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NATURAL RESOURCES COMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES
September 17, 2014

Thank you for the opportunity to submit written testimony for the record on H.R. 5066, Reauthorization of the National Geological and Geophysical Data Preservation Program Act of 2005 through 2019 (NGGDPP). This testimony is presented on behalf of the **Association of American State Geologists** (AASG). Our organization, founded in 1908, represents the State Geologists of the 50 United States and Puerto Rico. AASG seeks to advance the science and practical application of geology and related earth sciences across our lands. AASG strives to optimize the role that State Geological Survey agencies play in delivering benefits to the people of the United States in relation to developing economic prosperity, understanding and mitigating natural hazards, protecting property and lives, and preserving our natural environmental heritage.

AASG recognizes the work of Chairman Lamborn, Ranking Member Holt, sponsor Benishek and the members of this Committee. We commend your efforts to strengthen our nation's capacity to address the challenges associated with energy, as well as critical and strategic mineral resources. I share with you today the vital role of geological and geophysical data in this regard, the vulnerability of these resources, and I will emphasize the role that State Geological Surveys can play in addressing associated concerns.

THE AASG POSITION

AASG strongly supports preservation and access of geological and geophysical data, which is facilitated through this Act. We support long-term authorization and full appropriation of the Act. We acknowledge and support the role of the US Geological Survey (USGS) in administering this program, which includes the development and compilation of state and federal data inventories, an implementation plan, data standards, strategic planning, and collaboration regarding preservation techniques. We acknowledge the significance of the National Data Catalog at ScienceBase.gov. We acknowledge that local and state agencies and our federal partners, such as the Department of Interior, Department of Energy, Department of Homeland Security and the Environmental Protection Agency, rely on this data for purposes of water, energy and mineral resource assessments and sustainability, hazard mitigation, and protection of human health and the environment. AASG understands that despite the continuous evolution of geological, geophysical, engineering concepts, and analytical techniques, there is a constant need to revisit, re-examine, and re-analyze rock samples over time. These "second looks" at archived and heritage **data can yield energy and mineral discoveries worth billions of dollars and generate tens of thousands of jobs.** The NGGDPP supports important Federal-State partnerships that achieve mutually beneficial goals related to the rescue and accessibility of invaluable geoscience data.

A CRITICAL ISSUE FOR THE NATION

Geoscience-related issues are critical and of immediate concern to the Nation's security and economy. Examples include the following:

- Location, abundance, sustainability and quality of water supplies
- Domestic energy sources, such as oil, gas, coal, geothermal, and renewables; reduction of carbon emissions
- Domestic sources of metals and critical minerals
- Identification, mapping, and prediction of geologic hazards such as earthquakes, volcanic eruptions, sinkholes and landslides
- New technological breakthroughs require re-examination of samples and data; data historically deemed insignificant may become paramount to new discoveries
- Training the next generation of geoscientists, especially geologic mappers

All of these issues rely on the analysis of geological and geophysical samples, collections, and data that already exist. Regrettably, these vital materials are often in poor states of preservation and access, and in danger of permanent loss. Many of this nation's geological data repositories, most of which are maintained by State Geological Surveys, are now at or near their storage capacity. Some have exceeded their capacity and are relying on temporary, non-climate-controlled portable storage. Expansion of these facilities requires significant capital costs. While industry and government have made substantial investments to acquire geoscience data and collections for over 150 years, volumes of expensive and arduously obtained subsurface information are currently at risk of disposal or ruin. Once these data are lost, they probably will never be replaced.

The value of our Nation's geological and geophysical data (e.g., rock and ice cores, fossils, geophysical tapes and paper logs, rock, mineral and fossil samples, aerial photos, field notes) have long been recognized. The fact that significant portions of these materials are irreplaceable due to destruction of outcrops (e.g., construction, quarrying, flooding, landslides), urbanization, restricted access, and prohibitive replacement expenses only increases their importance. If preserved, these materials and data will be invaluable for the next generation of scientific research and education. The ability to preserve and maintain geoscience data and collections has not kept pace with the growing need for information and technological advancements, many of which require real-world calibration: samples from the Earth.

Not only is rescue of this data critical, a full understanding and access of the types and sources of data is equally important to future geoscientists. To this end, developing inventories, and recording *metadata* – or structured information about data – allows for future discovery and use through a georeferenced platform such as an internet-based map. Meticulous effort is involved in the research of metadata; it is much like detective or forensic work and is time-consuming.

