

## Calendar No. 156

106TH CONGRESS }  
*1st Session* }

SENATE

{ REPORT  
106-78

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### NATIONAL GEOLOGIC MAPPING REAUTHORIZATION ACT OF 1999

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JUNE 14, 1999.—Ordered to be printed

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Mr. MURKOWSKI, from the Committee on Energy and Natural Resources, submitted the following

### REPORT

[To accompany S. 607]

The Committee on Energy and Natural Resources, to which was referred the bill (S. 607) to reauthorize and amend the National Geologic Mapping Act of 1999, having considered the same, reports favorably thereon without amendment and recommends that the bill do pass.

#### PURPOSE OF THE MEASURE

The purposes of S. 607 is to reauthorize and amend the National Geologic Mapping Act of 1992 through fiscal year 2005.

#### BACKGROUND AND NEED

Since its establishment in 1879, the United States Geological Survey (USGA) has been charged with classifying and mapping the public lands, geologic structures, mineral resources and products of the national domain. Geologic mapping serves a number of vital social needs including assessing natural hazards such as earthquake-prone areas, volcanic eruptions, landslides and other ground failures; aiding in the exploration for mineral resources; facilitating the monitoring and protection of groundwater resources; and assisting urban land use planning and general environmental and resource management.

A 1988 report of the National Academy of Sciences expressed concerns about the adequacy of basic geologic mapping efforts nationwide. In response to these concerns, Congress enacted the National Geologic Mapping Act in 1992 (Public Law 102-285; 43

United States Code 31a–h). Congress reauthorized this law in 1997 (Public Law 105–36).

The NGMA authorizes the Secretary of the Interior, acting through the USGS, to develop and maintain a cooperative Federal State geologic mapping program. The program involves USGS and the geologic survey organizations of all 50 states, as well as academia, in an effort to provide comprehensive geologic mapping of the Nation’s surface and bedrock deposits.

S. 607 extend the authorization for the NGMA through fiscal year 2005. I would also increase authorization levels for the various geologic mapping programs, and raise the percentage of funds available to be matched by States for the State component of the program. It would also require the Secretary to prepare a five year plan for the management of the program.

#### LEGISLATIVE HISTORY

S. 607 was introduced by Senators Craig and Murkowski on March 15, 1999. Senator Smith of Oregon is a cosponsor. A hearing on S. 607 was held before the Subcommittee on Forests and Public Land Management on April 28, 1999. At the business meeting on May 19, 1999, the Committee on Energy and Natural Resource ordered S. 607 favorably reported.

#### COMMITTEE RECOMMENDATIONS AND TABULATION OF VOTES

The Senate Committee on Energy and Natural Resources, in open business session on May 19, 1999, by a vote of a quorum present, recommends that the Senate pass S. 607, without amendment.

#### SECTION-BY-SECTION ANALYSIS

*Section 1* designates the bill’s short title as the “National Geographic Mapping Reauthorization Act of 1999”.

*Section 2* adds the Congressional findings regarding the geologic mapping needs of the nation.

*Section 3* defines terms used in the bill.

*Section 4* makes clarifying amendments to the Federal, State and education components of the program, retaining the requirement that the Federal share of the cost of activities under the State and education components not exceed 50 percent, and adding a restriction on the amount of funds under the State and education components that can be used for administrative costs.

*Section 5* makes clarifying amendments to the advisory committee section of the Act.

*Section 6* adds a requirement that the USGS develop a 5-year strategic plan for the geologic mapping program, and makes other clarifying amendments.

*Section 7* makes clarifying amendments.

*Section 8* changes the requirement that the Secretary report to the Congress on the status of the geologic mapping program from annually to biennially and makes other clarifying amendments.

*Section 9* authorizes appropriations through fiscal year 2005 at the following levels: \$28 million for FY 1999; \$30 million for FY 2000; \$37 million for FY 2001; \$43 million for FY 2002; \$50 million

for FY 2003; \$57 million for FY 2004; \$64 million for FY 2005. It raises from a maximum of 25 percent to 48 percent the amount of appropriated dollars that shall be available for the State component, and retains the maximum amount of 2 percent that can be expended on the education component.

#### COST AND BUDGETARY CONSIDERATION

The following estimate of costs of this measure has been provided by the Congressional Budget Office:

U.S. CONGRESS,  
CONGRESSIONAL BUDGET OFFICE,  
*Washington, DC, May 24, 1999.*

Hon. FRANK H. MURKOWSKI,  
*Chairman, Committee on Energy and Natural Resources,*  
*U.S. Senate, Washington, DC.*

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the enclosed cost estimate for S. 607, the National Geologic Mapping Reauthorization Act of 1999.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contacts are Gary Brown (for federal costs) and Majorie Miller (for the state and local impact).

Sincerely,

BARRY B. ANDERSON  
(For Dan L. Crippen, Director).

Enclosure.

#### CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

##### *S. 607—National Geologic Mapping Reauthorization Act of 1999*

Summary: S. 607 would authorize the appropriation of \$245 million over the 1999–2004 period and \$64 million in 2005 for geologic mapping programs at the U.S. Geological Survey. Of that total, \$58 million in funding for 1999 and 2000 is already authorized under current law. CBO estimates that implementing S. 607 would result in additional outlays of \$185 million over the 2001–2004 period, assuming the appropriation of the authorized amounts. Enacting the bill would not affect direct spending or receipts; therefore, pay-as-you-go procedures would not apply.

S. 607 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA). State governments would incur some costs to match the federal grant funds authorized by this bill, but these costs would be voluntary.

