LOUISIANA CIVIL ENGINEER

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Benefit Cost Analysis for Wind Hazard Mitigation

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LOUISIANA SECTION • AMERICAN SOCIETY OF CIVIL ENGINEERS

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The Louisiana Section is located in ASCE Region 5 that consists of the Louisiana, Mississippi, Alabama, Georgia and Florida Sections.

President's Message

By Ali M. Mustapha, PE

Ali M. Mustapha, PE

Serving as an officer on a Branch or the Section board, chairing or serving on a committee or an institute at the local, state or national level is an honor and a very rewarding experience. The membership elected the 2009-2010 Section Officers at the Section's Spring Annual Conference that was held on April 14 and 15 at the Crowne Plaza Hotel and hosted by the Baton Rouge Branch. Congratulations to all the officers on their election and thank you for your commitment and dedication to serve the society, its members, the Civil Engineering profession and mankind.

These officers have invested, continue to invest, and have committed to invest hundreds of hours of their own personal time, use their own personal resources to travel to meetings; even some may use their own personal annual leave to attend Section Board Meetings. All the Branches and Section Officers deserve our utmost respect and support on their mission to serve, lead, protect and promote the Civil Engineering Profession. Please join me in pledging your full support to help these officers succeed in their leadership role. The elected 2009-2010 Section Officers will be installed in September at the Section's Annual Awards and Officers Installation Banquet which is to be held this year in Baton Rouge, the home Branch of the incoming President Christopher Knotts, PE.

The Baton Rouge Branch hosted a very successful Section Spring Conference at the Crowne Plaza Hotel on April 14 & 15. Attendees were able to acquire 12 Professional Development hours. A banquet was held on Wednesday evening to honor the 2009 Section Life members and the outstanding Senior Civil Engineering Student Award recipients from the six state civil engineering universities. Congratulations to all the Life members and thank you for your contributions to ASCE, the Civil Engineering Profession. Also congratulations to our Civil Engineers Seniors who will lead our profession into the future.

Many thanks to the Spring Conference Chairman Bob Jacobsen, PE, Baton Rouge Branch President Billy Wall, and the Baton Rouge Branch Board of Directors for planning and hosting an outstanding conference. Also many thanks to all the speakers, exhibitors, and sponsors for their participation and contributions to the success of the conference.

On March 25, 2009, ASCE released the Comprehensive 2009 Report Card for America's Infrastructures. A cumulative grade of "D" was awarded to our nation's roads, bridges, drinking water, wastewater, levees and other infrastructures. The nation's growth, prosperity, safety and quality of life depend on these critical facilities that became part of our daily lives. Approximately 2.2 trillion dollars are needed over a 5-year period to improve our failing infrastructures and insure that our nation will maintain its greatness and leadership role in the world. It is the responsibility of all Engineers regardless of discipline to make our elected officials at the local, municipal, parish, state and national levels aware of the seriousness of the problems facing our infrastructure. Also we need to provide them with potential solutions that include, funding resources, repair and rehabilitation methods, and infrastructure investment plans. The following are some of Louisiana Infrastructure facts from the ASCE Report Card:

- 30% of Louisiana's bridges are structurally deficient or functionally obsolete.
- Louisiana's drinking water infrastructure needs an investment of $4.11 billion over the next 20 years.
- Louisiana ranked 1st in the quantity of hazardous waste produced and 15th in the total number of hazardous waste producers.
- Louisiana's ports handled 456 million tons of waterborne traffic in 2005, ranking it 2nd in the nation.
- 44% of Louisiana's major roads are in poor or mediocre condition.
- 43% of Louisiana's major urban highways are considered congested.
- Louisiana has $3.33 billion in wastewater infrastructure needs.

Finally, congratulations to Rhaoul A. Guillaume, Sr., PE on his election of Fellow ASCE. Rhaoul is the founder and President of GOTECH, Inc., Consulting Engineers and is a member of the Baton Rouge Branch. Also he is currently serving a six year term on the Louisiana Professional Engineering and Land Surveying Board. Thanks for all your contribution and service to ASCE and the engineering profession. Congratulations again on your election to the elite Fellow member status.

Past President's Forum - The Importance of Professional Organizations to Professionalism

By E. R. Desormeaux, PE, F ASCE

In February, the Leadership Conference for Regions 1, 2, 4, and 5 was held in Cherry Hills, New Jersey, a suburb of Philadelphia. Having attended several of these conferences in the past, it was especially rewarding to observe many national, sectional, and local ASCE leaders, and students from many universities participating. Louisiana was well represented at this Conference, with State Section, Branch, and Region leadership, and students from several of our universities participating in the excellent conferences sponsored by ASCE. These conferences get better with each year, as ASCE continually improves on the sessions, using valuable lessons learned from previous Leadership Conferences.

I believe it is important for our State and Branch officers, and others involved in the customary operations by ASCE to continue to attend these conferences. Additionally, our Student Chapters, as possible, be encouraged (and supported) by the Branches and its members to send as many of the students. The continued success of ASCE as a professional society depends not only on its members, but also on the students after making the transition from student status to regular membership.

ASCE Communications

This year we have experienced significant advances in communications between our Society and its Region, Section, and Branch leadership. Additionally, ASCE has several venues to communicate news, etc. with its members. All members are encouraged to subscribe to "ASCE SmartBrief". This site provides members with news, research, and other important information on a daily basis. Each day a member will receive via an e-mail providing a variety of information from throughout the USA and abroad. The site is free to members, and only requires a simple registration.

Life Members

Did you know that 14 % of ASCE members are Life Members? They often have wonderful career experiences along with time and enthusiasm to provide services to the Branches and the Section. An ASCE Task Committee has already found examples of local organizations taking advantage of the resources their Life Members have to offer. The first step is to identify these members through the FTP database furnished to all Branches and Sections. The Branches and Sections are encouraged to "log on" to ASCE, and determine the "how to" in re-engaging these valuable members.

Hurricane Relief Fund

The ASCE Hurricane Relief Fund, established after "Katrina and Rita" has finally ended. This fund, which assisted students and members affected by the hurricanes, has disbursed all funds. In addition to the assistance provided immediately after the catastrophic events, funds were used to sponsor graduate civil engineering study at Louisiana universities, and to assist with student attendance at ASCE conferences. An audit of the fund was completed and delivered to ASCE headquarters.

Benefit Cost Analysis for Wind Hazard Mitigation

By Sam Amoroso, PhD, PE

Sam Amoroso, PhD, PE

Introduction

Wind damage from hurricanes, tornadoes, and other severe events is responsible for about three quarters of insured losses in the United States. This exceeds the losses from other hazards such as earthquakes or fires many times over. Engineers can play an important role in reducing the financial impact of wind storms by recommending mitigation of existing facilities or specifying fortified designs for new facilities.

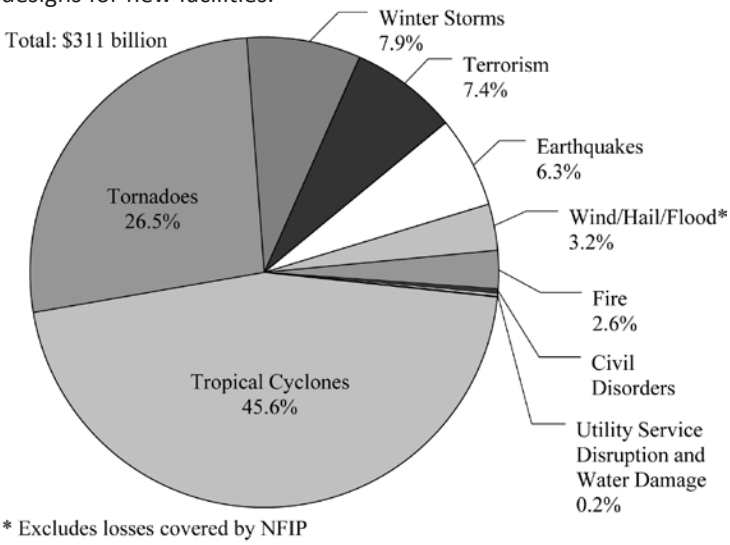


Figure 1. Catastrophic losses by peril 1988 – 2007 (Source: Insurance Information Institute).

With the benefit of unlimited project budgets, most civil engineers would be able to design structures with very little probability of suffering wind damage. One of my college professors once told our class, "An engineer can design anything you can pay for." However, all engineers appreciate that we live in a world of finite resources, and that we have a responsibility to not only design safe and serviceable facilities, but also to help our clients allocate resources efficiently.

It is often the case that major wind damage and losses arise from the failure of components that receive the least attention from engineers. Building cladding systems such as roof coverings, flashings, windows, and items such as roof top equipment represent a small portion of the total building value. However, when these items fail during wind storms, the consequences are often dramatically out of proportion with their contribution to the total building value. This suggests that small initial investments in improving these components may pay large dividends down the road in reducing future wind storm damage.

This article aims to introduce the general concepts required to undertake a wind fortification Benefit/Cost Analysis (BCA). The key difference between a traditional benefit cost analysis and one for a hazard mitigation project is in dealing with very uncertain future events. We do not know when future storms will occur, and we do not know how severe they will be. Therefore, we must use ideas and techniques from risk analysis which integrates probabilistic estimates of hazard, vulnerability, and consequence.

BCA Overview

Benefit/Cost Analysis (BCA) is probably familiar to most readers. The general idea is to quantify and compare the benefits and costs of a project, which are typically expressed in dollars. Projects having ratios of benefit to cost in excess of one are considered to have a net benefit.

In order to compare benefits and costs that occur at different times in the life of a project, their monetary values must be expressed in terms of net present values (NPV). Costs or benefits occurring sometime in the future are worth less than those occurring today due to the time value of money. The process of establishing equivalence between monetary values occurring at different times is called a cash flow analysis. Calculating the NPV of future benefits or costs requires the estimation of an interest rate or a "discount" rate.

