

*Dr. Berry*

*c.c. CANDEL members  
send for information.  
17 June 85*

DEEP CONTINENTAL DRILLING PROGRAMME  
OF THE UNITED STATES

Alan M. Jessop

Internal Report No. 85-12

May 1985

Crustal Studies  
Division of Gravity, Geothermics & Geodynamics  
Earth Physics Branch  
Department of Energy, Mines & Resources

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The author attended a meeting of DOSECC in Houston on 29 April to 1 May 1985, in order to observe the current discussions and state of decision concerning the deep continental drilling programme of the United States.

DOSECC is the acronym for Deep Observation and Sampling of the Earth's Continental Crust Inc., which is a consortium of universities and is supported by the National Science Foundation (NSF). Each university pays US\$3000 to belong to the consortium. The consortium has appointed a Science Advisory Committee (SAC), to review and make judgements on the proposals received, to act as the mechanism by which the consortium reaches decisions on the relative merits of the proposals and to produce final recommendations on funding.

A list of the universities involved so far and the members of SAC is attached as Appendix One. This list is copied from the book of abstracts handed out at the meeting. It is shown that the Department of Energy (DOE) and the United States Geological Survey (USGS) are also supporting DOSECC, but observers indicate that these agencies have their own drilling programmes and are not necessarily going to support any final DOSECC programme.

## THE PROPOSALS

Appendix Two shows the programme of proposals presented to the meeting. Only the author making the presentation is shown, but each one is the result of a team of scientists that has combined to offer a multi-disciplinary programme of research based on the drilling of one or more holes. By comparison of Appendices One and Two it may be seen that several of the proponents are also members of SAC, and it seems probable that more members would be found among the unlisted supporting proponents. Disinterested scientific judgement may thus be somewhat rare, but with honest practice this is a way of ensuring that scientific decisions are made by active scientists.

The proposals were highly varied in their approach to the definition of a drilling project, and they can be roughly classified by the nature of the target as follows:

- 1 - active hydrothermal or volcanic features;
- 2 - active faults or tectonic features;
- 3 - mineral deposits and local fossil systems;
- 4 - old basement structures under Phanerozoic cover.

There were several points of divergent opinion on the philosophy of target selection. Some wanted one "super-deep" hole of 10 km or more in depth, whereas others wanted several holes of lesser depths. There was a distinct division between those who would drill into areas that are hydrothermally or tectonically active now, with the attendant risks and drilling problems, and those who would drill only into stable areas to examine the results of past activity. Only one proposal, by Haase of Oak Ridge National Laboratory, approached the task from the base of having a site in search of a problem, rather than the other way round. The connection with the storage of nuclear waste was more clear in this presentation than it is in the written version. Despite the usual attempt to show a multi-disciplinary approach, many of the proposals had a sharp focus on specific aspects of the problem to be addressed, for example the geochemistry of the emplacement of mineral deposits, the hydrological systems of the Yellowstone area, or the dating of Precambrian rocks of the "mid-continent".

The varied nature of the proposals and some of the discussion suggest that there is no clear consensus on the type of prime objective of the drilling. Proposals seem to have been submitted based on the philosophy of the individual proponents, rather than on agreed, or at least discussed, philosophy of scientific and technological approach. Some preliminary discussion of what drilling has done for science in the past and what it can do now, with modern technology, might have been beneficial. There was no uniformity of approach to the concept of multidisciplinary focus on one central geological question. Many people have put considerable effort into preparing these proposals, effort that might have been better spent with some preliminary discussion of aims, objectives and techniques before the stage of target-selection.

However, there is obviously a great deal of enthusiasm for the concept of scientific deep drilling in the USA, which is being harnessed by the NSF through DOSECC. There is a forum for discussion, many ideas are being put forward, and many people are involved. All concerned seem to feel that there will be a drilling programme, and that the working scientists are involved in the decision-making process that is necessary before embarking on such a major undertaking. To an outside observer there seems to be a sense of optimism and excitement that something of major scientific significance will emerge from the discussions, proposals, meetings and seminars.

#### INDUSTRIAL OPINIONS

Two representatives of industry spoke to the meeting. Their opinions showed some fundamentally different approaches to the concept of scientific drilling. The first stressed the need to have support and contribution from industry before seeking government funding, particularly under the present administration. He stated that industry must be included from the beginning, even if this means drilling in places that are not scientifically ideal. Situations whereby scientists take over for deepening industrial wells when and if they are industrially unsuccessful should be worked out, a system referred to as "piggy-backing". It was implicitly assumed that only sedimentary basins are interesting, reflecting our presence in Houston. The idea that government funding agencies cannot react with funding in the same time-scale as industry was dismissed as trivial. The attitude was clearly that industry are the experts in drilling, and science should happily attach itself to industry charity.