Estimated cost to the Federal Government: Current law authorizes the appropriation of \$28 million in 1999 and \$30 million in 2000 for geologic mapping. In addition to those amounts, S. 607 would authorize the appropriation of \$37 million in 2001, \$43 million in 2002, \$50 million in 2003, \$57 million in 2004, and \$64 million in 2005. To date, an appropriation of \$23 million for geologic mapping has been provided in 1999.

For the purpose of this estimate, CBO assumes that S. 607 will be enacted by the end of fiscal year 1999 and that all amounts authorized by the bill will be appropriated for each fiscal year. Estimated outlays are based on historical spending rates for these pro-

grams. The estimated budgetary impact of S. 607 is shown in the following table. The costs of this legislation fall within budget function 300 (natural resources and environment).

	By fiscal year, in millions of dollars					
	1999	2000	2001	2002	2003	2004
SPENDING SUBJECT TO APPROPRIATION						
Spending on geologic mapping under current law:						
Authorization level <sup>1</sup> .....	28	30	0	0	0	0
Estimated outlays .....	28	30	2	0	0	0
Proposed changes:						
Authorization level .....	0	0	37	43	50	57
Estimated outlays .....	0	0	35	43	50	57
Spending on geologic mapping under S. 607:						
Authorization level <sup>1</sup> .....	28	30	37	43	50	57
Estimated outlays .....	28	30	37	43	50	57

<sup>1</sup>The 1999 and 2000 levels are the amounts authorized under current law (Public Law 105-36); to date, \$23 million has been appropriated for 1999.

Pay-as-you-go considerations: None.

Estimated impact on State, local, and tribal governments: S. 607 contains no intergovernmental mandates as defined in UMRA. As is the case under current law, this bill would require that all funds provided under the geologic mapping program for grants to states be matched by an equal amount of state funds. All state expenditures for this purpose would be voluntary. This bill would have no other significant impact on the budgets of state, local, or tribal governments.

Estimated impact on the private sector: This bill contains no new private-sector mandates as defined in UMRA.

Estimate prepared by: Federal costs: Gary Brown; Impact on State, local, and tribal governments: Marjorie Miller.

Estimate approved by: Paul N. Van de Water, Assistant Director for Budget Analysis.

#### REGULATORY IMPACT EVALUATION

In compliance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee makes the following evaluation of the regulatory impact which would be incurred in carrying out S. 607.

The bill is not a regulatory measure in the sense of imposing Government-established standards or significant economic responsibilities on private individuals and businesses.

No personal information would be collected in administering the program. Therefore, there would be no impact on personal privacy.

Little, if any, additional paperwork would result from the enactment of S. 607, as ordered reported.

#### EXECUTIVE COMMUNICATIONS

On April 16, 1999, the Committee on Energy and Natural Resources requested legislative reports from the Department of the Interior and the Office of Management and Budget setting forth Executive agency recommendations on S. 607. These reports had not been received at the time the report on S. 607 was filed. When the reports became available, the Chairman will request that they be printed in the Congressional Record for the advice of the Senate.

The testimony provided by the United States Geological Survey at the Subcommittee hearing follows:

STATEMENT OF P. PATRICK LEAHY, CHIEF GEOLOGIST, U.S.  
GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

Mister Chairman, I am pleased to be here today to express the Administration's support for S. 607, a bill to reauthorize the National Geologic Mapping Act of 1992.

I would like to begin by emphasizing the close coordination and agreement between the USGS and the Association of American State Geologists (AASG) on this reauthorization bill and on geologic mapping in general. The bill was reviewed by the Federal Advisory Committee for the National Cooperative Geologic Mapping Program in April of 1998 and we have been in close and frequent communication with the AASG on all aspects of the bill since that time.

The principal changes in this reauthorization bill are: First, an increase from approximately 20% to 48% of new funds that will be made available for matching-funds grants to State geological surveys, and second, an increase in the authorization levels. These changes are the result of an increased demand for geologic maps and a renewed emphasis by the USGS on one of our most basic mission responsibilities: producing objective and authoritative geologic maps and information systems, and represent an increased capacity of the States to provide matching funds. The authorization levels contained in the bill are not assumed in the Administration's current outyear funding levels and represent a significant challenge in terms of acquiring, in the years to come, the necessary resources through the Administration and Congressional budget and appropriations process.

At recent public forums in Alaska, California, Indiana, Ohio, and Virginia, and in opinion surveys conducted by State geological surveys, we have heard a consistent message—more geologic mapping is needed, and geologic mapping is considered as a principal strength and responsibility of the USGS and our State partners. In response, the President's FY 2000 budget proposes an increase of approximately 8% in funding for the Geologic Mapping Program

With the development of digital mapping technology, geologic mapping is experiencing a renaissance in its use and applicability. We anticipate increased demand for digital geologic maps in the future. The reason for this growth is simple, geologic maps are increasingly needed to bring together and interpret information about the Earth. Geologic maps are used by land, water, and natural resource managers at the Federal, State and local levels of government and by the private-sector to achieve the most efficient use of Earth resources in a way that is at once both sustainable and economically viable.

Economic growth is driven largely by access to the Earth's resources. Geologic maps provide the spatial framework to locate energy resources such as coal, petroleum, and natural gas; construction materials such as sand, gravel, limestone, and building stone; soil and rock types that enhance agricultural productivity; and metals and other mineral resources as diverse as gold and fertilizer. They also constitute the framework to locate and to monitor the cleanliness and availability of our groundwater resources.

