Bedford Institute of Oceanography
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Cruise Report 88018(E)

Navicula operations in southwest Newfoundland coastal waters: Port au Port Bay, St. George's Bay, La Poile Bay to Baraswav Bay and adjacent inner shelf

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GENERAL INFORMATION

Cruise:	*Navicula* 88018(E)
Dates:	5-24 August 1988
Area of Operations:	southwest Newfoundland coastal waters: - phase 8: Port au Port Bay - phase 9: St. George's Bay - phase 11: south coast (La Poile, Cinq Cerf, Couteau, Connoire, and Barasway Bays and adjacent inner shelf).
Agency:	Geological Survey of Canada (Atlantic Geoscience Centre [AGC])
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Scientific Staff:	John Shaw AGC Donald Locke AGC Darrell Beaver AGC

OBJECTIVES

Cruise 88018(E) was planned as part of an inner-shelf mapping initiative that embraced all AGC activities on *Navicula* during 1988 (all parts of cruise 88018 [legs A-H]). Although the primary objective of this work was to expand the geological knowledge base on the inner-shelf (to cover the "zone of ignorance" between onshore and offshore areas where information was available from previous work), specific issues in southwest Newfoundland coastal waters included the following: (1) scientific and economic interest in the marine placer potential of Port au Port Bay and of areas along the south coast in the vicinity of the Hope Brook gold deposit; (2) the extent of glaciation, the style and timing of deglaciation, and the nature of postglacial sea-level changes in south and west Newfoundland; (3) the distribution and mobility of bottom sediments in shallow coastal waters; and (4) the development and architecture of large coastal beach deposits, particularly the Flat Island and Stephenville barriers in St. George's Bay.

ORGANIZATION

Cruise 88018E was divided into three phases as follows (Fig. 1):
- phase 8: Port au Port Bay, west Newfoundland;
- phase 9: St George's Bay, west Newfoundland;
- phase 11: south coast and adjacent inner shelf (La Poile, Cinq Cerf, Couteau, Connoire and Barasway Bays).

The work was carried out on day trips from Piccadilly (phase 8), Stephenville/ Port Harmon (phase 9), and Grand Bruit (phase 11). Shore accommodation for scientific staff was in Stephenville for phases 8 and 9 and in Grand Bruit for phase 11. Surveys in the Port-aux-Basques area originally planned as phase 10 were cancelled when Navicula went into an unscheduled refit in Shelburne at the beginning of August.

SUMMARY OF ACCOMPLISHMENTS

Acoustic data collected on this cruise included bathymetry, side-scan sonar imagery, and shallow seismic reflection data. In addition, a magnetometer was towed on all lines. Navigation was by radar and Loran-C. The survey data amounted to approximately 214 km (32 lines) in Port au Port Bay (phase 8), 313 km (51 lines) in St. George's Bay (phase 9), and 153 km (40 lines) on the south coast. The sampling program produced a total of 66 van Veen grab samples and 8 gravity cores (22 grabs and 5 cores in Port au Port Bay, 20 grabs and 2 cores in St. George's Bay, and 24 grabs and 1 core on the southwest coast). The longest core obtained was 1.8 m.

PRELIMINARY SCIENTIFIC RESULTS

Phase 8 (Figures 2-6):

Port au Port Bay, and St. George's Bay to the south, fall within the Humber Zone (ancient Iapetus margin) of the Newfoundland Appalachians (Williams, 1975, 1979, 1985; Cawood and Williams, 1988). Various bedrock types outcrop at a number of locations in Port au Port Bay (Shearer, 1970) and the overall morphology reflects strong bedrock control. Prior to this cruise, no sidescan or shallow seismic information was available from Port au Port Bay and the most recent bathymetric data were from British Admiralty surveys in the 1890s (chart 4659). However, considerable work had been done on surficial sediments (Shearer, 1970; Ruest, 1976; Hill and Ruest, 1980), as well as on the Quaternary stratigraphy and geomorphology of the surrounding land area (Flint, 1940; MacClintock and Twenhofel, 1940; Twenhofel and MacClintock, 1940; Brookes, 1969, 1970, 1974, 1977, 1987; Brookes et al., 1985; Grant, 1987).

Port au Port Bay contains a number of elongated basins, aligned roughly parallel to the mainland coast. Basins on the east side of the bay (informally named East Basin and Fox Basin, after Shearer, 1970) contain thick sequences of acoustically-stratified fine-grained sediments, primarily a stratified draped facies interpreted as glaciomarine, overlying a variable thickness of material interpreted as till and ice-contact or proximal stratified drift. Extensive gas in the deeper parts of the basins appears to be associated with Holocene mud. The shallow basin in West Bay contains only a thin surficial sediment accumulation over bedrock. Submerged deltaic terraces off Fox Island River provide evidence for a minimum postglacial relative water level at about -25 ± 2 m, 9 to 13 m lower than previously reported in the literature (Brookes et al., 1985), and roughly coincident with the basin sill depth, suggesting the possibility of a temporary lacustrine phase in East Basin.

Because Fox Island River drains part of the Lewis Hills, which include ophiolites of the Bay of Islands igneous complex (Williams, 1975), this river has been proposed as a potentially important source of chromite and other placer minerals (Emory-Moore et al., 1988). Although no major marine placer occurrences were recognized during the sampling program, the newly-mapped extent of early paraglacial deltaic sedimentation at the mouth of Fox Island River has important implications for placer potential in the area.

One objective of the phase 8 magnetometer survey was to locate, if possible, the southern extension of the Odd-twins magnetic anomaly (Ruffman and Woodside, 1970). Although the magnetic data showed considerable variability and may be helpful in delineating geological boundaries within the bay, cursory monitoring of the magnetometer output during the cruise revealed no evidence of the Odd-twins anomaly. An attempt to run a traverse seaward from Long Point was abandoned due to heavy sea conditions.

Phase 9 (Figures 7-9):

St. George's Bay occupies a broad depression forming the seaward extension of the St. George's Bay lowland, reflecting the distribution of less resistant Carboniferous sedimentary rocks of the Codroy and Barachois groups (Riley, 1962; Williams, 1985). The St. George's Bay region has attracted considerable interest from Quaternary scientists over the years (e.g. Daly, 1921; Coleman, 1926; Flint, 1940; MacClintock and Twenhofel, 1940; Twenhofel and MacClintock, 1940; Brookes, 1969, 1970, 1974, 1977, 1987; Grant, 1987), making it one of the most thoroughly studied areas in the country. Despite this level of attention, the limits of Wisconsinan glaciation in the region remain poorly defined, in part because of the near-absence of sea-floor information from areas where ice extended offshore (Shearer, 1973). Carroll (1963) published a study of surficial sediment samples from St. George's Bay, but unfortunately did not report the sample locations. An extensive study of surficial sediments in the Gulf of St. Lawrence by Loring and Nota (1973) included no samples from either Port au Port Bay or St. George's Bay.

St. George's Bay contains two deep, partially buried, valleys, containing 170 m or more of acoustically-stratified fine-grained sediment. These extend headward beneath the barrier beach-ridge complex at Stephenville and into the head of the bay at the mouth of St. George's River. A broad sill further seaward is underlain by a complex body of irregularly-stratified material. This may include some ice-contact or ice-proximal outwash, but appears for the most part to be material reworked during lower Holocene relative sea levels to form beach and sill-spillover deposits. The latter occur as clinoform wedges that have prograded into deeper water on the landward side of the sill. The deposits on the sill overlie and pass seaward into a thick sequence of acoustically unstratified material (in four or more units separated by coherent continuous acoustic reflectors) on the seaward flank of the sill. Broad areas of the sea floor on the sill, in depths of roughly 6 to 30 m, display unusually extensive development of large-scale gravel ripples with wavelengths up to 3 m or more.

The large Holocene Flat Island barrier (Shaw and Forbes, 1987) appears to have been initiated as a regressive feature prior to a relative sea level minimum at about -26 to -28 m (indicated by a submerged delta topset/foreset sequence off St. George's River and another underlying the barrier off Flat Bay Brook). The present-day barrier developed through 12 km of spit extension and progradation during the Holocene transgression, forming a thick clinoform sequence of sands with a thin gravel cap. The development of this feature under rising sea level was made possible by its location at the down-drift end of a 55-km longshore transport path, much of which is bordered by cliffs formed in unconsolidated late-Quaternary sediments (MacClintock and Twenhofel, 1940).

Phase 11 (Figures 10-13):

In contrast to the Port au Port and St. George's Bay study areas, the south coast region investigated during phase 11 has received relatively little attention. Surficial sediments have been mapped onshore in the western part of the study area by Sparkes (1987) and D.R. Grant (personal communication, 1989). Flint (1940) extended his search for raised postglacial shore features along the south coast as far east as La Hune Bay, finding none. Fader et al. (1982) mapped the offshore surficial geology seaward roughly of the 100-m isobath.

The bedrock geology of the western part of the area, including La Poile, Cinq Cerf, and Couteau Bays, has been mapped by Cooper (1954) and Chorlton (1978, 1980). King and MacLean (1976) mapped the bedrock offshore. The region lies within the Gander Zone (eastern crystalline belt) of the Newfoundland Appalachians (Williams, 1979) and rock units along the coast include the Ordovician metavolcanic and metasedimentary Bay du Nord Group and La Poile Group, the latter hosting the Hope Brook gold deposit near Cinq Cerf and Couteau Bays (Loree, 1987). The west side of La Poile Bay is underlain by granitic rocks of the Silurian La Poile Batholith and much of the coast from Couteau Bay east is developed in other Silurian and Devonian granitic intrusive rocks.

A dominant feature of the onshore coastal terrain and of the inner shelf between La Poile and Burgeo is the marked absence of significant surficial sediment cover. Onshore occurrences in bedrock near the coast of striations, longitudinal ice-flow features (ramped and crag-and-tail hills) and erosional features attributable to subglacial meltwater scour (cf. Shaw and Sharpe, 1987, fig. 7) indicate that southward-moving Newfoundland ice extended out onto the inner shelf at some time (Sparkes, 1987; Shaw and Forbes, 1989). The coast is cut by north-south trending valleys that show varying degrees of glacial overdeepening. Cases investigated during the present cruise ranged from the shallow open embayment of Barasway Bay (near Burgeo) to the deep fjord trough of La Poile Bay.

The floor of Barasway Bay is characterized by extensive bedrock outcrop and a very limited sand and gravel cover, despite the presence onshore of one of the largest sand beaches on the south coast (Big Barasway). Connoire Bay contains a thicker sediment fill, the dominant feature being a seaward-dipping sequence, 40 m or more thick, of sand and gravel underlying a submerged surface interpreted as an outwash sandur graded to a base level at approximately 40 m present water depth near the mouth of the bay. Both Couteau and Cinq Cerf Bays are shallow, with limited sediment fill, although some sand is present off Cinq Cerf Brook (which drains the area of the Hope Brook gold deposit). In contrast, La Poile Bay extends to a depth in excess of 280 m immediately headward of the sill and contains a thick stratified sequence up to 160 m or more thick. Well-defined submerged deltaic terraces graded to approximately 22 m water depth occur on the northwest margin off North Bay and in Northeast Arm. The submerged outwash terraces in La Poile and Connoire Bays appear to be similar to features shown on the hydrographic charts in other bays along the south coast, including White Bear and La Hune Bays, where the present depths of the terrace lips range from 9 to 36 m (Flint, 1940).

SUMMARY OF OPERATIONS

August 5 (day 218)

Navicula alongside at BIO, mobilizing scientific equipment. Forbes and Shaw fly to Stephenville (Air Atlantic 434).

August 6 (day 219)

Navicula departs Halifax Harbour for Newfoundland. Beaver and Locke depart by road for Cape Breton Island. Forbes and Shaw to Burgeo by road for coastal surveys (Shaw and Forbes, 1989).

August 7 (day 220)

Beaver and Locke cross to Newfoundland, arriving Stephenville in evening. Forbes and Shaw examine coastal sections west of Stephenville, survey barriers at Port au Port isthmus (south side) and Two Guts Pond, and sample thick Holocene peat section on south shore of Two Guts Pond. Navicula arrives at Piccadilly Bay (Port au Port Bay) late in the night.

August 8 (day 221)

Beaver and Locke confirm arrival of Navicula in Port au Port Bay. Forbes and Shaw survey coastal sites at Boswarlos and Stephenville (Port Harmon).

August 9 (day 222)

Complete mobilization of scientific gear aboard Navicula at Piccadilly Bay. Cast off at 1435 UT (1305 local). Run lines in West Bay and across East Bay (Port au Port Bay), 1634-2039 UT.

August 10 (day 223)

Cast off from Piccadilly Bay at 1000 UT. Run lines in East Bay, off Fox Island River, and back up axis of West Bay, 1056-2114 UT.

August 11 (day 224)

Cast off at 1030 UT. Run lines and collect samples 8-01 to 8-21 (grabs and cores) in West Basin, off Fox Island River, and in East Bay, 1030-2213 UT. Return alongside at Piccadilly Bay ca. 2300 UT.

August 12 (day 225)

Cast off at 1005 UT. Run lines and collect samples 8-22 to 8-28 (grabs and cores) in central and northern Port au Port Bay, 1100-2012 UT, returning alongside at Piccadilly Bay ca. 2200 UT.

August 13 (day 226)

Navicula moves from Piccadilly Bay to Port Harmon (Stephenville). Shaw and Forbes by road to Flat Island to carry out beach surveys.

August 14 (day 227)

Navicula operating from Port Harmon. Run lines in St. George's Bay, 1028-2151 UT.