The second presented a list of criteria for the choice of drilling project, as follows:

- 1 - The drilling should advance the frontiers of both geological understanding and drilling technology;
- 2 - The drilling should consist of a single deep well that tackles fundamental principles of broad interest;
- 3 - The drilling should be aimed at and designed for scientific research, and there should be no "piggy-backing";
- 4 - The purposes should be simple in concept so that government funding agencies can understand and support them;
- 5 - For avoidance of drilling problems the holes must not be situated in deformed or complex sediments, geopressure zones, active fault zones or major earthquake areas;

6 - The project must not duplicate information that is already available from industry, or that is attainable by a series of shallow wells;

7 - The chosen site must be accessible throughout the year;

8 - Project selection and management should be by a consortium of academic, government and industrial scientists, like the Ocean Drilling Programme;

9 - The project must draw on available industrial expertise.

In response to discussion, the speaker considered that "piggy-backing" can lead only to very restricted and localised targets.

This speaker seemed to accept that industry benefits from science, unlike the first industrial representative, who would have reversed that idea.

#### POLITICAL ACTIVITY

Senator Dressler, of South Dakota, has become an enthusiastic supporter of the concept of deep scientific drilling. He has introduced to Congress two pieces of legislation. The first of these has been passed as an amendment to a larger package, and the second has only recently been introduced. The relevant pages of the Congressional Record are attached as Appendix Three. It was stressed by his assistant, who spoke about the legislation, that the senator's office had received a nearly 50% response to a circulated draft, a level that is apparently regarded as excellent. Those present were encouraged to write to their own senators to promote the concept.

#### APPLICATIONS TO CANADA

The USA has many interesting geological features to be examined, but one of the proposals called for drilling in the Bay of Islands ophiolite complex, in Newfoundland. The interesting features are not limited to the USA, and similar targets could be defined in Canada. For example one could design programmes for deep drilling in a greenstone belt, the Sudbury structure, a Grenville anorthosite, the Atlin terrain, the Darnley Bay anomaly, the Hazen structure, and many others. If we do not set up our own drilling programme, the USA will eventually want to drill the interesting targets in Canada.

Canada has both the scientific interest and the drilling technology to drill deep scientific holes. Both need to be fostered, and we should proceed promptly to solicit the ideas of both the active scientific and the drilling communities.

#### DOCUMENTS AVAILABLE

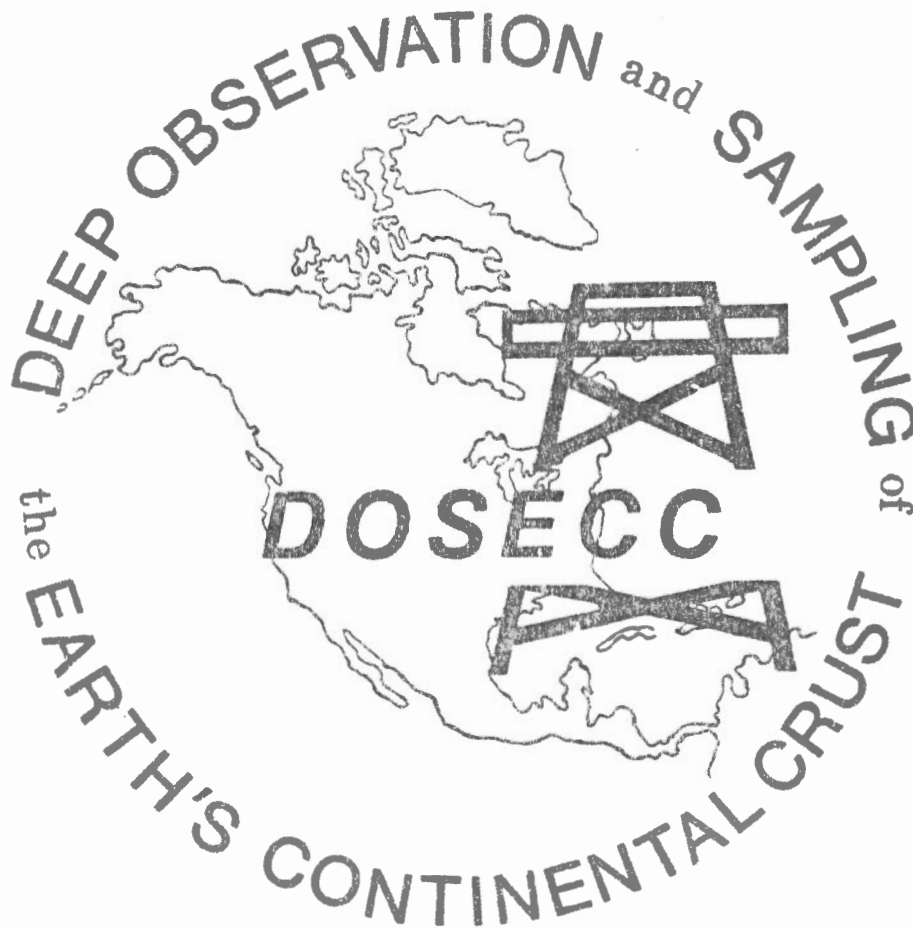
The author has copies of the following documents, which may be borrowed:

