REPORT OF THE

Subaqueous Minerals and Materials Study Commission

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

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1987

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Report of the
Subaqueous Minerals and Materials Study Commission
To
The Governor and the General Assembly of Virginia
Richmond, Virginia
March, 1987

To: Honorable Gerald L. Baliles, Governor of Virginia,
and
The General Assembly of Virginia

I. INTRODUCTION

The Subaqueous Minerals and Materials Study Commission was established pursuant to Senate Joint Resolution No. 104 by the 1985 Session of the General Assembly. The Commission was originally charged with making determinations as to whether subaqueous minerals and materials of the Commonwealth exist in commercial quantities and whether the removal, extraction, use, disposition, or sale of these minerals and materials can be adequately managed to ensure the public interest.

Senate Joint Resolution No. 85 continued the work of the Commission with emphasis on further study of the royalty scheme for the removal of materials from state bottomlands and recognition of the need for Virginia to participate in a federal or multi-state task force on heavy minerals activities in the Exclusive Economic Zone (EEZ).

The 1986 General Assembly passed two bills which were recommended by the Commission. Senate Bill 315 (removing the federal exemption to dredge sand and gravel) and Senate Bill 316 (clarifying the State Minerals Management Plan) were both signed into law by the Governor. A third measure, Senate Bill 317, was carried over to the 1987 General Assembly in the House Chesapeake and Its Tributaries Committee. A subcommittee of the Commission has proposed a redraft of SB 317 as a compromise solution and a recommendation to this effect appears in Part III of this report.

This document is submitted as the Commission's report on its 1986 activities.

II. 1986 DELIBERATIONS

The work of the Commission during 1986 was concentrated on two major issues: problems with the current royalty scheme for removal of state bottomlands and Virginia's participation in a task force for heavy minerals development in the EEZ. To better address these issues, separate subcommittees were appointed to make recommendations to the full Commission on the matters.

A. SUBCOMMITTEE #1 (ROYALTIES/SB 317)
Members: Stieffen (Chairman), Walker, Macfarlane, Moss, Larsen

1. Compromise Language to SB 317

During its deliberations, the Subaqueous Minerals Study Commission recognized that there could be a problem with the language in the Code of Virginia (§ 62.1-3) which prescribes a 20¢ to 60¢ royalty limit on material removed from state bottomlands. For example, an industry which decides to mine valuable heavy minerals from the state bottomlands might request a permit under § 62.1-3 and the Commonwealth would be limited to receiving royalties of only 20¢ to 60¢ per cubic yard.

In the attempt to avoid this limitation, SB 317 was introduced during the 1986 Session (see Appendix A attached). As proposed, the bill amended § 62.1-3 of the Code to simply remove the 60¢ upper limit on royalties which could be charged. The intent here was to allow for the charging of higher royalties in the instances where heavy minerals constitute the bottom material which is being removed.

Opponents of SB 317 claimed that eliminating the 60¢ cap on royalties for the removal of bottom materials would give the Virginia Marine Resources Commission (VMRC) too much discretion on what royalties it could charge. The opponents expressed the desire to keep the 20¢ to 60¢ range intact and the bill was carried over in the House Committee on Chesapeake and Its Tributaries until the 1987 Session.

The Subaqueous Commission met on May 23, 1986, and during its deliberations, it took up discussion on the status of the carry-over bill. A solution to the "cap on royalties" problem was proposed to the full Commission. The Royalties Subcommittee was appointed to study the proposed solution and any alternative proposals. Other solutions were offered and compromise language was agreed upon by the subcommittee to remedy the problem (see Appendix B). The intent of the compromise language is to indicate that the mining of heavy minerals is not subject to the royalty range specified for the removal of bottom materials.

2. Charges for Royalties and Annual Rents - The "Spin-off" Issue

During the deliberations pertaining to the compromise language for SB 317, a discussion ensued as to the extent of VMRC's authority to charge royalties at its discretion. Attorneys from Colonna Shipyard, Inc., and Newport News Shipbuilding Co. requested that the Royalties Subcommittee hear their concerns. These attorneys were challenging the authority of VMRC to require royalties under § 62.1-3 for encroachment over state bottomlands. In addition, they were challenging VMRC's decision to impose the royalty requirements in the form of annual rents to be paid to the Commission. These challenges were based on the claim by the attorneys that nowhere in the Code of Virginia are specific guidelines set forth by which VMRC can charge royalties (or annual rents) for encroachment over state bottomlands.

a. The Colonna Shipyard situation

Colonna Shipyard, Inc., of Norfolk has applied for permits to VMRC for:

(1) the dredging of 281,802 cubic yards of bottom materials,
(2) the installation and use of a floating drydock,
(3) construction of a causeway which would include the filling of state bottomlands.

The permit for the dredging of bottom materials was issued at 20¢/cubic yard and Colonna Shipyard has paid $56,360.40 for this activity. VMRC authority to require this payment under (1) is not in question.

What is questioned is VMRC's requirement that annual rental payments be made under (2) and (3) above for the encroachment over state bottomlands by the facilities described.

The amount of the annual rent from the causeway encroachment and the filling of state bottomlands is set at $960 (20¢ per square foot). The amount of annual rent for encroachment by the floating drydock is $6,750 (encroachment over 90,000 square feet of state-owned subaqueous lands at 7 1/2¢ per square foot).

Attorneys for Colonna Shipyard advised the withholding of any payment for these "annual rents" stating that they were unable to find statutory authority which accords the Commission the right to impose an annual rent.

b. VMRC authority

Before 1960, there was no requirement to obtain a permit for the use of subaqueous beds. Chapter 600 of the Acts of Assembly of 1960 required a permit from the Attorney General for the use of such beds if the use was not authorized by statute. Under this Act, the Attorney General had authority to approve or disapprove requests to use the beds and could specify such conditions as might be appropriate. Chapter 637 of the 1962 Acts of Assembly amended this provision of law, then numbered § 62-2.1, to shift the authority over the use of subaqueous beds from the Attorney General to the Commission of Fisheries, which could specify such conditions, terms and royalties as it deemed appropriate.

Essentially, this same language now appears in § 62.1-3 of the Code and, of course, the Commission of Fisheries is now named the Virginia Marine Resources Commission.

VMRC relies partially on the following language to justify its authority for charging royalties and annual rents:

> "The Marine Resources Commission shall have the authority to issue permits for all other reasonable uses of state-owned lands . . . The permits issued by VMRC shall be in writing and should specify such conditions, terms, and royalties as the Marine Resources Commission deems appropriate."
> (p. 1., lines 36-51, Appendix A)

This same language is a point of contention for the attorneys who represent the shipyards. They claim this language is vague, overly broad, and an unlawful delegation of legislative authority in violation of the Constitution. They would prefer to see guidelines added to the current law that would clearly indicate that VMRC can charge royalties and annual rents, and language that would be more specific as to the scope of VMRC's powers.

c. Possible solutions

At the request of the Royalties Subcommittee, staff prepared an issue paper in September 1986 which outlined possible solutions to this royalties "spin-off" problem. The solutions proposed included judicial review, statutory language changes, deference to the Executive Branch, or deference to JLARC for an independent review of the situation. Since the ultimate issue concerns the responsibilities of VMRC as an executive agency and whether it has acted within the scope of the law, the full Commission chose not to endorse any particular course of action to remedy this conflict.

B. SUBCOMMITTEE #2 (TASK FORCE INVOLVEMENT)
Members: Stieffen (Chairman), Bloxom, Morgan, Moore, Siapno

In 1985, the Commission recognized that by joining neighboring states and the federal government in an effort to determine the economic potential of the 197-mile federal economic zone of the eastern coast (EEZ), the Commonwealth would be in a position to play a role in the formulation of federal offshore development policies. It is anticipated that direct royalties from extraction activities might accrue to the Commonwealth from a mining activity within the EEZ, and the "second order effects" could be substantial.

