

FORESIGHT

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Wyoming T²/LTAP Studies
Roads, Roads & More Roads
(see story, page 3)



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FROM THE ASSOCIATE DEAN

July 1st began my five-year term as the associate dean of academic programs. I am honored to carry on the tradition of academic service established by those that came before me including Dick Schmidt, Dave Whitman, and John Steadman. Dick has provided a number of long lasting contributions to the College including the International Engineering Program, Engineers Without Borders, and start up of the Center for Student Services. His contributions and legacy will be enjoyed by students for many years to come.

My career at UW began in 1999, when I joined the faculty of the Electrical and Computer Engineering Department. Prior to coming to UW, I served 20 years in the U.S. Air Force. For approximately one half of my AF career, I served as a faculty member at the United States Air Force Academy. Both of my parents also served in the military. My wife Cindy and I have three adult children who have completed college. I've learned a lot during their college years that will help me assist students and parents with the challenges of college life.

Excited to join the Center for Student Services team which includes Susan McCormack, Lindy Johnson, and Ryan Kobbe, I am committed to continuing the "student first" approach. You will not find a more dedicated group of professionals who care deeply about students and their welfare. We will continue to provide student assistance in recruiting, orientation, retention, scholarships and job placement and are exploring initiatives to increase recruiting efforts throughout Wyoming. Additionally, we will take an active role with ongoing accreditation efforts.

Professionally, I am a strong proponent of engineering licensure having served as a PE exam writer for seven years as well as currently maintaining responsibility for the PE examination for computer engineering. I serve as an ABET accreditation evaluator, will continue to teach engineering courses on a regular basis, and maintain an active research program with Dr. Cam Wright on analog vision sensors. I especially enjoy working with undergraduate students early on so they continue their education through our graduate programs.

Enough about me...This issue of "Foresight" highlights a number of exciting news items and initiatives within the college. Read about significant upgrades to King Air Research Aircraft, the Wyoming Technology Transfer Center's 20 year efforts serving the Wyoming transportation community, development of cutting-edge techniques in coal based clean energy, and honoring the achievements of some of our esteemed graduates.



Chris Isaacson, electrical engineering major from Casper, Wyo., seeks senior design project assistance from Dr. Barrett, UW photo.

In closing, I am committed to our College's strong legacy of quality and personal undergraduate education. It is no surprise that UW was recently named within the "Best 373 Colleges" by the Princeton Review. Many of you have warm and pleasant memories about your time within the college. Please help to continue this legacy. Your financial support large or small will go a long way toward keeping the College on top!

Steven F. Barrett (Steve), Ph.D., P.E.
Associate Dean for Academic Programs

Persons seeking admission to the University of Wyoming shall be considered without regard to race, color, religion, sex, national origin, disability, age, veteran status, sexual orientation, or political belief.

FEDERAL STIMULUS FUNDS AID UW'S KING AIR

Courtesy of UW News Service

The university's uniquely-instrumented King Air research aircraft, with numerous specialized meteorological sensors and data recording equipment, has undergone a transformation thanks to a recent \$470,000 injection of federal stimulus funds from the National Science Foundation (NSF).

The funding helped facilitate upgrades to instrumentation, radar and the aircraft itself -- highlighted by the acquisition of a 4-bladed propeller system that will improve King Air's efficiency and performance.

"These are all enhancements," says Al Rodi, director of UW's Donald Veal Flight Research Center and head of the Department of Atmospheric Science in the College. "It's not that we'll be doing anything we haven't done in the past. It just lets us do what we already do, only better."

Ironically, Tristan LeCuyer, a researcher from Colorado State University -- UW's chief athletics rival -- will have the first opportunity to try out the newly-upgraded King Air. The twin turboprop is headed to Finland next month for a six- to eight-week, NASA-funded research project.

This will be just the latest international expedition for King Air, which has logged about 7,000 air hours since debuting in 1977, visiting Hawaii, Japan and Saudi Arabia, among other places. Its' predecessors, a twin-engine Beechcraft in the 1960s and Queen Air in the early '70s, helped establish UW as a premier airborne research university. The recent upgrades will only strengthen UW's reputation.



UW's King Air at the Veal Flight Research Center, UW photo.

In addition to the 4-bladed propeller system, which also serves to reduce or eliminate the production of aircraft produced ice particles that can contaminate measurements in the clouds, King Air's avionics were equipped with an XM weather interface that offers near real-time monitoring of Next-Generation Radar, or NEXRAD, a network of 159 high-resolution Doppler weather radars operated by the National Weather Service.

The other additions comprise upgrades to King Air's basic instrument package -- including a new integrated inertial measurement unit to provide improved accuracy, precision and frequency to measurements of aircraft attitude and velocity -- and an upgrade to the Wyoming Cloud Radar that will improve accuracy of airborne Doppler velocity measurements and the system's polarization capabilities.

The NSF grant to aid upgrades to King Air was one of 21 awards, totaling more than \$10 million, to UW last year in areas of advanced scientific research, scholarship advancement and outreach.

CONTENTS

Wyoming T2/LTAP Studies Roads, Roads & More Roads.....	3
What is Building Information Modeling?	5
Coal Based Clean Energy, Not Just a Dream	7
Hall of Fame Class of 2010.....	9
Green River Basin Water Research.....	11
H.T. Person Lecture: Deepwater Well Design.....	13
Homecoming Weekend Events.....	15
Faculty and Staff Highlights	16
In Memoriam	17
Alumni Highlights	18

ON THE COVER:

Wyoming Technology Transfer Center (WYT²/LTAP) summer interns and senior civil engineering students Burt Andreen (right) of Casper, Wyoming (UW) and Cody Kalivoda from Olathe, Kansas (Kansas State University) collect data for road profiler studies under the direction of Dr. Khaled Ksaibati, courtesy photo.

