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SENATE

{ REPORT
104-395

NATIONAL GEOLOGIC MAPPING REAUTHORIZATION ACT OF 1996

OCTOBER 1, 1996.—Ordered to be printed

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

REPORT

[To accompany H.R. 3198]

The Committee on Energy and Natural Resources, to which was referred the Act (H.R. 3198) to reauthorize and amend the National Geologic Mapping Act of 1992, and for other purposes, having considered the same, reports favorably thereon without amendment and recommends that the Act do pass.

PURPOSE OF THE MEASURE

The purpose of H.R. 3198 is to reauthorize appropriations for the National Geological Mapping Act of 1992 which will expire at the end of the fiscal year 1996.

BACKGROUND AND NEED FOR LEGISLATION

The National Geologic Mapping Act (NGMA) of 1992 (Public Law 102-285; 43 United States Code 31a-h) was the legislative response to concerns of the National Academy of Sciences as to the inadequacy of basic geologic mapping efforts in the country. The NGMA established a cooperative program involving the U.S. Geological Survey (USGS), the geologic surveys of the 50 States and academia to pursue an expanded geologic mapping effort of bedrock and surficial terranes.

Detailed geologic mapping provides basic information for solving a broad range of societal problems. These include the delineation and protection of sources of safe drinking water, environmental system understanding, and foundations of ecosystems management; identification and mitigation of natural hazards, such as earth-

quake-prone areas, volcanic eruptions, landslides and other ground failures, and many other land-use planning requirements; and assessment of coal, petroleum and natural gas, construction materials, metals, and other natural resources.

Only about one-fifth of the Nation is mapped at a scale adequate to meet these needs. Reauthorization of the NGMA will allow Federal, State and academic interests to continue to address these needs cooperatively. The critical areas have been identified at the State level by State-map advisory committees. These critical areas include Federal, State, and local priorities.

Since its establishment in 1879, the USGS has been charged with "classification of the public lands and examination of the geological structure, mineral resources and products of the national domain." While generally receiving good marks for its geologic mapping efforts for over a century, the National Academy of Sciences in a 1988 report recognized that the USGS alone lacked the manpower to overcome this deficiency. Traditionally, colleges and universities as well as the various State geologic surveys have contributed to the mix of geologic maps produced, albeit not always in a coordinated manner. The NGMA provides a cooperative framework to attempt to meet the Nation's geologic map data needs efficiently.

Funding for the program is incorporated in the budget of the U.S. Geological Survey. State geological surveys and university participants receive funding from the program through a competitive proposal process that requires 50:50 matching funds from the applicant, ensuring the value of each proposal is weighed against its cost in Federal and State appropriated funds. Since fiscal year 1993, approximately \$7.5 million of Federal appropriated funds have been matched by State monies in the cooperative, peer-reviewed program for geologic map products produced by the 50 State geological surveys, about 15 percent of the total Federal appropriation over the same interval for geologic mapping program efforts in total.

While the Committee recognizes the critical role mapping plays in the assessment of the nation's geologic resources, environment, and hazards, there is also a recognition that the Federal funding necessary to support the work is diminishing. In response to this growing financial deficit, the Committee urges the U.S. Geological Survey to actively seek opportunities, where appropriate, to increase the role of the private sector in this important national program.

LEGISLATIVE HISTORY

On March 29, 1996, Congressman Ken Calvert introduced H.R. 3198 in the House of Representatives. On April 23, 1996 the House Subcommittee on Energy and Mineral Resources held a hearing on the legislation. On July 11, 1996 the bill was favorably reported by the House Committee on Resources and on July 30, 1996 the bill passed the House by voice vote. The bill was referred to the Senate Committee on Energy and Natural Resources.

COMMITTEE RECOMMENDATION AND TABULATION OF VOTES

The Senate Committee on Energy and Natural Resources, in open business session on September 12, 1996, by voice vote of a quorum present, recommends that the Senate pass H.R. 3198.

SECTION-BY-SECTION ANALYSIS

SECTION 1. SHORT TITLE

The bill may be cited as the "National Geologic Mapping Reauthorization Act of 1996."

