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I am pleased to present the first double issue of WERCNEWS, updating important milestones and evolving WERC programs as we grow into our 16th year in 2006. Growth is a key word to describe WERC, from the physical expansion of our offices, to the unfolding umbrella of our programs and partnerships, of which I am very proud.

This edition of WERCNEWS highlights the opening of our satellite office in Albuquerque, the WERC Resources Center, serving as an epicenter for curriculum development and outreach for regional industry and small business on pollution prevention and critical energy issues.

Programs under WERC boast reinforced synergy with the College of Engineering, our administrative partner here at New Mexico State University. These include K-12 outreach efforts, the Southwestern New Mexico Regional Science and Engineering Fair, and PREP, the Las Cruces Pre-Freshman Engineering Program. WERC’s momentum holds a new look, online and in print, which I hope will reinforce the message that accompanies our continued leadership and dedication to our mission.

We continue to take an innovative lead on a spectrum of environmental research activities, Arsenic removal from our nation’s water supplies, as well as celebrating sixteenth birthdays for our Summer Academy and International Environmental Design Contest. We’re excited about this year’s featured speaker at the Design Contest Colloquium, the Honorable Peter B. Lyons, Commissioner of the U.S. Nuclear Regulatory Commission. In addition, we take pride in the congressional recognition of our partnership with The Higher Education Institute of the Navajo, Dine College.

I hope you enjoy the following pages, including FACE to FACE @ WERC, introducing your WERC staff. Everyone at WERC is grateful for the continued support by our Congressional Delegation, the U.S. Department of Energy, the State of New Mexico, our partner institutions, faculty and students, and the many other organizations and individuals who make the WERC system of programs a thriving and invaluable entity.

Regards,

Abbas Ghassemi
WERC Executive Director

Mission
To develop human resources and technologies that assist various levels of government and private sector companies in environmental issues, including restoration, waste minimization, and pollution prevention.

Vision
Through its leadership and achievements, WERC is nationally and internationally recognized for its commitment to students, faculty, sponsors, industrial partners, and our nation’s environment and natural resources.
From the Dean, College of Engineering

I am very happy that the Southwestern New Mexico Regional Science and Engineering Fair and the Las Cruces Pre-freshman Engineering Program (PREP) is moving ahead stronger and larger than ever before under the College of Engineering’s (COE) WERC system of programs. The natural affinity between the needs of the constituents of the COE/WERC and the development of our young people for careers in math, science and engineering makes the relationship a win-win for everyone - most of all our young people. These two programs together will be the cornerstone of the COE's outreach efforts in the public schools of New Mexico.

WERC has a successful history of developing and running K-12 programs. Over the years, their K-12 programs have touched the lives of more than 45,000 children in the border region through such programs as Project WET, the Bi-National Water Festival, the Essay and Art Contest on the Environment, Project Learning Tree and others. It is a natural extension of WERC's capabilities to undertake these types of programs.

Encouraging youngsters to pursue math, science and engineering studies is of the utmost importance to our nation. The country's pool of engineers that was originally spawned by the Cold War is aging and many of them will soon be retiring from service. Yet our institutions of higher education are turning out fewer engineers than India and China. It is essential to our national security that we inspire the next generation of engineers to come forth.

The NMSU College of Engineering has made recruitment and preparation of world-class engineers a priority and we have taken several major steps to bolster our efforts, including the hiring of a full-time recruiter and a marketing communications professional. While these efforts are hoped to entice newly graduated high school seniors into our college, we must reach students in the middle and high schools. This is where PREP and the Science Fair can make a huge impact.

I look forward to this year's programs and have confidence that under WERC's experienced leadership, the participants will discover the incredible opportunities in science, math and engineering.

Sincerely,

Steven P. Castillo
Regents Professor and Dean of the College of Engineering

Keynote Speaker for 2006 Environmental Design Contest Colloquium:
Commissioner of the U.S. Nuclear Regulatory Commission

The Honorable Peter B. Lyons was sworn in as a Commissioner of the U.S. Nuclear Regulatory Commission on January 25, 2005. Dr. Lyons brings to the NRC eight years of experience as a science advisor to Sen. Pete Domenici (R-NM) and the Senate Energy and Natural Resources Committee. From 1997 to 2002, he focused on military and civilian uses of nuclear technologies, national science policy and nuclear nonproliferation. More recently, he was involved with issues on national and international nuclear policy, energy research and development, and hydrogen technology.

From 1969 to 1996, Dr. Lyons worked in progressively more responsible positions at the Los Alamos National Laboratory. During that time he served as director for industrial partnerships, deputy associate director for energy and environment, and deputy associate director-defense research and applications. While at Los Alamos, he spent over a decade supporting nuclear test diagnostics.

Dr. Lyons has published more than 100 technical papers, holds three patents related to fiber optics and plasma diagnostics, and served as chairman of the NATO Nuclear Effects Task Group for five years.

A native of Nevada, Dr. Lyons received his doctorate in nuclear astrophysics from the California Institute of Technology in 1969 and earned a bachelor’s degree in physics/math from the University of Arizona in 1964. He is a Fellow of the American Physical Society. In addition, Dr. Lyons was elected to 16 years on the Los Alamos School Board and spent six years on the University of New Mexico-Los Alamos Branch Advisory Board. He is a resident of Virginia.
Given recent exploration-related developments promising to bring more brain trust and economic development to Las Cruces, WERC, continues to fuel the growing regional reputation for high-tech research and development through the 16th Annual International Environmental Design Contest, April 2-6 of this year.