To the extent possible, humans must be safe from natural hazards. Although hazardous events such as earthquakes, volcanic eruptions, landslides and floods cannot be stopped, recognizing and planning for these dangers significantly reduces the damages and costs of disasters. Identifying the location of hazardous areas on maps allows land managers, industry, and the public to predict potential losses, and develop strategies to minimize these losses. Geologic mapping is the principal means for discovering and recording areas that will be affected by natural hazards and geologic maps and Geographic Information Systems are the principal means for communicating the dangers and risks.

Unlike topographic maps, which show the elevation of the earth's surface and can increasingly be produced using remote sensing methods, geologic maps display the array of different types of soils, sediments, and rocks that are present at and below the surface of the Earth. Advances in computer technology and the development of Geographic Information Systems permit map users to display and analyze map information in three dimensions. This new ability to visualize geologic map information allows non-geologists to understand and use geologic maps more readily, which has further increased demand.

The geologic map has been a keystone product of the U.S. Geological Survey through its 120-year history. As reflected in the President's FY 2000 budget proposal, the USGS is again making geologic mapping a high priority. The Geologic Mapping Act of 1992 anticipated the increased demand for geologic mapping, and the reauthorization bill before this Committee will assist USGS and our partners in the States and Universities in responding.

To meet the need for new maps, our response must be coordinated with both those who use geologic maps and those who produce them. The broadest range of stakeholders must determine what information is needed so that our mapping efforts are well targeted. All of those who prepared geologic maps, from the U.S. Geological Survey to State geological surveys and the academic community, must work cooperatively to maximize each other's strengths and to avoid duplication. It is in this cooperative spirit that the National Geologic Mapping Act was written and under which the National Cooperative Geologic Mapping program was built.

## NATIONAL COOPERATIVE GEOLOGIC MAPPING PROGRAM

The National Cooperative Geologic Mapping (NCGM) Program was established by the National Geologic Mapping Act of 1992. Through involvement with private industry, policy makers, and the public, the program seeks to ensure that mapping efforts are focused on priority areas. The program uses stakeholder input to determine what formats are most needed as new geologic maps are being produced in digital formats and indexed for delivery on the Internet.

The NCGM Program has been designed so that the Nation will have the accurate geologic maps needed to address tomorrow's problems. To this end, the following goals are being pursued:

- Continued enhancement of outreach to stakeholders ensures that our maps address societal priorities and are produced at appropriate scales and in forms that are easily accessible and usable. For example, on February 24, 1999, the NCGMP participated in three separate public stakeholder meetings to discuss the availability and quality of water resources in New Mexico, the value of 3-dimensional earth science information for the Great Lakes Region, and the mitigation of geologic hazards in the Pacific Northwest. The net effect of this enhanced outreach is the design of geologic mapping projects that address high-priority issues and the incorporation of local and regional priorities into a national agenda for geologic mapping.
- Expanded cooperative mapping with the State geologic surveys and academic institutions, and expanded cooperation with other Federal agencies, and private-sector firms to enhance the usefulness of map information and data.
- Development of metadata (data about data) for the National Geologic Map database and development of standards and data models to make geologic maps accessible through the Internet.

The NCGMP supports the Mapping Act through three main components FEDMAP, STATEMAP, and EDMAP. Since its authorization by the National Geologic Mapping Act in 1992, the Geologic Mapping Program has worked with the States and Universities of the nation to produce more than 4,000 new maps and related scientific reports for high-priority areas in virtually every state of the Union. However, the job is far from complete. The 7.5 minute-geologic quadrangle map is the common denominator for Federal and State mapping, and this scale of work is widely accepted as the starting point for more detailed site-specific studies conducted by private industry. However, there are more than 50,000 such quadrangles across the nation, and high-priority areas must be re-mapped periodically to incorporate new scientific concepts, new technology, and new demands from the public. For ex-

ample, most of the geologic mapping in the upper Midwest was done more than 80 years ago, less than 2% is available at the 7.5 minute quadrangle scale, and an even smaller fraction is available in modern digital formats.

Early generations of geologic mapping were focused on locating mineral resources. This remains a focus in many areas of the country. However, the missions of the Federal and State geological surveys and the needs for geologic maps have expanded. For example, we are now making three-dimensional geologic maps to meet the needs of a nation that is increasingly turning to ground water for drinking, agricultural, and industrial uses.

The Federal-mapping component (FEDMAP) currently consists of 18 regional geologic mapping and synthesis projects. Government and private-sector clients and co-operators are involved in planning new FEDMAP projects. The NCGMP has increased interactions with other USGS programs and with State survey partners during the last four years in order to share expertise, leverage financial resources, and to respond directly to customer needs. Due to this change, the scientific emphasis of the program has shifted to issues that increasingly affect society and human health such as:

- Discovery and protection of ground water
- Identification and mitigation of natural hazards
- Assessment of our nation's mineral and energy resources
- Establishment of scientific baselines for environmental restoration
- Land resource assessment in support of infrastructure needs

The State mapping component, STATEMAP, awarded 3.8 million dollars to 45 states in FY 1999, a record number, and every Federal dollar was matched by a State dollar. The awards will fund more than 150 geologic mapping projects. State Mapping Advisory Committees met in all forty-five states during 1998 to help the Mapping Program prioritize geologic mapping needs. Over 500 individuals from Federal, State, and local government, academia, industry, and geoscience consulting firms, participated in these meetings. In addition, where the priorities of FEDMAP, STATEMAP, and EDMAP geologic mapping projects align well, regional coalitions have formed and resources are leveraged to maximize efficiency and benefit to the public.