WYOMING T²/LTAP STUDIES ROADS, ROADS & MORE ROADS

Courtesy of WYT²/LTAP

The Wyoming Technology Transfer Center (WYT²/LTAP) has been serving the transportation community in the state of Wyoming for over 20 years. Dr. Khaled Ksaibati, Director of the Center, started working for UW in 1990 after finishing his graduate education at Purdue. He also worked for the Indiana DOT as a pavement structural engineer prior to coming to Wyoming. Other full-time staff members at the Center include: George Huntington, Bart Evans, and Mary Harman. Several undergraduate and graduate students are employed by the Center on a regular basis.

The WYT²/LTAP Center sponsors more than 36 workshops and training sessions every year. These workshops cover a variety of timely topics such as work zone safety and traffic control, design and maintenance of gravel roads, pavement management systems, concrete pavement design, winter survival and the annual Transportation and Safety Congress. In addition to the general training sessions, the Center provides transportation professionals around the state with certification training in aggregate, asphalt, as well as concrete. Last year, there were over 900 workshop participants from all 23 counties in Wyoming. The Center also maintains a lending library that includes relevant publications, manuals, and training videos, and is available to all residents of Wyoming.

The Center is sponsoring a number of research projects which are useful to transportation professionals around the state, regionally, and nationally. One of these studies concentrated on developing the methodology for the Wyoming Rural Road Safety Program (WRRSP) with funding from WYDOT and FHWA and in cooperation with Wyoming counties. The primary objective of this study was to help counties



The WYT²/LTAP Center conducts research on gravel roads within the State, courtesy photo.

identify high risk rural locations, and then develop a strategy to obtain funding for the top-ranked sections to reduce crashes and fatalities on rural roads statewide. The methodology developed in this project has been presented nationally at the Transportation Research Board Annual Meeting and the National LTAP Association annual meeting. Workshops and presentations have also been given in Wyoming and throughout the broader Mountain-Plains region.

Additionally, the Center identified a need for a management methodology for unsealed dirt and gravel roads suitable for small local agencies. It also developed the methodology for a Gravel Roads Management System (GRMS), which provides two outputs. The first output provides elected officials with useful information that lets them make good financial decisions. The second output provides road managers with information that helps them maximize the efficiency of gravel road maintenance and rehabilitation. The next phase of this study involves the implementation of the developed methodology in three Wyoming counties.

“Applied and relevant research conducted by the WYT²/LTAP Center faculty, staff, and UW students can help make Wyoming roads safer and more efficient.”

**Khaled Ksaibati, Director
Wyoming Technology Transfer Center**

Recently, the WYT²/LTAP Center started a new study to evaluate the validity of automated data collection methods used to determine the shoulder slope and drop off. Pathway services' shoulder drop off sensor technology is on the cutting edge of road profiler data collection methods. Network level testing of this sensor will help to determine the validity of the data collected. The sensor will be tested on five different sections of highway in Wyoming. This kind of testing is critical in determining the usefulness of the data to WYDOT.

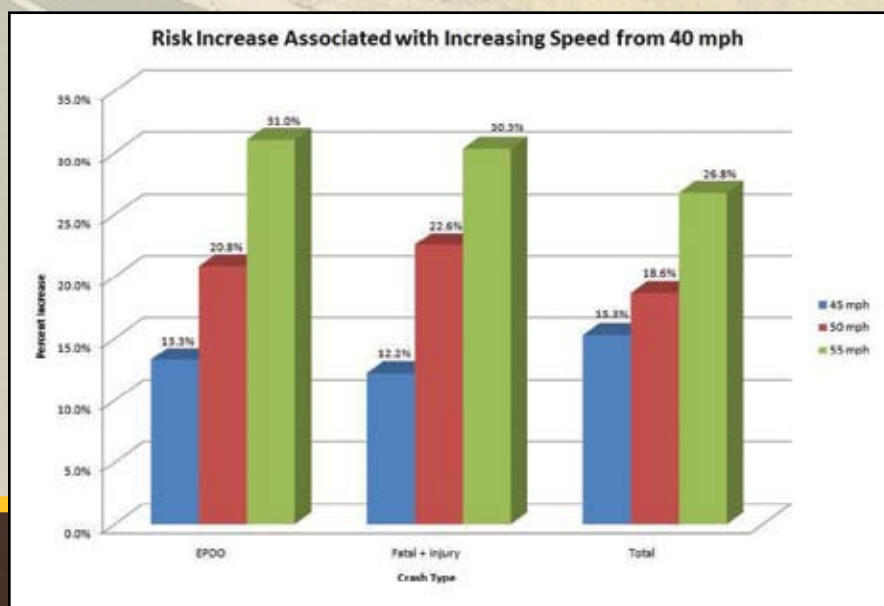
Another recent study addresses speed limits on gravel roads. The default speed limit of Wyoming gravel roads without a posted speed limit is covered under the same speed laws as the state highway system. The default statutory speed limit is 65 mph on all local gravel roads throughout the state. It has become a concern that excess speeds on gravel roads are unsafe, cause unnecessary road damage, and are irresponsible. This study was conducted to determine whether or not the speed limit should be altered. Speed and crash data were collected on gravel roads in eight counties throughout Wyoming.

Traffic counters were placed on 83 roads to collect the necessary information to conduct the study. The speed data collected included the average, 50th percentile, and 85th percentile speeds as well as vehicle counts. Crash data were then collected from the Critical Analysis Reporting Environment (CARE 9) database on the number of fatal, injury, and property damage only crashes on those road sections. The state of Wyoming is moving forward to

reduce the default speed limit from 65 to 45 mph on gravel roads in Wyoming.

In another project, the WYT²/LTAP Center and two Wyoming counties investigated the use of Recycled Asphalt Pavement (RAP) in gravel roads. The Wyoming DOT along with the Mountain Plains Consortium funded this study. The investigation explored the use of RAP as a means of dust suppression, and considered its effect on road serviceability. Test sections constructed in two Wyoming counties were monitored for dust loss. Surface distress evaluations of the test sections were performed using a technique developed by the U.S. Army Corps of Engineers. The data collected were summarized and statistically analyzed. The results of the contrast analysis allowed for fundamental conclusions and recommendations to be made for RAP and its ability for dust suppression. It was found that RAP incorporated into gravel roads reduces dust loss. Other counties and agencies can expand on this research to add another tool to their toolbox for dust control on gravel roads. More test sections will be built in Sweetwater County to confirm the findings of this study.

