

December 1, 2016

Ms. Molly Otto
Legislative Librarian
Colorado Legislative Council
Room 029, State Capitol
Denver, CO 80203

Representative Millie Hamner
Chair, Joint Budget Committee

Representative Edward Vigil
Chair, House Agriculture, Livestock, & Natural Resources

Senator Jerry Sonnenberg
Chair, Senate Agriculture, Natural Resources, and Energy Committee
c/o Colorado General Assembly
200 East Colfax
Denver, CO 80203

Dear Ms. Otto and Representatives Hamner and Vigil and Senator Sonnenberg:

Pursuant to §23-41-210 C.R.S., I respectfully submit the following annual report on the Colorado Geological Survey to the Colorado General Assembly.

Please let me know if you have any questions on the report or would like additional information.

Best regards,



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2016 Report to Colorado General Assembly on the Transfer of the Colorado Geological Survey

I. Overview

Pursuant to §23-41-201 C.R.S., the Colorado Geological Survey (CGS) transferred from the Department of Natural Resources to the Colorado School of Mines on January 31, 2013. The survey reports to the Dean of the College of Earth Resource Sciences and Engineering at Mines. This organizational structure allows CGS to collaborate with key departments of Geology & Geological Engineering, Geophysics, Mining Engineering, and Economics and Business, which are part of the college.

This report includes the following information as outlined in §23-41-210 C.R.S.

- Priorities for the CGS, as determined by the Colorado School of Mines;
- The sufficiency of severance tax and other state funding for the implementation of the functions and objectives of the CGS;
- Additional funding or other resources from any other source that are available to carry out the functions and objectives of the CGS;
- The number of full-time-equivalent employees dedicated to the implementation the functions and objectives of the CGS;
- Collaboration with state agencies, industry, academic institutions, or other entities;
- The objectives for the CGS and the office of the state geologist for the next year.

II. Functions and Objectives of Colorado Geological Survey and the Office of the State Geologist

In the executed memorandum of understanding between Colorado School of Mines and the State of Colorado's Department of Natural Resources, the State provided funding, from the Operational Severance Tax Trust Fund, for the following public safety functions:

- Review of schools for geologic hazards.
- Review of preliminary development plans for geologic hazards.
- HB1041 Areas/Activities of State Interest – Geologic hazard technical assistance to state and local governments.
- Create Guidelines for land use in natural hazard areas.
- Designate suitable areas for hazardous waste disposal.
- Define and map geological hazards for city/county master plans.
- Determine areas of natural geologic hazards that could affect the safety of or economic loss to the citizens of Colorado.
- Assist and advise state and local governments on geologic problems.
- Collect and preserve geologic information related to geologic hazards.
- Evaluate the physical features of Colorado, related to natural hazards, for human and animal use.
- Prepare, public and distribute reports, maps and bulletins when necessary to meet statutory mission related to land use and geologic hazards.

Through SB13-230, the General Assembly provided funding (General Fund) for CGS to perform additional functions related to mineral, energy, and water resources:

- Provide technical assistance to state and local governments on mineral and energy resources including geothermal.
- Assist and advise state and local governments on geologic problems related to mineral and energy resources.
- Prepare, publish and distribute reports, maps and bulletins when necessary to meet statutory mission related to mineral and energy resources.
- Provide advice and assistance to the Oil and Gas Conversation Commission as necessary.
- Collect and preserve geologic information related to mineral and energy resources.
- Update maps of commercial mineral deposits.
- Inventory and analyze the State's mineral and energy resources as to quantity, chemical composition, physical properties, location and possible use.
- To conduct scientific studies of how geology affects and controls water resources, especially within Colorado.

These core functions will remain the priority of the Colorado Geological Survey for FY 16-17 and FY17-18 pending continued funding levels from the Operational Severance Tax Trust Fund and the General Fund. A sample of projects scheduled for completion in FY16-17 can be found in Table I on page 4.

III. Funding

Efforts to provide statutory functions, at the same service levels prior to the transfer, continue to be limited by budget and staffing constraints. As part of the transfer, overall appropriations from the Operational Severance Tax Trust Fund to CGS were reduced by 40% and STAX appropriations to the mineral, energy, and water resources functions were eliminated.

As noted above, SB13-230 restored some funding to the non-public safety functions but total funding and FTE was reduced by 70%. Prior to the transfer, total appropriations for the mineral resource, ground water and energy functions were \$1,336,333. Of this amount, \$924,121 was from the Operational Severance Tax Trust Fund.

For fiscal year 2016-17, \$1,379,672 has been appropriated from the Operational Severance Tax Trust Fund for public safety functions and \$429,827 has been appropriated from the General Fund for mineral resource, ground water and energy functions (includes funding for 1 FTE for geologic hazards). The support from the General Fund and Operational Severance Tax Trust Fund is greatly appreciated. Without this funding, the Colorado Geological Survey would not have sufficient funding to continue to provide statutory services.

Major funding sources outside of severance tax or general fund include:

- Colorado Water Conservation Board
- Colorado Department of Health and Environment
- USGS
- Fees for Services to Local Governments
- NASA
- Colorado Energy Office

IV. Full-Time-Equivalent Employees

15.5 positions are budgeted to fulfill the prioritized functions of the Survey.

