December 12, 2008

Geology of the Red River Campaign of the American Civil War

Danny Harrelson, U.S. Army Engineer Research and Development Center

Abstract: The Red River Campaign (10 March to 22 May 1864) was the Union's largest combined army and navy campaign west of the Mississippi River. The primary objectives of the campaign were the capture of Shreveport, LA, seize major stockpiles of cotton in the area, and planting the Union flag in Texas. However, like many other Civil War campaigns, geology played a pivotal role in deciding the outcome. Union army and naval commanders overlooked several unique geologic and hydrologic factors influencing the Red River system. These unique properties included the great Red River Raft (a massive log jam that impeded navigation between Alexandria and Shreveport, LA), a series of rapids at Alexandria, LA, and the flashy nature and high sediment load of the river. The great Red River Raft in place for at least a millennium altered the flow regime of the River from a single channel to a series of anastomosing channels that created "strategic shooting lanes" for the Confederate defenders. The initial largely unsuccessful attempts at removing the raft were between 1833 -1838, so knowledge of the raft existed prior to the war. After removal efforts ended in 1838, the raft reformed quickly and was in place again by the time the Red River Campaign began. At the tactical level, the raft severely restricted the ability of the Union's naval forces to maneuver and advance, thereby relegating the land forces to a largely defensive role. The rapids at Alexandria, LA, served as another navigational restriction that almost cost the Union navy it's entire Red River fleet after it was trapped above the them during a sudden drop in the river level. The fleet was saved by one of the most imaginative engineering feats of military history; a "wing dam" proposed by Captain Joseph Bailey. These two dams constructed at the lower and upper rapids, raised the level of the Red River approximately 2.1 meters (seven feet) and provided sufficient draft that allowed most of the Union fleet to escape. Unable to achieve any of its objectives, the Campaign was considered a failure by the Lincoln administration and his military commanders. General William T. Sherman best described the failure of the Red River Campaign as "one damn blunder from beginning to end".

Paper co-authors: Robert Larson and William Myers, U.S. Army Engineer Research and Development Center

Biography: Danny W. Harrelson received his B.S. 1976 and M.S. 1981 degrees in geology (Igneous Petrography) from the University of Southern Mississippi, Hattiesburg, Ms. He has over 31 years of experience working for state and federal government, private industry (oil exploration)and consulting firms (oil service, geotechnical and environmental) working in Albania, Australia, Belgium, Bulgaria, Denmark, France, Germany, Greece, Hawaii, Italy, Micronesia, Norway, Portugal, South Korea, Switzerland and the United Kingdom. Mr. Harrelson has authored or co-authored more than 100 papers and abstracts on a variety of geologic subjects, published in numerous professional journals. Currently, he is employed as a research geologist for the U. S. Army Engineer Research Development Center, Vicksburg, Mississippi and is Chairman of the Gulf Coast Association of Geological Societies Faculty and Student Grant Committees.

November 14, 2008

Trends and Issues Related to Gulf Coast LNG Development

David E. Dismukes, Center for Energy Studies, Louisiana State University

Abstract: This presentation will highlight the role, importance, and development of liquefied natural gas ("LNG") regasification facilities along the Gulf of Mexico ("GOM"). The GOM is perhaps the best situated location for the development of LNG regasification facilities given the close proximity of a wide range of energy infrastructure that can help support, and serve as a market to, these new infrastructure investments. The presentation will provide some background on LNG development in the U.S. and the factors that are making this round of LNG development different than what occurred during the late 1970s and early 1980s. Changes in natural gas markets have been examined and the role that new environmental pressures are placing on natural gas-fired power and industrial applications discussed. The LNG "value chain" is discussed at length as well as the respective costs, and break even prices estimated to import natural gas into the U.S. Of particular interest is the interaction of these new facilities with existing GOM energy infrastructure. The presentation will show that the GOM pipeline and storage infrastructure in the region is perhaps one of the most important sets of energy assets that will help facilitate the movement of imported gas across the region, and into other regions of the U.S. Gas processing and other supporting gas infrastructure is also examined.

