

**REPORT OF THE**

**Subaqueous Minerals and  
Materials Study Commission**

**TO THE GOVERNOR AND  
THE GENERAL ASSEMBLY OF VIRGINIA**



**Senate Document No. 18**

**COMMONWEALTH OF VIRGINIA  
RICHMOND  
1986**

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**Report of the  
Subaqueous Minerals and Materials Study Commission  
To  
The Governor and the General Assembly of Virginia  
Richmond, Virginia  
February, 1986**

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 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.

The study was initiated based on the recognition that the beds of the ocean, bays, and rivers of the Commonwealth may contain potentially valuable minerals and materials which could be suitable for commercial use. Also, previous studies have indicated that sand resources exist in various Virginia submerged lands which could be recovered for the purpose of replenishing the public beaches of the Commonwealth.

Announcements made during the summer of 1985 by the United States Department of Interior revealed that U.S. Geological Survey explorations had identified heavy mineral concentrations off the coast of Virginia, providing further evidence that lands beneath the waters of the Commonwealth may contain similar concentrations.

Virginia could benefit from the development of these resources in a number of ways: by encouraging development of the marine mining industry, by leasing state lands for mining and dredging activities, by receiving royalties on materials extracted, by establishing sources of sand for the nourishment of Virginia's beaches, or by any number of indirect economic and social benefits that could result from developing, processing, and transporting such resources.

With this potential as a foundation, the Commission began to investigate the issues raised by the development of subaqueous resources and the problems encountered in this new and highly technical field.

The Commission meetings this year were focused primarily on technical presentations and the receipt of information as to the type and quantity of minerals and materials existing within and outside of Virginia waters. Based on the knowledge gained thus far, the Commission has developed several recommendations which are contained in Part III herein. Due to the nature and complexities of the issues, it was felt that the study should be continued next year.

This document is submitted as the Commission's report on its 1985 activities.

## II. 1985 DELIBERATIONS

Presentations made before the Commission revealed a wide range of topics and sub-issues that are directly related to the central question of whether minerals and materials exist in commercially feasible quantities in Virginia. Questions involving jurisdictional control, agency authority and management, legal rights of ownership and use, state and federal interaction and exempted activities confronted the Commission. The following paragraphs describe, in a topical fashion, the information, issues, and questions emanating from all of the Commission meetings.

### Ownership Rights in Submerged Lands

One important factor in determining the availability of subaqueous minerals and materials in the subaqueous lands of the Commonwealth is defining the ownership rights of the lands themselves. At the Commission's first meeting this year, a representative of the Attorney General's Office addressed the subject of ownership and use of state-owned bottom lands.

The Commission was informed that generally, the Commonwealth owns the beds of tidal waters. Section 62.1-1 of the Virginia Code states that:

"All the beds of the bays, rivers, creeks, and the shores of the sea within the jurisdiction of this Commonwealth, and not conveyed by special grant or compact according to law, shall continue and remain the property of the Commonwealth of Virginia...."

Difficulties arise in defining the ownership rights in lands beneath non-tidal waters. The Commission was told that non-tidal water beds were often conveyed by special grant or compact before the year 1792. After that time, all non-tidal beds were considered owned by the Commonwealth. Some of the submerged lands can still be traced back to these special grants, and if the waters above are non-navigable, courts have determined that the riparian owner owns the beds also. If the waters are navigable, and the beds are not traceable to a crown grant, the Commonwealth is usually considered the owner.

Further complicating the issues raised by submerged land ownership rights are the rights to use such land.

The use of state-owned bottom lands requires special statutory authority, or a permit from the Virginia Marine Resources Commission (VMRC). Unless it is shown that private title to submerged lands exists from the Commonwealth or a crown grant, the VMRC will assume the lands are state-owned and will require a permit for their use. In issuing a permit for the use of state-owned bottomlands, VMRC is to consider, among other things, the effect of the proposed project on other state waters and lands, the effect on marine resources and wetlands, and anticipated public and private benefits (§ 62.1-3, Va. Code).

Section 62.1-3 of the Code lists acts for which statutory authority is conferred for using state-owned bottomlands, such as a riparian's right to build a private pier out to navigable water and the right to take oysters and clams from the beds unless restricted by law. An additional statutory right is conferred to riparian owners for dredging sand and gravel, even though the State still owns title to the property (Chapter 19, Title 62.1, § 62.1-190 et seq., Va. Code).

The use and ownership rights in submerged lands can be summarized as follows: unless private title is established through proof of a special grant, the submerged lands under state waters are state-owned and their use must be either authorized by statute or a permit from VMRC. However, this is only a statement of the general rule, and various aspects of statutory and common law may set out additional stipulations, rights, or exemptions. One example of special right and exemption is the authority for the federal government to conduct certain acts in state-owned bottomlands without a permit. This includes federal navigation control projects and dredging sand and gravel under authority of the United States government.

As a further statement of state ownership of materials in its submerged lands, one of the Commission recommendations in Part III is to delete the current exemption in § 62.1-193 which allows the federal government or its agents to dredge sand and gravel in the waters of the Commonwealth without a permit.

Relating these aspects of use and ownership rights to the central issues of mining heavy minerals and removing sand, gravel and other materials from state bottomlands, it can be generally concluded that such mining and dredging activities will be allowed only if VMRC issues a permit or if the federal government is acting in its capacity to regulate navigation.