These and other programs have been success stories, showing how applied and relevant research conducted by the WYT²/LTAP Center staff, faculty, and UW students, help make Wyoming roads safer and more efficient. More detailed information on these and other studies can be found at the Center's website: www.eng.uwyo.edu/wyt2.



WHAT IS BUILDING INFORMATION MODELING?



Tal Wammen, civil engineering student, at the top of a rocket engine test stand at NASA, courtesy photo.

By Tal Wammen

Building information modeling (BIM) has recently become a valuable technology in the facilities industry. BIM is a building design and documentation

process solely based around high quality data that allows design and construction teams to generate and manage information about the project, across its entire scope. Increasingly popular, BIM is changing the process, product and delivery requirements of the facilities industry.

Traditionally, the design process was made up of manually created, two-dimensional drawings. This has evolved into the use of computer aided design based software, which automated this procedure. BIM is a completely different method. Using the traditional route means handling several 2D drafts of the projects, while BIM allows designers and contractors to work with a single 3D model. This model handles all of the tasks the 2D drafts are required to do, plus numerous other assignments. The idea of the BIM model is to allow professionals to explore a project's key physical and functional characteristics digitally, before it is built, and be able to interact with it during the entire building process.

BIM is not just a 3D model - it is a process of carrying out a design, from the original design development, to the actual construction of the project. Every bit of information gathered from start to finish is placed in the model. This means that all of the design data from structural, mechanical, civil, electrical and architectural engineers are entered into the same model in which the financial, planning and legal information is stored. This way, everyone who has access to the model can locate any category of data that they desire. The way this information is stored is key to the success of

BIM. With the traditional 2D CAD based process, designers produce the construction drawings. These 2D documents are then handed to the contractors through which bidding, estimating, detailing and the actual construction phase take place. With BIM, the designers and contractors can work together through the model to increase the efficiency of the project by eliminating interferences and decreasing change during construction. Construction detailing informs the design rather than following it, allowing issues to be addressed earlier, which improves the quality of the project and lowers its costs. For this to be possible, a design/build contract format would be required. A key point in BIM is interoperability. Communication between each discipline is the only way BIM can be used successfully. The construction drawings, environmental conditions, procurement details and submittal processes make up BIM's fine details. If fully utilized, BIM provides the opportunity to prevent any information loss between the design team, construction team and owner. Each group has the luxury of referring back to the information in the BIM model.

With BIM, the pros certainly outweigh the cons. Though you will not have immediate results, once your BIM process gets up to speed, it is proven to increase your productivity. Sometimes change can be difficult, and because BIM is fairly new, it will take time to realize its advantages. Let's take a look at some of its strong points.

Advantages of BIM

- BIM allows for more flexibility from the design of the project to the actual construction. It enables designers, contractors and owners to work through the model together to implement changes easily and efficiently.
- Changes are made easy in each phase of the model with BIM. Instead of going back to the drawing board, you simply change it in one place and the changes flow through all of the affected details. When you alter a dimension or property of a component, it is recognized by the model, and it modifies every database that deals with that element. This helps avoid any conflicts down the road that would normally slow the building process.

"BIM has the potential to become the leading technology of the building industry."

Tal Wammen

Civil Engineering Student from Reva, S.D.



Kendra Heimbuck, graduate student in architectural engineering from Green River, Wyoming, demonstrates BIM in a UW laboratory, UW photo.

- The model has the technology to produce several user-friendly documents needed during the course of a project. A typical design project (\$10 million or more) can contain over 50,000 pages of documents. With BIM, all you have is the model, from which any one of these documents can be produced. This feature can eliminate field or shop drawings by having parties work within the shared model. Two-dimensional and 3D pdf files can also be generated to give the owner or employees better visualizations of the design process.

- BIM offers the ability of specialized analysis tools to extract data from the design process to perform valuable analysis. Different fields of work (i.e. architects, transportation engineers, environmental engineers, etc.) use this capability for different tasks. Any category of data needed can be obtained from the work done in a BIM process. Every field has the ability to speak the same language regarding the model, from the lead architect in the design even to the project's insurer.

Disadvantages of BIM

- Errors in accuracy - since the model is the core of the project, just one error in precision can be very costly. With today's project method, there are several different sets of plans that can be used to check one another and

prevent such mistakes. With BIM, the plans are generated from the model, so they all reflect the same data, making it harder to catch small miscalculations that can lead to bigger problems.

- BIM technologies, such as training, software costs and required hardware upgrades, are costly and it takes a lot of time to implement them into an existing process. Adequate training is needed in different areas, and levels of expertise can vary. The problem here is that because such a large amount of data is exchanged among team members, there is the risk that any weak link in the group could endanger the entire project. Also, staff buy-in is crucial to the success of BIM.

BIM is a growing technology. Though it has its disadvantages, one positive fact to focus on is the future. BIM has the potential to become the leading technology of the building industry, and it is in the interest of most firms to begin their conversion toward its processes. The more BIM is used, and the more data collected and stored during the life of a project, the more benefits can be leveraged. As users gain proficiency with BIM, they will increasingly benefit from the technology's potential and push for new ways to gain advantages in every area of the project.

COAL BASED CLEAN ENERGY IS NOT JUST A DREAM



Dr. Tiberiu Popa with a lab-scale catalytic coal gasification research setup in the College, UW photo.

By Thyra Page

Increasing dependence on international energy resources has made domestic fossil fuels more attractive. Estimated reserves of coal in Wyoming are 68.7 billion tons, sufficient to contribute to the US energy portfolio for 60 years. Wyoming coal has been considered to be a dependable candidate as possible gasification feedstock. People are increasingly interested in using coal for more diversified products, such as transportation fuels, hydrogen (H₂), as well as for improved electricity generation.

