Geological Resource Assessments Subactivity

Program	1999 Estimate	Uncontrol. & Related Chgs	Program Redirect	Program Changes	FY 2000 Budget Request	Change from 1999
Mineral Resources	62,655	1,540	-11,987	-5,000	47,208	-15,447
Energy Resources	**26,035**	**647**	**-3,784**	**-1,000**	**21,898**	**-4,137**
Total Requirements $000	88,690	2,187	-15,771	-6,000	69,106	-19,584

Note: The Program Redirect column reflects the redirection of funds to the Integrated Science, Science Support, and Facilities activities.

Energy Resources

Current Program Highlights

The Energy Resources Program addresses a wide array of important energy issues involving the availability and use of fossil fuels. These include reducing greenhouse gas emissions to the atmosphere while maintaining the Nation's economic health, which is powered by a reliable supply of fossil energy. The program provides the most up-to-date and comprehensive analysis of oil, natural gas, and coal resources of the Nation and the World and produces digital energy resource information that facilitates land use, energy-policy, and environmental decisionmaking. Research on fossil energy resources includes assessments of the quantity, quality, and geographic locations of natural gas, oil, and coal resources, as well as estimates of energy resource availability and recoverability based on geological, technological, economic, and policy constraints. Information produced by the program is used by Federal and State agencies as the authoritative, objective, scientific basis for environmental regulation, land management, economic forecasting, and strategic analysis related to national security. Examples of these applications are provided in the following sections.

Emissions and Economic Modeling — The USGS is analyzing the interdependencies among atmospheric emissions, economic impacts, and energy resources. This activity builds on the USGS foundation of geospatial energy resource information, together with economic principles and fossil fuel emissions data, to model dynamic environmental and economic tradeoffs that lie at the heart of the effort to reduce global emissions of carbon and greenhouse gases to the atmosphere. Results will not only provide forecasts of carbon, greenhouse gas, and hazardous chemical atmospheric emissions based on current and projected energy consumption of the Nation and the World, but will include evaluations of energy supply reliability and economic impacts of various scenarios for reducing carbon and greenhouse gas emissions. The USGS is quantitatively assessing the capability of geologic repositories such as depleted oil and gas reservoirs, unmineable coal beds, aquifers, and the deep ocean to sequestor carbon dioxide

produced by power plants. The results will provide policy makers with a basis for evaluating technologies for reducing carbon dioxide emissions to the levels mandated by the 1997 Kyoto Treaty on Global Warming.

National Oil and Gas Resources — The USGS is building on the success of the 1995 National Assessment of Oil and Gas Resources and a 1997 report on the economically recoverable oil and gas resources. USGS petroleum research has been prioritized to improve our understanding of oil and gas occurrences and to reduce the uncertainties associated with oil and gas resource estimates. For example, the North Slope of Alaska is believed to have the greatest oil potential of any onshore area of the United States, and the USGS is conducting an intensive re-examination of the geology and petroleum potential of that region. The initial focus of this effort was the eastern North Slope, which includes the coastal plain of the Arctic National Wildlife Refuge (ANWR), and the current focus is the National Petroleum Reserve – Alaska (NPRA) on the western portion of the North Slope. The ANWR effort was completed in FY 1998, but the overall North Slope project will continue for several years as the focus of research shifts westward.

Current Energy Resources Program activities in Alaska include framework petroleum geologic studies in the NPRA; evaluation of the resource potential of frozen natural gases (methane hydrates) in northern Alaska; evaluation of coalbed methane as a local energy source for the native villages of Chignik, Fort Yukon, and Wainwright; and Cook Inlet petroleum reservoir and coal studies. These activities involve active collaboration with State agencies. The Energy Resources Program is actively rescuing Alaskan oil and gas datasets generated during two government oil and gas exploration programs in the NPRA-one by the U.S. Navy in the 1940s and 1950s and the other by the Navy and the USGS in the 1970s and 1980s. These data are being transferred to more accessible digital formats, and include more than 14,000 miles of seismic and related geophysical data, logs and other records from 126 drill holes, and special studies of geochemistry, paleontology, reservoir rocks. The USGS is working cooperatively with the Bureau of Land Management, USDA Forest Service, Alaska Division of Geological and Geophysical Surveys, and the mineral resources community at large to update and make internet accessible bibliographic, mineral occurrence. Parts of these databases are accessible at **http://imcg.wr.usgs.gov/**.