Biography: David E. Dismukes is a Professor and Associate Executive Director at the Center for Energy Studies, Louisiana State University. His research interests are related to the analysis of economic, statistical, and public policy issues in energy and regulated industries. Over the past 20 years, he has worked in consulting, academia, and government service. David has been on the LSU faculty for 13 years and since that time has led a number of the Center's research efforts on topics associated with most all aspects of the energy industry. He speaks regularly to professional, trade, and civic associations on important energy issues, trends, and topics. Dr. Dismukes received his M.S. and Ph.D. in economics from the Florida State University.

October 10, 2008

Post-Katrina Recovery Patterns among New Orleans Neighborhoods: Do Natural-System Models of Resilience Fit?

Margaret Reams, Ph.D., Department of Environmental Sciences, LSU

Post-Katrina population levels within the 181 U.S. Census Track areas of Orleans Parish are used to test the applicability of descriptive models of resilience developed for natural systems. Dr. Reams and her co-authors, Dr. Nina Lam and Lauren DeFrank, identify community attributes that may explain variation in the recovery rates of New Orleans neighborhoods. Resilience is indicated by the percentage of residents within each Census Track receiving mail delivery in the homes they occupied in the months preceding the storm, at intervals of one and two years after the hurricane. Neighborhoods with larger percentages of residents who had returned within two years were considered to exhibit higher levels of resilience. Using cluster analysis, the authors applied a four-dimensional model of resilience developed by researchers in plant biology to test the model's descriptive value when applied to human communities. The model identifies four typical recovery patterns, "usurper", "resistant", "susceptible", and "resilient", among plant species following a large-scale disruption. They used discriminate analyses to examine the relative influence of measures of social and economic capital on the observed resilience of these communities. The natural-system resilience model yielded insight in the recovery patterns, with New Orleans neighborhoods exhibiting return rates consistent with 3 of the 4 categories of return patterns observable within a natural system. Further, measures of Pre-Katrina social and economic capital within the neighborhoods explained roughly 75% of the variation in observed levels of resilience.

Biography: Margaret Reams holds a Ph.D. in Political Science from the University of Georgia and is an associate professor in LSU's Department of Environmental Sciences, teaching in the environmental planning and management area. She designed and implemented courses on environmental conflict resolution and environmental policy analysis at LSU. She was awarded the University's distinguished teaching award for graduate-level teaching and directs a multi-year research project for the U.S. Forest Service on Community-Based Wild Fire Risk Mitigation Programs. In addition, she directs an MMS project to develop a quantitative, integrated index measuring social-ecological resilience among coastal communities. She is a member of the LSU Graduate Faculty, and has supervised over seventy-five master's theses on various issues of environmental policy and attitudes. She has published articles in Environmental Management, Wetlands, Coastal Management, Marine Policy, Environment and Behavior, Social Science Quarterly, Forum for Applied Research and Public Policy, and the Journal of Environmental Systems among others.

September 12, 2008

Bossier-Haynesville Shale, North Louisiana Salt Basin: Geological and Geochemical Characterization

Don Goddard, LSU Center for Energy Studies

The presentation will discuss some of the results of a five year DOE North Louisiana petroleum system project carried out by LSU and the University of Alabama. It will focus on geological and geochemical studies regarding the Cotton Valley-Bossier Group and Haynesville shale beds. These rocks proved to be thermally mature and represent petroleum source rocks that generated and potentially expelled mostly gas and some oil. At their present maturity levels, they have mostly low to moderate total organic carbon contents and Type III kerogen. Original kerogen types in the immature stage, as assessed by kerogen petrography, were mainly gas-prone Type III and some oil and gas prone Type II/III. Visual kerogen data supports the predominantly gas prone nature of the source rocks. Vitrinite reflectance (Ro) values (0.94 % to 2.62%) and thermal alteration indices (TAI) (2.8 to 3.9) suggest that these source rocks entered the late oil window to main gas maturity window and thus have generated mostly gas with some oil. Thin section petrography of geochemically analyzed intervals documents the following rock types: black shale, muddy fine-grained sandstone, laminated fine-grained sandstone, sandy mudstone, and silty mudstone. The thickness and widespread deposition of predominantly gas-prone source rocks within the North Louisiana Salt Basin and their high thermal maturity led to potential sourcing of mainly gas with some oil, not only within the Bossier-Haynesville shale, but also in overlying Upper Jurassic Cotton Valley sandstone reservoirs and Lower Cretaceous reservoirs, particularly in the Hosston and Sligo formations. Hydrocarbon expulsion appears minimal suggesting the Bossier-Haynesville has potential as a shale gas reservoir. Mention will be made of the reservoir characteristics of the shale and about the available technologies required to produce its gas reserves.