### Heavy Minerals

Activity by the Commonwealth in the exploration for heavy minerals in state bottomlands was initiated by the Division of Mineral Resources and the Virginia Institute of Marine Science (VIMS) as a cooperative effort with the Minerals Management Service of the Department of Interior. The Commission was informed that this cooperative activity has achieved small scale, local, and scattered surface sampling which indicates the presence of some heavy minerals, but estimates on whether they exist in quantities which would make their extraction commercially feasible are uncertain. "Corings" of the deposits need to be conducted more extensively in order to get an idea of the quantity of heavy minerals that may exist in a particular area. The consensus of the Commission is that this work is most important and addresses further coring activity in their recommendations in Part III of this report.

The federal government has been involved with heavy minerals exploration. However, this federal activity has broad implications for Virginia and other coastal states. The United States Geological Survey announced this past summer that core samples taken five to ten miles off the Virginia coast show that certain heavy minerals exist in amounts that may be worth mining commercially.

The minerals identified include ilmenite, which is a source of titanium used for a variety of industries including the aerospace industry, as well as zircon, which is used in turbines for nuclear reactors. Ilmenite has an approximate value of \$25 to \$50 per ton. Zircon is approximately \$300 per ton. Other rare earth minerals such as xenotime, used for lasers, are worth thousands of dollars per ton (see Appendix F).

Dr. Andrew Grosz, a scientist for the U. S. Geological Survey (USGS) appeared before the Commission at its second meeting and explained that the recent surveys and resulting discoveries by the federal government came about as a result of President Reagan's 1983 declaration of the Exclusive Economic Zone (EEZ). The directive was to search for exploitable resources in the seabed of this zone which extends 200 nautical miles offshore. This effort was initiated so that the United States might recover its own titanium and other rare metals instead of continuing to rely on imports. The United States currently imports about 60% of its titanium.

Dr. Grosz told the Commission that even though the USGS took samples along most of the east coast, the samples taken off the coast of Virginia suggest very high concentrations of heavy minerals in comparison to the coastal waters of the Carolinas, Georgia, and Florida, the other east coast states surveyed. He further reported that the sampling and research is still in its early stages in this field of study and that further "core" sampling must be completed to reveal more about the quantities of heavy minerals that exist.

Any mining that would take place beyond the three mile state territorial boundary and out to the 200 mile limit would be regulated jointly by the Minerals Management Service of the Department of the Interior and the Commonwealth. If commercial mining is to take place in this zone, the individual states would still be involved in setting policy. Environmental effects of such mining would have to be measured and a coastal state such as Virginia would likely be involved in the processing, storing, and transportation of the minerals through its ports and other facilities. It was suggested to the Commission that Virginia should make more of an effort to play a role along with the USGS and other federal agencies to establish its position before the point is reached when industries begin to undertake commercial mining activity.

It was brought to the Commission's attention that California, Hawaii, and Oregon have put together a federal/state task force to consider the economic and environmental impacts resulting from subaqueous mineral development in the coastal areas of those states. In addition, North Carolina has initiated the possibility of establishing a similar task force relating to phosphate resources located off its shores. Recognizing the advantages of becoming involved in a coordinated effort with the federal government in subaqueous development, the Commission has made a recommendation for Virginia to become party to a task force which would consider various interests and direct policy (see Part III of this report). A discussion between staff and North Carolina representatives indicated a willingness and desire by that state to have Virginia representatives serve on the task force they are establishing. Another option is an initiative by Virginia to establish a joint task force with neighboring states such as North Carolina, Georgia, and Maryland, with the focus of its study encompassing all resources. In either case, the Commission noted the importance of having adjacent states, industry, and the federal government represented in such a group.

Regarding heavy minerals generally, the Commission concluded that there exists a real potential for commercial mining in state-owned bottomlands. The determination as to what quantities exist will depend on additional core sampling to measure the concentration and extensiveness of the deposits. Though encouraging discoveries have been made recently, it will be left to industry to decide whether actual economic development of the minerals will occur.

### Sand Resources

Pursuant to a 1979 study by the Coastal Erosion Abatement Commission, and the charge that "there is a need to locate sources of sand supplies for rebuilding public beaches" (Senate Document No. 4, 1979), VIMS has conducted a study of bottomlands in the lower Chesapeake Bay. The findings of that study suggest that there is an excess of 230 million cubic yards of sand in the lower bay region which is suitable for beach nourishment.

Commission member Dr. Robert Byrne of VIMS addressed the Commission at its first meeting this year and identified seven zones where sand has accumulated in significant deposits. He noted that certain environmental and physical factors would reduce the sand availability from 230 to approximately 120 million cubic yards. Dr. Byrne estimated that about 8 million cubic yards of sand would be needed for beach nourishment over the next 50 years.

One of the zones identified by Dr. Byrne became a topic of further discussion. The "Eastern Reach" of the Thimble Shoals Channel through the Chesapeake Bay Bridge Tunnel was found to

contain approximately 18 million cubic yards of suitable sand. About 500,000 cubic yards have been taken from this location for nourishment at Virginia Beach. The U. S. Army Corps of Engineers has been considering a project to deepen the channel into Hampton Roads to 55 feet, which would make available almost 3 million cubic yards of sand.

It is reported that difficulties would arise in determining the parties responsible for paying for the disposal and storage of the dredged sand, and in estimating the cost to the Commonwealth in meeting its sand replenishment responsibility.