In the Gulf Coast region, the USGS is developing a seismic-based geologic framework of the oil- and gas-bearing rocks of Texas and Louisiana. This framework will allow USGS scientists to better assess the potential for undiscovered resources and to define assessment plays that merge with plays developed for the Federal offshore by the Minerals Management Service. The USGS is specifically examining the extensive Austin Chalk trend, our Nation's largest, onshore domestic unconventional oil resource, and the deep gas reservoirs of the Tuscaloosa Formation, one of the major gas producers in the Gulf Coast Region (see Figure G-8). Additionally, the USGS is assessing undiscovered oil and gas resources at Big Thicket National Preserve in East Texas for the NPS. This assessment will form the basis of the NPS Oil and Gas Management Plan for the Big Thicket.

Understanding the environmentally important characteristics of oil and gas resources is critically important to forecasting the environmental impact of oil and gas exploration. A national database of the chemistry of the water associated with oil and gas production is being evaluated as a tool for anticipating areas where oil and gas brines may pose a hazard to the

environment or to groundwater resources. In addition, site specific studies of the environmental impacts associated with inappropriate management of brines are being conducted to evaluate the hazard potential on Federal and Native American lands.

The next National Oil and Gas Assessment will focus on the natural gas endowment of the Nation (conventional gas, continuous gas, coalbed gas) in 18 priority regions in the U.S., with a strong emphasis on resources under Federal Lands. A major component will be the prediction of surface infrastructure requirements for resource extraction.

National Coal Resources — The focus of the USGS National Assessment of Coal Resources is assessing the Nation's coal resources that will be used during the first quarter of the 21st century. This intensive, multi-year assessment of the quantity, quality, availability, and recoverability of coal involves the generation of digital databases and a GIS that facilitate quantitative estimation of coal resources. The results and digital products will be used by Federal and State land managers to support land-use decisionmaking by environmental regulators, to evaluate compliance with regulations stemming from the 1990 Amendments to the Clean Air Act, and by economists to forecast economic trends at regional and national scales. Electric utilities, coal producers, and coal consumers also will use the same results and products for evaluating the reliability and quality of coal resources to assure energy feedstock for electric power plants and to address air emissions and other environmental regulations with objective, scientific information. The national GIS is scheduled for completion in FY 1999, although reports on specific areas are being released as completed.

The National Coal Quality Inventory, a unique national database of coal quality (including chemistry) maintained by the USGS, is being expanded in scope through a collaboration that includes State geological surveys and the Electric Power Research Institute. The objective of this effort is to enhance the database by adding new data from coals that will be mined in each region of the United States during the coming decade. Results will include digital products that will enable Federal and State regulatory agencies, electric power utilities, and the coal industry to quickly access detailed information to address air quality issues and to determine compliance with the 1990 Amendments to the Clean Air Act. The National Coal Quality Inventory also will emerge as one of the most critical scientific tools as the United States evaluates the feasibility and procedures for achieving CO_2 and other greenhouse gases emission targets proposed in the Kyoto accords.

World Oil and Gas Resources — As U.S. dependence on imported oil continues to grow and demand increases, it is imperative that the Nation understands the global distribution of oil and gas resources as a basis for strategic and economic policy. The first objective, quantitative assessment of undiscovered oil and gas resources of the World is being conducted using quantitative and digital methodologies developed and refined in the USGS National Oil and Gas Assessment.

Recent Accomplishments

National Energy Resource Assessments — USGS spatial data summarizing the energy resources of the United States continue to be widely used as the basis for resource evaluations and land-management and energy-policy decisions nationwide. Building on this

foundation, the USGS recently completed several studies focused on specific areas of interest to the Federal government and others. For example, in 1998, results of a study estimating the oil and natural gas resources beneath onshore Federal lands were released. USGS gas data are being incorporated into a new National Petroleum Council study of the potential for natural gas to meet future increasing national demands. Also, the USGS has just established a consortium with the BLM and private industry to allow collaborative and integrated interdisciplinary studies of coalbed methane resources in the Powder River Basin. A National Coal Resource Assessment will be completed in 1999, however, interim products from this project are already being used by private industry and state governments. Recent energy assessment results in two regions of the nation, the Gulf Coast and Alaska, are highlighted here.

Gulf Coast Region — A coal resource assessment is nearing completion for five coal-producing regions of the nation. In the Gulf Coast Region, a series of digital (GIS) maps of coal-bearing rocks was produced by the USGS in 1998, which delineate the rank and extent of potential coal resources and provide the framework for focused assessments where data are available (see Figure G-8). These final maps and digital products will be published in 1999 cooperatively with the Bureau of Economic Geology at the University of Texas at Austin. Coal maps from this project have for the first time shown the regional distributions of coal in the Gulf Coast region. Coupled with other industrial data, these maps are being used by Texas utilities and coal companies as a basis of relating their mines and operations to those of competitors.