SECTION 2. FINDINGS

This section of the bill provides Congressional findings about the national need for geologic mapping performed in a comprehensive and cooperative manner.

SECTION 3. REAUTHORIZATION AND AMENDMENT

Section 3 reauthorizes and amends the expiring NGMA. The Federal/State/academia cooperative elements of the original Act are retained with minor amendments in definitions. The bill also establishes an advisory committee to the USGS Director on planning and implementation of the geologic mapping program, corrects references to the Committee on Resources in an annual report to the Committee, and authorizes appropriations for funding the cooperative geologic mapping program of the USGS and allocates funds between the Federal, State and education components of the program for the next four fiscal years.

COST AND BUDGETARY CONSIDERATIONS

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

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, September 18, 1996.

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 H.R. 3198, the National Geologic Mapping Reauthorization Act of 1996.

Enacting H.R. 3198 would not affect direct spending or receipts. Therefore, pay-as-you-go procedures would not apply to the legislation.

If you wish further details on this estimate, we will be pleased to provide them.

Sincerely,

JUNE E. O'NEILL, *Director.*

CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

1. Bill number: H.R. 3198.

2. Bill title: National Geologic Mapping Reauthorization Act of 1996.

3. Bill status: As reported by the Senate Committee on Energy and Natural Resources on September 16, 1996.

4. Bill purpose: H.R. 3198 would reauthorize and amend the National Geologic Mapping Act of 1992, which established a cooperative program for geologic mapping between the United States Geological Survey (USGS), the state geologic surveys, and academia. The legislation would authorize appropriations for fiscal years 1997 through 2000 for the geologic mapping program and would change the allocation of funds between the federal, state, and educational components. Other provisions would make minor definitional changes in the 1992 act, change the size and membership of the advisory committee to the USGS Director on planning and implementation of the geologic mapping program, and codify an existing requirement that federal funding of geologic mapping education be matched on a one-to-one basis by nonfederal sources.

5. Estimated cost to the Federal Government: Assuming appropriation of the authorized amounts, CBO estimates that enacting H.R. 3198 would result in additional discretionary spending of \$108 million over the 1997–2001 period. The costs of the legislation are shown in the following table.

[By fiscal year, in millions of dollars]

	1996	1997	1998	1999	2000	2001	2002
Spending under current law:							
Budget authority	22						
Estimated outlays	22	1					
Proposed changes:							
Authorization level		24	26	28	30		
Estimated outlays		23	26	28	30	1	
Spending under H.R. 3198:							
Authorization level ¹	22	24	26	28	30		
Estimated outlays	22	24	26	28	30	1	

¹The 1996 level is the amount appropriated for that year.

The costs of this legislation fall within budget function 300.

6. Basis of estimate: For the purposes of this estimate, CBO assumes that all amounts authorized in H.R. 3198 would be appropriated by the start of each fiscal year and that outlays would follow the historical spending patterns for the national geologic mapping program.

CBO estimates that other provisions in the legislation would have no significant budgetary impact. For example, H.R. 3198 would change the allocation of program funds so that increasing amounts are directed toward the state geological surveys. Based on information from USGS, however, CBO estimates that this change would not affect the rate at which funds are spent.

7. Pay-as-you-go considerations: None.

8. Estimated impact on State, local, and tribal governments: H.R. 3198 contains no intergovernmental mandates as defined in Public Law 104–4 and would impose no costs on state, local, or tribal governments. This legislation would authorize appropriations for the national cooperative geologic mapping program, including about \$22 million over the next four years for grants to states and about \$2 million over that period for an education component, consisting

of grants to colleges and universities. The state grant component would increase slightly over this period as a proportion of the total program. H.R. 3198 also would codify the existing one-to-one matching requirement for the education component.

9. Estimated impact on the private sector: This legislation contains no private-sector mandates as defined in Public Law 104-4.

10. Previous CBO estimate: Only July 1, 1996, CBO provided an estimate for H.R. 3198, as ordered reported by the House Committee on Resources on June 19, 1996. The two versions of H.R. 3198 and their estimated costs are the same.

