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HEARING BEFORE THE SUBCOMMITTEE ON MINERALS, MATERIALS AND FUELS OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS UNITED STATES SENATE NINETY-THIRD CONGRESS FIRST SESSION ON S. 378

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A BILL TO PROVIDE FOR THE ESTABLISHMENT AND OPERATION
OF A RESEARCH CENTER AT BLACKSBURG, VA.

SEPTEMBER 25, 1973



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CONTENTS

	Page
S. 378-----	2
Department reports: Interior-----	3

STATEMENTS

Brennan, Joseph P., vice president, economics and planning, National Coal Association-----	35
Byrd, Hon. Harry F. Jr., a Senator from the State of Virginia-----	4
Hahn, Dr. T. Marshall, president, Virginia Polytechnic Institute, State University-----	6
Henrie, Dr. T. A., Deputy Director for Mineral Resources and Environmental Development, Bureau of Mines, Department of the Interior, accompanied by Elwood Thomson, Budget Office, Department of the Interior-----	23
Metcalf, Hon. Lee, a U.S. Senator from the State of Montana-----	1
Scott, Hon. William L., a U.S. Senator from the State of Virginia-----	22
Wampler, Hon. William, a U.S. Representative from the State of Virginia-----	19

COMMUNICATION

Metcalf, Hon. Lee, a U.S. Senator from the State of Montana, letter to Dr. Thomas A. Henrie, dated October 2, 1973-----	34
---	----

ADDITIONAL INFORMATION

Addendum to statement of T. Marshall Hahn, Jr., president, Virginia Polytechnic Institute and State University-----	8
Biography of Dr. T. Marshall Hahn, Jr-----	18

878.2

BLACKSBURG, VA., RESEARCH CENTER

TUESDAY, SEPTEMBER 25, 1973

U.S. SENATE,
SUBCOMMITTEE ON MINERALS, MATERIALS AND FUELS,
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met at 10 a.m. in room 3110, Dirksen Office Building, Hon. Lee Metcalf, chairman, presiding.

Present: Senators Metcalf [presiding], Fannin, Hansen, and Bartlett.

Also present: Jerry T. Verkler, staff director; D. Michael Harvey, special counsel; and W. O. Craft, Jr., deputy minority counsel.

Senator METCALF. Our hearing will be in order.

OPENING STATEMENT OF HON. LEE METCALF, A U.S. SENATOR FROM THE STATE OF MONTANA

This is a hearing on S. 378, introduced by Senators Byrd and Scott of Virginia, to provide for the establishment and operation of a research center at Blacksburg, Va.

The research center referred to would be for the Bureau of Mines of the Department of the Interior and would be located at Virginia Polytechnic Institute and State University.

I understand that the legislation is designed to provide a location for the research center now located at the University of Maryland. The lease for that center expires on June 10, 1978, and the University of Maryland has informed the Bureau of Mines that it will not renew the lease.

I will place in the record at this point a copy of S. 378 and an executive communication from the Department of the Interior.

[The text of S. 378 and executive communication follows:]

93^D CONGRESS
1ST SESSION

S. 378

IN THE SENATE OF THE UNITED STATES

JANUARY 16, 1973

Mr. HARRY F. BYRD, JR. (for himself and Mr. SCOTT of Virginia) introduced the following bill; which was read twice and referred to the Committee on Interior and Insular Affairs

A BILL

To provide for the establishment and operation of a research center at Blacksburg, Virginia.

- 1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That the Secretary of the Interior, acting through the United
4 States Bureau of Mines, is hereby authorized and directed to
5 enter into a contract or contracts for the erection and equip-
6 ment of a building or buildings on a site on or near the cam-
7 pus of Virginia Polytechnic Institute and State University at
8 Blacksburg, Virginia, to replace research facilities at the Uni-
9 versity of Maryland, College Park, Maryland, that must be
10 vacated by June 10, 1978, under terms of Public Law 89-
11 227: *Provided*, That a site of approximately twenty acres, as

1 is necessary for the efficient operation of the facility and as
2 may be acceptable to the Secretary of the Interior, is do-
3 nated and conveyed by deed conveying absolute title to the
4 United States Government:

5 SEC. 2. In order to carry out the purpose of this Act
6 there is hereby authorized to be appropriated, out of any
7 money in the Treasury not otherwise appropriated, the sum
8 of—

9 (a) \$6,100,000 for the erection and equipment of
10 a building or buildings, including plumbing, lighting,
11 heating, ventilation, general service, experimental equip-
12 ment or apparatus, the necessary roads, walks, and
13 ground improvements; and

14 (b) such sum as may be necessary annually for the
15 maintenance and operation of the research center, in-
16 cluding personal services, supplies, equipment, and ex-
17 penses of travel and subsistence.

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., September 24, 1973.

HON. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This responds to your request for the views of this Department on S. 378, a bill "To provide for the establishment and operation of a research center at Blacksburg, Virginia."

In order to permit evaluation of alternative sites and to complete regular budgetary review of the Bureau of Mines program, we recommend that action on the bill be deferred.

S. 378 would authorize the Bureau of Mines to construct, equip and operate a research center at Virginia Polytechnic Institute and State University in Blacksburg, Virginia. This center would replace the facilities occupied by the College Park Metallurgy Research Center on the University of Maryland campus which were conveyed to the State of Maryland under terms of Public Law 89-277, and which must be vacated by June 10, 1978. A sum of \$6.1 million is authorized to

be appropriated to carry out the bill's purpose plus such amounts as are necessary to operate and maintain the center.

This Department is currently reviewing the overall Bureau of Mines program and will evaluate the need for replacing the College Park center and possible alternative facilities. We recognize that there are a number of advantages to a site near the Virginia Polytechnic Institute and State University. These include the availability of VPI faculty, students, and facilities, the opportunity for cross-fertilization of ideas and technology transfer, convenience to Washington and to mining areas, relocation of facilities in a rural area, and the willingness of VPI to donate land for the facilities. Proper management requires, however, that alternatives be weighed in the time available against program requirements and pertinent budgetary considerations.

The Office of Management and Budget has advised that there is no objection to the presentation of this report from the standpoint of the Administration's program.

Sincerely yours,

LAURENCE E. LYNN,
Assistant Secretary of the Interior.

Senator METCALF. Our first witness today will be our good friend, Senator Harry F. Byrd, Jr., one of the cosponsors of the bill.

We are delighted to have you here before the committee.

Senator BYRD. Thank you so much, Mr. Chairman.

STATEMENT OF HON. HARRY F. BYRD, JR., A SENATOR FROM THE STATE OF VIRGINIA

Senator BYRD. Mr. Chairman and members of the committee, I thank the chairman and members of this committee for scheduling these hearings to promptly expedite S. 378, to provide for the establishment of a research center for the Bureau of Mines, Department of the Interior, at Virginia Polytechnic Institute and State University at Blacksburg, Va.

A similar Research Center is now at the University of Maryland. But on October 1, 1965, the Congress authorized reconveyance to the State of Maryland for that land on which the Center is now situated, along with the buildings thereon.

This was done because of the need of the space by the University of Maryland. The Research Center thereupon leased the premises until a suitable relocation site could be found.

That lease expires on June 10, 1978, and the University of Maryland has informed the Bureau of Mines that it will not renew the lease.

Because of the dire need for additional space, the University of Maryland desires that the buildings housing the Research Center be vacated at the earliest possible moment.

Virginia Polytechnic Institute and State University has offered, without cost, to the Bureau of Mines, a tract of approximately 20 acres on or adjacent to its campus upon which a research center can be built.

The proposed legislation would authorize the expenditure of \$6.1 million to erect and equip such a facility and would also provide for funds necessary for the annual maintenance and operation of such facility.

The location of this Center at VPI and SU would be most beneficial to the Bureau of Mines. The university is a large and highly respected institution of higher learning, which has especially fine schools in the areas of technology and science.

It has a large library well oriented in technical and scientific fields. The university atmosphere and the locale are such that will be most attractive to prospective employees of the Center.

Blacksburg, Va., is located adjacent to Virginia's vast coal mining regions and is easily accessible to West Virginia and Kentucky, which have extensive coal mining industries.

Therefore, the Center would be located close to active centers of the coal industry.

As the Research Center must be relocated prior to June 1978, there is a one-time expense of relocation, which the Government must bear.

Relocation to the southwest Virginia area would, in the estimation of the Bureau of Mines, result in substantial savings in annual maintenance and operations costs.

Thus, over the years the Federal Treasury will benefit. A little later the president of Virginia Polytechnic Institute and State University, Dr. Marshall Hahn, will testify. He will give more detail than I have given.

I understand there will be another witness prior to Dr. Hahn. So, I want to say to the committee that Dr. Hahn is one of the ablest citizens of our State. As a matter of fact, he is the kind of man with the ability and the integrity to make not only a great president of the Virginia Polytechnic Institute and State University, but he would also make a very fine Governor, should he ever seek that office.

Congressman Wampler I understand will speak next, but I did want to make a few introductory remarks in regard to Dr. Hahn, as well as endorse this proposal which I emphasize is not a new facility for the Government as the Government already has a facility at Maryland.

It is being used in Maryland only because the University of Maryland requires the space and there will be no additional cost to the Treasury.

As a matter of fact, the Treasury as I understand, will benefit over the years.

I thank the chairman for this opportunity and I thank the committee.

Senator METCALF. Senator Byrd, the committee is honored to have you here.

This subcommittee would have reached this bill sooner, had we not been aware that the interest of Virginia and Kentucky and other areas in the coal mining, and we have been working on surface mining legislation.

And, having spent a good deal of the committee's time and effort to keep a quorum here, we are now picking up on some of the other bills we have neglected and we are delighted to have you here. We are honored to have you here.

My old friend Congressman Wampler is not here, so if you will bring your distinguished constituent, Dr. Hahn, forward, we will hear him at this time.

Senator BYRD. Thank you so much. Dr. Hahn.

Senator METCALF. Dr. Hahn, you come very well recommended and we are delighted to have you here this morning to help us with consideration of this legislation.

STATEMENT OF DR. T. MARSHALL HAHN, PRESIDENT, VIRGINIA
POLYTECHNIC INSTITUTE, STATE UNIVERSITY

Dr. HAHN. Thank you very much, Mr. Chairman and members of the committee. And of course I thank my good friend Senator Harry Byrd.

It is indeed a pleasure to be able to support as strongly as I can this proposed legislation authorizing the Bureau of Mines to establish and operate a research center near our campus.

We are replacing the facilities which must be vacated by the College Park Metallurgy Research Center on the University of Maryland campus.

Both the university and the Blacksburg community, of which the university is a part, extend a warm invitation to locate the research center at Blacksburg, and we look forward to welcoming it to our community.

Please be assured that we want this facility in our community and we support strongly its establishment and its operation.

We believe its move to our community will be of major benefit to the Bureau of Mines, as well as to the university.

Virginia Polytechnic Institute and State University, or, more informally, Virginia Tech, is Virginia's land-grant university, located in the beautiful mountains and the clean air of southwest Virginia, west of Roanoke.

You can travel to Blacksburg via Interstate 81 in just a few hours from Washington; you can take direct jet flights from Washington, New York, and Chicago to Roanoke Airport, only 40 minutes from our campus; or you can use the university's own airport, located across the highway from the site proposed for the Bureau of Mines Research Laboratory.

In support of our commitment to this facility, the VPI Educational Foundation, a nonprofit corporation that manages the university's private holdings, will contribute 20 choice acres of our University Research Park as the site for the laboratory, a site readily available to full electricity, sewage, and water service.

The site is about 2 miles from the university's central campus in an area already properly zoned and planned for just such use.

Virginia Tech has an enrollment of 15,500 students and offers bachelors, masters, and doctorate degrees in a total of more than 60 departments in 7 colleges.

Among the strongest of its programs are those in the division of minerals engineering in the college of engineering and the department of geological sciences in the college of arts and sciences.

