Rare Earth Elements and Strategic Minerals Assessment **FY2012 Request: $498,000**
Reference No: 51052

AP/AL: Appropriation
Project Type: Research / Studies / Planning
Category: Natural Resources
Location: Statewide
House District: Statewide (HD 1-40)
Impact House District: Statewide (HD 1-40)
Contact: Jean Davis
Estimated Project Dates: 07/01/2011 - 06/30/2014
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Brief Summary and Statement of Need:
This 3-year project will provide critical data for assessing Alaska's Rare Earth Element (REE) potential. It is needed now to address U.S. domestic needs for these critical elements. Many areas of Alaska are permissible for hosting REEs, but the lack of basic geologic data statewide hinders evaluation of Alaska's REE potential. Conducting field work and obtaining relevant geologic data will advance the state's knowledge of its geologic resources, promote informed state management decisions, spur mineral industry exploration, and contribute to the DGGS mission of conducting geological surveys to determine the potential of Alaskan land for production of metals.

Funding:	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	Total
Gen Fund	$498,000						$498,000
Total:	$498,000	$0	$0	$0	$0	$0	$498,000

☐ State Match Required ☑ One-Time Project ☐ Phased - new ☐ Phased - underway ☐ On-Going
0% = Minimum State Match % Required ☐ Amendment ☐ Mental Health Bill

Operating & Maintenance Costs:

	Amount	Staff
Project Development:	0	0
Ongoing Operating:	0	0
One-Time Startup:	0	
Totals:	0	0

Additional Information / Prior Funding History:
New request

Project Description/Justification:
This 3-year project will provide information critical for assessing Alaska's Rare Earth Element (REE) potential. Many areas of Alaska are geologically permissible for hosting REEs, but the lack of basic data statewide hinders evaluation of Alaska's REE potential. The most significant REE prospect in Alaska is the Bokan Mountain property, located 37 miles southwest of Ketchikan. Preliminary assessments suggest the area contains one of the largest REE deposits in North America, with significant enrichments in heavy REEs. Alaska has more than 150 additional known mineral occurrences and millions of acres of selected or conveyed lands with the potential to contain REEs, but the mineral-resource potential of these occurrences and lands is poorly understood, and there has been no systematic resource evaluation for REEs in Alaska. The Division of Geological and Geophysical Survey's (DGGS) Rare Earth Element Assessment project is specifically designed to address this data and knowledge gap, as described below.

REEs are a group of relatively obscure, but technologically critical, elements. These elements include both light REEs (lanthanum, cerium, praseodymium, neodymium, promethium, and samarium) and the economically more valuable heavy REEs (europium, gadolinium, terbium, dysprosium, holmium,

erbium, thulium, ytterbium, and lutetium), as well as the transition metals yttrium and scandium, which have similar properties.

REEs are indispensable for military and high-technology applications, as well as clean/renewable-energy technologies (i.e., wind turbines, solar panels, batteries for electric vehicles). For example, liquid-crystal displays for computer monitors and televisions use the REE europium, which produces the color red; there is no known substitute. REEs are used to convert heavy crude oil into gasoline and other products, and REEs are also used to make "permanent magnets," which enable miniaturization of electronic components (miniature high-capacity computer hard drives would not be possible without these magnets). In 2010, the U.S. Government Accountability Office assessed the likelihood of national security risks arising from the U.S.'s nearly 100 percent dependency on non-domestic sources (primarily China) for REEs, which recently cut its exports by 72 percent. Their report concluded U.S. defense systems will likely continue to depend heavily upon REEs, on the basis of current technology and system designs utilizing REEs, and a lack of effective non-REE substitutes. The lack of a domestic REE supply chain presents national security concerns for the U.S., and diminishes its ability to be a world-technology leader. It is essential for the U.S. to identify domestic sources for REEs in order to reduce the nation's vulnerability to disruptions in global supply.

In 2010, U.S. House and Senate bills were introduced to encourage reestablishment of domestic REE industries. The DGGS Rare Earth Element Assessment project is in line with the Alaska Legislature's recent House Resolution (SLA10/House Resolve 11/HR16) urging Congress to advance development of new REE reserves in the U.S., and continued exploration for REE deposits in Alaska. By assessing Alaska's potential for REEs, the State of Alaska will benefit from expanded mineral-industry investment in exploration and development and associated employment, better understand the natural resources of its lands for land-management purposes, and contribute to the nation's need for domestic supplies of these critically important elements. Information resulting from this REE assessment will be an important resource to help Alaska for many years into the future.