11. Estimate prepared by: Federal Cost Estimate—Gary Brown; State and Local Government Impact—Marjorie Miller; Private-Sector Impact—Patrice Gordon.

12. Estimate approved by: Robert A. Sunshine (for 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 H.R. 3198. 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 the administering of the program. Therefore, there would be no impact on personal privacy.

Little, if any, additional paperwork would result from enactment of H.R. 3198, or ordered reported.

EXECUTIVE COMMUNICATIONS

On September 24, 1996, the Committee on Energy and Natural Resources requested a legislative report from the Department of the Interior setting forth executive views on H.R. 3198. This report had not been received at the time the report on H.R. 3198 was filed. When the report becomes available, the Chairman will request that it be printed in the Congressional Record for the advice of the Senate. The following testimony from the administration was provided to the House during that bodies hearing:

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

Mr. Chairman, I am pleased to be here today to express the Administration's support for H.R. 3198, a bill to reauthorize the National Geologic Mapping Act of 1992. I appreciate the opportunity to review the progress made under the Act since 1992 and to outline the goals that we are setting through the reauthorization legislation.

The Earth provides the foundation of our society—we live upon it and we utilize its products. A thorough knowledge of the Earth's resources and dangers is crucial for informed decisions in making public policy. Geologic maps are the best tools to collect and convey this information. The National Cooperative Geologic Mapping Program, au-

thorized by the National Geologic Mapping Act of 1992, produces geologic maps needed by public and private organizations, maps essential to our continued economic health and vitality.

Geologic maps are the keystone of the U.S. Geological Survey's mission. They address each of the four principal themes of the Survey's mission: information, hazards, resources, and the environment. The geologic maps prepared by Survey scientists over the past century have been the primary means of communicating geologic information and data. In the past 100 years, society's needs have risen dramatically and have focused the attention of the earth science community on processes at and near the Earth's surface. We continue to seek and refine information that is essential for the protection of human health and safety and for continued economic growth, outcomes that can be traced ultimately to high-quality geologic maps. Old geologic maps must be revised and updated, and new ones prepared. Tight fiscal constraints require that the broadest range of stakeholders determine what information is needed so that our effort are well targeted. These constraints require that all those who prepare geologic maps, within the U.S. Geological Survey to State geological surveys and the academic community, work cooperatively to maximize each other's strengths and to avoid duplication. It is often said that cooperative effort of a group can exceed the sum of the individual efforts—today, I will outline how activities under the National Geologic Mapping Act are applying such a cooperative and synergistic approach among the Federal Government, the states, and the academic community.

To the extent possible, humans must be safe from natural hazards. Although natural hazards such as earthquakes, volcanic eruptions, landslides and floods cannot be stopped, recognizing and planning for these dangers can significantly reduce the chances for a major disaster. Geologic maps are the principal means for discovering and recording areas that will be affected by natural hazards and for communicating the dangers of hazards such as earthquake producing faults, landslides, collapse structures, expanding soils, volcanic eruptions, and both natural and manmade pollution. Identifying the location of hazardous areas on maps allows land managers, industry, and the public to predict potential losses, develop strategies to minimize these losses.

Human health depends largely on environmental quality. Effective environmental policy requires an understanding of the complex interrelationships among components of the biosphere, including the Earth itself. Geologic maps provide the foundation needed to achieve balanced and scientifically credible environmental protection. They provide information on the location of rock types that produce radon, release toxic heavy metals, or interact with water to produce acid drainage. They provide the framework to

predict flow paths for contaminated ground water plumes, to identify safe locations for waste sites and other facilities that will minimize the chances for pollution of soil and water. They also help to delineate specific soil or rock types necessary for certain plant communities.

Economic growth is driven largely by access to the Earth's resources. Water, energy, and building materials are required to sustain our vital economic engine. Geologic maps provide the keys for the location of safe drinking water, 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, fertilizer, and kitty litter (zeolite and vermiculite). Policy makers must know the nature and extent of resources in order to plan how to manage the land in an economically sustainable way. Industry and local governments need geologic maps to help estimate the available resources for water supplies, building, energy production, and extraction of raw materials.