A detailed petroleum assessment of the Padre Island National Seashore (Texas) (see Figure G-8) was completed by the USGS at the request of the National Park Service. The assessment forms the basis of the NPS' Oil and Gas Management Plan for Padre Island. Additionally, the USGS has supported a Federal inter-departmental memorandum of understanding (MOU) to provide a scientific basis for decisions regarding the natural resources and environment of the Mississippi Delta region. Also in 1998, the USGS signed an agreement with the DOE/Energy Information Agency for cooperative studies of the phenomenon of oil and gas field growth, which is where most of the future oil resources of the U.S. reside.

Alaska — A new assessment of the petroleum potential of the Arctic National Wildlife Refuge 1002 area (northeast Alaska) was completed in 1998, thereby providing a scientific basis for Federal energy-resource management in that arctic region. The USGS also provided scientific support for a DOI evaluation of land-management options for the National Petroleum Reserve - Alaska (northwest Alaska). A resultant lease sale, scheduled for 1999, will be the first Federal petroleum lease sale on the North Slope of Alaska since 1984.

Figure G-8 - Locations of lignite and coal resources and study areas of current USGS Energy Resources activities in the Gulf Coast Region.

National Coal Quality Inventory — The National Coal Quality Inventory (NaCQI) is a unique cooperative effort of the USGS and the utility and coal industries, state geological surveys, universities, and other organizations to develop a broad, up-to-date, national coal quality database. The USGS provides the only national, quality-assured database of coal chemistry essential for the evaluation of coal-resource quality and potential environmental and health impacts of coal use. In 1998, the Electric Power Research Institute (EPRI), joined the Department of Energy, and Environmental Protection Agency in funding and collaborating with the USGS and state geologic agencies to create this current coal-quality database. EPA has used this USGS resource-based database to help them address several key issues stemming from the 1990 Clean Air Act Amendments. In particular, EPA has used USGS data on mercury in coal to estimate the total load of mercury contributed per year by the combustion of coal in the U.S. Also, the USGS coal quality database has been used to review the recent Information Collection Request (ICR) of EPA for mercury and chlorine in U.S. coals.

World Oil and Gas Assessment — The USGS World Energy Project has produced five digital CD-ROM products in 1998, which have received significant attention, such as an unsolicited review of the CD series in a recent on-line issue of GIS World Magazine. Professor A. K. Turner of the Colorado School of Mines states: “several government agencies provide important and useful regional, national and even global datasets on CD-ROM and at various World Wide Web distribution sites. USGS products described in this column are merely some of the latest, and, in my opinion, the most completely documented and well-designed products.“ 15,000 copies have been requested by, or distributed to, Federal agencies, academia, and industry. These products include a ranking of the world's oil and gas provinces, and digital geologic maps of Africa, Arabia, South Asia, and the Former Soviet Union. A fifth CD-ROM is a proprietary map of Iraq oil fields, prospects, reserve data, and associated maps funded by and prepared for the intelligence community; these data are not available elsewhere in the U.S. A World Energy Consortium of over 24 organizations provides calibration, data and technical evaluation of this assessment effort. The project has been profiled in a nationally distributed video prepared by the American Geologic Institute and the USGS, and presentations have been made in several forums discussing the potential of an impending global oil crisis. The results of this study are already being used by many Federal agencies (including Department of State, DOD, and CIA) as fundamental input into analysis and development of foreign policy and domestic energy policy.

Review of the Energy Resources Program by the National Research Council — The National Research Council (NRC) of the National Academy of Sciences conducted a review of the Energy Resources Program and released a report on February 2, 1999. This six-month study by 11 distinguished earth scientists examines the current state of the Energy Resources Program of the USGS and offers suggestions for the future of the program.

Justification for Program Change

	FY 2000 Request	Program Change
$(000)	21,898	-1,000

The Coal Availability/Recoverability Studies collaborative project with the State Geological Surveys began in 1988 to select small representative areas (quadrangles) to study so that results could be extrapolated to the surrounding region. Approximately 150 quadrangles were originally selected in the Nation’s six major coal-producing regions, and by the end of FY 1999, approximately 110 Coal Availability Studies (CAS) and about half (50) of follow-on Coal Recoverability Studies (CRS) will be completed. Two of the originally planned 16 regional extrapolation studies will be completed. This reduction is being proposed given higher priority needs requested elsewhere in the FY 2000 budget.