Imagine that implementing a hypothetical project for an initial cost of $100.00 is estimated to produce a benefit to the owner of $200.00 in five years. Considering a discount rate of 7%, the net present value (NPV) of the future $200.00 is $142.00*. In this case the B/C ratio is 1.42, even though the owner doubles his initial investment. Figure 2 illustrates this example. This process can be

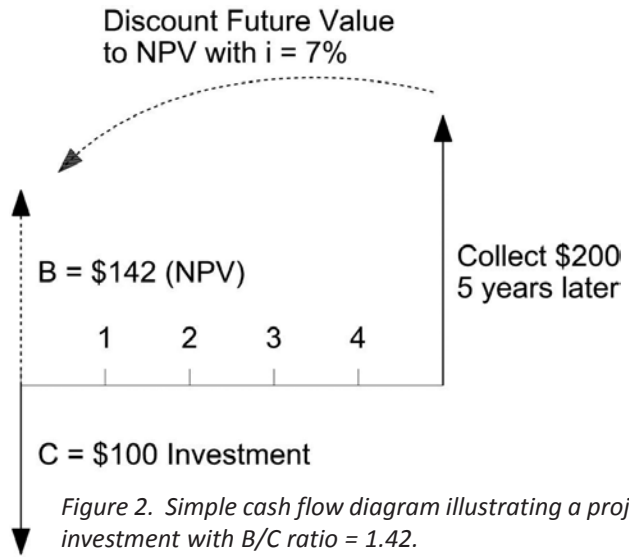


Figure 2. Simple cash flow diagram illustrating a project or investment with B/C ratio = 1.42.

* *I have omitted the mathematical formulas leading to the results in this section. The interested reader can readily find these in handbooks covering Engineering Economic Analysis.*

extended to handle multiple costs and benefits distributed throughout the life of a project or investment. BCA provides a method for easily comparing the relative attractiveness of taking various actions, including doing nothing, on the basis of a single metric. The underlying assumption is that an informed decision-maker will park unused resources (money) in an account that delivers a rate of return in the absence of a better alternative. The discount rate establishes the "base state" against which alternative uses for resources can be compared.

Application of BCA to Hazard Mitigation

Although there may be some uncertainty, the initial and recurring costs for an engineering project can typically be anticipated with some confidence. These costs would be represented on a cash flow diagram by the downward arrows that were illustrated previously.

The length of time considered for the analysis will depend on the characteristics of the facility under investigation and the perspective of the decision-maker. Light retail and multifamily residential structures may have useful lives of 25 years before development patterns render the structures functionally obsolete. More permanent commercial or institutional buildings may have useful lives of 50 years. High-value, signature structures may be used for 100 years or more. The developer or current owner of a facility may not anticipate having a long-term interest in the facility. These parties may have little interest in hardening their facilities at all, unless secondary factors such as increased value at resale are considered to be important. Government buildings, on the other hand, will likely be in the same hands for many years. It should be noted that longer analysis periods do not have an influence on the BCA proportional to the increase in the number of years in the period. The influences of future costs or benefits decay exponentially as the separation in time from the present increases.

The interest rate chosen for a cash flow analysis can have a large impact on the results of a BCA. The Congressional Budget Office (CBO) recommends using a discount rate that is based on Treasury yields minus inflation, or about 2% to 3%. This rate represents a "risk-free" interest rate. The Office of Management and Budget (OMB) requires the use of a 7% rate for publicly financed projects (such as those funded by FEMA), which is intended to approximate the private rate of return to capital. Private interests might use different rates that represent their individual opportunity costs. A rule to remember is that higher interest rates will lead to lower B/C ratios when the benefits occur in the future.

In the case of wind mitigation projects, the benefit that is gained is the ability to avoid future damage. The benefit then consists of the difference between the loss that occurs in the mitigated state and the loss that would have occurred in the unmitigated state. Damage and the associated losses are obviously costs, but since the difference between the mitigated and unmitigated states should be negative, the change in sign results in a benefit. The calculation of mitigation benefits depends on the ability to specify the damageability, or vulnerability, of the building to wind in the mitigated and unmitigated states. The damage estimates must include not only the direct damage to building components, but also the damage that occurs to protected elements such as interior finishes, equipment, and contents. An example cash flow diagram illustrating this concept is shown in Figure 3. Estimating vulnerability is not the only complication, however. It is entirely unknown when a damaging event in the future will occur and how severe it will be. Additional techniques must be included in the traditional cash flow analysis to perform BCA for hazard mitigation projects.

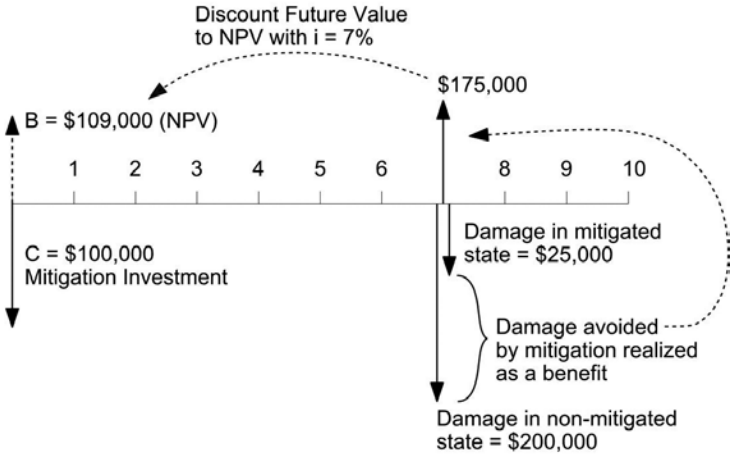


Figure 3. Hypothetical cash flow diagram showing a damaging wind event in year 7.

Example in Hindsight

I had the opportunity to review the damage and repair costs for an educational building that was affected by Hurricane Rita in 2005. This building was a three-story steel framed building. The roof structure consisted of open web steel joists covered with a metal deck, lightweight concrete, and a built-up roof. The building was constructed in the early 1980's and had approximately 30,000 square feet of interior space. The site experienced sustained wind speeds of approximately 75-80 mph (gusts of 95-100 mph) during the passage of Hurricane Rita. This corresponds to a mean return interval of approximately 25 to 50 years. For context, the current ASCE 7 design gust wind speed for the location is 110 mph. During Rita the roof covering was completely stripped away, 60 square feet of metal deck was lost on the roof's leading edge, and two windows were broken. Figure 4 shows the missing roof deck. The damage to the roof allowed rain to infiltrate the entire building, damaging nearly all of the interior finishes. After considering temporary

Figure 4. Three story building damaged during Hurricane Rita with loss of roof cover and roof deck.

repairs, environmental remediation (mold), rental costs for temporary facilities, permanent repairs to the building, and contents losses, the total bill was approximately $1.64 million. In retrospect, it is easy to see that had the building had a roof covering and roof structure with greater uplift resistance capacity, this damage could have largely been avoided. With the addition of impact resistant windows there may have been no damage at all. It was estimated that these improvements could have been accomplished with an expenditure of approximately $270,000.

It seems obvious in this instance that a mitigation investment would have been beneficial simply by comparing the losses to the mitigation cost. However, one must consider the time at which hypothetical mitigation action occurs to make this general conclusion. For example, had the mitigation occurred in 2005, right before Hurricane Rita, the B/C ratio would have been approximately six, since the time value of money would not have had any effect. Had the mitigation occurred in 1985, the B/C ratio would have been about 1.6 (assuming that all of the damage could have been avoided and using an interest rate of 7%) since the $1.64 million in avoided losses would have been discounted significantly to 1985 NPV. This reflects the twenty year gap between the investment and the realization of the benefit. It appears that mitigation could have been cost-effective in this case.

This anecdote is something of a set-up, though. It illustrates the principles discussed in this article, but it relies entirely on hindsight. Furthermore, I described a building that actually sustained significant damage from among all the possible buildings. Obviously, these promising results would not have been realized if I had chosen a building that performed well during the storm. So the presentation so far suffers from confirmation bias. How do we deal with events in the future that we can't predict?

Probabilistic Considerations

Although we do not know when hurricanes or other severe wind events will occur, or how severe they will be for a particular location, we can use statistical techniques to describe relative likelihoods for events of varying intensity in any given year. For locations in the interior of the U.S., wind hazard can be quantified through the statistical analysis of historical meteorological measurements. The analysis relies on Extreme Value Theory, which makes use of probability distributions that are very different than the Gaussian bell-shaped distribution that most of us learned about in our college probability and statistics courses. Extreme value distributions are positively skewed: known as having "fat tails." This represents the tendency of processes such as weather phenomena to produce extreme events that deviate dramatically from the norm.

The poor performance of meteorological instruments in hurricanes combined with the relative infrequency of hurricane occurrences prevents the same methods used to study thunderstorm activity from being useful on the hurricane coast. For hurricanes, a special statistical technique called Monte Carlo simulation must be used. This method simulates the occurrence (and non-occurrence) of storm events over long time periods (such as 100,000 years or more). The analysis incorporates the known statistical parameters for variables such as storm track heading, translational speed, storm central pressure, and radius to maximum winds. This type of complex simulation is the state of the art for evaluating and specifying the wind hazard for hurricane prone locations in the U.S. Using Extreme Value Theory, the results from this type of analysis can be transformed into continuous probability distribution functions for the annual occurrence of extreme wind speeds for hurricane-prone locations. With these distribution functions we can estimate the likelihood that events of varying severity will occur in any given year.

Assessing the value of more robust designs, or the application of mitigation, requires a quantification of the vulnerability of a structure to a continuum of hazard levels. A function describing the expected damage versus the wind speed must be defined for the structure. These functions are commonly called "vulnerability functions," "loss functions," "damage functions" or "fragility curves." These functions may be defined for a single building or a class of buildings. The level of physical damage is often defined on a relative basis, and therefore a value of zero indicates no damage or loss, and a value of one represents complete destruction or a total loss. Vulnerability functions are generated by studying empirical historical data and, more recently, by incorporating principles of engineering science and structural reliability. Vulnerability functions increase in value as the hazard level increases, but are limited on the low end to zero loss and on the high end by a total loss. These asymptotes on the low and high ends often give vulnerability functions a characteristic s-shape.

Estimates of extreme annual wind speed probability and building vulnerability can be combined mathematically in an operation called convolution to estimate expected annual damage (or loss). The mathematical relationship is as follows:

$$E[D] = \int_0^\infty D(v) \cdot p(v) \cdot dv$$

In the formula above, $E[D]$ is the annual expected damage; $D(v)$ is the relationship between damage and wind speed (i.e. the vulnerability function); and $p(v)$ is the probability density function for annual extreme wind speed. The expected damage, $E[D]$ represents a weighted average of annual damage. Each possible damage level is weighted by the probability of a wind speed producing that particular damage state in a given year. However, the word, "expected" may be misleading. This value does not represent what one would expect to occur each year. It simply represents a type of average value. In fact, no damage would occur in the overwhelming majority of years. The expected damage value distributes and dilutes the impact of rare events to an average annual basis.

To evaluate the effectiveness of a mitigation project on this "average" basis requires estimating the annual expected damage for the pre- and post-mitigations states. The difference between these two values can be assessed as a recurring annual benefit. The benefit in each year of the analysis can be discounted to NPV as a uniform payment series and then compared to the up-front cost of the mitigation. This is illustrated in Figure 5.