In 2002, the National Academy of Sciences reported on "Geoscience Data and Collections – National Resources in Peril," making the case for preserving these irreplaceable data and physical samples. The report notes that "housing of and access to geoscience data and collections have become critical issues

for industry, federal and state agencies, museums, and universities. Many resources are in imminent danger of being lost through mismanagement, neglect, or disposal. A striking 46 percent of the state geological surveys polled by the [National Research Council] committee reported that there is no space available or they have refused to accept new material.”

THE RESPONSE

Congress established the National Geological and Geophysical Data Preservation Program (NGGDPP) through the National Energy Policy Act of 2005 [PL 109-58, Sec. 351] to address these issues. Specifically, the NGGDPP was established to:

- Create a national network of cooperating geoscience materials centers and data archives, representing a partnership between U.S. Department of the Interior Bureaus and the State Geological Surveys;
- Archive geologic, geophysical, and engineering-geologic data, maps, well logs, and samples in accordance with National and international formats and standards;
- Permit ready access to the holdings of all collections through a common, distributed Internet-based National Digital Catalog of archived materials;
- Provide federal assistance, matched by state and private funds, to support physical and digital infrastructure efforts, outreach, public awareness, and workshops;
- Ensure that this Nation’s next generation of geoscientists has the necessary reference material with which to train;
- Designate the USGS as the program administrator to coordinate geologic material centers and data archives with other Department of Interior Bureaus, the State Geological Surveys and the AASG; and
- Encourage private industry and universities to partner with State Geological Surveys and the USGS to leverage resources.

BUDGET HISTORY – A STATE PERSPECTIVE

Since implementation of the NGGDPP, the annual authorization has been \$30 million, however, total appropriated funds since 2007 equals \$8 million. This comprises **three percent of the total \$240 million authorization** during that period. Cooperative funding of state projects began in 2007, totaling \$4.58 million to date in awards to the states. Over the last five years, on average, **25 states per year have received funding averaging \$27,033 per state**. This annually comprises an average of 63% of the appropriated funds over this five year period.

DATA PRESERVATION ACCOMPLISHMENTS AND APPLICATIONS

With the modest appropriation levels, intended capital improvements have not been possible; however, the USGS-administered NGGDPP has successfully implemented the National Data Catalog and funded small data rescue activities and improvements in data collections and management across the country. The following describes selected accomplishments of State Geological Surveys. In addition, examples of successful applications of previously archived geological and geophysical data are shared to illustrate the

importance of these geoscience data resources, which can generate billions of dollars for the Nation's economy, create jobs, and save lives:

- **Alabama** has digitally cataloged approximately 170,000 fossil specimens within its paleontology collection, providing ready access of fossil information to energy companies who are constructing or moving pipelines. The companies incorporate this information into the Paleontological Resources section of the required Environmental Impact Statement within their applications to the Federal Energy Regulatory Commission. Archived vibracores can be used to evaluate damage to the Alabama coast due to the Deepwater Horizon oil spill and may be the basis for recovering significant funds for coastal restoration.
- **Alaska** completed a major curation project supported partly by NNGDPP involving a valuable core sample collection at risk of severe material and data loss: 818 boxes of moldy coal-bed methane core from five oil and gas wells were cleaned, re-boxed, restored and made available to geoscientists studying potential energy resources. Other archived cores once examined and analyzed for gold, silver, and tin, are now being analyzed for their promising REE potential.
- **Arizona** digitized and georeferenced more than 4900 maps, 5500 reports, 5100 images to date; over 30,000 additional files and maps have also been scanned - information used extensively by state and federal agencies in environmental and abandoned mine/mine safety programs, and by mineral resource exploration companies.
- **California** notes the importance of its Historic Mine Maps Collection, which is used to remediate public safety hazards posed by abandoned mines throughout the state. Almost every year there are reports of California residents entering or falling into abandoned mines and becoming trapped sometimes with deadly results. Maps in the collection provide information on mine locations that would otherwise go undetected.
- **Florida** converted more than 7000 geophysical logs to digital format, providing information about state's deepest wells, making the data more accessible and useful toward exploration of oil, natural gas and deep-aquifer drinking water. Evaluation of core samples and geophysical logs continue to lead to a refined understanding of the Floridan aquifer system. Moreover, examination of core samples led to discovery of natural sources of arsenic, which fostered development of techniques that mitigate the release of this element underground sources of drinking water.
- **Kansas** used drill cores in its repository that were collected in the 1960s to help determine the cause of a gas explosion and recommend solutions. In 2001, natural gas bursts in Hutchinson, Kansas, resulted in downtown explosions and fires, as well as fountains of natural gas and brines three miles east of the fires and an explosion under a mobile home that killed two people. Using the drill cores and new seismic data, scientists determined that gas leakage from a salt cavern used to store natural gas had resulted in two anomalous zones of potential high gas pressure. Vent wells were drilled to release the pressure, which prevent further explosions. Originally acquired in the 1960s while the Atomic Energy Commission was trying to determine potential nuclear storage facilities, **the core was used in 2001 to prevent further explosions and deaths from underground natural gas accumulations.**
- **Michigan** received a mining company donation of 4000 core boxes and fortunately had sufficient staff process the samples and sufficient space to archive the materials for future access. **Reinspection of the samples led to discover of a potash deposit valued at \$65 billion.**
- **Missouri** received funding from NNGDPP and applied it to convert 400 hard-bound, paper field notebooks to a digital format via scanning for preservation and archival purposes, increasing public awareness of and accessibility to the information. The collection comprises more than