The former is certainly one of the Nation's strongest programs in mining and metallurgical engineering, and the latter—the Department of Geological Sciences—was cited by the recent American Council on Education study of graduate programs among the Nation's top 20 departments in the field of geology; in the more specialized field of mineralogy, of greater interest to the Bureau of Mines, it certainly ranks among the top 5 in the country.

The personnel, the advanced equipment, and the expertise of the university would constitute a valuable asset to the Bureau of Mines Metallurgical Laboratory, just as the location of this outstanding

laboratory, with the high caliber of its scientists and research programs, would be of inestimable value and stimulation to the university.

Time does not allow me to outline fully the university's personnel and facilities that would be of value to the Bureau of Mines Laboratory—facilities such as our isotope geochemistry laboratory, electron microprobe analytical facilities, computer-controlled laser facility, corrosion laboratory, optical crystallography laboratory, and many more.

I am submitting an addendum to this statement listing laboratories and equipment of value in our minerals programs valued totally at more than \$3 million and this figure does not include our \$4 million computer facility, our 800,000 volume library or our special 25,000 volume branch library in geological sciences—itsself of major value to minerals scientists.

[The addendum referred to by Dr. Hahn appears on p. 8.]

Dr. HAHN. The American Mineralogist, the leading professional journal of the discipline, is edited and headquartered on our campus.

Some of the Nation's leaders in this field are on our faculty: such scientists as Dr. F. Donald Bloss, present editor of the American Mineralogist; Dr. G. V. Gibbs, world authority on silicate structures; Dr. P. H. Ribbe, world authority on feldspars and microprobe analyses; Dr. J. Richard Lucas, one of the Nation's foremost scholars and educators in mining and metallurgical engineering; and Dr. C. I. Rich, worldwide leader in clay mineralogy.

There are, of course, many supporting programs, including Virginia's Water Resources Research Institute, our Center for Environmental Studies, and outstanding scholars in chemistry, physics, and other disciplines.

If this laboratory is located at Blacksburg, we foresee professional and technical personnel from the Bureau of Mines taking our graduate courses and degrees in all of these fields.

Because of their high caliber, we would expect to appoint some of them as adjunct professors and lecturers so they may contribute to our programs.

We would hope some would serve as advisers to our students and consultants on some of the sponsored research projects. By the same token, our faculty could serve as consultants and advisers for Bureau of Mines research projects, and our students, both graduate and undergraduate, could serve both as a source of current, part-time employees and future, well-trained career employees.

As the Bureau of Mines Laboratory and the university take maximum advantage of each other's equipment, facilities, and personnel, both will experience savings in their capital and maintenance budgets, by avoiding duplication of facilities and staff.

Most important, of course, the cross-fertilization of ideas between the university and the laboratory will be of major benefit.

We look forward to welcoming the Bureau of Mines Laboratory to our university community and urge your strong support of this legislation.

Senator METCALF. Thank you very much, Dr. Hahn.

[The addendum to Dr. Hahn's statement follows:]

**ADDENDUM TO STATEMENT OF T. MARSHALL HAHN, JR., PRESIDENT, VIRGINIA
POLYTECHNIC INSTITUTE AND STATE UNIVERSITY**

Advantages which would accrue from moving the College Park Laboratory of the U. S. Bureau of Mines to Blacksburg, would be the interaction between their personnel and interested scientists and engineers at Virginia Polytechnic Institute and State University. Moreover, there is considerable equipment now present at Virginia Polytechnic Institute and State University that could be used on occasion by Bureau scientists. Details are as follows.

EQUIPMENT IN PHYSICS

Electro-optical Laboratory (ca \$75,000)

Dr. Silverio Almeida and associates

Highly advanced, computer-controlled laser facility for monitoring pollution by particulate matter in air or water.

EQUIPMENT IN ENGINEERING

VPI&SU Nuclear Research Laboratory (ca \$587,000)

Dr. A. Keith Furr, Director; R. T. Stone, Reactor Supervisor;

M. D. Mogle, Lab Staff

The Research Reactor provides a number of internal and external irradiation facilities. Neutron exposures of megarads are possible within the reactor and neutron-free gamma irradiations of kilorads are possible. The Neutron Activation Analysis Laboratory has computerized gamma counting systems featuring high resolution Ge (Li) Detectors. An extremely sophisticated computer program reduces the problem of interfering peaks and dependence on literature values of nuclear constants.

Mining and geological applications include highly sensitive trace element analysis in soils, water, and plant material such as would be useful in geochemical prospecting for mineral deposits or in testing the local contamination produced by mining and smelting operations. An example of such localization of sources and range of pollutants is the analysis of bromine in plants to determine the influence of gasoline fumes near highways.

EQUIPMENT IN GEOLOGICAL SCIENCES

Facilities for Isotope Geochemistry (ca \$160,000)

Dr. Krishna Sinha

Lead-free laboratory equipped with a 35 cm solid source mass spectrometer with on-line PDP 11/20 computer. There are also laminar

flow units for clean isotope work. Near the laboratory there is a mineral separation facility that includes Wilfley Table, Frantz separator, Mikro grinder.

Facilities for High Pressure and Temperature Studies of Mineral Stability
(ca \$120,000)

Drs. Charles Gilbert and David Hewitt

Three laboratories equipped with 44 cold-seal bombs and furnaces for research up to 7000 bars at temperatures up to 850°C. A special high pressure laboratory containing two special high pressure furnaces for research to 50,000 bars and to 2000°C.

Electron Microprobe Analytical Facilities (ca \$150,000)

Dr. Paul H. Ribbe, Director; Mr. Tim Kurtz, technician; J. F. Light,
Electronic Instrumentation

Permits complete quantitative chemical analyses of particles
0.0001 inches in diameter.

Two Automated Single-Crystal Diffractometers (ca \$180,000)

Drs. G. V. Gibbs and P. H. Ribbe

Used to determine the atomic structures of crystals to high precision. One is computer card operated and the other is operated by a PDP-8 computer.

X-ray Diffraction Laboratory plus Dark Room (ca \$155,000)

Five Buerger precession cameras, four Weissenberg cameras including 2 high precision back-reflection cassettes, Gandolfi camera, three powder diffractometers with generators and read-out modules, three x-ray generators, and one Siemens x-ray fluorescence unit for bulk analyses of rocks and minerals.

Sulfide Laboratory

Dr. J. R. Craig

Facilities include 12 furnaces for determining the reactions of sulfides during their genesis and smelting with associated temperature detectors, miscellaneous laboratory equipment, and a microscope for study of ore minerals.

Calculating Facilities

Monroe Epic 3000; Wang model 600 with printing and programming accessories.

Optical Crystallography Laboratory (ca \$20,000)

F. D. Bloss

Facilities include two advanced polarizing microscopes and heating stage plus newly devised spindle stages. Programs available for computer analysis of optical data are new to the scientific world.

EQUIPMENT IN CHEMISTRY DEPARTMENT

ESCA Unit (ca \$150,000)

Dr. John Dillard

Electron spectroscopy for chemical analysis permits detection of elements in various oxidation states on the surface of a sample. Computer controlled with a PDP8/e computer.

ESR Unit (ca \$70,000)

Dr. Ray Dessy

Electron spin resonance unit that detects electrons with unpaired spins. This unit is also geared for broad-line NMR so that its use may be extended to solids.

Two Mass Spectrometers (ca \$150,000)

Dr. John Dillard

Determines molecular weights and elemental compositions of vapors. Permits quantitative determinations of gases in mines.

NMR (100 Megahertz) JEOL-PS100 Model (ca \$100,000)

Dr. John Schug

Used primarily to determine the structures of organic molecules. Useful for C₁₃, F₁₅, B₁₁ and potentially for Co₅₉.

Three Mossbauer Spectrometers (ca \$60,000)

Dr. Alan Clifford

Permit determinations of iron, mercury, cobalt, tin and rare earth elements in different oxidation states.

DTA Equipment (ca \$5,000)

Dr. Paul Field

Differential thermal analyses of minerals and inorganic compounds.

SEVEN LIQUID CHROMATOGRAPHS (ca \$50,000)

For chromatographic analyses of nonvolatile materials.

NQR (ca \$25,000)

Nuclear quadropole resonance to determine chlorine, bromine, and other elements that are not susceptible to NMR and Mossbauer analysis.

Laboratory Computers (ca \$50,000)

For automatic control of the foregoing items and other items of equipment in the chemical laboratories.

EQUIPMENT IN FORESTRY AND WILDLIFE

Scanning Electron Microscope (ca \$80,000)
Dr. G. Ifju

Permits highly magnified and detailed views of minerals, crystals, and small particles, especially clay minerals.

EQUIPMENT IN AGRONOMY

Laboratory for Study of Clay Minerals
University Professor Charles I. Rich

X-ray Diffractometer (GE-XRD5) (\$35,000)

Which has capabilities for x-ray fluorescence analysis but is used primarily for x-ray diffraction.

Thermal Analysis Instrument (\$7,000)

This instrument has the capability of differential thermal analysis as well as use in recording the weight of a sample as it is being heated.

Centrifuges (\$7,000)

These centrifuges are used in the separation and treatment of clays and other fine materials.

Infrared Instrument (Perkin-Elmer IR-8) (\$6,000)

This is used in the analysis and identification of clays and other materials.

Atomic Absorption Instrument (\$10,000)

(Perkin Elmer 303 with several attachments).

Ultramicrotome equipped with a diamond knife (\$5,500)

OTHER FACILITIES

Main Computer Facilities (ca \$4,000,000)

Federal government agencies would have access to our main computer facilities housed in Burruss Hall. These include two IBM 370 (Model 158) computers with a wide variety of peripheral devices.

The Geology Branch Library (est. \$150,000)

This branch of the Main Library contains 25,319 books and journal issues. Subscriptions are maintained for over 100 periodicals in earth sciences, petrology, economic geology, mineralogy, geochemistry, etc.

PERSONNEL

The presence of a strong Department of Geological Sciences at Virginia Polytechnic Institute and State University should be attractive to U. S. Bureau of Mines personnel. These include:

F. Donald Bloss, present Editor of the American Mineralogist and author of internationally used textbooks on optical crystallography and on crystallography and crystal chemistry.

G. V. Gibbs, a world authority on silicate structures and bonding in silicates and phosphates.

P. H. Ribbe, world authority on feldspars and microprobe analyses.

M. Charles Gilbert and David Hewitt, well known researchers in the synthesis and stability of minerals at high pressures and temperatures.

J. R. Craig, authority on sulfides whose basic researches cover methods of smelting sulfides so as to minimize air pollution.

Krishna Sinha provides expertise in isotope analyses.

Advice on structural geology, stratigraphy, and the use of geological data in industrial development is available from Professors Gordon Grender, W. D. Lowry, Lynn Glover, Charles Sears, and, in the College of Architecture, James Hackett.

Advice and criticism in respect to possible sites for nuclear reactors so as to avoid areas of active faulting and seismic activity will be available from J. K. Costain (head flow), G. A. Bollinger (seismic activity) and E. S. Robinson (earth tides).

There are also supporting faculty in other departments. Professor Charles I. Rich in clay mineralogy serves as Secretary for the Clay Minerals Society and is a frequent speaker at international symposia. He holds rank of University Professor, a rank bestowed on the University's distinguished scholars.