The university-mapping component, EDMAP, is the matching-funds educational program with universities to train a new generation of geologic mappers. In FY 1999 EDMAP awarded approximately 380 thousand dollars to 70 geology students at 41 universities and colleges. Again, each Federal dollar was matched. Our effort to help geologic mappers has grown stronger each year. This year's proposals showed that the students and their faculty advisors are working more closely with mapping projects at

State geological surveys and the USGS. Student mapping is tied more directly to societal needs than in the past, and more of these maps are being published by state geological surveys.

#### NATIONAL GEOLOGIC MAP DATABASE

All three components of the National Cooperative Geologic Mapping Program contribute to the construction of the National Geologic Map Database. The initial phase of the database is an Internet-based catalog of printed geologic maps. The index is available on the Internet at <http://ngmdb.usgs.gov> and is being populated with metadata (approximately 55% of USGS holdings are completed as of April, 1999). The second phase of the project is underway to adopt standards for GIS use and to provide access and delivery of digital geologic map data on the Internet. This is an area of continued emphasis in FY 1999 and increased effort in FY 2000. The USGS is currently working with both producers and users of geologic map information to develop draft format, symbols, and technical attribute standards so that digital geologic map information can be accessed, exchanged, and compared efficiently as part of the National Spatial Data Infrastructure.

#### FEDERAL PARTNERSHIPS

The geologic mapping program is developing cooperative relationships with Federal partners in addition to our State and academic cooperators. The most mature of these is with the National Park Service (NPS). In 1995, the USGS and NPS signed a Memorandum of Understanding that outlined areas of interaction between the two bureaus. The geologic mapping program has responded by working with NPS as part of their "Science in the Parks" initiative to direct a portion of the program's geologic mapping and supporting activities toward priorities established by NPS. This cooperative program has continued each year since 1995. NPS-identified priorities are merged with USGS capabilities in FEDMAP projects that create geologic maps and related interpretative products to serve the 180 million annual visitors to our Nation's parks.

We are currently conducting geologic mapping projects in partnership with NPS at more than a dozen Parks. For example, at Death Valley National Park in California, we are partnering with NPS, the Department of Energy, and Nye County by making geologic maps as the three-dimensional framework for modeling the ground-water system that originates in central Nevada, flows under the Nevada Test Site and terminates in Death Valley. In Shenandoah and Great Smokies National Parks we are making geologic maps that show the widespread distribution of landslide hazards and the impacts of landslides on mountain stream habitats for trout. And at a variety of Parklands across the Nation we are making geologic maps to assist the NPS ex-

plain the geologic treasures of the Parks to a curious and appreciative public.

#### EXAMPLES OF GEOLOGIC MAPPING PROJECTS

I would like to cite a series of our geologic mapping projects on a State-by-state basis and give a brief description of the reasons for the mapping in each case. Because this is a national program, with projects in virtually every state, it is a simple matter to select examples that may have particular meaning to the membership of this Committee.

Alaska: A new STATEMAP geologic mapping project in the North Slope region relates the well-known geology of Prudhoe Bay with new frontier areas farther inland. This work was prioritized by Alaska's State Mapping Advisory Committee as a means to stimulate inland exploration efforts.

Idaho: STATEMAP projects in western Idaho near Coeur d'Alene are mapping a major aquifer that is the sole source of water for over 400,000 people. EDMAP projects in Idaho support 7 students at Boise State University and Idaho State University.

Oregon: A FEDMAP project is mapping the earthquake-prone urban corridor of western Oregon and Washington. The project locates earthquake faults and defines areas that are susceptible to liquefaction, ground failure, and damage during earthquakes. Availability of ground water, forest health, and seismic and landslide hazards are principal issues addressed by STATEMAP projects in Klamath Falls, the upper Grand Ronde Basin, and the central Willamette Valley. An EDMAP project at Portland State University is investigating surface and subsurface water interaction in the upper Williamson River.

Montana: A FEDMAP project in Montana is contributing to the new State Geologic Map being compiled by the State geological survey and is contributing geologic information to address ground water resources and hazard issues in the Helena basin. A STATEMAP project is mapping large areas of central and western parts of the State, particularly in high-priority areas for Montana's Groundwater Characterization Program. Issues addressed include liquid-waste disposal in the Bitterroot Valley, and controls on groundwater resources in the upper Yellowstone Valley.

New Mexico: A joint FEDMAP-STATEMENT-EDMAP geologic mapping project with the New Mexico Bureau of Mines and Mineral Resources, two New Mexico Universities and the USGS Water Resources Division is developing an improved three-dimensional geologic map and ground-water flow model for the Middle Rio Grande Basin. The project works closely with the New Mexico Office of the State Engineer and the City of Albuquerque, who need an improved model to evaluate critical ground-water resources in the basin and to improve forecasts of the impacts of future ground-water use.

Wyoming: Geologic mapping of the Lander/Riverton area is underway by our STATEMAP project. This area was targeted for increased emphasis by the Wyoming Business Council to promote economic development. Geologic mapping is also being done in a number of areas where EPA and the Wyoming Geological Survey are studying aquifer vulnerability to contamination from pesticides.

Arizona: STATEMAP geologic mapping is directed at the Phoenix-Tucson corridor where 80% of the state's population resides. Due to the massive scale and rapid pace of growth, intense pressures are being placed on water resources. Land subsidence related to ground water withdrawal is one of the critical issues addressed by this detailed mapping.

Colorado: STATEMAP funds support geologic mapping in the Colorado Springs and Idaho Springs, areas where areas of geologic hazards such as landslides, rockfalls, swelling soils, and subsidence over underground mines are being mapped. Our FEDMAP project and the Colorado Geological Survey are evaluating landslide subsidence and infrastructure resources along the developing I-70 and Front Range corridors, and assessing sources for salt in the Colorado River.