Recognizing that enormous research and development is necessary to address technical as well as environmental issues of clean coal technologies, the State of Wyoming has launched a major initiative to make the University of Wyoming a leader in coal science, technology, and education. This initiative engages the College of Engineering and Applied Science, especially its Department of Chemical and Petroleum Engineering (CPE), and the School of Energy Resources (SER).

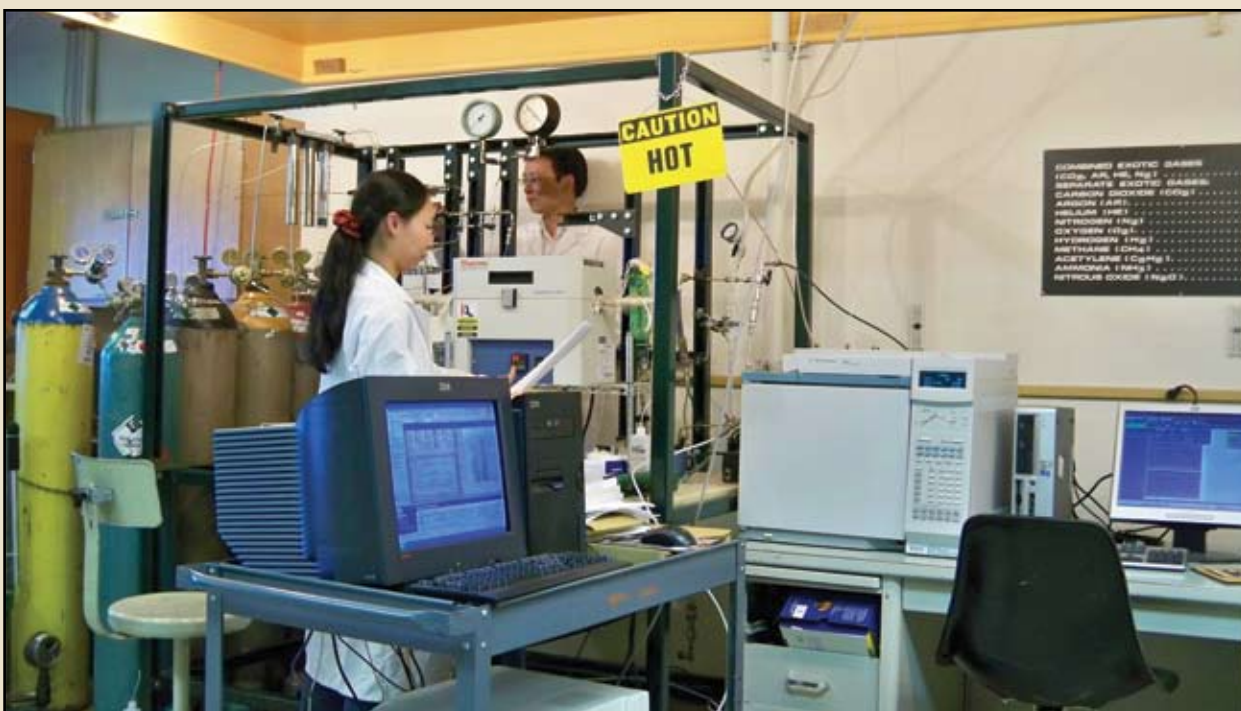
Engineering Associate Professor Maohong Fan has been working with his research colleagues on various clean coal technologies associated with both conventional coal-fired and future integrated gasification combined cycle (IGCC) based power generation systems. These works are being supported by various federal funding resources (e.g., the National Science Foundation), state agencies (e.g., SER and California Energy Commission), and major industrial companies (notably FMC Inc.). Funding of his currently contracted research projects at UW total more than \$4M.

One of his current research activities in his labs is the development of a cost-effective catalytic gasification process for future IGCC based power generation systems. IGCC plays a major role in coal-based H₂ production and utilization. It involves two operational systems, gasification and combined cycle. The inputs of gasification unit are coal, oxygen/air and steam. Outputs of gasification unit are acidic syngas and ash.

"The energy industry is increasingly interested in using coal for more diversified products, such as transportation fuels, and improved electricity generation."

Maohong Fan, Associate Professor

Department of Chemical & Petroleum Engineering



Ph.D. student Ying Li (left) and Dr. Zhijian Mei conduct research on water gas shift reaction, used for generating H₂ from the syngas resulting from coal gasification, UW photo.

The syngas is cooled, cleaned and processed through water gas shift reaction to produce clean H₂ for combined cycle unit. The heat recovered through gas cooling system can not only be used to generate steam which is sent to steam turbine to generate electricity but also sent to gasification unit for use. The cleaned H₂ can be used to produce chemicals or sent to gas turbine in combined cycle to generate electricity.

Significant progress has been made with gasification. However, a major problem with coal gasification is the high demand for heat (thereby making the gasification energy intensive). It is a problem that has not been satisfactorily overcome. Dr. Fan's group is interested in using catalysis as an effective tool to reduce the gasification reaction temperature, and increase the rates of gasification reactions. The catalysts to be used should be readily available and inexpensive. This feasibility of of requirement has yet to be determined. In this regard, Dr. Fan's group is working with FMC Inc. in testing Trona based products as potentially major components of composite catalysts for coal gasification.

Dr. Fan's research group is also developing an inexpensive bimetallic gasification catalyst, expected to take the corresponding advantages of individual metal based catalysts while avoiding their disadvantages. Specifically, the bimetallic catalyst is expected to increase gas production, stay active for a longer period, is more resistant to poisoning. The synergetic effects of the bimetallic catalyst could be tuned by controlling its composition to increase the activity of coal and the selectivity of reactions towards preferred coal gasification products. Dr. Tiberiu Popa, a former NSF Graduate Fellow and a current postdoc, is doing this research.

Another research effort involving Dr Fan and his group is the search for new generation of water gas shift reaction (WGS) catalysts or nanocatalysts. WGS is an important process in IGCC system used for generating H₂ from the syngas resulting from coal gasification with the set-up shown in the photo above. Dr. Zhijian Mei and Ying Li (a Ph.D. student) are doing this development.