August 15 (day 228)

Navicula taking on fuel at Port Harmon. Scientific staff working up data at hotel.

August 16 (day 229)

Run lines in St. George's Bay, 1009-2112 UT.

August 17 (day 230)

Run lines, 0953-1226 UT, and collect samples 9-01 to 9-22 (grabs and cores), 1249-2032 UT, St. George's Bay.

August 18 (day 231)

Run lines in St. George's Bay, 1007-2158 UT.

August 19 (day 232)

Navicula moves from Port Harmon to Port-aux-Basques. Scientific staff by road from Stephenville to Port-aux-Basques.

August 20 (day 233)

Navicula with scientific staff aboard moves from Port-aux-Basques to Grand Bruit.

August 21 (day 234)

Cast off from Grand Bruit ca. 0945 UT. Run lines, 1020-1952 UT, on inner shelf, in Couteau Bay, across inner shelf to 150 m water depth, and in Connoire Bay, returning to Grand Bruit ca. 2130 UT.

August 22 (day 235)

Cast off from Grand Bruit ca. 0940 UT. Run lines on inner shelf from Connoire Bay to Barasway Bay and within latter, 1107-

1523 UT. Collect grab samples 11-01 to 11-06 in Barasway Bay, 1550-1603 UT. Collect grab samples 11-07 to 11-12 in Connoire Bay, 1756-1851 UT. Collect grab samples 11-13 to 11-17 in Couteau Bay, 1956-2048 UT, returning to Grand Bruit ca. 2130 UT.

August 23 (day 236)

Cast off from Grand Bruit ca. 0950 UT. Run lines and collect grab samples 11-18 to 11-20 in Cinq Cerf Bay, 1028-1243 UT. Move to position off La Poile Bay and run line up axis of bay, followed by short lines near head of bay, 1427-2027 UT. Collect samples 11-21 to 11-27 (grabs and cores) near head of La Poile Bay, 1847-2027 UT. Set course for Port-aux-Basques, arriving ca. 2400 UT.

August 24 (day 237)

Navicula crosses Cabot Strait to Sydney overnight. Scientific staff by ferry to North Sydney and road to Sydney, arriving ca. 1300 local (ADT). Gorveatt arrives with van from BIO. Demobilize scientific gear and load vehicles. Scientific staff by road to Dartmouth, arriving ca. 2100 local.

TECHNICAL SUMMARY

Navigation

Navigation was by radar (10-minute fixes) and Loran-C (raw TDs logged every minute on a Corona personal computer in the lab, and every 10 minutes by the navigator on the bridge). The data technician acted as navigator, plotting the track every 10 minutes, an arrangement that helped considerably given the small size of the crew. Some difficulties were encountered in navigation, especially in Port au Port Bay and the Couteau Bay area, where the most recent charts (4659 and 4638) date from the 1880s-1890s and show no latitudes or longitudes. On other parts of the south coast, the only chart (4634) was at a scale of 1:75000, based on 1861-1889 soundings, and showed little detail in the treacherous inshore waters covered by this survey. Under these conditions, the Master's previous local knowledge was invaluable. The lack of adequate corrected Loran-C grids for much of the study area added another complication. Particular problems were encountered in the northern part of St. George's Bay, where the Loran-C signal seemed to be more seriously perturbed (in an area where suitable radar targets were especially scarce), and along the south coast. During most of the cruise, however, good radar navigation provided adequate calibration of the Loran-C positions. The track plots shown in Figures 2, 7, and 10 are based on Loran-C data without radar adjustment and therefore show some shore crossings.

Bathymetry

Bathymetric data were obtained using a 30-kHz Elac echosounder (permanently installed on Navicula). The data were recorded in analogue form on the display unit on the bridge (see tables in appendices). Depths were recorded manually every 10 minutes in the navigation log.

Sidescan sonar

The Klein 100-kHz sidescan sonar system performed well throughout the cruise, except in the deep water of La Poile Bay, where the fish could not be towed low enough to insonify the bottom. Sidescan data were recorded on a Klein wet-paper recorder and recorded on magnetic tape (see tables in appendices). The sidescan system was operated at a standard 100-m range (200-m swath) throughout the cruise. Scale lines on the records are nominally 15 m apart.

The sidescan fish was attached to a cable running through blocks on the starboard quarter to a winch mounted amidship immediately aft of the stack. Some difficulty was encountered in operation of the sidescan winch when rapid depth changes made it necessary to pull the fish up rapidly. In the cramped lab quarters, it was difficult to see the cable and almost impossible to watch both the cable and the sidescan record at the same time. The situation would be improved if the sidescan recorder could be placed directly under the window. A yellow mark painted on the cable made it easier to see when the fish was close to the surface.

Shallow seismic reflection systems

Shallow seismic data were obtained using (1) a Datasonics Bubble Pulser system, (2) a multitip sparker with ORE Geopulse 5210A receiver and NSRFC model LT06 streamer, and (3) a Huntec Sea-Lion sound source with the Geopulse receiver and NSRFC streamer (see tables in appendices).

The Datasonics system uses a 20-J coil mounted in a housing on the underside of a surfboard. The board was configured to tow just below the surface, an arrangement that reduced surface wave noise, and was simply deployed and recovered by hand. The system used a Datasonics model BPS-530 power supply and model BPR-510 receiver, with records produced on an EPC model 1600s recorder with a 190-ms sweep. Used throughout the cruise, this system was very reliable and produced excellent records of all major reflectors down to bedrock under most circumstances. The system produced a wide bubble pulse, giving a resolution of approximately 10 m.

The Sea-Lion is a Huntec boomer mounted in a housing designed to be towed at a depth of 5 m or so below the surface. This system had not been used prior to 1988 and had demonstrated somewhat erratic towing behaviour in earlier phases of the _Navicula_ program. The Sea-Lion and NSRFC eel were towed in tandem along the port side from a boom on the foredeck. This was the arrangement that had resulted in loss of an eel on a starboard turn during the preceding phase. The Sea-Lion was found to develop unpredictable instabilities and as a result we confined ourselves to port turns only (some greater than 270 degrees) when towing with this arrangement. The problem was solved later in the season by towing the Sea-Lion and eel separately, the former from the foreward boom and the latter from a block or boom on the port quarter. Although the Huntec system produced excellent resolution (approximately 2 m), it gave unsatisfactory results in some of the coarser sediments encountered. This, together with noise levels and the towing difficulties led us to abandon this system in favour of the sparker system early in phase 8.

For the remainder of the cruise, a 280-J 20-tip surface-tow sparker was deployed in place of the Sea-Lion. The two systems could not be used together because there was only one power unit available on the vessel. Although the sparker gave poorer resolution (roughly 2-8 m) than the Sea-Lion, it demonstrated excellent penetration (well over 200 ms in some cases) and produced high-quality profiles, relatively free of noise, showing internal structures in most facies encountered, including coarse-grained deltaic, shoreface, and spillover deposits.

The Sea-Lion and sparker data were displayed on an EPC model 4100 recorder, in most cases using a 250-ms sweep. All shallow seismic and sidescan records were marked with day and time at 2-minute intervals using a TSS 312B record annotator.

Magnetometer

A Barringer SM-123 nuclear-precession magnetometer was towed on all lines. The magnetometer data were recorded in analogue form and at 10-s intervals on diskette using a Corona personal computer (see tables in appendices).

Sampling

Sea-bed samples were collected using a van Veen grab sampler and a 3-m Alpine gravity corer (see tables in appendices). The grab sampling and coring operations went smoothly. The limited penetration obtained with the gravity corer was anticipated but nevertheless disappointing. A vibracorer suitable for operation from _Navicula_ or similar vessels is an essential requirement for inner shelf work of this kind. Lack of suitable cold-storage space for core samples was found to be another shortcoming of the vessel.

General comments

Navicula proved to be a remarkably convenient platform for work of this kind. The informality of work on a small vessel, with a small number of people, offsets some of the disadvantages of limited equipment capability and cramped quarters. During most of the cruise, six separate devices were being towed astern. Few problems were encountered, except when towing the Huntec Sea-Lion. The cramped lab space was uncomfortable but adequate. Occasional overheating of the sidescan recorder was alleviated by installation of a fan on the underside of an overhanging shelf and by opening the adjacent port-hole when conditions allowed. The fine summer weather during most of the cruise made it possible to run much of the time with the lab window open, improving ventilation considerably. Noise levels in the lab, resulting from the need to keep the engine-room door open, remain a serious concern. Finally, although many lines were run extremely close to shore, a vessel of shallower draft would have been advantageous in some places.

ACKNOWLEDGEMENTS

The positive attitude, cooperation, and seamanship of the crew were exemplary and sincerely appreciated by the scientific staff. The long hours and difficult conditions necessitated by the cruise schedule and the small size of the vessel put an unusual strain on the crew and other participants. We thank Darrell Beaver and Don Locke for their excellent technical support and positive attitude throughout the cruise and Mike Gorveatt for logistical support. Darrell Beaver produced the data tables and track plots appended to this report. Edna and George Billard and Marilyn and Bruce Billard of Grand Bruit were good enough to accommodate the scientific staff during operations along the south coast and we thank them most sincerely for their hospitality. Gordon Fader and David Frobel kindly read and commented on a draft of the report.

LIST OF CHARTS

All charts published by the Canadian Hydrographic Service, Department of Fisheries and Oceans, Ottawa.

4634 La Poile Bay to Ramea Islands (reproduction of U.S.N.O.O. chart 2417, August 1946 edition); from British surveys between 1861 and 1889; scale 1:75,000 at latitude 47°35'.

4637 The Burgeo Islands (reproduction of former British Admiralty chart 272); surveyed by Lieut. W.F. Maxwell, R.N., and assistants, 1872; scale 1:24,300.

4638 Wreck Island to Cinq Cerf Bay including Connoire, Muddy Hole and Couteau Bays (reproduction of former British Admiralty chart 1586); surveyed by Staff Cdr. W.F. Maxwell, R.N., and assistants, 1889; scale 1:24,318.

4659 Port au Port (reproduction of former British Admiralty chart 422); surveyed by the British Admiralty, 1893-1895; approximate scale 1:43,000.

4661 Bear Head to Cow Head (reproduction of former British Admiralty chart 2834); surveyed by Staff Cdr. W. Tooker, R.N., and assistants, 1895-1896; Bay of Islands surveyed by Staff Cdr. W.F. Maxwell, R.N., and assistants, 1880-1881; approximate scale 1:152,000.

4885 Port Harmon and approaches; surveyed by the Canadian Hydrographic Service to 1987; scale 1:40,000.

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TABLE A1

GRAB SAMPLES 88-018(E) PHASE 8

SAMPLE NUMBER	SAMPLER TYPE	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (M)	NO OF ATTEMPTS	NO OF SUBSAMPLES	SEISMIC TIME	GEOGRAPHIC LOCATION	NOTES
001	VAN VEEN	2241045	48 39.25N 58 52.44W	14	2	2	2221612	PORT AU PORT BAY	OLIVE GREY SANDY MUD WITH BLACK STAINING, PLANT FRAGMENTS, SHELL FRAGMENTS AND SEVERAL SMALL PEBBLES.
002	VAN VEEN	2241059	48 38.72N 58 53.01W	16	1	3	2221605	PORT AU PORT BAY	OLIVE GREY MUD.
003	VAN VEEN	2241128	48 42.26N 58 51.11W	21	1	3	2221830	PORT AU PORT BAY	BLACK MUD, MODERATELY COMPACT, WITH RED WORMS.
004	VAN VEEN	2241141	48 41.75N 58 49.22W	19	1	3	2221658	PORT AU PORT BAY	BLACK SILTY-SANDY MUD, MODERATELY COMPACT, WITH RED WORM AND SHELL FRAGMENT.
005	VAN VEEN	2241205	48 44.12N 58 48.76W	22	1	3	2221740	PORT AU PORT BAY	OLIVE-GREY TO BLACK SILTY MUD, MODERATELY COMPACT,WITH PEBBLE, PLANT FRAGMENTS AND WORM TUBE.
006	VAN VEEN	2241221	48 43.07N 58 47.61W	14	2	4	2221722	PORT AU PORT BAY	BROWN MEDIUM SAND, WITH SAND-DOLLARS, WORMS AND WORM TUBES.
010	VAN VEEN	2241603	48 42.48N 58 42.48W	43	1	2	2241415	PORT AU PORT BAY	MUDDY GRAVELLY SAND, NUMEROUS BRITTLE STARS, LARGE SHELL FRAGMENTS, ONE PEBBLE WITH ANCHORED FILAMENTOUS SEAWEED.
011	VAN VEEN	2241613	48 42.35N 58 42.35W	18	4	2	2241416	PORT AU PORT BAY	SAND-GRAVEL, WITH SAND-DOLLARS, SCALLOP SHELL.