California: FEDMAP and STATEMAP efforts are defining the structure and history of the San Andreas Fault system and its relation to earthquake hazards in the Los Angeles and San Francisco Bay areas. Detailed geologic maps produced by these efforts help to define seismic hazard zones, enabling local governments to plan accordingly. FEDMAP projects are also mapping ground-water basins in three-dimensions to support the water resource needs of the populous desert region of the state.

Louisiana: Our STATEMAP project supports geologic mapping of the Baton Rouge area where a detailed knowledge of active faults is necessary to protect critical aquifers from contamination and to aid in siting of solid-waste repositories. FEDMAP projects in Louisiana supported the training of three students of Centenary College of Louisiana and the University of New Orleans.

South Dakota: Our FEDMAP project is assisting the National Park Service evaluate cave resources in Jewell Cave National Monument and Wind Cave National Park, where only 5% of the cave passages are known. Geologic mapping helps locate undiscovered cave passages, as the distribution of impermeable rock above the cave-bearing formations controls the access of ground-water and therefore the location of the caves. Our FEDMAP projects are training two students to map areas in the northern Black Hills near Spearfish.

Arkansas: Our STATEMAP projects are mapping in southwest Arkansas, a prospective area for diamond mining and aquifer recharge, and an area where over 150 confined animal-waste-disposal sites are located. Our FEDMAP project in Arkansas is making geologic maps to

better understand the pathways and quality of water that flows through underground caves and springs in the Buffalo River National Scenic Riverway.

Illinois, Indiana, Ohio, and Michigan: The Great Lakes Geologic Mapping Coalition is a new partnership between the USGS and the State Surveys of Indiana, Illinois, Ohio, and Michigan to produce a new generation of geologic maps and three-dimensional maps of the glacial deposits that blanket the region. The Coalition formed to address the highest-priority earth science needs that were identified by public and private-sector representatives at public forums on geologic mapping in Indianapolis, Indiana (1997) and Columbus, Ohio (1999). Mapping is planned to evaluate ground-water quality and quantity, sand and gravel resources, to mitigation landslide and other natural hazards, and as the geologic framework to evaluate economic development and natural resource issues.

#### CONCLUSION

Mister Chairman, in concluding my remarks, I would like to state for the record that the National Geologic Mapping Act of 1992 has been instrumental in helping focus attention on the Nation's need for a new generation of high-quality geologic maps. The Administration supports reauthorization and urges bipartisan support for this legislation. Thank you, Mister Chairman for the opportunity to express the views of the U.S. Geological Survey on the benefits of the National Geologic Mapping Act and the value of reauthorizing this program. I would be happy to respond to any questions you may have.

#### CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill S. 607, as ordered reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

### NATIONAL GEOLOGIC MAPPING REAUTHORIZATION ACT OF 1999

\* \* \* \* \*

#### SEC. 2. FINDINGS.

(a) FINDINGS.—The Congress finds and declares that

(1) \* \* \*

\* \* \* \* \*

(7) geologic maps have proven indispensable in the search for needed fossil-fuel and mineral resources; **[and]**

(8) *geologic map information is required for the sustainable and balanced development of natural resources of all types, including energy, minerals, land, water, and biological resources;*

(9) *advances in digital technology and geographical information system science have made geologic map databases increasingly important as decision support tools for land and resource management; and*

[(8)] (10) a comprehensive nationwide program of geologic mapping of surficial and bedrock deposits is required in order to systematically build the Nation's geologic-map data base at a pace that responds to increasing demand.

(b) PURPOSE.—\* \* \*

\* \* \* \* \*

**SEC. 3. DEFINITIONS.**

(1) Advisory Committee \* \* \*

\* \* \* \* \*

(4) *Education Component*

*The term "education component" means the education component of the geologic mapping program described in section 6(d)(3).*

(5) *Federal Component*

*The term "Federal component" means the Federal component of the geologic mapping program described in section 6(d)(1).*

[(4)] (6) *Geologic Mapping Program*

The term "geologic mapping program" means the National Cooperative Geologic Mapping Program established by section 4(a) of this title.

[(5)] (7) *Secretary*

The term "Secretary" means the Secretary of the Interior.

[(6)] (8) *State*

The term "State" includes the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, American Samoa, Guam, and the Virgin Islands.

(9) *State Component*

*The term "State component" means the State component of the geologic mapping program described in section 6(d)(2).*

[(7)] (10) *Survey*

The term "Survey" means the United States Geological Survey.

**SEC. 4. GEOLOGIC MAPPING PROGRAM.**

(a) ESTABLISHMENT.—\* \* \*

\* \* \* \* \*

(b) RESPONSIBILITY OF THE SURVEY.—

(1) LEAD AGENCY.—The survey shall be the lead Federal agency responsible for planning, developing [priorities] *national priorities and standards for*, coordinating, and managing the geologic mapping program. In carrying out this paragraph, the Secretary, acting through the Director, shall—

(A) [develop a geologic mapping program implementation plan] *develop a 5-year strategic plan for the geologic mapping program* in accordance with section 6, which plan shall be submitted to the Committee on Resources of the House of Representatives and to the Committee on Energy and Natural Resources of the Senate [within 300 days after the enactment of the National Geologic Mapping Reauthorization Act of 1997] *not later than 1 year after the*

*date of enactment of the National Geologic Mapping Reauthorization Act of 1999;*

(B) appoint, with the advice and consultation of the Association, the advisory committee **【within 90 days after the date of enactment of the National Geologic Mapping Reauthorization Act of 1997】** *not later than 1 year after the enactment of the National Geologic Mapping Reauthorization Act of 1999* in accordance with section 5; and

(C) **【within 210 days after the date of enactment of the National Geologic Mapping Reauthorization Act of 1997】** *not later than 3 years after the enactment of the National Geologic Mapping Reauthorization Act of 1999, and biennially thereafter*, submit a report to the Committee on Energy and Natural Resources of the United States Senate and to the Committee of Resources of the House of Representatives identifying—

(i) how the Survey and the Association **【will coordinate】** *are coordinating* the development and implementation of the geologic mapping program;

(ii) how the Survey and the Association **【will establish】** *establish* goals, mapping priorities, and target dates for implementation of the geologic mapping program; and

(iii) how long term staffing plans for the various components of the geologic mapping program **【will lead to】** *affect* successful implementation of the geologic mapping program.