HALL OF FAME CLASS OF 2010

On September 18, the College of Engineering and Applied Science will honor Albert “Boots” Nelson, Paul A. Rechard, and H. David Reed as the newest inductees of the College Hall of Fame. All of these individuals are deserving of the highest honor the College bestows and will join 38 other alumni from the College that have entered the Hall of Fame since its creation.

The College Hall of Fame was established in 1997 to recognize outstanding graduates who have distinguished themselves nationally or internationally through their professional achievements and leadership in engineering. By honoring these deserving individuals at a luncheon ceremony on September 18, we wish to show appreciation to them for the distinction they have brought to the College and the University of Wyoming.

Albert “Boots” Nelson



Albert L. “Boots” Nelson was born of ranching parents in Jackson, Wyoming in 1933. In 1951, after graduating from Jackson/Wilson High School, he enrolled at UW in the College of Engineering and Applied Science. Boots’ education was interrupted by military service during which he served as a ski and outdoor

survival instructor in the Army Mountain Training Command. In 1956, Boots and his fiancée Bev were married and returned to Laramie to complete his degree program.

While in college, Boots worked part time at Banner Associates, a Laramie engineering firm. The experience molded his career. Leaving Banner in 1962, he became a field engineer for Questar in Vernal, Utah. In 1964, he founded

Nelson Engineering with offices in Green River and Jackson. Growing into one of the top engineering firms in the State of Wyoming, Nelson Engineering also opened offices in Idaho. Boots served as Director and then President of the American Council of Engineering Companies (ACEC) Wyoming and was also active in the Wyoming Engineering Society (WES) where he served as president. In 1993, one of his projects was named WES project of the year and it went to a national ACEC competition, an event he became involved with shortly after his participation.

The ACEC Engineering Excellence Award Ceremony is known as the “Oscar Awards of Engineering.” The program, judging, and award ceremony is managed by the ACEC Engineering Excellence Awards Committee. Boots served on that committee for ten years, and was chairman for two of those years. He is the first ACEC Wyoming member to be named a Fellow of ACEC.

Boots and Bev have four children, ten grandchildren, and one great-grandchild.

HALL OF FAME ROUNDTABLE

SEPTEMBER 17, 3:30 p.m.

Classroom Building Room 129

Join us for a panel discussion with the 2010 Hall of Fame on relevant issues affecting the inductees.

This event is open to the public.

HALL OF FAME INDUCTION CEREMONY

SEPTEMBER 18, 11:30 a.m.

Wyoming Union Family Room

RSVP by September 10 to engevents@uwyo.edu or call (307) 766-4248 for ticket information.

Paul A. Rechar

Paul Rechar's career developed through federal, state, interstate, academic organizations and finally, private enterprise. In 1949, he began as a water resource engineering with the Bureau of Reclamation. He then moved on to become director of Water Resources for the Wyoming Natural Resource Board and Interstate Streams Commissioner for the State in 1954, and after working for the passage of legislation authorizing the Upper Colorado River Storage Projects, became principal hydraulic engineer for the Upper Colorado River Commission in 1958. When Congress passed legislation in 1963, to establish water research programs in each state, UW called upon Paul to establish and direct the Wyoming Water Resource Research Institute (WRRI) and to be professor of civil engineering.



As a professor, Paul taught hydrology and established a graduate interdisciplinary degree program in water resources to foster dialogue among engineers, biologists, geologists, and environmentalists, such that each discipline would have knowledge of the others and thus discussions could grow from a common base of knowledge.

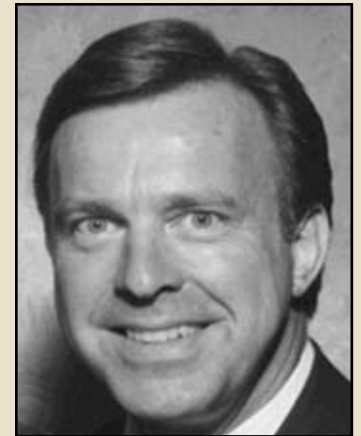
In 1980, Paul resigned from UW and co-founded the engineering consulting firm Western Water Consultants (WWC). During Paul's tenure as president of WWC, the organization grew to an engineering and environmental consulting firm employing approximately 60 people in Wyoming.

At the time of Paul's retirement in 2001, WWC was the largest Wyoming based engineering consulting firm with offices in Laramie, Sheridan, and Casper. To the extent possible, the firm employed graduates of UW with degrees in civil, agricultural, chemical, and electrical engineering as well as geology, range management, and accounting.

In 2007, in memory of his wife Mary Lou Rechar, Paul established the Mary Lou and Paul A. Rechar Endowed Fellowship in Civil Engineering for Water Resources to support a student seeking a graduate degree in civil engineering water resources. Along with Mary Lou, Paul has been an active alumnus, donor, and friend of the college since his graduation.

H. David Reed

Raised in Billings, Montana, H. David "Dave" Reed earned a B.S. in mechanical engineering from UW. Upon graduation in 1964, he joined the National Aeronautics and Space Administration (NASA) in Houston, Texas, becoming a mission controller responsible for tracking and trajectory dynamics. In this capacity he was the Flight Dynamics Officer for Apollo Flights 5 and 9, 11, 12, 13 and 14. He was the prime flight dynamics officer for Apollo 13 and was a joint recipient of the Presidential Medal of Freedom as a result of his contributions in the safe return of the crew. Reed was responsible for developing pin-point landing techniques which made focused lunar research possible. The Apollo 14 crew named a crater on the moon for Dave in recognition of his many contributions to the Apollo program.



Joining the U.S. Department of Transportation in 1971, he pioneered the introduction of integrated satellite communication systems, radio frequency identity tags and GPS positioning in the enforcement of UN sanctions against Serbia/Montenegro. Traveling world-wide in support of the multiple Government agencies, he employed these technologies in Bosnia, Haiti, Mogadishu, Somalia, S. Korea, and the Arabian Peninsula.

Dave who holds multiple patents retired in 1999, earned his MBA and then started a small manufacturing company. He remains active in community service and is a frequently sought to speak about his experiences.