Did you hear about the statistician who had his head in an oven and his feet in a bucket of ice? On average, he felt fine. A major

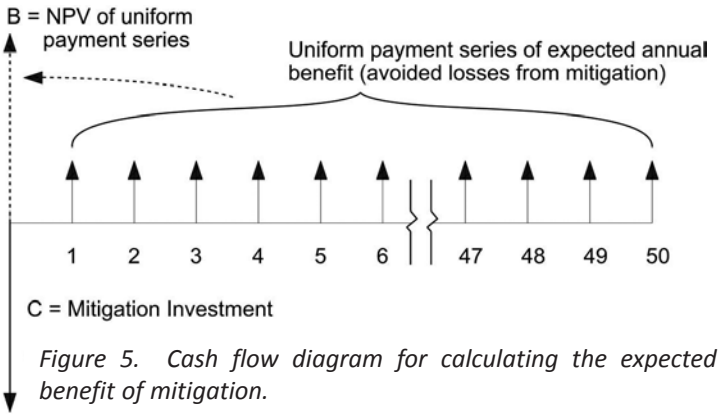


Figure 5. Cash flow diagram for calculating the expected benefit of mitigation.

limitation with this approach is that the result boils down to a single number and does not provide any insight into potential variability from the "expected" or average scenario. For owners looking to make a decision for a single property or for a small number of properties, the likelihood of realizing the expected result is very small. The actual mitigation benefits that are realized for a particular facility can be either much greater or much less than expected. This limitation is not as great of a concern for entities that are evaluating large numbers of properties. The highs and lows will tend to cancel one another, and the B/C ratio for the entire portfolio of properties will approach the expected value as the number of properties increases (as long as the analysis is accurate). As an example, FEMA requires that BCA be included in applications for funding from its Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation Grant Program (PDMGP). FEMA provides tools to assist applicants in performing BCA of mitigation projects, and the analysis is based on an estimate of the annual expected damage as discussed thus far. Since FEMA funds a large number of diverse projects across the country, the variability of the BCA result for a single project is not as much of a concern as it might be to a private owner.

Sensitivity analysis can be used to get some idea as to how uncertainty in the analysis affects the results. This involves experimenting with the input variables within realistic ranges. However, sensitivity analysis is still limited in that it does not provide an indication of the relative likelihoods of the different results.

Monte Carlo simulation can be used to alleviate some of these limitations by generating a large number of simulated building damage histories, each of which produces a different value for the NPV of the damage that occurs throughout the analysis period. The result is not a single number representing an "average," but a large set of results from which useful statistics (including the average) can be extracted. The set can also be used to construct a histogram or discrete probability density function of the results. These simulation methods are useful when direct analytical computations are difficult or impossible.

The generation of random numbers is the crux of Monte Carlo simulation. Many desktop computer applications, such as Microsoft Excel, can produce a uniformly distributed random number between zero and one. To randomly sample a particular variable for a statistical simulation, this uniform random number can be treated as a probability or percentile level and mapped to a known distribution. Consider, as an example, the case of sampling annual extreme wind speed from a known probability distribution. If the random number generator returned a value of 0.99, then the sampled wind speed would be the 100 year event. Likewise, if the sampled random number had been 0.998, then the corresponding wind speed would be the 500 year event.

To simulate a sample building life of 50 years, one would create a list of each year, 1 through 50, and instruct a computer program to generate a random number for each of the years. The random number would be used to sample an annual extreme wind speed for each of the 50 years as described above. The building vulnerability function would then be used to estimate the level of damage or loss occurring in each year based on the sampled wind speed. A typical sampled building history would be punctuated with a small number of damaging events occurring at random times, with zero or negligible damage for most of the years. The sample building history can then be thought of as a cash flow diagram with the small number of damaging events representing future costs. These future costs can be discounted back to NPV based on the discount rate and the time at which they occur. The cumulative NPV of all the damaging events represent a life-cycle cost associated with wind damage. This process can be repeated a large number of times to generate a statistical set of wind damage life-cycle costs. The number of simulations should be large enough that the values of the statistics of interest converge. The simulation can incorporate both the pre- and post-mitigation vulnerability functions, giving the NPV of the benefit of mitigation.

Monte Carlo Simulation Example

To illustrate the type of results that can be produced from such a simulation, consider a building similar in construction to the one described earlier that was damaged during Hurricane Rita. For the simulation, the annual occurrence of extreme wind speed was modeled using meteorological records and the results of hurricane modeling pertinent to the facility's geographic location. The vulnerability was estimated using relationships from FEMA's HAZUS-MH multi-hazard loss modeling software. The HAZUS-MH software contains vulnerability functions for a wide variety of building types. The building vulnerability estimates considered not only losses due to building damage, but also contents losses and the economic impact of interrupted building use. Two conditions were simulated in parallel: one representing an unmitigated building similar to the subject building, and the other in a mitigated state with a new single-ply membrane roof (instead of a built-up roof), superior roof deck connection, and shutters installed on the windows. The difference in damage for each sampled wind event represents the benefit of the mitigation. A building life of 50 years and an interest rate of 7% were used for this example analysis.

The simulation consisted of 10,000 sample building lives. Each of these building lives produced a result for the NPV of the avoided losses (benefit) by mitigation. From this large set of results, some key statistics can be extracted. The average (mean) benefit was 3.7% of the building value. The median benefit (50^{th} percentile) was only 1.3% of the building value. The large relative difference between the mean and the median indicates that the distribution is quite skewed. The mean benefit is influenced by rare, high-conse-

quence events. In fact, the mean benefit corresponded to the 77th percentile. This means that the benefit realized in any individual building life is three times more likely to be below the mean than above it. This shows the difficulty in relying solely on the mean, or expected, mitigation benefit. Table 1 summarizes results from the simulation.

	NPV of life-cycle wind losses		NPV of avoided loss (benefit)
	Pre-Mitigation	Post-Mitigation	
50th %ile	0.034	0.020	0.013
Mean	0.072	0.034	0.038
80th %ile	0.102	0.055	0.044
90th %ile	0.176	0.085	0.094
95th %ile	0.273	0.115	0.162
99th %ile	0.558	0.190	0.374

Table 1. Summary of results from example Monte Carlo simulation. The values in the table are the net present value of losses for pre- and post-mitigation conditions and avoided losses relative to building value for various confidence levels.

Most decision makers would like to have some confidence that a mitigation investment would be worthwhile. For a three-story building, the roof framing and covering account for about 3% of the building cost, and windows and glazed openings account for approximately 4% of the building cost, for a total of 7%. It is conceivable that the mitigations described in this example could be accomplished at a cost premium of 50% on these components, or for an additional 3.5% of the building value. If this were the case, the B/C ratio would be greater than one since the expected benefit was 3.7%. This may be a satisfactory result for a decision maker evaluating the effectiveness of a mitigation program involving a large number of widely distributed buildings. However, for someone considering a single building, the odds of achieving B/C >1 might be considered. For a mitigation cost of 3.5%, the B/C ratio would have been less than one for 75% of the sample building lives. On the surface, this is not a very encouraging result.

In order to get a more complete picture of the benefit of mitigation, the other end of the distributions of loss and potential benefit should be considered. Consider now the small number of sampled building histories in which there was enough damage to justify mitigation. The data in Table 1 indicates that the building in this exercise has a 10% chance (90th percentile) of experiencing wind related life-cycle costs amounting to 17.6% of the value of the building, if not mitigated. When mitigated, the NPV of wind losses at this risk level are only 8.5% of the building value. In this light, mitigation can be seen as a hedge against large down-side risks, even though it might not pay off in the majority of cases. Using the average as the only metric will not provide insight into the risks associated with extreme, but credible, scenarios. Considering the distribution of potential losses and mitigation impacts can help owners make decisions on the basis of their own risk tolerance.

Additional Discussion

There are examples in the financial world that are analogous to investing in mitigation. Insurance is the most obvious example. Most of us pay regular premiums to avoid the catastrophic consequences of severe events. For a given coverage (health, property, etc) people expect to pay more in premiums than they will ever collect in claims payments. However, we are willing to accept a predictable and small-magnitude loss in order to be protected against large down-side risks.

The comparison of investments in mitigation with the purchase of insurance leads to a question that has been brought up by members of the audience more than once when I have presented this topic publicly. Insurance often covers the losses associated with wind damage. Why then, should an owner invest in mitigation if the beneficiary will be the insurer? The most obvious reason is that an insurance claim payment does not represent the total impact of damage and loss to an owner. There are often intangible effects that cannot be effectively covered by insurance. Another reason is that owners will be responsible for deductibles. In our region deductibles are quite high for named storms; sometimes 5% of the building value. Mitigation will reduce the frequency and magnitude that the owner will be out-of-pocket for losses below the deductible. This can be investigated quantitatively using the techniques described herein with some modification. Still another reason is that in the long term insurance premiums should improve with improving claims history. Finally, if an owner is able to demonstrate that his facility has a lower likelihood of experiencing large losses, he may be able to use this fact in a competitive insurance market to obtain a less expensive premium.

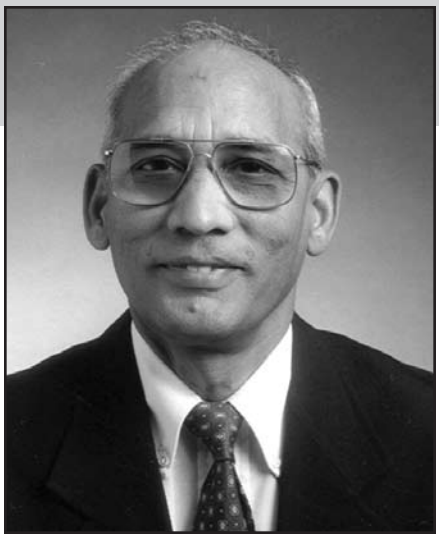
Conclusions

This article highlights the importance of considering the life-cycle costs associated with wind damage to buildings. It is often the case that minimizing the initial project cost takes precedence in the minds of owners and facility planners over investing in a more robust facility that will be subject to lower future costs due to wind damage. In order to reverse this attitude ideas, such as the ones discussed here, must be incorporated at a high level during early project development for the potential benefit to be realized. Engineers are typically only responsible for specific design and construction phase services, and are often brought into the process too late to have a significant influence on overall programming. Engineers are uniquely qualified to provide the technical analysis required to consult with owners and managers regarding the life-cycle cost and risk implications of decisions made early in project development. Participating in this way would be consistent with ASCE's vision for the profession which sees engineers "at the forefront in developing appropriate approaches and designs for managing and mitigating risk."

