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**COLORADO HIGHER EDUCATION COMPETITIVE RESEARCH AUTHORITY**

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University of Colorado:Colorado State University:University of Northern Colorado:Colorado Schools of Mines:State of Colorado

March 10, 2015

Honorable Members of the House and Senate Education Committees  
State Capitol  
200 East Colfax  
Denver, CO 80203

Re: Annual Report of the Colorado Higher Education Competitive Research Authority  
(CHECRA)

Dear Senators and Representatives:

Colorado Revised Statute §23-19.7-103(3) requires the Colorado Higher Education Competitive Research Authority (CHECRA) to report annually to the Education Committees of the Colorado House of Representatives and Senate on research projects funded by the CHECRA in the previous calendar year. This letter reports on calendar year 2014.

The CHECRA was created to provide a source of matching funds for National Science Foundation (NSF) and other federal grants that require a state match. CHECRA funding has helped to bring significant research dollars to Colorado. The following projects received CHECRA funding in 2014:

1. The National Science Foundation (NSF) awarded a Materials Research Science and Engineering Center (MRSEC) grant in 2008 to the Colorado School of Mines. The Center is focused on investigating emerging renewable energy materials, such as the next generation of solar panels and fuel cells. The CHECRA pledged \$400,000 per year for 6 years to this Center and made the final payment in 2014.
2. In 2014, the University of Colorado received the good news that the NSF had awarded a grant to continue and expand the Soft Materials Research Center into a full MRSEC. This Center focuses on liquid crystal frontiers, an area where the University of Colorado is among the leading authorities, and work related to DNA nano-science. The CHECRA has pledged \$400,000 per year for six years and made the first payment in 2014.
3. Colorado State University's Extreme Ultraviolet Engineering Research Center is a world leader in the generation and application of extreme ultraviolet light to challenging scientific

and industrial problems. The CHECRA made the final of four payments of \$400,000 each in 2014.

4. The Colorado School of Mines Re-inventing the Nation's Urban Water Infrastructure (ReNEWIt) Engineering Research Center received the fourth of five payments of \$400,000 from the Authority in 2014. With this grant, the School of Mines joins leading universities in tackling the acute water problems and needed infrastructure changes facing the West.
5. The Center for Multiscale Modeling of Atmospheric Processes (CMMAP) at Colorado State University received the fourth of five payments of \$150,000 from the Authority in 2014. CMMAP is a partnership of research and educational institutions, government agencies, and industry, and it focuses its research on improving the representation of cloud processes in climate models.
6. A research project at Colorado School of Mines called Water Quality and Supply Impacts from Climate-induced Insect Tree Mortality and Resource Management in the Rocky Mountain West received 75,000 in 2014. This five-year effort will determine potential water resource changes resulting from the mountain pine beetle epidemic.

Attachments A-F include detailed information on each of these projects. In addition to the millions of dollars in federal funding coming into the institutions and the state and the impressive scientific results achieved under the projects, all of the research centers funded by CHECRA have many additional positive benefits to Colorado. As you will read in the attached appendices, these benefits include support for graduate and undergraduate students, outreach to K-12 students and teachers, and economic development benefits from spin-off technologies and companies. Some highlights of these benefits include:

- The School of Mines renewable energy center offered a summer teacher training workshops for K-12 teachers in Adams County and Denver Public Schools, at which it trained over **40 teachers** to become proficient in delivering lessons on renewable energy topics that fit the state-mandated curriculum and are age appropriate for a specific grade. The Center also hosted **20 dyslexic students from grades 3-6** to enhance their proficiency in science and engineering concepts.
- The Mines Center also ran a research experiences for undergraduates program for **20 undergraduate students** from around the country. This program is an excellent recruiting tool to **attract the best and the brightest future scientist and engineers** to finish their educations in Colorado and hopefully remain here to bolster the scientific workforce.
- In 2014 alone, the Extreme Ultra Violet Engineering Research Center at Colorado State University (in collaboration with the University of Colorado) supported **75 graduate and undergraduate students and faculty, reached approximately 500 K-12 students and 25 teachers** with science workshops and demonstrations, and provided summer research experiences for high school teachers.

- The CMMAP provided an intensive week-long training to **36 K-12 teachers** with its Teaching Weather and Climate Summer Teacher Course and reached over **20,000 K-12 students** and teachers through the activities of the Little Shop of Physics in more than 40 schools visits and workshops.
- The Liquid Crystal Materials Research Center at the University of Colorado Boulder delivered **90 classes** to **3,400 Colorado K-12 children**. The Center *Graduate Training Program in Liquid Crystal Science and Technology* received funding from the Department of Education *Graduate Assistantships in Areas of National Need* program for 5 additional graduate fellowships.
- The project at the School of Mines examining the impact of the pine beetle on watersheds in the Rocky Mountain west held three **math & science events at local elementary schools** at which they taught students the elements of the water cycle and how water and contaminants move through the natural environment.
- The School of Mines started a new project under its ReNUWIt award **with the City and County of Denver** studying the technical, economic and legal feasibility of beneficial stormwater use in a west Denver neighborhood. The goal of this project is to collect stormwater in a centralized facility, treat the stormwater for better water quality using innovative ReNUWIt technologies before discharging into the South Platte River system, and use the storm-water for urban irrigation on City Parks and Recreation facilities (that would also serve as a public education facility).

During calendar year 2014, the Authority received two quarterly distributions from the waste tire recycling fees totaling \$191,152. As of July 1, 2014, the CHECRA no longer receives funding from this source. The Authority also received a single distribution of Limited Gaming Funds of \$2.1 million in 2014. Interest earnings on those funds totaled \$13,380, for a total income of \$2,304,532 in 2014. Disbursements in 2014 totaled 1,908,250. Please contact me if you have any questions.

Sincerely yours,



Lt. Gov. Joseph A. Garcia  
Chair

Attachments: Appendix A: School of Mines Renewable Energy MRSEC  
Appendix B: University of Colorado MRSEC  
Appendix C: Colorado State University Extreme Ultraviolet  
Appendix D: School of Mines Reinventing the Nation's Urban Water  
Infrastructure  
Appendix E: Colorado State University CMMAP