In the effort to pursue such a partnership, the staff made inquiries in January 1986 to the Minerals Management Service of the U.S. Department of Interior as to what steps were necessary for Virginia to become active in an EEZ task force with the federal government or neighboring states. The Department of Interior responded in March 1986, stating that while pleased to see legislative support, the formation of a joint task force is generally accomplished through the executive office.

A subcommittee was appointed to consider Virginia's involvement in a task force arrangement and to make any recommendations for further action. In August 1986, Subcommittee #2 addressed this issue and was briefed by staff on task force activities in other states and on federal legislation which, if passed, may require all coastal states to form task forces for EEZ development. This proposed federal legislation, known as the "Seabed Hard Minerals Act," would establish a regime for recovering hard mineral resources specifically. The mining of oil, gas, and sulfur would not be subject to this new Act since those activities are controlled under the Outer Continental Shelf Lands Act (OCSLA).

The Seabed Hard Minerals Act was described as involving participation by coastal states both as to leasing arrangements and environmental impact investigation. It would implement a revenue-sharing formula by which states would benefit financially from minerals development in the EEZ. The Act is pending before the Merchant Marine and Fisheries Committee in Congress and further deliberation on the Act is scheduled for early 1987. Since this

proposed Act contemplates that all coastal states would enter task force arrangements, the subcommittee recommended that any Virginia initiative to form a task force should follow as closely as possible the type of task force described in the Seabed Hard Minerals Act. The reason for this recommendation is so that a task force formed at this time (which would take place through OCSLA) could be "dovetailed" at a later date into the task force framework proposed in the Seabed Hard Minerals Act.

The subcommittee voted to recommend that the Governor officially request the formation of a Virginia/federal government task force through the Department of Interior (see recommendation, Part III). Staff was instructed to work with the Secretary of Natural Resources to carry out this request.

By letter dated September 18, 1986, the Secretary of Natural Resources formally requested the Governor to initiate the formation of a Virginia/federal task force through contact with the U.S. Secretary of Interior. As of this time, the Commission is not aware of further initiatives on this matter.

C. AGENCY COOPERATION

In a separate development related to the work of the Commission, the Virginia Institute of Marine Science (VIMS), through a letter approved by the Commission, requested the assistance of the newly created Center for Innovative Technology (CIT) in Herndon, Virginia. The letter urges the "forging of links between CIT participating corporations and VIMS for the purpose of assessing certain aspects of the potential for commercial mining of non-energy minerals within the EEZ and within the waters of the Commonwealth." The inquiry further specifies target minerals as titanium and zirconium, since the United States currently depends on imports to obtain such minerals. Staff has learned that CIT is receptive to this relationship with VIMS and that both groups will work together in support of proper heavy minerals exploration and mining in and beyond Virginia waters.

D. ONGOING EXPLORATION ACTIVITIES *

The preliminary mineral exploration within Commonwealth waters was initiated in July 1986 as a joint effort between VIMS and the Virginia Division of Mineral Resources (VDMR) and is proceeding on schedule. Funds were appropriated for the first year of a two-year effort. The work completed to date is described in the report in Appendix C and includes acquisition of surface samples along the Atlantic coast of the Eastern Shore and Virginia Beach. In addition, previously acquired cores from the mouth region of the Chesapeake Bay have been obtained and are being analyzed.

Given the fact that to date only a limited number of the samples collected have been processed to the level of mineral species identification, it is not yet possible to determine the potential for economic heavy mineral deposits within the territorial waters of the Commonwealth. However, limited speculation is possible for the region off of Smith Island. Although vibracores outside of Virginia's waters show lower concentrations of minerals than the surface samples, it is most encouraging to note that many samples, both core and surficial, contain significant amounts of ilmenite, zircon, and particularly, monazite. The surface samples within waters of Virginia show comparable concentrations.

Material containing potentially valuable minerals could be extensive offshore of Virginia; the seismic profile data suggest that there is a fairly continuous layer of near-surface sediment that is four to five meters (12 to 15 feet) thick. Only data from cores could confirm the continuation of valuable minerals from the EEZ into the Commonwealth's waters, as well as determine the true economic potential of the offshore sediments.

The remainder of fiscal year 86/87 will be devoted to completion of the heavy mineral analysis and cross-interpretation of the Bay mouth core results with the seismic information. This data ensemble will then provide the basis for selection of sites to core within the Commonwealth's territorial waters along the Atlantic coast.

* Source - Comments by Dr. Robert Byrne, Virginia Institute of Marine Science

III. RECOMMENDATIONS

The Subaqueous Minerals and Materials Study Commission recommends the following:

1. Cooperative efforts between the Virginia Institute of Marine Science (VIMS) and the Virginia Division of Mineral Resources (VDMR) in the exploration for and analysis of heavy mineral concentrations in and beyond Virginia territorial waters should continue. The Commission endorses plans to acquire new vibracores in target areas as described in the interim report (see Appendix C).

2. The Commission supports Virginia's participation in a Virginia/federal government task force in order for the Commonwealth to play a more active role in the consulting, advising, exploration and recovery of hard mineral resources in the Exclusive Economic Zone off the Virginia coast. The Governor should initiate such participation through communications with the U.S. Secretary of Interior.

3. Due to the ongoing research projects, continuing concern over royalties assessments and the initiation of sand dredging activities, the Commission recommends that its work be continued in 1987 (see Appendix D).

Respectfully submitted,

Stanley C. Walker, Chairman
S. Wallace Stieffen, Vice-Chairman
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Thomas W. Moss, Jr.
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1986 SESSION

LD1471137

SENATE BILL NO. 317

Offered January 21, 1986

A BILL to amend and reenact § 62.1-3 of the Code of Virginia, relating to royalties on materials from state bottomlands.

Patrons–Walker, Babalas, and Macfarlane; Delegates: Stieffen, Morgan, and Bloxom

Referred to Committee on Agriculture, Conservation, and Natural Resources

Be it enacted by the General Assembly of Virginia:

1. That § 62.1-3 of the Code of Virginia is amended and reenacted as follows:

§ 62.1-3. Authority required for use of subaqueous beds.–It shall be unlawful and constitute a Class 1 misdemeanor for anyone to build, dump, or otherwise trespass upon or over or encroach upon or take or use any materials from the beds of the bays and ocean, rivers, streams, creeks, which are the property of the Commonwealth, unless such act is pursuant to statutory authority or a permit by the Marine Resources Commission. Statutory authority is hereby conferred for the doing of such acts as are necessary for (1) the erection of dams, the construction of which has been authorized by proper authority; (2) the uses of subaqueous beds authorized under the provisions of Title 28.1 of the Code; (3) the construction and maintenance of congressionally approved navigation and flood-control projects undertaken by the United States Army Corps of Engineers, United States Coast Guard, or other federal agency authorized by Congress to regulate navigation, navigable waters, or flood control; (6) fills by riparian owners opposite their property to any lawfully established bulkhead line, provided that such owners have been granted, prior to July 1, 1972, a certificate of assurance from the State Water Control Board pursuant to § 21 (b) of the Water Quality Improvement Act of 1970; (9) piers, docks, marine terminals and port facilities owned or leased by or to the Commonwealth or a political subdivision thereof; (10) the placement of private piers for noncommercial purposes by owners of the riparian lands in the waters opposite such riparian lands, provided such private piers shall not extend beyond the navigation line or lawful private pier lines established by proper authority; and (11) causing the removal of silt and other waste material inside any lawfully established bulkhead line by riparian owners opposite their property incident to the construction and use of any graving dock, drydock or other shipbuilding facilities, where such owners have obtained prior to July 1, 1972, a certificate of assurance from the State Water Control Board pursuant to § 21 (b) of the Water Control Improvement Act of 1970.

The Marine Resources Commission shall have the authority to issue permits for all other reasonable uses of state-owned bottomlands, including but not limited to, the taking and use of material, the placement of wharves, bulkheads, dredging and fill, by owners of riparian lands, in the waters opposite such riparian lands, provided that such wharves, bulkheads and fill shall not extend beyond any lawfully established bulkhead line.

