TOPIC: TECHNOLOGY ADVANCEMENT GRANTS

PREPARED BY: JOHN KARAKOULAKIS

I. SUMMARY

The Colorado Commission on Higher Education's Technology Advancement Grant (TAG) is intended to fund research, development or technology transfer to develop or implement waste diversion, or recycling strategies, including the use of waste tires. As well as other environmental research, development or technology transfer for materials or products of any kind. The funds are intended to help spur new innovation within these fields by utilizing Colorado's institutions of higher education and partnerships with the private sector. Funds are made available for the TAG program from the state's advance technology fund, which is financed by the waste tire recycling fee.

At the CCHE's October 2006 meeting, the Commission approved staff's policy, priorities, criteria, and request for proposals for the TAG program. Following approval, staff issued the request for proposals for the TAG program. Proposals were due by December 5, 2006. A total of twenty proposals were received totaling $1,949,676.00 in funding requests. All of the proposals were reviewed separately three different times according to the same criteria. Staff from CCHE and the Colorado Department of Public Health and Environment reviewed each proposal once and the third review was based on field specific knowledge depending on the focus of the proposal from either, the Office of Economic Development, the Governor's Office of Policy and Initiatives, or various out of state university professors recommended by the National Science Foundation.

Each review evaluated proposals based on overall quality, technical innovation, viable results, ability to complete the project, benefits, and economic impact. Reviewers were asked to give an overall rating of each proposal based on the following scale: Excellent, Very Good, Good, Fair, or Poor.

II. STAFF ANALYSIS

The following are summaries of the twenty proposals that were received during the request for proposal process.

Proposal Number: 12050601
Title: "Viability of Engineered Fuel Briquettes From Biomass and Power Plant Waste Streams"
Principal Investigator: R. Malhotra

Organization: ICAST
Funding Request: $58,000

Proposal Summary: Proposes to evaluate the viability of commercially manufacturing engineered fuel briquettes composed of 40% fly ash and 60% biomass waste. Project is expected to produce economic, environmental and community benefits. Briquettes have already been produced in the laboratory based on prior research conducted over three years from a partnership between iCAST and CSU-P, CU Boulder and CSU Fort Collins.

Proposal Number: 12050602
Title: "University/Industry Cooperative Membrane Research"
Principal Investigator: A. Greenberg
Organization: CU-Boulder
Funding Request: $197,074

Proposal Summary: The Membrane Applied Science and Technology (MAST) Center and CU Boulder proposes five separate projects on membrane research: polymerization techniques to fabricate high capacity membranes; membrane processes for fractionation and recovery of lignins; micro sensors for detection of biofouling; separation of divalent and trivalent copper and iron species in liquid solutions; and organic carbon components.

Proposal Number: 12050603
Title: "Creating Engineered Structural Building Components from Oriented Strand Board that has been Diverted from Landfill Waste Stream"
Principal Investigator: W. Schmelzer
Organization: Green Giant LLC
Funding Request: $86,600

Proposal Summary: Proposes to confirm that scrap oriented strand board (OSB) can be laminated into thicker boards and beams that are suitable for replacing new lumber in residential building. Commercial success in reusing OSB would divert tens of thousands of tons of waste from the waste stream as well as reduce the need for new lumber.

Proposal Number: 12050604
Title: "Green Water Reuse Investigation to Create New Colorado Jobs, Develop New Technologies, and Conserve Colorado Water"
Principal Investigator: J. Flobeck
Organization: Aqua Prima
Funding Request: $98,000

Proposal Summary: Proposes to investigate individual county health requirements for green and gray water usage, and then analyze these requirements and develop standards that all counties will agree on. Then take the company's existing green water device and

adapt it to the standards agreed on by counties and formulate a business plan to manufacture and market the devices across the West.

Proposal Number: 12050605
Title: "The Colorado Roadmap to Construction and Demolition Recycling and Reuse"
Principal Investigator: T. Plant
Organization: ReSource Conservation
Funding Request: $65,175

Proposal Summary: Proposes to comprehensively analyze the construction and demolition waste stream and determine the most effective ways to manage and maximize diversion of that waste stream from the landfill for communities throughout the state. Project will examine model legislation and innovative procedures gathered from around the country and the world as well as potential market opportunities for waste products.