(2) Responsibility of the Secretary \* \* \*

\* \* \* \* \*

**【(d) PROGRAM COMPONENTS.—**The geologic mapping program shall include the following components:

**【(1) A Federal geologic mapping component, whose objective shall be determining the geologic framework of areas determined to be vital to the economic, social, or scientific welfare of the Nation. Mapping priorities shall be based on—**

**【(A) national requirements for geologic-map information in areas of multiple-issue need or areas of compelling single-issue need; and**

**【(B) national requirements for geologic-map information in areas where mapping is required to solve critical earth-science problems.**

**【(2) A geologic mapping support component, whose objective shall be providing interdisciplinary support for the Federal Geologic Mapping Component. Representative categories of interdisciplinary support shall include—**

**【(A) establishment of a national geologic-map data base, established pursuant to section 7;**

**【(B) studies that lead to the implementation of cost-effective digital methods for the acquisition, compilation, analysis, cartographic production, and dissemination of geologic-map information;**

**【(C) paleontologic investigations that provide information critical to understanding the age and depositional environment of fossil-bearing geologic-map units, which in-**

vestigations shall be contributed to a national paleontologic data base;

【(D) geochronologic and isotopic investigations that

【(i) provide radiometric age dates for geologic-map units and

【(ii) fingerprint the geothermometry, geobarometry, and alteration history of geologic-map units, which investigations shall be contributed to a national geochronologic data base;

【(E) geophysical investigations that assist in delineating and mapping the physical characteristics and three-dimensional distribution of geologic materials and geologic structures, which investigations shall be contributed to a national geophysical-map data base; and

【(F) geochemical investigations and analytical operations that characterize the major- and minor-element composition of geologic-map units, and that lead to the recognition of stable and anomalous geochemical signatures for geologic terrains, which investigations shall be contributed to a national geochemical-map data base.

【(3) A State geologic mapping component, whose objective shall be determining the geologic framework of areas that the State geological surveys determine to be vital to the economic, social, or scientific welfare of individual States. Mapping priorities shall be determined by multirepresentational State panels and shall be integrated with national priorities. Federal funding for the State component shall be matched on a one-to-one basis with non-Federal funds.

【(4) A geologic mapping education component, whose objective shall be—

【(A) the objective of which shall be—

【(i) to develop the academic programs that teach earth-science students the fundamental principles of geologic mapping and field analysis; and

【(ii) to provide for broad education in geologic mapping and field analysis through support of field studies;

【(B) Investigations under which shall be integrated with the other mapping components of the geologic mapping program, and shall respond to priorities identified for those components.

【(C) Federal funding for which shall be matched by non-Federal sources on a 1-to-1 basis.】

(d) PROGRAM COMPONENTS.—

(1) FEDERAL COMPONENT.—

(A) IN GENERAL.—*The geologic mapping program shall include a Federal geologic mapping component, the objective of which shall be to determine the geologic framework of areas determined to be vital to the economic, social, environmental, or scientific welfare of the United States.*

(B) MAPPING PRIORITIES.—*For the Federal component, mapping priorities—*

*(i) shall be described in the 5-year plan under section 6; and*

(ii) shall be based on—

(I) national requirements for geologic map information in areas of multiple-issue need or areas of compelling single-issue need; and

(II) national requirements for geologic map information in areas where mapping is required to solve critical earth science problems.

(C) INTERDISCIPLINARY STUDIES—

(i) IN GENERAL.—The Federal component shall include interdisciplinary studies that add value to geologic mapping.

(ii) REPRESENTATIVE CATEGORIES.—Interdisciplinary studies under clause (i) may include—

(I) establishment of a national geologic map database under section 7;

(II) studies that lead to the implementation of cost-effective digital methods for the acquisition, compilation, analysis, cartographic production, and dissemination of geologic map information;

(III) paleontologic, geochronologic, and isotopic investigations that provide information critical to understanding the age and history of geologic map units;

(IV) geophysical investigations that assist in delineating and mapping the physical characteristics and 3-dimensional distribution of geologic materials and geologic structures; and

(V) geochemical investigations and analytical operations that characterize the composition of geologic map units.

(iii) USE OF RESULTS.—The results of investigations under clause (ii) shall be contributed to national databases.

(2) STATE COMPONENT.—

(A) IN GENERAL.—The geologic mapping program shall include a State geologic mapping component, the objective of which shall be to establish the geologic framework of areas determined to be vital to the economic, social, environmental, or scientific welfare of individual States.

(B) MAPPING PRIORITIES.—For the State component, mapping priorities—

(i) shall be determined by State panels representing a broad range of users of geologic maps; and

(ii) shall be based on—

(I) State requirements for geologic map information in areas of multiple-issue need or areas of compelling single-issue need; and

(II) State requirements for geologic map information in areas where mapping is required to solve critical earth science problems.

(C) INTEGRATION OF FEDERAL AND STATE PRIORITIES.—A national panel including representatives of the Survey shall integrate the State mapping priorities under this para-

graph with the Federal mapping priorities under paragraph (1).