The week-long competition, sponsored by private and public entities such as Intel Corporation, U.S. Department of Agriculture, U.S. Department of Energy and the Food and Drug Administration, this year will engage 30 university teams (typically 4-10 students) tackling real-world environmental challenges, including four international schools and a concurrent high school competition with 14 teams participating. The April contest includes two NMSU teams and one from the University of New Mexico, competing with other top institutions on eight tasks (design challenges) for thousands in cash prizes, traveling trophies and worldwide recognition. A concurrent career fair for top students in their field is held on NMSU campus as well.

Government agencies, industrial affiliates and academic partners play a key role in the design contest, assisting WERC in the development of design problem statements and evaluation criteria, providing financial support for site-specific issues and serving as judges for the final competition. Design teams showcase their work through research papers, oral and poster presentations, and bench-scale demonstrations. The teams’ scientific approach must consider regulatory guidelines, public opinion, and cost, all core components of the environmental regulatory process. “A critical challenge for the design teams is building cost-effective bench-scale models while maintaining a high degree of scientific integrity,” said Steven Moates, a WERC technician responsible for bench-scale development.

This year’s tasks include several challenges focusing on water quality, food facility contamination and toxic waste removal from liquid waste collection systems, typically used in concentrated streams in semi-conductor industries. Water quality tasks include Arsenic Treatment for Water in Rural, Isolated Communities, which is particularly critical in New Mexico. The proposed solution removes arsenic, a known toxin and carcinogen, in the presence of other contaminants and ions such as silica and iron from water for human consumption. Seven teams are designing on this task including a group from Budapest Technical University in Hungary.

One of the design challenges students will address is to develop and demonstrate a simple and practical clean-up method for a food facility contaminated with a microbiological agent, mandates the solution be cost-effective and consider all aspects of clean up, including waste disposal. “Not only does this research benefit the nation with fresh and innovative solutions to some of our most pressing environmental problems, but students gain a unique educational opportunity through the experience of designing and developing technologies to real problems,” said Abbas Ghassemi, WERC Executive Director. “Over the years we’ve seen many amazing solutions developed by the students, some of which have actually been implemented in the industrial/commercial arena.”

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**Tuesday, April 4**
Bench-Scale Demonstration
8:30 a.m. - 5:00 p.m.

**Wednesday, April 5**
Colloquium on the Environment and Luncheon
~Honorable Peter B. Lyons~
NRC Commissioner, Keynote Speaker
12:15 a.m. - 1:00 p.m.
Corbett Center 3rd floor

Engineering & Technology Career Expo
9:00 a.m. - 5:00 p.m. W, TH
Corbett Center 2nd Floor

**Thursday, April 6**
Awards Ceremony
12:15 a.m. - 2:00 p.m.
Corbett Center 3rd floor

Collegiate Entrepreneurs 2006 Business Plan Competition TBA

For more information visit www.werc.net
Design Contest Tasks for 2006

Task 1
Arsenic Treatment for Water in Rural, Isolated Communities
Develop and demonstrate a cost-effective, energy efficient, treatment technology to remove arsenic from drinking water in rural, isolated communities. The proposed solution removes arsenic in the presence of other contaminants and ions such as silica and iron from water for human consumption.

Task 2
Low Energy Use Desalination System
Develop and demonstrate a low-cost, simple and reliable system for use in brackish water reclamation. The proposed solution must be applicable for use in inland desalination facilities and should address waste issues, energy consumption and associated costs. The solution should also reject water handling and optimization.

Task 3
Cleaning of a Water Distribution System
Develop and demonstrate a simple, easy to implement process to clean a contaminated water distribution system for a large city. The proposed solution must address effectiveness, implementation issues in existing pipelines and associated costs.

Task 4
Food Facility Decontamination
Develop and demonstrate a simple and practical clean-up method for a food facility contaminated with a microbiological agent. The solution must be cost-effective and consider all aspects of clean up, including waste disposal.

Task 5
Removal of Tetramethylammonium Hydroxide (TMAH) from a Liquid-Waste Collection System
Develop and demonstrate a cost-effective, easy to implement, system for removal of tetramethylammonium hydroxide from concentrated streams in the semi-conductor industries. The proposed solution must address solubility and economics, and present a practical approach in segregation and treatment of TMAH.

Task 6
Eliminate Black Smoke from Diesel Operations
Develop and demonstrate a cost-effective, efficient way to eliminate or reduce black smoke/plumes commonly associated with diesel generators. The proposed solution must be easy to implement, maintain and operate while providing effective removal.

Task 7
Carbon Sequestration
Develop and demonstrate a new and innovative technique for removal and permanent storage of carbon dioxide from flue gas. The proposed solution must address total carbon accounting and life cycle, carbon trading, economic issues, environmental impacts and all associated costs.

Task 8
Underwater Pond Liner Repair System
Develop and demonstrate a system that repairs pre-identified leaks (tears or punctures) in pond liners made from synthetic materials.

17th Annual Environmental Design Contest 2007
April 1-5
Registration Deadline Dec. 8, 2006
Join us for the most exciting Engineering Competition of 2007

Scenic Photography by Tom A. Freelove
The Comprehensive Arsenic Tool (CoAsT) is a free, user-friendly, web-based interactive tool that integrates "arsenic decision tools." The CoAsT is geared toward small communities, decision-makers and design engineers, and uses decision trees, cost models, a rate-setting tool and living documentation to answer the following questions:

* What is the optimal arsenic removal technology, and how will this technology perform compared to other technologies?
* How much does the technology cost?
* How do we pay for it?
* Where can I get support information?