Samuel D. Amoroso, PhD, PE *graduated from L.S.U. with a B.S. in Civil Engineering in 1999. After working in Texas for four years, he returned to L.S.U. in 2003 to pursue a PhD in Civil Engineering, which he completed in 2007. Sam is a licensed engineer in Louisiana, Mississippi, and Florida. Since 2006 he has been a member of Engensus, an engineering and consulting firm in Baton Rouge which provides structural engineering, wind engineering, coastal engineering, hurricane risk consulting, and forensic engineering services. Sam is a member of ASCE and the American Association for Wind Engineering, and currently serves as the practitioner advisor for the student chapter of ASCE at L.S.U. He also serves on an ASCE task committee responsible for revising wind load guidelines for the petrochemical industry.*

Mining Water from Oil and Gas Production

By Yong H. Huang, PhD[1] , Vijay P. Singh, PhD, DSc, PE, PH, Hon. DWRE [1], and Thomas L. Smith, PE, BCEE, DWRE [2]*



Vijay P. Singh, PhD, PE

Will there be enough fresh water resources to meet Louisiana's projected population growth? This is an important question that must be addressed in Louisiana as well as all over the United States.

Water is produced from onshore oil and gas operations in Louisiana. Produced water from oil and gas wells is the largest waste stream from oil and gas production operations. Major contaminants are present in produced water. As many oil fields in Louisiana and the US mature, more water is produced during hydrocarbon extraction. While produced water can be re-injected underground to facilitate hydrocarbon production, there is an increasing amount of excess produced water that needs to be treated and disposed of in an environmentally acceptable and compliant manner. Current practices of treating and disposing such water is prohibitively costly, involving removal of concentrated organic matters and salts as well as distant transport of water in large volume.

Production water is not the only source of wastewater in the oil gas industry. Water management operations for producers often include handling large volumes of fresh and saline water. Drilling operations can utilize water-based drill fluids for well construction and well completion activities, such as fracturing operations which can also use large amounts of water. The producers' water management approaches can utilize fresh water sources that are injected downhole where these sources mix with formation fluids and then flow back to the surface where treatment and disposal considerations must be addressed.

The picture below shows a well fracturing operation in the Barnett Shale using fresh water from the municipality of Cleburne in Johnson County, Texas. [This photo was obtained from a presentation on Energy Development and Water Needs in Texas: The Next 20 Years, by D.B. Burnett Global Petroleum Research Institute & C.J. Vavra Separation Sciences Guru Food Protein Research Center.]

The shortage of fresh water will become a growing concern for Louisiana and an escalating problem for other Gulf Coast States and many areas throughout the US. Therefore it is highly desirable and would help conserve our fresh water resources to utilize cost-effective technologies that would allow the treated produced water to be used beneficially for agricultural and other purposes.

According to recent environmental research in energy assets, oil and gas represent 63% of the world's energy supply (UNEP and E&P Forum, 2000). Although sustainable development and "green" technology are rightfully gaining support around the world, there is no quick solution in sight for any significant reduction of fossil fuel consumption. The world will continue to rely heavily on crude oil and gas production for the foreseeable future.

Produced Water: a Waste, Hazard and Liability

Oil and gas production involve using large volumes of water and generating even larger streams of highly contaminated wastewater. Oil, gas and water often coexist in underground reservoirs. As crude oil and gas are extracted from the reservoir, they are typically accompanied by co-produced water that often carries high concentrations of dissolved solids and organic matters (in form of dissolved or suspended oil) as well as various harmful substances, such as toxic metals and radionuclides. On the other hand, drilling and completion operations (including stimulation) may consume large amounts of surface water to pressurize the underground reservoir.

As an oil or gas field matures, the proportion of produced water generally increases. In the mature production in the United States, 7 barrels of wastewater are generated on average for every barrel of oil produced. The U.S. Department of Energy estimated that 756 billion gallons of wastewater were generated on shore alone in 2000 (U.S. DOE, 2004). As the largest oil-producing state in the United States, Texas generates more than 500 million gallons produced water per day, more than any other state in the United States (Burnett 2006, 2007). In 2002 Louisiana was projected as producing 124 million gallons produced water per day (Veil, Puder, Elcock and Redweik, Jr, 2004).

Securing water supplies and treating and disposing the oil and gas production water (hereinafter referred to as "produced water") have been a major challenge to crude oil and gas industry. The resulting operational costs and environmental issues are a major concern. The produced water is becoming a more urgent issue for the oil and gas production industry in recent years for several reasons.

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- While much of the produced water is re-injected into deep underground reservoir, there is an increasing amount of waste stream that needs to be treated and disposed. A certain level of pretreatment is needed prior to reinjection. The portion of produced water that is not re-injected is either evaporated or treated and discharged into surface waters, including shallow groundwater aquifers. One concern is that the produced water might not be contained in the disposal zone, and would then migrate and contaminate groundwater resources, thereby causing elevated concentrations of dissolved solids and minerals as well as organic pollutants.

- As many oil fields in the world mature, more water is co-produced in association with the oil and gas extraction from the underground reservoir. As oil prices surge and supply tightens, oil producers increasingly turn to the marginal or abandoned oil fields to increase their production. The produced water from such oil wells will typically contain higher concentrations of dissolved solids and oil matter. The Permian Basin in the western part of Texas is a good example. Louisiana experienced reduced oil production and increased water production in the early years of the 1900s. Even early on, Southern Louisiana's Jennings field and other prospects' oil volumes declined and wells had to be placed on pumps and produced water volumes rose rapidly.

- The technology of massive shale fracturing with fresh water has been adopted by more operators. Fracturing operations in "tight" gas developments uses large volumes of fresh water and then generate similarly large volumes of spent water that is contaminated with oil matters and elevated dissolved salts. The Barnett Shale, known as a "tight" gas reservoir in northern Texas, is a good example. One example of a "tight" gas play is the Vernon Field in Northern Louisiana. In some locations, there are inadequate or unsustainable freshwater resources available near the wellsite; and often there are no disposal facilities near the wellsite. As such, the needed freshwater must be trucked to the wellsite, and the used fracturing water trucked from the wellsite to treatment and disposal facilities. Trucking of such large amounts of water is a major cost, environmental, and security issue.

This picture below is representative of an oil and gas produced water hauling operation. [The picture was obtained from a presentation on Energy Development and Water Needs in Texas: The Next 20 Years, by D.B. Burnett Global Petroleum Research Institute & C.J. Vavra Separation Sciences Guru Food Protein Research Center.]

- Finally, there is a possibility that environmental regulation in the US will become more stringent to require further reduction in the oil content allowed in the discharged water, which will increase the treatment cost.

Current Methodology: Disposal

At present, most oil and gas producers deal with the produced water as a waste that must be treated and disposed in two ways.

- Offsite Commercial Disposal – Some operators prefer to send their produced water offsite to a commercial disposal facility. This is typically accomplished by truck hauling periodically between the well locations and the treatment and disposal facility. The resulting heavy truck traffic on local and county roads will disturb local communities by causing traffic congestion, damaging road pavements, and increasing road maintenance costs as well as harming local air quality. The use of fresh water could strain local water resources. There is a concern over potential contamination of freshwater resources in the process. It is obvious that disposal by water hauling is very costly, energy-intensive, and unfriendly to society and the environment. The costs associated with transportation and disposal of produced water continue to increase. Typical disposal and hauling costs associated with produced water can run up to $3.00 and upwards.

- Underground Injection for Disposal – Injection into underground formations is the most common approach for onshore produced water management. These injection wells are designated as Class II wells. The produced water may need a certain level of treatment to control excessive solids, dispersed oil, dissolved oil, scale, corrosion, chemical reactions, and/or growth of microbes prior to being injected into the formation to prevent plugging of the formation or damage to equipment.

Turning a Waste into an Asset: Can We?

Against the backdrop of the increasing waste volume of the produced water among the widespread water shortage in many oil producing regions, one can not help but ask the obvious question. Can produced water be economically treated to a quality that it can serve as a beneficial fresh water supply? In other words, can we turn the liability of a polluted stream into an asset?

To reuse the produced water, the wastewater must be treated sufficiently so that water quality meets the needs for a specific purpose. In one application, produced water was treated and reused as boiler feedwater (Heins, 2008). Unfortunately, to date reclaiming produced water has not been a main practice in any significant way by the oil and gas producers. The lack of a cost-effective treatment technology is a major obstacle.

Treating a highly complex and impaired waste stream, such as produced water, to a quality that allows for safe reuse is a major technical challenge. No single unit process is known to be capable of achieving this goal. The biggest technological gap lies in establishing a treatment process that can effectively remove virtually all organic matters of different forms and properties from the water and a cost-effective and reliable desalination technology. Minimizing

organic matter concentration is of particular importance, since various membranes used in current desalination technologies are prone to organic fouling. An improved desalination process that consumes less energy than the current membrane-based desalination technology will be the key to achieving economic viability.

In light of continued improved desalination technologies, we believe that reclaiming produced water is economically and technologically feasible. With proper implementation of existing and new technologies and with inter-local cooperation, what once would have been considered as wastewater can be treated, reclaimed, and reused for the benefit of our society.

Advanced Treatment for Reuse

As an alternative to disposal by hauling, the produced water could be deeply treated for reuse. The characteristics of produced water may vary widely among different oil wells and fields. Because of the complexity of its water quality, a multi-stage advanced treatment will be needed for purposes of any reuse. In essence, a treatment process should be able to significantly reduce the concentrations of oily matter and dissolved salts in the produced water.

To meet the treatment goal, the treatment process should include three stages: a pretreatment stage that removes primarily the oil and particulate matters, then a polishing stage that removes residual organic matter from the water, and finally, a desalination stage that removes excess dissolved salts (Figure 1). Current practice of re-injecting produced water requires a treatment level equivalent to the pretreatment stage.

Many technologies have been investigated and tested for the pretreatment stage. The pretreatment approach often incorporates combinations of liquid-liquid hydrocyclones, gas flotation, absorbents, media filtration, membrane-based micro/ultra filtration and other innovative treatment methodologies. Commercial systems currently available on market include the GPRI/GeoPure and Veolia's OPUS systems.

After pretreatment, unfortunately, there is very limited knowledge and experience in how to further reduce organic matter content and dissolved salts from produced water. Minimizing organic matter concentration is of particular importance, since various membranes used in current desalination technologies are prone to organic fouling. Two major technical challenges remain as:

(1) Technologies that can remove virtually all organic matters. Dispersed oil can damage polymeric membrane filters. Therefore, virtually all dispersed oil must be removed from the wastewater stream before membrane filters should be exposed to the pretreated water.