- 1 - Abstracts of the presentations of the workshop:  
compiled by DOSECC, 120pp.
- 2 - Preliminary proposal for an Illinois superdeep drillhole:  
Illinois State Geological Survey, 86pp plus appendices.

APPENDIX ONE

DETAILS OF DOSECC

# CONTINENTAL SCIENTIFIC DRILLING WORKSHOP



HOUSTON, TEXAS

APRIL 29 - MAY 1, 1985

SUPPORTED BY  
The National Science Foundation  
The Department of Energy  
The United States Geological Survey

DOSECC  
MEMBER INSTITUTIONS

Brown University	Texas A&M University
California Institute of Technology	University of California
City University of New York	University of Houston
Columbia University	University of Oklahoma
Louisiana State University	University of Michigan
Massachusetts Institute of Technology	University of Minnesota
Pennsylvania State University	University of South Carolina
Stanford University	University of Texas, Austin
South Dakota School of Mines	University of Wisconsin

MEMBERS OF THE SCIENCE ADVISORY COMMITTEE TO DOSECC

Dr. Francis Stehli, Chairman, University of Oklahoma  
Dr. Roger Anderson, Lamont Doherty Geological Observatory  
Dr. Hugh Barnes, Pennsylvania State University  
Dr. Phillip Bethke, United States Geological Survey  
Dr. Larry Cathles, III, Chevron Oil Field Research Co.  
Dr. Robert H. Dott, Jr., University of Wisconsin  
Dr. Robert O. Fournier, United States Geological Survey  
Dr. James Helwig, ARCO  
Dr. Earl Hoskins, Texas A&M University  
Dr. James Kelsey, Sandia National Laboratories  
Dr. William Luth, Sandia National Laboratories  
Dr. William Muehlberger, University of Texas at Austin  
Dr. Gary Oelhoeft, United States Geological Survey  
Dr. James Papike, South Dakota School of Mines  
Dr. Robert Schock, Lawrence Livermore National Laboratory  
Dr. Frank Schuh, ARCO  
Dr. Scott Smithson, University of Wyoming  
Dr. Mark Zoback, Stanford University

WORKSHOP ORGANIZER  
Dr. Edward Schreiber  
Queens College, CUNY

## PROGRAMME OF THE WORKSHOP

WORKSHOP ON  
CONTINENTAL SCIENTIFIC DRILLING  
AIRPORT HILTON, HOUSTON, TEXAS  
APRIL 29 THROUGH MAY 1, 1985

Sunday, April 28

Registration after 3:00 P.M.

Cocktails 7:00 to 9:00 P. M.

All sessions will be held in the Bengal-Calcutta Room

Monday, April 29

Morning Session Chairman: Dr. William Muehlberger

Welcome and Introduction <sup>1</sup>	0800
Dr. Barry Raleigh, DOSSEC	
Dr. James F. Hays, NSF	
Dr. Frank Stehli, SAC	
Miss Carla Gerrard	0830
U. S. Naval Weapons Center	
Navy Geothermal/Geotec Energy R&D Program Drilling Plans	
Dr. Matt Walton	0850
Minnesota Geological Survey	
Core Drilling Technology for Ultradeep Scientific Holes	
Dr. George Plafker	0910
U. S. Geological Survey	
Middleton Island, Gulf of Alaska: A Possible Site for Deep Drilling into an Active Subduction Zone	
COFFEE BREAK	
Dr. Art McGarr	1010
U. S. Geological Survey	
Deep Drilling near Parkfield, CA to Investigate Thermomechanical Processes Leading to a Magnitude 6 Earthquake	
Dr. Mark D. Zoback	1050
Stanford University	
Scientific Drilling and Experimentation at Cajon Pass, a Site Near the San Andreas Fault in Southern California	
Dr. Ronald L. Bruhn	1130
University of Utah	
Proposed Deep Drilling of the Wasatch Normal Fault Zone, Utah	