TABLE A1

GRAB SAMPLES 88-018(E) PHASE 8

SAMPLE NUMBER	SAMPLER TYPE	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (M)	NO OF ATTEMPTS	NO OF SUBSAMPLES	SEISMIC TIME	GEOGRAPHIC LOCATION	NOTES
012	VAN VEEN	2241633	48 42.17N 58 41.41W	8	6	2	2241427	PORT AU PORT BAY	SAND-GRAVEL INCL. COBBLES (WITH ATTACHED SEAWEED) AND SAND-DOLLARS.
013	VAN VEEN	2241658	48 41.04N 58 42.42W	10	3	2	2231452	PORT AU PORT BAY	SAND-GRAVEL, WITH SHELL FRAGMENT, GASTROPOD SHELL ON CRAB, SMALL STARFISH, ENCRUSTING GROWTH ON SOME GRAVEL CLASTS.
014	VAN VEEN	2241728	48 40.91N 58 42.38W	11	3	2	2231442	PORT AU PORT BAY	MUDDY SAND-GRAVEL, ENCRUSTING GROWTH ON SOME CLASTS; NO MUD IN ATTEMPTS 1-2; MUD IN ATTEMPT 3; JAWS OPEN IN ALL CASES.
015	VAN VEEN	2241739	48 40.95N 58 42.78W	31	1	3	2241748	PORT AU PORT BAY	OLIVE-GREY MUD, WITH SCATTERED PEBBLES, WHITE WORMS AND A TWIG.
016	VAN VEEN	2241820	48 38.23N 58 41.03W	6	2	3		PORT AU PORT BAY	WELL-SORTED MEDIUM SAND, WITH SAND-DOLLARS AND SHELL FRAGMENTS.
017	VAN VEEN	2241832	48 38.31N 58 41.36W	20	1	3		PORT AU PORT BAY	DARK OLIVE-GREY MUD, WITH FEW PEBBLES. WORMS.
018	VAN VEEN	2241855	48 36.57N 58 41.28W	8	4	2	2222035	PORT AU PORT BAY	SAND-GRAVEL, WITH ENCRUSTED SHELL FRAGMENTS.
019	VAN VEEN	2241908	48 37.09N 58 41.98W	23	1	2	2222027	PORT AU PORT BAY	DARK OLIVE-GREY MUD, WITH SCATTERED PEBBLES, WORMS.

TABLE A1

GRAB SAMPLES 88-018(E) PHASE 8

SAMPLE NUMBER	SAMPLER TYPE	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (M)	NO OF ATTEMPTS	NO OF SUBSAMPLES	SEISMIC TIME	GEOGRAPHIC LOCATION	NOTES
022	VAN VEEN	2251810	48 47.51N 58 43.98W	16	1	2	2251722	PORT AU PORT BAY	PEBBLY MEDIUM SAND WITH ABUNDANT SHELL FRAGMENTS.
023	VAN VEEN	2251820	48 47.55N 58 44.01W	16	8	3	2251722	PORT AU PORT BAY	SANDY PEBBLE-GRAVEL; MOST ATTEMPTS WITH ONLY FEW CLASTS, JAWS OPEN.
024	VAN VEEN	2251853	48 46.32N 58 45.71W	10	3	3	2251202	PORT AU PORT BAY	WELL-SORTED, FINE-MEDIUM SAND, WITH SCATTERED PEBBLES, ABUNDANT SAND-DOLLARS (20 IN FIRST ATTEMPT).
025	VAN VEEN	2251916	48 46.64N 58 42.27W	14	5	3	2251705	PORT AU PORT BAY	ATTEMPT 1: SAND-GRAVEL. ATTEMPT 5: WELL-SORTED, FINE-MEDIUM SAND, WITH PEBBLE. MISC. PEBBLES (WITH ATTACHED SEAWEED, INCL. SANDSTONE PEBBLE 99X24X30 MM) NOT RETAINED.
026	VAN VEEN	2251937	48 46.44N 58 39.32W	28	3	3	2251558	PORT AU PORT BAY	ATTEMPTS 1-2: SAND-GRAVEL. WITH ENCRUSTING GROWTH ON PEBBLES. ATTEMPT 3: SILTY FINE SAND WITH SAND-DOLLARS.
027	VAN VEEN	2251957	48 48.25N 58 38.27W	38	1	2	2251532	PORT AU PORT BAY	BROWN-GREY SANDY SILT, WITH LARGE WORM CASTS.

TABLE A2

CORE SAMPLES 88-018(E) PHASE B

SAMPLE NUMBER	SAMPLER TYPE	JULIAN DAY/TIME	LATITUDE	LONGITUDE	DEPTH (M)	CORER LENGTH (CM)	APP. PENN (CM)	CORE LENGTH (CM)	NO OF SECT	SEISMIC TIME	GEOGRAPHIC LOCATION	NOTES
007	GRAVITY	2241501	48 42.34N	58 42.27W	17	305	000	000	0	2241418	PORT AU PORT BAY	CUTTER DENTED. BARREL EMPTY.
008	GRAVITY	2241521	48 42.59N	58 42.78W	41	305	236	161	1	2241412	PORT AU PORT BAY	MUDDY COARSE SAND AND PEBBLES OVER GREY MUD. CUTTER-CATCHER SAMPLE IN BAG.
009	GRAVITY	2241548	48 42.38N	58 42.55W	33	305	010	000	0	2241416	PORT AU PORT BAY	COARSE SAND AND PEBBLES WITH SOME MUD AND ORGANICS. SAMPLE RETAINED IN BAG.
020	GRAVITY	2241917	48 37.42N	58 42.53W	34	305	305	180	1	2222020	PORT AU PORT BAY	OLIVE-GREY MUD. NO CUTTER OR CATCHER SAMPLE. SANDY SILTY MUD WITH SHELL FRAGMENTS ON CORE HEAD.
021	GRAVITY	2241943	48 37.01N	58 41.90W	22	305	165	106	2	2222027	PORT AU PORT BAY	MUDDY SAND OVER MUD OVER SAND. SECTION A-B IS (CATCHER PLUS BASE OF CORE). 17 CM. SECTION B-C IS 89 CM.
028	GRAVITY	2252012	48 48.19N	58 38.36W	37	305	165	086	1	2251532	PORT AU PORT BAY	GREY SANDY SILT.

TABLE A3

SIDESCAN RECORDS 88-018(E) PHASE 8

ROLL NUMBER	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	RECORDER	SIDESCAN SYSTEM
001	2221634	2222039	1-4	PORT AU PORT BAY	KLEIN 421	100-KHZ KLEIN
002	2231056	2231406	5-8	PORT AU PORT BAY	KLEIN 421	100-KHZ KLEIN
003	2231407	2231829	8-18	PORT AU PORT BAY	KLEIN 421	100-KHZ KLEIN
004	2231914	2232114	19-20	PORT AU PORT BAY	KLEIN 421	100-KHZ KLEIN
005	2241248	2242213	21-26	PORT AU PORT BAY	KLEIN 421	100-KHZ KLEIN
006	2251101	2251353	27-28	PORT AU PORT BAY	KLEIN 421	100-KHZ KLEIN
007	2251354	2251743	29-32	PORT AU PORT BAY	KLEIN 421	100-KHZ KLEIN

TABLE A4

SIDESCAN TAPES 88-018(E) PHASE 8

TAPE NUMBER	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	CHANNEL INFO	SIDESCAN SYSTEM
001	2221524	2221833	1-3	PORT AU PORT BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
002	2221835	2231212	3-6	PORT AU PORT BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
003	2231215	2231523	6-11	PORT AU PORT BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
004	2231525	2231834	11-18	PORT AU PORT BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
005	2231915	2241405	18-23	PORT AU PORT BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
006	2241409	2251155	24-27	PORT AU PORT BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
007	2251214	2251523	27-30	PORT AU PORT BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
008	2251526	2251743	30-32	PORT AU PORT BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN

TABLE A5

SEISMIC RECORDS 88-018(E) PHASE 8

ROLL NUMBER	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	GEOGRAPHIC LOCATION	RECORDER	SYSTEM / SOUND SOURCE
001	2221643	2222039	EXTERNAL EEL	1-4	PORT AU PORT BAY	EPC 1600	BUBBLE-PULSER
002	2231109	2231844	EXTERNAL EEL	5-18	PORT AU PORT BAY	EPC 1600	BUBBLE-PULSER
003	2231846	2232113	EXTERNAL EEL	18-20	PORT AU PORT BAY	EPC 1600	BUBBLE-PULSER
004	2241250	2242213	EXTERNAL EEL	21-26	PORT AU PORT BAY	EPC 1600	BUBBLE-PULSER
005	2251100	2251743	EXTERNAL EEL	27-32	PORT AU PORT BAY	EPC 1600	BUBBLE-PULSER
001	2221556	2222039	NSRFC EEL	1-4	PORT AU PORT BAY	EPC 4100	GEOPULSE/SEA-LION
002	2231111	2231641	NSRFC EEL	5-14	PORT AU PORT BAY	EPC 4100	GEOPULSE/SEA-LION
001	2231656	2231851	NSRFC EEL	15-18	PORT AU PORT BAY	EPC 4100	GEOPULSE/SPARKER
002	2231853	2232113	NSRFC EEL	18-20	PORT AU PORT BAY	EPC 4100	GEOPULSE/SPARKER
003	2241250	2242213	NSRFC EEL	21-26	PORT AU PORT BAY	EPC 4100	GEOPULSE/SPARKER
004	2251101	2251728	NSRFC EEL	27-32	PORT AU PORT BAY	EPC 4100	GEOPULSE/SPARKER
005	2251732	2251743	NSRFC EEL	32	PORT AU PORT BAY	EPC 4100	GEOPULSE/SPARKER

TABLE A6

BATHYMETRIC RECORDS 88-018(E) PHASE 8

ROLL NUMBER	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	FREQUENCY	RECORDER
001	2221440	2231610	1-13	PORT AU PORT BAY	30 KHZ	ELAC
002	2231611	2242105	13-26	PORT AU PORT BAY	30 KHZ	ELAC
003	2242106	2252012	26-32	PORT AU PORT BAY	30 KHZ	ELAC

TABLE A7

MAGNETOMETER RECORDS 88-018(E) PHASE 8

ROLL NUMBER	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	INSTRUMENT	RECORDER
001	2221600	2251743	1-32	PORT AU PORT BAY	BARRINGER SM-123	HP7155

Appendix B

Sample and Data Tables

Phase 9

St. George's Bay

TABLE B1

GRAB SAMPLES 88-018(E) PHASE 9

SAMPLE NUMBER	SAMPLER TYPE	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (M)	NO OF ATTEMPTS	NO OF SUBSAMPLES	SEISMIC TIME	GEOGRAPHIC LOCATION	NOTES
001	VAN VEEN	2301249	48 31.49N 58 44.26W	22	1	3	2301221	ST.GEORGE'S BAY	BROWN MEDIUM SAND, WITH SAND-DOLLAR AND SHELL FRAGMENT.
002	VAN VEEN	2301307	48 31.51N 58 42.57W	16	6	1	2301207	ST.GEORGE'S BAY	PEBBLES, MISC. LITHOLOGIES (INCL. BLUFF HD. METAVOLCANICS ?), MANY WITH ENCRUSTING GROWTH.
003	VAN VEEN	2301324	48 31.48N 58 41.77W	24	7	3	2301200	ST.GEORGE'S BAY	ATTEMPT 1: SANDY GRAVEL. SUBSEQUENT ATTEMPTS: MISC. PEBBLES AND COBBLES, ALL POSSIBLY OF NORTHERN PROVENANCE, INCL. METAGABBRO, SERPENTINITE AND LEWIS HILLS LITHOLOGY.
004	VAN VEEN	2301345	48 31.53N 58 39.89W	27	1	3	2301135	ST.GEORGE'S BAY	BROWN MEDIUM SAND, MINOR BLACK STAINING, SHELL FRAGMENTS, ONE SAND-DOLLAR.
005	VAN VEEN	2301356	48 31.41N 58 38.93W	43	1	2	2301126	ST.GEORGE'S BAY	OLIVE-GREY SILTY MUD, WITH SOME BROWN MUD, BLACK WORM TUBES.
006	VAN VEEN	2301408	48 31.36N 58 37.88W	47	1	3	2301126	ST.GEORGE'S BAY	OLIVE-GREY SILTY MUD, WITH WORM TUBES AND WORMS.
009	VAN VEEN	2301632	48 27.75N 58 33.51W	47	1	3	2271041	ST.GEORGE'S BAY	BROWN-BLACK MUD WITH PEBBLES, WORM TUBES, MUD-STAR AND SHELL FRAGMENTS.
010	VAN VEEN	2301644	48 27.16N 58 33.13W	38	1	3	2271051	ST.GEORGE'S BAY	BROWN SILTY FINE SAND, WITH SHELL FRAGMENT, MUD-STAR.

TABLE B1

GRAB SAMPLES 88-018(E) PHASE 9

SAMPLE NUMBER	SAMPLER TYPE	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (M)	NO OF ATTEMPTS	NO OF SUBSAMPLES	SEISMIC TIME	GEOGRAPHIC LOCATION	NOTES
011	VAN VEEN	2301653	48 26.95N 58 33.02W	17	1	3	2271053	ST.GEORGE'S BAY	DARK GREY FINE SAND, WITH SMALL RAZOR-CLAM, SHELL FRAGMENTS.
012	VAN VEEN	2301702	48 26.80N 58 32.93W	8	1	3	2271055	ST.GEORGE'S BAY	BROWN FINE SAND, WITH FEW PEBBLES.
013	VAN VEEN	2301710	48 26.59N 58 32.78W	4	1	3	2271058	ST.GEORGE'S BAY	BROWN MEDIUM SAND, WITH BLACK HEAVY-MINERAL FRACTION.
014	VAN VEEN	2301808	48 23.71N 58 42.08W	25	4	3	2301808	ST.GEORGE'S BAY	SANDY GRAVEL.
015	VAN VEEN	2301824	48 23.98N 58 42.33W	36	4	2	2271527	ST.GEORGE'S BAY	MUDDY GRAVEL.
016	VAN VEEN	2301846	48 24.81N 58 42.97W	24	1	3	2271516	ST.GEORGE'S BAY	BROWN MEDIUM SAND.
017	VAN VEEN	2301908	48 24.26N 58 42.69W	24	1	2	2271521	ST.GEORGE'S BAY	FINE PEBBLE GRAVEL (FROM RIPPLE PATCH).
018	VAN VEEN	2301917	48 23.64N 58 43.21W	26	1	2	2271621	ST.GEORGE'S BAY	COARSE PEBBLE GRAVEL (FROM RIPPLE PATCH).