(D) *USE OF FUNDS.*—The Survey and recipients of grants under the State component shall not use more than 15.25 percent of the Federal funds made available under the State component for any fiscal year to pay indirect, servicing, or program management charges.

(E) *FEDERAL SHARE.*—The Federal share of the cost of activities under the State component for any fiscal year shall not exceed 50 percent.

(3) *EDUCATION COMPONENT.*—

(A) *IN GENERAL.*—The geologic mapping program shall include a geologic mapping education component for the training of geologic mappers, the objectives of which shall be—

(i) to provide for broad education in geologic mapping and field analysis through support of field studies; and

(ii) to develop academic programs that teach students of earth science the fundamental principles of geologic mapping and field analysis.

(B) *INVESTIGATIONS.*—The education component may include the conduct of investigations, which—

(i) shall be integrated with the Federal component and the State component; and

(ii) shall respond to mapping priorities identified for the Federal component and the State component.

(C) *USE OF FUNDS.*—The Survey and recipients of grants under the education component shall not use more than 15.25 percent of the Federal funds made available under the education component for any fiscal year to pay indirect, servicing, or program management charges.

(D) *FEDERAL SHARE.*—The Federal share of the cost of activities under the education component for any fiscal year shall not exceed 50 percent.

**SEC. 5. ADVISORY COMMITTEE.**

(a) Establishment \* \* \*

(1) \* \* \*

\* \* \* \* \*

(3) *APPOINTED MEMBERS.*—Not later than [90 days after the enactment of the National Geologic Mapping Reauthorization Act of 1997] 1 year after the date of enactment of the National Geologic Mapping Reauthorization Act of 1999 in consultation with the Association, the secretary shall appoint to the advisory committee two representatives from the Survey (including the Chief Geologist, as Chairman), two representatives from the State geological surveys, one representative from academia, and one representative from the private sector.

(b) *DUTIES.*—The advisory committee shall

(1) review and [critique the draft implementation plan] update the 5-year plan prepared by the Director pursuant to section 6.

- (2) review the scientific progress of the geologic mapping program; and
- (3) submit an annual report to the Secretary that evaluates the progress of the Federal and State mapping activities and evaluates the progress made toward fulfilling the purposes of **[this Act]** *sections 4 through 7*.

**[SEC. 6. GEOLOGIC MAPPING PROGRAM IMPLEMENTATION PLAN.**

**[The Secretary, acting through the Director, shall, with the advice and review of the advisory committee, prepare an implementation plan for the geologic mapping program. The plan shall identify the overall management structure and operation of the geologic mapping program and shall provide for—**

**[(1) the role of the Survey in its capacity as overall management lead, including the responsibility for developing the national geologic mapping program that meets Federal needs while simultaneously fostering State needs;**

**[(2) the responsibilities accruing to the State geological surveys, with particular emphasis on mechanisms that incorporate their needs, missions, capabilities, and requirements into the nationwide geologic mapping program;**

**[(3) mechanisms for identifying short- and long-term priorities for each component of the geologic mapping program, including—**

**[(A) for the Federal geologic mapping component, a priority-setting mechanism that responds both to**

**[(i) Federal mission requirements for geologic-map information, and**

**[(ii) critical scientific problems that require geologic-map control for their resolution;**

**[(B) for the geologic mapping support component, a strong interdisciplinary research program plan in isotopic and paleontologic geochronology, geophysical mapping, and process studies to provide data to and interpret results from geologic mapping;**

**[(C) for the State geologic mapping component, a priority-setting mechanism that responds to**

**[(i) specific intrastate needs for geologic-map information, and**

**[(ii) interstate needs shared by adjacent entities that have common requirements; and**

**[(D) for the geologic mapping education component, a priority-setting mechanism that responds to requirements for geologic-map information that are driven by Federal and State mission requirements;**

**[(4) a mechanism for adopting scientific and technical map standards for preparing and publishing general-purpose and special-purpose geologic maps to**

**[(A) assure uniformity of cartographic and scientific conventions, and**

**[(B) provide a basis for judgment as to the comparability and quality of map products; and**

**[(5) a mechanism for monitoring the inventory of published and current mapping investigations nationwide in order to fa-**

facilitate planning and information exchange and to avoid redundancy.】

**SEC. 6. GEOLOGIC MAPPING PROGRAM 5-YEAR PLAN.**

(a) *IN GENERAL.*—The Secretary, acting through the Director, shall, with the advice and review of the advisory committee, prepare a 5-year plan for the geologic mapping program.

(b) *REQUIREMENTS.*—The 5-year plan shall identify—

- (1) overall priorities for the geologic mapping program; and
- (2) implementation of the overall management structure and operation of the geologic mapping program, including—

(A) the role of the Survey in the capacity of overall management lead, including the responsibility for developing the national geologic mapping program that meets Federal needs while fostering State needs;

(B) the responsibilities of the State geological surveys, with emphasis on mechanisms that incorporate the needs, missions, capabilities, and requirements of the State geological surveys, into the nationwide geologic mapping program;

(C) mechanisms for identifying short- and long-term priorities for each component of the geologic mapping program, including—

(i) for the Federal component, a priority-setting mechanism that responds to—

(I) Federal mission requirements for geologic map information;

(II) critical scientific problems that require geologic maps for their resolution; and

(III) shared Federal and State needs for geologic maps, in which joint Federal-State geologic mapping projects are in the national interest;

(ii) for the State component, a priority-setting mechanism that responds to—

(I) specific intrastate needs for geologic map information; and

(II) interstate needs shared by adjacent States that have common requirements; and

(iii) for the education component, a priority-setting mechanism that responds to requirements for geologic map information that are dictated by Federal and State mission requirements;

(D) a mechanism for adopting scientific and technical mapping standards for preparing and publishing general- and special-purpose geologic maps to—

(i) ensure uniformity of cartographic and scientific conventions; and

(ii) provide a basis for assessing the comparability and quality of map products; and

(E) a mechanism for monitoring the inventory of published and current mapping investigations nationwide to facilitate planning and information exchange and to avoid redundancy.