EQUIPMENT IN MINING ENGINEERING

Rock Mechanics Laboratory
Health and Safety Laboratory
Mining Ventilation Laboratory
Mineral Beneficiation and Processing Laboratory

Crushing, Grinding, and Comminution Laboratory
 Electrostatic Laboratory
 1,000,000# Testing Machine (\$25,000)
 18" Polariscope (\$7,500)
 12 Channel Digital Recorder for Strain Gauge Monitoring (\$5,000)
 Axial Vane Fan and Auxiliary Equipment (\$25,000)
 Beneficiation Laboratory (\$350,000)

EQUIPMENT IN METALLURGICAL ENGINEERING

Two analog computers (EAI, TR-20) with repetitive operation (\$10,000)
 Three fully equipped X-ray diffraction systems (Siemens) (\$60,000)
 X-ray spectrometer with vacuum tunnel (\$6,000)
 Thermo-gravimetric analysis system (\$8,000)
 Induction melting units and vacuum arc-melting unit (\$15,000)
 Fully equipped optical microscopy laboratory including vacuum
 hot stage metallograph (Richert research microscope, MeF-2L) (\$11,000)
 Instron and Baldwin tensile testing machines (\$30,000)
 Siemens Kristalloflex IV Automated Pole-Figure Diffractometer (\$40,000)
 Corrosion laboratory (\$3,000)
 Chemical metallurgy laboratory (\$5,000)
 Extractive metallurgy laboratory (\$11,000)
 Apparatus for television imaging and quantitative analysis of
 microstructures (\$4,000)
 Bergsman, Wilson-Tukon and Rockwell hardness testers (\$4,000)
 High temperature vacuum (or controlled atmosphere) furnace with
 programmable controller (\$6,000)
 Stanat rolling mill and Torrington swager (\$20,000)

EQUIPMENT IN CERAMIC ENGINEERING

Laboratories for thin film deposition and characterization
 Laboratories for phase equilibria and crystal structure studies
 Ceramic processing laboratory
 Thermal deposition (of thin films) vacuum system (\$9,000)
 RF Sputtering unit (\$12,000)
 X-ray diffraction unit (\$21,000)
 Research microscope with high temperature furnace (\$20,000)
 Spectrometer with IR reflectance attachment (\$20,000)
 ESCA unit with minicomputer (\$160,000)

Senator METCALF. Senator Bartlett.

Senator BARTLETT. No questions.

Senator METCALF. Dr. Hahn, we appreciate your appearance here; you have made a very persuasive and informative statement and I think we are delighted to have you here so we can see you in person, the man who is going to have administrative charge of all of these technical facilities.

We look forward to acting favorably upon the bill.

Senator Hansen.

Senator HANSEN. No questions, Mr. Chairman.

Senator METCALF. Senator Byrd.

Senator BYRD. Mr. Chairman, could I make just a couple of remarks to this point?

Senator METCALF. Of course.

Senator BYRD. Mr. Chairman, I want to emphasize again, and I want to say this in the presence of Dr. Hahn, that I would not have introduced this legislation unless I was convinced that it would be beneficial to the Federal Government as well as to the Virginia Polytechnic Institute and State University.

I always want to help VPI if I can, but I felt I could not have introduced it unless it would also have helped the Federal Government.

And, if we are going to have a research center, this, it seems to me, is an ideal location to have one. If we are going to cut out research which we have been doing for many, many years—we have had a research center for many years, but if we are going to do away with one that is something else.

But if we are going to have one, I submit this location would be highly beneficial to the Government. I think it seems to me that this is not the time to reduce research on minerals—at a time when we have a grave energy crisis and we are going into an era of scarcity in energy and in fuel.

We need a research center, and if we do need a research center, then I am convinced the Federal Government over the years will benefit financially from this project.

I thank the committee.

Senator METCALF. Just a minute. Senator Byrd, when you start something, you are talking to three Senators who are concerned with mines, mining and research and minerals and non-leasable minerals and all of that, and you have inspired Senator Hansen to ask a question.

Senator HANSEN. Thank you very much, Mr. Chairman.

May I extend a very belated welcome, in addition to those expressions already heard, to you, Senator Byrd, for your appearance here this morning.

I am keenly aware of your significant understanding of the economies of your State of Virginia and those of adjoining States. I appreciate your interest in the legislation that concerns this committee this morning.

I know, too, that you have made it your business to gain a far greater comprehension of some of the problems of our country as they relate to energy and fuels than is true of the typical Congressman or Senator.

Coming from the West as I do, and appreciating the fact that in the West we have rather generally thicker deposits of coal than is found in the East, and also having in mind the fact that our coals are low sulfur, it seems to me there might very well be good reason now, not only to continue the Bureau of Mines research activities on the campus of the University of Wyoming, which is an institution very dear to my heart, but to expand the scope of the research center in your proposal to treat precisely and explicitly the problems encouraged in the development of necessary important fossil fuel in the East.

It is my understanding that the eastern coals are higher in sulfur and the character of the deposits is not always typical of those western deposits of coal.

My question is: Do you think because of the differences in the nature of the character and kind of deposits that are found in these two geographical areas of the United States that it might be well to pursue further investigation of both kinds of coal?

Senator BYRD. Yes, Senator Hansen. The proposed facility at VPI at Blacksburg, Va., would take the place—it would not be a new facility at all—it would take the place of the facility that is now the University of Maryland and do the same work in the future at Blacksburg, Va., which in the past has been done at the University of Maryland.

The facility at the University of Maryland must be moved because of the need of that university for the property.

I thank the Senator for his comments.

Senator METCALF. Senator Bartlett.

Senator BARTLETT. Mr. Chairman, I, too, would like to welcome Senator Byrd to this hearing and to present his views on research.

I am very much aware of your interest in energy and in metallurgical work and in making full use of our existing facilities.

There have been, as I am sure you are aware, in addition to the Maryland facility, cutbacks in the Bureau of Mines research that has concerned this committee. I know one of these facilities, I believe, is in West Virginia, the other is in Bartlesville, Okla.

And, I would think it might be wise to have a study of just which facilities will continue to operate to determine if the Maryland facility or the research that has been going on in the Maryland facility can be accommodated properly in the other.

The point raised by Senator Hansen about the difference between the eastern and the western coals, Oklahoma happens to have coal that is similar to both eastern and western and naturally that would be a very likely spot to research both of them.

But, I recognize this is to replace a metallurgical facility and I would like to see an analysis made of what space is available, not just in the facility in Oklahoma, but also at other research facilities now in existence, which will continue to be in existence, which might accommodate this expansion.

Senator BYRD. Thank you, Senator Bartlett.

Mr. Chairman, could Dr. Hahn address himself to the question put by the distinguished Senator from Wyoming?

Senator METCALF. Just a moment—before Dr. Hahn responds may I also inform you and inform Dr. Hahn that many of the members of

this committee have a long record of dedication to research and development.

But, the problem here before the committee, and it is going to be yours and my problem, Senator Byrd, and Congressman Wampler's problem before the House, is that OMB is convinced there should not be any relocation of this research center, that the suggestion that they made, the suggestion that other research centers throughout the United States are able to take up this research and we should eliminate entirely the research done at College Park, Md., and not move anything to VPI.

Dr. Hahn, I wish you would respond to that and also to Senator Bartlett's inquiry as to whether we can pick up all of this research at established institutions around the United States.

Dr. HAHN. Yes, Mr. Chairman and members of the committee, I appreciate the opportunity to comment on these two related questions and I recognize and applaud the long displayed interest of this committee in research.

Research is essential to continue to build the capital from which we make withdrawals as we seek to apply technology for the benefit of all of the citizens of the country.

May I say first of all that the research which is being conducted at the present—metallurgical research—at the College Park facility is national in scope.

In my judgment there are not presently capabilities at other institutions that would have the strength of the interactions we are talking of here.

And, we are not talking so much about coal research. For example, some of the very important work done now at the Metallurgical Research Center is that of recycling of the valuable metallurgical materials in waste, hoping to solve waste disposal problems and recovering valuable resources, the mining of which is both expensive and has impact on our total environment.

It has been felt by many scientists, and it is my understanding this has been the view in the Bureau of Mines, it is important that this work be carried on on the east coast because of the population densities on the east coast and the availability of interaction with these areas.

Also, important areas of research being conducted at the present facility are in beneficiation of low-grade metal ores and this is national in scope. These ores are not concentrated in any one State or any one region.

I recognize, appreciate, and commend the Senators for their effective recommendations for their constituencies and the facilities in their States but it is important to note that this laboratory is a national laboratory and it does conduct research of significant impact on the mineral industries in all of the States.

It is important that it be located where there is a spectrum of States and it happens the university I represent has been cited as having particularly broad spectrum of strengths in these areas.

As far as I know no other institution has come forward and offered a free site for this laboratory and I think these additional comments may be helpful in understanding the role of the laboratory.

And, I am sure representatives of the Bureau of Mines can add to this explanation. But, these points that relate to recycling and beneficiation of minerals should be taken into account.

This is a laboratory that is really essential as we move from now at an energy crisis into what will surely be a mineral crisis.

Senator BARTLETT. My question relates to what the availability would be in the existing facilities, not only in West Virginia and Oklahoma, but in the other areas.

It is my understanding in Oklahoma, for example, Bartlesville, which is also the site of the very large and very versatile research center of Phillips Petroleum Co. which I think shows it has a spectrum strength, too, on a national basis.

But, at the Bureau of Mines facility there has been a reduction of research activity and there are available facilities so that not only would there be free land but free buildings.

In the availability of space for such an activity I realize there would be some differences between some of the studies done, but there are now conservation programs being studied at Bartlesville.

There is also research being done in addition to secondary recovery on the Commission standards and various matters relating to the energy crisis as well as—of course in Oklahoma we are interested in minerals, too.

So, I think it is important to consider your generous offer and presentation but I think it is also important that we consider what currently is available at perhaps very little cost.

Dr. HAHN. I would certainly not want to get into a debate with the able Senator from Oklahoma about relative merits of the two universities, either on the playing field or in the laboratories, but I would observe that there are many advantages to keeping the metallurgy research center as a unit wherever it is located because if it were disbursed and located in various institutions around the country that might have room, you would lose that important interface between the beneficiation work, the recycling work, and so on.

I would also observe that some of the facilities which I have mentioned which are not available at the University of Oklahoma, and which have costs that would approach those of the building itself, would represent savings and would represent access to equipment that would appear to be, if not essential, extremely important to this work.

As I said, I don't want to debate the relative merits of the institutions in any aspects but there are some compelling arguments.

Senator BARTLETT. Thank you, Dr. Hahn.

Senator HANSEN. I have a question of Dr. Hahn.

Mr. Chairman, would the distinguished president of VPI care to note on his side of the argument that there is merit in keeping this research center in the East where a major part of the pollution and associated problems occurs.

Dr. HAHN. In the case of landfills, particularly since the people are here, there are merits to keeping it in the East.

In fact, the location in Blacksburg is in a low population density area, an existing Federal policy in that connection.

Senator METCALF. Senator Byrd, I am going to ask you to do this. I hope you will provide us with a brief biography of Dr. Hahn and

the discipline in which he is graduated and some of his academic degrees and so forth, so it may be incorporated into the record.

Senator BYRD. Yes, Mr. Chairman, I would be delighted to do that.

Senator METCALF. I know you would.

[The biography of Dr. Hahn follows:]

BIOGRAPHY OF DR. T. MARSHALL HAHN, JR.

Dr. T. Marshall Hahn, Jr., became the 11th President of Virginia Polytechnic Institute and State University on July 1, 1962. Born Dec. 2, 1926, in Lexington, Ky., Dr. Hahn, at the time of his appointment, was the youngest president in Virginia Tech's history and the youngest president of any land-grant university in the United States.

After attending public schools in Lexington, he entered the University of Kentucky where he received his B.S. in physics "with highest honors" at age 18. In 1950, after also serving in the Navy, he received the Ph.D. degree (physics) at Massachusetts Institute of Technology. He was then 23.

While in the Navy, he was a lecturer in physics at the U.S. Naval Academy Preparatory School. He served as a physicist for the Naval Ordnance Laboratory, 1946-47; teaching fellow, MIT, 1947-48; research assistant, MIT, 1948-50; associate professor of physics, University of Kentucky, 1950-52; professor, director of graduate study in physics, and director of nuclear accelerator laboratories, University of Kentucky, 1952-54.

Dr. Hahn originally came to Virginia Tech in 1954 as professor and head of the physics department, where he served until 1959. From 1959 until he came to Tech as President in 1962, he was dean of arts and sciences at Kansas State University.