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1. Because of the number of collaborators associated with many of the abstracts, the first author only is cited in the program. No slight is intended and no offense should be taken. (ES)

Afternoon Session Chairman: Dr. Larry Cathles

- Dr. Mary Lou Zoback 1330  
U. S. Geological Survey  
Scientific Drilling in the Sevier Desert Basin, Utah: In-situ study  
of the Interaction Between High and Low Angle Normal Faults
- Dr. John Eichelberger 1410  
Sandia National Laboratories  
Direct Observation of Very Young Igneous Intrusions
- Dr. John Rundle 1450  
Sandia National Laboratories  
Investigation of Active Tectonic and Magmatic Processes in Long  
Valley, via Surface and Borehole Techniques

COFFEE BREAK

- Dr. Fraser Goff 1550  
Los Alamos National Laboratory  
Investigation of Magma-Hydrothermal Systems: CSDP Proposal for the Valles  
Caldera, New Mexico
- Dr. George R. Priest 1630  
Oregon Department of Geology & Mineral Industries  
Scientific Drilling in the Cascades Volcanic Arc *David Blackwell*
- Dr. Wilfred A. Elders 1710  
University of California  
Salton Sea Scientific Drilling Project (SSSDP) Status Report, April 1985

Tuesday April 30, 1985  
Morning Session Chairman: Dr. Frank Schuh

- Dr. James D. Hoover 0800  
University of Texas at El Paso  
A Deep Drill Hole on the Central Basin Platform of West Texas
- Dr. Marco T. Einaudi 0830  
Stanford University  
Deep Observation of Continental Crust and Fossil Hydrothermal Systems at  
Yerington, Nevada and Red Mountain, Arizona
- Dr. Robert O. Fournier 0910  
U. S. Geological Survey  
Deep Continental Scientific Drilling in Yellowstone National Park

COFFEE BREAK



Dr. Phillip Bethke 1010  
U. S. Geological Survey  
Hydrothermal Systems: Research Drilling Opportunities in the  
Creede Mining District, Colorado

Dr. Richard R. Donofrio 1050  
Astro Geological Resources, Inc.  
Significance of Ultra-Deep Basement Astroblemes

Dr. Jack B. Hartung 1130  
Howard University  
Scientific Drilling of the Manson, Iowa, Structure

Afternoon Session Chairman: Dr. Gary Oelheoft

Dr. William M. Roggenthen 1330  
South Dakota School of Mines and Technology  
Drilling Target: Harney Peak Granite: Exploration of the Root  
Zone of an S-Type Granite System

Dr. W. R. Van Schmus 1410  
University of Kansas  
Project Upper Crust: A Program for Shallow to Intermediate Depth  
Scientific Drilling and Associated Studies in the Continental Interior

COFFEE BREAK

Dr. Matt Walton 1510  
Minnesota Geological Survey  
A Proposal for a Technological and Geological Drilling Experiment in the  
Minnesota River Valley

Dr. M. E. Bickford 1550  
University of Kansas  
Proposal for a Six Kilometer Drill Hole in the Eastern Arbuckle Mountains,  
Oklahoma, the Spavinaw Creek Area, Oklahoma or the St. Francois Mountains,  
Missouri

Dr. John H. Sass 1630  
U. S. Geological Survey  
A Crustal Drilling Experiment Near the Southern Margin of the Colorado  
Plateau and the San Francisco Volcanic Field

Wednesday May 1, 1985

Morning Session Chairman: Dr. James Kelsey

Dr. Robert D. Hatcher, Jr. 0800  
University of South Carolina  
Appalachian Ultradeep Drill Hole: Scientific Objectives and Goals of  
the Site Study



United States  
of America

# Congressional Record

PROCEEDINGS AND DEBATES OF THE 98<sup>th</sup> CONGRESS, SECOND SESSION

Vol. 130

WASHINGTON, TUESDAY, OCTOBER 2, 1984

No. 128

## Senate

Before the period at the end of section 101(c) insert the following:

*Provide Further*, That to express the sense of the Congress that the Continental Scientific Drilling Program is an important national scientific endeavor, benefiting the commerce of the Nation, which should be vigorously pursued by government and the private sector.

