

The background of the cover is a photograph of an oil rig at sunset. The sky is a mix of orange, yellow, and blue, with a large, bright sun partially obscured by clouds on the left side. The rig's structure, including a tall derrick and various platforms, is silhouetted against the sky. The entire image has a blue color overlay.

Annual Report

2010

Center for Energy Studies

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Center for Energy Studies

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Center for Energy Studies

ALLAN G. PULSIPHER, EXECUTIVE DIRECTOR

www.enrg.lsu.edu

CES and the Deepwater Horizon

Following the April 20, 2010, explosion of the Deepwater Horizon ultra-deepwater drilling rig and the subsequent deepwater drilling moratorium, Center for Energy Studies researchers were called upon by government agencies, industry representatives, and local, national, and international media for their insights and expertise regarding impacts to the industry. Faculty gave almost two dozen interviews to television, Internet, and newspaper reporters. (See box for list.)

Soon after the incident, business groups and congressional committees sought expertise regarding changes to industry regulation. David Dismukes, CES associate executive director and professor, provided an overview of the impacts of the spill and the moratorium for the National Association for Business Economics, the Louisiana Association of Business and Industry, Jones Walker Law Firm, and the Second Annual Oil & Gas Symposium at LSU. In June, he testified at a congressional hearing before the U.S. House of Representatives Committee on Natural Resources to discuss proposed amendments to H.R. 3534, the "Consolidated Land, Energy, and Aquatic Resources (CLEAR) Act of 2009," which was designed to consolidate the administration of federal energy minerals management and leasing programs into one entity, the Office of Federal Energy and Minerals Leasing of the Department of the Interior. Amendments to the CLEAR Act would change offshore energy regulatory policies in the aftermath of the Deepwater Horizon incident. The bill passed in the House of Representatives July 30 but did not go on to receive a vote in the Senate. Dismukes' written comments are available at http://resourcescommittee.house.gov/images/Documents/20100630/testimony_dismukes.pdf

Outreach & Education

In 2010, Center for Energy Studies faculty and staff continued their outreach and education efforts by providing energy information and analysis to the academic community, public agencies, and business and civic groups. CES planned and participated in both internal and external programs, including workshops, conferences, and seminars. Faculty and staff responded to numerous media requests and public inquiries for information on energy issues, including oil and gas exploration and production technology, developments in alternative energy, and environmental and energy policy.

CES faculty responded to media calls for months following the Deepwater Horizon incident:

Allan Pulsipher

National Post, April 24, 2010

The Wall Street Journal, April 23, 2010

David Dismukes

Christian Science Monitor, May 19, 2010

USA Today, May 18, 2010

Clean Skies Sunday, Washington, D.C.-area news program, May 16, 2010

CBS News Online/Associated Press, May 12, 2010

McClatchy News, May 5, 2010

Clean Skies Sunday, Washington, D.C.-area news program, June 11, 2010

CNNMoney.com, June 24, 2010

Fortune (CNNMoney.com), June 24, 2010 (with Iledare)

The Miami Herald, June 27, 2010

New Orleans Times-Picayune, July 4, 2010

Los Angeles Times, July 9, 2010

Congressional Quarterly

DR (Danish Broadcasting Corporation)

Harper's Magazine

WNET (NY Public Broadcasting)

Engineering News and Mining Weekly, August 16, 2010

WBRZ TV, Baton Rouge, evening news, on unemployment related to moratorium, August 19, 2010

Infrastructure Solutions magazine, on Gulf oil spill and U.S. energy policy, Aug. 20.

Mobile Press-Register, September 2, 2010.

Wumi Iledare

Fortune (CNNMoney.com), June 24, 2010 (with Dismukes)

Mark Kaiser (with Allan Pulsipher)

New Orleans Times-Picayune, Sept. 15, 2010



Retired Vice Admiral Dennis McGinn, United States Navy, guest speaker during the 2010 Louisiana Clean Energy Expo, tours the alternative fuel vehicle display.

Greater Baton Rouge Clean Cities Coalition

In 2010, the Center for Energy Studies continued its partnership with the Louisiana Department of Natural Resources and the U. S. Department of Energy to support the efforts of the Greater Baton Rouge Clean Cities Coalition. A 501 (c) (3) non-profit, Clean Cities is one of around 90 similar organizations located throughout the U.S. that focus primarily on promotion of alternate fuels and alternate fuel vehicles. Clean Cities serves the Greater Baton Rouge five-parish air quality non-attainment area (Ascension, East Baton Rouge, Livingston, West Baton Rouge, and Iberville).

Led by CES professional-in-residence (retired) Mike D. McDaniel, who served as president during 2010, and research associate/GBRCCC coordinator Lauren Stuart, the coalition attempts to mobilize local stakeholders in government and industry to collaborate on public policy issues, develop joint projects, and promote use of alternative fuels in their communities.

The Clean Cities 2010 event calendar included April's Clean Fuel Symposium & Louisiana Alternative Energy Expo, co-hosted with CES, which featured presentations on fuels and fueling infrastructure and transportation energy policy, as well as an outdoor expo of alternative fuel vehicles and renewable energy products. In July, a biodiesel workshop was held as part of the Clean Transportation Education Project, and in November, Clean Cities partnered with NGV America and Chesapeake Energy Fuels for a Natural Gas Vehicle Training Seminar. Visit www.gbrccc.org for more information on Clean Cities projects and educational programs.



Louisiana Public Service Commission staff attend a CES workshop on smart grid technologies in October.

Louisiana Public Service Commission Workshops

Beginning in fall 2010, CES began hosting a series of alternative energy-themed workshops for the staff of the Louisiana Public Service Commission, as well as representatives from state agencies, including the Department of Environmental Quality, Department of Natural Resources, and Louisiana Economic Development. The October workshop addressed smart grid technologies, their capabilities and functions, and how smart grid fits into broader energy planning for regulated utilities. Instructors were Joydeep

Mitra, associate professor of electrical and computer engineering at Michigan State University; Kenneth Rose, an independent consultant and a senior fellow at the Institute of Public Utilities at Michigan State University; and David Dismukes, professor and associate executive director at the Center for Energy Studies. Subsequent workshops, held in spring 2011, addressed alternative fuel vehicles, environmental regulations, and renewable technologies.

2010 Conferences and Symposiums

In 2010, the Center hosted its annual full day conferences—Alternative Energy and Energy Summit—and co-hosted the second annual Oil & Gas Symposium, presented by the Baton Rouge Geological Society.

Visit www.enrg.lsu.edu/conferences for full agendas and details on all CES conferences

Alternative Energy 2010, "Greening an Enterprise Economy," was held April 21-22. The event, co-hosted by the Greater Baton Rouge Clean Cities Coalition, featured a symposium on clean fuels and the first Louisiana Clean Energy Expo on renewable energy, alternative fuels and vehicles, energy efficiency.

The focus of the 2010 Oil & Gas Symposium, held August 16 and 17, was the long-term impacts of the Gulf oil spill. The symposium featured a keynote address by then Secretary of State Jay Dardenne titled, "In Louisiana Oil and Water Do Mix," as well as presentations on political, environmental, societal, and business impacts of the disaster. The full list of presentations can be found at <http://brgs-la.org/web-content/Symposiums/2010OilandGasSymposiumProceeding.pdf>

Energy Summit, October 26, which addressed deepwater exploration and the future of the Gulf of Mexico in the aftermath of the Deepwater Horizon incident, featured John Hofmeister, former president of Shell and author of the recent book *Why We Hate the Oil Companies*, as well as presentations on the future of independent oil companies, public and market perceptions of changes to deepwater drilling regulation, insurance issues, and legal implications of changes in regulation.