Hall of Fame inductees have distinguished themselves nationally or internationally through their professional achievements and leadership in engineering.

GREEN RIVER BASIN WATER RESEARCH

Courtesy of Fred Ogden and Nawa Raj Pradhan

Estimation of consumptive water use for irrigation is increasingly important as demand for water resources increase and water supplies become scarcer and/or more variable in time and space as a result of both land use change and climate fluctuation. This is especially true in semi-arid and arid regions like Wyoming. Historically, water use has been estimated in irrigated lands by balancing surface water models—irrigation water input minus runoff output was assumed to be a reasonable estimate of water use by irrigators. But as discussions for water rights become contentious, more accurate estimates of evapotranspiration (ET) are needed.

Remote-sensing methods are increasingly employed in combination with modeling for evapotranspiration estimation because they can provide multi-temporal, spatially-distributed estimates of key variables based on spatially distributed measurement. The approach for estimating evapotranspiration with remotely sensed data couples thermal and optical remote sensing with energy balance models such as: SEBAL, Surface Energy

Balance Algorithms for Land, and METRICtm, Mapping Evapotranspiration at high Resolution using Internalized Calibration.

Ground-based reference evapotranspiration in combination of the satellite imagery derived actual evapotranspiration are particularly significant in:

- 1) deriving crop coefficient for estimation of the daily actual evapotranspiration which can then be applied to estimate the seasonal variation of the consumptive use (ongoing research);
- 2) deriving root zone soil moisture maps (ongoing research);
- and 3) testing the validity of satellite-based approaches for estimating ET over large areas such as the entire Green River Basin in Wyoming.

Thus, to conduct the research and the applicability on the above mentioned points, faculty members Dr. Fred Ogden and Dr. Nawa Raj Pradhan set up ground-based metrological stations, eddy-covariance and large-aperture scintillometer in the Green River basin, Pinedale, Wyoming.



“As discussions for water rights become contentious, more accurate estimates of evapotranspiration are needed.”

**Nawa Pradhan, Post Doctoral Assoc., Adjunct Professor
Department of Civil & Architectural Engineering**

Research data on the significance of the derived root zone soil moisture map in a distributed hydrological model will be presented by Pradhan et al. in a forthcoming Remote Sensing and Hydrology 2010 Symposium, in Jackson, Wyoming. Scintillometers were installed on July 7, 2010, in the Duck Creek meadow, west of Pinedale and that research data will be shared at a later date.

The main challenge in the energy balance approach used by Ogden and Pradhan is to determine the partitioning of the available energy, the difference between net radiation and ground heat flux, into latent heat flux and sensible heat flux. The energy balance approach utilizes a linear relationship between sensible heat flux and the radiometric surface temperature for all pixel conditions, wet and dry. We will test the validity of this generalized empirical relationship in the completely wet pixel, Duck Creek meadow wetland, with the eddy-covariance and large-aperture scintillometer sensible heat flux. This test would also help in comparative analysis of the applicability of scintillometers in the wetland fingerprint spectral region with that at the dry land. We will contribute our part of this research in 'Inter-Comparison of Large Aperture Scintillometers' by Hendrickx et al., in the upcoming Remote Sensing and Hydrology Symposium.

Theories of hydrological processes are sought for applications in regional water resources planning, in the amelioration of water quality and quantity degradation in large river basins, in the validation of general circulation models (GCMs) and in the prediction of the hydrological impacts of global climate change. Scale problems arise naturally when seeking connections among physical processes at disparate scales in space and time. In our research, we are taking account of data from a range of scales; point scale data from the eddy covariance system, data from wider fingerprint spectral region of scintillometers and the satellite imagery pixel resolution of 30m and more. It is hoped that this research outcome will hint at the proper notions of scale transformation in seeking generalization across scales of a theory, especially energy balance theory in evapotranspiration estimates.

The 2008–09 research was sponsored by the State Engineer's Office to study consumptive use of water in the Green River Basin. Although there was no funding this year, collaborative research continues using some funding from the US Army Research Office and equipment funding from the State of Wyoming and a grant from the U.S. Army Research Office. The laser scintillometer system is on loan from New Mexico Tech.

Background and photo on previous page show the experiment being conducted in cooperation with Steve Wolff of the Interstate Streams Division of the Wyoming State Engineer's office. The experiment compares an eddy-covariance system against a large-aperture radiometer in both measuring evapotranspiration and verification of satellite methods for estimating ET over the Green River Basin. This experiment was conducted this summer in Duck Creek meadow west of Pinedale, and was managed by post-doctoral associate Dr. Nawa Pradhan. Scintillometers (pictured on the right) are set up at Duck Creek in Pinedale, courtesy photo's.



DEEPWATER WELL DESIGN AND OPERATIONS

TOPIC OF H.T. PERSON LECTURE

On October 15, the College of Engineering and Applied Science will hold the annual H.T. Person Lecture in the College of Agriculture Auditorium beginning at 3 p.m.

Inspired by the impact former Professor, Dean, and President of UW, H.T. Person had on their lives, the members of the H.T. Person Endowment Committee set out to raise an endowment large enough to support a Chair that would be dedicated to teaching and bring unique learning opportunities to the college. The purpose of this lecture is to support that objective, and recognize and support efforts of the H.T. Person Endowment Committee and the splendid generosity of the donors who leave their own lasting legacy to their College and University.