NATIONAL COOPERATIVE GEOLOGIC MAPPING PROGRAM

The national Cooperative Geologic Mapping (NCGM) Program ensures that our Nation will continue to have the geologic maps it needs to protect the health of our citizens and promote economic growth. Through involvement with private industry, public policy makers, and the public, the Program seeks to ensure that mapping efforts are focused on priority areas. The Program also uses stakeholder input to determine what formats are most useful as we move into the information age; new geologic maps are being produced in digital formats that can be put on the Internet.

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

- Continue to enhance the outreach to stakeholders thus ensuring that the maps address societal priorities and are produced in forms easily accessible and usable.

- Expand cooperative agreements with the State geologic surveys, academic communities, other Federal agencies, and the private sector to enhance the output of map information and data.

- Develop metadata for the National Geologic Map database and make the data available through the Internet. Enhance the ability to produce digital as well as analog (paper) map products.

The NCGM Program brings together Earth scientists from the U.S. Geological Survey, State geological surveys, and academia through a process of partnering. The program will ensure a balance of funding between State geological surveys and academia. The goals of the academic

funding are to ensure that we train the scientists who will provide the geologic maps of the future.

The National Geologic Mapping Act of 1992, Public Law 102-285 authorized the establishment of a National Cooperative Geologic Mapping Program with the U.S. Geological Survey as the lead Federal agency responsible for coordinating and managing the geologic mapping program. The act also state that the program is to be implemented through four components: FEDMAP and SUPPORTMAP which constitute the Federal component of the geologic mapping program, STATEMAP, which supports the States' efforts in producing geologic maps, and EDMAP, which ensures the training of students in the production of geologic maps. The 1992 Act also called for the establishment of a National Advisory Committee, the development of a National Geologic Map Database, and the development of methods to increase public awareness of the role and application of geologic map information to the resolution of national issues. Several changes in the geologic mapping program have occurred since the passage of the National Geologic Mapping Act of 1992 that I am pleased to enter into the record:

1. Program name.—The National Geologic Mapping Program is now named the National Cooperative Geologic Mapping Program, a small change in the name, but a significant change in recognition of the strong partnering aspect of the program with the State geological surveys through the Association of American State Geologists (AASG), with academia, and with the National Park Service and other Federal agencies.

2. STATEMAP.—In FY 1995 only about 6 percent of total program funding was available for matching by State geological surveys, whereas in FY 1996 and beyond a minimum of 20 percent of appropriated funds will be apportioned to the STATEMAP component, thereby significantly increasing the amount of high-priority geologic mapping required by individual States and the Nation. In FY 1996 cooperative agreements are being made with 42 States to help support 60 geologic mapping projects. These projects were recommended for funding by a peer review panel consisting primarily of State Geologist (Exhibit 1).

3. EDMAP.—This important component of the geologic mapping program is being implemented for the first time in FY 1996. Two percent of the total program funding is available for matching by universities. The funding is to help support graduate students to conduct geologic mapping in areas of priority to State or Federal agencies. These studies not only help increase the geologic mapping of high priority areas but also help train the next generation of geologic mappers. In FY 1996 cooperative agreements are being made with 37 universities to support 40 geologic mapping projects recommended for funding by a peer review panel consisting primarily of university professors who are experts in geologic mapping (Exhibit 1).

4. FEDMAP/SUPPORTMAP.—The USGS continues to be active in executing geologic mapping (FEDMAP) and supporting studies (SUPPORTMAP) of paleontology, stratigraphy, geochronology, isotope geology, geophysics, and geochemistry. Over the past few years the geologic mapping program has moved from large numbers of essentially one-person projects to more integrated regional synthesis activities in which clients and cooperators are involved in all phases of the planning, implementation, and execution of project work. For this reason, much of our geologic mapping has moved from rural and wilderness areas to the “urban corridor” and “urban fringe” areas, where competing land use decisions benefit from improved geologic information. Three examples of the twelve regional synthesis projects are the Southern California Areal Mapping Project (SCAMP), the Middle Rio Grande Basin Project, and the Florida Cooperative Geologic Mapping Project.