The author of numerous scientific papers, he has been consultant for a number of large corporations. He also served as a physicist for the North American Phillips Co. and as a research participant for the Oak Ridge National Laboratory. Dr. Hahn has served as president of the Southern Association of State Universities and Land-Grant Colleges, as a member of the Board of Visitors of Air University, as a member of the Academic Affairs Commission of the American Council on Education, and as a member of the Board of Visitors of Ferrum Junior College.

He was named "Virginia's Outstanding Citizen" for 1965 by Toastmasters International, primarily for his efforts to create a broader public understanding of the state's educational strengths and deficiencies, and he received the Virginia Citizens Planning Association Award in 1970 for outstanding professional contributions. He was a member of the Governor's Commission on the Status of Women in 1964-66.

He served as Chairman of the Virginia Metropolitan Areas Study Commission, charged by the 1966 General Assembly with a study of Virginia's urban areas and their planning and development problems. Many of the Commission's far-reaching recommendations have been implemented, including one that the State be divided into Planning Districts to provide the basis for area-wide planning throughout the State.

In 1972, President Nixon named Dr. Hahn to the National Science Board for a six-year term, and Governor Holton appointed him for a two-year term on the Board of Control of the Southern Regional Education Board. Dr. Hahn is a director of the First National Exchange Bank, the Lane Co., Dominion Bankshares, Inc., the Roanoke Electric Steel Corp., the Shenandoah Life Insurance Co., and the Georgia-Pacific Corp.

The Virginia Tech president holds membership in many educational, honor and professional societies. Among these are Phi Beta Kappa, Sigma Xi, Omicron Delta Kappa, Sigma Pi Sigma, Pi Mu Epsilon, Alpha Zeta, Alpha Phi Omega, and Alpha Kappa Psi. He is a Fellow of the American Physical Society.

Dr. Hahn is married to the former Margaret Louise Lee of Dinwiddie County (Virginia), a graduate of Madison College. The Hahns have one son, Bill, and two daughters, Betty and Anne. He is a Methodist and a Rotarian.

Senator METCALF. Now my old friend from the House of Representatives, Congressman Wampler, who is a cosponsor of this legislation.

Congressman Wampler, will you come forward? I understand you have an identical or a similar bill in the House of Representatives and we are delighted and honored to have you here today.

STATEMENT OF HON. WILLIAM WAMPLER, A U.S. REPRESENTATIVE FROM THE STATE OF VIRGINIA

Mr. WAMPLER. Thank you very much.

Before I begin a very brief prepared statement I would like to associate myself with the remarks of both Senator Byrd and Dr. Hahn.

I think they have made an excellent presentation here this morning and I noted the colloquy that followed with a great deal of interest.

I want to say to you, Mr. Chairman and members of the committee, that I appreciate the long history of this committee and this subcommittee with its concern with the problems you have expressed.

Virginia is now the sixth ranking coal producing State in the United States and all of it is mined in the Ninth Congressional District which I am honored to represent.

And, VPI has long been noted for its interest in this great industry as well as other aspects of the mineral industry in this country.

It is a pleasure to appear today in support of Senate bill 378, which would provide for the establishment of a metallurgy research facility near the campus of Virginia Polytechnic Institute and State University at Blacksburg, Va.

This facility is currently located at the University of Maryland, College Park, Md., and the University of Maryland is anxious to utilize the space currently held by this facility for another purpose.

Virginia Polytechnic Institute and State University is anxious to have this facility located at Blacksburg.

Public Law 89-227 conveyed land and buildings for the present facility to the University of Maryland on June 10, 1968.

The State of Maryland purchased the land and buildings and the State leased the buildings back to the Federal Government rent free for 10 years.

This lease will expire in June 1978, and although the University of Maryland has the renewal option, the university is not expected to renew the lease in 1978.

For this reason, it is important that a new site be found for this facility immediately, in order that the replacement facility can be constructed and ready to begin operation in 1978, if the Bureau of Mines is to continue the metallurgy research projects now underway at the College Park facility.

Virginia Polytechnic Institute and State University at Blacksburg, in the Ninth Congressional District of Virginia, would be an excellent site for the relocation of the Research Center, and the university will donate 20 acres of choice land in its University Research Park on which the center would be situated.

The University Research Park is close enough to the Virginia Polytechnic Institute and State University campus to allow easy communication with, and access to, the faculty and services of the university, and at the same time it is distant enough to assure that future growth of the university will not encroach upon the site of the research facility.

The Bureau of Mines, by accepting this site, would not again be faced with the situation as it is now at College Park, necessitating transfer of the facility.

Mutual benefits to Virginia Polytechnic Institute and State University and the Bureau of Mines research programs would result from relocation at Blacksburg.

The university is widely known and recognized for its mining and minerals engineering programs, and the Bureau of Mines would benefit from interaction with both faculty and students with specialized skills.

Also, the university's library, computers, and specialized equipment would be at the disposal of the research facility.

In return, a facility of this caliber would be most beneficial to the university programs in mining and minerals engineering by augmenting these programs through the use of research center staff personnel and equipment.

The number of persons to be employed by the facility and the caliber of these persons would enhance the intellectual and economic status of the university, Blacksburg, and the surrounding Montgomery County.

I introduced the companion measure to this proposal, H.R. 2464, in the House of Representatives on January 18, 1973.

I am very pleased that your subcommittee is holding this hearing on the Senate bill, and I am hopeful that favorable action will be taken soon in order that planning and construction of a facility at Blacksburg can begin in the near future.

Senator METCALF. Thank you very much, Congressman Wampler. Senator Hansen.

Senator HANSEN. Mr. Chairman, I don't think I have any questions. I want to express my appreciation to my good friend and very able Representative in the State of Virginia for appearing here this morning.

His interest and his concern should focus attention upon growing realization of the fact that we are dealing with important sources of energy on the one hand and with the increasing cost of providing the variety and amounts of metals that are required to keep our society going, as was pointed out by Dr. Hahn.

What now is so clearly evident to everyone is—a fuel and energy crisis in this country indeed could very shortly become a broadened concern that would encompass a metal shortage as well.

I know the legislation we have been considering with respect to surface mining undoubtedly will be broadened some time to include the exploration and recovery of various metals.

And, it just makes good sense to me that we ought now to be taking all such steps as we can in order to be certain that we fully utilize these precious resources that without recycling and recovery would be wasted.

I thank Congressman Wampler for his appearance.

Senator METCALF. Senator Bartlett.

Senator BARTLETT. Mr. Chairman, I also share the views of the Senator from Wyoming and compliment you on your interest and research and it is obvious there are vital and future utilization of our resources and energy derivatives.

I believe your statement gave me a little better understanding of the problems involved and I thank you very much.

Mr. WAMPLER. Mr. Chairman, may I make just one brief observation. During the August recess of the Congress I was privileged to visit in South Africa and Rhodesia. And while visiting South Africa I had the opportunity to visit a facility near Johannesburg where they are now extracting petroleum from coal and they are using basically, as I understand it, a process that was developed in Germany and in the United States and I think this just points out the fact that we are in an energy crisis in this country and other countries of the world are facing this crisis.

Admittedly South Africa is a high energy cost area of the world and I recognize the problems that OMB has. I am in sympathy with them and I generally have tried to be a conservative in relation to fiscal matters.

But, it would seem to me that if this administration and prior administrations had taken the heed and warning of this committee as it relates to the whole problem of our energy crisis, perhaps we would not be in the energy crunch we are in today.

And, I believe very strongly that research, particularly as it relates to the energy crisis, is one area that we should not be cutting back on but we should be trying to increase our efforts and trying to find answers to these problems because they relate to the whole economy.

Again, I recognize the problems of OMB, I differ with them on this as I have in other matters, but as reasonable men we can disagree on our assessment of priorities but this is one area that we surely would not cut back on but surely would want to increase our efforts to get the most effective research that we can to find workable answers to these problems.

Senator METCALF. Congressman Wampler, I want to echo and concur in the statements made by my colleagues. I am always pleased to have one of my colleagues from the House of Representatives over here to testify.

You may be interested to know that at the last meeting of this subcommittee was dealt with on our off-shore development of minerals, you know that process where you either have a bucket or a glorified vacuum cleaner and mop up nodules from the ocean floor.

As Senator Hansen has pointed out, we are in an energy crisis right now and may be in a metal crisis soon. I can remember when I was first in politics, the attorney general of the State of Montana advocated continuous mining of coal from the Anaconda mines and we couldn't sell at that time.

Now, of course, it would seem to me one of the reasons for geographical location of research on this eastern seaboard would be the beneficiation and discovery of some of these nodules, which is a real problem, and at the same time a tremendous potential source of minerals such as copper, manganese, and so forth, which are scarce.

So, I do want to compliment you on your appearance here today.

How is your bill coming over in the House?

Mr. WAMPLER. Unfortunately we have not made the progress that you have made here. I would hope if we can get the position of the OMB—I certainly don't quarrel with Senator Bartlett or anyone who would ask before these decisions are made that we made a careful analysis.

Senator METCALF. All of us, of course, are a little bit parochial. If possible, if we had the facilities, I probably would be saying to you, "Well, we will put this out in the School of Mines for vocational education in Montana Tech, which used to be the School of Mines at Butte, which has a tremendously vital and able research department."

Probably Senator Hansen would want to have it at the University of Wyoming.

Senator HANSEN. Only if it could better serve the Nation.

Senator METCALF. And of course that tremendously able research institution that has just been mentioned at Bartlesville probably could absorb this without too much trouble.

I want to give you an inkling of some geographical handles we could put on it so we can support you as well as our own parochial constituency.

Mr. WAMPLER. I appreciate that sensitivity and let's say that I am here as an advocate of locating this facility at the campus of Virginia Polytechnic Institute and State University.

I am not speaking against any other institution.

Senator METCALF. We understand that you are speaking in the broadest national scope and Dr. Hahn has said that this is an ideal location for a national research center.

Mr. WAMPLER. I feel that very strongly.

Senator METCALF. Thank you very much, Congressman Wampler.

Immediately following the testimony we have had right now we will have the statement of Senator Scott, who is a cosponsor of the bill who will appear also to support S. 378, and it will appear as if given in person.

STATEMENT OF HON. WILLIAM L. SCOTT, A U.S. SENATOR FROM THE STATE OF VIRGINIA

Senator SCOTT. Mr. Chairman, I am certainly pleased to have the opportunity to present my views on this bill which is being sponsored by Senator Byrd and myself.

Senate bill 378 authorizes the Bureau of Mines to establish, equip, and operate a research center on a site near the campus of Virginia Polytechnic Institute and State University, Blacksburg, Va., replacing the facility now in use at the University of Maryland.

Presently, the Bureau of Mines leases the property at the University of Maryland. This lease expires in June 1978. The State of Maryland has requested return of the land to the university for needed expansion and has informed the Bureau of Mines that it will not renew the lease.

Thus, the research center must be relocated or closed by June of 1978.

To continue the operation of this center, Virginia Polytechnic Institute and State University, through its educational foundation, has agreed to contribute to the Government 20 acres of its University Research Park in Blacksburg for the site of the new Bureau of Mines facility.

The relocation of this facility to Blacksburg, Va., will be of mutual benefit to the Bureau of Mines and to the university.

VPI has exceptionally strong and nationally recognized educational and research programs in its division of mineral engineering and its department of geological sciences, areas of study which are of great interest to the Bureau of Mines.

VPI's faculty in these fields, including a number of nationally recognized scholars, will be available to strengthen, through advice and consulting, the Bureau of Mines research program.

In addition, the students of the university, both graduate and undergraduate, will be available as part-time employees and eventually as a source of trained career employees to the Bureau of Mines.

Scientists from the Bureau may also serve as professors and lecturers to strengthen university programs. The use by the Bureau of university facilities and personnel and the use by the university of Bureau of Mines facilities and scientists will provide a mutual benefit and cost savings through the interchange of ideas, technology, and physical plant.

For these reasons and because the replacement of the University of Maryland laboratory is considered essential if the Bureau of Mines is to continue its vital research program, I would hope that this subcommittee will act favorably on this proposal.