A representative of the U. S. Army Corps of Engineers appeared before the Commission and explained that the Corp assesses the cost of each project by determining the costs of dredging, transportation and disposal. The Corps attempts to arrange for the disposal of dredge materials for areas that need it, but they cannot incur unreasonable costs in making the material available. In evaluating the cost effectiveness of using sand from deepening the channel at the Bay Bridge Tunnel, the questions that arise are: (i) is the source of sand close enough to the beach to enable an economical transfer, and (ii) could the sand be stored at some holding location for later use? In practical terms, if the ultimate disposal site is not located within a reasonable distance of the source, it may turn out to be more cost effective to purchase sand from other sources.

Since sand has become such a sought after natural resource, the Commission briefly discussed the concept of establishing priorities for the use of dredged sand. In other words, should the Commonwealth set a policy that states, for example, sand for public beach nourishment receives first priority, Department of Highways use gets second priority, and so on? The Commission agreed that this should be considered in further study and makes a recommendation to that effect in Part III of this report.

To summarize the information which the Commission received on sand resources, there are identifiable areas in the lower Chesapeake Bay that can provide suitable sand for beach nourishment, but any evaluation of a sand resource must take into consideration the following:

1. the potential environmental impact of dredging from a particular site on marine life and shoreline property;
2. the rights of private property owners; and
3. the transportation costs, storage costs, and costs to distribute the sand onto the beaches in need of nourishment.

### Oyster Shells

The subject of oyster shells as a subaqueous resource arose during Commission discussions. Several members felt that it is important to ensure development of this subaqueous material in addition to the sand and heavy mineral activity.

Oyster shells are necessary for growing seed oysters and establishing oyster beds. The Commonwealth has been providing oyster shells for the growth of young oysters for 30 years and the public oyster harvest depends a great deal on this oyster replenishment activity. During 1985, the VMRC planted 1.8 million bushels of oyster shells and transplanted 26,000 bushels of seed oysters at a cost of \$832,000. The Commission recognized the importance of finding new oyster shell resources so that future public oyster beds can be developed. Maryland currently supplies Virginia with some oyster shells and several members expressed the desire that Virginia should avoid relying on another state to provide this resource unless the cost would justify buying shells from other states.

The Commission agreed that oyster shell replenishment should be included as a topic of study in the resolution continuing the Commission study.

### Management Roles

In 1982, the General Assembly enacted § 2.1-512.1 of the Code of Virginia. That section provides that the Governor of Virginia shall determine whether proposed mineral exploration, leasing, or extraction of minerals on state-owned lands is within the public interest. The law further provides that agencies, departments or institutions may execute mineral leases or contracts that have been approved by the Governor. The Governor subsequently delegated to the Secretary of Commerce and Resources, the right of approval for determining if the extraction of minerals on state-owned land is in the public interest. The authority to approve execution of leases or contracts for exploring or mining these lands was delegated to the Secretary of

## Administration and Finance.

The 1982 statute also directs that a State Minerals Management Plan be developed by the Division of Mineral Resources in cooperation with the Department of General Services and affected state agencies to coordinate agency activity in this area.

It was brought to the attention of the Commission that the 1982 law conflicts with certain existing provisions of the Code relating to the management role of VMRC over submerged lands. A regulatory system for permits, royalties, easements and leases for activity on subaqueous lands already existed when the law establishing the State Minerals Management Plan was passed. Section 62.1-3 requires a permit from VMRC for any encroachment of submerged lands unless the activity is exempted by statute. Section 62.1-4 authorizes VMRC to grant five-year renewable easements or leases of the beds of most waters of the Commonwealth. These sections and additional provisions within them contemplate procedures which are at odds with the 1982 statute. Some of the conflicting provisions are as follows:

1982 Statute Establishing The State Minerals Management Plan (§ 2.1-512.1)	VMRC Authority Through §§ 62.1-3, 62.1-4 of the Code
Public hearing required in locality of proposed activity	No public hearing required
Competitive bid process required	No competitive bid process
Leases or contracts approved by Secretary of Administration and Finance (Executive Order 21(82), November 3, 1982)	Execution of lease by Attorney General
Lease periods of 5 to 10 years	Lease period limited to 5 years
Proceeds from leases go to general fund	Proceeds from leases go to Special Public Oyster Rock Replenishment Fund

VMRC also collects dredging royalties under § 62.1-3 with a minimum 20¢ and a maximum 60¢ per cubic yard for material removed from state-owned beds. The Commission was informed that VMRC was satisfied with its role in subaqueous land management. Discussion by Commission members resulted in the suggestion that the 1982 statute establishing the State Minerals Management Plan be amended by excluding its applicability to subaqueous lands. This would make it clear that authority over encroachments to subaqueous lands would reside with VMRC. A recommendation to this effect appears in Part III.

Additional discussion revealed that there was some question as to which agency has jurisdiction over subaqueous mining activities that would take place in the beds of inland rivers and streams, which are west of the "fall line." Though it appears that VMRC legally has this authority, it may not have the expertise or resources to regulate such activity. The Commission suggested that issues such as this are worthy of interagency deliberations and expressed the hope that some agreement would be reached between VMRC and the Division of Mineral Resources as to jurisdiction in such cases.

The possibility of establishing a royalty system above the 20¢ to 60¢ dredging royalty was also discussed. Several other states operate under more flexible terms. For example, North Carolina is authorized to "grant to any person, firm or corporation.... the right to such mineral deposits, or to sell, lease, or otherwise dispose of same upon such other terms and conditions as may be deemed wise and expedient by the state and to the best interest of the state" (§146-8, North Carolina general statutes). Florida, in setting the amount of rental charge or royalties, "shall consider such factors as the probable rates of productivity and value of the product of the enterprise" (Florida Statutes § 253.71(2)). The Commission has recommended in Part III of this report that an alternative royalty system be considered for Virginia.