Southern California Areal Mapping Project (SCAMP)

This geologic mapping project is centered on the Los Angeles urban area and covers most of southwestern California (Exhibit 3). This is a joint effort with the California Division of Mines and Geology. Clients include the U.S. Air Force (March Air Force Base and Edwards Air Force Base), the U.S. Navy (Twentynine Palms Marine Corps Air/Ground Combat Center and the Chocolate Mountains Gunnery Range), the U.S. Forest Service (San Bernadino National Forest), U.S. Army Corps of Engineers (Seven Oaks Dam), National Park Service (Joshua Tree National Park), San Bernadino Valley Municipal Water Agency (Yucaipa and San Bernadino Basins), Mojave Water Agency (Lucerne and Morango Basins and Mojave River), Metropolitan Water District, and the Southern California Earthquake Center.

The components of the project address a variety of urban geology issues for which geologic mapping provides essential primary data. These are: (1) mapping the geometry of ground water basins and flow regimes to assist several California water districts in dealing with water resource and recharge problems and to help the Air Force monitor contaminant plumes in ground water, (2) mapping limestone and aggregate building resources to assist the National Forest Service manage its land, (3) providing geologic map data to assist the Corps of Engineers in siting a dam between two strands of the San Andreas fault and (4) helping the Metropolitan Water District define the structural setting of the “Domenigoni” reservoir, now under construction, which when completed will be the largest water retention structure in Southern California.

Middle Rio Grande Basin Project

One of the new cooperative urban-focus projects organized within NCGMP in FY 1996 provides a geologic framework and geologic map database for investigation of

the Middle Rio Grande Basin, a region that includes extensive Federal lands as well as the principal urban centers of New Mexico. This project addresses the critical issue of diminishing ground water supply in the rapidly developing Santa Fe-Albuquerque-Socorro urban corridor of New Mexico. Previous joint studies by the New Mexico Bureau of Mines and Mineral Resources and USGS have shown that the extent of the primary aquifer in the region is more limited in size and distribution than previously believed, and unless new water resources are identified, urban development will be limited (Exhibit 4). NCGMP has joined with other USGS Divisions, with area universities, New Mexico Bureau of Mines and Mineral Resources, and other federal agencies in a 5-year effort to better define the hydrology and geology of the Middle Rio Grande Basin. As illustrated in Exhibit 4, NCGMP is taking the lead in compiling the overall geologic map database for the region at 1:100,000-scale and in developing airborne geophysical data sets for identifying buried aquifers and geologic structures that control ground water flow.

Florida Cooperative Geologic Mapping Project

This is a cooperative effort with the Florida Geological Survey (FGS) to provide surficial and shallow subsurface geological mapping in the State of Florida (Exhibit 5). The activities of the FGS include primary responsibility for surficial geologic mapping, stratigraphic test drilling, and analysis and curation of drill core samples. NCGMP provides high resolution biostratigraphy and interpretation of the ancient environments where sediments were deposited. This joint work has established the geologic framework for hydrologic flow modeling by the South and Southwest Florida Water Management Districts and USGS and has resulted in a re-evaluation the stratigraphic setting and flow patterns within the principal Floridan aquifers. This cooperative work with the state has extended the stratigraphic range (thickness) and defined depositional settings where economic deposits of phosphate occur in Florida.

NCGMP has also formed a partnership with the Florida Geological Survey, South and Southwest Florida Water Management Districts, Dade County, U.S. Army Corps of Engineers, National Oceanic and Atmospheric Administration, Everglades National Park, and several area universities to investigate the quality and quantity of water delivered to both the southeast (Biscayne Bay) and south (Florida Bay) coasts of Florida (Exhibit 5). Both of these shallow bays are showing increasing signs of distress such as algal blooms, seagrass die-offs; fishery declines, increases in pollution, and changes in nearshore vegetation patterns. It is important to know how many of the observed changes are direct consequences of human activity and how many are related to natural variations in the ecosystems. This project is testing theories about human influence by examining the geologic record for the past 300

years and examining the ability of the natural systems to recover from disturbances. Initial results suggest that there are both man-induced changes, such as changes in plant distribution related to canal-building, as well as natural cycles in seagrass abundance and fishery productivity.