Mr. Chairman, again I would like to thank you and your fine committee for giving this measure your fair consideration.

Senator METCALF. Dr. Henrie of the Bureau of Mines, Department of the Interior.

We are delighted to have you here, Dr. Henrie, and I notice you have a prepared statement.

Dr. HENRIE. I have with me Mr. Elwood Thomson from our budget office in case questions of that nature come up.

Senator METCALF. We are pleased to have both of you here.

Please feel free to respond to any of the questions at any time.

STATEMENT OF DR. T. A. HENRIE, DEPUTY DIRECTOR FOR MINERAL RESOURCES AND ENVIRONMENTAL DEVELOPMENT, BUREAU OF MINES, DEPARTMENT OF THE INTERIOR; ACCOMPANIED BY ELWOOD THOMSON, BUDGET OFFICE, DEPARTMENT OF THE INTERIOR

Dr. HENRIE. Mr. Chairman and members of the committee, it is a pleasure for me to join you here today to discuss the need for replacing our Metallurgy Research Center located on the campus of the University of Maryland at College Park.

First, I would like to read a letter to you signed by Assistant Secretary Laurence E. Lynn that expresses the views of the Secretary.

These views are a result of the Secretary exercising his discretion in reviewing the research program underway by the Bureau of Mines at its various facilities and determining the location or relocation to best serve the needs of the country.

Second, to review the metallurgy research program carried out at the College Park Metallurgy Research Center.

Senator METCALF. Mr. Lynn's letter dated September 24, 1973, has been incorporated as a part of the administration report at the beginning of the record.

[The letter referred to above appears on p. 3.]

Dr. HENRIE. Thank you, sir.

In 1935, the State of Maryland donated land on the University of Maryland College Park campus to the Federal Government for construction of a Bureau of Mines research facility.

In 1937, this facility, known as the Eastern Experiment Station, began operation. Originally, it was occupied by the Bureau's non-metals, metallurgy, and mining divisions, a mineralogical laboratory, and headquarters office for the explosives division.

With the growth of the station and organizational changes within the Bureau, the original function was modified and the Eastern Experiment Station became the principal headquarters for the 17 most Eastern States, comprising region 8.

Early research activities included minerals extraction and processing, hard rock mining, stream pollution problems, boiler water analysis, and physics applied to mining operations.

Under subsequent organizational changes, the Eastern Experiment Station became the College Park Metallurgy Research Center with emphasis on finding solutions to a wide variety of metallurgical problems.

Today, a dynamic research program at the Center is directed toward the development of advanced minerals and metals technology.

Toward this objective, the research program encompasses a broad spectrum of areas from basic studies on mineral flotation and corrosion phenomena to the application of minerals beneficiation technology for separating municipal incinerator residue and unincinerated or raw refuse into many useful and valuable components including scrap iron, tin cans, aluminum, copper, and a paper and plastic fraction suitable for fuel.

Refining and upgrading ferrous and nonferrous scrap constitutes another important research area. Other research there is concerned with the utilization of abundant domestic resources, improvements in materials performance, development of new and improved analytical methods and techniques and the evaluation and economic analysis required to measure practicality and guide research efforts toward the development of lower cost metallurgical and chemical processing methods.

At the time land was donated to the Federal Government, the site was well north of the center of campus activity. However, rapid growth of the university during the post-World War II period enveloped the Research Center and it now occupies a prominent site at the heart of the campus.

Because of this central location, the State of Maryland requested return of the land to the university in order to complete consolidation of needed expansion and improvements.

Public Law 89-227—September 20, 1965—conveyed on June 10, 1968, slightly over 14 acres of land to the university, together with buildings and improvements, which the State of Maryland purchased from the Federal Government at fair market value.

In turn, the State leased the buildings back to the Government on a rent-free basis for a period of 10 years. According to the agreement, the lease is renewable at the university's option, but it is clear that the university does not intend to extend the lease.

The time limitation imposed by this agreement necessitates that early action be taken to construct a replacement facility so that it will be ready for occupancy by June 1978.

Throughout its history, the College Park Research Center continually has served as a showcase of the Bureau's work to the public and to various Government and industry officials.

Outstanding research accomplishments have been: The development of an economical process for recovering valuable metal and nonmetal constituents contained in incinerated urban refuse, electrodeposition of thick platinum coatings for ultra-high-temperature applications, alumina-from-clay process technology, electrostatic beneficiation techniques, manganese process technology, and basic corrosion properties of titanium and zirconium metals which still stand as the most comprehensive work on these metals in the world.

You are well aware, I am sure, of the final report of the National Commission on Materials Policy to the President and Congress of the United States which emphasizes the fact that this Nation is facing a minerals crisis comparable to our current energy crisis.

Unless we continue to forge ahead in developing new and more effective technology for extracting and recovering mineral raw materials from lower grade ores, this crisis will become an ever-increasing reality.

Consequently, we cannot afford to lose any of our metallurgical competence such as that established at College Park over a period of nearly 40 years.

Thus, replacement of the College Park Metallurgy Research Center is desired if the Bureau of Mines is to continue to meet its obligations to the public and to the Nation in advancing minerals processing technology, developing methods for eliminating or abating land, water, and air pollution, and recovering and reusing secondary mineral and metal resources.

Senator METCALF. Do you have anything to add?

Mr. THOMSON. No, sir.

Senator METCALF. Senator Bartlett.

Senator BARTLETT. Mr. Chairman, I concur it is a very fine statement giving additional information which I find very valuable.

I would like to ask the same question that I previously asked concerning in your opinion what facilities would be available in other Bureau of Mines research centers to accommodate this research that would be closed out in 1978 in Maryland.

Dr. HENRIE. Senator Bartlett, referring to some of the other centers such as the Bartlesville center or the West Virginia center, these two centers are devoted to resolving energy problems specifically and are energy laboratories.

The College Park laboratory is a metallurgical research center. Now, there is an interface at which this work must be coordinated and this is a responsibility of my particular office.

I think it is quite important that people engaged in research have both disciplinary as well as commodity interests and as a result of this we do have some choice of geographical locations for our laboratories.

As an example, Arizona, Utah, and Montana are principal producers of copper. Our laboratories located in these areas do the principal share of our copper work.

The people being located there have a special interest in copper metallurgy because I think they have the sense of serving that geographical area.

So, it is not so easy to just incorporate all of these disciplines. However, the loss of the College Park facility will mean much more than just one less Bureau of Mines research laboratory east of the Mississippi River.

It will mean a loss of an essential part of the Nation's metallurgical competence and I really believe these researchers need this sense of being associated with the commodity as well as the disciplinary problem.

Senator BARTLETT. Could you comment on the availability of space at the various centers such as Bartlesville and West Virginia where there have been reductions in programs in the last several years?

Dr. HENRIE. We have a considerable amount of laboratory space in Bartlesville. Laramie is quite short on space. Our Reno laboratory has space left that could be expanded, too. Our Salt Lake Metallurgy Research Center is in the same situation as College Park, the university wants us to move some little distance away.

If you were to visit the Bartlesville laboratory you wouldn't have the feeling they have excess space but I am sure if they were forced to comply, the space could be made available.

These laboratories were designed to have a few more people than they presently have.

Now, there is another problem I think, as far as Bartlesville and Laramie, we are no doubt going to expand our energy research programs to try to take care of the energy crisis. And, as a result of this it could be that some of these facilities will not have space.

Senator BARTLETT. I think you would find since this comes under your jurisdiction that a trip to Oklahoma occasionally would be very rewarding. You might be checking on activities there.

I notice in the basic studies that are carried on now in Maryland that there is quite a diversity in the area study and I am sure you are aware of the diversity that Phillips Petroleum and the Standard lab in Tulsa and other activities going on in Tulsa and basic research far beyond just energy goes on.

I am sure you are also aware of the early leadership that the tri-state area of Missouri, Kansas, and Oklahoma have done in minerals.

So, I think there isn't any corner on the market in the East, or necessarily in Virginia. But the point I am trying to make is not strictly provincial but I would like to request, Mr. Chairman, that the Department of the Interior make a study of what is available, what could be used, and what the options are.

This isn't meant in any way to be derogatory to the bill we are now looking at of my good friend from Virginia, but I do think it would be wise just to see what is available and what other options might be open in addition to opening a new facility, or rather reopening a facility at a new place.

Senator METCALF. Senator Bartlett, of course your request is going to be relayed to the Secretary of the Interior to do as you suggest.

However, if you will yield to me for a moment.

Senator BARTLETT. Yes, sir.

Senator METCALF. When these matters were before this committee previously in 1965, the Department of the Interior and Bureau of Mines came up and told this committee that a study was underway for alternative sites and disposition of this laboratory, either moving it or using its facilities at other laboratories throughout the United States.

You told this committee it would be ready in 1966. Now, how are you getting along with your work, Mr. Henrie? What happened to that study?

Dr. HENRIE. Mr. Chairman, the letter signed by Secretary Lynn mentioned yesterday—

Senator METCALF. Secretary Lynn used a euphemism the Bureau of the Budget always used: that proper management requires that alternatives be weighed in the time available against program requirements.

Now, how much time do you need available since 1965, Mr. Henrie?

Dr. HENRIE. I am sure the study is being conducted with all diligence by the Secretary at this time.

Senator METCALF. It was supposed to be done in 1966. You know, I came to Congress the year that the Supreme Court handed down the segregation and integration decision and they used the phrase "all deliberate speed."

But, believe me, even the Supreme Court of the United States would be appalled at the deliberate speed that you have demonstrated here by starting a study that was supposed to be due in 1 year and is still coming before us and saying well, proper management requires that we study alternatives.

Dr. HENRIE. Yes, sir.

Senator METCALF. When is this deliberate speed going to accelerate at something more than a mile an hour?

Dr. HENRIE. Sir, I am positive they are making a concerted effort at this time and they have asked the advice of the Bureau of Mines recently in the last 2 or 3 weeks for new evidences and new information that they could use to make their decision.

Senator BARTLETT. Senator Hansen and I are wondering if that was a Democratic promise that has been unfulfilled by the Republicans.

Senator METCALF. It must have been a Democratic promise back in those days, but there has been a Republican administration here for quite a while.

Senator BARTLETT. I said a Democratic promise unfulfilled by the Republicans.

Senator METCALF. Let's leave it at that.

Dr. HENRIE. Mr. Chairman, may I respond to the kind Senator from Oklahoma?

I did visit the Bartlesville Station 4 weeks ago. My first visit there as Deputy Director happened to be the day you were running for Governor and I had a very nice visit there that day. And, I feel it is a very good laboratory and it is a highly scientific laboratory.

They are doing wonderful work and many of those researchers there are personal friends and we rely heavily on their judgement and their experience.

Senator METCALF. Senator Hansen.

Senator HANSEN. I have no questions.

Senator METCALF. Senator Fannin is working on a couple of questions and while you are working perhaps you will defer to me.

Senator FANNIN. I will defer to you.

Senator METCALF. Would this not be a duplicate of much of the research that we are doing in other agencies back here? For instance, we have research in the Bureau of Standards, in the Geological Survey, and so forth, to take care of the very things that you are talking about, that is, recycling of waste.

Dr. HENRIE. The College Park facility has been deliberately programmed to be more national in the nature of its research scope than some other laboratories because of its location near the Washington area.

It has had a broader assignment, principally, because these people are readily available to the Washington office for advice and they can readily come into the Washington office and help with special assignments.

Their typical researcher has a very keen understanding of broad programs and problems that oftentimes we don't receive from general consultation.

The Bureau of Mines' research in metallurgical problems is not duplicated by other agencies. We are charged with the responsibility of being the guardian or conducting research to foster and encourage the development of a viable mineral resource base in our country.

Now, as to overlap with the Bureau of Standards and the Geological Survey—we are the engineering arm of the Department of the Interior in developing mineral extractive processes, whereas the Geological Survey is more the scientific group—the group that outlines and delineates where minerals are located.

The Bureau of Standards' program is significantly different than ours.