The Marine Resources Commission is hereby authorized and empowered, but not in conflict with the United States Corps of Army Engineers, to establish bulkhead lines and lawful private pier lines on or over bays, rivers, creeks, streams and the shores of the ocean, to the extent owned by or subject to the jurisdiction of the Commonwealth for that purpose, and to issue and publish maps and plats showing such lines.

The Marine Resources Commission shall have the authority to issue permits for recovery of underwater historic property pursuant to this section and § 10-145.9 of the Code of Virginia.

The permits issued by the Marine Resources Commission shall be in writing and shall specify such conditions, terms and royalties as the Marine Resources Commission deems appropriate.

In granting or denying any permit for the use of state-owned bottomlands, the Commission shall be guided in its deliberations by the provisions of Section 1 of Article XI of the Constitution of Virginia, and shall consider, among other things, the effect of the

proposed project upon other reasonable and permissible uses of state waters and state-owned bottomlands, its effect upon the marine and fisheries resources of the Commonwealth, its effect upon the wetlands of the Commonwealth, except when its effect upon said wetlands has been or will be determined under the provisions of Chapter 2.1 (§ 62.1-13.1 et seq.) of this title, and its effect upon adjacent or nearby properties, its anticipated public and private benefits, and, in addition thereto, the Commission shall give due consideration to standards of water quality as established by the State Water Control Board.

No permit for a marina or boatyard for commercial use shall be granted unless the owner or other applicant prior to issue presents a plan for sewage treatment or disposal facilities which is approved by the State Department of Health. The Marine Resources Commission shall consult with any state agency, including the Virginia Institute of Marine Science, the Water Control Board, the State Department of Highways and Transportation and the State Corporation Commission whenever the decision of the Marine Resources Commission on an application for a permit relates to or affects the particular concerns or activities of other state agencies.

A fee of twenty-five dollars shall be paid for issuing each such permit as charge for such permit, but if the cost for the project or facility is to be more than $10,000, the fee paid shall be $100. A fee of twenty-five dollars shall be paid for issuing each permit for recovery of underwater historic property. When the activity or project for which a permit is requested involves the removal of bottom material, the application shall so state and the Marine Resources Commission shall specify in each such permit issued a royalty of not less than twenty cents per cubic yard for ~~new removal, provided that no royalty for the removal of bottom material shall exceed the amount of sixty cents per cubic yard of material removed~~ *the removal of bottom material* . In fixing the amount of royalty to be paid for removal of bottom material, the Commission shall consider, among other things, the primary and secondary purposes of the removal of bottom material, whether the material has any commercial value and whether it will be used for any commercial purpose, the use to be made thereof and any public benefit or any adverse effect upon the public in connection with the removal or disposal, the physical characteristics of the material removed, and the expense of its removal and disposal. Nothing contained herein shall preclude the imposition of additional assessments not to exceed an amount treble the normal permit fee and royalties provided above where it appears that the project or facility for which an application for permit is made has been completed or work thereon already commenced at the time such application is made. Bottom material removed attendant to maintenance dredging shall be exempt from any royalty.

The Virginia Department of Highways and Transportation shall be exempt from all such fees and royalties otherwise assessable pursuant to this section.

All counties, cities and towns of the Commonwealth shall be exempt from permit fees and royalties other than the permit issuing fee; provided that a permit as required under this section be issued prior to the commencement of any of the work to be accomplished under said permit.

All royalties or funds that are collected from such agreements or contracts shall be paid into the state treasury to the credit of the Special Public Oyster Rock Replenishment Fund for the purposes of such fund. Expenditures and disbursements of all sums from such fund shall be made by the State Treasurer on warrant of the Comptroller issued on vouchers signed by such person or persons as shall be so authorized and designated by the Marine Resources Commission.

All permits heretofore issued pursuant to this section or prior § 62-2.1 are hereby ratified, validated and confirmed.

Any person aggrieved by a decision of the Marine Resources Commission pursuant to this section shall have the right to judicial review of said decision as provided in § 28.1-33 of the Code of Virginia.

Appendix B

Compromise language for SB 317*

1. Appendix A, page 2, lines 23-25, remove strike-throughs and new language so law reads as it did before

2. Appendix A, page 2, line 54, Add the following language:

> "No permit shall be issued under this section for a primary or secondary purpose of obtaining oil, gas, minerals or other substances except landfill material, sand or gravel for sale by the permit applicant. An easement or lease for such purposes may be granted under § 62.1-4 and the provisions prescribed for the Subaqueous Minerals Management Plan required therein."

* FOOTNOTE: The House Committee on Chesapeake and its Tributaries voted on January 22, 1987 to take no action on SB 317 and the proposed amendment above was tabled.

APPENDIX C

INTERIM REPORT TO THE SUBAQUEOUS MINERALS AND MATERIALS STUDY COMMISSION

CONCERNING

THE OCCURRENCE AND DISTRIBUTION OF HEAVY MINERALS IN VIRGINIA'S OFFSHORE

C. H. Hobbs, III
Virginia Institute of Marine Science
School of Marine Science
College of William and Mary

and

C. R. Berquist, Jr.
Virginia Division of Mineral Resources
Department of Mines, Minerals and Energy

December 1986

Introduction

Preliminary work by the United States Geological Survey (USGS) and by a cooperative effort between the Virginia Division of Mineral Resources (VDMR) and the Virginia Institute of Marine Science (VIMS) funded by the Minerals Management Service (MMS) indicated the occurrence of potentially significant deposits of economic heavy minerals within the Exclusive Economic Zone (EEZ) adjacent to Virginia. Following a review of the MMS funded report and a presentation by the USGS, the Subaqueous Minerals and Materials Study Commission recommended further exploration concentrated within the territorial waters of the Commonwealth. The Commission also recommended a level of effort which would focus investigations along the Eastern Shore and within the mouth of the Chesapeake Bay; funds were appropriated for the first year of a two-year work plan. The project began in July 1986. The first year of that plan called for sampling of the bottom sediments accompanied by shallow, subbottom, seismic profiling, and analysis of cores previously acquired within the Bay's mouth region. The second year of the plan would focus on acquisition of new vibracores in areas suggested from results of the surface sampling.

Coincident with the first year of Commission work, VIMS and VDMR obtained new vibracores and companion seismic data off Smith Island and in the bay mouth. This project began in January 1986 with funds provided by MMS. This interim report to the Commission includes the status and partial results of work from both MMS and state funded projects. The work is being performed by VDMR and VIMS at the Virginia Institute of Marine Science under an agreement with the Division of Mineral Resources, Department of Mines, Minerals and Energy.

Status of Effort

Table 1 outlines tasks and progress for work common to both MMS and Commonwealth projects. Table 2 lists tasks and progress unique to each project. Tasks listed below are only those requiring at least one week of effort; considerable other work of shorter duration also has been required.

In summary, all field work and sample collection has been completed. Additionally, Mr. Hobbs attended a meeting of the Underwater Mining Institute in Biloxi, Mississippi where he made a presentation about Virginia's subaqueous minerals program. Mr. Berquist visited the Associated Minerals and Dupont mining operations in Florida.