TABLE B1

GRAB SAMPLES 88-018(E) PHASE 9

SAMPLE NUMBER	SAMPLER TYPE	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (M)	NO OF ATTEMPTS	NO OF SUBSAMPLES	SEISMIC TIME	GEOGRAPHIC LOCATION	NOTES
019	VAN VEEN	2302006	48 25.14N 58 38.28W	56	1	3	2271352	ST.GEORGE'S BAY	BROWN SILTY FINE SAND, WITH BRITTLE-STAR.
020	VAN VEEN	2302017	48 24.83N 58 38.07W	16	1	3	2271356	ST.GEORGE'S BAY	BROWN FINE-MEDIUM SAND, WITH SHELL FRAGMENTS.
021	VAN VEEN	2302026	48 24.51N 58 37.80W	10	1	3	2271401	ST.GEORGE'S BAY	BROWN FINE-MEDIUM SAND, WITH FEW GRANULES, SAND-DOLLARS.
022	VAN VEEN	2302032	48 24.33N 58 37.66W	6	1	3	2271403	ST.GEORGE'S BAY	BROWN MEDIUM SAND.

TABLE B2

CORE SAMPLES 88-018(E) PHASE 9

SAMPLE NUMBER	SAMPLER TYPE	JULIAN DAY/TIME	LATITUDE	LONGITUDE	DEPTH (M)	CORER LENGTH (CM)	APP. PENN (CM)	CORE LENGTH (CM)	NO OF SECT	SEISMIC TIME	GEOGRAPHIC LOCATION	NOTES
007	GRAVITY	2301447	48 31.49N	58 39.00W	42	305	185	20	1	2301135	ST.GEORGE'S BAY	SILTY MUD, WITH MOLLUS PAIR IN VERTICAL POSITION NEAR BASE. SAMPLE RETAINED IN BAG. NO CUTTER OR CATCHER SAMPLE.
008	GRAVITY	2301500	48 31.49N	58 39.00W	42	305	195	152	1	2301135	ST.GEORGE'S BAY	SILTY MUD. CUTTER SAMPLE BAGGED SEPARATELY.

TABLE B3

SIDESCAN RECORDS 88-018(E) PHASE 9

ROLL NUMBER	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	RECORDER	SIDESCAN SYSTEM
001	2271027	2271429	1-6	ST. GEORGE'S BAY	KLEIN 421	100-KHZ KLEIN
002	2271430	2271753	6-12	ST. GEORGE'S BAY	KLEIN 421	100-KHZ KLEIN
003	2271754	2272152	12-17	ST. GEORGE'S BAY	KLEIN 421	100-KHZ KLEIN
004	2291009	2291341	18-22	ST. GEORGE'S BAY	KLEIN 421	100-KHZ KLEIN
005	2291342	2291731	23-29	ST. GEORGE'S BAY	KLEIN 421	100-KHZ KLEIN
006	2291733	2292111	29-35	ST. GEORGE'S BAY	KLEIN 421	100-KHZ KLEIN
007	2301014	2301226	36-38	ST. GEORGE'S BAY	KLEIN 421	100-KHZ KLEIN
008	2311007	2311354	39-41	ST. GEORGE'S BAY	KLEIN 421	100-KHZ KLEIN
009	2311356	2311732	42-44	ST. GEORGE'S BAY	KLEIN 421	100-KHZ KLEIN
010	2311733	2312100	44-50	ST. GEORGE'S BAY	KLEIN 421	100-KHZ KLEIN
011	2312102	2312158	50-51	ST. GEORGE'S BAY	KLEIN 421	100-KHZ KLEIN

TABLE B4

SIDESCAN TAPES 88-018(E) PHASE 9

TAPE NUMBER	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	CHANNEL INFO	SIDESCAN SYSTEM
001	2271030	2271339	1-5	ST. GEORGE'S BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
002	2271343	2271652	5-9	ST. GEORGE'S BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
003	2271654	2272003	9-14	ST. GEORGE'S BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
004	2272005	2291131	14-18	ST. GEORGE'S BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
005	2291134	2291449	19-26	ST. GEORGE'S BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
006	2291451	2291801	26-30	ST. GEORGE'S BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
007	2291803	2292110	30-35	ST. GEORGE'S BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
008	2301015	2311104	36-38	ST. GEORGE'S BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
009	2311107	2311415	38-42	ST. GEORGE'S BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
010	2311418	2311728	42-44	ST. GEORGE'S BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN

TABLE 84

SIDESCAN TAPES 88-018(E) PHASE 9

TAPE NUMBER	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	CHANNEL INFO	SIDESCAN SYSTEM
011	2311731	2312040	44-47	ST. GEORGE'S BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
012	2312043	2312157	47-51	ST. GEORGE'S BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN

TABLE B5

SEISMIC RECORDS 88-018(E) PHASE 9

ROLL NUMBER	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	GEOGRAPHIC LOCATION	RECORDER	SYSTEM / SOUND SOURCE
001	2271028	2272151	EXTERNAL EEL	1-17	ST. GEORGE'S BAY	EPC 1600	BUBBLE-PULSER
002	2291009	2292112	EXTERNAL EEL	18-35	ST. GEORGE'S BAY	EPC 1600	BUBBLE-PULSER
003	2300953	2301226	EXTERNAL EEL	36-38	ST. GEORGE'S BAY	EPC 1600	BUBBLE-PULSER
004	2311008	2312158	EXTERNAL EEL	39-51	ST. GEORGE'S BAY	EPC 1600	BUBBLE-PULSER
001	2271028	2272151	NSRFC EEL	1-17	ST. GEORGE'S BAY	EPC 4100	GEOPULSE/SPARKER
002	2291011	2292112	NSRFC EEL	18-35	ST. GEORGE'S BAY	EPC 4100	GEOPULSE/SPARKER
003	2300953	2301226	NSRFC EEL	36-38	ST. GEORGE'S BAY	EPC 4100	GEOPULSE/SPARKER
004	2311009	2312158	NSRFC EEL	39-51	ST. GEORGE'S BAY	EPC 4100	GEOPULSE/SPARKER

TABLE B6

BATHYMETRIC RECORDS 88-018(E) PHASE 9

ROLL NUMBER	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	FREQUENCY	RECORDER
001	2271030	2291410	1-25	ST. GEORGE'S BAY	30 KHZ	ELAC
002	2291411	2301917	25-38	ST. GEORGE'S BAY	30 KHZ	ELAC
003	2302006	2312157	39-51	ST. GEORGE'S BAY	30 KHZ	ELAC

TABLE B7

MAGNETOMETER RECORDS 88-018(E) PHASE 9

ROLL NUMBER	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	INSTRUMENT	RECORDER
001	2271040	2312158	1-51	ST. GEORGE'S BAY	BARRINGER SM-123	HP7155

Appendix C

Sample and Data Tables

Phase 11

South Coast

TABLE C1

GRAB SAMPLES 88-018(E) PHASE 11

SAMPLE NUMBER	SAMPLER TYPE	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (M)	NO OF ATTEMPTS	NO OF SUBSAMPLES	SEISMIC TIME	GEOGRAPHIC LOCATION	NOTES
001	VAN VEEN	2351550	47 36.04N 57 44.70W	37	3	4	2351509	BARASWAY BAY	COARSE SAND AND GRAVEL (NO GROWTH ON PEBBLES), WITH SAND-DOLLARS.
002	VAN VEEN	2351603	47 35.95N 57 43.72W	33	5	2	2351458	BARASWAY BAY	ATTEMPT 1: SAND AND GRAVEL WITH SHELL HASH. ATTEMPTS 2-5: GRAVEL WITH ENCRUSTING GROWTH, AND SEAWEED.
003	VAN VEEN	2351615	47 35.83N 57 43.75W	34	1	3	2351458	BARASWAY BAY	BROWN FINE-MEDIUM SAND, WITH BLACK HEAVY-MINERAL FRACTION.
004	VAN VEEN	2351623	47 36.04N 57 43.46W	30	1	3	2351455	BARASWAY BAY	BROWN FINE-MEDIUM SAND, WITH BLACK HEAVY-MINERAL FRACTION, SHELL FRAGMENTS AND CLAM.
005	VAN VEEN	2351639	43 35.50N 57 45.11W	55	3	1	2351327	BARASWAY BAY	COARSE SAND AND GRAVEL.
006	VAN VEEN	2351643	43 35.50N 57 45.11W	55	1	3	2351327	BARASWAY BAY	VERY COARSE SAND AND GRANULES, WITH WORM.
007	VAN VEEN	2351756	47 40.95N 57 55.43W	19	1	3	2341704	CONNOIRE BAY	BROWN MEDIUM SAND, WITH HIGH PROPORTION OF SHELL FRAGMENTS.
008	VAN VEEN	2351806	47 40.33N 57 54.97W	24	3	2	2341854	CONNOIRE BAY	ATTEMPT 1: SANDY GRAVEL RIPPLES). ATTEMPT 2: PEBBLE-COBBLE GRAVEL, WITH ENCRUSTING GROWTH.

TABLE C1

GRAB SAMPLES 88-018(E) PHASE 11

SAMPLE NUMBER	SAMPLER TYPE	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (M)	NO OF ATTEMPTS	NO OF SUBSAMPLES	SEISMIC TIME	GEOGRAPHIC LOCATION	NOTES
009	VAN VEEN	2351826	47 38.95N 57 55.93W	53	2	2	2341922	CONNOIRE BAY	SANDY GRAVEL, WITH SMALL URCHINS AND BRITTLE-STAR.
010	VAN VEEN	2351835	47 38.87N 57 55.99W	69	1	2	2341924	CONNOIRE BAY	BROWN SILTY FINE SAND, WITH BRITTLE-STAR.
011	VAN VEEN	2351843	47 38.77N 57 56.12W	80	1	3	2341926	CONNOIRE BAY	BROWN SILTY FINE SAND (HIGHER ORGANIC CONTENT THAN STN 010),WITH WORM TUBES, WORM.
012	VAN VEEN	2351851	47 38.48N 57 56.27W	81	1	3	2341930	CONNOIRE BAY	BROWN-BLACK MUDDY SAND WITH PEBBLES AND HIGH ORGANIC CONTENT.
013	VAN VEEN	2351956	47 41.65N 58 02.41W	16	3	4	2341220	COUTEAU BAY	FINE SAND, WITH SEAWEED.
014	VAN VEEN	2352018	47 40.99N 58 03.33W	21	1	3	2341245	COUTEAU BAY	COARSE SAND, WITH PEBBLES, SHELL FRAGMENTS, WORM, SHRIMP.
015	VAN VEEN	2352031	47 40.40N 58 04.17W	19	4	3	2351309	COUTEAU BAY	PEBBLY MEDIUM-COARSE SAND.
016	VAN VEEN	2352042	47 39.86N 58 04.30W	23	2	0	2341319	COUTEAU BAY	EMPTY (JAWS CLOSED).

TABLE C1

GRAB SAMPLES 88-018(E) PHASE 11

SAMPLE NUMBER	SAMPLER TYPE	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (M)	NO OF ATTEMPTS	NO OF SUBSAMPLES	SEISMIC TIME	GEOGRAPHIC LOCATION	NOTES
017	VAN VEEN	2352048	47 39.93N 58 04.33W	29	3	3	2341318	COUTEAU BAY	GRAVEL.
018	VAN VEEN	2361218	47 40.48N 58 06.91W	21	2	4	2361156	CINQ CERF BAY	BROWN FINE-MEDIUM SAND.
019	VAN VEEN	2361231	47 40.66N 58 06.15W	20	2	3	2361143	CINQ CERF BAY	SAND-GRAVEL, WITH THIN GROWTH ON FEW CLASTS ONLY. ATTEMPT 2: BLACK COLORATION CONCENTRATED AROUND SEAWEED FRAGMENTS.
020	VAN VEEN	2361243	47 41.18N 58 05.91W	14	3	3	2361132	CINQ CERF BAY	SAND-GRAVEL.
021	VAN VEEN	2361847	47 44.92N 58 17.57W	28	4	3	2361649	LA POILE BAY	MUDDY SANDY GRAVEL, LAG GRAVEL VENEER WITH ENCRUSTING GROWTH AND AGARUM CRIBROSUM.
022	VAN VEEN	2361900	47 44.81N 58 17.69W	56	3	2	2361651	LA POILE BAY	COARSE SUBANGULAR PEBBLE GRAVEL, WITH MINOR MUDDY SAND. ENCRUSTING GROWTH ON PEBBLES. ATTEMPT 3: EMPTY.
023	VAN VEEN	2361909	47 44.76N 58 17.77W	58	1	3	2361652	LA POILE BAY	PEBBLY MUDDY FINE SAND.
024	VAN VEEN	2361932	47 44.02N 58 20.16W	24	1	3	2361726	LA POILE BAY	BROWN COARSE SAND WITH FEW ANGULAR PEBBLES.

TABLE C1

GRAB SAMPLES 88-018(E) PHASE 11

SAMPLE NUMBER	SAMPLER TYPE	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (M)	NO OF ATTEMPTS	NO OF SUBSAMPLES	SEISMIC TIME	GEOGRAPHIC LOCATION	NOTES
025	VAN VEEN	2361945	47 43.97N 58 20.07W	65	1	3	2361728	LA POILE BAY	PEBBLY SANDY MUD, WITH WORM TUBES, SHELLS AND MUD-STAR.

