GEOLOGICAL SURVEY OF CANADA
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Cruise Hart 2000004
Multibeam Bathymetry, Geophysical Surveys and Sampling Operations in Saint John, NB, 12-18 May 2000

D. R. Parrott and R.O. Miller

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Background

As part of a joint project between the Geological Survey of Canada Atlantic (GSC-A) and the University of New Brunswick Ocean Mapping Group, a multidisciplinary suite of data was collected in April-May 2000 to study seafloor conditions in the vicinity of the Black Point offshore disposal site in Saint John Harbour, NB and in Kennebecasis Bay, on the Kennebecasis River, NB. Geophysical data were collected to provide information on the character and distribution of seafloor sediments, and the geological and oceanographic processes which have affected the seafloor in these areas. A high resolution multibeam bathymetry survey was performed, from 26–30 April 2000, over the disposal site at Black Point and off Mispec Bay using a Simrad EM3000 multibeam bathymetry system mounted in a hydrographic survey launch. In early May 2000, the University of New Brunswick research vessel Mary O was used to collect sediment samples, seafloor photographs and free fall penetrometer data in Saint John Harbour and Approaches. The CCGS JL Hart was used from 12-18 May 2000 to collect gravity core samples near the Black Point disposal site and samples and photographs in deep water, south of the disposal site. These vessels are shown on the front cover of this report and in Figure 1 below.

Geophysical equipment used during the survey consisted of a Simrad MS992 dual frequency (120 and 330 kHz) sidescan sonar system and IKB Seistec sub-bottom profiler. Sediment samples were collected with a vanVeen grab sampler and a small gravity corer. Cores from the survey were analyzed to determine temporal changes in the chemical signature of modern sediments near the Black point disposal site and in the protected environment above the Reversing Falls. Results of these analyses will be integrated into the studies of recent changes in Black Point, in Saint John Harbour.

Bottom photographs were taken along transects through the survey areas. Cores from the survey will be analyzed to determine temporal changes in the chemical signature of modern sediments in the protected environment above the Reversing Falls. Results of these analyses will be integrated into the studies of recent changes in Black Point, in Saint John Harbour.

a) 

b) 
c) 

Figure 1. The survey and seafloor sampling program were performed using (a) the CCGS JL Hart, (b) the University of New Brunswick research vessel Mary O, and (c) the CSL Plover equipped with a Simrad EM3000 multibeam bathymetry system.

Previous Work

Black Point, Saint John, NB

For over 50 years, the Black Point Ocean Disposal Site (Fig. 2), in the approaches to Saint John Harbour, New Brunswick, has been used as a disposal site for material dredged from Saint John Harbour. Up to 1,000,000 m^3 of dredged sediment are deposited annually at the site. The site is located in a high-energy area affected by the outflow of the Saint John River and the Bay of Fundy tides. Although it was predicted that material dumped at the disposal site would be dispersed by the strong currents, studies indicated that disposal activities have resulted in a buildup of sediment with a chemical imprint and an impoverished benthic community.

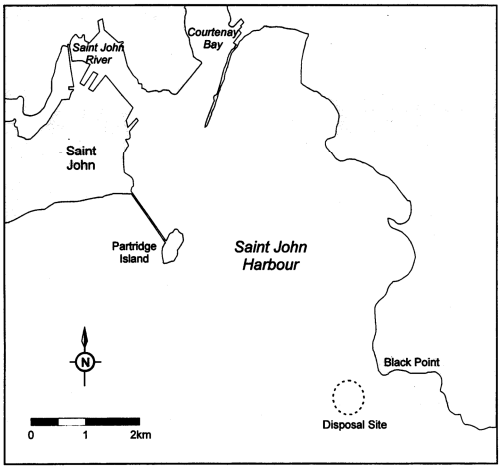

Figure 2. Location of Black Point offshore disposal site

Environment Canada had previously sponsored a three year monitoring program (1992-94) at the disposal site, to define the zone of influence of the disposal activities, to assess the physical, chemical and biological impacts caused by disposal activities, and to evaluate the long-term use of the site for future dredging projects (Tay et al., 1997). Sidescan sonar, sub-bottom profiler, single beam bathymetry, seafloor photographs, and samples were collected over the disposal area. The study indicated that past disposal activities resulted in a significant buildup of dredged material within a one-kilometer radius of the disposal buoy.

A joint research program between Environment Canada and the Geological Survey of Canada was initiated in 1999 to determine recent changes in the disposal site and to study the possibility that material was being transported away from the disposal area and impacting nearby fisheries.

During survey Hart2000004, a suite of seafloor samples, photographs and free fall penetrometer measurements were taken to provide information on the character of seafloor sediments in Saint John Harbour and Approaches. A multibeam bathymetry survey was conducted from the survey launch Plover to provide detailed bathymetry information over the disposal site and in Mispec Bay.