(2) A cost-effective and reliable desalination technology. Desalination is anything but new. Our current membrane-based desalination technologies (such as nano filtration, reverse osmosis, electrodialysis) have existed for decades. Energy-inefficiency and membrane fouling, however, remain to be two major weaknesses of the current membrane technologies. The energy actually consumed by these processes is much higher than the theoretical thermodynamic energy needed to separate salt ions from water. How to narrow the energy gap between the actual consumption and the theoretical need is the biggest challenge in desalination. Capacitive deionization is considered by many as a promising desalination technique that can significant reduce energy consumption.

Figure 1. A three-stage treatment process for reclaiming produced water. The main technology gaps are in the second and third stage.

The level of desalination may be dependant on the purpose of water reuse. The World Health Organization (WHO) recommends that the dissolved solids concentration (or salinity) of drinking water should be less than 500 parts per million (milligrams per liter). For agricultural irrigation, however, a 2,000 ppm dissolved solids is considered acceptable [according to Texas Commission on Environmental Quality (TCEQ)]. Disposal of desalination concentrate in an environmentally acceptable method has often been difficult. The concentrate generated from desalination process, now only a small fraction of the original produced water volume, could be disposed of by re-injecting into an underground aquifer.

Complexity of Reusing Produced Water

In addition to being a major engineering challenge, treating the produced water for reuse has been complicated by several unsolved issues:

- First, there is the regulatory issue. Even if a mature and practicable technology exists, if it is not allowed by the regulators (e.g., U.S.EPA, or TRRC and TCEQ in Texas), then reclaiming the produced water will not be considered. The applicable regulatory agencies in the state of Louisiana are the Louisiana Office of Conservation and the Louisiana Department of Environmental Quality.

- Second, there is the corporate policy and liability issue. Because of potential liabilities, many companies will not allow their waste streams to be used by others, especially if it could possibly be eventually consumed by humans.

- Third, water quality criteria for water reuse have not been established or standardized. Without clearly applicable water criteria, most well-work is done with "potable" quality water, just to prevent damaging the well. Establishment of recommended water quality criteria for reuse will help define treatment specifications and select treatment technologies.

- Fourth, disposal of the associated concentrate from desalination treatment need to be addressed.

Potential Benefit of Reclamation

Further research is needed to identify appropriate technologies and develop an integrated treatment system for transforming the largest waste stream of oil and gas production into valuable fresh water resources for our society. Such transformation, if implemented, will generate tremendous economic, social, and environmental benefits.

- The oil and gas producers could profit from creating new fresh water supplies. The reclaimed water could be sold to agricultural and other users. The premium collected could partially or fully compensate the treatment costs.

- The local communities, many of which are located in the water shortage-stricken areas, will have new freshwater resources to support social and economic development.

- Reclaiming and reusing the produced water will reduce the withdrawal of precious surface and ground water and therefore benefit the regional natural environments. It will reduce the consumption of desalinated water and thus reducing water costs, desalination energy consumption, and emissions of green house gases. The advanced treatments for water reuse will reduce the chance of water environment pollution that might be caused by the discharge of otherwise partially-treated produced water.

Outline for Conceptual Research Design and methods

Produced water from oil and gas production varies with production sites, but in general it comprises a complex mixture of contaminants that may include suspended oil, dissolved oil, suspended solids (sands, clay, soil minerals, etc), dissolved solids, heavy metals and radionuclides, dissolved gases (CO_2, H_2S, O_2), bacteriological matter, and added substances (treating chemicals, kill fluids, acids, etc). Treating impaired water with such a complex constituents for reuse is always an engineering challenge. No known single treatment technique alone can meet this requirement. Rather, a multi-stage integrated system employing various advanced treatment processes will be needed.

We envision that a three-stage treatment process (Figure 1) will be necessary for treating produced water: First, a pretreatment stage that removes much of oil and inorganic and organic particulate matters that are readily-removable using a simple process; second, an organic contaminant polishing stage that can lower organic pollutant in the water to a minimum level; and third, a desalination stage that removes excess dissolved solids as well as residual heavy metals. For each stage, there are many viable technologies to explore and select. One can explore different combinations of technologies and integrate them into a treatment system that can meet both the performance objectives and the cost objectives of transforming produced water into valuable water resources. While one should extensively collect and analyze relevant knowledge and industrial experiences and then propose solutions based on critical and objective review, it is unrealistic to experimentally investigate and improve every existing or new technology that has potential for treating produced water. Instead, one should focus on filling the most important technology gap that is responsible for holding back the practice of reclaiming produced water for reuse. Based on this understanding, the second stage for removal of organic substance and the third stage for desalination should be future the research focus. Specifically, experimental research on two aspects is needed: (1) advanced organic matter removal technology that can ensure minimum organic residual in the treated water; (2) capacitive deionization technology as an energy-efficient desalination technology to replace the current membrane-based technologies.

References

Burnett, D. 2006. Advanced Membrane Filtration Technology for Cost-Effective Recovery of Fresh Water from Oil and Gas Operations. Technical report prepared for U.S. Department of Energy National Energy Technology Laboratory. Available at: http://www.osti.gov/bridge/servlets/purl/898777-NBkdRL/898777.PDF.

Burnett, D. 2007. Recovery of fresh water resources from desalination of brine produced during oil and gas production operations. Global Petroleum Research Institute report prepared for the United States Department of Energy.

Heins, W. F. 2008. Operational data from the world's first SAGD facilities using evaporators to treat produced water for boiler feedwater. Journal of Canadian Petroleum Technology, Vol. 47(9), pp. 32-39.

U.S. DOE 2004. "Eye on the Environment" Water Resource Issues, Spring 2004, U.S. Department of Energy, Washington, D.C.

UNEP and E&P Forum 2000. "Environmental management in oil and gas exploration and production, An overview of issues and management approaches", Joint E&P Forum/UNEP Technical Publications.

Veil, J. A., Puder, M. G., Elcock, D. and Redweik, Jr., R. J. 2004. A white paper describing produced water from production of crude oil, natural gas, and coal bed methane. Prepared for U.S. Department of Energy, Argonne National Laboratory (Under Contract W-31-109-Eng-38).

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Section Leaders Attend 2009 ASCE Legislative Fly-In

By Patrick J. Landry, PE and Luke E. LeBas, PE

The 10th annual ASCE Leadership Training in Government Relations, commonly referred to as the "Fly-In", was held March 24-26, 2009 in Washington D.C. As members of the Louisiana Section Board, we were honored to represent the state at this year's conference. Also in attendance from Louisiana was Dr. Kam Movassaghi, PE, Past Section Board President, and Mr. Bo Bolourchi, PE, Director of Water Resources for the Louisiana Department of Transportation and Development. In all, approximately 160 members attended from all 50 states, the Virgin Islands and Puerto Rico. The purpose of the "Fly-In" was for each of the attendees to request legislative support from their Congressional delegates on critical infrastructure bills.

Louisiana delegation visits Congressman Charles Boustany (R-La.) in his Washington office during the Legislative Fly-in. From left: Bo Bolourchi, Pat Landry, Boustany, Luke LeBas, Kam Movassaghi.

The initial session on March 24th was called the *Beginner's Training* and the program, conducted by the ASCE Washington D.C. staff, was geared to attendees who were there for the first time. The material presented included an overview on how Congress introduces and passes bills and stressed that this 111th Congress is a relatively young and inexperienced group. The Senate welcomed 13 new members in January and one fourth of the members have two or less year's experience. The ASCE staff also stressed that the "Fly-In" is held in March each year because this is the time of year when bills are introduced and is the most opportune time to meet with our congressmen regarding support of particular pieces of legislation. The *Beginner's Training* session concluded with a reception for the attendees.

On Wednesday, March 25th, the training continued with an in-depth session titled *Legislative Issue Focus: Infrastructure Improvement*. The 2009 Report Card for America's Infrastructure was presented to the attendees. The comprehensive report grades America's infrastructure in 15 categories, including the newest category: levees. An overall grade of "D" was issued for this year's report card and the grade has not improved since the last evaluation conducted four years ago. An estimated investment of $2.2 trillion dollars is needed to raise the grade to a respectable grade of "B". The remaining portion of the session focused on three pieces of pending legislation that are critical to improving infrastructure. The first piece of legislation is H.R. Bill 915, the FAA Reauthorization Bill, which would expand aviation infrastructure and provide $50 billion over a 5 year period to improve and maximize infrastructure effectiveness. The second piece of legislation is the Dam Rehabilitation and Repair Act which, if enacted, would provide $200 million needed to repair the most critical dams (high hazard potential) over a 5 year period. In Louisiana, 20 of the state's 540 dams are in need of rehabilitation to meet state dam safety standards. The final piece of legislation is the Surface Transportation Act, which would increase infrastructure investment significantly. ASCE supports a 25 cents per gallon increase in the motor fuels user fee to support financing this legislation. The U.S. DOT estimates that $78 billion per year is needed to maintain the highway system in its current state and $132 billion is needed to improve conditions.

Following the morning training session on Wednesday, we visited with the congressional staffs of Senators David Vitter and Mary Landrieu and Representatives Bill Cassidy and Steve Scalise to discuss the FAA, Dam Rehabilitation and Surface Transportation legislation. During our meetings, Dr. Movassaghi also took the opportunity to promote the support for I49 funding from Lafayette to New Orleans. The highway, nicknamed "America's Energy

continued on next page

Corridor", transports 30% of the entire energy consumption in the United States. As engineers with Louisiana's Office of Coastal Protection and Restoration, we also promoted the continued funding of previously authorized legislation such as the 2007 Water Resources and Development Act. Also, we updated the legislators on the progress made within the last several years on coastal projects. We concluded our activities Wednesday with the opportunity to meet personally with Representative Charles Boustany, whose 7th District encompasses southwest Louisiana. We requested support for the same legislative bills with Congressman Boustany.

Louisiana delegation visits Congressman Charlie Melancon (D-La.) in his Washington office during the Legislative Fly-in. From left: Pat Landry, Melancon, Luke LeBas.

Afterwards, we attended a Congressional Reception hosted by ASCE's National President, D. Wayne Klotz, PE, FASCE.

On Thursday, March 26th, we attended an ASCE sponsored breakfast on Capitol Hill followed by a visit to Congressman Charlie Melancon, whose 3rd District encompasses the southeastern part of the state, to discuss the bills ASCE is promoting for passage as well as coastal issues.

