.5 kHz only 53 14.28 108° 05.93	
			(rebuilding gun - seals)	
2036			EOL 75 / SOL 76 @ L42a 53° 13.93 108° 06.20	
~2050			Sats down ; then power low - no end-of-file	
			written to NAV801C	
2129			Sats up ; power OK ; logging NAV801D on	
			new disk (#18)	
2141			EOL 76 @ L44a (Stop) 53° 18.02 108° 15.03	
2146			Stop logging NAV801D (17K)	
2215			Start logging NAV801E	
2219			SOL 77 @ L44a (resume ops) 53° 18.11 108° 14.78	
			noisy records, esp. H2O gun	
2300			both records very bad, noisy	
0115			2 Aug. 91 - records better, but still somewhat noisy	
0148+			Pass core site 332, cont. line 77 ; 53° 31.39 107° 54.54	
0154			Log off NAV801E (248 k) 464K left	
0155			Log on NAV801F	
0345			EOL 77 @ L45	
0348			Stop log NAV 801F (123 k) End disk #18	

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES ±	LATITUDE MINUTES	LONGITUDE ± DEGREES ±	LONGITUDE MINUTES	TYPE	QUAL.
91	08	02	1330	078	039	10.7		53	52.4	108	11.5		
			1400	078	042	11.1		54	54.7	108	14.9		
			1430	078	040	11.0		53	57.7	108	17.5		
			1500	079	149	11.3		53	58.7	108	20.0		
			1532	079	144	11.4		53	56.4	108	24.2		
			1600	079	145	11.4		53	54.1	108	27.0		
			1630	079	142	11.8		53	51.8	108	30.7		
			1700	079	137	12.0		53	49.1	108	34.9		
			1730	079	148	11.3		53	47.0	108	38.4		
			1800	079	136	10.7		53	45.8	108	41.3		
			1830	080	220	10.6		53	42.6	108	38.3		
			1900	080	220	10.5		53	40.5	108	36.5		
			1930	80	219	10.6		53	37.5	108	33.4		
91	08	02	2005	81	321	10.0		53	39.7	108	29.4		
			2030	81	319	10.1		53	41.9	108	26.9		
			2100	81	319	10.7		53	43.9	108	23.7		
			2130	81	323	10.1		53	45.6	108	20.2		
			2200	81	321	11.0		53	47.3	108	17.8		
			2229	81	329	11.6		53	49.2	108	13.9		
			2300	81	331	10.0		53	52.3	108	10.8		
			2308	81	EOL			53	52.1	108	10.3		
91	08	03	0143					53	35.4	108	14.8		
91	08	03	1430	082	196	11.4		54	21.8	104	58.0		
			1500	082	225	11.0		54	19.3	108	55.7		
			1530	082	221	11.0		54	17.8	108	52.5		
			1600	082	221	10.5		54	14.1	108	49.8		
			1630	082	218	10.7		54	12.5	108	47.2		
			1700	082	227	11.0		54	09.1	108	44.9		
			1730	082	227	11.2		54	07.1	108	40.4		
			1800	082	222	11.4		54	05.2	108	37.4		

TAPE #	START	END	COMMENTS AND OBSERVATIONS	PAGE 22
1314			log on to NAV802A (NAV per 91-19)	
			Underway to L58a to begin Line 78	
1324			SOL #78 @ L58a 53° 51.79' 108° 10.97'	
1452			EOL #78 @ L59a 53° 59.08' 108° 19.69'	
			SOL #79	
1650			Logoff NAV802A OK 582K left on Disk	
1651			log on to NAV802B	
1725			computer Discovered off (?) not clear how	
			this happened NAV802B apparently full - 0 kbytes	
1726			New Disk #20 log on to B:NAV802	
1800			EOL #79 @ L60a SOL#80	
1935			EOL 80 / SOL 81 @ L61a 53° 37.57; 108° 32.96	
2000			Sats down briefly (~5 min)	
2135			Log off NAV802C (257k)	Sats down briefly sometime 2130-2140
2136			Log on NAV802D (472 k left)	
2308			EOL 81 passed L58a 53° 52.71; 108° 10.13	
2309			Stop log NAV802D (104 k)	
8/3/91				
0143			334 RC1 53° 35.04 108° 14.86	
0207			334 RC1 53° 35.16 108° 14.70	
0250			334 RC1 53° 35.08 108° 14.93	
0422			334 RC2 53° 35.22 108° 14.83	
1402			log on to NAV803A - Disk 20	
1418			SOL #82 @ 328 54° 22.90 N 108° 58.56 E	
1437			course change 54° 21.02 N 108° 58.10 E	
1654			log off	
1655			log on to NAV803B 188 Kb on Disk	
1713			course change @ 330 54° 08.74 N 108° 42.66 E	
1710			crossed SAN # 330 54° 09.01 N 108° 43.01 E	
			New Heading 227°	