TABLE 1

Progress on Tasks Common to Both MMS and Commonwealth Projects

TASK	STATUS
Equipment	
Order sample processing equipment	completed
Assemble and calibrate Humphrey Spiral	completed
Assemble and calibrate Frantz Magnetic separator	completed
Sample preparation	
Set up analytic procedures; confer with USGS	completed
Set up computer data base management system	completed
Contract for heavy-liquid separation	completed

TABLE 2

A: Progress on MMS Project (begun January 1986)

TASK	STATUS
Contract for and acquire 300 linear feet of vibracores off of Smith Island and Virginia Beach (24 cores)	completed
Collect seismic and sidescan sonar data at Wachapreague and Quinby Inlets and over vibracore sites in Bay mouth	completed
Analyze seismic and sidescan data	95% complete
Cut, describe, sample and archive cores	completed
Process samples on spiral	completed
Heavy liquid separation of samples	completed
Magnetic separation of samples	50% complete
Mineral identification and entry of information into data base	20% complete

B: Progress on the Commonwealth's Minerals Project (begun July 1986)

TASK	STATUS
Collect boxcore and grab samples off Chincoteague to North Carolina	completed (102 samples)
Collect sidescan and seismic data between Chincoteague and North Carolina	completed
Analyze sidescan and seismic data	75% complete
Acquire vibracores from USGS archives	completed
Cut, describe photograph, and sample USGS cores	not started
Process samples on spiral	50% complete
Heavy liquid separation of samples	40% complete
Magnetic separation of samples	10% complete
Mineral identification and data entry	5% complete

Results

Commonwealth Project

Figure 1 depicts the locations of the sampling stations for surficial sediments. As vibracores were available through the MMS project for locations off of Virginia Beach, the surface sampling grid was extended to include that sector. Figure 2 shows the total heavy mineral concentrations for grab samples processed to date. For the area offshore Smith Island, it is noteworthy that concentrations of heavy minerals in Virginia waters are comparable to values previously reported in Federal waters; the total percent of economic heavy minerals is significant in this region. Table 3 lists the total weight percent of heavy minerals for grab samples shown in Figure 2. Figures 3 and 4 show interpretation of some seismic and sidescan sonar data taken for this project.

MMS Project

Vibracores acquired for this project are located in the Smith Island site in Federal waters (same area as last year's MMS project), in the mouth of Chesapeake Bay, and offshore of Virginia Beach. Some of the cores have been analyzed and the results are shown in Tables 3 and 4. Average heavy mineral concentrations are less in cores than in grab (surface) samples from the same site. Figure 5 shows the breakdown of heavy mineral composition for core H1-1 and explains the relationship of total heavy mineral concentration (in weight percent) and the composition of the heavy mineral

TABLE 3

TOTAL WEIGHT PERCENT OF HEAVY MINERALS FROM SELECTED SAMPLES

SAMPLE NAME	WT %	SAMPLE NAME	WT %	SAMPLE NAME	WT %	SAMPLE NAME	WT %
B1-1	4.15	H9-1	3.86	13	3.07	57	7.96
B1-2	2.99			14	5.60	58	5.55
		H10-1	2.94	15	5.95	59	11.36
B2-1	2.57	H10-2	3.40	16	2.51	60	4.55
B2-2	4.08			17	0.55	61	6.13
		H11-1	4.18	18	4.44	62	2.98
B3-1	3.36			19	2.65	63	3.69
B3-2	3.45	H12-1	7.65	20	1.33	64	5.41
B3-3	3.56	H12-2	6.52	21	1.54	65	1.56
				22	4.65	66	7.22
B4-1	2.72	H13-1	2.41	23	2.02	67	2.59
				24	3.92	68	1.17
B5-1	1.91	H14-1	0.54	25	5.81	69	0.85
B5-2	1.87	H14-2	1.56	26	0.73	70	0.67
				27	0.74	71	1.21
H1-1	4.03	86-03-1	1.18	28	2.74	72	1.97
H1-2	5.49	86-03-2	0.83	29	4.62	73	5.04
H1-3	6.44	86-03-3	0.61	30	7.22	74	4.53
		86-03-4	0.84	31	3.14	75	0.56
H2-1	2.56			32	8.23	76	0.49
H2-2	1.11	86-13-1	2.77	33	5.25	77	1.53
H2-3	1.43	86-13-2	1.69	34	7.90	78	1.06
		86-13-3	3.91	35	7.39	79	0.14
H3-1	2.28	86-13-4	2.19	36	9.33	80	5.05
				39	8.65	81	5.05
H4-1	3.24	86-31-1	1.80	40	5.36	82	4.41
H4-2	1.40	86-31-2	1.09	41	8.73		
H4-3	1.67	86-31-3	1.41	42	11.86		
		86-31-4	1.37	43	3.02		
H5-1	3.95			44	4.24		
		1	7.51	45	2.40		
H6-1	3.30	2	6.42	46	7.03		
H6-2	1.78	3	5.44	47	6.44		
H6-3	1.64	4	9.44	48	9.72		
H6-4	0.83	5	7.82	49	6.52		
		6	2.33	50	6.45		
H7-1	3.92	7	2.12	51	6.62		
H7-2	1.92	8	1.69	52	5.98		
H7-3	1.62	9	1.79	53	8.06		
		10	7.78	54	14.95		
H8-1	5.83	11	1.55	55	8.08		
H8-2	2.99	12	8.38	56	8.09		

Samples beginning with "B" are from cores in the Chesapeake Bay Mouth
Samples beginning with "H" are from cores off of Smith Island.
Samples beginning with "86" are from cores off of Virginia Beach, acquired from the U.S. Army Corps of Engineers.
All other samples are grab samples taken in the fall of 1986.

TABLE 4

WEIGHT PERCENT OF HEAVY MINERAL FRACTION

SAMPLE NAME	B5-1	B5-2	H1-1	H4-2	H6-2
MAGNETITE	4.83	5.05	3.15	10.82	3.36
ILMENITE	21.03	25.66	30.89	13.24	15.89
GARNET	12.52	5.44	15.70	8.52	13.94
EPIDOTE	10.82	7.51	8.37	3.91	10.48
STAUROLITE	5.22	9.60	8.25	6.72	8.42
AMPHIBOLE	14.40	12.72	7.14	12.98	11.79
PYROXENE	9.12	6.94	4.68	21.82	9.38
RUTILE	0.65	0.90	0.95	0.70	0.00
SILL/KYANITE	5.70	9.22	4.07	5.73	9.07
SPHENE	0.92	0.90	1.14	0.70	1.35
TOURMALINE	T	T	0.04	0.05	T
LEUCOXENE	0.82	0.45	0.19	0.05	0.57
MONAZITE	T	T	0.83	T	T
ZIRCON	2.66	3.86	3.21	4.19	5.30
OTHER	11.31	11.74	11.37	10.56	10.44
Total heavy mineral concentration of sample	1.91	1.87	4.03	1.40	1.78

"T" indicates trace amounts of the mineral were observed.

fraction. Figures 6 and 7 show the interpretation of sidescan sonar and seismic data for the study site off Wachapreague Inlet.

Conclusions

Given the fact that to date only a limited number of the samples collected have been processed to the level of mineral species identification, it is not yet possible to offer comment on the potential for economic heavy mineral deposits within the territorial waters of the Commonwealth. However, limited speculation is possible for the region off of Smith Island. Although vibracores show lower concentrations of minerals than grab samples, it is most encouraging to note that many samples, both core and surficial, contain significant amounts of ilmenite, zircon, and particularly, monazite. Material containing potentially economic minerals could be extensive offshore of Virginia; the seismic profile data suggest that there is a fairly continuous layer of near-surface sediment that is four to five meters (12 to 15 feet) thick (Figures 3, 4, 6 and 7). Only data from cores could confirm the continuation of economic minerals from the EEZ into the Commonwealth's waters, as well as determine the true economic potential of the offshore sediments.

Projection of Project Effort

The remainder of FY 86/87 will be devoted to completion of the heavy mineral analysis, and cross-interpretation of the core results with the seismic information. This data ensemble will then provide the basis for selection of sites to core.