The Commission was in general agreement that the management roles as to subaqueous minerals are not clearly delineated under the current system. In order for industry to become significantly involved with subaqueous mining, it must be fully aware of the permitting, leasing, and royalty system it will have to abide by. A policy that would divide minerals management between subaqueous lands and uplands may be the best approach, or a comprehensive system that would eliminate the statutory conflicts listed previously may be the appropriate course of action. In either case, the best policy would be one which lays out a more definitive regulatory scheme.

### III. RECOMMENDATIONS

The Subaqueous Minerals and Materials Study Commission recommends the following:

**1. The Commission should continue its work during 1986 in order to determine whether subaqueous minerals and materials of the Commonwealth exist in commercial quantities.**

The Commission has reviewed both past and present exploration activities of the U. S. Minerals Management Service (MMS), Virginia Division of Mineral Resources (VDMR), and Virginia Institute of Marine Science (VIMS). The data collected by these agencies indicate that deposits of heavy minerals exist in the continental shelf bordering Virginia. Although similar exploration within Virginia's waters has been less extensive, data does suggest the possibility of the presence of heavy minerals such as ilmenite and zircon. But, until three dimensional analyses of these deposits have been completed, and the concentrations determined, the Commission is unable to make a judgment as to whether heavy minerals exist in commercial quantities. Therefore, the Commission recommends that its work be continued as stated in the resolution set out in Appendix A of this report.

**2. Expand present mineral exploration efforts off the eastern shore of Virginia and in the Bay mouth zone.**

The present cooperative exploration efforts of the MMS, VDMR, and VIMS are not substantial. Only one person year will be devoted to exploration activity for each year of the biennium. Up to now the primary focus has been on the near continental shelf off the Eastern Shore, largely outside Virginia waters. Existing data indicate the presence of surface deposits of heavy minerals such as titanium and zirconium, both within and without state waters. In order to determine whether these minerals exist in quantities that would make extraction economically desirable, the Commission recommends that a more extensive two-year effort be undertaken. This exploratory activity should (a) focus attention along the Atlantic shoreline, and (b) determine the extent of concentration of these heavy mineral deposits. Using such techniques as surface sampling with boxcores and shallow sub-bottom seismic profiling the first year, followed in the second year by corings taken in those "promising areas," a three dimensional view of the deposits could be developed. The analysis of the presence and concentration of heavy minerals is an essential step in determining the commercial viability of subaqueous mining. The Commission recommends that such an effort be funded for two years at a cost of \$291,699, as set out in the Level 2 funding proposal in the document entitled "Subaqueous Economic Heavy Minerals in Virginia: An Outline Addressing Expanded Exploration" (Appendix B).

**3. The Commission should establish a subcommittee to work with neighboring states and the federal government in the exploration and development of the United States Exclusive Economic Zone.**

By joining neighboring states and the federal government in an effort to determine the economic potential of the 197 mile federal economic zone off the eastern coast, the Commonwealth would be in a position to play a role in the formulation of federal offshore development policies. Direct royalties from extraction activities will likely accrue to the Commonwealth from a mining activity within the EEZ, and the "second order effects" could be substantial. For instance, raw material produced by mining or drilling would have to be processed onshore, resulting in additional employment opportunities. There also would be a role for educational institutions and private sector companies in various support and research activities. Therefore, whether Virginia establishes a task force with neighboring states or chooses to establish its own relationship with the federal government, involvement in EEZ exploration activities hold the promise of potential benefits to the Commonwealth, its educational institution and private corporations.

**4. Determine whether there is a need to establish a priority system for the use of sand preserves.**



This report has documented Virginia's substantial deposits of subaqueous sands, especially in the lower Chesapeake Bay. Potential excavation activities, such as the deepening of the Hampton Roads channel and access channels, may result in significant new deposits of sand becoming available. Even with the prospects of newly available deposits, the economic costs of excavation and transportation limits the use of sand from subaqueous sources. This, combined with the fact that upland sources of sands are diminishing because of increasing land values, could necessitate the institution of a priority use system. Such a system would attempt to establish the current and future requirements among competing interests.

**5. The Commonwealth strongly supports the Commonwealth's increased efforts to locate oyster shells for use as seed beds.**

Oysters depend on the availability of suitable bottom conditions in order for larvae to have a place to "set." One of the best substances for oyster larvae "to set" is on other oyster shells, but large scale harvests and siltation have reduced the available oyster shell bottom in most areas. This, combined with the fact that many of the oyster spats are attached to marketable oysters, suggests the need to locate additional oyster shells for future "seed" beds. To avoid having to depend on other sources such as adjoining states for oyster shells, the Commonwealth should increase its efforts to locate additional shell resources within the waters of the Commonwealth. In view of the possibility that the State of Maryland may disallow shell resources to be transported to Virginia, this increased effort to locate shell resources in Virginia waters is viewed by the Commission as being of high priority.

**6. Delete the exemption for the U.S. in current law from the prohibition against dredging sand and gravel below the low-water mark in waters of the Commonwealth.**

Section 62.1-190 of the Code prohibits the dredging or removal of sand or gravel between the high and low watermarks or extending from the low water mark under the beds of the waters of the Commonwealth. However, § 62.1-193 exempts riparian owners or "any person or corporation acting under the authority of the United States...." from those prohibitions.