LSU Day Provides CES Outreach Opportunity

The CES booth at LSU Day, November 13, received more than 300 visitors to view a display of the award-winning "A Comprehensive History of the Offshore Oil and Gas Industry in Louisiana and its Consequences" project, as well as Louisiana Geological Survey maps, including the popular Atchafalaya Basin map. The Radiation Safety Office provided a hands-on demonstration of several radiation detection devices. Guests could test levels of radioactivity on several consumer products, including Fiesta dinnerware, Vaseline glass, a smoke detector, lantern mantles, sodium-free salt, natural uranium rock, and granite countertop.

The culmination of a year-long celebration of the LSU sesquicentennial, LSU Day was highlighted by performing arts showcases, tours, and exhibitions showing off LSU's history and achievements in athletics, research, the arts, academics, and community engagement.

CES is grateful to the following companies and agencies for providing continued support of our educational events:

- AGL Resources*
- American Electric Power*
- Chevron*
- CleanFuel USA*
- ConocoPhillips*
- ExxonMobil*
- F. Malcolm Hood & Associates*
- Ferrellgas*
- Kean, Miller, Hawthorne, D'Armond, McCowan & Jarman, LLP*
- Louisiana Department of Economic Development*
- Louisiana Department of Natural Resources*
- Louisiana Public Service Commission*
- Petroleum Technology Transfer Council*
- Premier Industries*
- Southern Strategy Group*
- Suez Energy section of Outreach Education*



Energy Summit 2010 attendees listen as Lloyd Guillory of ExxonMobil describes a marine well containment system.



In the CES booth at LSU Day, Charles Wilson of Radiation Safety teaches young Tiger fans about radiation emitted by common household items.

Presentations: 2010

During 2010, CES faculty traveled across town, throughout the states, and abroad to deliver energy industry expertise to professional associations, business, industry, and government agencies. Most CES presentations are available on the CES website.

January

Natural Gas Supply Issues: Gulf Coast Supply Trends and Implications for Louisiana
DAVID E. DISMUKES, ENERGY BAR ASSOCIATION – NEW ORLEANS CHAPTER

February

Alternative Energy Developments (with Emphasis on Louisiana) ■ MIKE D. MCDANIEL, SCHOOL OF THE COAST AND ENVIRONMENT, LOUISIANA STATE UNIVERSITY

March

Accountability and Transparency: Fiscal Rules & Responsibility; Budget Integrity; National Oil Companies; Checks & Balances—The Case of Nigeria ■ WUMI ILEDARE, WITH ROTIMI SUBERU, WORLD BANK HEADQUARTERS, WASHINGTON, D.C.

2010 Energy Outlook: Trends and Policies ■ DAVID E. DISMUKES, ISA-LAFAYETTE GO TECH EXPO

The EPA Regulatory Gauntlet: Challenges Facing Louisiana ■ MIKE D. MCDANIEL
LOUISIANA AMMONIA PRODUCERS

Update on Potential Federal Regulation of Greenhouse Gases ■ WOMEN'S ENERGY NETWORK,
MIKE D. MCDANIEL

Lsu Statewide Greenhouse Gas Inventory Project ■ LOUISIANA SOLID WASTE CONFERENCE,
MIKE D. MCDANIEL

The Energy Outlook: Trends and Policies Impacting Southeastern Natural Gas Supply and Demand Growth ■ DAVID E. DISMUKES, SECOND ANNUAL LOCAL ECONOMIC ANALYSIS AND RESEARCH NETWORK (“LEARN”) CONFERENCE

May

Air Quality and Alternative Energy: Local Trends ■ MIKE D. MCDANIEL, CAPITAL REGIO
PLANNING COMMISSION

Federal and State Regulatory Developments Affecting Bioenergy ■ MIKE D. MCDANIEL,
LSU AGCENTER/INTERNATIONAL PROGRAMS, USTDA & AEAI PAKISTAN SUGAR INDUSTRY BIOMASS
COGENERATION ORIENTATION

June

Deepwater Moratorium: Overview of Impacts for Louisiana ■ DAVID E. DISMUKES,
LOUISIANA ASSOCIATION OF BUSINESS AND INDUSTRY (LABI)

Projects

For a full list of ongoing grant research projects, visit www.enrg.lsu.edu/view/projects

CES Completes Port Fourchon Emissions Research Inventory

The “Port Fourchon Ozone Day Port-Related Emissions Inventory Study,” prepared for ExxonMobil, presents initial estimates of the mobile source emissions associated with operations in and around the port. The inventory was provided to the Louisiana Department of Environmental Quality (DEQ) and the Baton Rouge Ozone Task Force to be used in regional ozone modeling to support the DEQ’s Non-attainment State Implementation Plan (SIP) for ozone.

A previous analysis of regional ozone modeling in the Baton Rouge area in 2007-2008 indicated an unaccounted for source of oxides of nitrogen (NO_x) emissions thought to be originating along the Gulf Coast of Louisiana. NO_x emissions are considered a precursor to ozone. Port Fourchon, which serves approximately 90% of all deepwater and 45% of shallow water rigs and platforms in the Gulf of Mexico and is the only port to serve the Louisiana Offshore Oil Port (LOOP), was considered a likely source of the emissions.

Presentations: 2010

July

Forecasting for Regulators: Current Issues and Trends in the Use of Forecasts, Statistical, and Empirical Analyses in Energy Regulation ■ DAVID E. DISMUKES, INSTITUTE OF PUBLIC UTILITIES, MICHIGAN STATE UNIVERSITY

August

Overview and Issues Associated with the Deepwater Horizon Accident
DAVID E. DISMUKES, NATIONAL ASSOCIATION FOR BUSINESS ECONOMICS (NABE), REGIONAL ROUNDTABLE MEETING

Long-Term Energy Sector Impacts from the Oil Spill ■ DAVID E. DISMUKES, SECOND ANNUAL LOUISIANA OIL & GAS SYMPOSIUM

Update on Potential Federal Regulation of Energy/Greenhouse Gases ■ MIKE D. MCDANIEL, DESK AND DERRICK CLUB, BATON ROUGE

Overview on Offshore Drilling and Production Activities in the Aftermath of Deepwater Horizon
DAVID E. DISMUKES, JONES WALKER LAW FIRM SYMPOSIUM

September

Deepwater Moratorium and Louisiana Impacts
DAVID E. DISMUKES, INDUSTRY ASSOCIATES ADVISORY MEETING, LSU CENTER FOR ENERGY STUDIES

Decommissioning in the GOM ■ MARK KAISER, WEBINAR HOSTED BY HALIBURTON

Regulatory and Ratemaking Issues Associated with Cost and Revenue Tracker Mechanisms
DAVID E. DISMUKES, NARUC ADVANCED TRAINING WORKSHOP

Forecasting and Energy Demand Analysis: Issues and Trends in the Use of Empirical Analyses in Energy Regulation ■ DAVID E. DISMUKES, IPU ADVANCED RATEMAKING WORKSHOPS

October

Energy Outlook: Trends and Policies ■ DAVID E. DISMUKES, 2010 TRI-STATE MEMBER SERVICE CONFERENCE, AR-LA-MS ELECTRIC COOPERATIVES

Petroleum Industry Restructuring in Nigeria: A Simulation Analysis of Its Impact on Deepwater Project Economics ■ WUMI ILEDARE, 29TH USAEE/IAEE NORTH AMERICAN CONFERENCE, CALGARY CANADA

November

How Current and Proposed Energy Policy Impacts Consumers and Ratepayers ■ DAVID E. DISMUKES, 122ND NARUC ANNUAL MEETING

Regulatory Issues in Inflation Adjustment Mechanisms and Allowances ■ DAVID E. DISMUKES, 2010 NASUCA ANNUAL MEETING, ATLANTA, GEORGIA

View or download
CES presentations at
[www.enrg.lsu.edu/
presentations](http://www.enrg.lsu.edu/presentations)

CES and Starcrest developed an initial inventory of NO_x emissions using data representing three days in June and August 2009. Other pollutants measured include volatile organic compounds (VOCs), carbon monoxide, sulfur dioxide, particulate matter, and carbon dioxide.