Kennebecasis River
A series of sidescan sonar and sub-bottom profiler survey lines were run in Kennebecasis Bay as part of a joint program with the Ocean Mapping Group of the University of New Brunswick. Geophysical surveys were performed along approximately 40 km of transects. Gravity cores were collected at 9 locations to assist with interpretation of the geophysical data.

Data Acquisition and Processing

The following geophysical and sampling equipment was used in the survey:

- IKB Seistec high resolution sub-bottom profiler
- Simrad MS992 sidescan sonar system
- ORE TrackPoint II ultra short baseline towfish positioning system
- AGCNAV survey navigation package with input from differential GPS, version 3.1 software
- HP workstations running GRASS with GSC-A extensions
- GSC-A Ice-Hole camera
- vanVeen grab samples
- Small gravity corer
- Free fall penetrometer

Multibeam Bathymetry
Multibeam bathymetry data were collected using a Simrad EM3000 multibeam bathymetry system mounted in the hydrographic survey launch Plover. The EM3000 system uses 300kHz transducer with 127 beams, with a beam width of 1.5^{o} x 1.5^{o}. The system provides a depth resolution of 1 cm with an accuracy of 5 cm RMS. Each beam insonifies an area of 1.35 m^2 at 50 metres water depth.

Lines were run to provide 200 percent coverage of the seafloor in depths greater than about 20 metres. Data were cleaned and processed by the Ocean Mapping Group of the University of New Brunswick to remove erroneous soundings and to remove the effects of tidal variations. About 600 kilometers of survey lines were run to provide information on 25-30 km^2 of seafloor near the disposal site.

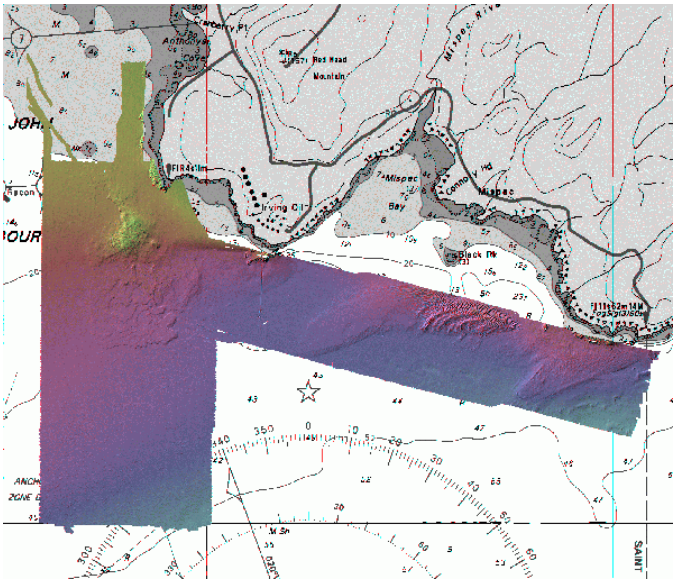

Figure 3. Coloured shaded relief of EM3000 multibeam bathymetry data collected in April 2000.

A preliminary investigation of the multibeam bathymetry data has shown that the major spoil pile, and slump immediately south, are still present (Figure 3). Data from this survey will be used to determine changes in the distribution of sediments in the area. A series of 4-6 metre high sand ridges, with 2-3 metre sand waves superimposed on them have been observed near Mispec Point indicating the presence of strong currents in the area. Further analysis will be performed to determine the direction of sediment movement.

Multibeam backscatter

The strength of an echo from the seafloor is known as the acoustic backscatter intensity. Acoustic backscatter intensity values are controlled by the physical properties of the seafloor sediments such as the velocity of sound, the density and roughness of the sediment. Backscatter generally increases as the sediments on the seafloor become denser and less porous, and increase in grain size. Mapping the distribution of backscatter provides valuable information on the distribution of sediments within an area. The multibeam bathymetry data collected in April 2000, were processed by the Ocean Mapping Group at the University of New Brunswick to extract acoustic backscatter information and to determine the resolution limits of the data.

