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Submitted to the House Committee on Appropriations
Subcommittee on Commerce, Justice, Science, and Related Agencies
April 14, 2010

Mr. Chairman and Members of the Subcommittee, my name is Mridul Gautam and I am the Interim Associate Vice President for Research and Economic Development at West Virginia University. I also am the Robert C. Byrd Professor of Mechanical & Aerospace Engineering at West Virginia University. Thank you for the opportunity to testify today regarding the National Science Foundation's (NSF) and the National Aeronautics and Space Administration's (NASA) Experimental Program to Stimulate Competitive Research (EPSCoR). For Fiscal Year 2011, we respectfully request \$170.0 million for the NSF EPSCoR and \$25.0 million for the NASA EPSCoR programs.

EPSCoR is the mechanism at NSF and NASA for addressing the geographic imbalance in research funding and for creating a truly national research community in all states. Although EPSCoR states have 20% of the population, and about 25% of its doctoral research universities, they only receive about 10% of the allocations for research.

To be eligible for the NSF EPSCoR program, a state must fall below three-fourths of one percent (0.75%) of NSF funding calculated on a three-year basis. Individual states currently range from about 0.10 percent to 0.73 percent of NSF funding on an annual basis. Today, there are 27 states and 2 jurisdictions participating in EPSCoR. To give some perspective, in FY 2000, there were 18 states and Puerto Rico identified as EPSCoR states.

EPSCoR is an essential mechanism for ensuring that all states participate in NSF and NASA research activities and in building a national research community and scientific workforce. Such a community and workforce are essential to our nation's competitiveness and to the economies of the individual states.

What does EPSCoR do for our states? It helps us develop the research infrastructure (both human and physical) that allows us to better educate our students, to address research issues of particular importance to our states and to become more competitive for research grants and opportunities both within NSF and across the federal government. Our states are making great strides in submitting and winning more research awards from federal and private sources, securing major engineering and material sciences awards, and attracting new faculty and students who are drawn by the quality of life in our states and by the quality of research and education offerings.

EPSCoR jurisdictions prepare a major portion of the nation's future "high tech" workforce by educating thousands of scientists and engineers each year. These scientists and engineers go on to work for many of our nation's high tech firms, including Boeing and Northrop Grumman. And, several of them have ended up as Directors or Deputy Directors of the NSF. We have many

Truman and Goldwater Scholars, are among the major energy-producing states, and are in the forefront of ocean and coastal research, fossil energy research, climate change and many other areas that are considered vital to our nation's future.

We are very grateful for the support the Subcommittee has given EPSCoR over the past years. However, we believe that we must again seek your help in order to cover the additional states that have been added to the EPSCoR program, to continue progress in the states that participate and to integrate our states more fully into NSF research activities, particularly as they relate to centers development.

NSF has a statutory function "to strengthen research and education in science and engineering throughout the United States and to avoid undue concentration of such research and education." It has sought to accomplish this goal and develop infrastructure through the EPSCoR mechanisms (a) that directly support research infrastructure development and scientific workforce preparation and (b) that promote greater participation by the EPSCoR community in regular NSF research programs. We believe that both these approaches need to be strengthened and expanded. The budget should be strengthened not only to accommodate new states, but also to expand efforts in currently eligible states and to promote more integration into such NSF programs as IGERTS, MRSECs, ERCs, S&Ts, and new initiatives. The \$170.0 million the EPSCoR states are seeking this year will help cover the costs associated with the inclusion of ten additional states in the program since 2000 (two states became eligible in 2009), expanded research infrastructure development and additional EPSCoR co-funding with other NSF programs. In FY 2000, there were 19 EPSCoR jurisdictions and the NSF Research and Related Activities (RAA) budget was approximately \$3 billion. Co-funding was about \$25 million. In FY 2011, there are 29 EPSCoR jurisdictions, the NSF RRA budget is approximately \$6 billion and the co-funding projection is only \$41 million. This is particularly troublesome at a time when there should be increasing opportunities throughout NSF. Finally, there are a number of NSF mechanisms, such as EAGER awards, that could benefit the EPSCoR states.

Let me talk about West Virginia. West Virginia is one of the five original EPSCoR states, and has benefited greatly from its participation in this important program.

Investment in West Virginia by NSF EPSCoR has yielded success in several ways. Research Infrastructure Improvement (RII) grants have brought strong, young faculty and modern equipment to our campuses. These have led to increased competitiveness with more than a doubling of competitive federal awards from 2005 to today.

The RIIs also have catalyzed investment from the state of West Virginia. Since 2004, \$80M has been invested in our science and technology enterprise through the state's Research Challenge Fund, Eminent Scholars Fund and the Research Trust Fund. These funds and West Virginia EPSCoR are managed by the Division of Science Research at the Higher Education Policy Commission and are strategically invested in scientists and engineers and their research.