1,500 geology field notebooks that date back to 1855. The collection is one of a kind and would be impossible to replace should be lost or destroyed. The notebooks contain historic geologic data on outcrop locations, rock-unit layers, mining, karst, hydrology, structure and other topics. They also contain historic data on physiography, vegetation, socio-economic and cultural information and a myriad of other subjects. The notebooks have proven to be essential for site location and characterization work on mine-related Brownfields work. The information has not only reduced costs and time by providing mine location data, but has also been the sole source of information for more than 1,700 historic mines, many of which have significant soil or groundwater lead contamination and are now proximal to residential development.

- **Montana** applied NRGDPP funds to collect and preserve mines and mineral data throughout the state, specifically, preserving drill hole logs, mineral evaluations, and many other data related to the New World Mining District. Preservation of mineralogical and geochemical data was also accomplished to evaluate hundreds of abandoned-inactive mine sites for reprocessing waste rock.
- **New Jersey, Maryland and Delaware** used geologic and geophysical logs from their respective collections to cooperate on a transboundary study to understand the Potomac Aquifer, which is a principal supplier of drinking water in each state. The project was supported by the USGS National Cooperative Geological Mapping Program (STATEMAP). The geologic information, made available in part from the NRGDPP program, assisted the team with identifying the dimensions of the aquifer, and for locating optimal drilling locations for additional test wells. Drilling test wells is costly, and the use of existing geologic and geophysical information allowed the team of researchers to make optimal use of their research funds.
- **New York** applied NRGDPP resources to support the scanning of over 1,700 maps, therefore preserving the documents and making them more accessible. State agencies, such as the Departments of Transportation and Environmental Protection, have used the scans of our bedrock maps for projects such as landslide mitigation, resource planning, and habitat protection. They have also been used by the engineering community in planning and construction of a new water supply tunnel for New York City. **Engineers on the project stated that the existence of archival bedrock data in the NYSGS open file saved the City “millions of dollars in drilling costs.”**
- **Oklahoma** has a core facility and data center, the Oklahoma Petroleum Information Center, that is the size of 4 football fields and holds over 100 miles of core. It also holds 1000's of well logs, 1000's of boxes of drilling cuttings, very popular old aerial photographs that we have scanned with NRGDPP funding, and equally popular old data such as mud logs which we have also scanned with NRGDPP funding. These data are being used daily in oil and gas exploration and production efforts across Oklahoma, and we are regularly told how invaluable these data are. Some of the recent plays that are in the news are the Mississippi Lime, Granite Wash, Woodford shale, and SCOOP (South Central Oklahoma Oil Province). The utility of the data we preserve can be easily tracked by the requests for core viewing, examination of cuttings, and paper records as these and other plays develop.
- **Pennsylvania** gas archived core that was drilled and archived over the last 40+ years and has been utilized over the last 5 years for studies of the Marcellus shale. This horizon has recently fueled a significant increase in available gas resources to support the US economy. Were it not for the cores preserved and maintained by the PA Survey, and the work over the last 30 years to map, sample and evaluate the Marcellus – long before the advent of current drilling technology

and the now recognized importance of organic shales - the rapid and efficient development of this resource would have been significantly delayed.