5. External advisory committee.—The U.S. Geological Survey sponsored two national workshops, one in December of 1994 and a second in February of 1995, to begin the process of soliciting advice on the planning and implementation of the geologic mapping program. Workshop participants were producers and users of geologic map information including representatives from Federal and State agencies, academic institutions, and the private sector. Just recently, a 16-member National Cooperative Geologic Mapping Program Advisory Committee has been chartered and appointed. It is scheduled to hold its first meeting April 25–26, 1996, in Washington, DC.

6. National geologic map database.—A draft of this database design has recently been released for comment via the Internet by creating a site on the World Wide Web (WWW). The Uniform Resource Locator (URL) for this site is “<http://wwwflag.wr.usgs.gov/ngmdb>”. This web site is also linked to the recently created web site for the National Cooperative Geologic Mapping Program whose URL is “<http://ncgmp.usgs.gov>”. A critical element in database construction is the development, acceptance, and adherence to a certain level of standardization. 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 geologic map database information can be accessed, exchanged, and compared efficiently and accurately as required by Executive Order 12906 (59 Fed. Reg. 17,671; 1994), which established the National Spatial Data Infrastructure (NSDI).

7. USGS circular 1111.—“Societal Value of Geologic Maps”, published in 1993, is an economic analysis by the geologic mapping program that describes geologic maps, a rigorous benefit-cost model for valuing geologic map information, and the economic issues associated with determining whether or not a geologic map is a public good (Exhibit 6). Nearly ten thousand copies have been requested since publication. This publication and similar studies are increasing public awareness of the utility (value in use) of geologic map information to issues of land use management.

8. Federal partnerships.—The geologic mapping program is developing a series of cooperative relationships with various 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 agencies. The geologic mapping program responded by working with NPS during 1995 as part of their “Science in the Parks” initiative to di-

rect a portion of the program's geologic mapping and supporting activities toward priorities established by NPS. The NPS used a national project call and priority system to rank over 100 proposals for geologic work in FY 1996. The geologic mapping program has begun work in FY 1996 with 10 of the 30 top-priority parks. The geologic mapping program is currently in the process of fostering similar partnerships with other Federal agencies including Bureau of Land Management, U.S. Forest Service, Environmental Protection Agency, and Department of Energy.

Mr. 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 more attention on the Nation's need for a systematic, high-quality geologic map database to serve as the primary underpinnings for virtually all applied and basic earth science investigations. The Administration supports reauthorization and urges bipartisan support for this legislation. Thank you, Mr. Chairman, for the opportunity to express the views of the U.S. Geological Survey on the benefits of the current 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, the changes in existing law by the Act H.R. 3198, 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 ACT OF 1992

* * * * *

SEC. 3. DEFINITIONS.

[As used in this Act:] *In this Act:*

(1) *ADVISORY COMMITTEE.*—The term “advisory committee” means the advisory committee established under section 5.

(2) *ASSOCIATION.*—*The term “Association” means the Association of American State Geologists.*

[(2)] (3) *DIRECTOR.*—The term “Director” means the Director of the United States Geological Survey.

[(3)] (4) *GEOLOGIC MAPPING PROGRAM.*—The term “Geologic mapping program” means the National Cooperative Geologic Mapping Program established by section 4(a).

[(4)] (5) *SECRETARY.*—The term “Secretary” means the Secretary of the Interior.

[(5)] (6) *SURVEY.*—The term “Survey” means the United States Geological Survey.

SEC. 4. GEOLOGIC MAPPING PROGRAM.

