September 28, 2007

Ms. Karlene Fine
Executive Director
North Dakota Industrial Commission
State Capitol – Fourteenth Floor
600 East Boulevard Avenue
Bismarck, ND 58505

Dear Ms. Fine:

Subject: EERC Proposal No. 2008-0076 Entitled "Demonstration of Coal Combustion Products for Green Roadbuilding in Medora, North Dakota."

Enclosed please find an original and six copies of the subject proposal. The Energy & Environmental Research Center (EERC) is pleased to submit this proposal for consideration for funding through the North Dakota Industrial Commission (NDIC). Also enclosed is the $100 application fee.

If you have any questions, please contact me by telephone at (701) 777-5261 or by e-mail at dphassett@undeerc.org.

Sincerely,

Debra F. Pflughoeft-Hassett
Research Manager

DFPH/kal

Enclosures

c/enc: Jeff Burgess, NDIC

DEMONSTRATION OF COAL COMBUSTION PRODUCTS FOR GREEN ROADBUILDING IN MEDORA, NORTH DAKOTA

EERC Proposal No. 2008-0076

Submitted to:

Ms. Karlene Fine

North Dakota Industrial Commission
State Capitol – Fourteenth Floor
600 East Boulevard Avenue
Bismarck, ND 58505

Amount Requested: $125,000

Submitted by:

Debra F. Pflughoeft-Hassett
Bruce A. Dockter
Tera D. Buckley

Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
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Debra F. Pflughoeft-Hassett, Project Manager

Dr. Barry I. Milavetz, Associate VP for Research
Research Development and Compliance

September 2007

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DEMONSTRATION OF COAL COMBUSTION PRODUCTS FOR GREEN ROADBUILDING IN MEDORA, NORTH DAKOTA

ABSTRACT

North Dakota utilizes coal combustion products (CCPs) in a wide variety of construction and manufacturing applications and is a leader in the United States for its use of fly ash in concrete. The use of fly ash in concrete is one key use of CCPs that has been identified as environmentally sustainable because the replacement of cement with fly ash results in a reduction of CO_2 emissions related to the concrete produced. Environmentally sustainable or "green" construction technologies and products are currently being developed and demonstrated throughout the United States, including for roadbuilding. Green roadbuilding is an area where CCPs can contribute to efforts to preserve and protect the environment by aiding with storm water management, reducing the use of virgin materials, and aiding with conservation and protection of ecosystems.

The objectives of this project are to demonstrate environmentally sustainable (green) roadbuilding using multiple CCP utilization applications and, in the process, to educate North Dakota industry, state agencies, and the public about environmentally sustainable construction.

The proposed effort, to be conducted by the Energy & Environmental Research Center at the University of North Dakota, will demonstrate multiple CCP-based green roadbuilding technologies that are commercially available and many of which are currently approved for use in North Dakota. This project will apply these technologies in a single site to demonstrate that a North Dakota product, CCPs, can be effective in constructing durable roads that meet North Dakota transportation needs and are environmentally sustainable.

DEMONSTRATION OF COAL COMBUSTION PRODUCTS FOR GREEN ROADBUILDING AND CONSTRUCTION

PROJECT SUMMARY

A project to demonstrate environmentally sustainable ("green") roadbuilding using multiple coal combustion products (CCP) utilization applications is proposed. The effort will focus on identifying and applying commercial CCP-based green roadbuilding technologies that can be used effectively together to meet environmentally sustainable or green roadbuilding objectives: 1) watershed-driven storm water management, 2) reuse and recycling of materials, and 3) conservation and and protection of ecosystems.

The University of North Dakota's (UND's) Energy & Environmental Research Center (EERC) will work with project partners, the Medora Foundation and Great River Energy (GRE), to apply the identified green roadbuilding technologies at a site in Medora, North Dakota. Construction contractors will be provided information on the technologies to be applied, and the EERC will offer guidance and assistance during the construction process. The EERC will also communicate with and educate the North Dakota Department of Transportation (ND DOT), the Federal Highway Administration (FHWA), and the North Dakota Department of Health (NDDH) on the sustainable and performance aspects of the technologies selected and applied. The EERC will use existing information to develop a sustainability ranking of the project as compared to standard construction practices. Over the duration of the project, the EERC will work to bring contractors, state agency representatives, and other stakeholders to the site to view the construction process and the final product. Educational information will be available at the site so visitors to the site can learn about the project and green roadbuilding. The EERC will continue

to use the project site for educational efforts on the use of CCP-based green roadbuilding technologies.