Scope of Work to be Performed

This three-year project will determine the potential of state lands for hosting REE mineral deposits by conducting geologic field work throughout Alaska, obtaining appropriate supporting analytical data, evaluating currently available and newly collected data, determining Alaska-specific REE mineral-deposit models, and publishing the results of our studies. One, non-permanent (Geologist I) position will be needed to assist with this project.

End Results Achieved

Mineral resources comprise a major part of Alaska's economic assets. The location and magnitude of these resources are largely unknown, yet that knowledge is key to orderly development of the State and maintenance of a stable economy. The State of Alaska cannot efficiently manage or develop assets that are unknown and not quantified. The benefits of a thorough mineral-resource information base include:

1) Enhancing community and local government economies and revenue opportunities;
2) Stimulating private-sector exploration and competitive development of Alaska's mineral resources;
3) Developing transportation corridors and infrastructures, which always requires cost justification based on prior knowledge of resources; and
4) Developing long-term decisions on management of state-interest lands.

Specifically, the Rare Earth Element Assessment project will achieve the following important end results:

- The State of Alaska will develop a better understanding of REE resources on state lands to help with land-management decisions.
- Potentially leverages private sector funds in the form of donations of private industry and native corporation data to support this project.
- Data generated will be useful for attracting mineral exploration companies to Alaska, which is competing with other countries to attract industry investment dollars.
- The project will likely catalyze private sector investment and job generation at a level that far surpasses the cost of the REE Assessment project. Jobs for the Alaskan public are created both as a direct result of the project's execution and as a result of the knowledge generated during the project about Alaska's REE mineral resources. During execution of the project, immediate jobs are created in the private sector in the form of helicopter, logistical, lodging, analytical, and various small contracts. Jobs are also generated in the private sector from the typical increase in the amount of exploration dollars spent and in the number of mining claims staked. Significant job creation by the mineral exploration industry is expected, both immediately upon release of this project's data, and for many years into the future.
- The true economic benefits in terms of future job generation or revenue for the State of this project are impossible to predict. Although mineral development is a high-risk enterprise, there is a good probability that one or more of the prospects identified with the help of data generated by this project will become major mines and thus return the amount of the State's data generation investment a hundred fold.
- Encourages exploration for REEs, which is the first step in reestablishment of the U.S REE supply chain, which may lead to creation of additional domestic jobs in the mining, refining, alloying, and technology manufacturing industries.
- Reduces U.S. vulnerability to disruptions in REE supply and enhances national security.

Identify How Project Meets Statutory/Constitutional Responsibilities

The Rare Earth Element Assessment Project is congruent with the statutorily mandated mission of the DGGS to: "Conduct geological and geophysical surveys to determine the potential of Alaskan land for production of metals, minerals, fuels, and geothermal resources...and...such other surveys and investigations as will advance the knowledge of the geology of the state" (AS 41.08.020). Conducting field work, and obtaining relevant geologic data on REEs in Alaska, will directly promote informed state management decisions, spur mineral industry exploration, and will advanced the state's knowledge of its geologic resources. This project will increase targets and results for Geological Development Strategy A2, Target 4 to make available new minerals-related geologic information.

Why is this Project Needed Now?:

Although REEs were mined in the U.S. as recently as 2001, currently the U.S. has no functional domestic REE supply chain (this includes the mining, refining, and alloying industries, and there is very limited capability for REE-related manufacturing). The U.S. is nearly 100 percent dependent on imports of REEs and REE-bearing manufactured goods, primarily from China, which controls the REE market. China began imposing REE-export quotas in 2006, and in the last half of 2010 cut its REE exports by 72 percent. China is rapidly building its high-technology industry to create domestic jobs, and is restricting export of REEs to reduce global competition and to leverage its supplies of REEs to

force companies to move to China to have access to REE supplies. China's future export policies are unpredictable, but they are expected to favor China's domestic interests, needs, and economic development. Additionally, the total expected production of REEs in China is expected to be insufficient for worldwide demand.