[(a) ESTABLISHMENT.—There is established in the United States Geological Survey a National Cooperative Geologic Mapping Pro-

gram. The geologic mapping program shall be developed in consultation with the advisory committee and shall be designed and administered to achieve the objectives set forth in subsection (c).】

(a) *ESTABLISHMENT.*—

(1) *IN GENERAL.*—*There is established a national cooperative geologic mapping program between the United States Geological Survey and the State geological surveys, acting through the Association.*

(2) *IN DESIGN, DEVELOPMENT, AND ADMINISTRATION.*—*The cooperative geologic mapping program shall be—*

(A) *designed and administered to achieve the objectives set forth in subsection (c);*

(B) *developed in consultation with the advisory committee; and*

(C) *administered through the Survey.*

(b) *RESPONSIBILITIES OF 【USGS】 THE SURVEY.*—

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

(A) *develop a geologic mapping program implementation plan in accordance with section 6, which plan shall be submitted to the 【Committee on Natural Resources】 Committee on Resources of the House of Representatives and the Committee on Energy and Natural Resources of the Senate within 300 days after the 【date of enactment of this Act】 date of enactment of the National Geologic Mapping Reauthorization Act of 1996;*

(B) *appoint, with the advice and consultation of the 【State geological surveys】 Association, the advisory committee within 90 days after the 【date of enactment of this Act】 date of enactment of the National Geologic Mapping Reauthorization Act of 1996 in accordance with section 5; and*

(C) *within 210 days after the 【date of enactment of this Act】 date of enactment of the National Geologic Mapping Reauthorization Act of 1996, submit a report to the Committee on Energy and Natural Resources of the United States Senate and to the 【Committee on Natural Resources】 Committee on Resources of the House of Representatives identifying—*

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

(ii) *how the Survey and the Association will 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 successful implementation of the geologic mapping program 【; and*

【(iv) *the degree to which geologic mapping activities traditionally funded by the Survey, including the use*

of commercially available aerial photography, geodesy, professional land surveying, photogrammetric mapping, cartography, photographic processing, and related services, can be contracted to professional private mapping firms.】

(2) *RESPONSIBILITIES OF THE SECRETARY*.—In addition to paragraph (1), the Secretary, acting through the Director, shall be responsible for developing, as soon as practicable—

(A) in cooperation with the 【State geological surveys】 *Association*, other Federal and State agencies, public and private sector organizations and academia, the geologic-map data base; and

(B) maps and mapping techniques which achieve the objectives specified in subsection (c).

(c) *PROGRAM OBJECTIVES*.—The objectives of the geologic mapping program shall include—

(1) determining the Nation’s geologic framework through systematic development of geologic maps at scales appropriate to the geologic setting and the perceived applications, such maps to be contributed to the national geologic map data base;

(2) development of a complementary national geophysical-map data base, geochemical-map data base, and a geochronologic and paleontologic data base that provide value-added descriptive and 【interpretive】 *interpretative* information to the geologic-map data base;

(3) application of cost-effective mapping techniques that assemble, produce, translate and disseminate geologic-map information and that render such information of greater application and benefit to the public; and

(4) development of public 【awareness for】 *awareness of* the role and application of geologic-map information to the resolution of national issues of land use management.

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

(1) *FEDERAL COMPONENT*.—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) *SUPPORT COMPONENT*.—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, analy-

sis, 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 investigations 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;]

(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) *STATE COMPONENT.*—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) to develop the academic programs that teach earth-science students the fundamental principles of geologic mapping and field analysis; and

[(B) to provide for broad education in geologic mapping and field analysis through support of field teaching institutes.

Investigations conducted under the geologic mapping education component shall be integrated with the other mapping components of the geologic mapping program, and shall respond to priorities identified for those components.]

(4) *EDUCATION COMPONENT.*—A *geologic mapping education component—*

(A) *the objectives 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; and

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

SEC. 5. ADVISORY COMMITTEE.

[(a) *ESTABLISHMENT.*—There shall be established a sixteen member geologic mapping advisory committee to advise the Director on planning and implementation of the geologic mapping program. The President shall appoint one representative each from the Environmental Protection Agency, the Department of Energy, the Department of Agriculture, and the Office of Science and Technology Policy. Within 90 days and with the advice and consultation of the State Geological Surveys, the Secretary shall appoint to the advisory committee 2 representatives from the Survey (including the Chief Geologist, as Chairman), 4 representatives from the State geological surveys, 3 representatives from academia, and 3 representatives from the private sector.]