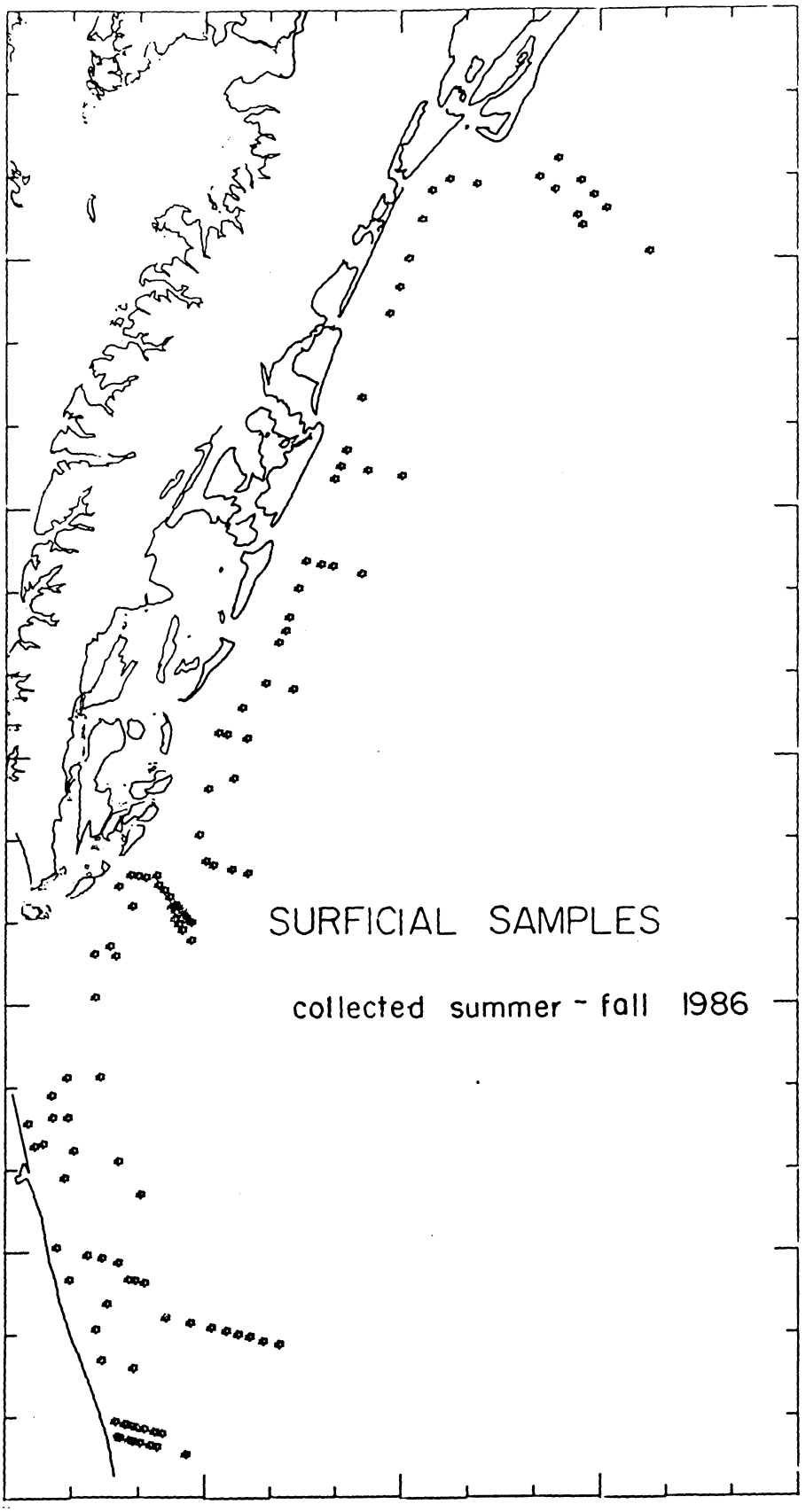


Figure 1. Location of samples collected in 1986.

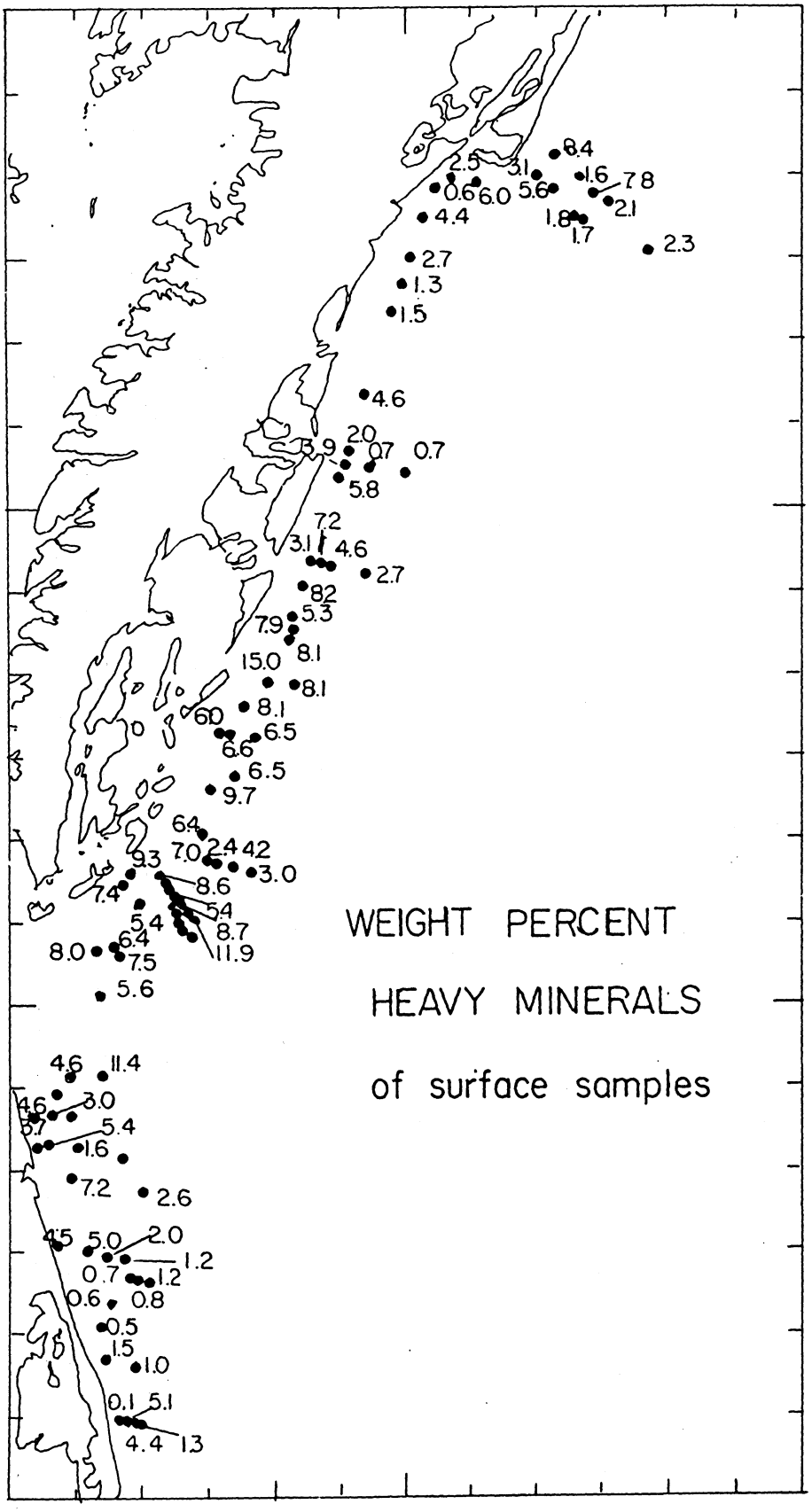


Figure 2. The weight percent of heavy minerals in the samples collected and analyzed during 1986.