CES professional-in-residence Mike D. McDaniel and research associate Kathryn Perry performed data collection for the inventory. Emissions sources included marine vessels that docked at Port Fourchon berths or passed through the port; cranes and cargo handling equipment; heavy-duty trucks; helicopters; and offshore emissions measured by the Minerals Management Service (now the Bureau of Ocean Energy Management, Regulation and Enforcement).

CES research projects for 2010 included the following, some of which are ongoing:

Diversifying Energy Industry Risk in the Gulf of Mexico. David Dismukes. Funded by the U.S. Department of the Interior, Minerals Management Service and the LSU Coastal Marine Institute. This project proposes to investigate how the energy industry diversifies its risk exposure in general in the GOM, with a particular emphasis on insurance-related issues. Risk mitigation is secured through the use of various strategies, including but not limited to the following: the private insurance market, energy supply



The Energy, Coast & Environment Building rotunda conference center hosts educational events for the LSU community and the public throughout the year.

Conference Center Update

The Dalton J. Woods Auditorium, rotunda conference room, and lobby were venues for 22 public events in 2010, totaling 225 hours of use. In addition to CES events, the conference center was the locale for public safety training for medical emergency preparation, the Atlantic Scientific Review Group for Marine Mammals, the Louisiana Food Processors Conference, and Environmental Literacy Development, as well as University organization meetings, seminars, dissertation defenses, and film screenings.



portfolio management, alternative energy development, and non-traditional markets such as hedge funds. The purpose of this study is to examine the main issues associated with the energy industry's risk diversification strategies, with a particular focus on the implications that these strategies will have not only on major oil and gas companies, but also smaller independents and Gulf Coast communities.

Forecasting Service Vessel and Helicopter Trips Related to OCS Development.

Mark Kaiser, David Dismukes, and Allan Pulsipher. Funded by the U.S. Department of the Interior, Minerals Management Service and the LSU Coastal Marine Institute. This project will expand and update the current MMS (BOEMRE) descriptions related to service vessel and helicopter trips and to develop methodologies (and usable equations) to forecast the trips required to support a given level of oil and gas activity. The level of diversity and the magnitude of offshore activity in the GOM require a reasonably precise description of the operational requirements associated with various activity classes to preserve the general nature of the approach and the level of decomposition necessitated by EIS studies.

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The Offshore Drilling Industry and Rig Construction Market in the Gulf of Mexico.

Mark Kaiser, David Dismukes, and Allan Pulsipher. Funded by the U.S. Department of the Interior, Minerals Management Service. Drilling contractors and speculators have on order 140 mobile offshore drilling units (MODUs) worldwide valued at over \$36 billion to be delivered through 2011. New yards are being built and old yards expanded or reopened around the world to handle the latest construction boom, the sixth cycle the industry has seen since its inception. Most of the rigs are being built in Asia, but the U.S. Gulf Coast has 10 jackups and 3 inland barges in construction estimated at \$2 billion. The purpose of this proposal is to examine the offshore drilling industry and rig construction markets, and to investigate targeted issues relevant to the Gulf of Mexico (GOM). We will develop empirical models over specific segments of the industry, prepare aggregate statistics for rig construction by class and geographic region, quantify labor and materials requirements for rig construction in the GOM, and investigate trends that are currently playing out and that are expected to impact the industry in the future. The economics of rig supply and demand in the GOM, and the factors that influence the competitiveness of the domestic rig construction industry, is of particular interest.

Understanding Current and Projected Gulf OCS Labor and Port Infrastructure Needs.

David Dismukes and Allan Pulsipher. Funded by the U.S. Department of the Interior, Minerals Management Service and the LSU Coastal Marine Institute. This project is comprised of two parts: a labor needs analysis and ports infrastructure needs analysis. The primary component of analysis for both of these sub-projects will be a workshop series to explore, scope, and seek input and conclusions on numerous important issues facing the offshore industry in both its labor

and port infrastructure needs and requirements. The labor needs portion of this analysis will be structured to lay an important framework for examining these issues, among others, relative to the labor needs in the GOM region that support offshore activities. As will be discussed in the methods section of this proposal, the labor needs analysis of this project is composed of two different components: (1) an analysis component which will compile existing and publicly available information on recent labor and employment trends; and (2) a workshop process to bring together various stakeholder groups to discuss their concerns, impressions, and challenges in meeting labor requirements to support offshore activities. The port infrastructure needs analysis will explore the real challenges facing ports and supply bases along the GOM from a comprehensive and interactive basis. The research being proposed will combined traditional research with a series of workshops that will bring together several port representatives and port customer to discuss their perceptions of challenges and opportunities over the past several years, and over the next several years.

Newsorthy

Center for Energy Studies Project Wins U.S. Department of the Interior Award

In spring 2010, the U. S. Department of the Interior selected the LSU Center for Energy Studies project, "History of the Offshore Oil and Gas Industry in Southern Louisiana," as the winner of its Cooperative Conservation Award, which recognizes achievements in collaborative activities among a diverse range of groups, including federal, state, local, and tribal governments, private for-profit and not-for-profit institutions, other non-governmental entities, and individuals.

The multi-year project was funded by the Bureau of Ocean Energy Management, Regulation and Enforcement (formerly Minerals Management Service), which manages oil and gas resources on the Outer Continental shelf under federal jurisdiction. It documented the development of the offshore oil and gas industry and its effects on the people, environment, and economy of the coastal communities along the Gulf of Mexico. A substantial portion of the effort was devoted to collecting oral and life histories from people who participated in or were affected by the development of the offshore oil and gas industry in Southern Louisiana.

The project team included Allan Pulsipher, executive director for the Center for Energy Studies; Harry H. Luton, BOEMRE Gulf of Mexico OCS Region; Diane Austin and Thomas McGuire, University of Arizona, Bureau of Applied Research in Anthropology; and Joseph Pratt and Tyler Priest, University of Houston, Departments of History and Business.

The project report is available in PDF format from the BOEMRE at <http://www.gomr.boemre.gov/homepg/whatsnew/techann/2008/tech2008-042-047.pdf>

Dismukes Contributes to NARUC Report

In spring 2010, David Dismukes served as an advisor to the National Association of Regulatory Utility Commissioners' (NARUC's) Moratoria Study Group. The public/private group identified trillions of dollars of impacts resulting from updated domestic oil and gas resource projections and decisions to maintain moratoria restrictions against development of America's oil and gas resources. The report concludes that continuing oil and natural gas exploration and production moratoria off the U.S. East Coast would likely have significant negative effects on the U.S. economy. The model used in the study predicts, among other things, that by 2030, U.S. crude oil production will decrease by 15% annually, oil imports from OPEC countries will increase 19%, and U.S. gross domestic product will decrease on average 0.52% each year.

Personnel

Faculty

Allan G. Pulsipher, Ph.D., executive director and Marathon Oil Company Professor of Energy Policy in the Center for Energy Studies and a professor in the Department of Environmental Sciences at LSU.

David E. Dismukes, Ph.D., associate executive director, director of the Policy Analysis Division, and professor.