PROJECT DESCRIPTION

Introduction

North Dakota is a leader for CCP utilization in the United States (1). As a result of concerted efforts by North Dakota utilities, CCP marketers, members of the North Dakota ready-mixed concrete and construction industries, and researchers, North Dakota utilizes CCPs in a wide variety of construction and manufacturing applications. The percentages of fly ash used in concrete in North Dakota both by ND DOT and commercial applications are among the highest in the United States. Additionally, North Dakota uses fly ash in the filling of underground mine voids to mitigate subsidence; for stabilization of soils in road construction, parking areas, and animal feedlots; and for other applications such as flowable fill and concrete products. These CCP utilization applications and others utilizing bottom ash and boiler slag are examples of environmental stewardship as defined by the U.S. Environmental Protection Agency (EPA): "the responsibility for environmental quality shared by all those whose actions affect the environment." EPA and other federal agencies play important roles in promoting environmental stewardship, and among EPA's current promotional efforts is a joint EPA–FHWA–industry effort called the Green Highways Partnership (GHP). The GHP has been working to advance sustainability or "greening" of highway construction, with a focus on storm water management, reuse and recycling, and conservation and ecosystem protection, as noted in Table 1.

Table 1. GHP Focus Areas and Examples of CCP Utilization Applications for Each Focus Area

GHP Focus Area	Examples of CCP Utilization Applications Addressing Issues in the GHP Focus Area
Watershed-Driven Storm Water Management	Pervious fly ash concrete to capture and store runoff, reduce need for deicing salts, reduce hydroplaning Bottom ash use in rain gardens to capture and store runoff and reduce erosion
Reuse and Recycling	Fly ash concrete Fly ash for soil stabilization Fly ash flowable fill for utility cuts, bridge abutments, and other infrastucture needs Fly ash use for full-depth in-place recycling of asphalt
Conservation and Ecosystem Protection	Bottom ash use in rain gardens to encourage growth of native vegetation Fly ash concrete bridges, culverts, tunnels or barriers for wildlife crossings

The current GHP efforts are focused in the EPA Mid-Atlantic Region 3, but the EERC proposes to demonstrate green roadbuilding technologies utilizing CCPs in order to showcase the use of multiple CCP utilization applications to improve the final road performance and to meet the objectives of the three areas identified by the GHP. Table 1 provides examples of roadbuilding technologies that utilize CCPs and address the GHP focus areas. Many of these CCP utilization application examples are currently approved for use in North Dakota, but it is proposed to demonstrate multiple CCP utilization applications in a single roadbuilding project that will provide a means of better understanding how to design roads that meet North Dakota transportation needs and are environmentally sustainable.

Objective

The primary objective of this effort is to demonstrate environmentally sustainable (green) roadbuilding using multiple CCP utilization applications. Supporting objectives are as follows:

- To familiarize North Dakota construction contractors with road construction techniques that utilize approved North Dakota CCPs in common construction applications. These applications will include CCP soil stabilization for roads and parking lots; fly ash flowable fill, and bottom ash for construction of storm water runoff controls, commonly called rain gardens.
- To provide an education opportunity for ND DOT personnel (state and county) to develop additional technical information to support and encourage the use of CCPs as green construction products.
- To provide a model CCP-based green roadbuilding project for North Dakota and surrounding states and demonstrate the environmental and economic advantages for promotional purposes.

Methodology

The EERC will work with the project partners, the Medora Foundation and GRE, and appropriate construction contractors and state agencies to accomplish the demonstration of multiple CCP-based roadbuilding technologies by performing the following tasks.

Task 1 – Select Green Roadbuilding Technologies

The Medora Foundation plans to construct a hotel in Medora, North Dakota, with an anticipated start date in 2008. The associated parking and driveway areas are appropriate for the demonstration of green roadbuilding technologies such as high-volume fly ash concrete, flowable fill, soil stabilization, pervious concrete or rain gardens for storm water control and

ecosystem protection, and other applications. Consultation with the Medora Foundation facilities staff and contractors will allow the specific requirements of the construction site and facilities to be evaluated in order to identify the best CCP-based green roadbuilding technologies to meet the needs of the hotel and the surrounding environment and to demonstrate the application of these technologies. The ND DOT, FHWA representatives, and the NDDH will also be contacted to gain insight and input on the site and the proposed green roadbuilding technologies to be demonstrated. It is proposed that at least four different CCP-based green roadbuilding technologies will be selected, addressing, at minimum, the GHP focus areas of storm water management and reuse and recycling of materials. It is also proposed to incorporate technologies of highest interest to the ND DOT where possible. A final list of CCP-based green roadbuilding technologies will be assembled for contractors.