In summary, the Legislative Fly-in has grown in the number of individuals and state participation over the last ten years. Several ASCE participants have attended each of the previous conferences which have helped establish a solid relationship with their respective members of Congress. The Louisiana Section is committed to continuing our involvement with national issues of importance to our state and the nation and will continue to participate in events such as the Legislative Fly-In.

LOUISIANA SECTION NEWS

The following is a list of the **2009-2010 Section Board**: They were voted in at the membership meeting which was held in conjunction with the Spring Conference at the Crowne Plaza Hotel in Baton Rouge on April 15, 2009.

President: Christopher P. Knotts, PE (Baton Rouge)

President Elect: Patrick J. Landry, PE (Acadiana)

Vice President: Ronald L. Schumann, PE (New Orleans)

Secretary / Treasurer: Kurt Nixon, PE (Shreveport)

Director at Large: Dax Douet, PE (Acadiana)

Director at Large: Russell J. "Joey" Coco, PE (Baton Rouge)

Director at Large: Christopher Sanchez (New Orleans)

Director at Large: Charles Eric Hudson, PE (Shreveport)

Many thanks to all the new Section Board members for volunteering to serve.

ASCE SPRING CONFERENCE

Pictured left to right, front row: Joey Coco, Chris Knotts, Ali Mustapha, Ronnie Schumann, Chris Humphreys.

Back row: Jeff Duplantis, Billy Wall, Patrick Landry, Luke LeBas, Nathan Junius.

Branch News and Leadership Forum

BATON ROUGE

By William H. Wall, PE, Branch President

The January luncheon was at Drusilla Seafood Restaurant and our speaker was Davis Rhorer Executive Director of the Baton Rouge Downtown Development District. We had about 75 people in attendance.

We had no luncheon in February but awarded scholarships to students at LSU and Southern at the E-Week Banquet on February 19, 2009.

The March luncheon was at Drusilla Seafood Restaurant and the speakers were Michael Songy and Brad Ponder with CSRS they gave us an update on the Green Light Program. We had about 80 people in attendance.

We had no luncheon in April due to the ASCE Spring Conference. We had about 160 people attend the conference.

The May luncheon will be at Drusilla Seafood Restaurant again on May 21, 2009 the speaker with be the Baton Rouge Mayor Kip Holden and this will be a joint meeting with LES.

ASCE Scholarship winner Courtney Alexis Thompson, Southern University

ASCE Scholarship winner Kevin Hanegan, LSU

NEW ORLEANS

By Nathan J. Junius, PE

On January 26th Charlie Buckels with Redflex Traffic Systems spoke at Zea Rotisserie & Grill on the traffic cameras and how they work. The luncheon was well attended by many members who failed at getting their red light tickets fixed. At the next membership meeting Lawrence C. Novak, SE, SECB, LEED® AP, Director of Engineered Buildings at the Portland Cement Association, spoke about the Burj Dubai Tower at the Parkview Terrace in City Park. Mr. Novak was the lead structural design engineer of the Dubai Tower and when completed, the tower will be the world's tallest structure. This building used cutting edge construction methods, materials and design to make the ultra-tall high-rise building come to realization. Anyone interesting in submitting a speaker, topic or restaurant can send suggestions to njunius@lhjunius.com.

The structures committee held a meeting on March 5th at UNO on Lessons Learned from the I-35W Bridge Collapse. Dr. Justin Ocel was the speaker and has been integrally involved with the forensic investigations of the Boston I-90 Connector Tunnel Ceiling collapse and the Minneapolis I-35W bridge collapse along with the ultra-high performance concrete program.

The New Orleans Branch recently judged the senior and junior division of the Greater New Orleans Science Fair. Students completed projects ranging from the effect of wind on model structures to the safety of drinking water. Members from the New Orleans branch judged these projects and provided awards to the students whose projects were the top three in the field of civil engineering.

If you are interested in speaking at the 2009 Fall Conference this year on September 23rd or 24th please visit the ASCE website (www.asceneworleans.org), fill out a speaker information sheet and submit to ryan_koenig@urscorp.com.

As always the board is interested in hearing from our members and encourages your input. You can always contact me at njunius@lhjunius.com with any questions, comments or ideas how we can better serve our members.

SHREVEPORT

The Student Chapter at Louisiana Tech University hosted its Annual Winter Banquet on January 28, 2009 and the Shreveport Branch awarded two scholarships. The first scholarship was awarded to Callie Hernandez for outstanding senior civil engineering student and the second was awarded to Stephanie Bayne for outstanding junior civil engineering student. Daniel Thompson presented each student with a check for $1,000.00.

In February the Shreveport Branch hosted the joint ASCE/LES luncheon and Dr. Bobby Price was the guest speaker. As always, Dr. Price gave an outstanding presentation on "Ethics". There were close to sixty people in attendance, many of which were past students of Dr. Price's. It is always fun to see what he remembers about some of his more "active" students.

In May, the Shreveport Branch will host its Annual Spring Classic golf tournament. This year's event will be held at the Stonebridge Golf Course in Bossier City, Louisiana. If you are interested in attending or providing a sponsorship please contact Daniel Thompson at 318.425.7452.

After the golf tournament, the Shreveport Branch will take June, July and August off for Summer Break and will reconvene in September. On behalf of the officers in the Shreveport Branch we would like to thank each of you for your participation this year and wish you and your families a safe and fun filled summer.

Callie Hernandez

Stephanie Bayne

JOB POSTING

PSI Information To Build On
Engineering • Consulting • Testing

PSI, a national engineering consulting firm, seeks a Geotechnical Engineering Department Manager for the Jefferson, Louisiana office. You will be responsible for overall management of geotechnical engineering services, including 2 - 4 drill rigs, 5 - 10 Lab Technicians, and 3 - 5 Engineers. In addition, you will be responsible for P & L, business development, and client relations. As the Manager, you will direct and execute geotechnical project assignments including engineering analysis and report preparation, field exploration, and laboratory services.

PSI's diverse client base offers an excellent opportunity to gain experience in a wide variety of project types and an outstanding career opportunity with our company. PSI has over 100 offices nationwide with 2,100 employees. We offer a competitive salary and comprehensive benefits package. Position is bonus-eligible.

REQUIREMENTS: BS OR MS IN CIVIL ENGINEERING, PE REGISTRATION, AND 5 - 10 YEARS EXPERIENCE IN GEOTECHNICAL ENGINEERING. EXPERIENCE IN GULF ALLUVIAL SOILS USACE AND LDOTD PROJECTS A PLUS. (NOTE: You must meet these requirements for your resume to be considered)

Please send your resume to JOE.EBURNO@psiusa.com.

Editorial

By Deborah Ducote Keller, PE

Another school year ends and many high schools seniors will be following their dreams as they head off to college, while college graduates leave behind some of the best years of their lives and start counting down the years to retirement! As I reflect on my own college graduation 30 years ago, so much has changed, yet so much remains the same.

Females aren't the oddity in engineering schools anymore, at least not as freshmen. And while the colleges of engineering can boast of diversity among the first year students, the attrition rate among women and minorities is unacceptably high. Perhaps it reflects an aggressive recruiting campaign and therefore, many may be attracted initially, but realize early on that engineering is not their passion. Or perhaps, engineering education has not changed to meet the needs of a diverse student population who learn, communicate, and interact differently than the stereotypical engineering students of previous generations, so the profession loses them to other majors. From my experience and the women of my generation, you had to really want or need to stick it out in engineering school to make it to graduation. I like to say that we "survived" engineering school at a time when women didn't have many options in professional careers and the help wanted ads still were divided into "Help Wanted Men" and "Help Wanted Women." Another good difference is that the discriminatory practices of prior years, especially with regards to pay inequity, appear to be fading.

I encounter a wide cross-section of college students through many of my activities. They have incredible talents, ambitious goals, creative minds, and diverse interests. Their expectations from a career include not only great salaries, but also a sense of fulfillment, of making a difference, of recognition of their contributions, and they readily acknowledge that changing employers or changing professions may be needed over the course of their careers to obtain these lofty goals.

If civil engineering is going to continue to attract students, some of which have so many paths they could pursue, then we need to get involved at all stages of a child's development. Consider accepting an opportunity to speak at a career day, or work a booth at Jazz Fest for the ASCE children's area, or judge a science fair, or encourage a young person to job shadow at your company.

To reach those who are enrolled in engineering school, consider volunteering to be a guest speaker, or to give a tour of a current project. You can help make engineering come alive and show students the hands-on side of civil engineering. Unfortunately, the first two years of engineering curriculum are heavy in math and science, regardless whether a student is interested in graduate research or being a practitioner. Consider how you could demonstrate the principles of math, science, and engineering being applied outside the classroom.

A recent article in USA Today reported that the teaching profession will face a profound number of vacancies as the Baby Boomers enter retirement in the next ten years. Engineering will not be any different. For America to rely upon its own brainpower, it needs to attract and retain its youth into the professions. Will civil engineering be able to compete for the best and brightest minds?

Mentoring – Our Ultimate Future

By Ann Forte Trappey, PE

Ann Forte Trappey, PE

The first time I met Nedra Davis at an ASCE luncheon, she and I were discussing the issue of females in Engineering and how I have a daughter who will be graduating from LSU in Civil Engineering soon. She asked me to write this article on how I mentored her to go into Engineering. I have mentored several young people who are now Engineers. There is no greater satisfaction than having given career path advice to someone who is now a Professional Engineer. Mentoring a young person toward Engineering is in my belief a true duty to our profession, particularly when that young person has the qualities it takes to become outstanding technically as well as professionally. Anyone who knows my daughter Elise will know what an independent spirit she is. I knew that she had the potential to not only do well in Engineering, but eventually, because of her love of math and science, would excel. She loves children and in high school insisted that she wanted to become an Elementary Education Teacher. I have the utmost respect for Teachers and heaven knows how badly

continued on next page

we need good ones, but I also know that unfortunately a Teacher's salary would never be enough to support my sweet precious daughter. We all know great teachers who have since moved on to other careers for a variety of reasons. I also made her realize that if she started off in Engineering, she could always go back to Education. Starting off in Education and attempting to change to Engineering would definitely cost hours because of the additional math and sciences required to complete an Engineering degree. So, she began College in Civil Engineering and has excelled as I had hoped and somewhat expected. My next encouragement is for her to get a PhD We'll see…..