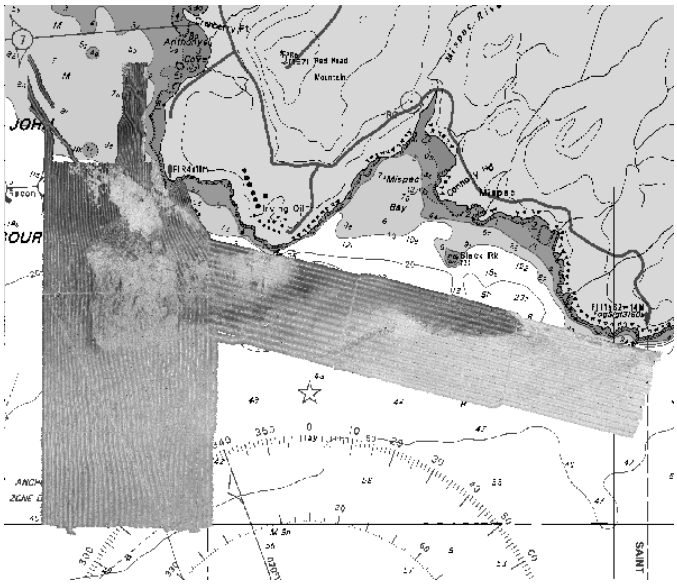

Figure 4. Acoustic backscatter intensity data collected in April 2000

In the acoustic backscatter intensity data, shown in Figure 4, the Black Point disposal site is quite evident as the high backscatter area (light colour in this image) surrounded by the low backscatter muds and silts (shown by the dark colour in this image) of the inner harbour. The slump to the south of the disposal pile has a mottled texture on the data due to the variable nature of the sediment in the slump. The sand waves off Mispec Bay have lower backscatter intensity than the surrounding seafloor. The data will be compared with backscatter information from the 1999 sidescan sonar survey.

Sidescan sonar

High-resolution, acoustic images of the seabed were produced with a Simrad MS992 dual frequency (120 and 330 kHz) sidescan sonar system equipped with a neutrally buoyant towbody deployed behind a dead weight depressor. This configuration was chosen to reduce noise on the sidescan sonar records due to vessel-induced heave and thereby improve resolution. The sidescan sonar system was capable of resolving objects down to a size of about 0.15 m. An ORE TrackPoint II acoustic position system was used to position the towfish. A hardcopy graphic record of the sidescan sonar data was produced on an Alden 9315CTP thermal recorder.

Sidescan sonar data from survey Hart 200004 (both 120 and 330 kHz) were collected digitally using an AGCDIG digitizer with version 2.3 software, at a sample interval of 65 microseconds Digital gain settings for the sidescan sonar system and digitizers were logged on field sheets. During the survey, data were imported into a Unix workstation at a resolution of 0.35 metres (across track). The seafloor was detected, slant range and beam corrections applied to the raw data. The data were integrated with navigation and imported into the GRASS GIS system at 1 metre resolution. A variable layback, based on towfish positions from the TrackPoint II positioning system, was applied to the sidescan sonar data.

Sub-bottom profiler

High-resolution, sub-bottom profiler data were collected using an IKB Seistec system. The Seistec system was used to map the thickness and structure of materials on the sea floor and provide information on the genesis of the sediments. The system uses an electrodynamic (boomer) source to produce a repeatable impulse-like output, which provides resolution of 0.25 metre or better. The Seistec system, equipped with an internal line-and-cone array and an external streamer, was deployed by crane on the starboard side of the vessel and towed at the surface. The system was fired 2 times per second, or faster, and graphic records displayed on a thermal graphic recorder.

Digital data acquisition
The sidescan sonar and sub-bottom profiler data were digitized and logged on an AGCDIG digital data recorder developed at the Geological Survey of Canada - Atlantic running version 2.3 software. The clock in the AGCDIG was synchronized to the GPS time signal. No gains or corrections were applied by the digitizer to the raw logged data. Channel configurations for the logged data were:

Sidescan sonar - 65 microseconds sample interval

Channel	Use
0	120 kHz port
1	120 kHz starboard
2	330 kHz port
3	330 kHz starboard

Sub-bottom profiler – IKB Seistec - 30 microseconds sample interval

Channel	Use
0	Seistec line and cone receiver
1	GF10/15P streamer hydrophone

Navigation
Navigation was by a differential Global Positioning System utilizing corrections broadcast from the Coast Guard station at Western Head. Accuracy of the navigation was about 4 m.

Data Processing
Data were processed and imported into a GRASS (Geographic Resources Analysis Support System developed by the U.S. Army Corps of Engineers) Geographical Information System for further analysis and display.

Digital sidescan sonar data were recovered from the ExaByte tapes recorded on the AGCDIG recorder and processed to remove geometric distortions present in sidescan sonar data. The geometrically corrected data were integrated with navigation and processed to remove the effects of varying sensor gain with angle. The sidescan sonar data from adjacent survey lines were integrated to produce a sidescan sonar mosaic using software developed by the Geological Survey of Canada.