Biography: Donald Goddard began his career in 1965 with Gulf Oil Company (Mene Grande) in Eastern Venezuela. After working as an exploration geophysicist and then production geologists for many years, he became Manager of Geological Operations for Maraven Oil Company in Western Venezuela's Maracaibo region. He moved to the USA in 1990 and began working as a petroleum researcher at LSU's Basin Research Institute. Presently, he serves as the Director of the PTTC's technology transfer program at LSU's Center for Energy Studies. His tasks involve petroleum systems studies of Gulf Coast basins, integrated field studies in mature areas of Louisiana, as well as identifying and transferring upstream technologies to independent operators of this State. His 30 years of petroleum experience include E&P projects in important oil and gas producing basins of North, Central and South America. He has a B.S. degree in geology from Florida State University, M.Sc. and PhD degrees in marine geology and geophysics from the University of London (UCL), and a geological engineering degree from the Universidad Central de Venezuela. Dr. Goddard is a member of the American Association of Petroleum Geologists (AAPG), the Baton Rouge Geological Society (BRGS), and the Venezuelan Geological Society (SVG).

May 9, 2008

The Dunbar-Hunter Expedition of 1804-1805: Early Geological Observations in the Louisiana Purchase Territory

Jeff Hanor, Department of Geology and Geophysics, LSU

In the years following the Louisiana Purchase Treaty with France in 1803, U.S. President Thomas Jefferson commissioned four expeditions to explore the new territory. Best known of these, of course, was the Lewis and Clark expedition of 1804-1806 across the northern margin of the Purchase. However, of interest in the history of scientific exploration in what is now Louisiana and Arkansas is the second expedition Jefferson commissioned, the Dunbar-Hunter expedition of 1804-1805 up the Ouachita (Washita) River to the hot springs of central Arkansas. Both William Dunbar and George Hunter had strong Louisiana connections. Dunbar was born in Scotland and in the 1770s and 80s ran a mercantile business in New Richmond, West Florida (now Baton Rouge, Louisiana) before relocating south of Natchez. Hunter, who was also a Scotsman, was a chemist in Philadelphia. In 1815 he and his family moved to New Orleans, where he set up one of the first industrial chemical plants along the Mississippi River, Hunter's Mills.

Both Dunbar and Hunter kept daily journals in which they recorded their observations of flora, fauna, people, and geologic features (Berry et al., 2006). Dunbar's careful survey of the Ouachita would result in finely detailed map of the river. The explorers reached the hot springs in December 1804. Hunter made qualitative measurements of the chemistry of the hot waters using reagents he had brought with him. His analyses are broadly consistent with what we know today: the waters are of low salinity, are dominated by Ca-HCO_3, and have moderate levels of sulfate and low concentrations of chloride. The physical model that Hunter and Dunbar invoked in their journals for the origin of the hot springs has its origin in medieval thought on the nature of the hydrologic cycle. It was thought that seawater made its way into the interior of the earth, where it was distilled by local sources of heat. The vapors condensed in caverns in mountains to form spring waters. Dunbar attempted to measure the total discharge rate of the springs by noting the time it took a large spring to fill a kettle with water and extrapolating the results to other springs. His result of 240,000 gal/day is surprisingly close to modern measurements of 750,000 to 950,000 gal/day. Material from the reports sent to Jefferson after the expedition was published in three different editions in 1806. Early public interest in the springs, which was contributed to in great measure by the Dunbar-Hunter reports, led to Federal management of the area in 1832 as the Hot Springs Reservation.

Berry, T., Beasley, P., and Clements, J. (eds.), 2006, The forgotten expedition, 1804-1805: The Louisiana Purchase Journals of Dunbar and Hunter. Baton Rouge, Louisiana State University Press, 248 p.