The 'Living Document/State-of-Science' section of the CoAsT includes information about the Arsenic Water Technology Partnership, general information about arsenic in drinking water, arsenic chemistry, health effects, federal and state(s) regulatory information, a glossary and list of acronyms, and a list of references and appropriate web links. This information is updated regularly to reflect changes in the knowledge base, and to provide the user with the most current peer-reviewed information to aid in decision-making.

The arsenic treatment technology decision trees are structured to guide a user to a technology or family of technologies that would be most appropriate for a specific water system. The decision trees address mitigation strategies or treatment minimization, pre-oxidation processes, enhancement of existing treatment processes and the addition of new treatment technologies. The decision-making scenarios within the trees enable the user to input utility-specific water quality data and utility preferences, and the trees are intended to be used as an iterative (repeated) tool.

Three cost models are available for conducting cost estimation of any of the treatment technologies identified by the decision trees. The American Water Works Association Research Foundation (AwwaRF) model, developed by Malcolm-Pirnie, Inc., and University of Colorado for adsorptive media and activated alumina technologies, calculates capital costs using an empirical equation. Operation and maintenance (O&M) costs are based on water chemistry, lab/field study results (usually bed volume predictions) or manufacturer recommendations. The ARCE (EPA Cost) model developed by Battelle for EPA, can provide costs for adsorptive media, activated alumina and ion exchange technologies. Capital costs are estimated by developing a detailed equipment list for the process, and O&M costs are based on lab/field study results or manufacturer recommendations. A third cost tool, the U.S. EPA Multiple Technologies model, provides information a utility can use to calculate planning-level capital and O&M costs for the treatment method selected from the decision trees. Cost information from this model will give the utility only a rough estimate of the selected treatment process costs so that relative costs can be evaluated.

The rate-setting tool can be used to determine the cost per connection per month - once an appropriate technology has been identified using the decision trees and evaluated using one or more of the cost models. The rate-setting tool is based on an Excel-based spreadsheet currently used by the Rural Community Assistance Corporation (RCAC) that has been converted to a Web-based, user-friendly version. The tool provides hard-copy results that communities can use to set their own rates to meet capital and O&M costs obtained with the technology cost tool.

CoAsT also includes an embedded, on-line tool evaluation form that provides automatic e-mail delivery of a user's comments to WERC.

Peter Nathanson, Program Coordinator, Water & Environmental Outreach, shares guidelines with Brandon Beckett, a CoAsT tool development assistant from Las Cruces High School.
Sandia National Laboratories researcher Malynda Aragon shows Sen. Pete Domenici, left, and former Rio Rancho Mayor Jim Owen, the pilot arsenic water treatment technology that was installed in October at a Rio Rancho well site. Domenici pushed for funds for affordable arsenic removal technology, and Sandia (through the Arsenic Water Technology Partnership) is helping communities around the state understand their best options. (Photo by Randy Montoya, Sandia National Laboratories)

Pueblo of Jemez Public Works Department Office Manager Olivia Toya, Stanley Loretto, Water Operator, and Leonard Loretto, Public Works Director, use the real-time CoAsT tool at the Fall 2005 Arsenic Workshop at the WERC Resources Center in Albuquerque.

Sandia National Laboratories researcher Malynda Aragon shows Sen. Pete Domenici, left, and former Rio Rancho Mayor Jim Owen, the pilot arsenic water treatment technology that was installed in October at a Rio Rancho well site. Domenici pushed for funds for affordable arsenic removal technology, and Sandia (through the Arsenic Water Technology Partnership) is helping communities around the state understand their best options. (Photo by Randy Montoya, Sandia National Laboratories)

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WERC’s enhanced Web site will soon have a media room for the press, an E-gallery of our publications available for download, and a more interactive, user-friendly, event registration tool set. Log on and Go LIVE at werc.net.

Go LIVE on www.werc.net
The WERC program is fortunate to have Ricardo Maestas, a New Mexico State University Environmental Science major, as a fellowship student. Throughout his three-year involvement with WERC, Maestas has demonstrated leadership, devotion and a strong commitment to the environment and WERC programs.

Maestas credits his love, respect, and concern for the environment to growing up on the banks of the Pecos River in the Northern New Mexico village of Anton Chico. The small community helped Maestas appreciate the natural beauty of the rural atmosphere and sparked his interest in an environment-based career. Maestas graduated from Santa Rosa High School in 2002 and said “Living there has taught me to appreciate the environment.”

Maestas’ involvement with WERC began three years ago when he saw a flyer for the fellowship program. Because of his continued commitment to the environment and his unfailing help with many WERC-based programs, he was awarded the WERC Certificate Fellowship for the spring 2006 semester.

Having participated in a variety of activities, Maestas says he most enjoys working with children. In 2004, he helped at an annual Water Festival hosted by Sierra Middle School and in 2005 returned for the same event, this time hosted by Gadsden Middle School. Among his favorite WERC activities, Maestas recalls working with elementary school students on Earth Day at the Mesilla Park Community Center, where he shared with children the importance of recycling. “The most rewarding thing,” he said about the Earth Day Project, “was getting good feedback from the parents.” With nine WERC activities under his belt, Maestas was also the Lead Judge for the MESA Southwest Conference (Math, Engineering and Science Achievement) in 2004, and has set up WERC booths and presented information at incoming Freshman Fairs in both 2004 and 2005.