"Only 18.1% of engineering bachelor's degrees went to women in 2006-2007, the lowest share since 1996." "This is significantly lower than the total student body where women comprise 58 percent of enrolled undergraduates."1 Because of these statistics, it's critical that we mentor young women and minorities who have the abilities to prosper in Engineering. Coupled with the low numbers of engineering graduates in general, it's significant that we approach these underrepresented groups of people to become engineers. As I look back on when I was growing up in a family of five girls with both parents who have college degrees, I knew I would go to and finish college. My father was an Electrical Engineer and my mother was a High School Math and English teacher. I actually started my college career in Architecture and finally 2.5 years later, I realized that the classes I enjoyed the most were the most technical. So, with 90 college credit hours on my vita, I started my Engineering career with only 30 of those hours applying to my new chosen field. It was the best decision I could have ever made. That experience probably lent my wisdom to the explanation I provided Elise in her review of how to approach her college career. Looking back, despite the wonderful friends I made in Architecture, if someone had encouraged me to go straight into Engineering, it might have been easier and certainly less expensive for my parents.

Even though there appears to be a push to attract women and minorities to the math and science fields over the past several years, it is questionable if the efforts have really borne fruit. With my very limited and quick research, the statistics certainly do not show what any statistician would consider a "significant" growth in representation by women and minorities. Studies have shown that how girls and boys learn math and science is actually different, yet the educational system at the pre-k to 12 levels do not accommodate that difference. The likelihood that any significant change in that system will be made soon is suspect.

So what can we as Professional Engineers do to change the trend. I wonder if the fathers (particularly those who are Engineers) realize that they don't encourage their little girls to do the same things they would encourage their sons to do. It doesn't just happen in Engineering. Go out onto a golf course. You see Dad's with their sons at an early age. Do they do the same with their little girls? What about the hunting club? How about the fishing camp? I know that this trend is somewhat changing, but is it really? Even I, who own a business still accept that in certain circumstances, that "good ole boys club" is alive and well. With the dire need for strong technical minds to be cultivated in this country, why are we not truly encouraging this generation of young women to pursue what most would consider more male traditional careers? I contend that not only should we, but we must in order to remain competitive as a nation. It is also incumbent upon those educators particularly those teaching undergraduate math and sciences to encourage and mentor their brightest students. The LSU College of Engineering has instituted programs to encourage women and minorities to pursue engineering and to assist those who initially choose engineering as a major to stay in Engineering. This program and others like it need our help. As professionals, we should be taking an active role in programs which encourage math and science education. We should all do our part to seek out those bright young women and minorities and truly encourage them to pursue careers in math and science, hopefully Engineering. I can remember that my father would take me to visit his projects and his clients. I never realized then that he was cultivating my love for engineering. Perhaps my sisters didn't care to run around with Dad, but I loved it and he obliged me at every opportunity. My parents were obviously extremely supportive of my career.

We all need to be supportive of our profession by mentoring young people and supporting our own Alma Maters. The programs that have been developed to continually encourage young people toward Engineering careers are extremely important to the success of Engineering as a profession. Look around… there's someone you can encourage to be the next great Engineer. That person may be your daughter.

1. Engineering by the Numbers, by Michael T. Gibbons, Director of Data Research, American Society for Engineering Education.

Ann Forte Trappey, PE, FACEC *is the CEO / President of Forte and Tablada, a Baton Rouge based Consulting Engineering and Land Surveying firm. She has a BS in CE from LSU. She has held numerous Board and committee positions in ACEC/L. She serves on both the LSU College of Engineering Dean's Advisory Council as well as the CEE Dept. Advisory Council. She maintains membership in LES, LEF, SAME, NSPE as well as ASCE. Over the years, her civic endeavors have been many and presently serves as Metro Board Chair of the Baton Rouge YMCA. She has been recognized by both the College and the Dept. of CEE at LSU as a Hall of Distinction Member.*

ASCE-SEI New Orleans Chapter Report

By Om Dixit, PE, FASCE, Newsletter Editor

Since our report in the August issue of this magazine, ASCE SEI New Orleans Chapter hosted four seminars in New Orleans:

January, 28, 2009 **Using the 2008 MSJC Code and Specification – *Dr Richard Klingner,*** *(University of Texas, Austin, Texas) explained to the audience about the* changes and usage of "*Masonry Standards Joint Committee's (MSJC) 2008 Building Code Requirements and Specification"* for Masonry Structures. He further showed the audience the short cuts for design of masonry structure. The seminar was attended by about 70 members.

March 5, 2009 ***Lessons Learned from the I 35 W Bridge Collapse*** ***Dr. Justin Ocel*** explained the to the audience the details of the investigations of the bridge collapse. The discussion revolved around the nonlinear finite element modeling in regards to the calibration, load history, and possible causes of failure. Concluding his talk he discussed the engineers' responsibility as infrastructure inspectors. The seminar was attended by about 50 members.

April 16, 2009 **More To Concrete Than Meets The Eyes**, ***Dr. Kenneth Hover*** (Cornell University, Ithaca, NY) presented the 2009 Annual David Hunter Lecture. This entertaining and informative presentation was those who work with concrete via designs and specifications, production, installation, verification of properties in the field or lab, troubleshooting or making decisions about acceptance. The seminar started by exploring the time and length scales used to measure concrete behavior, noting that the duration of the construction period is typically less than 0.1% of the length of the expected service life, noting that short-term changes in the material and the construction environment have long-term consequences.

After seminar from left to right; Bill Rushing, Vice Chairman; Dr. Richard Klinger, Speaker; and Om Dixit, Newsletter Editor.

Future Seminars:

The following dates are the projected seminar dates for 2009. The exact dates may change due to the availability of the speakers and UNO Lecture room.

June 11, 2009	To be Announced
August 6, 2009	To be Announced
October 15, 2009	3rd Herb Roussel, Jr. Marine Seminar
December 3, 2009	To be Announced

More details about these seminars will be posted on the ASCE New Orleans Branch website as soon as they are finalized. The committee is looking for good topics and speakers for future presentations. Members with expertise in above areas would be welcome to join the Executive Committee. For any suggestion and joining the Executive Committee one can contact Chairman Jay Jani, PhD,PE, at jay.jani@engconsultsvcs.com.

The ASCE SEI New Orleans Chapter sponsored awards at ***Greater New Orleans Regional Science Fair*** held in February 2009. The award winners were:

Junior Division

The First Place ($150) award was given to ***Destin Bailey*** of Ruppel Academy for her project *"Does the Design Affect the Strength of the Bridge?"* The Second Place ($100) award went to ***James Nicolas*** of T.H.Harris Middle School for his project *"How They Engineer Buildings to Withstand Natural Disasters."*

Senior Division

The First Place ($150) award was given to ***Gavin Pitre*** of John Curtis Christian for his project *"Wood You Believe it?"* The Second Place ($100) award was given to Ashley Spooner of Ursuline Academy for her project *"What's in Your Concrete?"*

This year two awards of $50 were also given to the Teachers of the first place project's school for encouraging their students to do a Structural Engineering project. These teachers were ***Michelle Leona*** of *Ruppel Academy* and ***Cathy Boucvalt*** of *John Curtis Christian*. The Chapter is also working with GNO Science Fair organizers to provide the interested schools with volunteers to guide students in their future engineering projects.

ASCE SEI New Orleans Chapter welcomes ***Dr. Zolan Prucz*** of Modjeski & Masters as a new member on Executive Committee. His experience in Bridges and Highways will benefit the committee planning future activities.

All seminars are held at the University of New Orleans. Seminar dates, pertinent information, and registration can be found on the New Orleans Branch website at www.asceneworleans.org. To add your name to our mailing list, e-mail Om P. Dixit at om@fenstermaker.com.

ASCE-T&DI Louisiana Chapter Report

By Om Dixit, PE, FASCE, Chairman

The executive committee of ASCE T&DI Louisiana Chapter has started to meet regularly every month for planning the future activities of the group for its membership. I would like to introduce the current members on Executive Committee and here they are:

Chairman: *Om Dixit*, (C.H. Fenstermaker & Associates)
Vice Chairman: *Robert Schmidt* (HNTB)
Treasurer: *Miles Bingham* (URS)
Newsletter Editor: *Gay Knipper* (LTM)
Members:

Mike Aghayan (La. DOTD)
Donald Barbe (University of New Orleans)
William Cromartie (Port of New Orleans)
Brin Ferlito (Neel Schaffer)
Elba Urbina Hamilton (Aillet Fenner Jolly & McClelland)
Karen Holden (Providence)
Dennis Lambert (Lambert Engineers)
Louay Mohammad (LSU/LTRC)
Karen Parsons (New Orleans Regional Planning Commission)
Harold "Skip" Paul (LSU/LTRC)
Ronald Schumann, Jr. (AECOM)
Don Sorgenfrei (Modjeski & Masters)

The activities of this group will arrange seminars, workshops and other activities for benefit of the ASCE and T&DI members. One does not have to be an Engineer to join T&DI. The Institutes are formed for the benefit of ASCE and non-ASCE members to participate and interact with other transportation professionals.

The Chapter is currently planning its first activity as a 2 hour seminar in Baton Rouge at LSU/LTRC facility in May. The details will be announced soon. More information could be found on the ASCE Louisiana Section website at www.lasce.org and ASCE New Orleans Branch web site www.asceneworleans.org. To add your name to our mailing list and/or to join the Executive committee, e-mail Om P. Dixit at om@fenstermaker.com.

STUDENT CHAPTER NEWS

UNO STUDENT CHAPTER

By Daniel Bobeck, ASCE UNO President

The spring semester was busy for UNO ASCE members. Aside from devoting thousands of man hours to both the Steel Bridge and Concrete Canoe projects, and not quite as many to studies, many students have devoted their time to planning the 2010 ASCE Deep South Regional Conference. The University Of New Orleans ASCE Student Chapter is hosting the 2010 Deep South Regional conference in March of 2010. UNO students have formed at planning committee to raise money, organize events and reserve venues for the 2010 conference. We are currently looking for sponsors for this event. Thirteen universities from Arkansas, Louisiana, Mississippi and Tennessee compete at the Deep South conference every year. If you are interested in sponsorship please contact Gianna Cothren at UNO or visit the UNO ASCE website at *orgs.uno.edu/asce/*.

In May, UNO ASCE members are volunteering at McMain Middle School for the Hispanic Engineer National Achievement Awards Conference (HEENAC) sponsored Viva Technology Day. ASCE members will act as "college captains" for groups of middle school students as they compete for technology prizes and catch a glimpse of careers in Engineering, Math, Science and Technology.

During Jazz Fest ASCE members can be found volunteering for the ASCE-NO Outreach Event. ASCE-NO has set up a kid's booth to teach kids about "Rebuilding Louisiana's Coastline", where kids can see how trees and marsh land minimize storm surge damage. For volunteering their time ASCE members will get a ticket to Jazz Fest to enjoy after or before their shift.