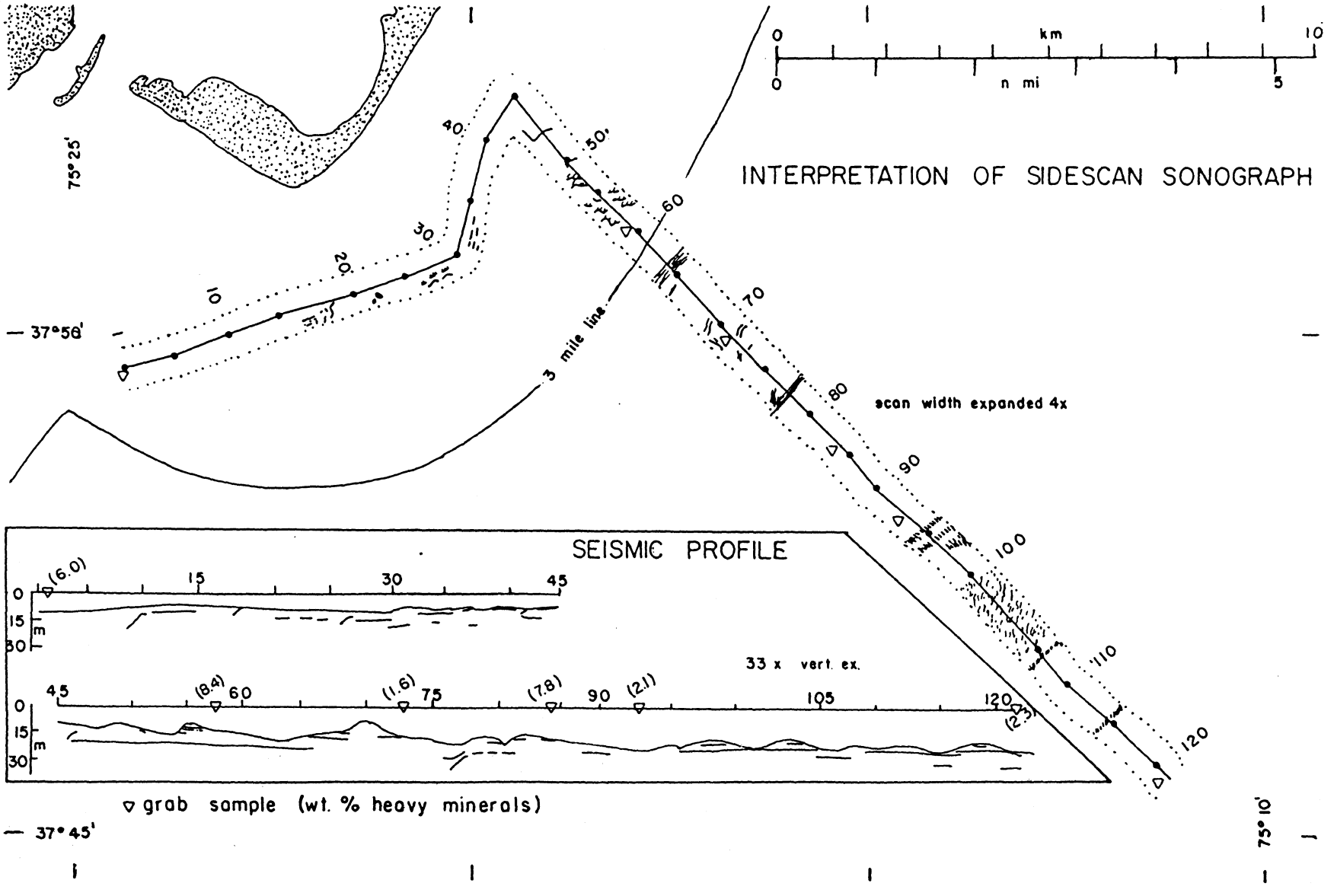


Figure 3. The figure depicts the survey line and the interpretations of the sidescan sonography and sub-bottom profiles obtained adjacent to Chincoteague Island.

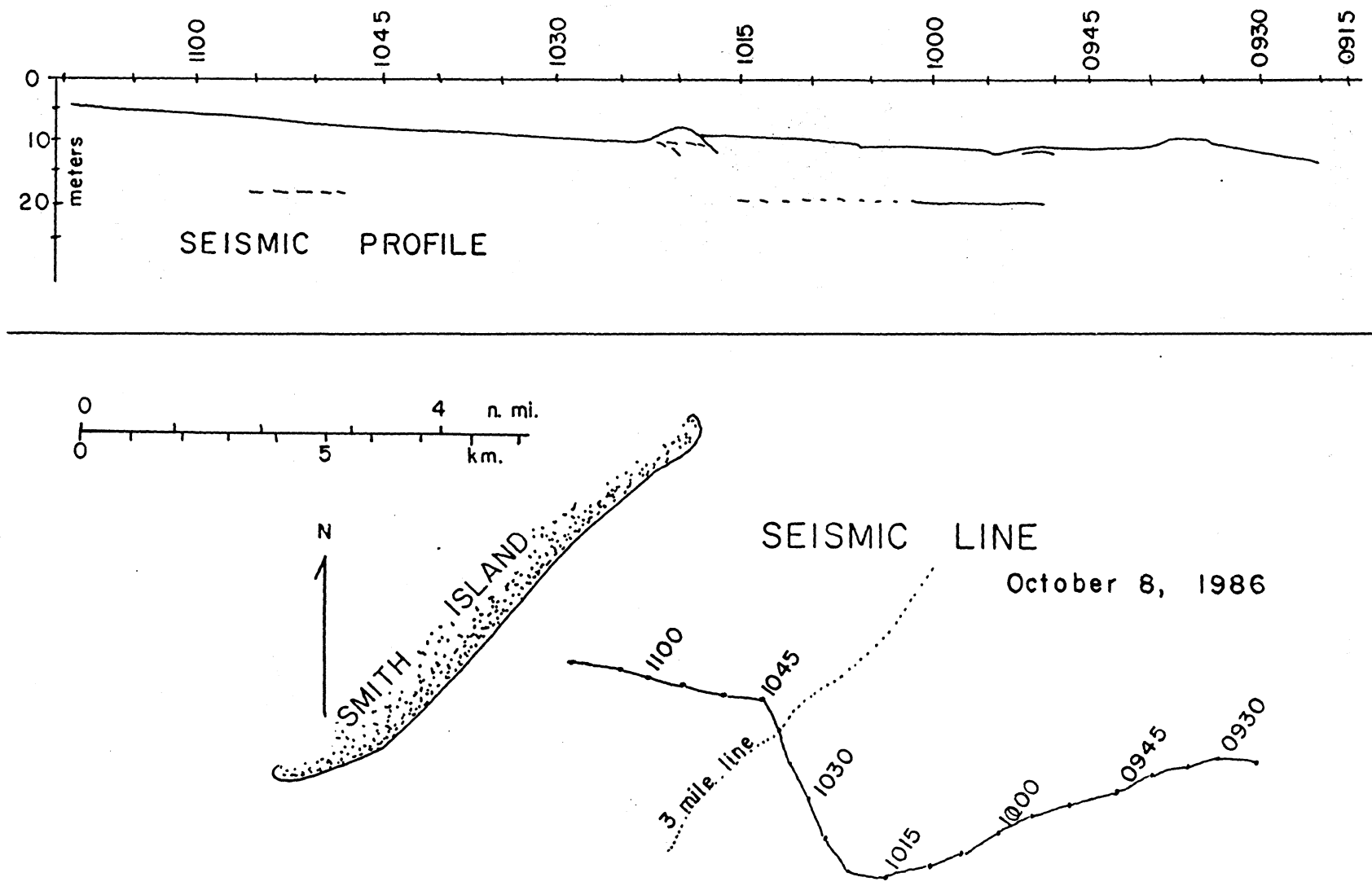
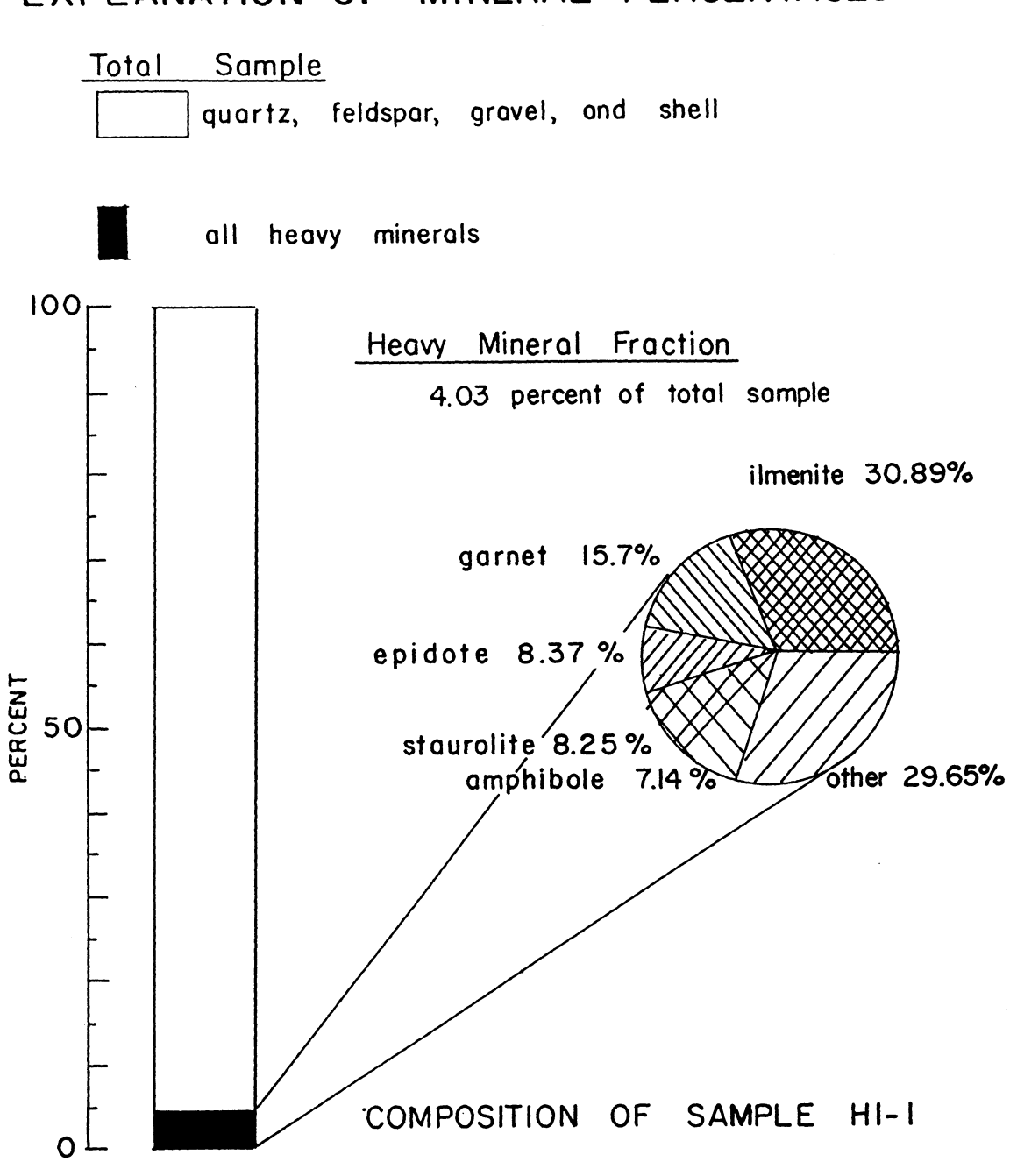