TABLE C2

CORE SAMPLES 88-018(E) PHASE 11

SAMPLE NUMBER	SAMPLER TYPE	JULIAN DAY/TIME	LATITUDE	LONGITUDE	DEPTH (M)	CORER LENGTH (CM)	APP. PENN (CM)	CORE LENGTH (CM)	NO OF SECT	SEISMIC TIME	GEOGRAPHIC LOCATION	NOTES
026	GRAVITY	2362008	47 44.80N	58 17.73W	57	305	200	20	1	2361652	LA POILE BAY	NOT SAVED. BADLY DISTURBED AND DUPLICATES GRAB. WASHED OUT ON RECOVERY.
027	GRAVITY	2362027	47 43.51N	58 19.78W	176	305	210	68	1	2361732	LA POILE BAY	NO CUTTER SAMPLE. CATCHER SAMPLE BAGGED.

TABLE C3

SIDESCAN RECORDS 88-018(E) PHASE 11

ROLL NUMBER	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	RECORDER	SIDESCAN SYSTEM
001	2341028	2341416	1-10	COUTEAU BAY	KLEIN 421	100-KHZ KLEIN
002	2341419	2341754	11-17	CONNOIRE BAY	KLEIN 421	100-KHZ KLEIN
003	2341755	2341952	18-22	CONNOIRE BAY	KLEIN 421	100-KHZ KLEIN
004	2351107	2351523	23-27	CONNOIRE BAY TO BARASWAY BAY	KLEIN 421	100-KHZ KLEIN
005	2361038	2361208	28-33	CINQ CERF BAY	KLEIN 421	100-KHZ KLEIN
006	2361427	2361757	34-40	LA POILE BAY	KLEIN 421	100-KHZ KLEIN

TABLE C4

SIDESCAN TAPES 88-018(E) PHASE 11

TAPE NUMBER	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	CHANNEL INFO	SIDESCAN SYSTEM
001	2341027	2341340	1-10	COUTEAU BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
002	2341345	2341652	10-14	CONNOIRE BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
003	2341654	2341951	14-22	CONNOIRE BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
004	2351108	2351418	23-25	CONNIRE BAY TO BARASWAY BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
005	2351421	2361642	25-36	BARASWAY BAY TO LA POILE BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN
006	2351644	2361759	36-40	LA POILE BAY	PORT-FM STBD-FM REF-DR SPEED-DR	100-KHZ KLEIN

TABLE C5

SEISMIC RECORDS 88-018(E) PHASE 11

ROLL NUMBER	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	GEOGRAPHIC LOCATION	RECORDER	SYSTEM / SOUND SOURCE
001	2341020	2341952	EXTERNAL EEL	1-22	COUTEAU BAY TO CONNOIRE BAY	EPC 1600	BUBBLE-PULSER
002	2351108	2351523	EXTERNAL EEL	23-27	CONNOIRE BAY TO BARASWAY BAY	EPC 1600	BUBBLE-PULSER
003	2361035	2361758	EXTERNAL EEL	28-40	CINQ CERF BAY AND LA POILE BAY	EPC 1600	BUBBLE-PULSER
001	2341020	2341952	NSRFC EEL	1-22	COUTEAU BAY TO CONNOIRE BAY	EPC 4100	GEOPULSE/SPARKER
002	2351109	2351523	NSRFC EEL	23-27	CONNOIRE BAY TO BARASWAY BAY	EPC 4100	GEOPULSE/SPARKER
003	2361035	2361738	NSRFC EEL	28-39	CINQ CERF BAY AND LA POILE BAY	EPC 4100	GEOPULSE/SPARKER

TABLE C6

BATHYMETRIC RECORDS 88-018(E) PHASE 11

ROLL NUMBER	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	FREQUENCY	RECORDER
001	2341020	2351615	1-27	COUTEAU BAY TO BARASWAY BAY	30 KHZ	ELAC
002	2361038	2362027	28-43	CINQ CERF BAY AND LA POILE BAY	30 KHZ	ELAC

TABLE C7

MAGNETOMETER RECORDS 88-018(E) PHASE 11

ROLL NUMBER	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	INSTRUMENT	RECORDER
001	2341030	2361750	1-40	COUTEAU BAY TO LA POILE BAY	BARRINGER SM-123	HP7155

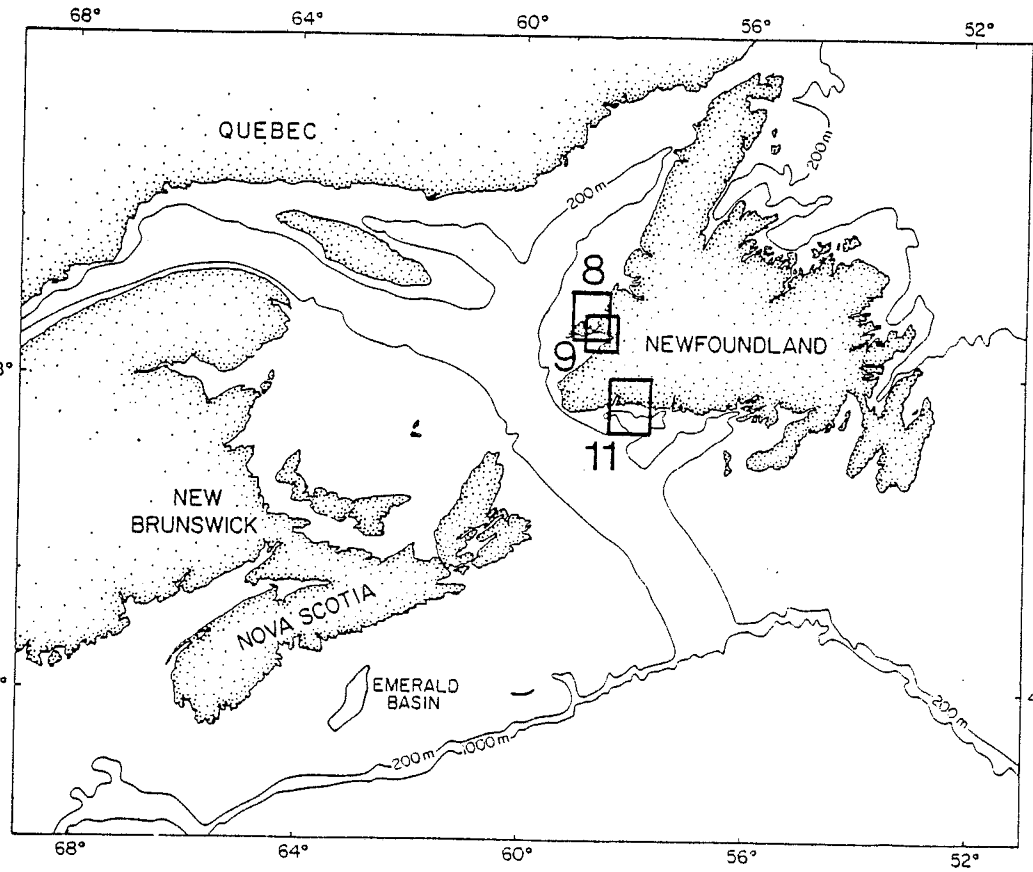

Figure 1. Regional setting showing study areas and associated phase numbers.

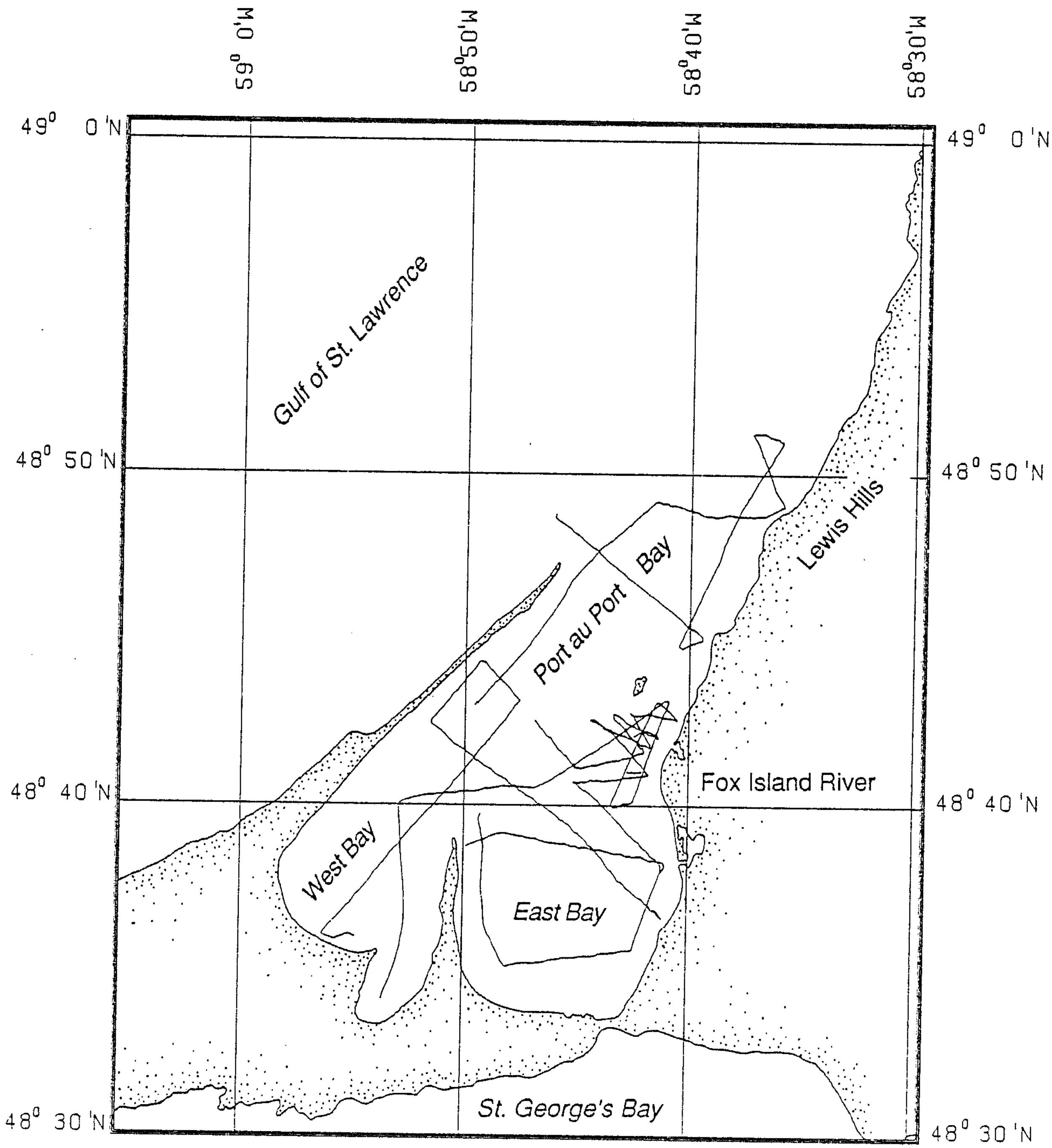

Figure 2. Track plot, phase 8, Port au Port Bay.

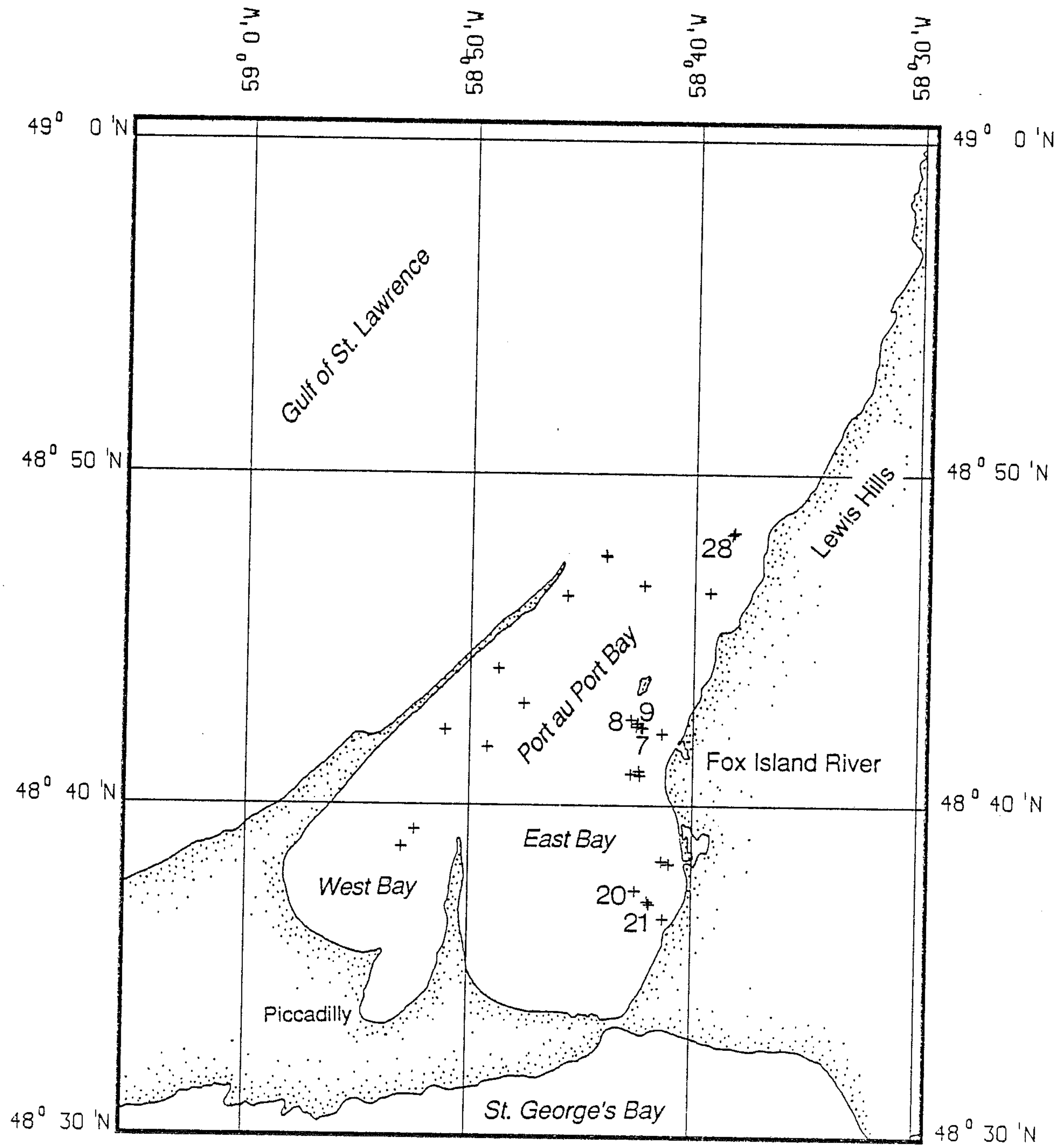

Figure 3. Sample locations, phase 8, Port au Port Bay. Numbers refer to cores.