Introducing the 2010 H.T. Person Speaker

Joe Leimkuhler

“Deepwater Well Design & Operations—Going Forward Post Moratorium”



Joe Leimkuhler is the Offshore Well Delivery Manager for Shell Exploration and Production – Americas, covering all Tension Leg Platforms (TLP), and Jack-Up based offshore well operations in the Americas. Over the last 28 years he has worked well Engineering and Drilling Operations in a variety of capacities. Joe’s prior assignments with Shell have included Subsea Development Manager for the Gulf of Mexico, and Deepwater Drilling Superintendent assignments on TLP, Drillship and Semi-Submersible well operations. Prior to taking on a management role, Joe served as the Project Drilling Engineer for the Mars development, and numerous Deepwater Exploration wells. Joe also served as an instructor at Shell’s Bellaire Research Center in Houston, Texas, where he taught Shell’s Drilling Engineering classes. He graduated from the University of Montana in 1981, with a B.S. degree in geology and graduated from UW with an M.S. in petroleum engineering in 1987. He is a member of the Society of Petroleum Engineers, serves on various university engineering advisory boards, including UW’s Department of Chemical and Petroleum Engineering, and is the past National President of the American Association of Drilling Engineers. Joe is the Chair of the 2010 Gulf of Mexico Deepwater Technical Symposium and also currently serves on the American Petroleum Institute Deepwater Joint Industry Task Force to address Deepwater well design operating procedures and safety.

“This year’s lecture enables our students to interact with a world-class expert regarding a complex contemporary topic—offshore drilling.”

**Rob Ettema, Dean
College of Engineering and Applied Science**

HONORING AN OUTSTANDING EDUCATOR

Hjalmar Thorval (H.T.) Person

During his remarkable career as Professor, Dean and President of UW, he touched lives, inspired his students and shaped the University of Wyoming College of Engineering and Applied Science. He was beloved and respected by his colleagues, his peers and most importantly by “his” students. He was called by some the “finest teacher I ever had.” His students remembered his ability to make a complicated subject understandable. Affectionately known as “Prof.,” he was a mentor, father figure, friend, and a teacher who listened, supported, and cared.



Inspired by the impact H.T. Person had on their lives, the members of the 1991 H.T. Person Endowment Committee successfully set out to raise an endowment large enough to support a Chair that would be dedicated to teaching. Eighteen years later we ask you to honor H.T. once more.

UW President Tom Buchanan designated the H.T. Person Chair Endowment as an endowment in memory of H.T. Person.

Ways to Give

By designating your gift to the H.T. Person Memorial Endowment, you will have an integral part in supporting a Chair in his memory that is dedicated to teaching. Excellence in teaching provides graduates the confidence and knowledge to meet the challenges of everyday life through life-long learning opportunities.

Corporate Matching Gifts—Many companies will match employees’ charitable giving with a gift of their own to institutions of higher education, and often match charitable contributions made by retirees.

Planned Gifts—The UW Foundation’s gift-planning staff assists donors in integrating charitable gifts into their financial, tax, and estate-planning objectives, maximizing benefits to both donors and UW (which is given to the College immediately).

Please consider giving a gift to keep H.T. Person’s memory alive by sending your H.T. Person Endowment designated gift to the UW Foundation, 1200 East Iverson Avenue, Laramie, Wyoming, 82070-4159, or contact Laura Baxter at 307-766-1802 or lbaxter1@uwyo.edu if you have any questions.

Our appreciation goes to the original donors who made this endowment possible and to those donors who have recently given to increase the memorial endowment.

HOMECOMING WEEKEND

OCTOBER 15-16, 2010

FRIDAY, OCTOBER 15

3:00 p.m.

H.T. Person Lecture

College of Agriculture Auditorium

4:30 p.m. (follows lecture)

Homecoming Reception

College of Agriculture Auditorium Atrium

Meet our H.T. Person Speaker and Visiting Alumni

SATURDAY, OCTOBER 16

Homecoming Parade (downtown Laramie)

Featuring the College of Engineering and Applied Science Student Projects

1:30 p.m.

Tailgate Hospitality Tent

College of Engineering and Applied Science & the College of Education

Tailgate Park, South of the Stadium

BBQ Beef Sandwich, Chips, and Beverages Available

4 p.m.

Wyoming vs. Utah—GO POKES!

War Memorial Stadium/Jonah Field

**For information and reservations please contact us by phone at
(307) 766-4248 or by e-mail to engevents@uwyo.edu.**

FACULTY, & STAFF HIGHLIGHTS



Fred Chapp, office assistant senior in the Engineering and Applied Science Dean's Office, received a "Tip of the Cap" Award from the UW Mortar Board. Fred was nominated by Mortar Board student Charles Schmidt. Members of Mortar Board, the senior honor society at

UW, recognized staff members during the spring "Tip of the Cap" ceremony. The program honors those who offered "exceptional contributions to UW and inspiration of students."

Former Associate Deans **Dr. Richard J. Schmidt**, **Dr. David Whitman**, and **Dr. Andy Hansen** were recently honored by the College for their services in that capacity. Dr. Schmidt served as associate dean from 2005-2010 and Dr. Whitman served as associate dean from 1989-2005. Dr. Hansen served as associate dean of graduate programs and research until 2009. Dr. Schmidt will continue working with the Engineers Without Borders (EWB-WYO) students during their project in Kenya and will be on sabbatical next year in Pforzheim, Germany. Incoming Associate Dean **Dr. Steve Barrett** was also welcomed to the Dean's Office and began his associate dean responsibilities on July 1. Dr. Barrett will work

closely with Dean Ettema in stewarding the College undergraduate programs. His areas of expertise include image processing, medical laser applications, and embedded controllers. He earned a B.S. in electronic engineering technology (1979) at the University of Nebraska, an M.S. degree in electrical engineering at the University of Idaho (1986), and a Ph.D. at the University of Texas (1993).

Dr. Sadrul Ula, former Professor of Electrical and Computer Engineering at UW, retired July 16 after 28 years of service to the Department. He will continue his research at CE-CERT as a Project Scientist affiliated with the Southern California Research Initiative for Solar Energy (SC-RISE). Dr. Ula's research with CE-CERT will focus on renewable (solar/wind) energy, electric power generation and systems, and energy management and education. In addition to teaching at UW, he served as Director of UW's Cooperative Education program, Energy Advisory to the Governor of Wyoming, and member of the Bangladeshi Planning Commission on long range national energy planning.



Associate Dean Steve Barrett (left) with former associate deans Richard J. Schmidt, Andrew Hansen, and David Whitman are honored by College Dean Rob Ettema at a recent reception.

JOIN US!