The Continental Scientific Drilling Program is an important national scientific endeavor that is vital to the understanding of the geologic evolution of the Earth and the economic value of its resources;

The most effective and efficient means of realizing the fullest potential in the Continental Scientific Drilling Program is through a cooperative effort by the Department of Energy, the National Science Foundation, and the United States Geological Survey;

Many important commercial and scientific advances may result from the Continental Scientific Drilling Program; and

Many foreign nations are engaged in a comparable deep drilling program, and cooperation and coordination would be beneficial to United States efforts.

It is the sense of the Congress that—

(1) the Continental Scientific Drilling Program is an important national scientific endeavor by the United States which should be enthusiastically implemented through a joint cooperative effort among the United States Department of Energy, the National Science Foundation, and the United States Geological Survey;

(2) The private sector should be encouraged to support the Continental Scientific Drilling Program and the participating agencies should solicit appropriate private sector participation in such Program; and

(3) The United States Government should cooperate to the extent practicable with the international community in developing this

important scientific and technical activity.

**Mr. McCLURE.** Mr. President, this is a resolution in the form of a amendment to the bill dealing with the Continental Scientific Drilling Program.

Mr. President, I understand that the distinguished Senator from South Dakota [Mr. PRESSLER] is offering an amendment regarding the Continental Scientific Drilling Program. I would just like to take a moment to add my support to this important legislation, and to commend my colleague for his able leadership on this issue.

Senator PRESSLER has told me of the superior capabilities of the South Dakota School of Mines and Technology in this area, and I certainly agree that the repository facilities he mentioned would be well suited for this program. He is a great champion for the interests of South Dakota, and you can always count on his word. South Dakota is fortunate to have a Senator of his caliber serving in the U.S. Senate.

I have watched his work closely over the years. His skillful handling of the amendment before us is illustrative of his well-established abilities as a truly exceptional legislator. He is a tireless worker and a refreshingly innovative thinker.

Mr. President, I just want to conclude by reiterating my strong support for this amendment and its distinguished author.

**Mr. PRESSLER.** Mr. President, I thank my distinguished colleague from Idaho for his very kind words,

Dr. Arthur E. Nelson 0840  
U. S. Geological Survey  
Recent Geological and Geophysical Investigation in Southern Appalachians and  
their Relation to Drill Sites for the Continental Scientific Drilling Program

Dr. Steve Haase 0920  
Oak Ridge National Laboratory  
A Continental Scientific Drilling Program Basement Test Borehole in Valley  
and Ridge of Tennessee

COFFEE BREAK

Mr. J. James Eidel 1020  
Illinois State Geological Survey  
The Illinois Superdeep Drillhole: A Comprehensive Central U.S. Lithosphere  
Study

Dr. M. Charles Gilbert 1100  
Texas A & M University  
Continental Scientific Drilling Program-Southern Oklahoma Aulacogen

Dr. George W. Viele 1140  
University of Missouri-Columbia  
The Ouachita Folded Belt, a Site for Deep Continental Drilling

Afternoon Session Chairman: Dr. Robert Schock

Dr. Lynton S. Land 1330  
University of Texas at Austin  
A Proposal for Deep Scientific Drilling & Associated Exploration and  
Research, Texas Gulf Coast

Dr. Gerard Bond 1410  
Lamont-Doherty Geological Observatory  
Instrumenting Deep Continental Drill Holes in the Alaska Peninsula. A Unique  
Experiment in determining crustal structural & evolution of an active island  
arc-trench system

Dr. Carl M. Wentworth 1450  
U. S. Geological Survey  
Structural and Tectonic History of California Coast Ranges: Testing  
an Obduction Model-Franciscan Emplacement Inferred from Seismic  
Reflection Profiles and Other Geophysical Data

Dr. John F. Casey 1530  
University of Houston  
Proposal to Drill in the Bay of Islands Ophiolite Complex, Western  
Newfoundland

and for his support of this legislation. I greatly appreciate his cooperation on this important issue.

Mr. President, I rise today to offer an amendment to the continuing resolution. This amendment expresses support for the Continental Scientific Drilling Program, designed to encourage its development in the United States. This legislation is enthusiastically supported by the geological and related scientific communities, as well as by the administration. I have a letter of support from the White House, signed by Dr. G.A. Keyworth, science adviser to the President. I ask unanimous consent that it be printed in the RECORD.