Senator METCALF. I notice both you and Dr. Hahn—no, both you and Mr. Lynn and Dr. Hahn used the term "cross-fertilization."

It seems to me you have to respond to the idea that there is not only in addition to these agencies we have discussed, the Bureau of Standards and the U.S. Geological Survey and Atomic Energy Commission and all of those Government agencies have research coal and metallurgic research laboratories throughout the United States.

We have special university research which is not financed by the Federal Government, they all have cross-fertilization without this facility at all.

Dr. HENRIE. Yes, sir, this is very important. I am a former research director myself of one of the laboratories. I was at the Reno Station.

We do have many professors at universities working as part-time employees. Many of our researchers at the bureaus serve in a part-time professorial capacity at the universities and it is quite important that we have a so-called check and balance between the more scientific people and the engineering people.

I think the engineering people keep the scientific people tuned up and I think on the other hand the scientific people help point the engineers in the direction they should go.

I think it is quite important that these people work together as far as the duplication of efforts. Many of our universities have special facilities that the Bureau uses, especially automatic data processing and resources of this nature. We do have good working relationships on the campuses where we have laboratories.

Senator METCALF. Maybe you can get on the telephone and call some of those people up and give us a faster report on alternate sites.

Dr. HENRIE. The people at the Department?

Senator METCALF. All of these alternative facilities and these facilities that have automatic data processing and so forth. It would seem to me that some time since 1965 we could have had some sort of a report such as we have been promised.

Senator HANSEN. Would the Senator yield at that point?

Senator METCALF. I would be delighted.

Senator HANSEN. Chairman Metcalf and Dr. Henrie, may I say this report was to have been submitted before I became a Member of the Congress, but I can't help thinking it is terribly important to understand and appreciate fully the problem posed by the distinguished chairman of the subcommittee.

I say that because there are any number of proposals before the Congress. One of the solutions that has been proposed is to undertake a massive research program contemplating the expenditure of \$2 billion per year for 20 years.

And, as I reflect, upon that enormous outlay of cash, I am convinced that the Bureau of Mines with its talent for research and knowledge is in a very unique position to be able to give some guidance to the Congress as to the direction we should be taking now—where we are weak, where our strengths lie, where the focus should be, where the emphasis needs greater application than it is receiving at the present time.

And, I think that is what the Senator from Montana has in mind when he deplores the fact that we are so far behind in having the recommendations that would properly and accurately apprise the Congress of what the situation is.

I just hope that, before we launch on yet newer programs and undertake a restructuring of our research effort and our developmental efforts, we will have the advantage that would be given us by this report.

If we don't have it, I well suspect we will find we are putting dollars on top of other dollars to plow the same ground that has already been tilled many times without knowing about it.

Because, here I am, just as an example, coming in new and I can be persuaded as most of us are by the arguments that are so compelling when you look at the situation this country faces and you want to do something.

And, a typical reaction of an average Congressman is to assume that every problem can be solved by appropriating more money and bringing into being new bureaus or new agencies or new research efforts.

And, that very likely will happen again. So, with all of the earnestness I can command, I sincerely hope that the Bureau of Mines will take to heart the admonition given by the distinguished chairman of this full committee. You may not clear it with everybody, I could care less if you do, but, let's have a consensus of what you think ought to be done now based on the experience you have, the understanding that is yours and what you believe should be the direction the Congress takes.

Dr. HENRIE. Thank you very much, Senator Hansen. I am sure we will do this. I am sure we, like many others, are guilty of procrastinating and put other things we thought more important ahead of this.

I am sure introduction of this bill will encourage us to act a little more promptly to this.

Senator HANSEN. Thank you, Mr. Chairman.

Senator METCALF. Thank you, Senator Hansen.

And, if the Senator from Arizona will continue to yield to me for a moment.

Senator FANNIN. I will be pleased to.

Senator METCALF. This bill carries an authorization for \$6.1 million. In your opinion is that an adequate amount to take care of the moving at this time, in view of our inflation and the economic situation?

Dr. HENRIE. The breakdown of costs in replacement today would likely be \$8.1 million with architectural and engineering design being \$800,000, GSA \$800,000, construction based on 95,000 square feet at \$60 per square foot—\$5.7 million, contingencies 15 percent of construction cost—another \$800,000 for a total of \$8.1 million.

Senator METCALF. Would you supply that, a breakdown for the record? I am not sure—we have a very competent reporter but—

Dr. HENRIE. We certainly will.

[The material referred to above follows:]

BREAKDOWN OF ESTIMATED CONSTRUCTION COSTS FOR REPLACEMENT FACILITIES

	<i>Millions</i>
Architectural and engineering design-----	0.8
GSA administration-----	0.8
Construction (95,000 sq. ft. x \$60/sq. ft.)-----	5.7
Contingencies (15 percent of construction)-----	0.8
Total -----	8.1

Senator METCALF. We are confronted with a moving cost of \$8.1 million instead of \$6.1 million?

Dr. HENRIE. Likely so, Mr. Chairman.

Senator METCALF. How much, if you know, is the current budget for this facility at the University of Maryland?

Dr. HENRIE. The current budget is \$1.6 million at College Park. I could break that down for you a little more if I could find the detailed sheet.

The studies of physical and chemical properties of minerals and analytical techniques is \$235,000; metallurgical process evaluation is \$160,000; utilizing abundant resources, that is, recovery processes for nickel and copper, \$320,000; improved mineral and metal recycling, recovery and refining of secondary metals and minerals, \$600,000; and improved performance materials, that is corrosion of iron and iron alloys, \$225,000.

I, too, will supply this in detail for the record.

[The material referred to above follows:]

COLLEGE PARK METALLURGY RESEARCH CENTER, FISCAL YEAR 1974, RESEARCH
ACTIVITIES

Developing lower cost processes:	
Studies of physical and chemical properties of minerals and analytical research.....	\$235, 000
Metallurgical process evaluation.....	160, 000
Utilizing abundant resources: Innovative nickel and copper recovery processes	320, 000
Improved mineral and metal recycling: Recovery and refining of secondary metals and minerals.....	660, 000
Improved performance materials: Corrosion of iron and iron alloys..	225, 000
Total	1, 600, 000

Senator METCALF. What is the staff at College Park?

Dr. HENRIE. At present we have 85 employees in the metallurgy research area; 43 of these are full-time professionals, the majority of which are chemists, chemical engineers, metallurgists, and physicists.

Senator METCALF. A light has indicated that we have a rollcall coming up.

If this bill does not pass and authorization is not given to move this facility down to Blacksburg, Va., or to some other place and appropriation is not available for the \$8.1 million, what plans do you have for continuing this research and deploying the staff you just mentioned?

Dr. HENRIE. The loss of this facility will mean much more than just losing one of our laboratories, because as I said before, we will lose a tremendous competence in metallurgical research.

Now, the final report of the National Commission on Materials Policy, also the second report of the Secretary to the Congress of the United States emphasizes the fact that this Nation is facing a tremendous minerals crisis in the 20-to-25-year span and that it would be the equivalent to our current energy crisis.

It is necessary that we continue the technology of extracting and recovering mineral raw materials from lower grade ores if we are going to maintain the balanced supply of materials that we need.

So, if it were necessary for us to distribute this technology and research personal throughout our various laboratories we would lose some competence.

I am sure—I suppose our older people would retire. Younger people would be faced with the problem of either going to some of the other places where research studies would be moved or finding other jobs and; as a result, it would break up this research team which has taken years to build.

Senator METCALF. With the permission of my colleagues, we will recess now in order to go vote. When we come back Senator Fannin will have some questions to ask you and then we will finish the hearing with the last witness.

[Recess.]

Senator FANNIN. [presiding]. Chairman Metcalf will be here in a few minutes but he has asked that we call the hearings to order and has given us permission to ask a few questions.

So, with your indulgence I would like to discuss some of the statements that were made by Dr. Henrie. On the last page he states, "Unless we continue to forge ahead in developing new and more effective

technology for extracting and recovering mineral raw materials from lower grade ores, this crisis will become an ever-increasing reality.

"Consequently we cannot afford to lose any of our metallurgical competence"—such as that established at College Park for a period of nearly 40 years.

Now, I wholeheartedly agree with that statement. But, I am wondering exactly what the studies are that the chairman has spoken about and what we have determined as far as the priorities that exist. Just where are we as far as making a determination as to how we can meet the goals that we have under the priorities that have been scheduled.

Now, what work is being done at the center that is not being done at other research centers around the country?

Dr. HENRIE. This center has long been the leader in secondary metal recovery, scrap recovery, and things of this nature. This is quite a good location for this, the east coast, because this is where our industries are that mainly engage in secondary metal recoveries, this is where most of this type of refuse is.

It has also been a group that has led the other metallurgy labs in developing analytical techniques for chemical analysis of metals and minerals.

It has a high degree of proficiency in chemical analysis. It has been an outstanding group in corrosion testing some of the exotic metals as well as stainless steel.

It has carried the ball for the Bureau of Mines in this area.

Many of these disciplines are necessary in our mineral research. If this bill were not to pass, if we were not able to relocate the facility as such, the research would have to be done at some other metallurgical laboratory.

Senator FANNIN. What you are saying is this work is not being done and is not being duplicated at other laboratories in other parts of the country?

Dr. HENRIE. That is right.

Senator FANNIN. You speak of the number of people involved—naturally we are concerned about that, but I feel we must concentrate more in many of these fields. I agree with you that this is one of tremendous and growing importance because of the situation in metals today.

So, I am vitally concerned. But, I am anxious to learn whether or not we are coordinating our efforts and whether we are duplicating this work in other areas of this country making it unnecessary for this facility to be transferred.

Dr. HENRIE. This is my specific responsibility, to direct and coordinate the efforts between our various laboratories in the disciplines of energy, mining, metallurgy, and mineral supply.

And, I hope, Mr. Senator, I am doing a good job.

I feel we do not have any overlap that would be excessive.

Senator FANNIN. I am in no way making a combination of that, Doctor, but I am anxious to know or determine whether we are fully utilizing all of our facilities, coordinating our efforts to the best advantage.

Are we doing the same as far as private industry is concerned? I know in my State we do have some research centers that are not perhaps in the same line of activity that we are considering.

But, I am just wondering if we are to the fullest extent possible coordinating the activities of the governmental research centers as well as the private industry centers.

Dr. HENRIE. Mr. Fannin, I think most of our work goes a little beyond the desire and the capability of many of our mining and mineral processing industries. We look at longer range problems, we are looking at new processes and procedures that may not be evaluated today as being economic, but are on the fringe.

And, if the technology were there we would hope to change the conditions such that many of our resources would become reserves.

Senator FANNIN. Personally, Dr. Henrie, I think that is exactly where the Government does fit in. If we are delving into research that is involved with production, research that is involved with improved facilities for the mining industry, then I feel we should look to private industry to a greater extent.

But, when we are delving into new processes perhaps uneconomical for the moment, I think it is highly essential that we look to our resources for the activity to be performed.

When you are talking about the certain areas that are covered in your statement I can understand your concern. But, I still wonder just what would happen if this legislation is not approved. Where is the nearest facility that is available for transfer of this work?

Dr. HENRIE. The nearest facility would be at our Twin Cities Laboratory in Minneapolis. Some of these disciplines would best fit at Salt Lake City or Reno.

I suppose that one or two of our energy labs could take a portion of the effort.

Senator FANNIN. But you feel if this would be the result of not passing legislation it would be very detrimental to the continuation of programs that you now have underway?

Dr. HENRIE. I didn't quite understand your question.

Senator FANNIN. If the legislation is not approved and these transfers are made, or if this work is transferred to other areas it would be detrimental both from the standpoint of time and the continuation of the programs and perhaps lessen the opportunities for some of this work to be accomplished.

Dr. HENRIE. I think it would be highly desirable if this research team could be held together.

Senator FANNIN. Thank you very much, sir.

Senator METCALF [presiding]. Thank you very much for your appearance here today.

Senator Hansen.