**College of Engineering and Applied Science
&
College of Education**

Homecoming Tailgate Hospitality Tent

**October 16
1:30 p.m.**

**UW Tailgate Park
Prior to the WYO vs. Utah Homecoming Football Game**

IN MEMORIAM

Sadly since our last issue, we have lost the following alumni. Our sympathy goes out to the families of our valued alumni and friends.

Charles C. Bergman	B.S. Mechanical Engineering 1955	Twin Falls, ID
William F. Bramall	B.S. Electrical Engineering 1959	Huntsville, AL
Bruce R. Brinkman	B.S. Civil Engineering 1991	Cheyenne, WY
Ben Buh	B.S. Petroleum Engineering 1970	Lander, WY
Robert Bunning	B.S. Mechanical Engineering 1941	Rock Springs, WY
Joe L. Davenport	B.S. Electrical Engineering 1959	Julian, CA
William J. Demchok	B.S. Electrical Engineering 1958	Sheridan, WY
W.R. English	B.S. Electrical Engineering 1948	Minden, NV
James L. Garrett	B.S. Civil Engineering 1942	Cheyenne, WY
Larry R. Garrett	B.S. Mechanical Engineering 1972	Cheyenne, WY
Major John A. Harbolt	B.S. Mechanical Engineering 1964	Fort Worth, TX
James A. Kurtz	B.S. Civil Engineering 1949	Auburn, WA
Paul W. Lange, III	B.S. Electrical Engineering 1973	Colorado Springs, CO
Don J. Likwartz	B.S. and M.S. Petroleum Engineering 1963, 1966	Casper, WY
Dale S. Plaster	B.S. Mechanical Engineering 1960	Boise, ID
Neal E. Porter	B.S. General Engineering 1955	Worland, WY
Jerome Satterlee	B.S. Civil Engineering 1968	Powell, WY
William J. Schmidt	B.S. Civil Engineering 1959	Richmond, VA

ALUMNI HIGHLIGHTS

Ashli Babbitt, B.S. mechanical engineering 2009, from Douglas, Wyoming, is attending graduate school with plans to obtain an M.S. in mechanical engineering. She is currently working under direction of Dr. Jonathan Naughton, Director of the Wind Energy Research Center in the College, working on wind energy research with specific focus on characterization and control of dynamic blade flows. After completing graduate school, Ashley plans to search for a career in the wind industry and hopes to remain in the Rocky Mountain Region.

Marcus Catchpole and Jennifer (Beman) Catchpole, Union Wireless 2010 summer engineering interns began another union through their recent marriage on May 29, 2010. Both Wyoming natives, they currently attend UW engineering. Marcus is pursuing a degree in electrical engineering and plans to graduate the spring of 2011. Jenny will graduate in December with a B.S. in computer engineering and hopes to continue her education through a n M.S. program. Congratulations to the newlyweds!

Jill Cook (Engelhardt), B.S. civil engineering 1999, is now a licensed professional engineer in Montana with her recent passing of the Principals and Practice of Engineering Exam.

Patricia Gunderson, B.S. architectural engineering 2009, joined SmithGroup in Washington, D.C. on August 30th. One of the oldest architectural firms in the U.S., SmithGroup will allow Patti to develop new relationships with architects, electrical engineers, techs and planners as well as participate in various projects from start to finish. With plenty of variety and creativity, Patti will be able to participate in projects and share ideas and research in an educational and supportive environment with professional licensure and excellent mentorship.

Sherrie Merrow, B.S. computer science 1978, joined Encana Natural Gas Inc., as the external relations lead. Sherrie's team focuses on increasing the demand for natural gas, especially in the power generation and transportation areas, which will help bring a less costly, cleaner and domestic fuel to market. She works directly with industry, public and private groups, and state and local governments to engage appropriate fleets and vehicles in the advantages associated with natural gas usage. One specific area of activity is leadership of the Wyoming Natural Gas Vehicle Infrastructure Coalition which is focused on building natural gas stations (CNG / LNG) in Wyoming.

William G. "Bill" Wright, B.S. mechanical engineering 1980, M.S. mechanical engineering 1989, joined the Laramie Wyoming based company of Firehole Technologies as its Director of Commerical Products and Engineering. Among Bill's duties at Firehole will be to serve as the company's primary interface with leading aerospace companies with a focus on delivering analytical, and technical support for their composite structures. Firehole Technologies supplied computer-aided simulation software and consulting services specializing in analysis of composite materials.

CALL FOR NOMINATIONS

Hall of Fame, Wyoming Eminent Engineer, and Outstanding Alumnus Engineer

If you know of an outstanding engineer you wish to nominate for the College of Engineering and Applied Science Hall of Fame contact us via e-mail at enevents@uwyo.edu or (307) 766-6433. Eminent Engineer award nominations are also being sought and may be directed to Steven Barrett at SteveB@uwyo.edu or visit the Tau Beta Pi Web site at www.eng.uwyo.edu/societies/tbp and click on Eminent Engineer Nominations. Deadline is January 31, 2011.



UNIVERSITY OF WYOMING
College of Engineering and Applied Science
Dept. 3295
1000 E. University Avenue
Laramie, WY 82071-2000

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UPCOMING EVENTS

Hall of Fame Panel Discussion
September 17 - 3:30 pm
Classroom Building Room 129
Open to the Public

Hall of Fame Induction Ceremony
September 18 - 11:30 a.m.
Wyoming Union Family Room
RSVP by September 10
to engevents@uwyo.edu

**H.T. Person Lecture
& Homecoming Reception**
October 15 - 3 p.m.
College of Agriculture Auditorium

**Partnering with the College of Education
for an Alumni Tailgate Hospitality Tent**
October 16 - 1:30 p.m.
Tailgate Park

Senior Design Symposium
December 2 - 8 a.m. to 5 p.m.
Engineering Building Rooms 1062, 1075, and 2101

Tau Beta Pi Honors Banquet
April 15, 2011
Crane-Hill Dining Room

Contact the Office of Communications at (307) 766-4248
or by e-mail to engevents@uwyo.edu about upcoming events.



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