Although it is recognized that the federal government has paramount rights in navigable waters, the Commission maintains that the language of § 62.1-193 is overly broad and has the effect of declaring a blanket authority for the federal government to dredge the Commonwealth's sand and gravel without compensation.

The Commission's recommendation is to delete the language specifically exempting the United States, or agents under contract with the U. S. from the dredging exemption section of the Code (see Appendix C). The intent of such a deletion is not to question the authority of the federal government. Rather, the intent is to recognize that sand and gravel in the beds of the Commonwealth is state property, subject to certain rights of landowners. The federal government has ongoing rights in navigable waters which need not be set out separately in a state statute.

**7. Clarify the statute establishing the State Minerals Management Plan to indicate that it shall only apply to exploration and mining in lands which are not submerged.**

Since the early 1960s, VMRC has conducted a management program relating to encroachment on subaqueous beds. Applications for permitted activities on subaqueous bottomlands has risen from 12 applications in 1962 to 1350 applications in 1984.

Due to the fact that VMRC has an established program and permitting procedure for subaqueous mining, it is the recommendation of the Commission to amend § 2.1-512.1 and § 62.1-4 of the Code of Virginia to separate the management of subaqueous lands and uplands (see Appendix D). In effect, this will separate the control of subaqueous minerals from the State Minerals Management Plan and clarify existing law to better delineate agency responsibility. Management of minerals in uplands will be conducted by the Department of Mines, Minerals and Energy and the Department of General Services pursuant to § 2.1-512.1. Subaqueous minerals management will be carried out by VMRC and the powers and duties prescribed to that agency in Titles 62.1 and 28.1 of the Code. A subaqueous minerals management plan shall be developed which will supplement the State Minerals Management Plan.

**8. Consider the possibility of implementing a royalty system to compensate the Commonwealth for minerals extracted from state-owned lands.**

Section 62.1-3 of the Code of Virginia authorizes the VMRC to specify, in each permit for the removal of bottomland, a royalty of no less than 20¢ and no more than 60¢ for each cubic yard of material removed. This section further states that "bottom material removed attendant to maintenance dredging shall be exempt from any royalty," and that the "Virginia Department of

Highways and Transportation shall be exempt from permit fees and royalties." Also, counties, cities and towns are exempt from royalties. The combination of a specific range of modest royalty assessments and the exemptions just mentioned can result in the extraction of resources of the Commonwealth with very little compensation to the Commonwealth.

Under the current royalty system, valuable heavy minerals could be mined from state bottomlands and the only proceeds the state could receive would be the permit or leasing fees and a maximum of 60¢ per cubic yard of material mined.

In order to benefit the Commonwealth and the public interest of its citizens, the Commission recommends that a more flexible royalty assessment system should be implemented by removing the ceiling of 60¢ per cubic yard of new material removed. This will allow the Commission to fix the amount of royalty at a rate more in line with the commercial value of the material (see Appendix E).

Respectfully submitted,

Stanley C. Walker, Chairman  
S. Wallace Stieffen, Vice Chairman  
Gary L. Anderson  
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**APPENDIX A**

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**SENATE JOINT RESOLUTION NO. 85**

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

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

WHEREAS, the Commission has determined that there is a need to further study sand resources that exist in various Virginia submerged lands which could be recovered for multiple uses; and

WHEREAS, the Commission has determined that there is a need to further study the royalty scheme for the removal of materials from state bottomlands; and

WHEREAS, the study commission has received testimony documenting the presence of deposits of various heavy minerals such as ilmenite and zircon off the coast of Virginia; and

WHEREAS, the study commission has determined that more analysis and work are needed to determine if the concentrations of these heavy minerals exist in commercial quantities; and

WHEREAS, the federal government has recently designated an Exclusive Economic Zone (EEZ) out to 200 miles from the coasts of the United States; and

WHEREAS, the potential benefits which might accrue from Virginia's participation in the exploration and development of this area could be substantial; and

WHEREAS, the study commission has recommended that Virginia join adjacent states and the federal government in this effort; 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 submit recommendations in the form of an interim report to the 1987 Session of the General Assembly.

The direct and indirect costs of the study are estimated to be \$18,480.

APPENDIX B

SUBAQUEOUS ECONOMIC HEAVY MINERALS IN VIRGINIA:  
AN OUTLINE ADDRESSING EXPANDED EXPLORATION

R. J. Byrne, Member, Subaqueous Minerals  
and Materials Study Commission

October, 1985

## Subaqueous Economic Heavy Minerals in Virginia

### Rationale:

The efforts of the United States Geological Survey (USGS), and those of a cooperative effort between the Minerals Management Service (MMS of USGS), the Virginia Division of Mineral Resources (VDMR) and the Virginia Institute of Marine Science (VIMS, College of William and Mary) have demonstrated that economic deposits of heavy minerals may exist on the continental shelf bordering Virginia. The same data, and others, suggest that deposits may occur **within** the territorial boundaries of the Commonwealth. The heavy mineral sand include minerals yielding titanium, zirconium as well as other valued minerals. Those deposits within the Commonwealth may occur on the innermost continental shelf, with the Chesapeake Bay and tributaries, and in the Coastal Plain uplands. To date the published, or open file, information has not established economic potential to the degree that would attract private industry to prove the deposits. To date the information gathered on the continental shelf within the EEZ is most developed. The MMS/VDMR/VIMS studies have operated close to the Commonwealth territorial boundary with favorable results.