Omowumi (Wumi) Iledare, Ph.D., director of the Energy Information and Data Division, professor of petroleum economics and policy research, adjunct professor of petroleum economics at the Craft & Hawkins Department of Petroleum Engineering at LSU and the University of Ibadan.

Mark J. Kaiser, Ph.D., director of the Research & Development Division and professor.

Mike McDaniel, Ph.D., professional-in-residence and an adjunct professor of environmental sciences in the School of the Coast and Environment.

Ralph W. Pike, Ph.D., director of the Minerals Processing Research Division and Paul M. Horton Professor of Chemical Engineering.

Research Associates

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Kathryn Perry

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Ann Lewis, word processor operator specialist

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Diana Reynolds, assistant to the executive director

Versa Stickle, librarian

Michael Surman, computer analyst

Minerals Processing Research Division

www.mpri.lsu.edu

The Minerals Processing Research Division (MPRD) was established in 1979 by Federal legislation as one of 31 State Mineral Institutes associated with the U.S. Department of Interior. The mission includes facilitating research and public service programs in process research and technology transfer, sustainable development, energy management, energy sustainability, and inherently safer design.

This minerals processing research and public service complements and benefits from the energy research and geological research performed by other groups in the Center for Energy Studies and the Louisiana Geological Survey.

The current research focus is development of new processes based on biomass resources that supply the same products as current plants and carbon capture from power plants. Cooperative research agreements are in place with Monsanto, Motiva Enterprises (formerly Texaco) and Mosaic (formerly IMC Agrico). This research and technology transfer involves collaboration with process and plant engineers at these and other companies.

Integrating a Cogeneration Facility into Engineering Education

Cogeneration is a topic of increasing importance to the economic viability of many industries. The government appreciates this need, and it has issued a “CHP Challenge” which has the goal of doubling the amount of cogenerated power in the U.S. by 2020. This goal necessitates capital investments exceeding \$10 billion/yr. There is also the potential for substantial dollar savings in existing CHP systems through optimal energy management schemes.

As part of an NSF-funded project, “Integrating a Cogeneration Facility into Engineering Education,” we are integrating into chemical and mechanical engineering curricula the study of energy production and management with the analysis of real-time data from the 20 MW cogeneration system at LSU. Making such data web-available will allow sophomore-year students to perform industrial material and energy balance calculations on major unit operations including gas and steam turbines, air conditioning systems, cooling towers, and boilers. For junior-year students, advanced process modeling is exploring, for example, energy recovery in a heat recovery steam generator. Vertical integration of such individual operations are allowing senior students to explore global issues in energy production and management, including the optimization of utility costs and the analysis of process dynamics associated with process upsets and highly variable loads, and the resulting optimal control strategies.

This project involves LSU faculty from the Minerals Processing Research Division and the Cain Department of Chemical Engineering, F. Carl Knopf and Kerry M. Dooley; LSU Facility Services, Peter Davidson and Tony Cupit; and consultant Michael Erbes. Partner universities including Tulane University, Florida State University, and University of Alabama are utilizing LSU-provided data and materials.

Continuing Education for Professional Engineers

The Division maintains an extensive website that provides continuing professional development self-study courses for professional engineers’ PDH requirements. Also available on the website are research results including journal articles, conference proceeding, technical reports, theses, dissertations and computer programs. The programs have installation files that can be downloaded and used on an individual’s computer. Included with the programs are users’ manuals and tutorials. These programs have been developed using actual plants, and the process models can be applied to comparable plants.

MPRD Staff

The Minerals Processing Research Division consists of a director, associate director, four adjunct professors, a process engineer, two Ph.D. and three undergraduate students as listed below.

Director: **Ralph W. Pike**, Horton Professor of Chemical Engineering

Associate Director: **F. Carl Knopf**, Anding Professor of Chemical Engineering

Adjunct Professor: **Richard C. Farmer**, SECA Incorporated, Carson City, Nevada

Adjunct Professor: **Michael J. Richard**, Richard Consulting, Raleigh, North Carolina

Adjunct Professor: **William L. Waldrop**, Quantum Engineering Corp., Knoxville, Tennessee

Adjunct Professor: **Bert Wilkins**, Computer Ventures, Incorporated, Baton Rouge, Louisiana

Process Engineer: **Thomas A. Hertwig**, Mosaic Corporation (retired)

Ph. D. Student: **Debalina Sengupta**

Ph.D. Student: **Mohammed Shafi Syed**

Undergraduate Student: **Elizabeth Lester**, major English

Undergraduate Student: **Tate Stumper**, major chemical engineering

Undergraduate Student: **Arpan Seth**, major chemical engineering

Technology Transfer

Two technologies which have immediate and substantial energy savings on chemical plants and refineries are “pinch technology” and “on-line optimization.” Large companies have corporate level groups that routinely apply pinch technology and on-line optimization. Small to medium sized chemical companies in Louisiana do not have the trained personnel needed to apply this technology, and these short courses are available on request by contacting MPRD at www.mpri.lsu.edu.

MPRD Research Highlights

The vision is to convert industries based on non-renewable resources to ones based on renewable resources.

Chemicals from Biomass

The chemical production complex in the Gulf Coast is uniquely positioned to take advantage of bio-derived feedstocks. There is strong agricultural industry in the region, and the Mississippi River provides deep-water ports to ensure continuous supply of bio-feedstocks throughout the year. New plants based on renewable resources would supply products of the current industries. This program includes transitioning existing plants to ones using biomass feedstocks that require nonrenewable resource supplements.

In the chemical production complex in the lower Mississippi River corridor there are about 150 chemical plants producing a wide range of petrochemicals that are used in housing, automobiles, fertilizers, and numerous other consumer products, consuming 1.0 quad (10^{15} BTUs per year) of energy. The state’s chemical industry is the largest single employer with nearly 26,000 direct employees, a number that does not include the thousands of contract and maintenance employees that work at the plants year round. These jobs generate \$5.9 billion in earnings and \$125 million in state and local taxes on personal income. Over a billion dollars is spent in Louisiana annually with Louisiana suppliers, according to the Louisiana Chemical Association.

With the assistance of industrial collaborators and published sources, MPRD developed a quantitative description (material and energy balances) of the chemical production complex in the lower Mississippi river corridor. It is based on the plants in the agricultural chemical chain and the methanol and benzene chains. This complex is representative of current operations and practices in the chemical industry and is called the base case of the existing plants. It includes the sources and consumers of carbon dioxide in the chemical production complex. This description of the chemical production complex was used in research on biobased chemicals, energy integration and carbon dioxide utilization.

This base case of existing plants chemical production complex has thirteen production units plus associated utilities for power, steam and cooling water and facilities for waste treatment. A production unit contains more than one plant. The phosphoric acid production unit contains four plants owned by three companies. The sulfuric acid production unit contains five plants owned by two companies. Here, ammonia plants produce 0.75 million tons/year of carbon dioxide, and methanol, urea, and acetic acid plants consume 0.14 million tons of carbon dioxide. This leaves a surplus of 0.61 million tons/year of high purity carbon dioxide that is being vented to the atmosphere.

The vision is to convert industries based on non-renewable resources to ones based on renewable resources. Researchers evaluated bioprocesses for the introduction of ethanol into the ethylene product chain and glycerin into the propylene chain. Ethanol is too valuable a commodity for the manufacture of plastics, detergents, fibers, films and pharmaceuticals to be used as a motor fuel. Fatty acid methyl esters (FAME) from natural oils can be substitutes for polymers. Glycerin, a by-product from transesterification process for production of FAME is generated in large quantities, and can be used in the propylene chain. Byproducts of agricultural production – bagasse, cane leaf materials, corn stover, rice husks, and poultry and hog wastes – are potential feedstocks for chemicals and could fulfill some of the energy requirements of the plants.