WERC has not only brought new knowledge to Maestas but hands on experience. “You can only learn so much from taking classes required of your major,” explains Maestas, who is also working to get an environmental management minor through the WERC program, “In a classroom you talk about things that have happened or can happen, but through WERC you are able to go to specific cases and see the end result.”

Maestas, who plans to graduate within the next two years, says he plans to stay involved in the WERC program through the completion of his degree. “I’m just glad that there are helpful programs through WERC, not only economic help but getting something in return... life experience.”

Maestas hopes to get a federal job once he graduates but is adamant that no matter what kind of job he has, the most important thing is educating others on the importance of caring for our environment. “Making other people aware of the issues and showing them what they can do in everyday life can make a big impact,” he said.

Denette Martinez is a sophomore who has already proven herself to be an asset to the WERC Fellowship Program. A civil engineering major, she was awarded the WERC Book Fellowship for the spring of 2006.

Martinez grew up in Las Vegas, New Mexico and graduated from Robertson High School 6th in her 2004 class. Coming from the Northern New Mexico country made a big impact on her and ultimately, helped form her decision to pursue an environmentally-related career path.

Once she graduates, Martinez hopes to get a job involved with water resources or material engineering. “The first thing I noticed when I traveled to the East Coast was the water, and it made me realize how little of it we really have here in New Mexico.”

Since her involvement with WERC began, Martinez has participated in informational fairs for incoming freshman and high school students. Her optimism for the future of the environment is what, she says, sets her apart from others who will be striving for the same position once graduated.

Martinez, who heard about the WERC program through friends, said the WERC fellowship has not only helped her financially but it has helped her gain experience and knowledge she will need, and apply, in the future.
The Las Cruces Pre-freshman Engineering Program (PREP) is undergoing a change as it moves under the leadership of WERC Project Manager Karen Mikel. Mikel, who coordinates special projects at WERC, has taught many levels of education, from elementary school to the corporate level, giving her experience working with children and teaching in the fields of science and engineering.

“Ms. Mikel brings to the program balanced experience in classroom teaching and the private sector,” College of Engineering Dean Steven Castillo said. “Her vision for PREP will continue to evolve the core curricula and expand the number of students able to participate in the program.”

PREP, a summer program that uses instruction, guest speakers, and hands-on experience, exposes and prepares pre-college students for careers in science, engineering and mathematics. According to The PREP annual report, more than 500 students have attended the program since it began in 1997, 217 of whom are now of college age. Of the 217 students, 100 percent have graduated from high school and 91 percent are currently in college.

“This is a unique and challenging program that opens the doors of discovery and opportunity to the students in Doña Ana County. This is a wonderful success story,” Castillo said.

While PREP is open to all students, the program particularly targets underrepresented minorities and women. In 2005, 84 percent of the students who participated in PREP were minorities, and 56 percent of the students were female.

“The PREP program gives the students a deep-seated desire to succeed,” Alyne Fulte, former director of PREP said.

The WERC Resources Center opened its doors in August 2005 at the New Mexico State University Albuquerque Center. The Resources Center staff, Dr. Debra Thrall and Christopher Campbell, provide a variety of environmental services to clients throughout New Mexico.

Thrall provides curriculum development and support to science teachers and state agencies promoting environmental education (EE) and radiation education to New Mexico youth.

Each semester, she teaches an environmental management or nuclear technology course to NMSU students via the WebCT, a Web-based learning program. Thrall represents WERC on the Executive Board of the Environmental Education Association of New Mexico and the New Mexico Science Teachers Association, which promote EE throughout the state and advise government agencies and schools on integrating EE into all school curricula.

Campbell manages an outreach program for New Mexico industry, small business, municipalities and Native American groups on pollution prevention (P2) and energy efficiency issues. On-site technical assistance and training on P2 are provided for many sectors on the best techniques and management practices for waste reduction and elimination, with emphasis on related cost-savings for New Mexico businesses. Energy efficiency assessments can also be conducted by WERC through Department of Energy-funded programs.

In addition, Campbell assists the Arsenic Water Technology Partnership by organizing and implementing training sessions for rural drinking-water systems on arsenic removal technologies, non-treatment options and funding sources.

All WERC and NMSU related activities are welcome at the NMSU Albuquerque Center. Some of the resources available include distance-learning facilities, a computer lab, training and meeting rooms. Contact Thrall or Campbell at WERC or Clara Bulger, NMSU Center Manager, at 505.830.2856 or cbulger@nmsu.edu.

Courtesy of New Mexico Business Weekly
New Mexico State University will host the 2006 Southwestern New Mexico Regional Science and Engineering Fair on March 11 in the Corbett Center Ballroom.

Eight counties will compete in the Southwestern New Mexico chapter, which is affiliated with the Intel International Science and Engineering Fair. The students participate in either the junior (grades 6-9) or senior (grades 9-12) division, and will be judged in one of 14 categories, including Biochemistry, Engineering, Physics and Zoology.

Five judging criteria (six for team projects) are used to rank the exhibits within each category. Based on these scores, Regular Category Awards will be given. Students will also be judged for Special Awards, in which sponsors, including governmental agencies, the Armed Forces, and professional societies will set the criteria.

“The students need to know their subject well and be innovative with their approach,” David Johnson, a judge for the Biochemistry category, said. “It is also important for the student to have researched other possibilities before coming to a conclusion.”

The regional winners go on to the state competition where senior division winners could advance to compete at the Intel International Science and Engineering Fair. At the international level, more than 1,400 students from over 40 nations compete for scholarships, tuition grants, internships and the grand prize: a $50,000 college scholarship and a trip to Stockholm, Sweden to witness the Nobel Peace Prize presentation.