Seafloor Photographs

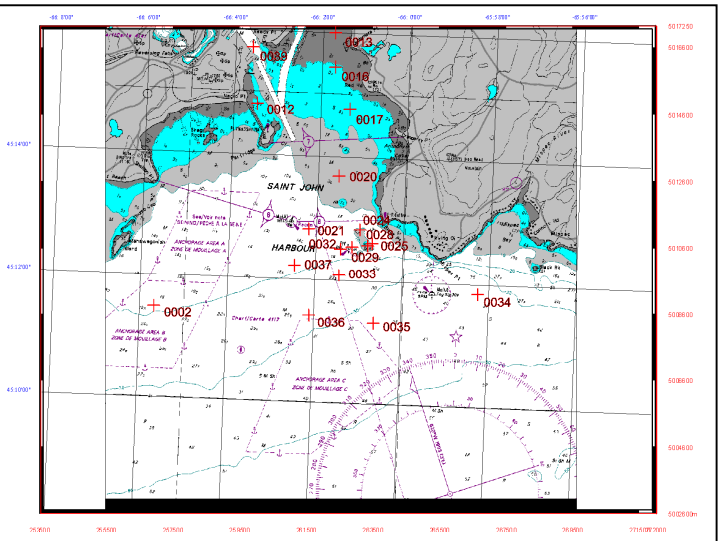

Figure 5 Location of Seafloor photographs taken in May 2000

Photographs were taken at 18 camera stations in Saint John Harbour (about 130 photographs in total) with the “Icehole” camera developed by GSC-A. Images were obtained on roughly north-south transects through the disposal site. Locations for all camera stations are shown in Figure 5, and provided in Appendix IV. The photographs are presently being processed and will be stored on CD-ROM in “PCD” format.

Seafloor Samples

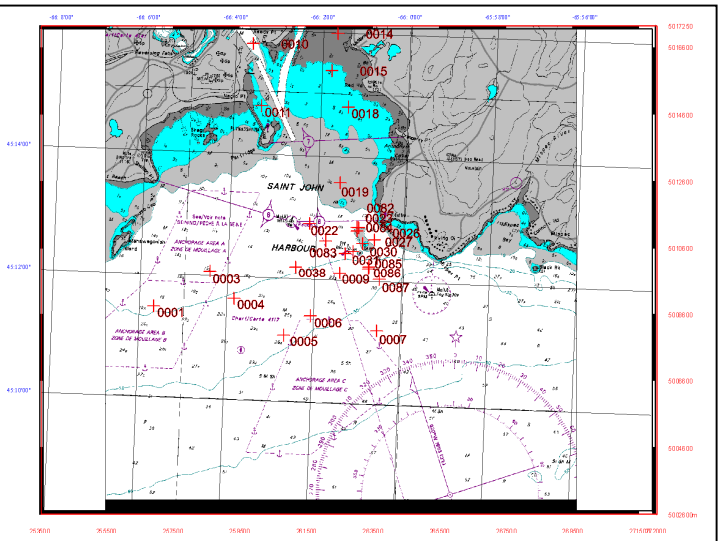

Figure 6 Location of grab samples taken in May 2000

Sediment samples were taken with a vanVeen grab sampler (29 samples in Saint John Harbour) to provide groundtruth for the interpretation of the sidescan sonar and sub-bottom profiler data. The sample locations are shown in Figure 6-8. The sample positions are provided Appendix IV.

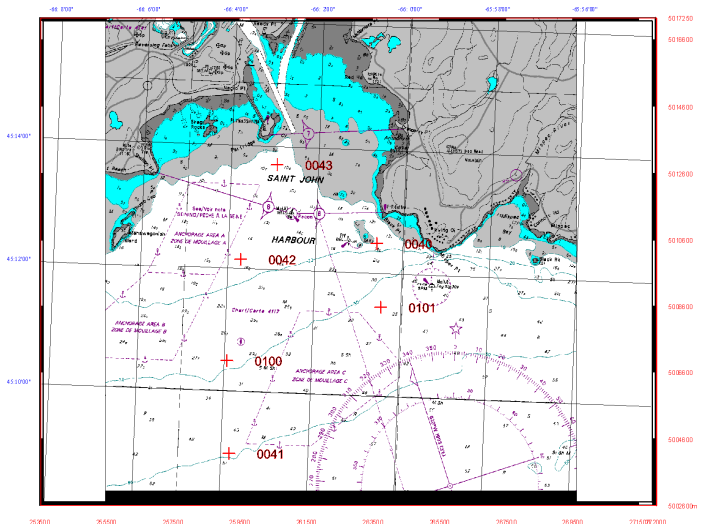

Figure 7. Location of gravity cores grab samples taken in Saint John Harbour and approaches in May 2000 .

A small gravity corer was used to collect 6 cores near the Black point disposal site, and 10 in Kennebecasis Bay. The cores from near the disposal site were extruded, split, and subsampled in the field. Pore water extracted from the sediments will be used to determine sediment accumulation rates in the area.