A conceptual design of a biomass feedstock-based chemical production complex was developed that shows conversion routes for biomass feedstocks to chemicals. The feedstocks included oils, sugars, starches and cellulose, and products included plastic intermediates such as 1,3-propanediol, ethylene and its derivatives such as polyethylene and polyvinyl chloride (PVC), acetic acid and a host of other specialty chemicals. This complex has methanol from synthesis gas (syngas) being used in transesterification of vegetable oils.

Based on conceptual design, industrial scale processes were designed in Aspen HYSYS® for fermentation, anaerobic digestion and transesterification processes for the production of chemicals from biomass. The chemicals produced from the biomass were ethanol from corn and corn stover, fatty acid methyl esters (FAME) and glycerol from transesterification, acetic acid from anaerobic digestion, syngas from gasification of biomass, algae oil production, ethylene from ethanol and propylene glycol from glycerol. Process cost estimations were made using Aspen ICARUS®.

Processes using biomass as feedstocks were incorporated into the chemical production complex of existing plants that gave a superstructure of plants which was used to determine the optimal configuration of plants. The objective function used for the optimization was the triple bottom line that incorporates economic, environmental and sustainable costs. Triple bottom line costs were evaluated and included economic and environmental costs and sustainable credits and costs. These were used in a multicriteria, mixed-integer nonlinear programming problem that used global solvers to determine Pareto optimal solutions. Monte Carlo analysis and supply and demand elasticity were used to determine sensitivity of the optimal solution to the parameters in the optimization problem. Carbon dioxide from the integrated complex was utilized for algae production and other chemicals which consume carbon dioxide. The optimal structure was obtained from the superstructure. In Table 1 existing plants are listed that are in the optimal structure along with those not included in the optimal structure.

The triple bottom line from the optimal solution increased 93 percent from the base case. The increase was from the sale of new products from the bioprocesses. The utility costs increased due to the addition of new plants. The sustainable costs to the society decreased from the base case as credits were given for pure carbon dioxide consumption. The total pure carbon dioxide emission in the optimal structure was reduced to zero from the base case. Eighty-four percent of the pure carbon dioxide was consumed by algae and used for the production of algae oil. Impure carbon dioxide emissions from the power plant increased by 75percent from the base case and contributed to sustainable costs to society.

Table 1 Plants in the Optimal Structure from the Superstructure

Existing Plants in the Optimal Structure	New Plants in the Optimal Structure
Ammonia	Fermentation to ethanol (corn)
Nitric acid	Bio-ethylene from dehydration of bio-ethanol
Ammonium nitrate	Transesterification to FAME and glycerol (soy oil and algae)
Urea	Algae oil production bio-propylene glycol from glycerol
UAN	Gasification to syngas (corn stover)
Granular triple super phosphate (GTSP)	Formic acid
MAP and DAP	Graphite
Contact process for sulfuric acid	Propylene from CO ₂
Wet process for phosphoric acid	Propylene from propane dehydrogenation
Power generation	
Existing Plants NOT in the Optimal Structure	New Plants Not in the Optimal Structure
Acetic acid	Fermentation to ethanol (corn stover)
Ethylbenzene	Anaerobic Digestion to acetic acid (corn stover)
Styrene	Methanol - Bonivard, et al., 1998
	Methanol - Jun, et al., 1998
	Methanol - Ushikoshi, et al., 1998
	Methylamines (MMA and DMA)
	Ethanol
	Dimethyl ether
	Hydrogen/synthesis gas
	Acetic acid - new process
	Styrene - new method
	Electric furnace process for phosphoric acid
	SO ₂ recovery from gypsum waste
	S and SO ₂ recovery from gypsum waste

Detailed results from the optimal solution, the Pareto optimal solutions from multicriteria optimization and the sensitivity of the optimal solution evaluated using Monte Carlo simulations are reported in the MPRD website, <http://www.mpri.lsu.edu/the-sisindex.html>. In summary, a new methodology has been developed for identifying new bioprocesses and demonstrating integration of these bioprocesses into an existing industrial complex. This methodology shows that there can be a transition from nonrenewable resources to renewable resources as feedstocks for chemicals. Based on these results, the methodology could be applied to other chemical complexes in the world for reduced emissions and energy savings such as the one in Camaçari-Bahia, Brazil. Collaborative research has begun with the Federal University of Rio de Janeiro (UFRJ), and support has been requested from USAID to expand this effort for sustainable development in Brazil.

Publications on Chemicals from Biomass

Debalina Sengupta and Ralph W Pike. *Chemicals from Biomass: Integrating Bioprocesses into Chemical Production Complexes for Sustainable Development*, CRC Press, Boca Raton, FL, in press.

Debalina Sengupta and Ralph W Pike. "Chemicals from Biomass," *Handbook of Climate Change Mitigation*, Chapter 12, Springer, Heidelberg, Germany, in press.

Debalina Sengupta and Ralph W Pike. "Biomass as Feedstock," *Handbook of Climate Change Mitigation*, Chapter 65, Springer, Heidelberg, Germany, in press.

Debalina Sengupta, Ralph W Pike, Thomas A. Hertwig, and Helen H. Lou. "Optimal Integration of Industrial Scale Biomass Feedstock-Based Chemical Processes in the Petrochemical Complex of the Lower Mississippi River Corridor," Paper No. 270e, American Institute of Chemical Engineers Annual Meeting, Salt Lake City, (November 7–12, 2010).

Capturing Carbon Dioxide Generated by Power Plants

Research has been completed on a three year program from a \$1.1 million competitive grant with \$277,000 in cost sharing for a total of \$1.37 million. Conducted jointly by the Minerals Processing Research Division and TDA Research, Inc. of Denver, Colorado, the project was funded by the National Energy Technology Laboratory (NETL) of the Department of Energy. This research was in support of the Department of Energy's Clean Coal Program for research, development, and demonstration (RD&D). This program is to ensure the availability of ultra-clean, abundant, low-cost, domestic electricity for economic prosperity and strengthen energy security.

TDA Research had developed a solid adsorbent for carbon dioxide that is effective in removing carbon dioxide from power plant stack (or flue) gases that are now being released to the atmosphere. The Division has developed a process that recovers 90 percent of carbon dioxide from flue gas and converts it in to pipeline quality carbon dioxide at 2,200 psi based on TDA Research laboratory data for the adsorbent. TDA Research and Babcock & Wilcox are to use this design to build and test a pilot scale version of the process.

Simulation and economic analysis of the Conesville #5 Power Plant operations included the off-design case that produces steam for regeneration of a solid adsorbent. A significant cost is electricity assigned to the sequestration process, estimated at 106,300 kW. The levelized make-up power cost is 7.46 ¢/kW-hr which would result in an increased utility cost of 33.6 ¢ based on current (no sequestration) Conesville No. 5 electricity cost. Regeneration of the sequestration system, when capturing 90 percent of the base-case generated CO₂, will require 1,700,000 lbs/hr of low pressure steam. This steam flow rate is ~ 34 percent of the total HP steam generated in the boiler of the power plant. The Aspen HYSYS process design for capturing carbon dioxide from a coal-fired power plant using the TDA adsorbent is given in the final report in the Excel spreadsheet; *Moving Bed Adsorber and Regenerator Design with Downstream Processing rev 5-3-10.xls*.

Publication on Carbon Capture

Ralph W. Pike, F. Carl Knopf, Debalina Sengupta, "Low-Cost Sorbent for Capturing Carbon Dioxide Emissions Generated by Existing Coal-Fired Power Plants," MPRI-TDAR-2, Final Report submitted to TDA Research, Inc. Department of Energy Contract Number DE-NT0005497, May 10, 2010.