Senator HANSEN. If I could ask one quick question.

Dr. Henrie, in light of recent developments in the energy picture in this country would it be your feeling that consideration at least should be given to a broadening of the scope of research presently extant on the University of Maryland campus were this facility to be moved some place else or its role taken over by other institutions throughout the

country to include the mining and utilization of coal as a fuel resource?

Is there any spinoff in the research now being undertaken that would have some applicability to this broadened area?

Dr. HENRIE. Mr. Senator, I am a professional metallurgist. I think we in this profession have been a little neglectful of doing research on the real energy problems.

I am speaking of all of the metallurgists in this country. I am also president-elect, or will be in February, of the Metallurgical Society so I am quite familiar with metallurgical research.

We have done our research strictly from the dollar side; that is, that type of economic cost. We have not put enough emphasis in our metallurgical research on the cost of energy, or the costs related to environment.

And, we have got to expand this as professional people. I assume part of this blame because, I suppose we did the research that was popular.

We looked at the dollar rather than some of the other social costs that may be much greater.

Senator HANSEN. Thank you very much.

Senator METCALF. Thank you very much, Senator Hansen. And, again thank you for your appearance here. Thank you for being so well prepared and giving us responses to some of these questions concerning cost, Dr. Henrie, and concerning the change of moving.

[No answer to the following letter was forthcoming at the time the hearing was printed.]

SUBCOMMITTEE ON MINERALS, MATERIALS AND FUELS,
Washington, D.C., October 2, 1973.

Dr. THOMAS A. HENRIE,

Deputy Director, Mineral Resources and Environmental Development, Bureau of Mines, U.S. Department of Interior, Washington, D.C.

DEAR DR. HENRIE: You will recall that during the hearings last week on S. 378 several members of the Subcommittee indicated that they wanted information about alternative sites for the Bureau of Mines laboratory now located at the University of Maryland. They also indicated the desire to have an analysis of other alternatives for continuing the research programs now at Maryland other than simply relocating the present facility.

Please submit these analyses to the Subcommittee as soon as possible. We wish to include them in the hearings record for S. 378. Thank you very much for your assistance.

Very truly yours,

LEE METCALF, *Chairman.*

Senator METCALF. Our next witness is Joseph P. Brennan, vice president, economics and planning, National Coal Association.

Mr. Brennan, we are delighted to have you here again. As you elicited this morning, this is not a laboratory that is devoted to coal research but perhaps it could be if it were moved down into the coal area.

But it has been my experience that the National Coal Association is concerned with other metallurgical problems and programs.

So, we are delighted to have you here in your official capacity and in your capacity as a very knowledgeable man in the mining industry.

STATEMENT OF JOSEPH P. BRENNAN, VICE PRESIDENT, ECONOMICS
AND PLANNING, NATIONAL COAL ASSOCIATION

Mr. BRENNAN. Thank you, Senator, and again I am delighted to be before this committee. I have been before you several times and I have always found the experience challenging, stimulating, and hopefully, helpful.

I understand because of the hour I will summarize the statement I have.

Senator METCALF. Your statement will be incorporated in the record in its entirety and will appear as if read.

Mr. BRENNAN. My name is Joseph P. Brennan, I am the vice president, economics and planning, of the National Coal Association, which represents most major coal producing and coal sales companies of the Nation.

We appreciate the opportunity to appear here before this committee and present our views on S. 378.

We support the passage of S. 378, a bill introduced by Senators Byrd and Scott of Virginia. This bill provides for the establishment of a Bureau of Mines Research Center at Blacksburg, Va., on the campus of Virginia Polytechnic Institute.

We believe that the transfer of the Bureau of Mines research facility from its present location on the University of Maryland campus to VPI is warranted for several reasons.

First, it will assist the Bureau in its ongoing program of research and development, and to meet its historic objectives which we believe to be the following:

(1) To achieve an adequate, dependable, and timely supply of mineral substances at the lowest possible material cost to the consumer and the economy.

(2) To achieve material needs without objectionable occupational costs in terms of health and safety of the workers in the extractive minerals industries.

(3) To achieve material needs without objectionable environmental and social costs.

These objectives have guided the Bureau since the early part of this century. But, their imperative has become more intense in the last several years because of the emerging imbalances in the supply/demand picture for minerals, particularly energy minerals; the increasingly more restrictive environmental considerations; and the national mandate to reduce the occupational health and safety hazards of mineral extraction.

In view of these considerations the Bureau's program must expand—not contract. It must also shift resources into areas of pressing national need, among which energy must rank high.

Recently, I was a member of the National Academy of Engineering Ad Hoc Committee for the Bureau of Mines commissioned to study the Bureau's research program.

As a part of my activity on that committee I visited the lab on the University of Maryland campus. I was very much impressed with the

caliber and dedication of the personnel there, and believe that they are a national asset which should be utilized to the fullest possible degree.

Second, the shift to VPI will expand the technological resources concerned with coal.

VPI is close to the major Appalachian coalfields. Its faculty has had a long and close association with the coal mining industry and is well aware of its problems and potentials.

Locating the Bureau of Mines facility there will have three beneficial effects:

(1) It will make more convenient a continuing academic/Bureau of Mines interaction with mutual benefits to both parties.

The Bureau has long espoused the desirability of such an interaction and we believe this policy has worked well.

(2) The close proximity of the bureau facility to the campus will assist in the training of engineering and science students. We cannot overstate the value of this, especially in view of the dramatic increase in demand for personnel of this type, and the stagnation of supply.

(3) The ability of the facility to draw upon the practical experience of the mining industry will be enhanced. Many large mines are located within a reasonable distance from the proposed location and the interaction between the theory of the laboratory and the reality of the mine face will benefit both.

There can be no doubt that the United States is technologically inadequate insofar as energy production, distribution, and use is concerned.

The potential demands upon the coal industry, for example, are enormous, and will require a major research effort to provide the technical basis for such rapid expansion.

Complicating the problem has been the long-standing neglect of coal research on the national level and the woefully inadequate Federal funding for that purpose over the years.

Now that the imperative to coal is to expand, the need for research is clear. Facilities such as proposed in S. 378 are vital. They are one indispensable part of our overall research strategy which can, in time, match technological capability with resource potential.

Third, the transfer will lend more emphasis to coal research.

Much of the work done by the lab at the University of Maryland had to do with urban waste disposal and mineral extraction. All of those programs were good and all are well within the research objectives of the Bureau.

But, at the same time, the changing national priorities require much greater emphasis on coal research. This fact is recognized by the executive and legislative branches of Government in the increased funding for research and in the close attention now being paid to the institutional framework of the Federal research effort.

We look to S. 378 to provide one more technological center of excellence for coal. We look to its personnel as talent who now will become familiar with the industry, its problems and potentials, and move toward maximizing the coal resources in the national interest.

Fourth, the permanent establishment of the Bureau of Mines facility at Blacksburg will provide for on-going work in the area of coal mining, distribution, and use.

The present technological imbalance in the extraction, distribution, and use of energy is, as we have said, in large part a part of the neglect of the past.

Hopefully steps will be taken on a crash program to overcome the present imbalance so that severe economic and social consequences do not befall the American people.

On the other hand, we recognize that once we get over the immediate imbalances of supply and demand we must make provisions so that the present crisis does not repeat itself.

One way to do this is to provide for on-going research and development at established centers and through other means to insure that the problems are resolved before they become crises.

For example, much of the work of the Bureau in the past now serves as the basis for the expanded work of the present and future.

That type of basic research must continue in centers such as the one proposed for Blacksburg, which is uniquely suited to carry on that type of R. & D.

Parenthetically, I could not help but be impressed during my work with the National Academy of Engineering with the basic research work done by the Bureau of Mines.

Much of this work will not come to commercial fruition for many years—if not decades. But, cumulatively, it adds to the storehouse of knowledge which can provide the basis for the further development and eventual commercial implementation of many technologies which add substantially to the health and well-being of the American people at large.

Thus, the National Coal Association is extremely interested in seeing this type of research center at Blacksburg and seeing to it that it is funded at a level which will enable it to meet its stated goal.

There is a great deal more that could be said, Mr. Chairman, on the need for coal research and the role of facilities such as the one we are supporting for VPI in coal research.

Much has been written and said on this subject and we, in the interest of the time of the committee, will not repeat it here.

What we do suggest, however, is that the coal industry is now becoming a primary industry in the American economy. Making sure that the vast potential of our coal resources is, in fact, actualized, is an urgent national priority.

Research is one of the keys to the attainment of that priority, research in both the development area and the basic research area.

S. 378 is a positive step toward the establishment and implementation of a proper research structure for energy in the United States and we enthusiastically support it and urge the committee to implement it at the earliest possible time.

Thank you. I will be ready to answer any questions.

Senator METCALF. It is a very fine statement. I am going to call on Senator Fannin.

Senator FANNIN. Yes; I, too, commend you for an excellent statement.

I understand from your statement that your association has been actively involved with work at the research center in College Park.

Mr. BRENNAN. I, Senator Fannin, am a member of a committee of

the National Academy of Engineering which reviewed the entire Bureau of Mines research program.

As a part of that work I did visit the College Park facility. We are not actively directly involved as an association with that particular facility.

Senator FANNIN. I was just referring, to benefits that have come about as a result of work in College Park. That has been of great interest to your association.

Mr. BRENNAN. Absolutely, it has been of great interest to me personally as well as the association.

Senator FANNIN. And you agree with the statements made here this morning by witnesses that perhaps these benefits will be of greater assistance to you.

Mr. BRENNAN. Yes, Senator Fannin, when you take a group of men such as you have at College Park or any research facility and you build there a tradition, you build a cohesiveness, you build a good working relationship.

I think it is extremely important to keep those men together and working together. I would say this regardless of the emerging priorities which we must place on this type R. & D. That has made it much more imperative.

And, as I say in my statement, we are now in a period of energy crisis, we are approaching a period of minerals crisis. And, I think to break up a team like this anywhere is just wrong, I don't think it should be done, and I think from what I have seen at College Park personally that the work that is being done there can be expanded to improve coal and hopefully the whole program will be expanded when it gets beyond coal.

Senator FANNIN. Not in any way critical, I think you know that one of your associates, Mr. Brennan, an executive in the National Coal Association, was criticized for his statement.

Now, I did not hear him make this statement, but apparently he indicated that the Coal Association is not responsible for research activities, that work should be done by other organizations.

Is that your feeling?

Mr. BRENNAN. We have a research affiliate, Bituminous Coal Research, the coal industry has historically done the bulk of its industrywide research through BTR.

We are entering a period, Senator Fannin, when there is need for vastly expanded coal research in terms of making up a neglected past.

We feel there is a role in that for industry and certainly there is a very large role for Government. I notice Senator Hansen this morning mentioned the crash program of \$2 billion a year. We have testified in support of something like that with the full recognition that we are attempting to make up for many years in a euphoria of energy abundance we did nothing.

Senator FANNIN. I wholeheartedly agree with what you have said; but, are you familiar with the publicity that was given to one of the statements made?

Mr. BRENNAN. I am not familiar with that one particular thing, no, sir.

Senator FANNIN. I think from your statement perhaps there was a misunderstanding involved. I am very concerned about the industry

programing being coordinated with the governmental research and governmental activities.

I do feel we could proceed much more rapidly and I also agree with some statements made earlier this morning that there are certain fields of activity where the Government must take the lead in the research. Still it is highly essential research.

Of course we have to do a little dreaming along with our very practical and basic research. I do appreciate what you have expressed, and will very carefully study your statement.

Mr. BRENNAN. One of the problems we have in the area of energy research, and particularly in coal mining, where I have some particular expertise is the fact we have to begin to relatively rapidly translate developmental work as it comes in into practical mining situations.

And, in that area there is no question that there must be a very close interface between industry and Government. In my statement I note that one of the advantages of a VPI location is that when you get into mining research it is relatively easy geographically to take that research and to put it in underground mining in a real underground mining situation so you talk not in terms of text books but in terms of what it is like at the mine face.