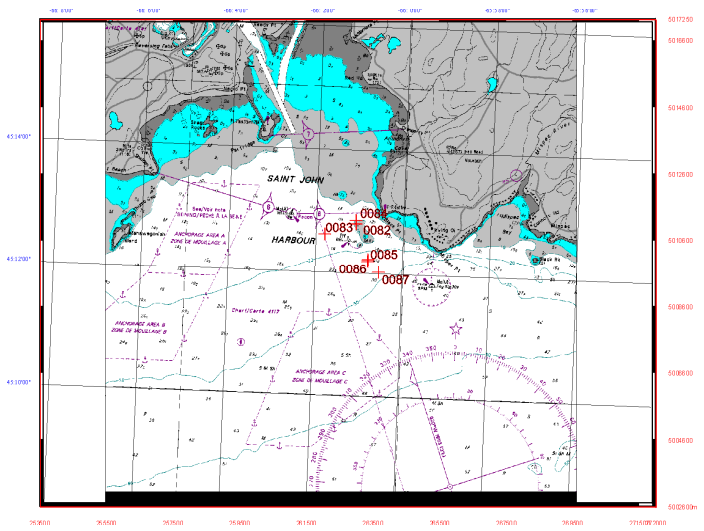

Figure 8. Location of grab samples taken for Organic Chemistry analysis in May 2000

A series of samples were taken at locations specified by Environment Canada for analysis to determine the concentrations of organic chemical compounds. Locations for these stations are shown in Figure 8, and provided in Appendix IV. Note that no sample was acquired at some of the attempted sites.

Free fall penetrometer

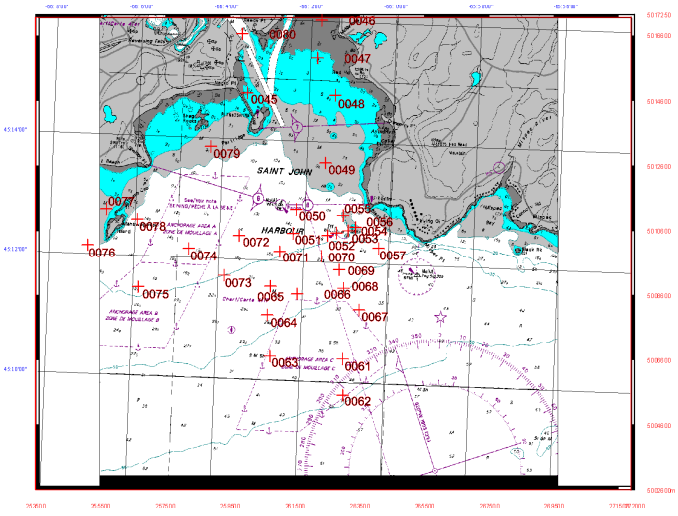

Figure 9. Location of Free Fall Penetrometer stations taken in May 2000

A free fall cone penetrometer FFCPT has recently been developed by Brooke Ocean technology of Dartmouth, NS (Brooke Ocean Ltd, 2000). The FFCPT was deployed at 39 sites in Saint John Harbour, to provide data that will be processed to provide estimates of the pore pressure and dynamic shear strength of seafloor sediments. Locations are shown in Figure 9 and provided in Appendix IV. Measurements were made at several sites previously tested by the Sea Carousel benthic flume (Amos et al., 1993) to provide a correlation with the measurements made of the erosion potential of sediments estimated from Sea Carousel deployments. Data from these control sites will be used to extrapolate existing measurements and to estimate the erosion potential of sediments in the area.

Tides

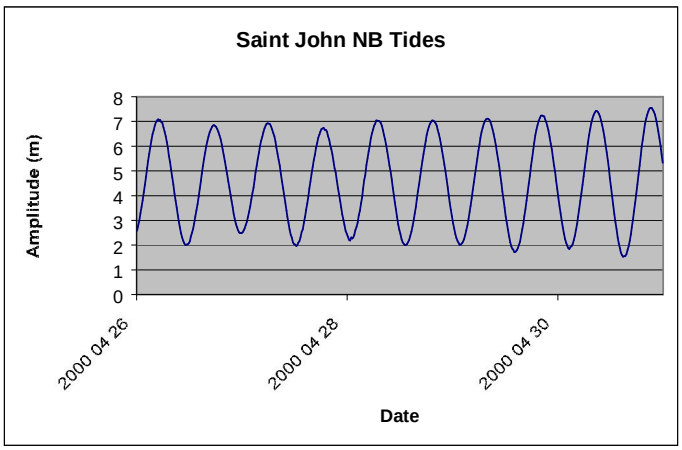

Figure 10. Tides measured at the CHS tide gauge in Saint John, NB, from 24 April to 1 May 2000.

Tidal data was retrieved from the CHS tide gauge in Saint John NB. A tidal range of about 6 metres was observed during the survey.