Task 2 – Provide Technical Information on Green Roadbuilding Technologies

The focus of this project is to use commercial and proven technologies and demonstrate their sustainability for roadbuilding in North Dakota and the region, but some technologies that may be appropriate for the selected site may not have previously or commonly been used in North Dakota. It is anticipated that some of the CCP-based green roadbuilding technologies will be unfamiliar to the parties involved in the actual construction. To support the use of these technologies in this effort, the EERC will assemble appropriate documentation on technologies that are unfamiliar to the project contractors and representatives of state agencies. Authoritative sources will be used, including those available through the GHP, the FHWA Recycled Materials Resource Center (RMRC), the American Association of State Highway and Transportation Officials, and state DOTs and environmental departments. Information may also be sought from industry resources, including the American Coal Ash Association, the U.S. and North Dakota

Ready Mix & Concrete Products Associations, the American Concrete Pavement Association, the Asphalt Institute, and other trade associations as appropriate. The EERC will also draw information from other academic and research organizations including North Dakota State University's Upper Great Plains Transportation Institute (UGPTI), the Pennsylvania State University Center for Dirt and Gravel Road Studies, Texas A&M's Texas Transportation Institute, and the University of Wisconsin – Madison's Transportation Information Center. Information will be assembled and presented to contractors, ND DOT and NDDH representatives, and other interested parties in either written or oral formats.

The EERC will also provide information to representatives of the ND DOT, FHWA, and NDDH and work with them to ensure that the applications meet any applicable state requirements. One example of a state requirement is the submission of a project checklist for use of fly ash for soil stabilization.

Contractors and EERC researchers will plan for incorporation of the identified technologies into the project plan and a final cost evaluation will be performed.

Task 3 – Construction Planning

The construction team, including representatives of the ND DOT and NDDH where appropriate, will work with the EERC to design and plan the construction activities incorporating the CCP-based green building technologies. Logistics for acquiring CCPs or products containing CCPs will be developed in conjunction with GRE and CCP and product suppliers. Placement/construction activities will be discussed, and the EERC will provide input to the contractors for any applications or technologies for which experience is limited. The EERC will work with the contractors to ensure appropriate material or product sampling and testing are scheduled.

Task 4 – Construction Support

During the construction activities, the EERC will coordinate with the material suppliers and construction groups to ensure the selected CCP-based green roadbuilding technologies are appropriately scheduled and carried out. EERC research staff will be at the project site to field questions and facilitate troubleshooting for any technical issues that arise, especially those related to technologies that are relatively new to local contractors. The EERC research staff on site will also be available to assist with or provide guidance on materials or product sampling that are generally required for construction projects.

Task 5 – Project Review and Education Activities

The project review will be initiated during the accomplishment of Task 4 – Construction Support. During the construction activities, EERC staff will assist contractors in understanding how the CCP-based green roadbuilding technologies differ from standard construction practices, material-handling considerations, impressions of the final product, and ways of using the technologies relative to their experience.

EERC researchers will also collect and assemble information and data on the green roadbuilding technologies used in the demonstration so the sustainability of the project can be evaluated. As no ranking or rating system has been formally approved by any DOT or the FHWA, it is anticipated that a rating system such as that proposed by the University of Wisconsin, called “Green Roads” (http://pavementinteractive.org/index.php?title=Green_roads), will be used to determine the level of sustainability of this demonstration.

Education activities will focus first on the contractors involved in the project. As already noted in Task 2, the EERC will provide information to the contractors specific to the applications and technologies to be used at the demonstration site. State agencies will also be invited to

participate in any on-site education activities. Education opportunities are expected to continue after completion of the construction phase of the demonstration. The EERC anticipates developing a course or workshop with separate funding from EPA Region 8 for North Dakota and regional contractors and state agencies to learn about the green roadbuilding technologies employed.

Task 6 – Reporting

Reporting for this project will include quarterly reports over the duration of the project, a draft final report, and a final report.

Anticipated Results/Impact

The anticipated impact of this project is to increase the use of green roadbuilding technologies in North Dakota, especially those that incorporate CCPs. This is expected to be accomplished by providing education and experience to the contractors specifically involved in the demonstration project, by providing education to other contractors throughout North Dakota, by working with the ND DOT, FHWA, and NDDH to facilitate acceptance of the combined CCP-based technologies, and to develop interest in sustainable or green roadbuilding technologies by visitors to Medora. Education and promotional efforts will be used to make stakeholders and the general public aware of the demonstration and its implications for the environment.

STANDARDS OF SUCCESS

The standards on which the success of this project will be measured are:

1. The successful completion of at least four CCP-based green roadbuilding technologies in the construction of the proposed parking and driving areas at the site in Medora,

North Dakota. The project will be summarized for inclusion in the C2P2 and GHP case studies, so a wider audience becomes aware of the demonstration.