Figure 4. Location and interpretation of sub-bottom profile near Smith Island.



see TABLE 4, several minerals listed in the table have been combined into "other" for simplicity.

Figure 5. A graphic explanation of heavy mineral percentages.

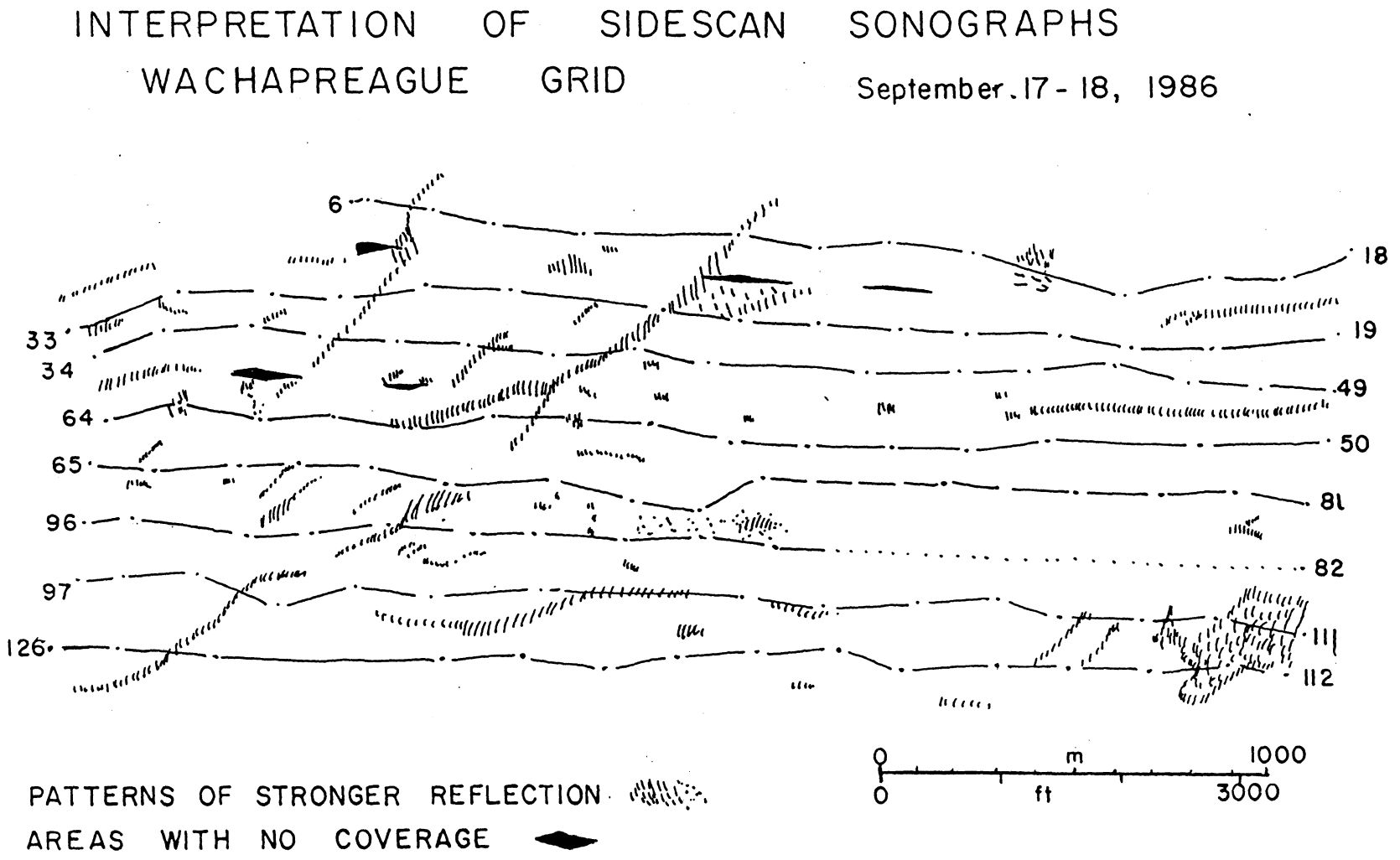


Figure 6. An interpretation of the mosaic of sidescan sonographs from the site near Wachapreague. The shaded areas of stronger reflection result from relief associated with bedforms and/or from harder packed, more reflective sediment.