Biography: Jeff Hanor received his B.A. in Geology at Carleton College and his Ph.D. degree in Geology from Harvard. He was an NSF Postdoctoral Fellow and an Assistant Research Oceanographer at the Scripps Institute of Oceanography before joining LSU in 1970. He is currently an LSU Alumni Professor in the Department of Geology and Geophysics. His professional interests include sedimentary geochemistry, environmental geology, and hydrogeology.

April 11, 2008

Developments in Geological Sequestration of Carbon Dioxide

Michael A. Simms, URS Corporation

Geological sequestration (GS) of CO2 is the injection of emissions captured from industrial and energy-related sources into geological formations in sedimentary basins for long-term isolation from the atmosphere. Large point sources accounting for over 50 % of CO2 emissions include fossil-fuel power generation, industry, natural-gas production, synthetic fuel plants, biomass energy facilities, and fossil-fuel based hydrogen production plants. The objective of GS is to store and contain the CO2 for sufficiently long times for mitigation of potential climate change. The criteria for GS site selection include presence of storage zones (reservoirs) and confining zones, trapping mechanisms, and reservoir injectivity (connectivity and permeability). The depth of a reservoir and its confining zone should be great enough (approx. 1 km) to maintain the injected CO2 in the supercritical-fluid state. The reservoir and trapping mechanisms should have sufficient capacity for the lifetime of the project. The confining zone should be characterized to identify and avoid potential leakage pathways and should contain at least 99 % of the injected CO2 for time frames of at least 1,000 years. Tectonic stability also is an important factor in the integrity of a storage site. Other factors for site selection include proximity of the CO2 source and need for pipeline transport, the characteristics and purity of the CO2 stream, presence of subsurface resources, and locations of population centers. The site characterization should enable quantification of the project risks including the containment risk (long-term leakage or sudden release), the effectiveness risk (storage capacity and injectivity), natural resource damage, and other project safety risks. GS is being conducted in the North Sea at the Statoil Sleipner project (operating since 1996), In Salah, Algeria, Weyburn, Canada, and Snohvit, Norway. Australia is actively developing GS projects including the ZeroGen 100-MW coal-fired integrated gasification-combined cycle (IGCC) power plant in Rockhampton, Queensland. In this project, the CO2 will be separated prior to combustion and transported by pipeline to the GS site in the Denison Trough of the Bowen Basin. The selected storage zone is the Permian Aldebaran Sandstone in a well-characterized area of natural-gas field development. The risk assessment for this project is being conducted by a team from the Australian CO2CRC, Shell, and URS. In the U.S., the DOE FutureGen project will include GS at large coal-fired power plants. The U.S. EPA currently is developing regulations for selection, evaluation, and monitoring of GS sites within the framework of the Underground Injection Control program. The Gulf Coast region has the largest GS potential in the U.S.

March 14, 2008

Global Warming: Exploring Uncertainties

Jay Grymes LSU Climatologist & WAFB Chief Meteorologist

The Earth is warming and humans are the primary agents of this global temperature change -- this is the conclusion drawn by the Intergovernmental Panel on Climate Change (IPCC). National and international surveys indicate that "global warming" ranks among the top issues of environmental concern. Near-daily reports can be found in the popular press regarding "global warming," and the topic is now one of such import that it has taken a significant place in the political landscapes across Europe and America. But a question arises: "Do the headlines and politics of 'global warming' interfere with a scientific dialog about the IPCC's conclusions?" The objective of this forum is not to argue against well-documented IPCC findings, but to show that important scientific questions remain to be explored regarding the roles of natural and human-induced climate variability and change.