There being no objection, the letter was ordered to be printed in the RECORD, as follows:

THE WHITE HOUSE,  
Washington, August 29, 1984.

HON. LARRY PRESSLER,  
U.S. Senate,  
Washington, DC.

DEAR SENATOR PRESSLER: Thank you for sending me an advance copy of your proposed resolution on the Continental Drilling Program.

We fully agree with the National Academy of Sciences' recent assessments of the importance of a program of scientific continental drilling. The President's FY 1985 budget contained a small initiative in the National Science Foundation to begin preparatory studies for such a program. We are pleased with the progress so far, and expect that it will continue as planned. We are fully supportive of the proposals outlined in your resolutions, and look forward to continuing to work with the Congress to develop a really exciting and productive cooperative scientific drilling program.

Yours truly,

G.A. KEYWORTH,  
Science Advisor to the President.

Mr. PRESSLER. Mr. President, I would like to take a moment to explain the amendment, and urge my colleagues to support its passage.

In essence, the Continental Scientific Drilling Program has been developed to enhance our understanding of the processes that have led to the evolution of the chemical and physical

structure and properties of the Earth's continental crust. According to an interagency agreement by the Department of Energy, the Department of the Interior, and the National Science Foundation, this program would "contribute directly to the solution of serious national problems such as ensuring adequate supplies of energy, water and mineral resources, safe isolation of wastes, protection against the hazards of earthquakes and volcanic eruptions, and national defense." It goes on to state that the program "is an especially important tool for the scientific exploration of the earth's crust."

Mr. President, the United States has a lot of catch-up work to do in this area. Russia and many of our European counterparts are far ahead of us in this important scientific technology. I think it would behoove this body to act as expeditiously as possible to illustrate our strong desire to forge ahead as a nation in this program.

There is much yet to learn about the Earth. I am convinced that our understanding of this fascinating planet will be the key to a livable, prosperous future for generations to come. My colleagues will recall my support for, and interest in, our National Remote Sensing Satellite Program. My enthusiasm for the CSDP stems from much the same interest. Mr. President, we have to better understand our Earth and all its important resources if we are to properly manage and preserve them for our children.

This scientific and economic importance of this program is well documented. I would like to see us begin as soon as possible to get it fully underway.

This important research will not be limited to any one area or State, and will have a very positive impact in the areas affected. As I have said before, the CSDP is not only an extremely important scientific program, but carries with it important economic benefits, as well.

In my home State of South Dakota, for example, there are a number of

specific targets for CSDP research. One is a large, relatively low temperature geothermal anomaly located in the central portion of the State, which could tell us much about the flow and temperatures of aquifers and lead to a better understanding of a large source of geothermal energy.

Another would be the famous Black Hills of South Dakota, which offer us a unique look at the basement of the central United States. This small exposed piece of the continental crust contains the largest producing gold mine in the Western Hemisphere. Further, more sophisticated exploration and study could produce much more information about the mineral potential in these types of areas.

Perhaps more importantly, the South Dakota School of Mines and Technology (SDSM&T)—one of the most respected and innovative technical colleges in the world—is located in Rapid City, SD, in the heart of the Black Hills. SDSM&T and its superb faculty are well suited to play a major role in this important program—both inside and outside of South Dakota. SDSM&T facilities are well equipped for this type of research, and many members of its faculty are experts in specific areas of the CSDP. Eileen Ashworth (rock mechanics), J.J. Papke (crystal chemistry, mineralogy, and petrology), W.M. Roggenthen (geophysics, paleomagnetic studies), and C.K. Shearer (geochemistry and analytical chemistry) are just a few examples. I am very proud of SDSM&T and know that it can play an important role in the CSDP.

Finally, South Dakota would be well suited for curation of cores and other samples collected as part of the CSDP. As author of this legislation, it is my hope and intention that the former coal gasification plant in Rapid City, which was initially financed by the Federal Government and now stands empty, is utilized as the central repository for core and other samples collected as part of the Continental

Scientific Drilling Program. Experts in the field have found that it is an ideal location for a repository of this type. I hope my colleagues will agree and vote in support of this amendment. In brief, the plant is a soundly constructed facility with adequate space and excellent access. Rapid City is relatively centrally located and quite accessible by air or highway. The presence of the Department of Geology and Geological Engineering, the Institute for the Study of Mineral Deposit (ISMD), and the Engineering and Mining Experiment Station (EMES) provide the scientific expertise and analytical facilities which are crucial to the operation of a repository of this magnitude.