YR	MO	DAY	TIME	LINE #	SHIPS COURSE	SHIPS SPD	NAVIGATION FIX TIME	LATITUDE ± DEGREES ± MINUTES	LONGITUDE ± DEGREES ± MINUTES	TYPE	QUAL.
91	08	03	1830	082	226	11.3		54 02.2	108 34.2		
			1900	082	224	11.2		54 00.2	108 31.8		
			1930	082	219	10.9		53 58.5	108 28.6		
			2000	082	227	10.6		53 56.4	108 25.0		
			2030	82	228	10.3		53 54.4	108 21.5		
			2109	82	231	10.9		53 51.3	108 17.6		
			2130	82	236	10.8		53 49.5	108 14.8		
			2200	82	238	10.7		53 48.2	108 10.3		
			2230	82	239	10.5		53 46.8	108 07.5		
			2300	82	236	10.7		53 44.3	108 03.9		
91	08	03	2330	82	238	11.0		53 42.4	107 59.6		
91	08	04	0000	82	239	11.4		53 41.2	107 55.7		
			0030	82	236	11.8		53 39.3	107 51.9		
			0100	82	215	11.6		53 37.7	107 47.0		
			0130	82	216	11.4		53 34.9	107 44.0		
			0200	82	215	11.1		53 31.4	107 41.7		
			0230	82	215	10.7		53 29.4	107 39.2		
			0300	82	215	10.8		53 26.9	107 36.2		
			0303	82	EOL			53 26.6	107 36.6		
								.	.		
91	08	04	1900	83	331	11.1		52 26.7	106 22.9		
			1930	83	329	10.5		52 28.1	106 19.9		
			2000	83	325	10.5		52 30.2	106 16.3		
			2030	83	327	11.1		52 33.4	106 14.6		
			2100	84	242	11.2		52 33.4	106 10.7		
			2130	84	235	11.1		52 31.5	106 06.4		
			2200	85	160	12.2		52 28.1	106 07.3		
			2206	85	EOL			52 28.0	106 07.0		
								.	.		
								.	.		

TAPE #	START	END	COMMENTS AND OBSERVATIONS PAGE 23
1945			Log off
1946			Log on New Disk NAV Ver 91-21 — file NAV803C
2145			Sats down briefly - 20 min
2130			c/c on 82 @ L58b 49.95 14.88
2302			Log off NAV803C (192K) Log on NAV803D (538K left)
0057			08/04/91 c/c line 82 @ L45a 53° 37.43; 107° 47.38
0303			EOL 82 just past 335
0304			End log NAV 803D (255K) 282 K left
0359			335 PC1 53°26.74 107°36.84
0446			335 PC1 53°26.79 107°37.10
0608			335 PC2 53°26.81 107°37.11
0820			RICK SACRIFICES BOOTS TO THE GOD OF BAIKAL AT THE MOUTH
			OF THE LITTLE SEA... THERE IS GREAT REJOICING ABOARD + ASHORE.
1826			Log on to NAV804A YO!
			Approaching L30
1843			SOL # 83 @ L30 Sats Down temporarily
1845			52° 24.89N 106° 23.48 E
~2040			EOL 83 / SOL 84 @ L29 sats down briefly 52 34.00 106 12.62
2109			End log NAV804A (133 K) Start log NAV804B
2133			EOL 84 / SOL 85 @ L28 52° 31.59; 106° 05.73
2206			EOL 85 past C3 52° 28.20; 106° 07.90
2209			Log off NAV804B (64K) End Disk 21