2. The preparation and dissemination of information on technologies or applications that have not previously been used in North Dakota or by the contractors for the project.
3. The determination of the sustainability of the project based on existing rating systems. The rating will be compared to the rating of the project as it would have been performed using standard applications/technologies. This information will be incorporated into reports and shared with contractors and DOT representatives to facilitate a dialogue on and an awareness of the sustainability of specific applications and technologies.

BACKGROUND

The EERC has been active in developing, demonstrating, and promoting the use of CCPs in North Dakota nationally and internationally since the 1970s. Early work focused on the use of fly ash produced in North Dakota for use in concrete, and work in that area progressed with the demonstration of high-volume fly ash (HVFA) concrete in numerous locations throughout North Dakota, including at Coal Creek Station where the HVFA concrete continues to perform well after 20 years of service. The EERC has also worked with various state entities to demonstrate the use of flowable fill for multiple uses, the use of bottom ash and fly ash for soil stabilization in agricultural and road settings, and the use of fly ash for concrete and ceramic products. Many of the use applications investigated and demonstrated by the EERC have been used in North Dakota and throughout the United States, and some of these applications are used commercially in North Dakota and elsewhere. The EERC has worked with industry and state agencies to address common goals, and the EERC has been successful in facilitating the acceptance of CCPs for utilization in applications for road construction.

The EERC coal ash research program is committed to improving the technical and economic aspects of CCP management and to promoting the environmentally safe, technically sound, and economically viable utilization of these materials. Green or sustainable construction, including road construction, is an important way in which CCPs can be used to achieve durable products that meet construction requirements and address environmental issues. Since North Dakota has little urban or industrial pollution and is home to numerous wildlife refuges and natural settings for hiking, boating, wildlife viewing, and other enjoyment of the North Dakota environment, the EERC believes that sustainable or green construction can facilitate the preservation and protection of air and water quality and maintenance of the North Dakota environments and ecosystems. The combination of availability of high quality CCPs, expertise in CCP utilization, commitment to preserving the environment, and desire to protect the ecosystem makes North Dakota an ideal place to demonstrate green roadbuilding technologies. Medora, North Dakota, exemplifies the environment that North Dakota is committed to preserving and protecting, and it will provide an opportunity for a model demonstration that will be available to interested parties in construction industries and to representatives of state agencies and to visitors who will be able to see North Dakota's commitment to a clean environment in a very practical way.

The green roadbuilding technologies that are expected to be used in this proposed effort will focus on those employing CCPs, especially fly ash. The EERC has worked with industry to develop many of these technologies and applications including high-volume fly ash concrete in pavement applications, fly ash and bottom ash for soil stabilization, fly ash and bottom ash in flowable fills and low-strength concrete, and fly ash in concrete products. It is anticipated that these will be components of the demonstration project. Additional technologies and products are

also expected to be incorporated into the demonstration, including the use of bottom ash for rain gardens and pervious fly ash concrete to aid in storm water management. All of these applications are currently used commercially, although not all of them have been used in North Dakota.

The EERC research staff is experienced in the use of CCPs, in construction, and in educating and working with industry and state agencies. The EERC can manage this project to accomplish the demonstration of multiple CCP-based technologies, design the project to serve as a model for future state and commercial projects in North Dakota and the region, and use existing methods to demonstrate the advantages of green roadbuilding technologies.

QUALIFICATIONS

The EERC is a research facility that operates as a business unit of UND. The EERC has an annual budget of $33.6 million and has worked with nearly 1000 clients in all 50 states and in 49 countries. The EERC has a multidisciplinary staff of more than 300 who has expertise and partnerships in a broad spectrum of energy and environmental programs, including over 30 years of research experience on CCPs. The EERC houses the longest-standing CCP research group in the United States. The EERC CCP research team has developed and demonstrated a broad number of uses for CCPs in North Dakota and nationally since the 1970s. The EERC has worked with industry on many of these utilization applications, has developed information hindering the use of CCPs and has assembled information on the use of CCPs in green construction.

Ms. Pflughoeft-Hassett has several years of experience in the management of technical research projects, with an emphasis on investigation of the utilization of CCPs, including lignite ash. She also has experience in the environmental and engineering aspects of CCP utilization projects and has participated in project teams evaluating the economic aspects of CCP utilization.

Ms. Pflughoeft-Hassett has managed several previous CCP-related projects funded by the NDIC Lignite Research Council.

Mr. Bruce Dockter's, EERC Research Engineer, principal areas of interest and expertise include physical and chemical analysis of fly ash and examination of coal ash for utilization in high- and low-volume applications. In addition, he has also worked extensively in the field of high-temperature research on the physical and chemical properties of coal ashes and slags.