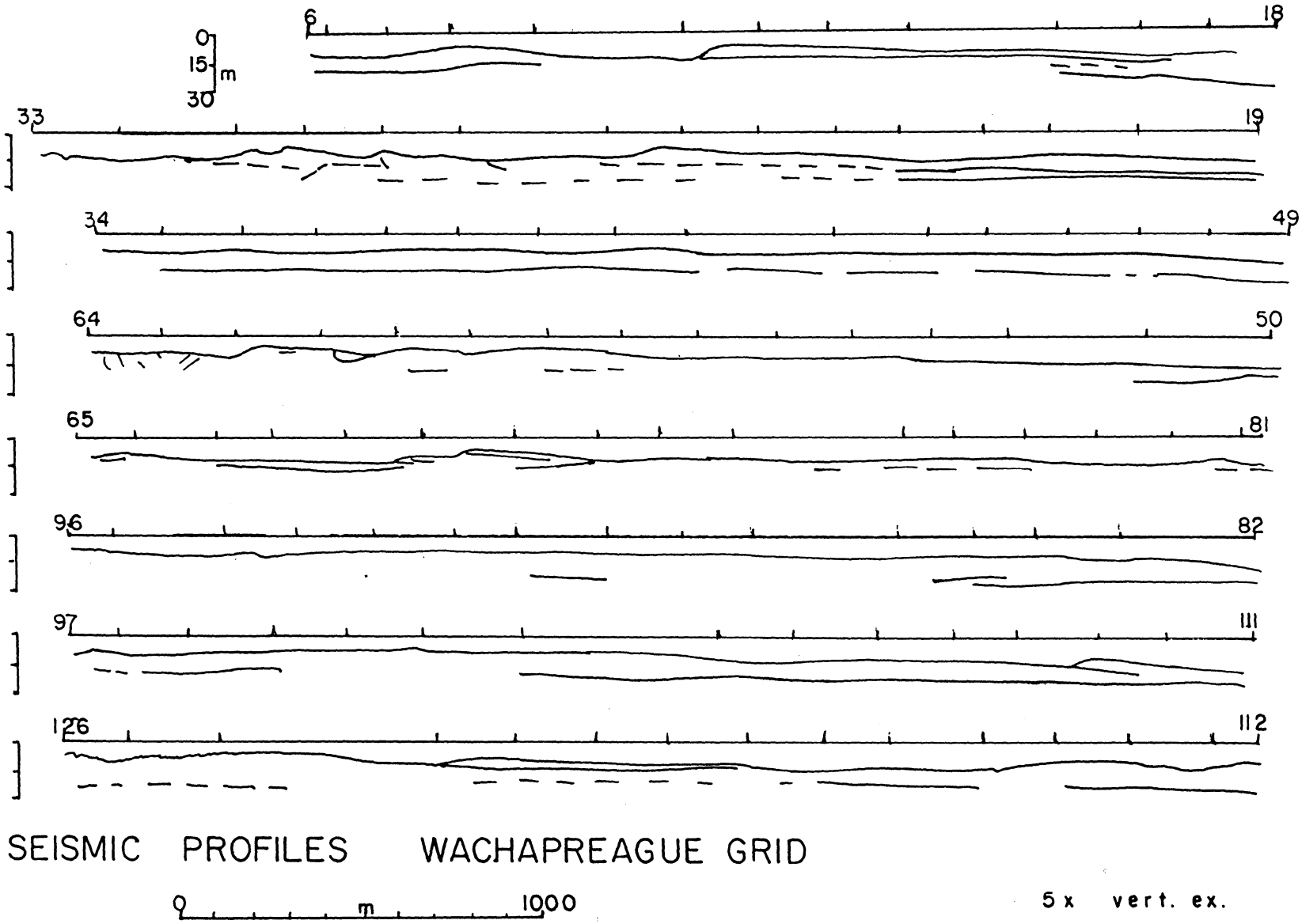


Figure 7. An interpretation of the sub-bottom, seismic profiles underlying the Wachapreague study area. The horizontal line at the top of each section represents the water surface. The undulatory lines are interpretations of the bottom and of the stronger sub-bottom reflectors.

GLOSSARY

Box-corer: A device to take a sample of uniform depth across a modestly sized area (approximately 6" x 9"). The sampler is driven into the bottom by its own weight and ballast; depending upon the hardness of the bottom, penetration ranges from nill to 18 inches.

Core, core sample: A sample colleted with an aim to acquire information over depth. See box-corer, vibracorer.

Exclusive Economic Zone: A zone extending offshore from the 3 nautical mile line separating state from federal jurisdiction to 200 nautical miles in which the federal government has jurisdiction over (minerals). Reference Presidential Proclamation No. 5030, 1983.

Frantz magnetic separator: A commerically marketed device, commonly modified in the field, used for separating minerals into groups according to the magnetic susceptibility of the minerals. This serves to aid in the identification of individual mineral species.

Grab sample: A sample taken from the surface of the bottom sediment without concern for the depth or uniformity of penetration. Usually grab samples are the most easily obtained samples of the bottom; however, their value is limited by the lack of information on the subsurface.

Heavy liquid separation: A laboratory procedure for separating the heavy and light mineral fractions of sediment sample by introducing the sample to a liquid (commonly highly toxic) having a specific gravity equal to that of the lower limit of a heavy mineral. The heavy minerals sink and are removed from the bottom of the container whereas the non-heavy or light minerals float upon the heavy or dense liquid.

Heavy mineral: A detrital mineral having a specific gravity greater than an arbitrary standard (usually around 2.85). Most of the detrital minerals of economic interest are heavy minerals. Note: Heavy minerals should not be confused with heavy metals which usually are anthropogenically introduced pollutants in the marine environment.

Humphry's Spiral: A commerically marketed device for making a rough separation of the heavy mineral fraction from a sediment sample.

Mineral: A naturally occurring, usually inorganic crystalline substance with characteristic physical and chemical properties that are due to its atomic arrangement.

Sand: A size classification of sediments. Sand grains are rock fragments of detrital particles with diameters between 0.0025 and 0.08 in (1/16 to 2 mm).

Sidescan sonar: A marine, acoustic device which produces an image or depiction of the surface and texture of the marine bottom in a swath each side of the ship's track. The image provides information on the roughness of the bottom and the nature of the bottom surface sediment.

Surface or surficial sample: A sample with very limited penetration of the sediments of the bottom surface. See grab sample.

Vibracorer: A device which obtains relatively long or deep, usually continuous samples of the bottom sediment. The samples generally are less than 4 inches in diameter but may be many feet long. The name derives from the vibrating action used to drive the sampler into the bottom. See core.

1987 SESSION

LD9057137

SENATE JOINT RESOLUTION NO. 126

Offered January 23, 1987

Requesting the continuation of the Subaqueous Minerals and Materials Study Commission.

Patrons—Walker, Babalas and Macfarlane; Delegates: Morgan, Moore, Bloxom and Stieffen

Referred to the Committee on Rules

WHEREAS, Senate Joint Resolution 104, passed during the 1985 Session of the General Assembly, requested a joint subcommittee to study whether the subaqueous minerals and materials of the Commonwealth exist in commercial quantities and whether the removal, extraction, use, disposition, or sale of these minerals and materials can be adequately managed to ensure the public interest; and

WHEREAS, Senate Joint Resolution 85, passed during the 1986 Regular Session of the General Assembly, recognized the need to continue the work of the Commission in order to further study the royalty scheme for the removal of materials from state bottom lands, and to investigate potential benefits which may accrue to Virginia from minerals development in the Exclusive Economic Zone (EEZ); and

WHEREAS, though the Commission has made specific recommendations pertaining to these matters, related royalty issues have come to the attention of the Commission and potential minerals development in the EEZ requires further planning and strategy to enhance the Commonwealth's participation in such development; and

WHEREAS, explorations and surveys of an ongoing nature are being conducted by the Virginia Institute of Marine Science to determine the concentrations of heavy minerals off the coast of Virginia and further review and analysis of those surveys are appropriate; now, therefore, be it

RESOLVED by the Senate, the House of Delegates concurring, That the Subaqueous Minerals and Materials Study Commission is hereby continued. The current membership of the study commission shall continue to serve.

The study commission shall complete its work no later than November 15, 1987, and thereafter submit its recommendations to the 1988 Session of the General Assembly.

The indirect costs of this study are estimated to be $11,070; the direct costs of this study shall not exceed $10,860.

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Agreed to By The Senate	**Agreed to By The House of Delegates**
without amendment ☐	without amendment ☐
with amendment ☐	with amendment ☐
substitute ☐	substitute ☐
substitute w/amdt ☐	substitute w/amdt ☐
Date: _____	Date: _____
Clerk of the Senate	Clerk of the House of Delegates