Access to Data and Samples

The sidescan sonar, sub-bottom profiler and grab samples collected during this survey are archived at the Geological Survey of Canada - Atlantic in Dartmouth Nova Scotia. For access to the geophysical data and samples contact the senior scientist for the survey, Russell Parrott (902-426-7059) or Susan Merchant of the GSC-A Curation group (902-426-3410). Graphical records for the sidescan sonar and subbottom profiler, digitally processed sidescan sonar mosaics, ExaByte tapes containing the sidescan sonar data in SEG-Y format, CD-ROMs containing the sidescan sonar and sub-bottom profiler data in SEG-Y format, and ExaBytes tapes of the raw data are available for viewing.

References

Amos, C.L., K-L. Tay, M. Hughes, A. Robertson, and B. Wile. 1993. Seabed stability monitoring at dump site B of Saint John Harbour, New Brunswick, using Sea Carousel. Geological Survey of Canada Open File 2764. 41pp.

Brooke Ocean Technology, 2000. Free Fall Cone Penetrometer. www.brooke-ocean.com/ffcpt-01.html . 2 pp.

Cdn. Seabed Research Ltd. 1994. Acoustic monitoring of the Black Point ocean dump site; Saint John, New Brunswick; sidescan sonar and sub-bottom profiler survey results. Contract report to Environment Canada. 22 pp

Parrott, D.R., 1995. Sidescan Sonar Survey of the Liverpool Offshore Dumpsites 26-28 September 1995. Report to Public Works and Government Services Canada Architectural and Engineering Services, Atlantic Region and Transport Canada Marine Navigational Aids. Geological Survey of Canada Open File Report 3249. 20 pp.

Tay, K.L., K.G. Doe, A. J. MacDonald and K. Lee, 1997. Monitoring of the Black Point ocean disposal site, Saint John Harbour, New Brunswick 1992-1994. Environment Canada, Ocean Disposal Report #9. ISBN 0-662-25655-7 Cat. No. En40-214/9E. 133 pp.

Appendices

Appendix I Survey Particulars

Name of Vessel:	CCGS J.L. Hart	MV Mary O
Vessel captain:	Pious Antle	Robert Bosine
Dates	12-19 May 2000	11-19 May 2000
Area of Operation	Saint John NB	Saint John NB

Appendix II List of Participants

Geological Survey of Canada Atlantic

Scientific project leader:	Russell Parrott, GSC,A
Senior Field Scientist:	Robert O. Miller, GSC,A
Navigation:	Darrell Beaver, GSC,A
Sampling:	Bob Murphy, GSC,A
Electronics:	Austin Boyce GSC,A
Sample Editing:	Barb Szlavko, GSC,A

University of New Brunswick

Professor	John Hughes Clarke
Student	Graham Nickerson
Student	John

Appendix III Summary of Activities

Thursday 11 May 2000

– UNB vessel Mary O

13:00 Beaver and Murphy leave BIO, Dartmouth and transit to Saint John NB.

20:00 Discussions with Bob Bosine, captain of UNB research vessel Mary O about upcoming operations.

Friday 12 May 2000

– UNB vessel Mary O

0800 Beaver and Murphy to CCGB Saint John to make arrangements for vessel berths and laboratory space for geochemical work.

1300 Arrive Kennebecasis Yacth Club to meet with UNB personnel .

14:00 Load sampling and photographic gear on UNB research vessel Mary O.

Saturday 13 May 2000

– UNB vessel Mary O

07:00 Beaver and Murphy arrive Kennebecasis Yacth Club and start transit through Reversing Falls. UNB student Graham Nickerson on board to assist with operations. Captain is Bob Bosine.

12:00 Commence sampling operations in Saint John Harbour and Approaches. Ten grab samples taken before winds increase and conditions deteriorate.

15:00 Return to CCGB Saint John.

Sunday 14 May 2000

– UNB vessel Mary O

07:00 Beaver, Murphy, Bosine and UNB student Graham Nickerson depart CCGB Saint John for sampling and seafloor photography operations in Saint John Harbour and Approaches. Twenty six stations (cameras and grabs) were completed.

17:00 Return to CCGB Saint John.

– CCGS JL Hart

11:00 R. Miller, A. Boyce and R. Cranston depart BIO and transit to Saint John NB.
15:00 JL Hart arrives at CCGB Saint John.
17:00 GSCA personnel arrive in Saint John NB.

Monday 15 May 2000

– CCGS JL Hart

07:00 GSCA personnel Miller, Beaver, and Murphy depart CCGB Saint John. Steamed to first core site over the disposal site, made 2 attempts to recover core. No sample recovered. At this time the vessel was blitzed by lobster fishermen telling personnel to leave the site. GSCA personnel confirmed that no gear was being towed but were taking bottom samples from a stationary position. At this time the vessel moved to sample locations which were the furthest out the Harbour to assess the distribution of lobster traps throughout the study area. Lobster traps were ubiquitous and plentiful near the disposal site!! Core samples were taken in deep water in areas with no lobster traps.
12:00 Barb Szlavko departs BIO for Saint John.
17:00 Return to CCGB Saint John.