Ms. Tera Buckley, EERC Marketing Research Specialist, has expertise in planning, designing, and carrying out technical and marketing research and technology transfer related to CCPs. Her principal areas of interest and expertise include developing and conducting research studies, promoting CCP utilization, conducting feasibility assessments, and producing marketing materials.

VALUE TO NORTH DAKOTA

The proposed demonstration project will provide value to North Dakota in the following ways:

- Expand opportunities for use of a North Dakota product (CCPs) in roads and other construction.
- Educate industry and state agency representatives on commercial applications of CCPs that facilitate the preservation and protection of the environment and the conservation of natural resources, exhibit good engineering performance, and are economical.
- Facilitate continued development of a visitor destination in North Dakota while providing a visible demonstration of North Dakota's commitment to sustainability.
- Provide an opportunity to bring regional and national contractors and industry representatives to North Dakota to learn about green roadbuilding technologies.

MANAGEMENT

Ms. Debra Pflughoeft-Hassett will be the project manager for the proposed project. Ms. Pflughoeft-Hassett will manage all technical, promotional/educational, and administrative aspects of the effort. Technical efforts are expected to include the development of technical information on CCP-based roadbuilding applications; guidance and coordination of on-site preparation; material or product placement, construction, and finishing; and performance evaluations. Mr. Bruce Dockter will also participate in these technical activities. Promotion/education efforts are expected to include communication with state agencies and contractors, development of training information, and coordination of site visits. Ms. Tera Buckley will work with Ms. Pflughoeft-Hassett in these efforts. Administrative efforts will include contracting, procurement, scheduling, budget control, and reporting. EERC support offices and staff will assist Ms. Pflughoeft-Hassett in these activities.

TIMETABLE

The period of performance for the proposed effort is February 1, 2008 – June 30, 2009. The work schedule noted in Table 2 is based on the proposed period of performance. Table 2 indicates the proposed project schedule, detailing task initiation and completion. Project reports will include quarterly reports, a draft final report, and a final report.

BUDGET

The EERC requests $125,000 from the NDIC Lignite Research Council to support the proposed project. The total project cost is estimated to be $377,725. The remaining $252,725 for this effort will be provided from multiple sources:

- An industrial cash contribution in the amount of $25,000 will be provided by GRE.
- A $100,000 cash contribution will be provided by the Medora Foundation.

Table 2. Timetable for Green Roadbuilding Demonstration in North Dakota

Task	Task Description	Work Schedule by Project Month
Task 1	Select Green Roadbuilding Technologies	1–7
Task 2	Provide Technical Information on Green Roadbuilding Technologies	1–15
Task 3	Construction Planning	3–5
Task 4	Construction Support	5–15
Task 5	Project Review and Education Activities	4–17
Task 6	Reporting	3, 6, 9, and 12 (quarterlies) 15 (draft final report) 17 (final report)

- Upon approval of funding from the NDIC Lignite Research Council, the EERC will request an additional $127,725 from the EERC's U.S. Department of Energy (DOE) Jointly Sponsored Research Program (JSRP).

The funding for this effort will be used to provide technical assistance from EERC researchers on CCP-based greenbuilding technologies to contractors, ND DOT, FHWA representatives, and NDDH. The funding will also be used for construction activities related specifically to CCP-based greenbuilding technologies.

MATCHING FUNDS

This proposal is requesting $125,000 in support from NDIC through the Lignite Research Council to match a $25,000 cash contribution from GRE and a $100,000 cash contribution from the Medora Foundation. Letters of support for the industrial sponsors are included in Appendix A. Further funding in the amount of $127,725 will be requested from the EERC–DOE JSRP. The total cost of this project is estimated at $377,725.

The EERC also anticipates submission of a proposal to EPA Region 8 to develop and hold an educational program for contractors and state agency representatives in EPA Region 8. If successful in obtaining that funding, the EERC will develop a training course to be held in

conjunction with construction activities at the site selected for this project. This effort will be funded separately from the proposed project but is expected to be held during the performance of this project at the project construction site. North Dakota contractors, state agency representatives, and other interested parties will be invited to participate in this event.

TAX LIABILITY

The EERC is part of UND, a tax-exempt entity of the state of North Dakota.

CONFIDENTIAL INFORMATION

There is no confidential information contained in this proposal.

REFERENCES

1. Buckley, T.D.; Pflughoeft-Hassett, D.F. *Review of North Dakota Regulations, Standards, and Practices Related to the Use of Coal Combustion Products*; Draft Final Report for U.S. Environmental Protection Agency, U.S. Department of Energy, Lignite Research Council, Basin Electric Power Cooperative, Great River Energy, Minnkota Power Cooperative, and American Coal Ash Association; Energy & Environmental Research Center: Grand Forks, ND, in process.