The U.S. must identify domestic sources for REEs in order to reduce the nation's vulnerability to disruptions in global supply. In 2010, U.S. House and Senate bills were introduced by U.S. Rep. Coffman and U.S. Sen. Murkowski, respectively, to encourage reestablishment of domestic REE industries. In support of this legislation, the Alaska Legislature passed House Resolution (HR16) urging Congress to advance development of new REE reserves in the U.S., and continued exploration for REE deposits in Alaska. Subsequently, U.S. Rep. Dahlkemper introduced U.S. House Bill H.R. 6160 entitled *Rare Earths and Critical Materials Revitalization Act of 2010.* On Sept. 29, 2010 the U.S. House approved this bill with overwhelming bipartisan support.

The DGGS Rare Earth Element Assessment project is needed now to address U.S. domestic needs for these critical elements, and to help Alaska with state land management decisions. It takes many years for the mineral industry to explore for, identify, investigate, permit, and develop mineral resources. Without new REE exploration and discoveries, the U.S. will not be able to reestablish its REE supply chain. The Rare Earth Element Assessment Project will provide information that will help encourage resource development and create Alaska jobs. This strategic and effective investment will aid in identifying REE mineral resources in Alaska, and likely expand an industry that annually contributes millions of dollars in direct revenue to the State and municipalities, and employs thousands of people statewide. This project is a cost-effective method for State government to increase knowledge that will aid the mining industry and enable state planning for resource development and land management. In order to make appropriate land-relinquishment decisions over the next few years, State land managers need to be aware of what REE resources are present on state-selected land to prevent relinquishment of potential revenue-generating lands that host REE deposits. Products from this project will allow the state to look beyond the short-term rise and fall of commodity markets in formulating mineral-resource policies and in responding to related issues, such as land trades, corridor development, and area plans.

Impacts of Not Doing This Project

The present lack of geologic knowledge about REEs in Alaska is a formidable impediment to long-range planning for both the mineral industry and the state. The lack of REE-resource knowledge discourages private-sector investment in Alaska, and instead favors capital allocation to other areas of the world where comprehensive REE assessments exist or are being actively generated. Major mining companies rely on government-supplied exploration-scale (1:63,360) geological, geophysical, and geochemical maps to design and implement their programs. Mining companies expect at least this level of effort from any government that seriously desires mineral industry investment. If the industry invests its exploration dollars elsewhere, the state will lose out on job generation and future state revenues from mine production.

The State of Alaska will continue to be unaware of what REE resources it may possess, leading to poor land management decisions. For example, as the state makes relinquishment decisions in the next few years regarding its land over selections, the state may unknowingly relinquish potential revenue-generating land that hosts REE deposits.

The U.S. will remain vulnerable to disruptions in the supply chain for and availability of REEs. The expected REE production from China (and other international sources) is predicted to be insufficient for worldwide demand.

Specific Spending Detail:

LINE ITEM	DOLLAR AMOUNT	DESCRIPTION
Personal Services	$ 231,400	Partial support for existing DGGS personnel and one non-permanent employee.
Travel	$ 15,230	Travel for field work.
Services	$ 242,370	Field work and contract services; Helicopter, lodging, truck rental, scientific analyses, misc. contracts
Commodities	$ 9,000	Helicopter fuel, field and office supplies, maps and literature data, digital orthorectified air photos

State Match Required:

☒ **NO**
☐ **YES**

Project Support:

Agencies and groups known, or considered likely to support this project, include:

- Mineral companies interested in exploration opportunities for REEs in Alaska will welcome the data and interpretive results generated through this project.
- The Alaska Minerals Commission and the Alaska Miners Association support this project.
- Federal agencies (such as the U.S. Geological Survey) compiling mineral-resource data, and conducting national strategic- and critical-mineral assessments, will welcome the creation of baseline geologic data for Alaska.
- The U.S. Department of Defense will be better able to assess its REE-related vulnerability and potential sources.
- Various regional native corporations hold surface and subsurface rights to large land positions in their respective regions of the state, and would benefit from improved understanding of the REE-resource potential of their lands.
- University of Alaska-Fairbanks faculty and students benefit from state-administered investigations of this type, which create opportunities for academic research and educational opportunities.
- Various agencies within the Department of Natural Resources will support the project as it will provide them with information needed to make wise land-management and on-going land relinquishment decisions.
- Local communities and private businesses statewide will benefit from the direct purchase of contract services to support this project. Future purchases and local employment opportunities throughout Alaska are expected, as mineral exploration companies utilize the data and interpretive results generated through this project.

Project Opposition:

None anticipated.