Exhibit set-up will take place March 11 at 7:15 a.m. and the judging will begin at 8:30 a.m. The exhibits will be open for public viewing from 1:00 to 3:00 p.m., followed by an award ceremony at 5:45 p.m. in the Corbett Center Ballroom.

For more information, visit the Science and Engineering Fair Web site at https://corridor.nmsu.edu/scifair/index.html, or contact Karen Mikel at kmikel@nmsu.edu or at 505.646.2162.

~ These students are our Einsteins of tomorrow.

Twenty-five percent of the students that compete on the international level already have patents on their work ~
What began as a student team project for an environmental design competition in 1998 has blossomed into a funded research project that has global potential as a mine tailings remediation technology.

In 1998, NMSU Associate Professor of Chemical Engineering David Rockstraw, mentored a student team in the WERC Environmental Design Contest. Rockstraw’s students developed a technology that would collect and transport mine tailings in a slurry mixture and recover and reuse the water used in the process, while enhancing the removal of residual copper from the ore. The task was sponsored by Phelps-Dodge, the second largest copper producer in the world. The NMSU team competed against 14 others and although it didn’t win first prize, it was recognized for developing the most innovative process.

“We got some good results from that project,” said Rockstraw. “Later, one of my students, Mohammed Murshed, adopted it for further research as part of his master’s thesis. Now he is a Ph.D. candidate and is continuing this research.”

WERC recently awarded a $60,000 technology development grant to support the project.

The high concentration of metal in mine tailings reacts with rain water and oxygen in the atmosphere, producing sulfuric acid which contaminates surface and ground water. Mining operations must contain and treat the water runoff from their operations, even when the mines are no longer active.

The students incorporated the use of potassium ferrate, a form of iron that has the ability to oxidize the residual metal in the tailings, while also preventing the production of sulfuric acid by converting sulfides to sulfates that can be easily removed in a liquid process. The solid tailing that remains after treatment is benign and has no potential to further leach sulfuric acid. “We confirmed the chemistry,” said Rockstraw. “Now we are studying the fundamental mechanisms of the process: how fast it works, how different temperatures and concentrations affect the process. We need to determine how effective it is and get a better picture of the cost of implementing the process.”

The expense involved in the creation of potassium ferrate has been a barrier to its commercial manufacture. However, a recently patented technology that was developed by NMSU Chemistry and Biochemistry Associate Professor Michael Johnson shows promise for less expensive laboratory production of the material. As part of this project, Johnson’s process will be further refined and used to produce the potassium ferrate used in the research.

“The process is a long way from being economically feasible for widespread use, but the potential is enormous because all mines have this problem,” said Rockstraw. “And there are other applications for potassium ferrate in waste-water treatment and also in medicine.”

“It is very fulfilling to see something spawned by our Environmental Design Contest grow into something that has the potential to address a serious worldwide environmental problem,” said WERC Executive Director Abbas Ghassemi. “This is what it’s all about.”

**Sweet Sixteen for Summer Environmental Academy**

The Summer Environmental Academy is the longest running K-12 outreach program under WERC. The Academy, started in 1990, is a week long event for high school math and science teachers and their select students. Teachers and students from all over New Mexico and adjoining states are welcome to participate.

WERC’s Environmental Academy (WEA) is a project intended to increase awareness of how science, technology, and mathematics relate to studies and careers in engineering and the environmental fields. It is designed to get students excited about environmental issues in an effort to encourage environmental career paths and increase teacher knowledge in environmental education.

During the Academy, teachers and students will work in educator-student teams and address carefully constructed, real-world simulated problems with a hands-on learning approach.

Conducting Sustainability Education in a Cross-cultural Context is the 2006 WEA focus. By introducing sustainability in a cross-cultural context, WERC will partner with tribal, community members and educators to support professional development opportunities for teachers and learning experiences for students.

A historical and cultural-based approach will allow students and teachers to see how these factors influence the choices we make regarding the environment, and the effects these influences bring forth. These issues are important, particularly in New Mexico, because cultural practices and beliefs play a significant role in how environmental issues are taught and addressed.

WEA 2006 will be in Taos, New Mexico July 16-21 and will be hosted by Northern New Mexico College. Registration deadline date is May 26, 2006. Teacher-student teams will participate with mentors from WERC, Los Alamos National Laboratories, NM Environmental Department, U.S. Forest Service, and state and tribal agencies in a variety of activities. The program is free and participant lodging and meals are provided.

“The primary value of WEA,” said K-12 programs director, Bryan Swain, “is the opportunity to introduce high school students to new things around them that they may have never realized the importance of before.”
NMT Professor Advances toward Refined Water Conservation Strategies

Principal Investigator Jan Hendrickx, professor of hydrology at the New Mexico Institute of Mining and Technology (NMT), is conducting WERC-funded research to increase the effectiveness of water-conservation strategies for New Mexico.

Since New Mexico is an arid state with scarce water supplies, the development of successful water resource strategies is vital. Several studies have indicated the replacement of non-native vegetation, such as Salt Cedar and Russian Olive, by native vegetation, such as Cottonwoods, will reduce water use in riparian areas, areas of vegetation directly separating land from water, and enhance river flows.

To gauge the success of riparian land reclamation, studies have attempted to comparatively measure water use of native and non-native vegetation. Because the evapotranspiration (the sum of evaporation and plant transpiration) of riparian vegetation depends on both plant species and soil water retention, the measurement of consumptive water use in New Mexico is hard to determine.