We look forward to seeing all of you in New Orleans in March of 2010 and want to see a very competitive bunch of bridges and Canoes.

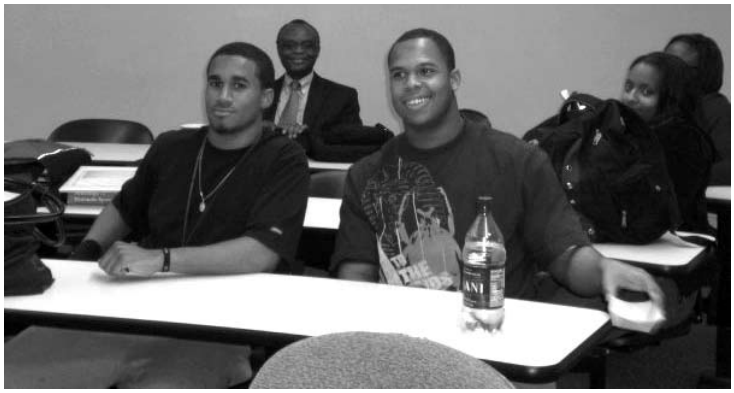
SOUTHERN UNIVERSITY

The ASCE Student chapter at Southern University and A&M College is an active student organization in the Civil and Environmental Engineering department. In Fall 2008, the department of Civil and Environmental Engineering welcomed a new chairperson: Dr. Emmanuel U. Nzewi, PE (emmanuel@engr.subr.edu). Our ASCE Student chapter provides an environment where Civil Engineering students can interact with one another and participate in extracurricular, professional and service activities. In January 2009, the following officers were elected to serve the organization from January 2009 through May 2010:

President: C. Alexis Thompson (courtneythompson@engr.subr.edu)
Vice President: Deirdra Boley
Secretary: Aaron Davis
Treasurer: Santisha Davis
Publications Chair: Allan Baugh
Outreach Chair: Lauren Collins
Fundraising Chair: Nikita Cummings
Sergeant at Arms: Justin Foster
Faculty Advisor: Dr. Hak-Chul Shin (hakchulshin@engr.subr.edu)

Next year, our ASCE Student chapter plans to attend and compete in the ASCE Deep South Regional Conference. Our goal is to enter in the steel bridge and concrete canoe competitions in addition to other available events. Several students from our ASCE Student chapter attended the ASCE Spring Conference, April 14-15, 2009, which was held in Baton Rouge, LA.

Over the year (2009-2010), our ASCE Student chapter has planned several service and professional activities including: food fundraisers, FE Mock exams (inaugural - October 2008; April 2009, October 2009), a T-Shirt sale, FE Review manual sale, monthly College of Engineering complex cleanup, and Freshman (engineering) orientation. Our goal is to create a community where Civil Engineering students, and those interested in civil engineering, can grow professionally and promote civil engineering as an exciting professional career while providing meaningful community and outreach services to the surrounding communities.



UNIVERSITY OF LOUISIANA AT LAFAYETTE

By Amy Henschke, Student Chapter Secretary

The members of the University of Louisiana student chapter of ASCE recently attended the Workshop for Student Chapter Leaders (WSCL) in New Jersey in February. Representing the chapter were Alison Lognion, Stephanie Hesse, and Corey Meaux along with practitioner advisor, E.R. Desormeaux, PE, and faculty advisor, Jasmine Dufreche, EI. Participating members attended ice breaker sessions and workshops where they learned how to recruit members, effectively conduct meetings, and organize fundraisers and community outreach activities. UL paired up with students from the University of Tennessee for most of the workshop, an example of the networking opportunities provided by the conference and the importance of attendance of the chapter's student leaders. While in New Jersey for the conference, the students and advisors had the opportunity to travel to Philadelphia to get Philly cheesesteaks and to see the Liberty Bell and other historical sights.

The Chapter also recently developed a new website to promote the Chapter and to keep the student members informed of Chapter activities (http://www.asce-ul-lafayette.org). Interested students can access the website to stay informed about upcoming meetings and events, connect to links for scholarships and job posting, learn about the benefits of becoming a member, and contact student officers and faculty advisors.

ASCE Deep South

By Daniel Bobeck, ASCE UNO President

UNO

The University of New Orleans ASCE student chapter experienced another year of success at the 2009 ASCE Deep South Student Conference at Arkansas State University in Jonesboro. The steel bridge team repeated as regional champions, the concrete canoe team finished in a tie for 2nd place, the environmental competition team captured 2nd place, and the mystery event team captured 3rd place.

On Friday morning, all of the participating schools gathered at the ASU Convocation Center for the steel bridge competition, technical paper presentation, and concrete canoe oral presentation, and environmental competition. The steel bridge team dominated the field as Ali Tareh, Raymond Meladine, and Jesse Adams assembled the bridge in just over nine and one-half minutes. The team won first place in five of six categories: aesthetics, construction speed, construction economy, structural efficiency, and lightness. It captured second place in stiffness. The first place victory resulted in a berth in the 2009 National Student Steel Bridge Competition to be held May 22-23 at the University of Nevada-Las Vegas. In order to be eligible for this event, ASCE mandates that each school participate in a technical paper competition held at each regional conference, usually according to the rules of the National Daniel W. Mead Student Paper Contest. Christopher Rau presented his paper on "Sustainability and Civil Engineering," the topic of this year's Mead contest; the UNO students and faculty who attended his presentation were pleased with his efforts. The environmental team, consisting of Kayode Adewumi, Marcus Maier, Daniel Flores, and Manuel Mosquera, designed a water filter using sand and other materials.

On Saturday, all the schools gathered at Craighead Forest Park for the canoe races, the mystery event, and surveying competition. UNO was scheduled first to perform the swamp (buoyancy) test; however, the team experienced an unfortunate battle with the weather. The back end of a strong cold front ushered a fierce surge of cold air that caused waves of nearly a foot in height to move across the lake. Several canoe team members including Mallory Davis, Daniel Bobeck, and Jenni Schindler quickly tried to remove the test water from the canoe and bring it back to the shore. Shortly after they did, a strong wave moved onshore and overturned the canoe, inducing a crack from side to side near the midpoint. The judges suspended the contest for nearly a half hour as the strong wind and hard rain continued to move through the park. Most team members, faculty members, and spectators fled to their cars to avoid catching illness, while some waited out the storm under the nearby picnic shelter. After the rain stopped and the winds slightly subsided, the judges resumed the swamp test for the other schools. Over the course of about an hour, the canoe team members as well as their supporters quickly improvised a plan to correct this situation. They used several rolls of duct tape to patch up the crack as well as provide reinforcement several feet on either side on both the top and bottom of the canoe. The wave action refused to significantly subside; so after the swamp test, the judges announced a break for lunch and subsequently called for a team captain's meeting to discuss an abbreviated race schedule. They reached a final agreement that only one race would occur. Each school would race 2 men and 2 women together on the endurance race course. Daniel Bobeck, Manuel Mosquera, Jenni Schindler, and Mallory Davis raced "Floatilla the Hun" for about seven and one-half minutes, finishing 5th in the race event. Thanks to the leadership demonstrated by them and their fellow ASCE students by successfully patching it up, they returned to the finish line with virtually no leakage. The only water that entered the canoe was a result of the paddling action along the race course. The mystery event team, consisting of Ali Tareh, Kayode Adewumi, and Daniel Flores, designed a miniature water tower consisting of plastic drinking straws, a plastic drinking cup, and small needles pierced through the cup. The judges measured each team for their ability to design the tower to optimize holding water at the highest possible height

On Saturday evening, all the schools gathered at the Convocation Center ballroom for the Awards Banquet. The ASU student chapter hosted as guest speaker Todd Huston, a handicapped mountain climber and author who set the world record of visiting the highest point of each of the 50 states in the U.S. in the shortest amount of time (66 days, the previous record was 101 days by a non-handicapped British man). Todd described his experience with having to have his right leg amputated after a nearly-fatal water-skiing accident as a teenager. He showed a slide show of photos of his visits to the highest point in every state on his own after a company who offered to pay for him to do so withdrew their offer. He offered advice to all the students that there is no problem they can not overcome as long as they maintain the will to do so.

The UNO ASCE chapter is very proud of their accomplishments this school year. While it is disappointed in failing to reach the National Concrete Canoe competition, it is excited for its steel bridge team's dominating triumph and wishes all the team members the best of luck when they venture to Las Vegas in May. The chapter is thankful for the support provided by Dr. Gianna Cothren, Dr. Michael Folse, and Mr. Byron Landry in the steel bridge and concrete canoe projects and for the companies that have contributed to our chapter's funding this year. The chapter hopes to build upon the successful efforts of the last 2 conferences when it hosts the 2010 ASCE Deep South Student Conference next spring.

— Calendar of Events —

June 1, 2009	Application deadline for Professional and Fundamentals of Engineering October 2009 Exam (for First Time Applicants)	July 15, 2009	Copy deadline to printer for August issue of Louisiana Civil Engineer Journal
June 15, 2009	Voting for 2010 ASCE National Elections begins	August 1, 2009	2009 SPAG Projects should be completed.
June 16, 2009	Nomination forms from Branches due for Section Awards	August 7, 2009	SPAG Final Activity Report due at ASCE Headquarters
July 2, 2009	Deadline for article submission for August issue of Louisiana Civil Engineer Journal	August 13, 2009	Voting for 2010 ASCE National Elections closes

http://www.lasce.org/calendar.aspx

http://www.asce.org/conferences/

- World Environmental & Water Resources Congress 2009 [17-May-09]
- Joint 2009 ASCE-ASME-SES Conference on Mechanics and Materials [24-Jun-09]
- TCLEE 2009 Conference [28-Jun-09]
- 33rd International Association of Hydraulic Engineering & Research (IAHR) Congress [10-Aug-09]
- Pipelines Conference 2009 [16-Aug-09]
- 14th Conference on Cold Regions Engineering [30-Aug-09]
- VI-International Conference on Environmental Hydrology & 1st Symposium on Coastal and Port Engineering [28-Sep-09]
- 5th Congress on Forensic Engineering [10-Nov-09]
- First International Conference on Coastal Zone Management of River Deltas and Low Land Coastlines [06-Mar-10]

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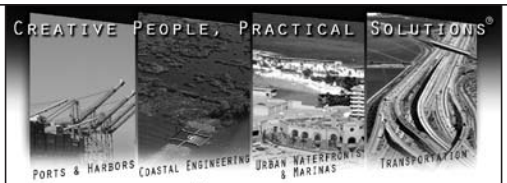

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