For example, Research Challenge Grants support the creation of research centers and foster economic development and workforce advancement and have resulted in a substantial return on investment. The first six scientific research projects funded through this grant program have

leveraged external funding of more than \$20 million and have resulted in five startup companies with five-year projected revenues of \$124 million. Two of the startup companies—Protea Biosciences LLC in Morgantown and Vandalia Research Inc. in Huntington—estimate they will be hiring 295 additional employees in the next five years. In addition, two university research centers with industry partners were formed and one production facility is under development.

In the most recent round of Research Challenge Grants, two young astrophysicists at West Virginia University are building an exemplary program and have a number of important discoveries that have been published in *Science* and *Nature*. Another project that is focusing on protection of our nation's infrastructure has been featured on National Geographic television. Two faculty members at Marshall University who were hired by the 2001 RII are the leaders of another of these grants and created the Cell Development and Differentiation Center at Marshall. One of these faculty members recently discovered that acetaminophen may help prevent age-associated muscle loss and other conditions, and his work has been covered by a number of news outlets.

The Eminent Scholars Fund and Research Trust Fund have allowed West Virginia University and Marshall University to hire successful scientists with strong competitive funding histories. These endowed professors provide leadership to advance research and development at our research universities. Even in these challenging economic times, the state match for private donations has proven to be an effective tool for university fundraising. The \$10M Eminent Scholars Fund has been totally matched by West Virginia University and Marshall University. To date, approximately \$7M has been donated and matched by another \$7M from the Research Trust Fund.

The successes fueled by federal and state support help policymakers justify a continued investment in research. None of this significant progress in our state would have been possible without the initial support received through NSF's EPSCoR program. Without question, the Track 1 RII grants were the catalyst for these recent commitments to improving our state's research capacity and, ultimately, ensuring a brighter future for all West Virginians.

For NASA EPSCoR in FY 2011, we are requesting an appropriation of \$25.0 million. As in the case of EPSCoR at NSF, NASA EPSCoR is designed to develop the capacity of those states that traditionally have had limited amounts of NASA R&D funding. The program helps our states become more competitive in research areas associated with the NASA centers and enterprises. This laudable goal is accomplished through two primary funding mechanisms: Research Infrastructure Development Awards (RID), and Research Implementation Awards (Implementation).

Implementation grants, which are competitively awarded research grants, provide up to \$750,000 spread over a 3-year period (i.e., \$250,000 per year). If an award is made, the entire \$750,000 is obligated in the first year. Thus, the amount of funding available in any single year determines the number of research awards that can be made. At the same time, a certain number of awards will expire each year, ending their three-year timeframe. States have between 1 and 4 awards, depending upon the competition. Most states believe they could manage between 2 and 5 awards.

RID funding provides \$125,000 to each participating state to develop programs, reach out to faculty and students and initiate collaborations with NASA centers and facilities.

In order to retain the current award levels and provide the \$125,000, NASA EPSCoR needs at least \$25 million. To grow the number of implementation (research awards) additional funding would be required.

NASA EPSCoR is engaged in significant research throughout the states, research that is resulting in enhanced research capacity and contributing to the NASA mission. The projects are having an impact on technological developments in this country. A few examples include: (1) Real-time Wireless Shape Monitoring of Deployable Space Structures in Maine; (2) The Nevada Astrophysics project and the Exploring Planetary Surfaces: Earth, Moon, Mars project; and (3) The Neutron Detectors for Detecting Illicit Nuclear Material project, and the Safeguards Against Reverse Engineering of Nation's Critical Technologies project in Louisiana.

Additionally, in the 3-year period (2007-09), support from NASA West Virginia EPSCoR has resulted in eight (8) new successful grants outside NASA, worth more than \$800,000. At least 27 researchers from various universities and colleges in West Virginia have received competitive grants from NASA West Virginia EPSCoR. They have supported 33 college students resulting in 16 new collaborative efforts with other entities (federal, state, private industry), and 41 peer-reviewed publications and presentations at technical conferences.

West Virginia research supported by NASA EPSCoR has resulted in three approved patents and six that are pending. Two of the accepted patents are: (1) Drs. Huebsch and Cairns (West Virginia University): "Stimulus Responsive Nanoparticles" and " Dynamic Roughness Using Stimulus Responsive Nanoparticles"; (2) Dr. J. Valluri (Marshall University): "Microgravity Enhanced Stem Cell Selection"; and (3) Research Seed Grants and a Joint University-Industry Research grant enabled Dr. Hongwei Yu of Marshall University to co-found Progenesis Technologies, LLC.

Our nation needs all our research capabilities and all our talent. We are competing with countries with three and four times our population, several with young populations seeking new heights in science and technical careers. Every one of our states, our students and our citizens has important contributions to make to the nation's competitiveness. EPSCoR enables eligible states to advance in vital science and research areas.

I want to thank you for the opportunity to address the Subcommittee today.

Thank you.