Dr. Ghassemi was asked to speak on behalf of WERC and NMSU; he acknowledged WERC’s continuing participation in Diné environmental research and training projects and thanked the congressional delegation for their support of Diné, The Higher Education Institute of the Navajo. Ghassemi emphasized the importance of weaving environmental and human-health issues into the evolving context of technology and culture. McCain pledged to continue to work with New Mexico to support environmental sustainability, and applauded efforts undertaken by Diné College in environmental training and education. Domenici highlighted the importance of supporting the vision of WERC and Diné. He stressed the significance of maintaining the stream of resources needed to support infrastructure and development, particularly in the Southwest.

“As demonstrated throughout history, education is the key to set people free and Domenici established the WERC program based on that principle. We are excited to be a part of this outstanding endeavor in training the next generation of scientists, engineers and policy-makers,” Ghassemi said.

“Since no two sites are equal, water use of vegetation at adjacent sites cannot be adequately compared,” Hendrickx said.

To overcome this obstacle, his solution is to measure consumptive water use before the removal of nonnative vegetation and compare this information to data collected after the reestablishment of native vegetation at the same site.

To do this, Hendrickx has adapted the Surface Energy Balance Algorithm for Land (SEBAL) to New Mexico conditions for the prediction of evapotranspiration rates in the landscapes in question. SEBAL, using satellite imagery from Landsat and measurements of wind speed, is based on surface reflectivity, temperature and vegetation index.

Once locations have been identified where nonnative vegetation has been removed, Landsat analysis can determine previous and current evapotranspiration rates. SEBAL can then be used to predict future evapotranspiration of the same site. Once the data is collected and compared, the resulting information will indicate whether or not current reclamation strategies are worth the state’s money and time. Hendrickx is currently utilizing this technology to map the rate of evapotranspiration in the Middle Rio Grande Basin. “We have confidence in the accuracy of the rates we find,” Hendrickx said. “The next step we must take is to utilize the tool for the benefit of the state.”

This information is valuable to many agencies, including the State Engineer’s Office for the proper development of water conservation strategies. The knowledge gained from Hendrickx’s research will facilitate New Mexico in planning for the devotion of adequate resources for the completion of water budgets for all major river systems and water systems.

“The issue of water conservation is a very relevant and growing concern in today’s society,” Executive Director Abbas Ghassemi said. “Research with the potential to advance and refine water conservation strategies will have great long-term effects on our national and local communities.”

On November 13 last year in Washington, D.C., WERC Executive Director Abbas Ghassemi, Jim Bickel, Associate Director and Chris Campbell, Pollution Prevention Manager, represented WERC at the Diné College Congressional Reception in the Senate Indian Affairs Hearing Room in the Russell Senate Office Building. WERC consortium partner, Diné College and members of the Navajo Nation, promoted a number of legislative initiatives at the reception. Guests included Sens. Pete Domenici, (R-NM) John McCain, (R-AZ) Rep. Rick Renzi (R-AZ) and their staff and interns.

On March 19th, 2008, Senator John McCain and Congressman Steve Domenici (R-NM) hosted a dinner in honor of WERC and the Diné College Environmental Institute (DCEI) for a reception at the Russell Office Building in Washington, D.C. On March 20th, 2008, the two Senators held a Diné College Environmental Institute (DCEI) hearing in the Senate Indian Affairs Committee. The Diné College Environmental Institute (DCEI) is part of Diné College and is a WERC funded program. WERC presented updates on the progress of the Diné College Environmental Institute (DCEI) and Dr. Abbas Ghassemi, the WERC Executive Director, addressed the importance of Diné College Environmental Institute (DCEI) to the Navajo Nation at the hearing.

Since New Mexico is an arid state with scarce water supplies, the development of successful water resource strategies is vital. Several studies have indicated the replacement of non-native vegetation, such as Salt Cedar and Russian Olive, by native vegetation, such as Cottonwoods, will reduce water use in riparian areas, areas of vegetation directly separating land from water, and enhance river flows.

To gauge the success of riparian land reclamation, studies have attempted to comparatively measure water use of native and non-native vegetation. Because the evapotranspiration (the sum of evaporation and plant transpiration) of riparian vegetation depends on both plant species and soil water retention, the measurement of consumptive water use in New Mexico is hard to determine.
Kay Perkins: Woman of The Hour

She has been with the WERC program for 14 years, headed the Environmental Design Contest for 13 of those years, and drives a Vespa motor scooter named Vinny to work every morning. The woman is none other than the vivacious Kay Perkins.

Perkins joined the WERC program after she applied for the position of working with the Environmental Design Contest and got the job. By her second year, she headed one of the largest events at New Mexico State University, now celebrating the 16th Annual Environmental Design Contest (EDC).

The title Program Facilitator does not quite do Perkins justice. In short, she runs the Design Contest. Perkins handles everything related to the EDC from the smallest detail to keeping close contact with students, teachers, and judges from all over the United States involved with the Design Contest. “The networking that goes on is priceless, between the students and the teachers and the judges, I’m smack dab in the middle of it. It’s so cool,” Perkins said, “it really is the best part.”

The Environmental Design Contest has changed a lot since the first Design Contest. From being a half-day event consisting of six tables in the first year, to having over 190 university and high school students, representing 32 teams from across the United States, China, Canada and Mexico during the 2005 competition.