At the present time the Commonwealth has not established a sufficient data base to ascertain whether commercially economic deposits occur within its subaqueous lands. The remainder of this brief report outlines an exploration program which would provide the required data base. The program outlined is presented at varying scales of effort and cost for the 1986-1988 biennium. The various levels of effort outlined for biennium 1986-1988 represent a stepwise increase in geographic coverage.

#### LEVEL 1. Ongoing Cooperative Effort of MMS/VDMR/VIMS

The ongoing cooperative effort of MMS/VDMR/VIMS is a relatively low level effort with approximately one person/year devoted each year. The effort is now in the second year with a potential of extending throughout a five-year term (depending on MMS funding). The combined total level of funding in the first 30 months is about \$135,000.

The geographic area of focus is the nearshore conshelf off the Eastern Shore of Virginia. The State of Maryland is involved in a similar cooperative effort in the northern Delmarva and to gain cost effectiveness some of the field missions are joint efforts. The effort to date has consisted of higher density surface sediment sampling and shallow seismic track. Two subenvironments, limited in area, were based upon the prior sparse sampling by the USGS. One of these is a ridge and swale field off of Smith Island (Smith Island Shoals). The other site is a shore parallel band of more planar topography which ends in a ridge field off of Parramore Island. The rationale of this focus is to test a conceptual model for heavy mineral concentration due to the hydraulic gradients associated with the complex topography in a ridge/swale field. The work planned for summer 1986 includes acquisition of 25 vibratory cores (30 ft) into the substrate to trace the vertical extent of higher heavy mineral concentrations found at the surface. Only a fraction of this effort is within the territorial boundary of the Commonwealth.

Level 1 activity requires no additional funding by the Commonwealth.

LEVEL 2. Augmented Exploration Efforts off the Eastern Shore of Virginia and in the Bay Mouth Zone

This level of activity involves expanding the exploration along the Eastern Shore **within** the Commonwealth's territorial boundary, and the analysis of cores already obtained within the Bay mouth area by the Corps of Engineers (archived by the USGS), and by VIMS (Sand Inventory Study) and others. The "new" exploration would consist of surface sampling with **box cores** and shallow subbottom seismis profiling followed in the second year of the biennium with vibracoring to explore the 3rd dimension in those promising areas defined by the surface sampling and the remote sensing of shallow stratigraphy. The examination of cores already secured by previous investigations is a logical step since one of the more "suggestive" areas is an external Bay mouth shoal shaped by ongoing hydraulic processes. This work involves processing of existing cores archived by the USGS, VIMS, and the Norfolk Corps of Engineers.

LEVEL 2

Estimated Effort and Cost

	1986/87	1987/88
Effort: Person Years	2.44	3.38
Cost	\$118,581	\$173,118
Biennium	\$291,699	

Budget details are attached.

LEVEL 3. Exploration Within the Stem of the Chesapeake Bay.

Analysis of samples from a very sparse sampling grid within the Virginia Bay stem indicates several areas worthy of further evaluation. Specifically, these focus on "show" areas off of Mathews/Gloucester counties

in the western Wolf Trap area, and off of York/Poquoson/Hampton counties (Figure 1, attached). The target minerals are the Zircon/Rutile/Ilmenite suite and associated minerals. During the first year the activity would be focused on **quantitative** surface sampling and on shallow subbottom seismic "remote" sensing. The second year effort would be directed to vibracoring for third-dimension sampling in areas demonstrated by surface sampling and shallow seismic surveys in the first year. This effort is important since the depositional environment of these potential deposits is different from those off the ocean coast. These deposits were formed during the period when the present Chesapeake Bay was a fluvial, rather than an estuarine system. Thus the information gathered provides the framework for a **model** from which additional Bay Stem and Tributaries exploration may be formulated.

### LEVEL 3

#### Estimated Effort and Cost

	1986/87	1987/88
Effort: Person Years	4.91	5.83
Cost	\$195,115	\$305,267
Biennium	\$500,382	

Incremental cost over Level = \$208,683

#### LEVEL 4. Extention of Exploration to the Nearshore (territorial and beyond) Shelf off of Virginia Beach

This element of the program extends the initial phases of exploration to the south of the Bay mouth. Some geologists would argue that if the James River drainage was a heavy mineral source then concentrations of such minerals should be found in shallow waters bordering the present land mass south of Cape Henry. Herein is proposed a two-year effort of surface



sampling and shallow seismic survey to explore this area, with second year funding for vibracoring to examine the third dimension with quantitative sampling in areas of promise.

LEVEL 4

Estimated Effort and Cost

	1986/87	1987/88
Effort: Person Years	7.0	7.4
Cost	\$264,547	\$405,898
Biennium	\$670,445	

Incremental Cost over Level 2 + Level 3 = \$170,063

EFFORT FOLLOWING THE 86/88 BIENNIUM

Just what effort is advisable in the biennia following 86/88 is difficult to judge as much would depend upon the results of the 86/88 effort. However, two actions can be projected:

- A. Preliminary assessment of the environmental impact of extraction at sites identified as having higher potential.
- B. Extension of exploration in the tributaries, particularly the James River.