DEMONSTRATION OF COAL COMBUSTION PRODUCTS FOR GREEN ROADBUILDING IN MEDORA, NORTH DAKOTA
NDIC
PROPOSED PROJECT START DATE: 12/1/07
EERC PROPOSAL #2008-0076

BUDGET

CATEGORY		TOTAL	NDIC SHARE		OTHER COST SHARE		JSRP SHARE	
TOTAL DIRECT HRS/SALARIES	1,421	$ 57,595	79	$ 2,855	79	$ 2,855	1,263	$ 51,885
TOTAL FRINGE BENEFITS		$ 29,949		$ 1,485		$ 1,485		$ 26,979
TOTAL LABOR		$ 87,544		$ 4,340		$ 4,340		$ 78,864
OTHER DIRECT COSTS								
TRAVEL		$ 5,015		$ 200		$ 200		$ 4,615
SUPPLIES		$ 1,979		$ 173		$ 173		$ 1,633
COMMUNICATION - PHONES & POSTAGE		$ 200		$ 15		$ 15		$ 170
OFFICE (PROJECT SPECIFIC SUPPLIES)		$ 200		$ 20		$ 20		$ 160
FOOD		$ 650		$ 325		$ 325		$ -
OPERATING FEES & SVCS								
Graphics Support		$ 1,144		$ 55		$ 55		$ 1,034
Fee – Roadbuilding		$ 150,000		$ 75,000		$ 75,000		$ -
TOTAL DIRECT COST		$ 246,732		$ 80,128		$ 80,128		$ 86,476
FACILITIES & ADMIN. RATE - % OF MTDC	VAR	$ 130,993	56.0%	$ 44,872	56.0%	$ 44,872	47.7%	$ 41,249
TOTAL PROJECT COST		$ 377,725		$ 125,000		$ 125,000		$ 127,725

Due to limitations within the University's accounting system, bolded budget line items represent how the University proposes, reports and accounts for expenses. Supplementary budget information, if provided, is for proposal evaluation.

DEMONSTRATION OF COAL COMBUSTION PRODUCTS FOR GREEN ROADBUILDING IN MEDORA, NORTH DAKOTA
NDIC
PROPOSED PROJECT START DATE: 12/1/07
EERC PROPOSAL #2008-0076

BUDGET

CATEGORY			TOTAL		NDIC SHARE		OTHER COST SHARE		JSRP SHARE	
LABOR		Rate	Hrs	Cost	Hrs	Cost	Hrs	Cost	Hrs	Cost
Pflughoeft-Hassett, D.	Project Manager	$ 46.30	595	$ 27,549	22	$ 1,019	22	$ 1,019	551	$ 25,511
Dockter, B.	Principal Investigator	$ 34.64	200	$ 6,928	22	$ 762	22	$ 762	156	$ 5,404
Hassett, D.	Principal Scientist	$ 46.72	60	$ 2,803	5	$ 234	5	$ 234	50	$ 2,335
Buckley, T.	Principal Investigator	$ 25.40	240	$ 6,096	25	$ 635	25	$ 635	190	$ 4,826
----------	Senior Management	$ 62.38	120	$ 7,486	-	$ -	-	$ -	120	$ 7,486
----------	Research Technician	$ 22.77	161	$ 3,666	-	$ -	-	$ -	161	$ 3,666
----------	Technical Support Services	$ 18.93	45	$ 852	5	$ 95	5	$ 95	35	$ 662
				$ 55,380		$ 2,745		$ 2,745		$ 49,890
Escalation Above Base		4%		$ 2,215		$ 110		$ 110		$ 1,995
TOTAL DIRECT HRS/SALARIES			1,421	$ 57,595	79	$ 2,855	79	$ 2,855	1,263	$ 51,885
TOTAL FRINGE BENEFITS				$ 29,949		$ 1,485		$ 1,485		$ 26,979
TOTAL LABOR				$ 87,544		$ 4,340		$ 4,340		$ 78,864
OTHER DIRECT COSTS										
TRAVEL				$ 5,015		$ 200		$ 200		$ 4,615
SUPPLIES				$ 1,979		$ 173		$ 173		$ 1,633
COMMUNICATION - PHONES & POSTAGE				$ 200		$ 15		$ 15		$ 170
OFFICE (PROJECT SPECIFIC SUPPLIES)				$ 200		$ 20		$ 20		$ 160
FOOD				$ 650		$ 325		$ 325		$ -
OPERATING FEES & SVCS										
Graphics Support				$ 1,144		$ 55		$ 55		$ 1,034
Fee – Roadbuilding				$ 150,000		$ 75,000		$ 75,000		$ -
TOTAL DIRECT COST				$ 246,732		$ 80,128		$ 80,128		$ 86,476
FACILITIES & ADMIN. RATE - % OF MTDC			VAR	$ 130,993	56.0%	$ 44,872	56.0%	$ 44,872	47.7%	$ 41,249
TOTAL PROJECT COST				$ 377,725		$ 125,000		$ 125,000		$ 127,725

Due to limitations within the University's accounting system, bolded budget line items represent how the University proposes, reports and accounts for expenses. Supplementary budget information, if provided, is for proposal evaluation.