Biography: Jay arrived at Louisiana State University in 1985 and became the Assistant State Climatologist for Louisiana the following year. In 1991 he was appointed the Louisiana State Climatologist, a position he held through May 2003. He currently holds a 50% faculty appointment in the LSU system, divided between the Dept. of Geography & Anthropology, where he teaches "Earth Atmosphere", and the LSU AgCenter/Dept. of Biological & Agricultural Engineering, where he serves as an Cooperative Extension weather specialist and program managerof the AgCenter's automated weather network. In 1996, Jay joined WAFB-TV (CBS affiliate, Baton Rouge) as a part-time weathercaster and in May 2003 he moved to a full-time role at "Channel 9" and was named the station's Chief Meteorologist. Jay served as the editor/publisher of the Louisiana Monthly Climate Review for roughly 15 years and has more than a dozen professional and academic publications dealing with aspects of Gulf Coast weather and climate. Over the years he has given more than 60 presentations at national and regional professional and academic conferences. His most prized professional honors include election as the President of the American Association of State Climatologists (2001-2002) and recipient of the Louisiana Association of Broadcaster's "Weathercast of the Year" Award (2004). Among Jay's professional public service activities are: weather consultant for the Louisiana State Police, the East Baton Rouge Office of Homeland Security & Emergency Preparedness, and the Louisiana Department of Justice.

February 8, 2008

Use of the Multiple Lines of Defense Strategy to Sustain Louisiana's Coastal Estuary and Coastal Economy

John Lopez, Ph.D.
Lake Pontchartrain Basin Foundation

South Louisiana appears to have entered a period when the combination of two powerful forces is working against its survival: (1) coastal land loss and (2) more frequent intense hurricanes. Since the 1950's, the processes driving coastal loss have continued only slightly abated reducing the effectiveness of Louisiana's coastal buffer to storm surge. Since 1990, meteorological and oceanic processes driving tropical systems more frequently have generated Category 4 and 5 hurricanes. Hurricanes that are more destructive are also predicted for coming decades. South Louisiana's ongoing peril is the continued overlap of weakened hurricane protection with more frequent and intense hurricanes. The Multiple Lines of Defense Strategy proposed by Lopez (2006) proposes that two key elements of the coast be addressed that will together sustain the coast. The two planning elements are: (1) Utilizing natural and manmade features, which directly impede storm surge or reduce storm damage (Lines of Defense), and

(2) Establishing and sustaining the distribution goals of wetland habitat types. The Multiple Lines of Defense Strategy is not a new restoration technique; rather, it is a planning methodology to coordinate and prioritize conventional restoration methods and projects for coastal habitats and flood protection. The “Lines of Defense” include the Gulf of Mexico shelf, the barrier islands, bays, the sounds, marsh land bridges, natural ridges, manmade ridges, floodgates, flood levees, pump stations, home and building elevations, and evacuation routes. Identification of these Lines of Defense on a map allows hydrologists, levee district managers, emergency personnel, etc., all to share a common landscape template to evaluate, abate, and monitor flood risk or other storm impacts. The result is a map that meets the suggestion of the National Research Council for Louisiana to develop a clear vision for the coast. The Multiple Lines of Defense Strategy has been adopted by the State of Louisiana in its development of the “Louisiana’s Comprehensive Master Plan for a Sustainable Coast”. A report has been generated, which includes additional recommendations supporting the use of the Multiple Lines of Defense Strategy to sustain coastal Louisiana. In addition, the Multiple Lines of Defense Strategy has also been adopted by the United States Army Corps of Engineers in its ongoing development of the Louisiana Coastal Protection and Restoration Plan. The new Multiple lines of Defense report should be considered as additional input to this ongoing evaluation adding robustness and external input to state and federal agencies. The overriding goal of all these efforts is to promote convergence on a set of optimal recommendations for coastal Louisiana, regardless of point of origin, that are based on sound science and engineering.