BUDGET DETAIL: MINERAL EXPLORATION 86/87

Object	LEVEL 2		LEVEL 3		LEVEL 4	
	1986/87	1987/88	1986/87	1987/88	1986/87	1987/88
Personnel (Salary plus Fringe)	\$ 56,481 (2.44)*	\$ 86,418 (3.38)	\$114,015 (4.91)	\$146,367 (5.83)	\$168,147 (7.0)	\$191,098 (7.4)
Travel	2,000	2,000	3,000	3,000	4,000	4,000
Supplies	11,000	3,700	19,500	6,400	24,500	8,000
Equipment	22,600	--	22,600	--	22,600	--
Maint/Repair	2,000	2,000	2,500	2,500	3,000	3,000
Vessels	8,000	--	16,000	--	24,000	--
Report	500	1,000	1,000	1,500	1,500	2,000
Computer	1,000	1,000	1,500	1,500	1,800	1,800
Contractual Vibracoring	--	62,000	--	114,000	--	166,000
Core Analysis Hampton Univ. Archive New	15,000	15,000	15,000	30,000	15,000	30,000
TOTAL	\$118,581	\$173,118	\$195,115	\$305,267	\$264,547	\$405,898
BIENNIUM	\$291,699		\$500,382		\$670,445	

\*Person Year Effort.

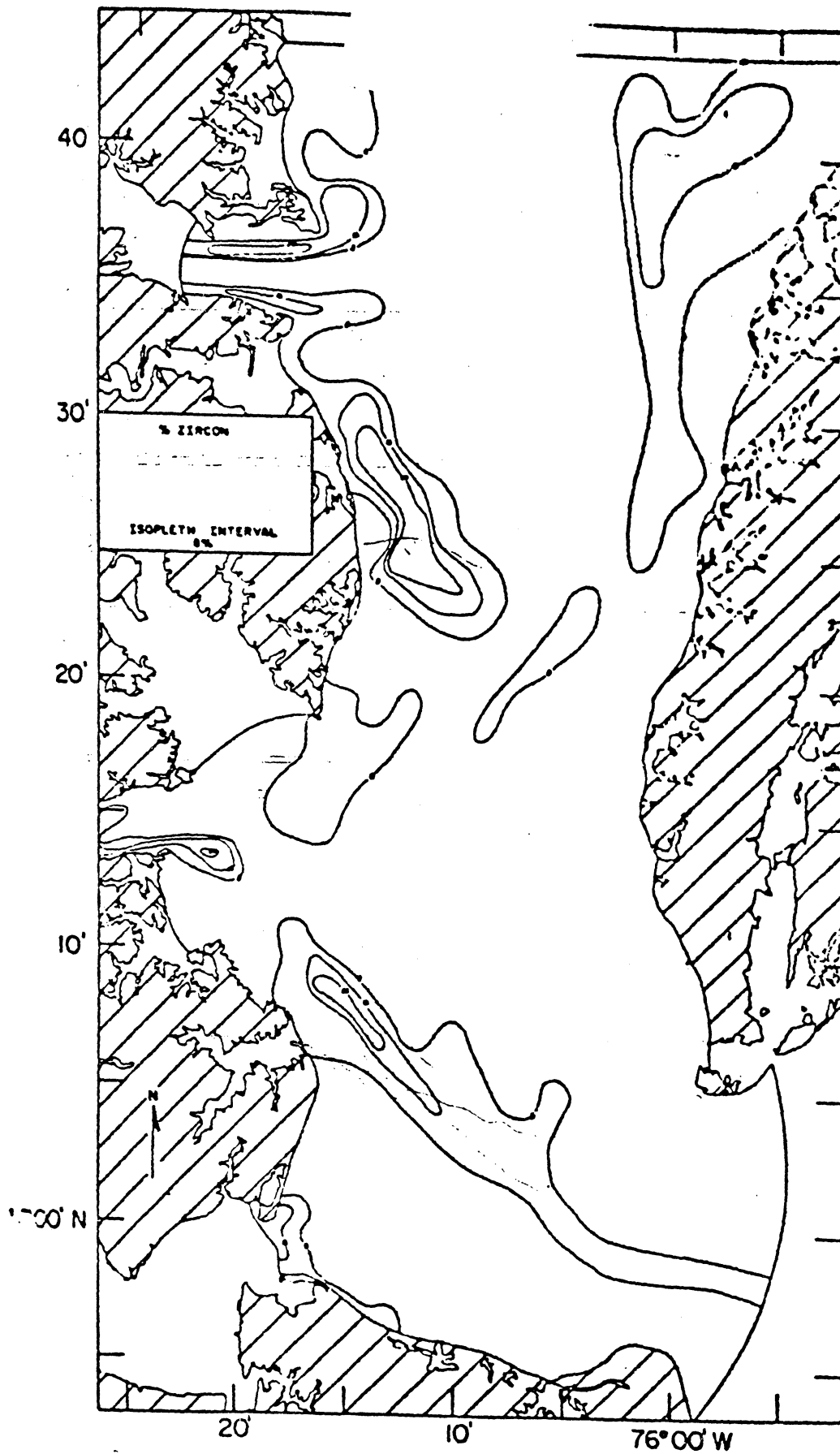


Figure 1. Concentrations of Zircon, from Firck, 1975.

APPENDIX C

LD1472137

D 1/16/86 M. Ward C 1/17/86 jds

**SENATE BILL NO. 315**

A BILL to amend and reenact § 62.1-193 of the Code of Virginia, relating to dredging sand and gravel; exemptions.

Be it enacted by the General Assembly of Virginia:

1. That § 62.1-193 of the Code of Virginia is amended and reenacted as follows:

§ 62.1-193. Exemptions from chapter.—The prohibitions of this chapter shall not apply to any owner of any fastland, bluff, beach or bed of stream, upon or in front of which such deposits may lie, nor to any person or corporation acting under written permission from, or contract with such owner ; ~~nor to any person or corporation acting under the authority of the United States, necessarily removing such deposit in the lawful improvement or regulation of navigation of any waters subject to the authority of the United States .~~

None of the provisions of this chapter shall be deemed to interfere in any manner with the provisions of any law of this *State Commonwealth* relating to taking fish and oysters.