DEMONSTRATION OF COAL COMBUSTION PRODUCTS FOR GREEN ROADBUILDING IN MEDORA, NORTH DAKOTA
EERC PROPOSAL #2008-0076

BUDGET - TRAVEL

RATES USED TO CALCULATE ESTIMATED TRAVEL EXPENSES			
DESTINATION	PER MILE	LODGING	PER DIEM
Medora, ND	$ 0.33	$ 60	$ 25

	NUMBER OF						PER		
PURPOSE/DESTINATION	TRIPS	PEOPLE	MILES	DAYS	MILEAGE	LODGING	DIEM	MISC.	TOTAL
Site Visit/Medora, ND	5	2	1,100	4	$ 1,815	$ 1,800	$ 1,000	$ 400	$ 5,015
TOTAL ESTIMATED TRAVEL									$ 5,015

DEMONSTRATION OF COAL COMBUSTION PRODUCTS FOR GREEN ROADBUILDING
IN MEDORA, NORTH DAKOTA
EERC PROPOSAL #2008-0076

DETAILED BUDGET - RECHARGE CENTERS

			TOTAL	
Graphics Support	Rate	#		$Cost
Graphics (hourly)	$55	20	$	1,100
Subtotal			$	1,100
Escalation		4%	$	44
Total Graphics Support			$	1,144

BUDGET NOTES

ENERGY & ENVIRONMENTAL RESEARCH CENTER (EERC)

BACKGROUND

The EERC is an independently organized multidisciplinary research center within the University of North Dakota (UND). The EERC receives no appropriated funding from the state of North Dakota and is funded through federal and nonfederal grants, contracts, and other agreements. Although the EERC is not affiliated with any one academic department, university faculty may participate in a project, depending on the scope of work and expertise required to perform the project.

INTELLECTUAL PROPERTY

If federal funding is proposed as part of this project, the applicable federal intellectual property (IP) regulations may govern any resulting research agreement. In addition, in the event that IP with the potential to generate revenue to which the EERC is entitled is developed under this agreement, such IP, including rights, title, interest, and obligations, may be transferred to the EERC Foundation, a separate legal entity.

BUDGET INFORMATION

The proposed work will be done on a cost-reimburseable basis. The distribution of costs between budget categories (labor, travel, supplies, equipment, etc.) is for planning purposes only. The project manager may, as dictated by the needs of the work, incur costs in accordance with Office of Management and Budget (OMB) Circular A-21 found at www.whitehouse.gov/omb/circulars. Escalation of labor and EERC recharge center rates is incorporated in to the budget when a project's duration extends beyond the current fiscal year. Escalation is calculated by prorating an average annual increase over the anticipated life of the project. The cost of this project is based on a specific start date indicated at the top of the EERC budget. Any delay in the start of this project may result in a budget increase. Financial reporting will be at the total agreement level. Budget category descriptions presented below are for informational purposes; some categories may not appear in the budget.

Salaries: The EERC employs administrative staff to provide required services for various direct and indirect support functions. Salary estimates are based on the scope of work and prior experience on projects of similar scope. The labor rate used for specifically identified personnel is the current hourly rate for that individual. The labor category rate is the current average rate of a personnel group with a similar job description. Salary costs incurred are based on direct hourly effort on the project. Faculty who work on this project will be paid an amount over their normal base salary, creating an overload which is subject to limitation in accordance with university policy. Costs for general support services such as contracts and intellectual property, accounting, human resources, purchasing, shipping/receiving, and clerical support of these functions are included in the EERC facilities and administrative cost rate.

Fringe Benefits: Fringe benefits consist of two components which are budgeted as a percentage of direct labor. The first component is a fixed percentage approved annually by the UND cognizant audit agency, the Department of Health and Human Services, and covers vacation, holiday, and sick leave (VSL). This percentage is applied to direct labor for permanent staff eligible for VSL benefits. The second component is estimated on the basis of historical data and is charged as actual expenses for items such as health, life, and unemployment insurance; social security; worker's compensation; and UND retirement contributions.