“Putting on an event this big is never easy,” Perkins said. She recalls the Design Contest several years ago when an 80 mph wind almost caused the contest tent to fly away. Because the wind was so fierce, the University Physical Plant personnel sent several strong employees equipped with sledgehammers to circle the tent and make sure it stayed down. “We had to make some quick changes,” she said. “That was scary.”

Changes, Perkins cites, are a big part of being a program facilitator. In fact, her advice to a newcomer heading the Design Contest comes in one word, flexibility. “Things change all the time and every detail seems to require flexibility,” advises Perkins.

For Perkins, the Design Contest has not only been a large part of her life for 14 years, but it has also proven to be a tremendous learning experience each year. Working with college students, judges, and teachers that come to the EDC has been Perkins favorite part of her job. Perkins said she realizes the importance of the environment and is confident that this generation will make great strides to better it. “That’s what these students are doing,” she said about those who participate in the international competition.

Perkins recently decided to take a motorcycle class after getting tired of planning her meetings around the parking lot to get a parking space. Now she does not have to worry about finding parking. She is currently driving an Italian Vespa, which she fondly named Vinny. “When you see something you think should be done or you’d like to do, you need to do it,” explains Perkins. “Lots of things need to be done in this world and I think you need to not say, ‘oh, I don’t have time,’ you need to do it.”

Cessna Baca
Brian Barrick
Luigi Caiani
Kacey Cubine
Thomas Erbes
Jerome Fisher
Kassidy Gonzales
Michaela Gorspe

Jason Hansen
Jon Hawthorne
Philip Kopf
Arturo Leyva
Maria Leyva
Tiffany Lovato
Ricardo Maestas
Aous Manshad
Denette Martinez
Luis Onsurez
Larisa Pachecho
Sharareh Reihani
Andres Sanchez
Sara Shannon
Todd Tillman
Rose Ann Vasquez

NMSU, NMT and UNM Fellowship Recipients

Fall Courses 2006

WERC 200
Introduction to Environmental Fundamentals
WERC 300
Introduction to Pollution Prevention & Its Application
WERC 301
Introduction to Nuclear Energy Technology
WERC 330/530
Environmental Management Seminar I
WERC 350
Introduction to Energy, Environment and Risk Assessment
WERC 491
Sustainable Design & Construction – offered through UNM
WERC 495
Selected Topics
WERC 595
Special Topics
NMSU, NMT and UNM Fellowship Recipients

Affected by the new arsenic standard

Water Technology Partnership workshop

October 11, 2005 – Albuquerque, NM:
WERC partners, training coordinator and staffers Barbara Valdez, Jim Loya, and Steve Moates conducted the Summer Environmental Academy in Ruidoso. The academy was attended by 19 teachers and 17 high school students from 17 schools across the state.

September 2005 – Socorro, Albuquerque, Las Cruces, NM:
Thirteen fellowships were awarded at New Mexico Tech (NMT) – a total of $4,450. NMT added 10 new students to the program. Six fellowships were awarded at the University of New Mexico for a total of $4,500. Six new students at UNM are participating. NMSU awarded 19 fellowships for a total of $7,400.00. Sixteen new NMSU students were added to the program.

September 12, 2005 – Las Cruces, NM:
WERC Researcher, Dr. Carl J. Popp of New Mexico Tech, submitted his final report for his seed project entitled, “Atmospheric Haze in New Mexico: Preliminary Analysis and Characterization of Particles and Gaseous Species to Determine Precursors and Sources.” This grant provided support for obtaining and analyzing field samples from a remote site in central New Mexico to use as a basis for statistical analysis and to provide data for a future research proposal submission.

September 15, 2005 – Las Cruces, NM:
WERC Researcher, Dr. Shuguang Deng of New Mexico State University, submitted his final report for his seed project entitled, “Microwave Synthesis of Metal-Organic Framework (MOF) for Hydrogen Storage.” The research project was carried out to build the infrastructure for hydrogen storage research at New Mexico State University.

October 11, 2005 – Albuquerque, NM:
WERC staff members, Abbas Ghassemi, Fernando Cadena, and Chris Campbell, as well as WERC former graduate student Peter Nathanson, hosted an Arsenic Water Technology Partnership workshop at the NMSU Albuquerque Resources Center. Thirty-eight representatives from 19 different New Mexican water systems affected by the new arsenic standard were present. Water operators and Board members from all regions of the State and the Navajo Nation attended. The Partnership unveiled its comprehensive cost tool (CoAsT) for system operators and others to input data from their system into a computerized decision-tree format, which is designed to choose the best and most cost-effective route to compliance.

October 14, 2005 – Anthony, NM:
Training Coordinator, Bryan Swain and WERC staff members Barbara Valdez, Steve Moates and Kay Perkins, and Peter Nathanson, conducted the 2005 Community Water Education Festival, hosted by Gadsden Middle School. The event, which featured the theme “Water-Every Drop Counts” served 1,258 students and teachers.

October 19-20, 2005 - Las Cruces, NM:
Seven fellowship students attended the 50th Annual New Mexico Water Conference held at Corbett Center at NMSU. The students attended presentations on water law, policy, demand, quality, and agricultural water use, as well as a panel discussion on the role of water in economic development and land use.

November 27-30, 2005 – Durango, Mexico:
Dr. Fernando Cadena, WERC’s esteemed visiting faculty member, attended the 17th Congreso Internacional de Ingeniería Civil y Arquitectura (International Congress of Civil Engineering & Architecture,) where he gave two presentations on arsenic and received broad media coverage. The presentations included an overview of arsenic regulations, health and treatment technologies, Point of Use/Point of Entry and the use of the WERC-developed arsenic decision tool, CoAsT.