These are just a few of the potential specific benefits to one area. I want to emphasize that this is not a limited or parochial program. It is a national program with many international implications, and is deserving of our strong support.

With that, Mr. President, I will conclude my statement by once again urging my colleagues to join me in supporting this expression of strong support for the CSOP and to act expeditiously in order to send a strong signal to those involved.



United States  
of America

# Congressional Record

PROCEEDINGS AND DEBATES OF THE 99<sup>th</sup> CONGRESS, FIRST SESSION

Vol. 131

WASHINGTON, FRIDAY, APRIL 26, 1985

No. 51

## Senate

FRIDAY, APRIL 26, 1985

(Legislative day of Monday, April 15, 1985)

By Mr. PRESSLER:

S. 1026. A bill to direct the cooperation of certain Federal entities in the implementation of the Continental Scientific Drilling Program; to the Committee on Energy and Natural Resources.

### CONTINENTAL SCIENTIFIC DRILLING AND EXPLORATION ACT

Mr. PRESSLER. Mr. President, I am extremely pleased today to introduce the Continental Scientific Drilling and Exploration Act of 1985. This legislation represents an early step in a scientific program which I believe parallels in importance our efforts in space over the past three decades—but at a tiny fraction of the cost. Its scientific value and potential for resolving heretofore unanswered questions about the development and management of the planet on which we live is inestimable.

By increasing our basic understanding of the Earth, an effective Continental Scientific Drilling Program [CSDP] has practical day-to-day applications in areas dealing with energy and mineral development, natural hazards such as earthquakes and volcanic eruptions, disposal of hazardous-wastes, water resource management, and a host of other areas.

Mr. President, this legislation calls for the implementation of the Continental Scientific Drilling Program joint resolution which I introduced last year, and was signed into law by the President on October 12, 1984. The legislation represents an effort to define in greater detail some policy goals and objectives of the U.S. Continental Scientific Drilling Program, and calls on the Interagency Coordinating Group to prepare and submit to the Congress a study outlining those detailed goals and objectives, and recommend a plan of action.

The Interagency Coordinating Group consists of an outstanding group of scientists that were brought together as a result of an interagency

accord on continental scientific drilling signed by the Department of Energy, the U.S. Geological Survey and the National Science Foundation.

Much work has already been done in this important area. Years of dedication and work have already been invested in the program. We are now on the threshold of an exciting new scientific era in basic Earth sciences research and application, but we need to take the next step by beginning sincere congressional inquiry into this area and carefully assessing our need to make a commitment toward CSDP. I firmly believe this is one of the most important scientific programs this body has considered in some time.

I have been astounded by the Scientific community's tremendous interest in and support for this legislation. For example, in an effort to make the legislation as substantive and technically correct as possible, I circulated a draft bill to approximately 130 top scientists from around the country. The response was tremendous. We received substantive, detailed comments from nearly 50 percent of the scientists. All were generally supportive and enthusiastic about the legislation. The comments and recommendations I received were, to the extent possible, incorporated in the bill I am introducing today. I believe it is a good piece of legislation and encourage my colleagues to join me as cosponsors.

It is important to get this bill passed in a timely fashion. The program is already going forward. Indeed, the National Science Foundation is sponsoring a meeting of a large group of distinguished scientists and engineers who will gather in Houston, TX, next week to lay groundwork for what I hope we will develop into a truly national, long-term Continental Scientific Drilling Program.

I might just pause here to take a moment to recognize the dedication and cooperative spirit of the individuals and Government agencies in-

involved in this program. It is heartening to witness people and agencies so truly devoted to a worthy common goal.

My interest and involvement in this program is relatively recent, and stems from the potential role that the South Dakota School of Mines and Technology could and should play in CSDP. But the more I study the program, its goals and what it could mean for the United States, the more enthusiastic I become and the more certain I am that we must go forward on a national scale.

There is much yet to learn about the Earth. I am convinced that our understanding of this fascinating planet will be the key to a liveable, prosperous future for generations to come. The Continental Scientific Drilling Program is an extremely important element in gaining a better fundamental understanding of and insight into our Earth. Space is not the final frontier. Much closer, just as mysterious, and probably more beneficial is the inside of our own planet. A thorough exploration of this important frontier, I am certain, will reap great rewards. I again ask you to join me in support of this effort and support passage of this important legislation. The text of the bill itself goes a long way toward explaining the thrust of my legislation. I commend it to my colleagues' attention and ask unanimous consent that a copy of the bill be printed in the RECORD at this point.