Biography: John is a resident of Louisiana who has lived in southeast Louisiana all his life except while attending college or on brief job assignments out of the state. John and his wife currently reside in Livingston Parish after losing their home in Slidell to Hurricane Katrina. John is a coastal scientist with multi-disciplinary training in Geology, Engineering and Biological Sciences with a Doctorate in Engineering and Applied Sciences. After working in the oil industry for 20 years, and working in coastal restoration pro bono, he decided to work full time professionally in coastal restoration. He worked for the U.S. Army Corps of Engineers in Project Management for the Coastal Restoration Branch. Project assignments included CWPPRA and LCA. John is President of Delta Science, LLC., a coastal consulting firm, and also is currently Director of the Coastal Sustainability Program for the Lake Pontchartrain Basin Foundation. John is also an Adjunct Professor at the University of New Orleans. Starting in 2003, he chaired a team of scientists and engineers to develop a comprehensive restoration plan for the Lake Pontchartrain Basin. As an outgrowth of this work, he developed the Multiple Lines of Defense Strategy to integrate flood protection and coastal restoration. This concept was developed prior to Hurricanes Katrina and Rita. It was presented in August 2005 at the Coastal Zone 05 Conference in New Orleans, where John was awarded a national award for his coastal work. The Multiple Lines of Defense Strategy has recently been adopted by the U.S. Army Corps of Engineers as a cornerstone to the Louisiana Coastal Protection and Restoration planning process being developed jointly with the State of Louisiana. Since release of the Multiple Lines of Defense Strategy, John has been asked to participate in several post-Katrina programs and has presented this concept in many venues including as an Invited Speaker at the 2nd Presidents Forum Meeting: Coastal Challenges - Safer Growth in Coastal Louisiana. John has held board or chairmanship positions with the Coalition to Restore Coastal Louisiana, the Lake Pontchartrain Basin Foundation, the State Review of Oil and Natural Gas Regulations, the Pontchartrain Research Committee, the Comprehensive Habitat Management Plan Draft Committee, the Technical

Advisory Committee and the Lake Pontchartrain Artificial Reef Working Group. He currently serves on the Navigation Engineering Committee for the American Society of Civil Engineers. He holds a Doctorate in Engineering and Applied Sciences (2003) from the University of New Orleans; was a Fellow in 2000 at the Loyola University Institute of Environmental Communications; hold a M.S. Geology from the University of Southern California (1981); and a B.S. Geology from Louisiana State University (1976).

January 11, 2008

The Dolet Hills Lignite Company Presentation To The Louisiana Geologic Society

David V. Wright

Tucked away in the lush green piney woods of northwestern Louisiana are several thousand acres of lignite reserves. A soft brownish-black coal in which the texture of the original wood often still can be seen, lignite accounts for approximately nine percent of the United States' coal reserves. Like its harder bituminous and sub-bituminous counterpart, lignite is used most commonly to fuel electric utility power plants. Located about 30 miles south of Shreveport, near Mansfield, Louisiana, Dolet Hills Lignite Company (DHLC) has approximately 28,000 acres under permit, most of which is leased from area landowners, The mine produces approximately 3 million tons of lignite annually. The low-cost fuel feeds the nearby 650-megawatt Dolet Hills Power Station. An overland conveyor transports the lignite directly from the mine to the power plant. Mining began in 1985 and currently employs approximately 200 DHLC employees and 100 contract workers. DHLC is wholly owned by Southwestern Electric Power Company (SWEPCO), a subsidiary of American Electric Power (NYSE:AEP). The Dolet Hills Power Station is co-owned by SWEPCO and Cleco Corporation. The lignite is mined with the use of two electrically operated 1570-W Bucyrus-Erie walking draglines with 85-cubic-yard buckets, and other diesel operated loading and haulage equipment. Each of the 85-cubic-yard buckets are about the size of a 1 1/2-car garage. The lignite is located in the Naborton Formation, which is the deepest geologic unit in the mine area that yields fresh water. The Dolet Hills Formation directly overlies the lignite seam and contains fresh ground water over the entire mine permit area and vicinity. The presentation will take you on a pictorial tour of the mining area and mining process.

Biography: Originally from Pt. Pleasant, W. Va., Dave Wright is Manager of Environment & Land - Lignite at AEP/ SWEPCo's Dolet Hills Lignite Company. In his position, Wright is responsible for overseeing the environmental programs and land management program at the lignite mining operation. Wright began working for AEP as a civil engineer in 1971 at their Southern Ohio Coal Company. All of his 36 years at AEP operations have been spent at their fuel supply facilities. He has been involved in abandoned mine reclamation programs at both state and national levels, having spent 8-years as President of the Ohio Mineland Partnership, and 4-years as the Vice-President of the National Coalition for Abandoned Mine Reclamation. In 1998 he was named Ohio's Resource Conservation & Development Councils Person of the Year, and served as an appointee of the Governor of Ohio on the Ohio AML Reclamation Board prior to his relocation to Louisiana in August 2001. He earned his degree in civil engineering from the West Virginia Institute of Technology in 1970. Wright now resides in Shreveport, LA with wife Susan.