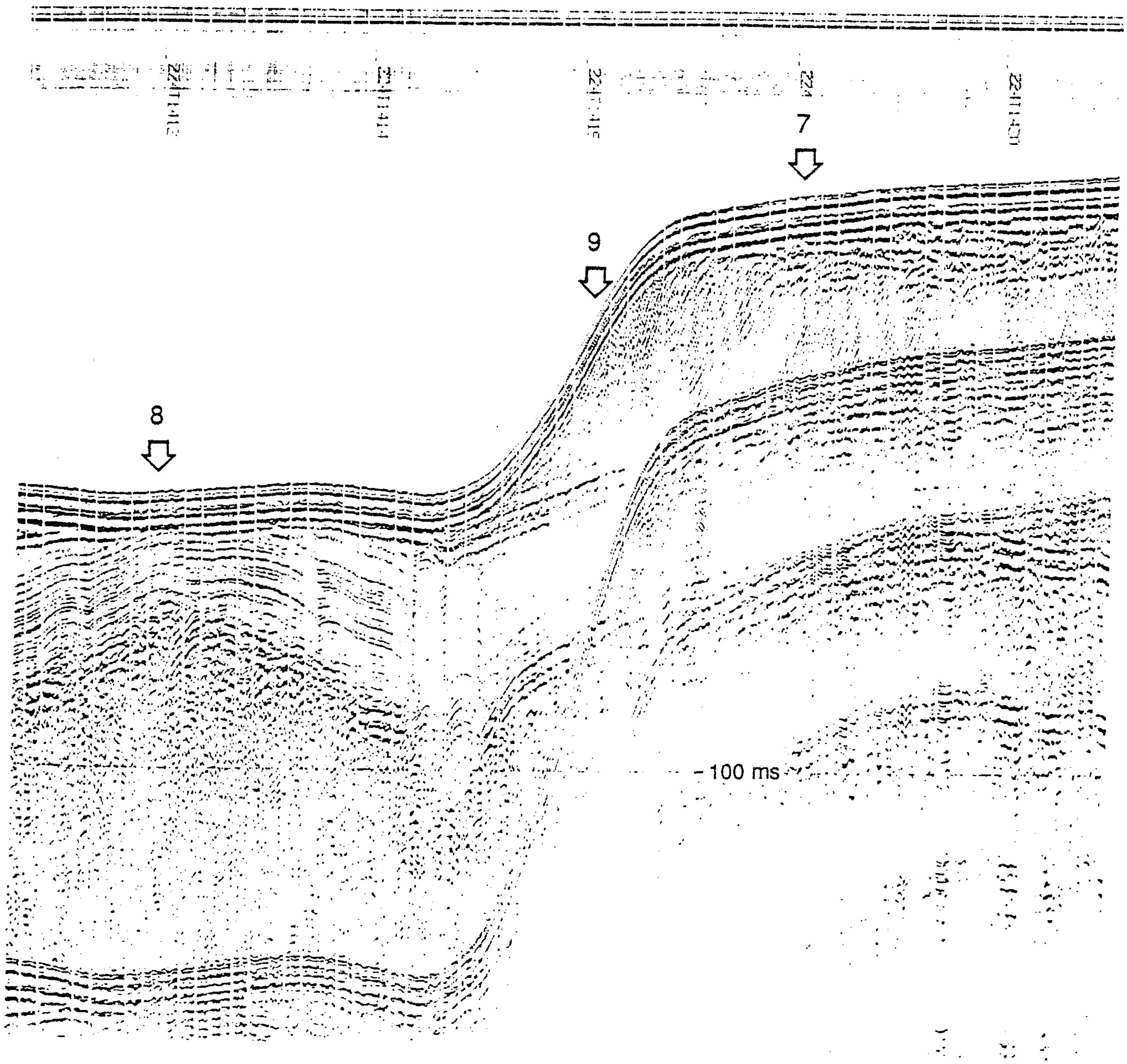

Figure 4. Sparker profile showing approximate sampling locations for cores 8-07, 8-08, and 8-09, off Fox Island River, Port au Port Bay.

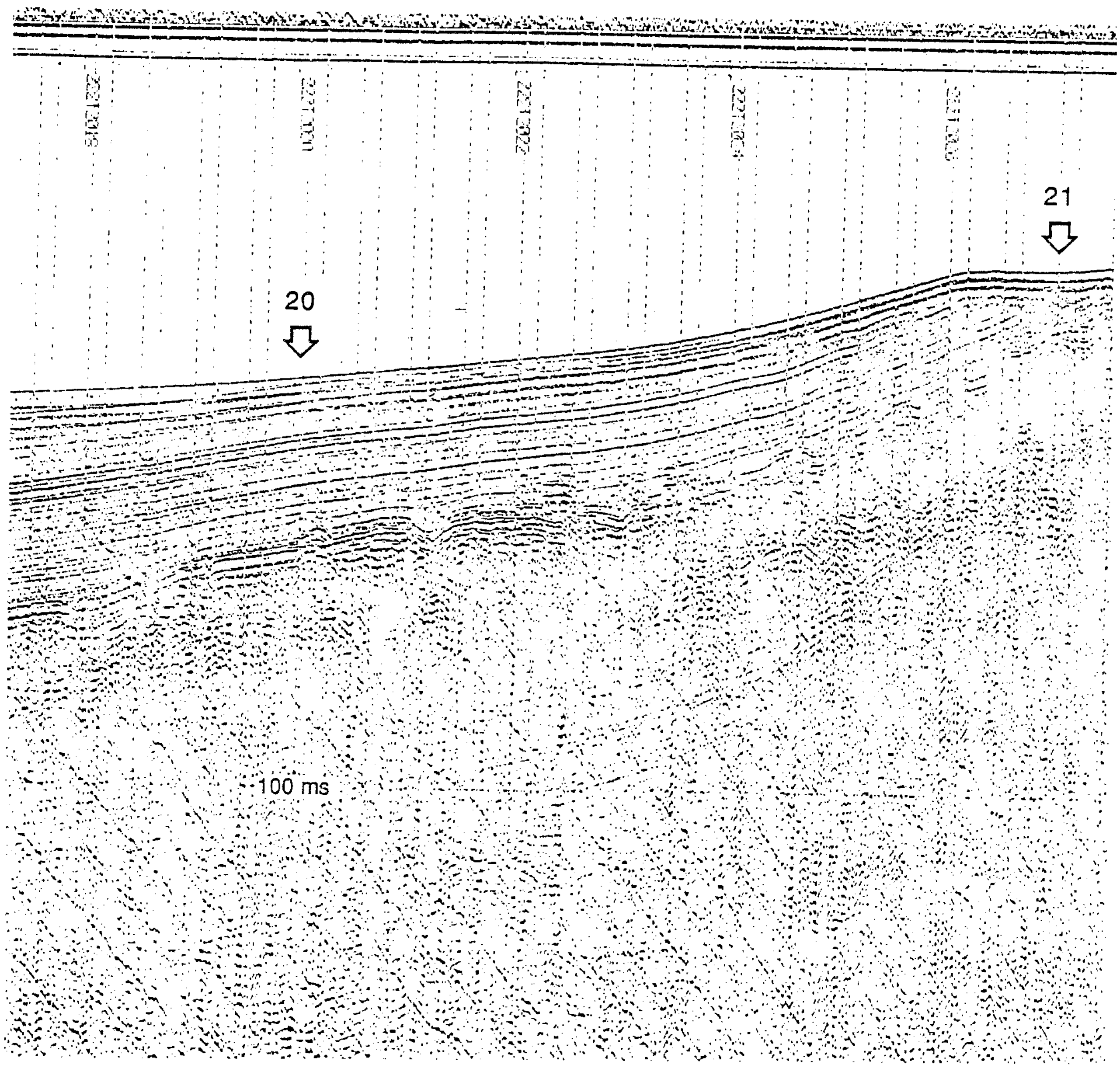

Figure 5. Boomer profile showing approximate sampling locations for cores 8-20 and 8-21 on the eastern flank of East Basin, Port au Port Bay.

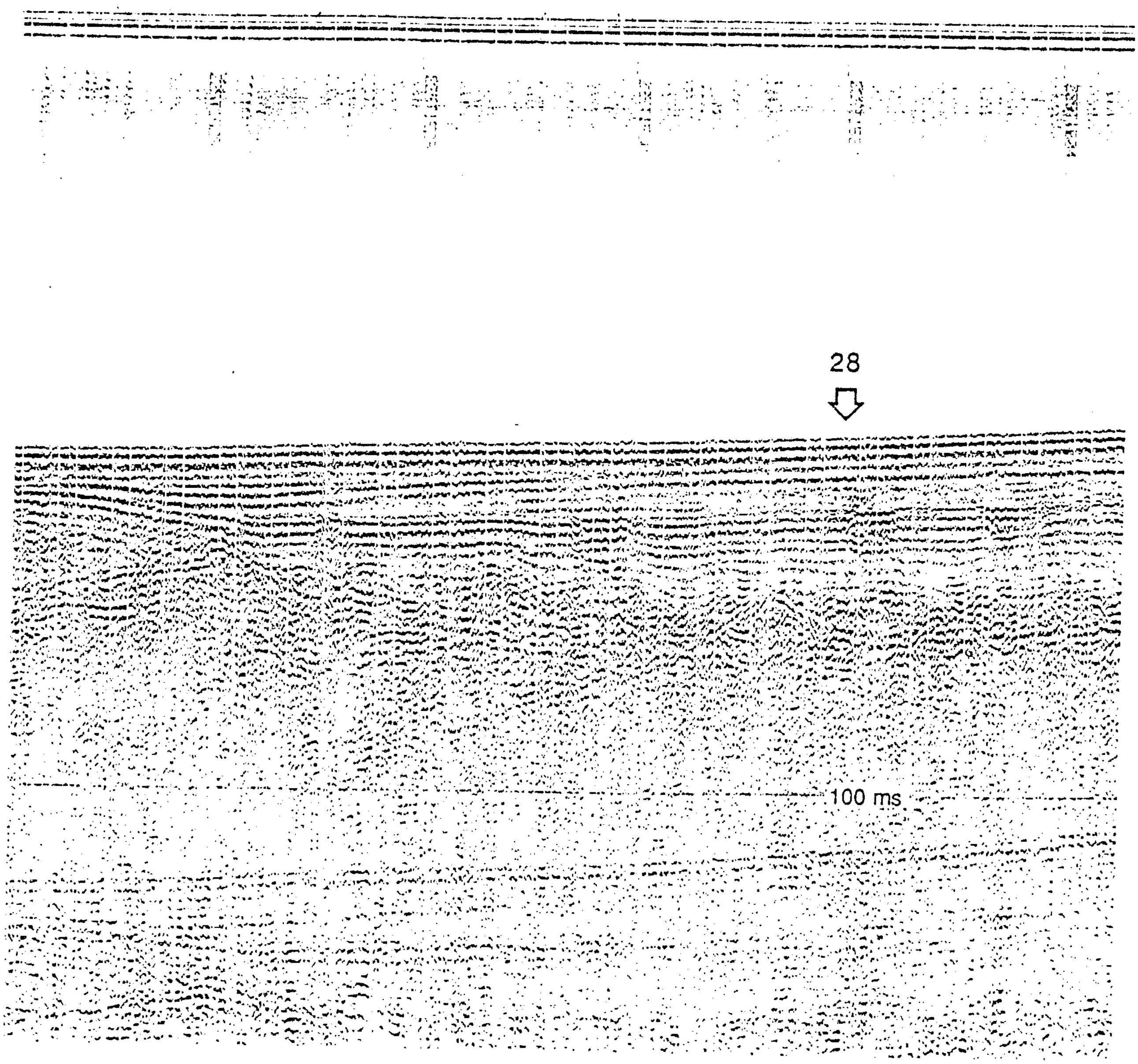

Figure 6. Sparker profile showing approximate sampling location for core 8-28 in Fox Basin, northeast Port au Port Bay.