Louisiana Geological Survey

Chacko John, Director
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Projects & Publications

LGS Contracted to Perform Haynesville Shale-area Water Quality Studies

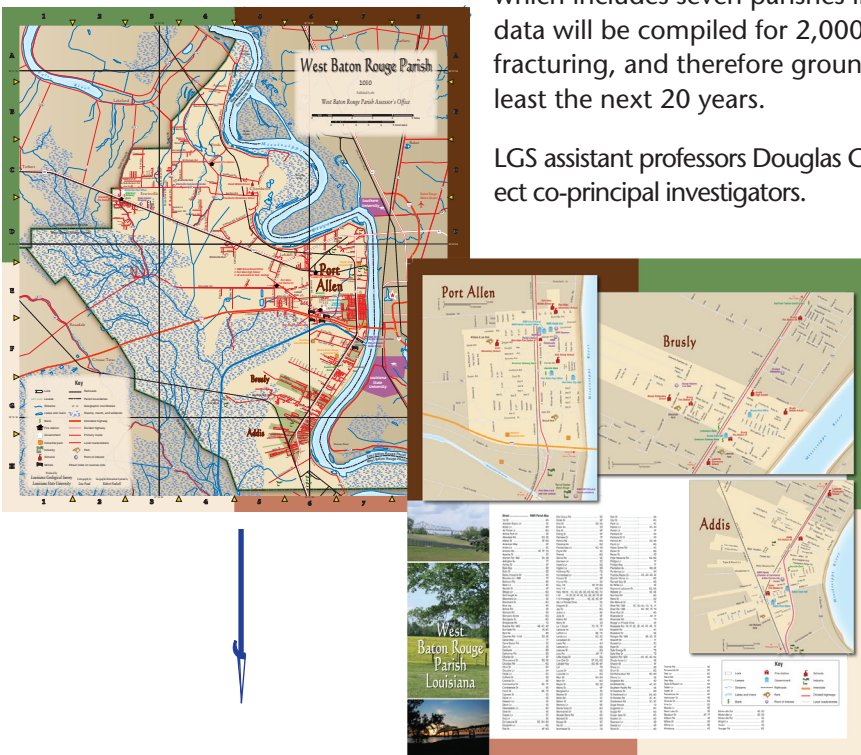
During the summer of 2010, LGS was contracted to perform two water quality studies in and around the major north-Louisiana natural gas play, the Haynesville Shale. Hydraulic fracturing, the process used to enhance the extraction of gas from shale, requires vast volumes of groundwater, the use of which will impact local and regional water levels and has the potential of reversing water flow.

For the first study, before major drilling activity takes place, the LGS researchers will determine water levels and water quality, focusing on inorganic compound concentrations. Researchers will collect samples from approximately 950 to 1,050 wells in parts of Caddo, Bossier, and De Soto Parishes. Police juries from the participating parishes have funded the study (\$216,596).

The second study will measure the preexisting concentration of methane and volatile organic compounds (VOCs) within the same area. EXCO Resources, an independent oil and gas company, has funded this study (\$149,634).

The two studies mark the start of the creation of a database and series of maps displaying compound concentrations as a baseline of water quality in the Haynesville Shale region, which includes seven parishes in north Louisiana. Ultimately, baseline data will be compiled for 2,000 wells. It is expected that hydraulic fracturing, and therefore groundwater monitoring, will take place for at least the next 20 years.

LGS assistant professors Douglas Carlson and Thomas Van Biersel are the project co-principal investigators.



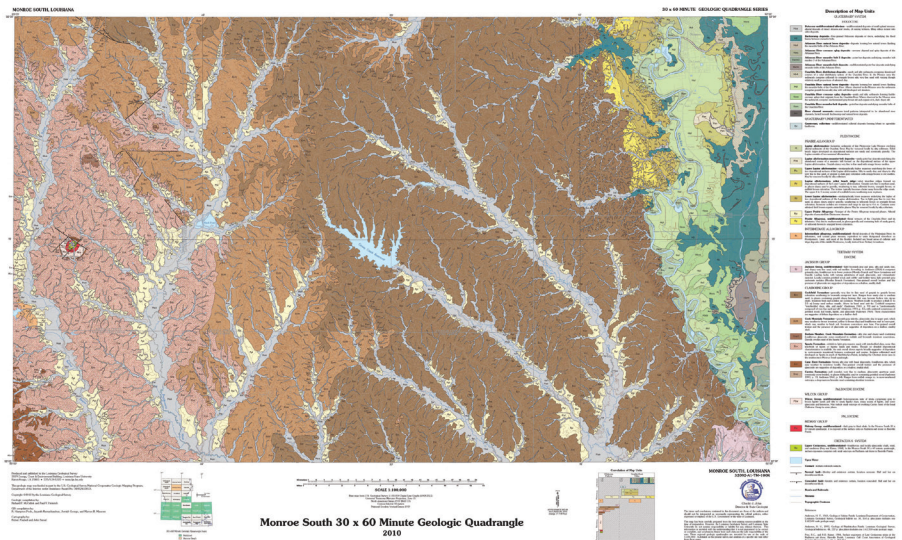
Cartography Assists West Baton Rouge

The LGS Cartographic Section provided technical and cartographic support to produce a 2-sided 22 x 24 inch lithographic folding map of West Baton Rouge Parish.

The thematic map was sponsored by the West Baton Rouge Parish Assessor's Office. It depicts cultural and physical features of the parish with a street index. The reverse side shows detailed incorporated areas.

Louisiana Geological Survey Publishes Geologic Quadrangle Map for Monroe Area

As part of its legislatively mandated mission to map the state, the Louisiana Geological Survey, or LGS, has published the *Monroe South 30 x 60 minute Geologic Quadrangle* map (1: 100,000 scale), which describes and illustrates the surficial, or surface, geology of the South Monroe area. The colorful 28" x 48" map identifies the various geologic formations, composition of the surface soils and locations of fault lines and waterways.



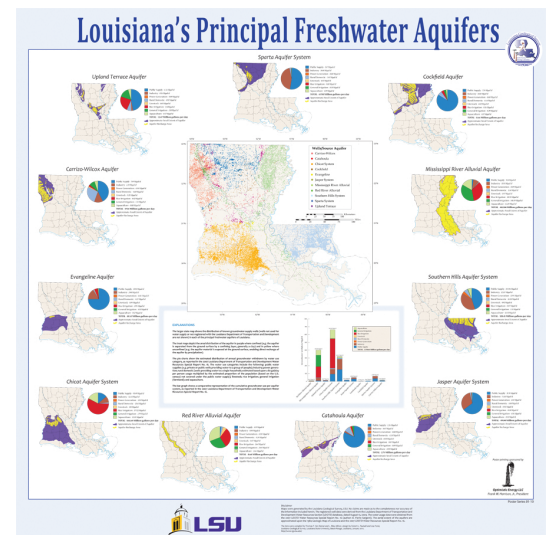
Funding for the mapping work is provided on an annual competitive basis by the U.S. Geological Survey under the National Co-operative Mapping Program. The geologic compilation for the *Monroe South* map was performed by LGS research associates Richard P. McCulloh and Paul V. Heinrich, with cartography by research associate Robert Paulsell and cartographic manager John Snead. The GIS compilation was done by research associate R. Hampton Peele, along with graduate students J. Ramachandran, J. George and Marcus Massom.