Senator FANNIN. I agree in the fields of atomic energy and other fields where it took actual experience to bring about good, efficient equipment. In fact, even with practical equipment, our research may give us an indication of what could be done but when placed into operation; you find much more is necessary before the goal for that equipment can be accomplished.

Thank you very much.

Mr. BRENNAN. Thank you, sir.

Senator METCALF. Mr. Brennan, once we pass the surface mining bill which is before the Congress at the present time—and I think it will pass—I think perhaps you will find that Montana and Wyoming are the two ranking States in coal production after the present moratorium on leases is lifted and so on.

So, I am real pleased to recognize my colleague from Wyoming who maybe is even going to beat Montana in coal production, Senator Hansen.

Senator HANSEN. Thank you, Mr. Chairman, and thank you, Mr. Brennan. I think you made an excellent statement.

I notice on page 2 you discuss among other points the desirability of locating such a facility near the presence of the mining industry when you say:

Many large mines are located within a reasonable distance from the proposed location and the interaction between the theory of the laboratory and the reality of the mine face will benefit both.

On the next page you say:

Complicating the problem has been the longstanding neglect of coal research on the national level and the woefully inadequate Federal funding for that purpose over the years.

In your statement you alluded to the fact that we did suffer and we are presently being caught up by our neglect resulting from the euphoria of the 1960's when it was assumed we had adequate and almost inexhaustive sources of industry that seemed to push coal right out of the picture.

We know that now of course that is not true. The President has said the only way to come to grips immediately, or one of the ways, with our energy crisis, is to make greater not lesser use of coal.

And, in furtherance of that idea he has recommended to the Governors of several States that they take steps seeking to hold in abeyance the application of even tougher environmental standards insofar as emission control standards are concerned.

Would it be your thought that if this research center is moved as is proposed by this bill that it might well be contemplated by Government to expand the concept of the research to include various aspects of mining and of energy use? What studies might be most useful and be included with a continuation of the metallurgical thrusts that are being made?

Mr. BRENNAN. Senator Hansen, it would very definitely be my thought and the thought of the National Coal Association that the major research facility at VPI certainly should concern itself with coal mining and coal utilization.

VPI has a long record in this area. It has a faculty that is really very, very excellent in this area and it would seem to me to be a waste not to use that resource in terms of the coal industry.

And, I might make reference also to the point that was made this morning that very often these facilities take on the character of a community-type thrust where they are concerned with the immediate problems of the area, which they are. And, certainly from what I have seen of the talent of the Bureau directing that talent perhaps with a priority to energy development as an adjunct to what they are doing I think it would be very helpful.

Senator HANSEN. The chairman of this committee and I are both very keenly aware of the contribution that has been made by the coal-fields in Eastern America and I think I can safely say that neither he nor I want to do anything to diminish that contribution.

At the same time we are both aware of the need to do a better job in reclamation efforts than we have in the past. And I think he and I have a pretty good track record because of our deep convictions that while we will do our part in the West to help supply the energy requirements of this Nation, and they are growing constantly, at the same time we want to be certain that a national law does not limit or curtail State legislative efforts translated into laws to establish standards that might be more applicable in one part of the country than in another.

Because of that conviction he and I have tried to insist that this land reclamation effort recognized as the law may eventually evolve the sovereignty of State law over Federal law.

If we want to have tougher laws in the West than could be employed in the East, the distinguished Senator from Montana and I take the position that that ought to be all right.

I have the feeling that knowing very little about mining nationwide, that it could well be indicated that there is reason to recognize the difference in sulfur content, the difference in rainfall, which is a real effect upon acid concentrations in streams, and other problems. The problems of reclamation and restoration are entirely different in the West and in the East. Do you think there is some valid basis for the

convictions that are presently held by the Senator from Montana and me on this issue of differences in coal areas?

Mr. BRENNAN. Senator, there is an obvious difference between different geographical locations in terms of ability to reclaim, in terms of mining conditions, although I don't speak for the National Coal Association on this.

I personally feel and have testified that you regulate in terms of geographic areas. Occasionally when I have a luxury of sitting back and taking a look at where we are going in terms of energy, in terms of reviewing it as objectively as I can, I see ahead and I see really developing now a discreet break with our past.

And, as I look ahead and I see the rapidly growing demands for energy I know we have to use all of our resources, not only strip coal from Montana, not only strip coal from Kentucky, but also deep coal from the East and increasingly deep coal in the West.

Otherwise we have to go deeper for this coal, we have to apply new technology, we have to come to grips with more complex technological problems.

I see we don't really have the technological base to do this. And, given that, I think we must develop, with the full recognition that what we have done in the past is no barometer for what we are going to have to do.

The coal industry conception, because of the demands placed upon it, is going to be a brandnew industry. And, technologically, it is not ready to be a brandnew industry.

Now, hopefully we are getting there. So, what I am saying is, we must look upon ourselves as a brandnew industry, we must look upon ourselves as to the astronomical demands—it is incredible to me. I appeared before Senator Metcalf in his environmental quality report.

We were talking about the report and the committee was talking about mining thick seams which would be a major problem in the West. And, they made reference to the work that is being done in India.

Now certainly I know that if we have to go to coal production from 600 million tons to 1.5 billion, I can't reply on what I have now.

And, what I am suggesting is, it goes beyond the VPI question that we begin now to develop that resource. We are late, we may be tragically late, but we have to overcome the problem and then we have to build so that as those needs come up we can meet them and meet them in terms of our metal standards which are going to become more complex, more restrictive in terms of safety standards, which are going to have to become more complex because of the literal environmental problems surrounding us—in terms of meeting these not only in the West but in the East and the Middle West so we can get every pound of resources there and utilize it in the proper way.

Senator HANSEN. Thank you, Mr. Chairman.

Senator METCALF. Thank you, Senator Hansen, for bringing out some very important testimony relative to coal.

I want to emphasize, however, that sitting here this committee is very much concerned with coal and surface mining as you know.

Sitting here we are concerned with other mining problems, too. I come from a State where we used to have just copper running in all directions. Now all at once we find this country has a copper shortage.

I can remember when just through the smelter we threw a whole lot of material away. Now we are going to have to rework for some of these scarce minerals.

It seems to me today we had better be thinking about where we are going in some of these other mineral problems; at a decade or two decades ago we should have been thinking about where we are going in coal.

And, I can remember going up as a special committee on coal research and all they could tell us about coal research was to take a few pounds of coal and how to make silt or develop some special chemicals out of it.

On the other hand, I ended the war, and coal at Montana it is just like dirt. They are making aviation gas out of it.

Over those decades we let our research go. Today we had better be thinking about what we are going to do about copper, lead, zinc, silver, manganese, and nickel and all of those things, all of which we had so much at one time and we are going to have to depend on the undeveloped nations for those.

It seems to me we had better have research laboratories all over the United States to do those things.

Mr. BRENNAN. I couldn't agree with you more, Senator, personally, and as a representative of the National Coal Association.

As I said, the energy crisis of today will become the mineral crisis of tomorrow. America is entering into a discreet part of its history and that is going to be characterized by the need for operating in an atmosphere of resource scarcity, not resource abundance.

I was appalled listening earlier this morning—you were talking about—someone suggested talking about copper in the ocean.

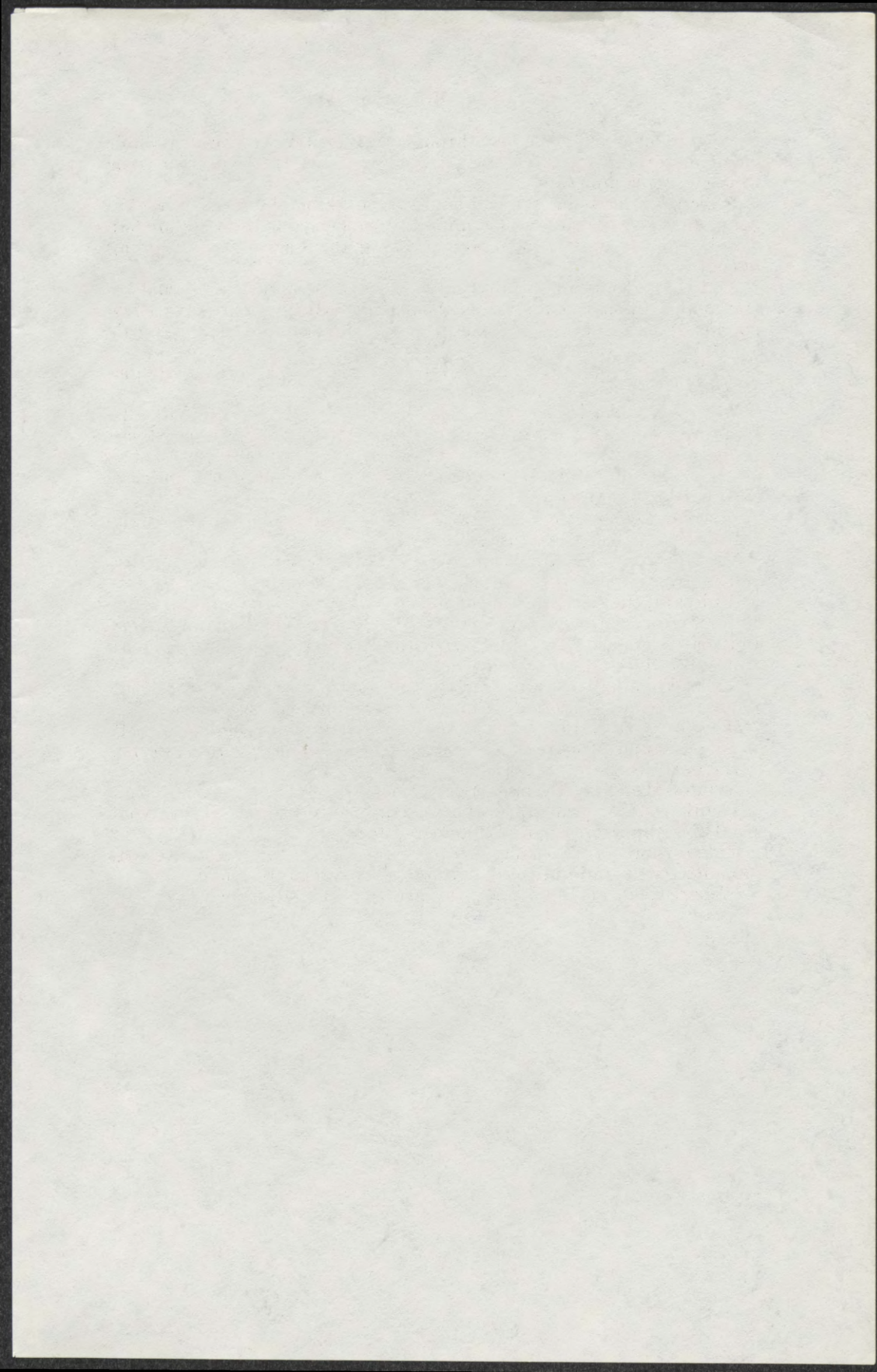
We must as a Nation think in terms of where we are going to be 10 or 15 years and prepare now. So, it is a problem now and not a crisis in the next decade.

Senator METCALF. Thank you very much.

Thank you for your appearance again, Mr. Brennan. It was your usual able appearance before this committee.

Unless there is something else to come before this committee the committee will stand in recess subject to the call of the Chair.

[Whereupon, at 12:07 p.m., the hearing was adjourned.]



BLACKSBURG, VA., RESEARCH CENTER

HEARING

REPORT THE

SUBCOMMITTEE ON

MINERALS, MATERIALS AND FUELS

OF THE

COMMITTEE ON

INTERIOR AND INSULAR AFFAIRS

UNITED STATES SENATE

NINETY-THIRD CONGRESS

FIRST SESSION

ON

S. 378

A BILL TO AMEND THE ORGANIZATION AND OPERATION OF A RESEARCH CENTER AT BLACKSBURG, VA.

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