January 12-13, 2006 – Santa Fe, NM:
WERC staff member Chris Campbell participated in the New Mexico Environment Department (NMED) Pollution Prevention Workshop attended by approximately 50 officials from NMED and the City of Santa Fe.

January 28, 2006 – Farmington, NM:
In partnership with International Project WET, Bryan Swain provided a specialized watershed workshop for 29 educators from the Navajo Nation, the New Mexico Four Corners region and Southern Colorado. Participants were trained on classroom implementation of the new Project WET curriculum, Discover a Watershed: The Colorado River.

February 4, 2006 – Las Cruces, NM:
WERC Training Coordinator Bryan Swain conducted specialized 40-Hour HAZMAT training for 18 university engineering, environmental and health science students. The credit-awarding EPA course, Emergency Response to Hazardous Material Incidents [EPA 165.15], provided instruction in identification of hazardous materials, team response capabilities, selection and utilization of protective clothing, and tactical skills for incident response. This training was presented in collaboration with Dr. April Ulery, NMSU Soil Sciences, College of Agriculture.

February 6-8, 2006 – Albuquerque, NM:
Representatives from five health care facilities in northern New Mexico attended a full-day training on pollution prevention and other environmental topics at the NMSU Albuquerque Center. The workshop was co-sponsored by WERC/NMSU, Hospitals for a Healthy Environment (H2E), the New Mexico Hospitals and Health Systems Association (NMHHSA), New Mexico Environment Department and the City of Albuquerque.

February 15, 2006 – Albuquerque, NM:
WERC published the 2006 Environmental Art Contest calendar. It highlights the winning artwork of 12 students from the 2005 WERC Environmental Art Contest. The calendar is available in hard copy from WERC or can be seen and downloaded from the WERC web site at http://www.werc.net/outreach/K-12_programs/art_essay_contest.htm.
WERC was established in 1990 through a cooperative agreement with the U.S. Department of Energy. Partner institutions include New Mexico State University (WERC headquarters), the University of New Mexico, the New Mexico Institute of Mining and Technology and Diné College, in collaboration with Los Alamos and Sandia National Laboratories.

For more information, contact Dr. Abbas Ghassemi, Executive Director, 800.523.5996, or visit www.werc.net.

### 2006 Calendar of Events

<table>
<thead>
<tr>
<th>DATE</th>
<th>EVENT</th>
<th>LOCATION</th>
<th>INFORMATION</th>
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<tr>
<td>March 11</td>
<td>SWNM Regional Science &amp; Engineering Fair</td>
<td>Las Cruces, NM</td>
<td>Karen Mikel</td>
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<tr>
<td>March 21</td>
<td>NM Rural Water Association Annual Conference</td>
<td>Albuquerque, NM</td>
<td>Peter Nathanson</td>
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<td>April 2-6</td>
<td>16th Environmental Design Contest Colloquium and Luncheon Engineering and Technology Career Expo Awards Luncheon Collegiate Entrepreneurs 2006 Business Plan Competition</td>
<td>Las Cruces, NM</td>
<td>Kay Perkins</td>
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<td>April 4-5</td>
<td>Environmental Team Project Competition</td>
<td>Las Cruces, NM</td>
<td>Jim Loya</td>
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<tr>
<td>April 5</td>
<td>Environmental Essay Contest</td>
<td>Las Cruces, NM</td>
<td>Jim Loya</td>
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<tr>
<td>April 12</td>
<td>Arsenic Affected Systems Workshop</td>
<td>Window Rock, AZ</td>
<td>Peter Nathanson</td>
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<td>April 17-20</td>
<td>EPA Region 6 Pollution Prevention Roundtable</td>
<td>El Paso, TX</td>
<td>Chris Campbell</td>
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<td>June 5-July 21</td>
<td>PREP - Pre-freshman Engineering Program</td>
<td>Las Cruces, NM</td>
<td>Karen Mikal</td>
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<td>July 16-21</td>
<td>Summer Academy</td>
<td>Taos, NM</td>
<td>Bryan Swain</td>
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<tr>
<td>August (TBA)</td>
<td>Environmental Art Contest Submission Deadline</td>
<td>Las Cruces, NM</td>
<td>Jim Loya</td>
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For more information, call the appropriate contact at 800.523.5996, or visit www.werc.net.

In late June last year, Environmental Design Contest Oral Presentation teams and their faculty advisors from Louisiana State University, the University of Arkansas and Clarkson University, presented design-project findings to federal agencies sponsoring the teams’ competition tasks. WERC Executive Director Abbas Ghassemi and Program Facilitator Kay Perkins supported the teams in their presentations to the U.S. Food and Drug Administration, the U.S. Department of Agriculture and the congressional staff of the team’s respective states.

Design Contest judges selected top competitor teams based on the applied solutions devised for specific tasks. “This experience exemplifies the excellence that arises when students apply ingenuity in the Design Contest...in solving problems facing our nation and benefiting the scientific community at the federal level,” said Ghassemi.

“Having the opportunity to travel to DC afforded me valuable insight on how scientists and policy makers, now more than ever, need to find a common ground to address issues such as carbon emissions. Effective policy is only possible through full understanding of the issues at hand. Without an open dialogue between scientists, and even student scientists, policy makers may miss certain technical aspects of an issue.”

~~ Chemical Engineering Senior, Jordan Winkler of Clarkson University