Created by the Louisiana Legislature in 1934, LGS is the only geologic mapping research agency in the state. Quadrangle maps published by LGS are critical for the creation of derivative maps used extensively by industry for environmental projects, site location and numerous other industrial and economic development projects.

The *Monroe South* map and the other quadrangle maps published by LGS are available from LGS publications: 225-578-8590 or <http://www.lgs.lsu.edu/deploy/publications/publicationcatalog.php>

Main Pass Oil and Gas Fields Atlas, Freshwater Aquifers Poster Available

The Louisiana Geological Survey, LGS, recently released two publications: "Atlas of the Main Pass Area Offshore Oil and Gas Fields" and a poster titled "Louisiana's Principal Freshwater Aquifers." The atlas is the third publication in the LGS publication series titled "Atlas of Oil and Gas Fields in Offshore State Waters of Louisiana." Volumes 1 and 2 are atlases of the Breton Sound and Chandeleur Sound offshore areas, respectively. The volume contains all publicly available information on the discovery dates of the fields, number of wells, productive zones and intervals, type logs, cross sections, maps, geology, and production information. The current atlas provides a handy reference publication for companies operating in the Main Pass area and for further evaluation for potential increased production from deeper and/or bypassed zones in the Main Pass offshore area in state waters. The authors for the Main Pass Atlas are research associates Brian Harder, Bobby Jones, Warren Schulingkamp, LGS director Chacko John, and computer analyst Reed Bourgeois.



**LGS is the
only geologic
mapping
research agency
in the state.**

"Louisiana's Principal Freshwater Aquifers" is a 27" x 27" multicolored poster featuring illustrations of all Louisiana aquifers. Pie charts and graphs show approximate amounts of water withdrawals for different purposes from each of the various aquifers. The aquifer information was compiled by research associates Thomas Van Biersel and Riley Milner. The poster was designed by cartographers Robert Paulsell and Lisa Pond.

Copies of the atlas on CD and of the poster can be ordered by contacting LGS publications (225-578-8590). The cost of the atlas CD is \$50. The poster is free of charge but requires a \$5 shipping fee.

Earth Science goes Public

In February, research associate Riley Milner gave a presentation to the third grade classes at Highland Elementary School on the geologic history and physical development of the State of Louisiana as we know it today. In March, LGS participated in the BREC Park Bluebonnet Swamp Nature Center's all day activity "Rockin' at the Swamp." The LGS exhibit booth was manned by research associate Riley Milner and assisted by director Chacko John. Nearly 700 visitors were informed of the recent discovery of a meteor impact crater located in southwestern St. Helena Parish, and identified as "The Brushy Creek" late or possibly terminal (~11,000 years BP) Pleistocene impact crater. The display of LGS researcher Paul Heinrich's GCAGS poster of the Brushy Creek impact crater, and a Scope-on-a-Rope with a petrographic microscope and displayed on a 32" television were well received by all attendees. Thin sections of the Greenwell Springs meteorite, which was found about eight feet from the home of Mr. Freddie Rapuana in 1987, were shown to the attendees. Many other thin sections of various type of rock were also shown, as well as hand specimens of rock and minerals that can be found in Louisiana along with many other rocks and minerals from around the United States.

Conference Participation

LGS Presents at the GCAGS Convention

The 60th Annual Convention of the Gulf Coast Association of Geological Societies (GCAGS) and the Gulf Coast Section of the Society of Sedimentary Geology (GCSSEPM) was held October 10-12, 2010, at the Henry B. Gonzalez Convention Center in San Antonio, Texas. LGS faculty members presented the following papers:

Marty Horn: "Problems and Progress in Defining Louark Group Lithostratigraphic Boundaries: Results from Examination of Well Samples and Recent Geophysical Logs."

Thomas Van Biersel: "Natural History, Geology, and the Civil War Battlefield at Port Hudson, Louisiana."

Douglas Carlson: "Influence of Lithology on Scaling Factors for Permeability of Louisiana Geologic Units" and "Influence of Lithology on Vertical Anisotropy of Permeability at a Field Scale for Select Geologic Units."

LGS Attends AAPG Annual Convention

At the 2010 American Association of Petroleum Geologists Annual Convention and Exhibition, held at the Morial Convention Center in New Orleans April 11-14, LGS exhibited its updated 2008 Oil and Gas map of Louisiana and other publications and maps. The event was attended by more than 6500 professionals from around the world. The map of the oil and gas fields attracted much attention from industry personnel who were also very interested in other ongoing research at LGS, particularly in the oil and

gas and geologic mapping areas. Douglas Carlson, secretary-treasurer of the Division of Environmental Geology, and Chacko John, Gulf Coast Section councilor of Division of Professional Affairs, attended their respective meetings held prior to the start of the main convention program. Thomas Van Biersel presented a poster paper dealing with the sustainability of groundwater resources for the Haynesville shale development.

McCulloh, Heinrich participate in National Park Service Geologic Resources Inventory Meeting

McCulloh and Paul Heinrich attended a Geologic Resources Inventory (GRI) Scoping Meeting for the Jean Lafitte National Historical Park and Preserve held by the Geologic Resources Division of the National Park Service (NPS) on April 15, 2010, at the French Quarter headquarters building on Decatur Street in New Orleans.

Participants included NPS staff from the park and preserve, the Geologic Resources Division, and the Gulf Coast Network, as well as cooperators from Colorado State University and LGS. The GRI Program is designed to generate digital geologic maps and geologic resources inventory reports for National Park System units. To accomplish this, geologic scoping meetings are held to summarize geologic mapping coverage and needs, evaluate the adequacy of existing geologic maps for resource management, discuss park-specific geologic resource management issues, review distinctive geologic features and processes, identify potential monitoring and research needs, and conduct a site visit with knowledgeable park personnel.

As part of the meeting agenda McCulloh gave a presentation entitled, "Geologic Overview of Jean Lafitte National Park." This was based in large part on ongoing geologic mapping of the New Orleans and Terrebonne Bay 30 x 60 minute quadrangles being prepared at 1:100,000 scale with co-principal investigators Paul Heinrich, Marty Horn, and Hampton Peele for a fiscal-year 2009 project supported by the National Cooperative Geologic Mapping Program, STATEMAP component under cooperative agreement with the U.S. Geological Survey.

Notes of Distinction

Louisiana Geological Survey Director Appointed to DOE Project Board

Professor Chacko John, Louisiana Geological Survey (LGS) director and state geologist, has been appointed to the National Scientific Advisory Board for an alternate energy project funded by the U.S. Department of Energy and managed by the Arizona Geological Survey." The three-year \$21-million project will create a national geothermal database for assessment and development of geothermal energy resources nationwide. Project participants include the 50 U.S. state geological surveys.

The interoperable, seamless, and searchable database, with state-specific information, is expected to encourage renewed industry efforts to exploit geothermal energy resources across the U.S.

LGS will compile information on the Gulf Coast geopressured-geothermal resources with particular reference to Louisiana. Data will include temperatures, geologic maps, suitable trends and sites for drilling, rock core and cuttings information, deep oil, gas, and water well information, thermal gradient maps, and more, in digital format. A geographic information system (GIS) will be developed with the associated metadata.

John sees the development of Louisiana's geopressured-geothermal resources as having the potential to reshape the state's energy landscape. "Louisiana has tremendous geopressured-geothermal resources," he said. "Their development could lead to an increase in state revenues, new job creation, and a leveraging of alternate energy resources well into the future."



Jerry Daigle, USDA, retired and service award recipient, R. Hampton Peele.