APPENDIX D

LD1470137

D 1/15/86 M. Ward C 1/17/86 dt

SENATE BILL NO. 316

A BILL to amend and reenact §§ 2.1-512.1 and 62.1-4 of the Code Virginia, relating to the State Minerals Management Plan.

Be it enacted by the General Assembly of Virginia:

1. That §§ 2.1-512 and 62.1-4 of the Code of Virginia are amended and reenacted as follows:

§ 2.1-512.1. Exploration for and extraction of minerals on state-owned uplands.—A. Upon receiving the recommendation of both the Director of the Department of General Services and the Director of the Department of Mines, Minerals and Energy, the Governor shall determine whether the proposed mineral exploration, leasing, or extraction of minerals on state-owned ~~lands~~ *uplands* is in the public interest. No state ~~land~~ *uplands* shall be approved for mineral exploration, leasing, or extraction without a public hearing in the locality where the affected land or the greater portion thereof is located and a competitive bid or proposal process as described in the Plan. The provisions of this section shall not apply to the extraction of minerals on state-owned lands pursuant to an oil or gas pooling order unless the well through which the extraction will occur is situated on ~~state-owned~~ *such* land.

*For the purposes of this section, "state-owned uplands" shall mean lands which lie landward of the mean low water mark in tidal areas and which have an elevation above the ordinary water level in nontidal areas.*

B. The agencies, departments, or institutions proposing or receiving applications for mineral exploration, leasing or extraction on state-owned ~~lands~~ *uplands* shall, through their boards or commissions, recommend as specified in § 2.1-512 B all such activities to the Department of General Services, Division of Engineering and Buildings, following ~~guidelines~~ *set forth* in the State Minerals Management Plan. The Division of Engineering and Buildings and the Department of Mines, Minerals and Energy shall review and recommend to the Governor such proposed activities. Such agencies, departments or institutions, through their boards or commissions, may execute such leases or contracts which have been approved by the Governor.

C. The Department of Mines, Minerals and Energy, in cooperation with the Department of General Services, Division of Engineering and Buildings, shall develop, with the assistance of affected state agencies, departments, and institutions, a State Minerals Management Plan. The Plan shall include provisions for the holding of public hearings and the public advertising for competitive bids or proposals for mineral exploration, leasing, and extraction activities *on state-owned uplands*. Sales of mineral exploration permits and leases *for these lands* shall be administered by the Department of General Services, Division of Engineering and Buildings, with the advice of the Department of Mines, Minerals and Energy.

D. The proceeds from all such sales or leases above the costs of such sale to the Department of Mines, Minerals and Energy or to the agency, department or institution sponsoring this sale shall be paid into the general fund of the state treasury, so long as the sales or leases pertain to general fund agencies or the property involved was originally acquired through the general fund. Net proceeds from sales or leases of special-fund agency properties or property acquired through a gift shall be retained by such agency or institution or used in accordance with the original terms of the gift if so stated.

*E. Mining, leasing, and extraction activities in state-owned submerged lands shall be authorized and administered by the Virginia Marine Resources Commission pursuant to §§ 62.1-3 through 62.1-4 of the Code of Virginia.*

§ 62.1-4. Granting easements in, and leasing of, the beds of certain waters.—The Marine Resources Commission, with the approval of the Attorney General and the Governor, may grant easements in, and may lease, the beds of the waters of the *State Commonwealth*, without the Baylor Survey. Every such easement or lease may be for a period not exceeding five years, may include the right to renew the same for an additional period not exceeding five years each and shall specify the rent royalties and such other terms deemed ~~expedient~~ *proper*. Such

easements and leases may, in addition to any other rights, authorize the grantees and lessees to prospect for and take from the bottoms covered such reports to be made on or before the first day of December 1 preceding the convening of each regular session thereof.

*The Commission shall, in cooperation with the Division of Mineral Resources of the Department of Mines Minerals and Energy and with the assistance of affected state agencies, departments and institutions, develop a State Subaqueous Minerals Management Plan which shall supplement the State Minerals Management Plan set forth in § 2.1-512.1 of the Code of Virginia.*

*The Subaqueous Minerals Management Plan shall include provisions for the holding of public hearings and public advertising for competitive bids or proposals for mineral leasing and extraction activities. The Marine Resources Commission shall promulgate any regulations it deems necessary to develop the Subaqueous Minerals Management Plan.*

## APPENDIX E

LD1471137

D 1/15/86 M.Ward C 1/17/86 dt

### SENATE BILL NO. 317

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

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 F

Various Minerals and Their Approximate Value Per Ton

MINERAL NAME	ECONOMIC COMPONENT	COMMODITY USES	IMPORT RELIANCE	\$ VALUE/ TON
Ilmenite	45-55% Ti	Pigment	60%	25-50
Leucoxene	55-93% Ti	Ti metal	60%	40-70
Rutile	95+% Ti	Ti metal	100%	250
Monazite	60% REO	Rare earths	W <sup>1</sup>	550
Zircon	60/30 Zr/Hf	Nuclear Ind.	W <sup>1</sup>	300
Xenotime	45-65% YO	Lazers	100%	1000's
Garnet	Garnet	Abrasives	0%	10-30