There being no objection, the bill was ordered to be printed in the RECORD, as follows:

S. 1026

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled.* That this Act may be cited as the "Continental Scientific Drilling and Exploration Act".

### PURPOSES

SEC. 2. The purpose of this Act is to—  
(1) implement section 323 of the joint resolution entitled "Joint Resolution making



continuing appropriations for the fiscal year 1985, and for other purposes", approved October 12, 1984 (Public Law 98-473; 98 Stat. 1875) which supports and encourages the development of a national Continental Scientific Drilling Program;

(2) enhance fundamental understanding of the composition, structure, dynamics, and evolution of the continental crust, and how such processes affect natural phenomena such as earthquakes, volcanic eruptions, transfer of geothermal energy, distribution of mineral deposits, the occurrence of fossil fuels, and the nature and extent of aquifers;

(3) advance basic earth sciences research and technological development;

(4) obtain critical data regarding the earth's crust relating to isolation of hazardous wastes; and

(5) develop a long-range plan for implementation of the Continental Scientific Drilling Program.

#### FINDINGS

Sec. 3. Congress finds that—

(1) because the earth provides energy, minerals, and water, and is used as a storage medium for municipal, chemical, and nuclear waste, an understanding of the processes and structures in the earth's crust is essential to the well being of the United States;

(2) there is a need for developing long-range plans for a United States Continental Scientific Drilling Program; and

(3) the Continental Scientific Drilling Program would enhance—

(A) understanding of the crustal evolution of the earth and the mountain building processes;

(B) understanding of the mechanisms of earthquakes and volcanic eruptions and the development of improved techniques for prediction;

(C) understanding of the development and utilization of geothermal and other energy sources and the formation of and occurrence of mineral deposits;

(D) understanding of the migration of fluids in the earth's crust for evaluation of waste contamination and the development of more effective techniques for the safe subsurface disposal of hazardous wastes;

(E) understanding and definition of the size, source, and more effective use of aquifers and other water resources; and

(F) evaluation and verification of surface geophysical techniques needed for exploring and monitoring and earth's crust.

#### IMPLEMENTATION OF CONTINENTAL SCIENTIFIC DRILLING PROGRAM

Sec. 4. The Secretary of the Department of Energy, the Secretary of the Department of the Interior through the United States Geological Survey, and the Director of the National Science Foundation shall implement the policies of section 323 of the joint resolution entitled "Joint Resolution making continuing appropriations for the fiscal year 1985, and for other purposes", approved October 12, 1984 (Public Law 98-473; 98 Stat. 1875) by—

(1) taking such action as necessary to assure an effective, cooperative effort in furtherance of the Continental Scientific Drilling Program of the United States;

(2) taking all reasonable administrative and financial measures to assure that the Interagency Accord on Continental Scientific Drilling continues to function effectively in support of such program;

(3) assuring the continuing effective operation of the Interagency Coordinating Group to further the objectives of such program;

(4) taking such action to assure that the Interagency Coordinating Group receives

appropriate cooperation from any Federal agency that can contribute to the objectives of such program, without adversely affecting any program or activity of such agency; and

(5) acting through the Interagency Coordinating Group, preparing and submitting to the Congress, within one hundred and eighty days after the enactment of this Act a report describing—

(A) long and short-term policy objectives and goals of the United States Continental Scientific Drilling Program;

(B) projected schedules of desirable scientific and engineering events that would advance United States objectives in the Continental Scientific Drilling Program;

(C) to the extent and for the duration that the Interagency Coordinating Group deems practicable, maximum, minimum, and intermediate levels of resources and funding that would be required by each participating Federal agency to carry out events pursuant to subparagraphs (A) and (B) at the various levels of effort;

(D) the scientific, economic, technological, and social benefits expected to be realized through the implementation of such program at each level described in subparagraph (C);

(E) a recommended course for interaction with the international community in a cooperative effort to achieve the goals and purposes of the Act;

(F) the extent of participation or interest shown to date in the Continental Scientific Drilling Program by—

(i) any other governmental agency;

(ii) any academic institution;

(iii) any organization in the private sector; and

(iv) any governmental or other entity in the international community;

(G) a plan to develop beneficial cooperative relationships among the entities mentioned in subparagraph (F), to the extent that the Interagency Coordinating Group deems practicable; and

(H) any other information or recommendations that the Interagency Coordinating Group deems appropriate.