(a) *ESTABLISHMENT.*—

(1) *IN GENERAL.*—There shall be established a 10-member geologic mapping advisory committee to advise the Director on planning and implementation of the geologic mapping program.

(2) *MEMBERS EX OFFICIO.*—Federal agency members shall include the Administrator of the Environmental Protection Agency or a designee, the Secretary of Energy or a designee, the Secretary of Agriculture or a designee, and the Assistant to the President for Science and Technology or a designee.

(3) *APPOINTED MEMBERS.*—Not later than 90 days after the date of enactment of the National Geologic Mapping Reauthorization Act of 1996, in consultation with the Association, the Secretary shall appoint to the advisory committee 2 representatives from the Survey (including the Chief Geologist, as Chairman), 2 representatives from the State geological surveys, 1 representative from academia, and 1 representative from the private sector.

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

(1) * * *

* * * * *

(3) submit an annual report to the Secretary that evaluates the progress of the Federal [and State], *State, and University* mapping activities and evaluates the progress made toward fulfilling the purpose of this Act.

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 *cooperative* geologic mapping program and meets Federal needs while simultaneously fostering State needs;

* * * * *

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

(A) * * *

* * * * *

[(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]

(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 description of the degree to which the Survey can acquire, archive, and use Side-Looking Airborne Radar (SLAR) or Interferometric Synthetic Aperture Radar (IFSAR) data in a manner that is technically appropriate for geologic or related mapping studies;

[(5) 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]

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

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

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

[(6)] (5) a mechanism for monitoring the inventory of published and current mapping investigations nationwide in order 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.

[(b) STANDARDIZATION.—Geologic maps contributed to the national archives should have standardized format, symbols, and technical attributes so that archival information can be assimilated, manipulated, accessed, exchanged, and compared efficiently and accurately.]

(b) STANDARDIZATION.—

(1) *IN GENERAL.*—Geologic maps contributed to the national archives shall have format, symbols, and technical attributes that adhere to standards so that archival information can be accessed, exchanged, and compared efficiently and accurately, as required by Executive Order 12906 (59 Fed. Reg. 17,671 (1994)), which established the National Spatial Data Infrastructure.

(2) *DEVELOPMENT OF STANDARDS.*—Entities that contribute geologic maps to the national archives shall develop the standards described in paragraph (1) in cooperation with the Federal Geographic Data Committee, which is charged with standards development and other data coordination activities as described in Office of Management and Budget revised Circular A-16.

SEC. 8. ANNUAL REPORT.

The Secretary shall, within 90 days after the end of each fiscal year, submit an annual report to the [Committee on Natural Resources] *Committee on Resources* 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] *program and describing and evaluating the progress* achieved during the preceding fiscal year 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 purpose of this Act.

[(SEC. 9 AUTHORIZATION OF APPROPRIATIONS.

[There is authorized to be appropriated to carry out this Act the following:

[(1) For Federal mapping activities under this Act, \$12,500,000 for fiscal year 1993, \$14,000,000 for fiscal year 1994, \$16,000,000 for fiscal year 1995, and \$18,000,000 for fiscal year 1996.

[(2) For Federal support activities under this Act, \$9,500,000 for fiscal year 1993, \$10,000,000 for fiscal year 1994, \$10,500,000 for fiscal year 1995, and \$11,000,000 for fiscal year 1996.

[(3) For State mapping activities under this Act, \$15,000,000 for fiscal year 1993, \$18,000,000 for fiscal year 1994, \$21,000,000 for fiscal year 1995, and \$25,000,000 for fiscal year 1996.

[(4) For educational support activities under this Act, \$500,000 for fiscal year 1993, \$750,000 for fiscal year 1994, \$1,000,000 for fiscal year 1995, and \$1,500,000 for fiscal year 1996.]

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) \$24,000,000 for fiscal year 1997;
- (2) \$26,000,000 for fiscal year 1998;
- (3) \$28,000,000 for fiscal year 1999; and
- (4) \$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 1996—

(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—

(i) 73 percent shall be allocated for Federal mapping and support mapping activities;

(ii) 25 percent shall be allocated for State mapping activities; and

(iii) 2 percent shall be allocated for educational mapping activities.

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