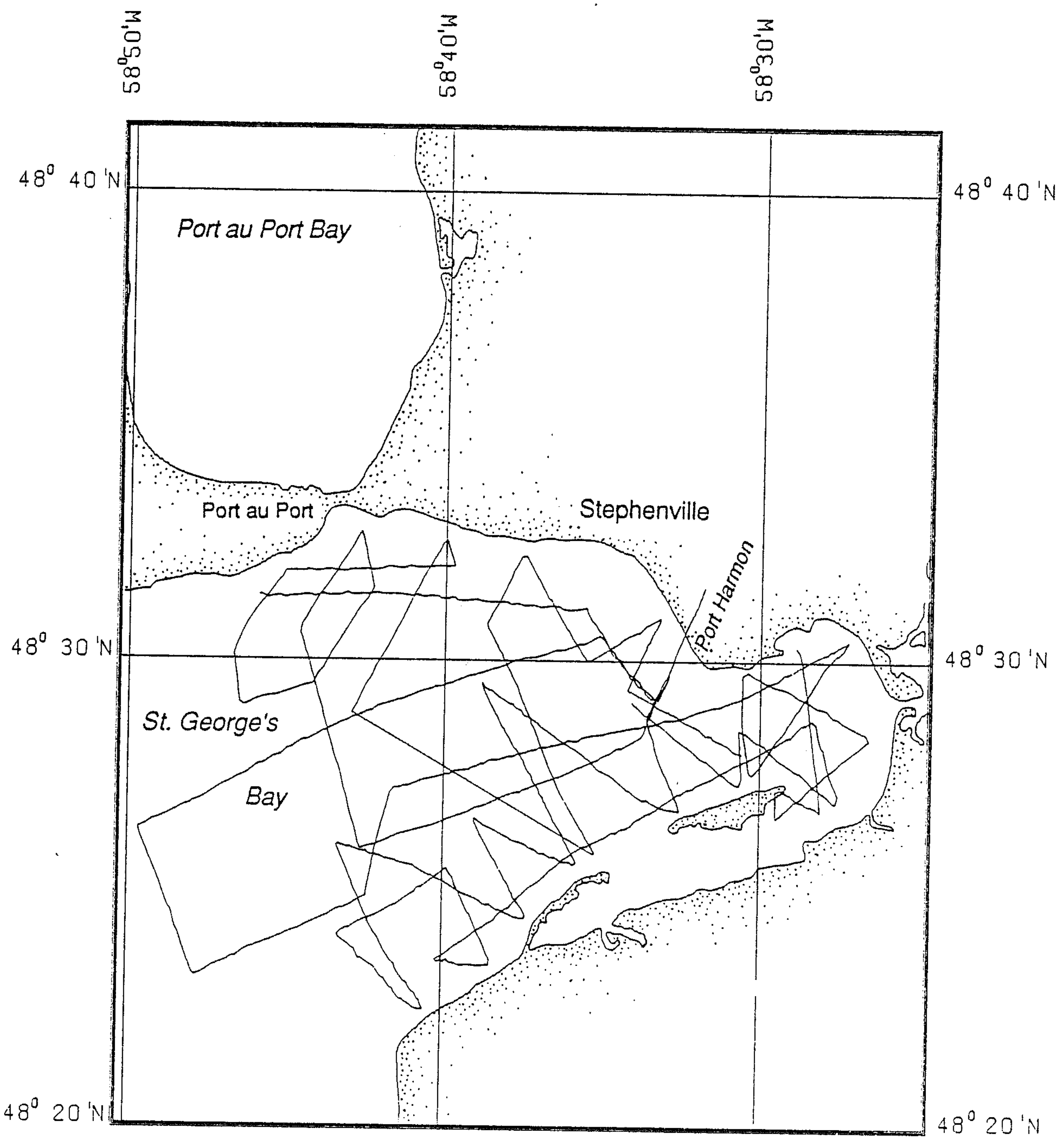

Figure 7. Track plot, phase 9, St. George's Bay.

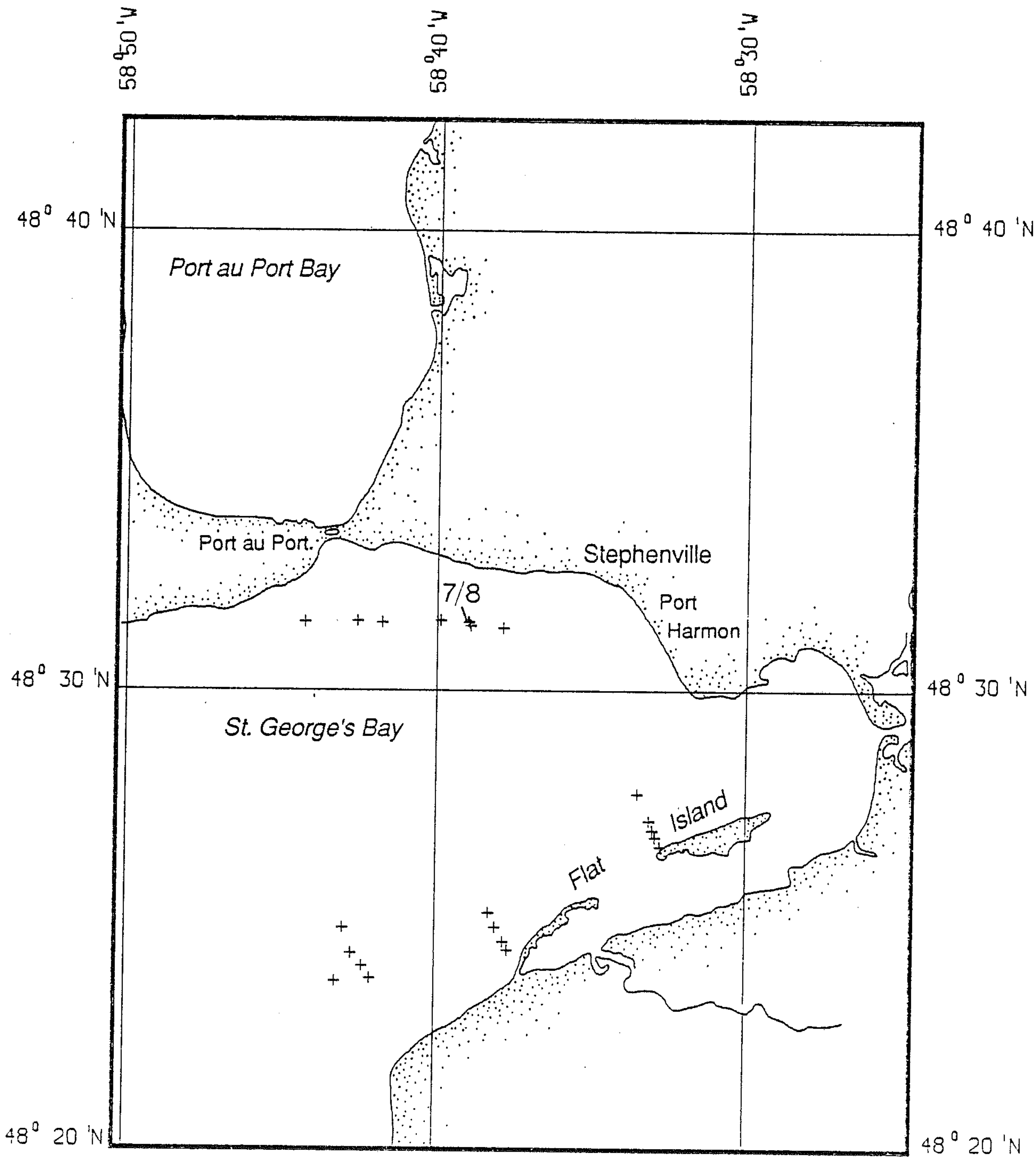

Figure 8. Sampling locations, phase 9, St. George's Bay. Numbers refer to cores.

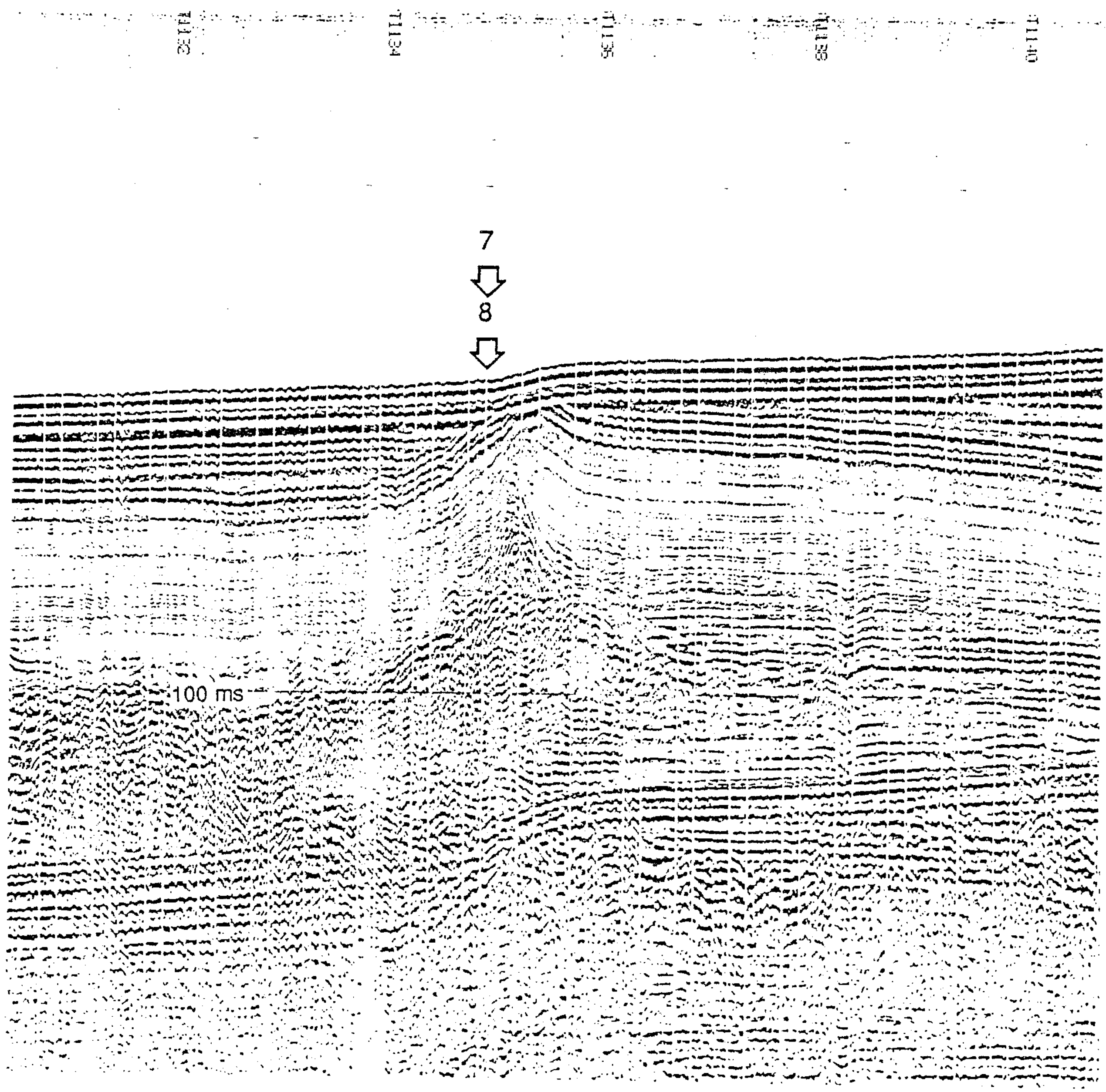

Figure 9. Sparker profile showing approximate sampling locations for cores 9-07 and 9-08, northern St. George's Bay.

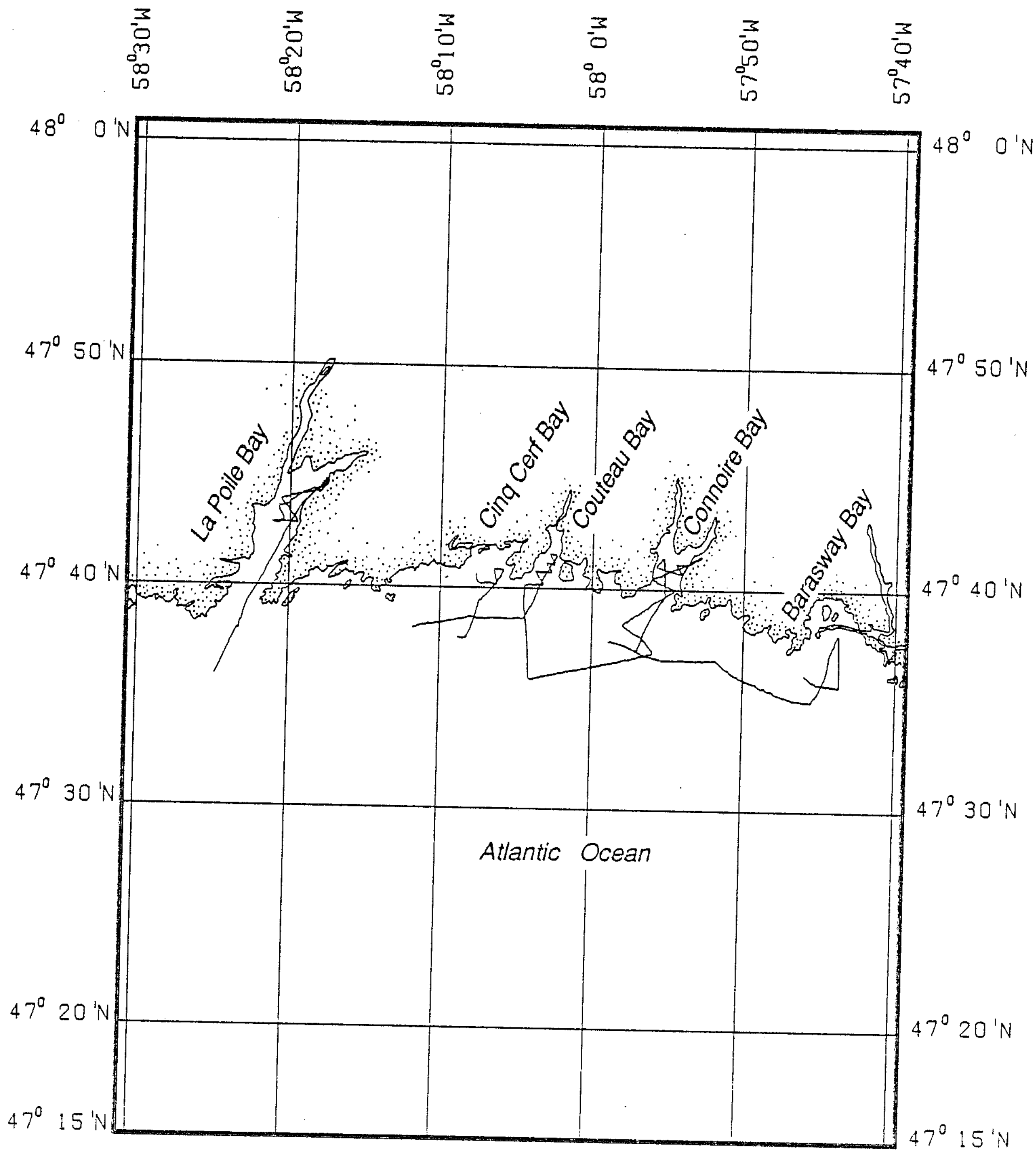

Figure 10. Track plot, phase 11, south coast.