Travel: Travel is estimated on the basis of UND travel policies which can be found at www.und.edu/dept/accounts/policiesandprocedures.html. Estimates include General Services Administration (GSA) daily meal rates. Travel may include site visits, field work, meetings, and conference participation as indicated by the scope of work and/or budget.

Equipment: If equipment is budgeted, it is discussed in the text of the proposal and/or identified more specifically in the accompanying budget detail.

Supplies – Professional, Information Technology, and Miscellaneous: Supply and material estimates are based on prior experience and may include chemicals, gases, glassware, nuts, bolts, and piping. Computer supplies may include disks, paper, memory, software, and toner cartridges. Maps, sample containers, minor equipment, signage, and safety supplies may be necessary as well as other organizational materials such as subscriptions, books, and reference materials.

Subcontracts/Subrecipients: Not applicable.

Professional Fees/Services (consultants): Not applicable.

Other Direct Costs

Communications and Postage: Telephone, cell phone, and fax line charges are generally included in the facilities and administrative cost. Direct project costs may include line charges at remote locations, long-distance telephone, postage, and other data or document transportation costs.

Office (project-specific supplies) and Printing: General purpose office supplies (pencils, pens, paper clips, staples, Post-it notes, etc.) are generally included in the facilities and administrative cost. Budgeted project office supplies include items specifically related to the project such as copies and printing.

Food: Food expenditures for project meetings, workshops, and conferences where the primary purpose is dissemination of technical information may include costs of food, some of which may exceed the institutional limit.

Professional Development: Fees are for memberships in technical areas directly related to work on this project. Technical journals and newsletters received as a result of a membership are used throughout development and execution of the project by the research team.

Operating Fees and Services – EERC Recharge Centers, Outside Labs, Freight: EERC recharge center rates for laboratory, analytical, graphics, and shop/operation fees are established and approved at the beginning of the university's fiscal year.

Laboratory and analytical fees are charged on a per sample, hourly, or daily rate, depending on the analytical services performed. Additionally, laboratory analyses may be performed outside the university when necessary.

Graphics fees are based on an established per hour rate for production of such items as report figures, posters, and/or PowerPoint images for presentations, maps, schematics, Web site design, professional brochures, and photographs.

Shop and operation fees are for expenses directly associated with the operation of the pilot plant facility. These fees cover such items as training, personal safety (protective eyeglasses, boots, gloves), and physicals for pilot plant and shop personnel.

Freight expenditures generally occur for outgoing items and field sample shipments.

Facilities and Administrative Cost: The facilities and administrative rate (indirect cost rate) included in this proposal became effective July 1, 2005. Facilities and administrative cost is calculated on modified total direct costs (MTDC). MTDC is defined as total direct costs less individual items of equipment in excess of $5000 and subawards in excess of the first $25,000 for each award.

APPENDIX A

LETTERS OF SUPPORT

Theodore Roosevelt
MEDORA FOUNDATION

September 26, 2007

Ms. Debra Pflughoeft-Hasset, Director
CARRC
Energy and Environmental Research Center
University of North Dakota
15 N. 23rd St., Stop 9018
Grand Forks, ND 58202-9018

Dear Debra,

I am writing to confirm that the Theodore Roosevelt Medora Foundation will participate in the demonstration project for the use of Coal Conversion Products for Green Roadbuilding in Medora, North Dakota.

Assuming additional funding can be obtained to achieve the goals of the project, the Theodore Roosevelt Medora Foundation will provide $100,000 in funds for this project.

We look forward to working with you and your other partners on this project..

Respectfully,

Randy Hatzenbuhler
President

medora@medora.com
800-633-6721
www.medora.com

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GREAT RIVER
ENERGY

Coal Creek Station • 2875 Third Street SW • Underwood, North Dakota 58576-9659 • 701-442-3211 • Fax 701-442-3726

September 26, 2007

State of North Dakota
The Industrial Commission
State Capitol
Bismarck, ND 58505
ATTN: Lignite Research Program

To Whom It May Concern:

Great River Energy (GRE) is pleased to present this letter of support for the Energy & Environmental Research Center's (EERC) proposed project entitled "Demonstration of Coal Combustion Products (CCPs) for Green Road Building in Medora, North Dakota."

GRE agrees to contribute $25,000 of cash and materials to the proposed effort and to participate in project meetings and other activities as appropriate and identified by the project partners.

I would be happy to speak with anyone who would like to discuss GRE's support for this effort. I can be reached by phone at (701) 442-7031 and by e-mail at achristianson@GREnergy.com.

Sincerely,

GREAT RIVER ENERGY

Al Christianson
Business Development & Government Affairs