**[SEC. 7. NATIONAL GEOLOGIC-MAP DATA BASE.**

**[(a) ESTABLISHMENT—**The Survey shall establish a national geologic-map data base. Such data base shall be a national archive that includes all maps developed pursuant to this Act, the data bases developed pursuant to the investigations under sections (4)(d)(2)(C), (d), (E), and (F), and other maps and data as the Survey deems appropriate.**]**

**SEC. 7. NATIONAL GEOLOGIC MAP DATABASE.**

(a) *ESTABLISHMENT.—*

(1) *IN GENERAL.—*The Survey shall establish a national geologic map database.

(2) *FUNCTION.—*The database shall serve as a national catalog and archive, distributed through links to Federal and State geologic map holdings, that includes—

(A) all maps developed under the Federal component and the education component;

(B) the databases developed in connection with investigations under subclauses (III), (IV), and (V) of section 4(d)(1)(C)(ii); and

(C) other maps and data that the Survey and the Association consider appropriate.

(b) *STANDARDIZATION.—*\* \* \*

\* \* \* \* \*

**[SEC. 8. BIENNIAL REPORT.**

**[**The Secretary shall, within 90 days after the end of each fiscal year, submit an annual report to the Committee on Interior and Insular Affairs of the House of Representatives and the Committee on Energy and Natural Resources of the Senate describing the status of the nationwide geologic mapping program, and describing and evaluating progress achieved during the 2 preceding fiscal years in developing the national geologic-map data base. Each report shall include any recommendations for legislative or other action as the Secretary deems necessary and appropriate to fulfill the purposes of this Act.**]**

**SEC. 8. BIENNIAL REPORT.**

*Not later 3 years after the date of enactment of the National Geologic Mapping Reauthorization Act of 1999 and biennially thereafter, the Secretary shall submit to the Committee on Resources of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report that*

(1) *describes the status of the national geologic mapping program;*

(2) *describes and evaluates the progress achieved during the preceding 2 years in developing the national geologic map database; and*

(3) *includes any recommendations that the Secretary may have for legislative or other action to achieve the purposes of sections 4 through 7.*

**[SEC. 9. AUTHORIZATION OF APPROPRIATIONS.**

**[(a) IN GENERAL.—**There are authorized to be appropriated to carry out the national cooperative geologic mapping program under this act—

- [(1) \$26,000,000 for fiscal year 1998;
- [(2) \$28,000,000 for fiscal year 1999; and
- [(3) \$30,000,000 for fiscal year 2000.
- [(b) ALLOCATION OF APPROPRIATED FUNDS.—
  - [(1) IN GENERAL.—Of the amount of funds that are appropriated under subsection (a) for any fiscal year up to the amount that is equal to the amount appropriated to carry out the national cooperative geologic mapping program for fiscal year 1999—
    - [(A) not less than 20 percent shall be allocated to State mapping activities; and
    - [(B) not less than 2 percent shall be allocated to educational mapping activities.
  - [(2) INCREASED APPROPRIATIONS.—Of the amount of funds that are appropriated under subsection (a) for any fiscal year up to the amount that exceeds the amount appropriated to carry out the national cooperative geologic mapping program for fiscal year 1996—
    - [(A) for fiscal year 1997—
      - [(i) 76 percent shall be allocated for Federal mapping and support mapping activities;
      - [(ii) 22 percent shall be allocated for State mapping activities; and
      - [(iii) 2 percent shall be allocated for educational mapping activities;
    - [(B) for fiscal year 1998—
      - [(i) 75 percent shall be allocated for Federal mapping and support mapping activities;
      - [(ii) 23 percent shall be allocated for State mapping activities; and
      - [(iii) 2 percent shall be allocated for educational mapping activities;
    - [(C) for fiscal year 1999—
      - [(i) 74 percent shall be allocated for Federal mapping and support mapping activities;
      - [(ii) 24 percent shall be allocated for State mapping activities; and
      - [(iii) 2 percent shall be allocated for educational mapping activities; and
    - [(D) for fiscal year 2000—
      - [(ii) 25 percent shall be allocated for State mapping activities; and
      - [(i) 73 percent shall be allocated for Federal mapping and support mapping activities;
      - [(iii) 2 percent shall be allocated for educational mapping activities.]

**SEC. 9. AUTHORIZATION OF APPROPRIATIONS.**

(a) *IN GENERAL.*—*There are authorized to be appropriated to carry out this Act—*

- (1) \$28,000,000 for fiscal year 1999;
- (2) \$30,000,000 for fiscal year 2000;
- (3) \$37,000,000 for fiscal year 2001;
- (4) \$43,000,000 for fiscal year 2002;
- (5) \$50,000,000 for fiscal year 2003;

- (6) \$57,000,000 for fiscal year 2004; and
- (7) \$64,000,000 for fiscal year 2005.

(b) *ALLOCATION OF APPROPRIATIONS.*—Of any amounts appropriated for any fiscal year in excess of the amount appropriated for fiscal year 2000—

- (1) 48 percent shall be available for the State component; and
- (2) 2 percent shall be available for the education component.

\* \* \* \* \*