Distinguished Service Award for the Advancement of Spatial Analysis in Louisiana Presented by the Executive Board of the Louisiana Remote Sensing and GIS Workshop

The *Distinguished Service Award for the Advancement of Spatial Analysis in Louisiana* is presented annually at the Louisiana Remote Sensing and GIS Workshop to a colleague who has made extraordinary contributions to the *application* of mapping sciences specifically in Louisiana. Mapping sciences includes environmental remote sensing, Geographic Information Systems (GIS), cartography, spatial analysis, surveying, and geospatial sciences. The recipient has won the esteem of colleagues by exhibiting exceptional dedication to service while recording noteworthy

achievements of statewide impact and importance. These individuals have demonstrated professional expertise, leadership, management, and enterprise related to significant RS-GIS projects or programs in Louisiana. They have also shown an inclination for cooperation, outreach, assistance, and training of others; sharing of knowledge and data; and volunteering services in the geospatial community. The award is conferred by a committee of peers in the GIS, remote sensing, and mapping professions in Louisiana representing federal, state, and local governments, academic institutions, industry, and professional societies.

At LGS, Peele has designed and developed more than 100 GIS products, contributed to more than 30 published maps. He is a member of the group that developed the Louisiana GIS CD and the Louisiana Digital Map DVD set. He served as a team leader for emergency GIS mapping support in the state Emergency Response Center during Hurricanes Katrina, Rita, Gustav and Ike and is a member of the LSU Hurricane Surge Modeling team.

Peele received a B.A. in Anthropology and a B.S. in Geography, and a master's degree in mapping science from LSU.

Louisiana Geological Survey Personnel

Administrative Personnel

Chacko J. John, Ph.D., director and state geologist, professor-research

John Johnston., assistant director

Patrick O'Neill, LGS Publications Sales and Resource Center

Basin Research Energy Section

Marty Horn, assistant professor-research

Brian Harder, research associate

Warren Schulingkamp, research associate

Reed Bourgeois, computer analyst

Geological Mapping & Minerals Mapping Section

Richard McCulloh, research associate

Paul Heinrich, research associate

Water & Environmental Section

Douglas Carlson, assistant professor-research

Riley Milner, research associate

Cartographic Section

John Snead, cartographic manager

Lisa Pond, research associate

Robert Paulsell, research associate

R. Hampton Peele, research associate

Staff

Melissa Esnault, administrative coordinator

Jeanne Johnson, accounting technician

Radiation Safety Office

Wei-Hsung Wang, Director
www.radsafety.lsu.edu

The Radiation Safety Office (RSO) which resides under the Center for Energy Studies (CES) is a critical and unique component to support research and teaching activities involving the applications of sources of radiation at LSU, the LSU Agricultural Center, and Pennington Biomedical Research Center. The RSO is responsible for implementing radiation control policies and procedures, as well as ensuring safe practices to not only comply with the federal- and state-mandated regulations but also assure proper protection of people and the environment and the integrity of the University. Administrative authorization for the radiation protection program from the University is contained in the LSU System's Permanent Memorandum-30. Enforcement actions for radiation safety violations are authorized under LSU Policy Statement-99.

The RSO provides training and personnel monitoring for persons who use sources of radiation. RSO staff perform routine site surveys and audits, radiation survey meter calibrations, x-ray equipment inspections, radioactive waste management, and leak tests of sealed radioactive sources for approved radiation laboratories to be consistent with the applicable regulatory requirements and broad-scope Radioactive Material License conditions.

In 2010, there were 734 approved radiation workers (including 119 radiation principal investigators) and 220 radiation laboratories under the LSU radiation protection and control program. During this calendar year, the RSO reviewed and approved 90 grant proposals involving the uses of radiation sources. Funds requested by the proposals were \$86,051,971. Actual funds granted to LSU were \$33,070,850.

Due to limited manpower and resources at the RSO, CES provides administrative support in accounting and purchasing activities, computer and network maintenance, and personnel management for the RSO.

Laser Safety Program

The RSO implemented a comprehensive laser safety program based on the American National Standard for Safe Use of Lasers (ANSI Z136.1-2007). A total of 97 Class 3B and Class 4 laser systems were identified on the LSU campus. Of these 97 laser systems, 79 had been inventoried, evaluated, and inspected for laser intra beam hazards, 12 had been designated as inactive and posted as such, and the review and assessment of the last 6 active ones was in process. The Laser Safety Manual, training slide presentation, and related forms can be accessed online at the link <http://www.radsafety.lsu.edu/NonIonizingRadiation.html>.

Technical Support to Other LSU Campuses

With recognized expertise in radiation protection, the RSO has been providing advisory services and technical support to other LSU campuses. In 2010, Mary J. Haik, operations manager and laser safety officer, visited LSU Eunice twice and conducted five X-ray equipment inspections. She also visited LSU Alexandria and inspected one X-ray unit.

Uses of Radioactive Material by Louisiana Universities Marine Consortium

A research project involving the use of carbon-14 to assess phytoplankton productivity in Louisiana coastal waters was proposed by a faculty member at Louisiana Universities Marine Consortium (LUMCON). LUMCON is listed as an approved location for use and storage of radioactive materials under LSU System's broad-scope Radioactive Material License. However, LUMCON is independent of the LSU System. This research project also required the filing for Reciprocity with the U.S. Nuclear Regulatory Commission (NRC), as this work would involve the use of radioisotopes in the Gulf of Mexico more than three nautical miles from the Louisiana shore. Under direction from the Radiation Safety Committee, the RSO reviewed the research protocol and subsequently approved the project. The RSO also obtained a reciprocity agreement with the NRC under the following conditions: (1) the approval expired on December 31, 2010, (2) the NRC might also perform inspections of activities by Agreement Licensees, and (3) the NRC needed to be notified by the date of scheduled activity if there were any deviations from the activity information originally submitted to NRC.



RSO technical assistants Jamie Dismukes (left) and Bobby Zhang carry out a routine radiation laboratory contamination survey using smears and a pancake Geiger-Mueller probe survey meter.



RSO technical assistant Nicholas Kubiak (left) and research specialist Nicholas Desselles perform leak test analysis of sealed radioactive sources using an alpha-beta proportional counting system.

Appointment for a New Member of the Radiation Safety Committee

William J. Metcalf, professor and former chair in the Department of Physics and Astronomy, who had been serving on the Radiation Safety Committee (RSC) for more than 20 years, retired from LSU in July of 2010. The RSC recommended Jeffrey C. Blackmon as Metcalf's replacement on the committee with a unanimous vote at the RSC meeting in September 2010. Blackmon, associate professor in the Department of Physics and Astronomy, has nearly 20 years of experience in nuclear instrumentation, experimental nuclear physics, and radiochemistry. He also held Radiation Worker II certification from the Oak Ridge National Laboratory. He possesses good working knowledge in the areas of radiation and radioactive materials.

Radiation Safety Office Personnel

Wei-Hsung Wang, Ph.D., CHP, CLSO, Director
 Mary J. Haik, M.S., Operations Manager & Laser Safety Officer
 Daryn M. Bovard, Radiation Specialist
 Richard E. Teague, RRPT, Senior Technologist
 Nicholas Desselles, Research Specialist
 Lorraine Day, Ph.D., CAMD Liaison
 Lorrie Gaschen, D.V.M., Ph.D., SVM Liaison
 Leslie M. Smith, PBRC Liaison
Technical Assistants
 Kyle Babin
 Rachel Bozeman
 Jamie Dismukes
 Rebecca Hill
 Nicholas Kubiak
 Dana Lewis
 Blake Richard
 Charles Wilson IV
 Bobby Zhang



Radiation Safety Office director Wei-Hsung Wang (seen here) and his team participated in the LSU sesquicentennial event LSU Day, held Homecoming Day, November 13, 2010.

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