– UNB vessel Mary O

07:00 A Boyce, a UNB student, and Bosine depart CCGB Saint John. Collected free fall cone penetrometer data all day.
10:30 Return to CCGB Saint John to refuel vessel.
12:00 Depart wharf and continue free fall cone penetrometer operations.
17:30 Return to CCGB Saint John.

Tuesday 16 May 2000

– CCGS JL Hart

07:00 Depart CCGB Saint John to collect cores and camera stations in an area south of Saint John Harbour. Upon arrival at the Black Point offshore disposal site, too many lobster traps were present to allow sampling operations to be carried out at any of the desired locations using the JL Hart without the risk of becoming tangled in lobster trap lines. The marine weather forecast predicted that gale force winds would not allow the vessel to operate in the Harbour or approaches after early Wednesday morning.
10:00 Beaver and Murphy transfer to the Mary O to collect more seafloor samples required for organic chemistry analysis by Environment Canada. Boyce returns to the JL Hart.
14:00 Arrangements were made with John-Hughes Clark, UNB, to run a small geophysical survey and sampling program in Kennebecasis Bay on the Kennebecasis River. Captain Pious Antle had not taken a vessel through the Reversing Falls and arranged for the captain of the CCGS Partridge Island to act as pilot for the transit. The first attempt at traversing the Reversing Falls failed and the Hart returned to CCGB Saint John.

– UNB vessel Mary O

07:00 Boyce and UNB student continue cone penetrometer stations.
10:00 Sampling personnel (Beaver and Murphy) transferred from Hart to the Mary to continue with seafloor sample and photograph sites for Environment Canada.
15:00 Weather deteriorates. Mary O returned to CCGB Saint John
19:00 Mary O returned to sample sites to continue operations.
21:00 Return to CCGB Saint John.

Wednesday 17 May 2000

– CCGS JL Hart

12:00 Leave wharf to go through Reversing Falls. Miller, Boyce and Graham Nickerson (UNB) drive to Yacht Club and transfer to Hart via zodiac.

14:00 Deploy Seistec sub-bottom profiler and Simrad sidescan sonar to run survey (one long line up axis of Kennebecasis Bay).

18:00 Recover gear.

19:30 Scientific staff dropped off via zodiac at yacht club. Hart goes to anchor for the night.

– UNB vessel Mary O

07:00 Collect samples at Black Point disposal site. Some problems with lobster trap lines. Beaver, Murphy and UNB student onboard.

10:00 Winds increase and weather deteriorates.

12:00 Mary O transits through Reversing Falls to wharf at yacht club and is dismissed from program.

Thursday 18 May 2000

– CCGS JL Hart

05:30 Miller, Boyce, Murphy and Graham Nickerson picked up by Zodiac at yacht club and join JL Hart. Collect 10 gravity cores for UNB (Nickerson impending PhD area).
Beaver remains at CCGB Saint John to make arrangements for Hart at site across Harbour.

07:00 Gorveatt departs BIO with van to assist with demobilizing.

09:00 Cranston and Szlavko depart in vehicle to transport geochemical gear back to BIO.

09:21 Deploy and run a series of transects across Kennebecasis Bay.

11:11 Recover Seistec.

12:00 Transit through Reversing Falls. Gorveatt arrives with van. Demobilize all gear from JL Hart

14:00 Finish demob and depart for BIO.

20:00 Arrive BIO.

Friday 19 May 2000

08:00 Demobilize all gear from vehicles.

Appendix IV Sample Stations

Camera Stations

– UTM position for UTM zone 20 using wgs84

Station	Easting	Northing	Water Depth	Day/Time
0002	256892.39	5008872.32	21.3	134/1357
0012	260010.37	5014942.00	9.5	135/1103
0013	262361.82	5017053.15	4.6	135/1132
0016	262358.90	5016026.55	5.5	135/1241
0017	262793.18	5014768.06	9.1	135/1259
0020	262462.52	5012769.34	12.5	135/1340
0021	261552.75	5011191.11	16.2	135/1355
0024	263092.84	5011160.12	14	135/1502
0025	263457.82	5010749.11	13.7	135/1513
0028	263319.95	5010679.17	7.6	135/1553
0029	262849.03	5010640.05	15.2	135/1604
0032	262507.17	5010582.77	15.2	135/1652
0033	262457.88	5009788.32	22.9	135/1701
0034	266628.29	5009192.60	33.5	135/1726
0035	263489.23	5008329.14	32	135/1747
0036	261550.40	5008575.10	24.4	135/1803
0037	261123.47	5010098.03	16.2	135/1818
0039	259883.62	5016632.93	14	135/1909