- **Texas** maintains three core research centers. In 2008, reinspection of a small manila pouch full of rock chips from a dry oil test well in southern Texas led to **discovery of the Eagle Ford Shale play: a \$25 billion economic impact in a 20 county area supporting more than 47,000 jobs**. The pouch resides in a box among half a million boxes in a Texas Bureau of Economic Geology core research facility. The sample had likely not been inspected since the 1950s.
- **Utah** has record of over 24,000 air photos that were downloaded last fiscal year for use by geotechnical and environmental engineering consultants in support of investigations for new development to identify and locate potential geologic hazards, and in environmental assessments, and by local governments and others to document land-use changes. The Survey's Aerial Imagery Collection is being used on almost all internal geologic hazard projects and emergency responses, and is critical for mapping landslide occurrences (such as the over 500 square mile Wasatch Plateau landslide inventory mapping project, Seeley Fire emergency response, etc.), and other hazards.

IN CLOSING

The AASG endorses the NGGDPP as it is designed to readily address a vast and enduring concern for the Nation. Not only are geological and geophysical data at risk, but scientific clues revealing undiscovered water, mineral and energy resources may be lost, and more importantly, data that can save lives may be lost. This cooperative Federal-State program affords the Nation the opportunity to more fully understand the reserves of water resources and mineral and energy reserves in our lands. In addition, the data is also used for prediction and preparation of geological hazards, as well as to avoid unnecessary costs of embarking in geologic exploration in areas already represented in historic collections.

Given past appropriation levels and the immense importance of this successful program, the AASG strongly recommends that the authorization be extended to a ten-year duration, "... 2015 through 2025." We also encourage full appropriation levels to meet national demands for capital improvement projects to store, protect and make these valuable geoscience resources more readily available.

Thank you, again, for this opportunity. I hope you find this information helpful as you consider this important matter.

For more information about geoscience data repositories and success stories:

American Geological Institute, 1997, National Geoscience Data Repository System Phase II: Final Report, Alexandria, Virginia, 127 p.

American Geological Institute, 2003, National Geoscience Data Repository System Phase II: Implementation and Operation of the Repository Final Report, Alexandria, Virginia, 42 p.

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Collette, Mark, December 30, 2012, "The Wildcatter: Corpus Christi's Gregg Robertson, key member of Eagle Ford discovery, named 2012 Newsmaker of the Year," Corpus Christi Caller Times, Retrieved from <http://www.caller.com/business/eagle-ford-shale/the-wildcatter-corpus-christis-gregg-robertson>

National Research Council, 2002, Geoscience Data and Collections – National Resources in Peril, National Academies Press, Washington, D.C., 107 p.

Office of Management and Budget, 2002, Coordination of Geographic Information and Related Spatial Data Activities. Circular No. A-16 Revised.

Roland, Cheryl, September 10, 2013, "Western Michigan University research facility assists in rediscovery of rare mineral deposit," Western Michigan University News, Retrieved from <http://wmich.edu/news/2013/09/9197>

SUPPORTING IMAGES

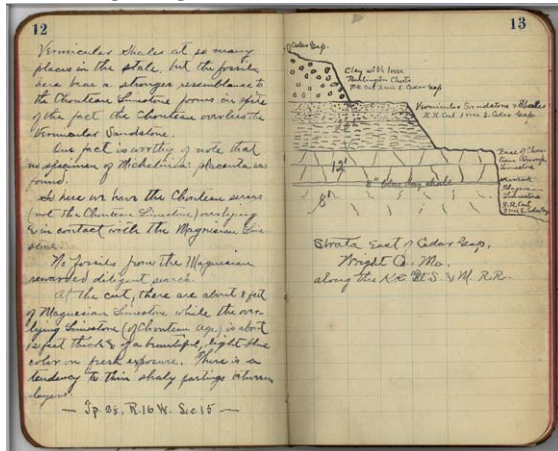
Geological sample rescue: before and after



Cores in need of rescue



Rescued geological field notebook



Core analysis



Photo by David M. Stephens,
Bureau of Economic Geology, The University of Texas at Austin.