V. Collaboration with State Agencies, Industry, Academic Institutions, or Other Entities

Key collaborations and partners by functional area are outlined in Table II.

Colorado Geological Survey FY16-17 Work Plan

Project	Deliverable	Funding Partnerships			Mines Technical Partnerships		
		State	Federal	Local	Students	Faculty	Graduates
New Geologic and Geologic Hazard Mapping	Four new geologic/hazard maps (1:24,000); two West Slope and two Front Range	✓	✓	☐	✓	☐	☐
Geothermal Assistance to Local Governments	Collection and dissemination of geothermal data and information in response to requests from local governments and industry	✓	☐	☐	✓	✓	☐
Landslide Mapping Using LIDAR	Landslide susceptibility maps for four counties	✓	✓	✓	☐	☐	✓
Debris Flow Mapping	Susceptibility maps for three counties	✓	✓	☐	✓	✓	✓
Industrial Sand Potential on State Land Board Property	Report on sand resources suitable for hydraulic fracturing and other industrial uses	✓	☐	☐	☐	☐	☐
Mesa, Park, and Chaffee County Groundwater Studies	Reports on groundwater sources in each county	✓	☐	✓	☐	☐	☐
Hazard Planning Assistance to Local Governments	Assist with incorporating geologic hazard mitigation into local land use and pre-disaster mitigation plans	✓	✓	✓	☐	☐	✓
Emergency Response Assistance to Local Governments	Provide disaster response and recovery assistance to state and local governments as needed.	✓	☐	☐	☐	☐	☐
Geologic Hazard Derivative Maps	Create hazard maps for state/local planning using existing maps and new technologies	✓	✓	✓	✓	☐	✓
Geothermal Resource Assessment in the Piceance Basin	Compile geothermal gradient maps using data from oil and gas wells	✓	✓	☐	✓	☐	☐
Mineral and Mineral Fuel Activity Report	Produce report on activity in Colorado during 2015-2016.	✓	☐	☐	☐	☐	☐
Induced Seismicity/Earthquake Hazard Monitoring	Install two new seismometers to better discriminate between natural and induced events and locate unknown faults.	✓	✓	☐	✓	✓	☐
Archuleta County Rockfall and Landslide Study	Evaluate the style of movement, stability, and potential triggers of a large landslide	✓	☐	☐	✓	✓	☐
Land Use Reviews	Reviews proposed subdivisions, school sites and other improvements to help ensure that people and property are not exposed to geologic hazards	☐	☐	✓	✓	☐	✓
Mineral Resource Derivative Maps	Create mineral resource maps from completed geologic maps	✓	☐	☐	☐	☐	☐
Geothermal Technical Assistance to CEO	Ongoing geothermal technical support to the Colorado Energy Office. Complete direct-use feasibility study for Town of Rico.	✓	☐	✓	✓	✓	☐

Table I: Colorado Geological Survey FY16-17 Work Plan

Statutory Objective	Partner	Partner	Partner	Partner	Partner
Geologic Hazards					
Review of schools, development plans, and land-use plans for geologic hazards. Provide technical assistance to local governments.	Municipalities, Counties and School Districts	Colorado Department of Emergency Management	Colorado Water Conservation Board	Colorado Department of Local Affairs	Colorado Resiliency and Recovery Office
Prepare, publish, and distribute reports, maps and bulletins when necessary to meet statutory mission	Colorado School of Mines	Colorado Department of Emergency Management	Colorado Oil & Gas Conservation Commission	USGS	Municipalities and Counties
Determine areas of natural geologic hazards that could affect the safety of or economic loss to the citizens of Colorado	Colorado Department of Emergency Management	Colorado School of Mines	Municipalities and Counties	Colorado Resiliency and Recovery Office	Colorado Water Conservation Board and OIT
Mineral and Energy Resources					
Identify areas with commercial mineral deposits	Municipalities and Counties	Colorado State Land Board			
Promote economic development of mineral and energy resources	Colorado Energy Office	Colorado School of Mines	Municipalities and Counties	Colorado State Land Board	
Prepare, publish, and distribute reports, maps and bulletins when necessary to meet statutory mission	Colorado Mining Association	Colorado School of Mines	University of Colorado	Colorado State Land Board	Municipalities, and Counties
Inventory and analyze the state's mineral and energy resources as to quantity, chemical composition, physical properties, and possible use	Colorado School of Mines	Municipalities, and Counties	Colorado State Land Board	NASA	Colorado Energy Office
Water Resources					
To conduct scientific studies of how geology affects and controls water resources	Colorado Water Conservation Board	Coalition for the Upper South Platte	Counties	Colorado School of Mines	Colorado Department of Health and Environment
Prepare, publish, and distribute reports, maps and bulletins when necessary to meet statutory mission	Colorado Water Conservation Board	Coalition for the Upper South Platte	Counties	Colorado Department of Health and Environment	Colorado School of Mines

Table II: Collaboration with state agencies, industry, academic institutions, or other entities

VI. Objectives for the CGS and the Office of the State Geologist for FY17-18

It is anticipated that similar types of projects to those listed in Table I will be completed in FY17-18. CGS will develop a FY17-18 work plan in the spring of 2017 with input from the Colorado School of Mines and a variety of state, local government, industry, and general public stakeholders.