Grab Samples

- UTM position for UTM zone 20 using wgs84

Station	Easting	Northing	Water Depth	Day/Time
0001	256876.50	5008855.91	21.9	134/1031
0003	258569.79	5009918.94	15.8	134/1532
0004	259290.10	5009083.07	19.8	134/1547
0005	260781.16	5007975.54	26.2	134/1605
0006	261584.87	5008554.67	24.4	134/1628
0007	263574.93	5008104.23	33.5	134/1647
0008	266789.28	5009222.49	30.5	134/1710
0009	262465.91	5009857.88	21.3	134/1732
0010	259871.60	5016728.06	13.7	134/1825
0011	260121.57	5014869.36	9.1	135/1017
0014	262416.99	5017028.83	4.6	135/1146
0015	262236.36	5015918.80	5.5	135/1214
0018	262728.50	5014828.56	9.1	135/1309
0019	262483.96	5012565.40	12.5	135/1326
0022	261564.36	5011347.09	16.2	135/1406
0023	263039.98	5011224.73	14	135/1425
0026	263511.65	5010859.90	13.7	135/1525
0027	263157.03	5010746.67	12.2	135/1536
0030	262866.51	5010508.35	15.2	135/1612
0031	262629.53	5010446.36	15.2	135/1633
0038	261143.67	5010043.43	15.2	135/1827
0082	262990.24	5011124.80	12.2	137/2103
0083	262045.96	5010825.92	13.7	138/1015
0084	262988.13	5011232.46	0	138/1029
0085	263341.94	5010042.69	12.2	138/1035
0086	263334.15	5009985.80	19.8	138/1055
0087	263655.84	5009653.52	24.4	138/1113
0088	263619.26	5009893.51	22.9	138/1134
0089	262273.90	4989283.97	24.4	138/1149

Gravity Cores

- UTM position for UTM zone 20 using wgs84

Station	Easting	Northing	Water Depth	Day/Time
0040	263598.24	5010516.82	24	136/1511
0041	259153.13	5004167.35	57	136/1559
0042	259503.97	5010044.27	20.9	136/1746
0043	260604.67	5012871.15	15	136/1811
0081	259570.07	5017255.07	24.9	137/1242
0090	256733.91	5023342.06	27	138/942
0091	256232.12	5023183.53	18.4	138/958
0092	256708.61	5022506.94	18	138/1012
0093	256482.24	5022289.82	10	138/1024
0094	255208.69	5022745.18	41	138/1045
0095	253760.44	5022873.63	12.9	138/1057
0096	254360.22	5022169.12	20	138/1109
0097	254242.12	5021515.05	18.2	138/1117
0098	253608.61	5021904.02	20	138/-1
0099	253564.22	5022894.42	10	138/1140
0100	259089.58	5006964.92	-1	136/1650
0101	263713.16	5008570.86	-1	136/1755

Cone Penetrometer

- UTM position for UTM zone 20 using wgs84

Station	Easting	Northing	Water Depth	Day/Time
0044	259384.17	5017466.96	22	136/1301
0045	260086.18	5014918.54	22	136/1440
0046	262399.04	5017165.56	3	136/1508
0047	262262.95	5015997.01	4	136/1515
0048	262821.21	5014840.6	8	136/1523
0049	262510.31	5012752.30	10	136/1534
0050	261605.34	5011314.18	13	136/1545
0051	261506.64	5010572.31	19	136/1552
0052	262573.59	5010504.41	21	136/1602
0053	262847.69	5010585.37	17	136/1608
0054	263213.94	5010653.60	9	136/1614
0055	263054.77	5011126.39	18	136/1622
0056	263444.86	5010759.94	14	136/1629
0057	264163.41	5010107.06	30	136/1638
0058	266608.04	5009330.26	36	136/1746
0059	264755.23	5008756.59	38	136/1801
0060	265504.68	5006621.12	48	136/1815
0061	263040.81	5006663.08	42	136/1828
0062	263044.94	5005535.01	49	136/1837
0063	260781.75	5006752.45	32	136/1853
0064	260699.45	5008022.12	26	136/1906
0065	260799.07	5008917.13	22	136/1915
0066	261627.35	5008680.12	24	136/1931
0067	263549.76	5008176.03	39	137/1139
0068	263065.82	5008852.12	33	137/1149
0069	262932.92	5009431.12	30	137/1158
0070	262387.52	5009858.37	27	137/1207
0071	261087.53	5010006.27	23	137/1207
0072	259824.21	5010502.16	18	137/1247
0073	259360.10	5009260.86	25	137/1257
0074	258259.76	5010109.10	19	137/1308
0075	256690.07	5008907.35	26	137/1321
0076	255120.56	5010222.43	10	137/1332
0077	255701.55	5011333.14	13	137/1352
0078	256661.85	5011017.14	18	137/1402
0079	258949.76	5013265.15	11	137/1415
0080	259926.00	5016743.58	22	137/1438