Proposal Number: 12050606
Title: "Development and Marketing of In-Situ Soil Mixing for Cleanup of Contaminated Soils and Reuse of Contaminated Lands"
Principal Investigator: T. Sale
Organization: CSU
Funding Request: $148,440

Proposal Summary: The objective of this project is to broaden the scope and realize the full commercial potential of two environmental technology patents donated by DuPont to CSU, covering in situ admixing of waste zero valent iron and stabilizing agents for treatment of chlorinated solvents in subsurface settings. The net benefit of this technology is a dramatic reduction in future releases of contaminants to down-gradient groundwater.

Proposal Number: 12050607
Title: Web-Based Image Processing System for Environmental Resource management
Principal Investigator: L. Johnson
Organization: CU-Denver
Funding Request: $148,945

Proposal Summary: Proposes to use web based image processing for utilization in enterprise spatial decision support systems. Project will harness cutting edge satellite and data processing technology to provide distributed image processing to various organizations for environmental monitoring and removal of waste.

Proposal Number: 12050608
Title: "Construction Site Recycling; Model for Efficient Landfill Diversion and Industry Growth"
Principal Investigator: L. Skumatz

Organization: Econservation
Funding Request: $24,790

Proposal Summary: Proposes to demonstrate successful recycling programs for the construction industry and communicate this information to private sector construction companies. The project will examine models of successful recycling programs, establish a pilot program and conclude with a manual of best practices for construction site managers and an analysis of future opportunities.

Proposal Number: 12050609
Title: "Development of High Durability Rubber-Modified Concrete"
Principal Investigator: Y. Xi
Organization: CU-Boulder
Funding Request: $50,000

Proposal Summary: Proposes to use crumb rubber in concrete to enhance the ductility and toughness of concrete and also reduce disposal of waste tires. The project will research rubber modified concrete to find the optimal mix and proper coupling agents to improve the long term durability which could be used later on various projects such as roadways and bridges.

Proposal Number: 12050610
Title: "Three Waste-to Value Technologies for Sustainable Urban Infrastructure in Colorado"
Principal Investigator: A. Ramaswami
Organization: CU- Denver
Funding Request: $155,000

Proposal Summary: Proposes three waste-to value technologies for urban sustainability in Colorado cities; high performance green concrete; zero waste and negative biodiesel processes; and converting organic municipal waste to energy. If the technologies were adopted they would make Colorado a leader in waste diversion and sustainability.

Proposal Number:12050611
Title: "Promoting Rubberized Asphalt and Other Scrap Tire Products in Colorado"
Principal Investigator: R. Amme
Organization: DU
Funding Request: $110,958

Proposal Summary: Proposes laboratory and field efforts relating to rubberized asphalt. The project will provide technical support for additional Terminal Blend rubberized asphalt as it is used in paving projects by monitoring roadway noise reduction and skid

resistance. The project will also attempt to promote new asphalt rubber chip seal maintenance projects among C-DOT entities.

Proposal Number: 12050612
Title: "Development of an Inventory & User Matching Database to Support Colorado Recycling"
Principal Investigator: M. Griek
Organization: Colorado Assoc. of Recyclers
Funding Request: $70,328

Proposal Summary: Proposes to develop and implement a system to collect, manage, and share baseline data on sources of recycled materials and potential users of these materials within the Colorado business community. The project will obtain tonnage of diverted waste materials that were processed and brokered in 2006 in the state and the tonnage that was exported creating the most complete record of the sources and uses of the state's recyclable commodities.

Proposal Number: 12050613
Title: "Gap Analysis, Best Practices "Technologies" and Technology Transfer for Residential and Commercial Waste Diversion in the State of Colorado"
Principal Investigator: L. Skumatz
Organization: Econservation
Funding Request: $46,830

Proposal Summary: Proposes to gather technical information on programs, tonnage, and demographics to identify current waste diversion levels, assess gaps in service, and analyze best practice programs and policy technologies within and outside the state. The project will also provide a practical toolkit for environmental or recycling coordinators to facilitate technology transfer on best practices.

Proposal Number: 12050614
Title: "Development of a Near Real-Time Technique for the Measurement of Carbonyl Compounds in the Atmosphere"
Principal Investigator: L. Anderson
Organization: CU-Denver
Funding Request: $65,161

Proposal Summary: Proposes to design and construct a laboratory prototype for an automated, continuous system for sampling and analyzing carbonyl compounds in the ambient air. The goal is to develop and test a near real-time system that is capable of sub ppb detection of a broad series of carbonyl compounds. It is intended that this system will be an economically viable option as a replacement for cartridge sampling and laboratory analysis systems that are currently used.

