§ 19067. Critical minerals mining research and development

(a) Critical minerals mining research and development at the Foundation

(1) In general

In order to support supply chain resiliency, the Director shall make awards, on a competitive basis, to institutions of higher education or nonprofit organizations (or consortia of such institutions or organizations) to support basic research that will accelerate innovation to advance critical minerals mining strategies and technologies for the purpose of making better use of domestic resources and eliminating national reliance on minerals and mineral materials that are subject to supply disruptions.

(2) Use of funds

Activities funded by an award under this section may include—

(A) advancing mining research and development activities to develop new mapping and mining technologies and techniques, including advanced critical mineral extraction and production, separation, alloying, or processing techniques and technologies that can decrease energy intensity to improve existing or to develop new supply chains of critical minerals, and to yield more efficient, economical, and environmentally benign mining practices;

(B) advancing critical mineral processing research activities to improve separation, alloying, manufacturing, or recycling techniques and technologies that can decrease the energy intensity, waste, potential environmental impact, and costs of those activities;

(C) conducting long-term earth observation of reclaimed mine sites, including the study of the evolution of microbial diversity at such sites;

(D) examining the application of artificial intelligence for geological exploration of critical minerals, including what size and diversity of data sets would be required;

(E) examining the application of machine learning for detection and sorting of critical minerals, including what size and diversity of data sets would be required;

(F) conducting detailed isotope studies of critical minerals and the development of more refined geologic models;

(G) improved understanding of the geological and geochemical processes through which critical minerals form and are concentrated into economically viable deposits; or

(H) providing training and research opportunities to undergraduate and graduate students to prepare the next generation of mining engineers and researchers.

(3) Existing programs

The Director shall ensure awards made under this subsection are complementary and not duplicative of existing programs across the Foundation and Federal Government.

(b) Critical Materials Interagency Subcommittee

(1) In general

The Critical Minerals Subcommittee of the National Science and Technology Council (referred to in this section as the ''Subcommittee''), shall coordinate Federal science and technology efforts to ensure secure, reliable, and environmentally sustainable supplies of critical materials to the United States.

(2) Purposes

The purposes of the Subcommittee shall be—

(A) to advise and assist the National Science and Technology Council, including the Committee on Homeland and National Security, on United States policies, procedures, and plans as it relates to critical materials, including—

(i) Federal research, development, and commercial application efforts to minimize the environmental impacts of methods for extractions, concentration, separation and purification of conventional, secondary, and unconventional sources of critical materials;

(ii) efficient use, substitution, and reuse of critical materials;

(iii) the critical materials workforce of the United States; and

(iv) United States private industry investments in innovation and technology transfer from federally funded science and technology;

(B) to identify emerging opportunities, stimulate international cooperation, and foster the development of secure and reliable supply chains of critical materials and establish scenario modeling systems for supply problems of critical materials and energy critical materials;

(C) to ensure the transparency of information and data related to critical materials; and

(D) to provide recommendations on coordination and collaboration among the research, development, and deployment programs and activities of Federal agencies to promote a secure and reliable supply of critical materials necessary to maintain national security, economic well-being, public health, and industrial production.

(3) Responsibilities

In carrying out this subsection, the Subcommittee may, taking into account the findings and recommendations of relevant advisory committees—

(A) provide recommendations on how Federal agencies may improve the topographic, geologic, and geophysical mapping of the United States and improve the discoverability, accessibility, and usability of the resulting and existing data, to the extent permitted by law and subject to appropriate limitation for purposes of privacy and security;

(B) assess the progress towards developing critical materials recycling and reprocessing technologies, and technological alternatives to critical materials;

(C) establish a mechanism for the coordination and evaluation of Federal programs

with critical material needs, including Federal programs involving research and development, in a manner that complements related efforts carried out by the private sector and other domestic and international agencies and organizations;

(D) examine options for accessing and developing critical materials through investment and trade with our allies and partners and provide recommendations;

(E) evaluate and provide recommendations to incentivize the development and use of advances in science and technology in the private industry;

(F) assess the need for and make recommendations to address the challenges the United States critical materials supply chain workforce faces, including aging and retiring personnel and faculty, and foreign competition for United States talent;

(G) develop, and update as necessary, a strategic plan to guide Federal programs and activities to enhance scientific and technical capabilities across critical material supply chains, including a roadmap that identifies key research and development needs and coordinates on-going activities for source diversification, more efficient use, recycling, and substitution for critical materials; as well as cross-cutting mining science, data science techniques, materials science, manufacturing science and engineering, computational modeling, and environmental health and safety research and development;

(H) assess the need for, and make recommendations concerning, the availability and adequacy of the supply of technically trained personnel necessary for critical materials research, development, extraction, and industrial production, with a particular focus on the problem of attracting and maintaining high-quality professionals for maintaining an adequate supply of energy critical materials; and

(I) report to the appropriate Congressional committees on activities and findings under this section.

(c) Definitions of critical mineral and critical mineral or metal

In this section, the terms ''critical mineral'' and ''critical mineral or metal'' include any host mineral of a critical mineral (within the meaning of those terms in section 1606 of title 30).

(Pub. L. 117–167, div. B, title III, § 10359, Aug. 9, 2022, 136 Stat. 1564.)

§ 19068. Advancing IoT for Precision Agriculture Capabilities Act

(a) Short title

This section may be cited as the ''Advancing IoT for Precision Agriculture Act of 2021''.

(b) Purpose

It is the purpose of this section to promote scientific research and development opportunities for connected technologies that advance precision agriculture capabilities.

(c) Foundation directive on agricultural sensor research

In making awards under the sensor systems and networked systems programs of the Foundation, the Director shall include in consideration of portfolio balance research and development on sensor connectivity in environments of intermittent connectivity and intermittent computation—

(1) to improve the reliable use of advance sensing systems in rural and agricultural areas; and

(2) that considers—

(A) direct gateway access for locally stored data;

(B) attenuation of signal transmission;

(C) loss of signal transmission; and

(D) at-scale performance for wireless power.

(d) Omitted

(e) GAO review

Not later than 18 months after August 9, 2022, the Comptroller General of the United States shall provide—

(1) a technology assessment of precision agriculture technologies, such as the existing use of—

(A) sensors, scanners, radio-frequency identification, and related technologies that can monitor soil properties, irrigation conditions, and plant physiology;

(B) sensors, scanners, radio-frequency identification, and related technologies that can monitor livestock activity and health;

(C) network connectivity and wireless communications that can securely support digital agriculture technologies in rural and remote areas;

(D) aerial imagery generated by satellites or unmanned aerial vehicles;

(E) ground-based robotics;

(F) control systems design and connectivity, such as smart irrigation control systems;

(G) Global Positioning System-based applications; and

(H) data management software and advanced analytics that can assist decision making and improve agricultural outcomes; and

(2) a review of Federal programs that provide support for precision agriculture research, development, adoption, education, or training, in existence on August 9, 2022.

(Pub. L. 117–167, div. B, title III, § 10361, Aug. 9, 2022, 136 Stat. 1567.)

Editorial Notes

CODIFICATION

Section is comprised of section 10361 of Pub. L. 117–167. Subsec. (d) of section 10361 of Pub. L. 117–167 amended section 1862i of this title.

§ 19069. Astronomy and satellite constellations

The Director shall support research into and the design, development, and testing of mitigation measures to address the potential impact of