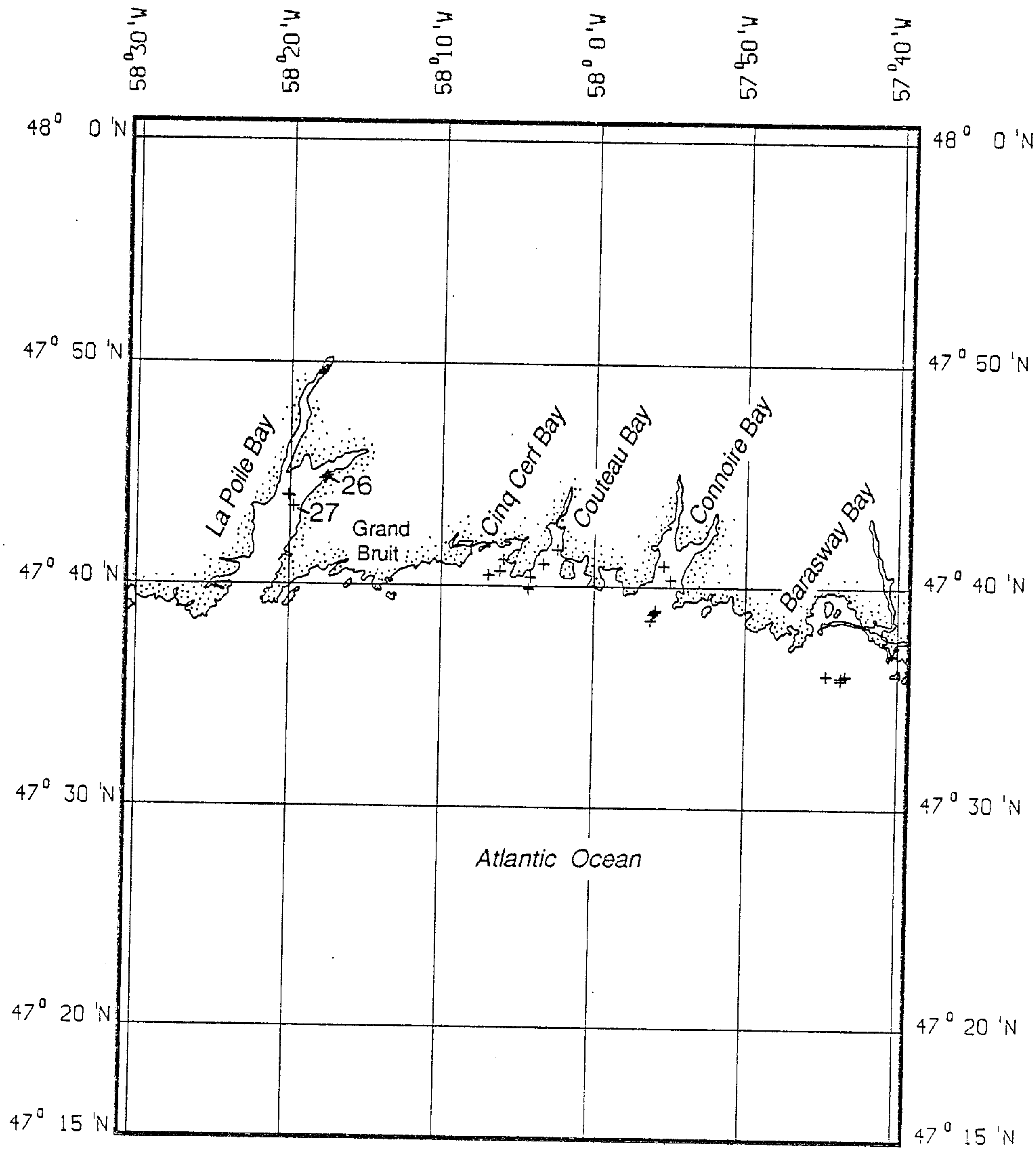

Figure 11. Sampling locations, phase 11, south coast. Numbers refer to cores.

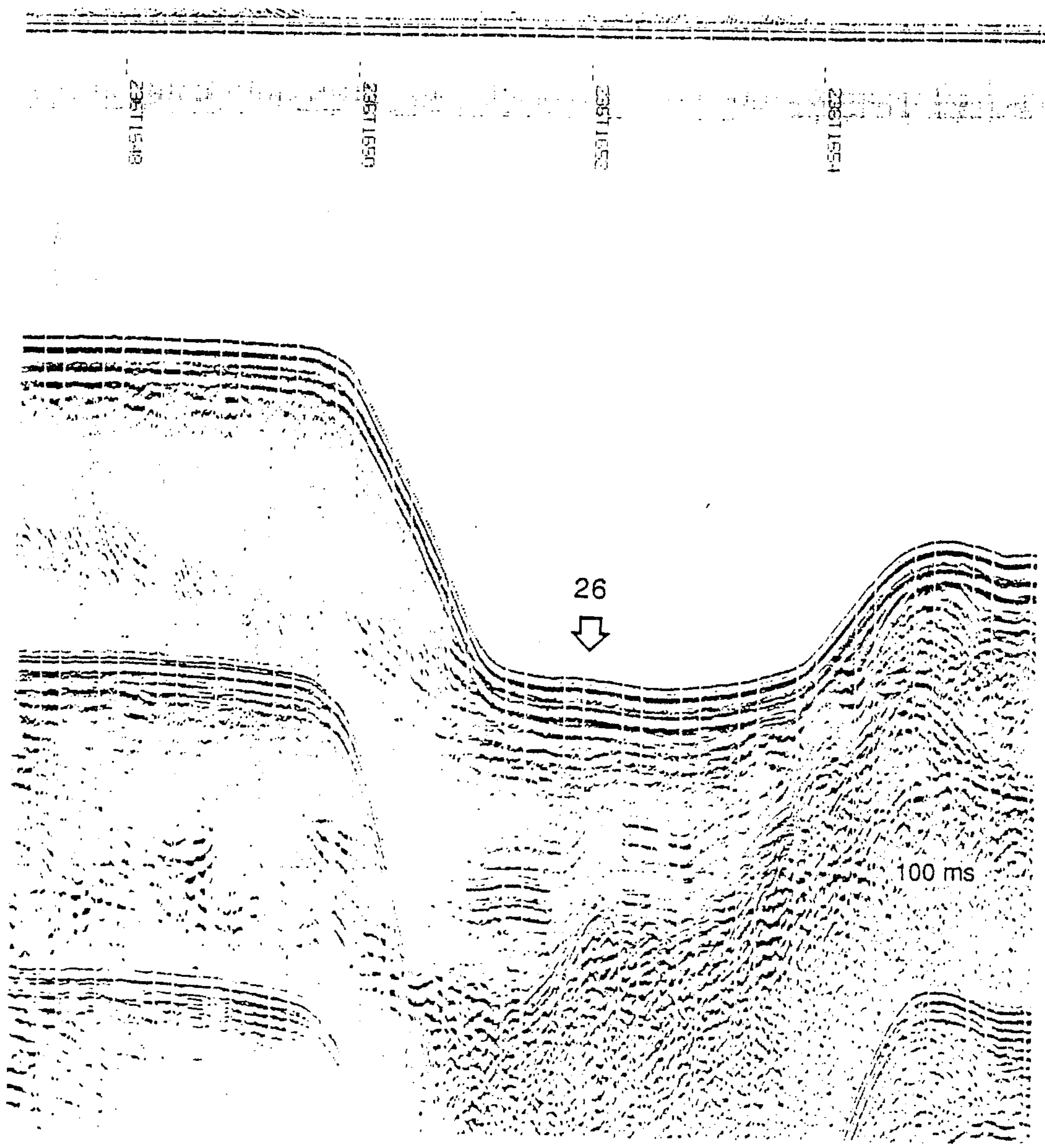

Figure 11. Sparker profile showing approximate sampling location for core 11-26 near head of La Poile Bay.

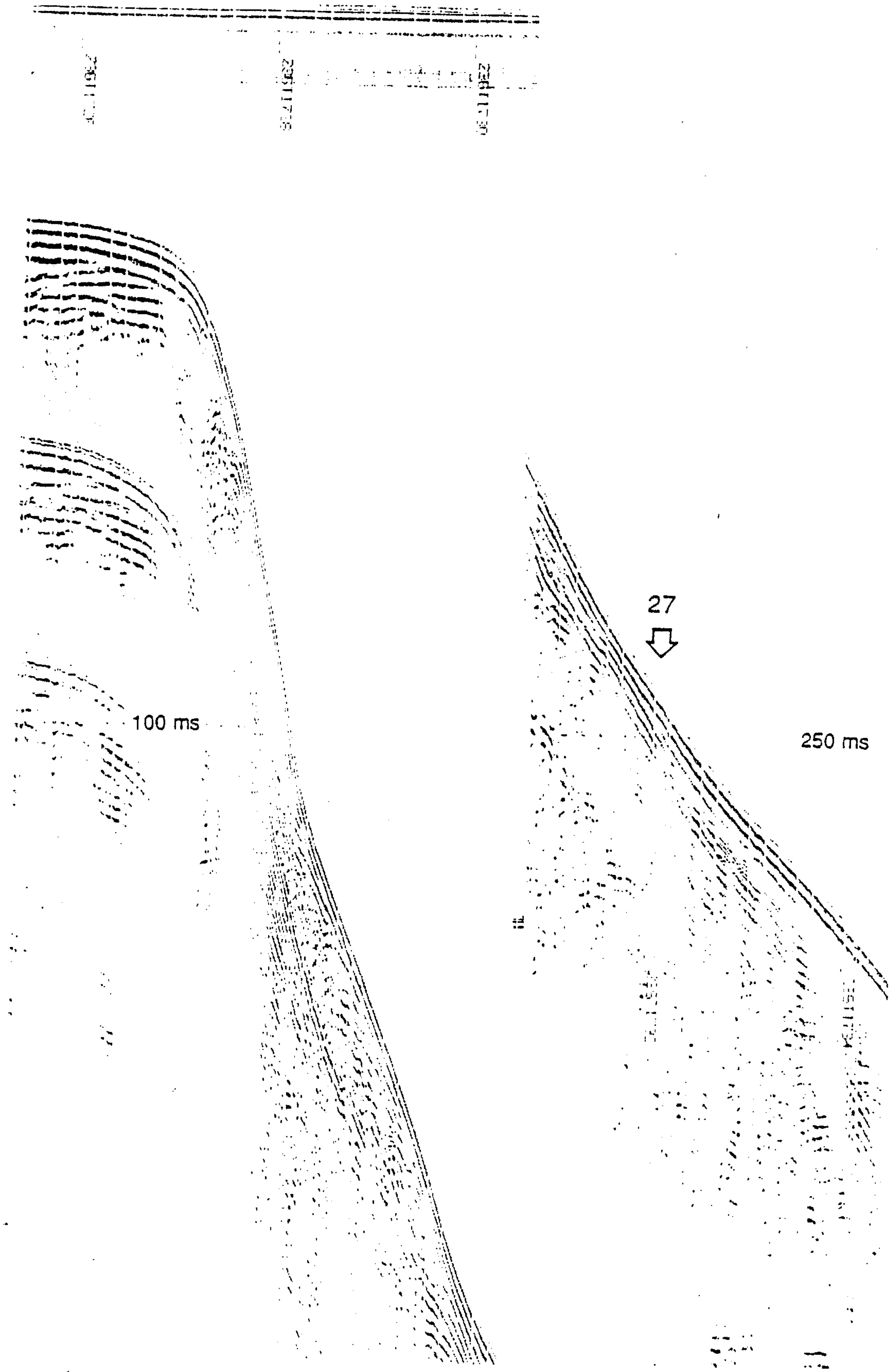

Figure 13. Sparker profile showing approximate sampling location for core 11-27 near head of La Poile Bay.