Proposal Number: 12050615
Title: "Low Maintenance, Self-Cleaning Membranes for Water Reuse"
Principal Investigator: R. Wickramasinghe
Organization: CSU
Funding Request: $92,241

Proposal Summary: Proposes a one year proof of principle research and development project which will result in the development of new low maintenance, self-cleaning nano-filtration and reverse osmosis membranes for water treatment. The project would focus on wastewater and water co-produced during oil and gas exploration.

Proposal Number: 12050616
Title: "A Biological Assessment Tool for Metal Toxicity – Ensuring Colorado's Environmental Health"
Principal Investigator: T. Roane
Organization: CU-Denver
Funding Request: $65,999

Proposal Summary: Proposes developing a bacterial indicator for environmental cadmium toxicity. Specifically, the study will take a soil-borne bacterium and investigate it for use in sensing cadmium toxicity. The long-term goal of the research is to create a marketable biosensor for environmental quality indication.

Proposal Number: 12050617
Title: "Durable Roof Tiles from a Fly-Ash/Tire Composite: Testing and Manufacturing Toward a Sustainable World"
Principal Investigator: P. Heyliger
Organization: CSU
Funding Request: $113,126

Proposal Summary: Proposed project focuses on refining the development of "green composite roof tiles" consisting of structural composite combinations of fly ash, the by-product of coal combustion in power plants, and ground up used tires. The project will: refine composite mixtures to find the most durable tile; produce enough for a real life test against benchmark standards for concrete roof tiles; conduct cost analysis for various production scales; and create a marketing and overall commercial strategy.

Proposal Number: 12050618
Title: "Expansive Foundation Soils Stabilized with Waste Tire Rubber"
Principal Investigator: J. Carraro

Organization: CSU
Funding Request: $128,913

Proposal Summary: Proposes to carry out original basic research to evaluate and demonstrate the feasibility of using waste tire rubber to reduce the swell potential of local expansive foundation soils from Colorado.

Proposal Number: 12050619
Title: "Building an Environmentally Sound and Sustainable Infrastructure for Electronics Recycling in Colorado"
Principal Investigator: M. Griek
Organization: Colorado Assoc. of Recyclers
Funding Request: $75,513

Proposal Summary: Proposes to research Colorado's e-scrap industry in order to determine what business and technology investments will best help it grow. Research and activities will look at access, current environmental health and safety practices, estimate the number of potential jobs, determine best practices, and expand re-use opportunities to bridge technology gaps.

Proposal Number: 12050620
Title: "Optimizing the Effluent from the Vertical Tube Reactor for Agricultural Application"
Principal Investigator: J. McGrew
Organization: Applied Science
Funding Request: $148,601

Proposal Summary: Proposes to evaluate the environmental effect of direct field application of the reacted effluent from a Vertical Tube Reactor which employs air to oxidize the impurities in aqueous hog waste. The project will utilize a unique laboratory reactor to subject hog waste to different temperatures, pressures, and reaction times to produce different end products which will then be evaluated on plant growth in soil types found in Colorado.

IV. STAFF RECOMMENDATION

All reviews were not received by the deadline for publication of this briefing book so full recommendations for funding could not be included. Final recommendations for funding will be distributed at the Commission meeting. (See attachment)

STATUTORY AUTHORITY

Authorization for the expenditure of these funds is found in 23-1-106.5 (9) (b) C.R.S., as follows:

23-1-106.5. Duties and powers of the commission with regard to advanced technology - fund created. (9) (b) The commission shall expend moneys in the advanced technology fund to finance research, development, and technology transfer with regard to waste diversion and recycling strategies or environmental alternatives by providing research funding and technology transfer capital to individuals or public or private entities seeking to develop or implement waste diversion or recycling projects for materials or products of any kind, including, without limitation, strategies pertaining to waste tires, Including the use of waste tires for noise mitigation along state highways as prioritized by the Department of Transportation pursuant to section 43-2-402 (5) (b), C.R.S., or for environmental, research, development, and technology transfer programs in the state for materials and products of any kind. The commission shall adopt a policy for the expenditure of such moneys, which shall contain priorities and the criteria for providing research funding and technology transfer.