Alabama's Oil Sands: Research and Regulation

State Oil and Gas Board of Alabama Geological Survey of Alabama



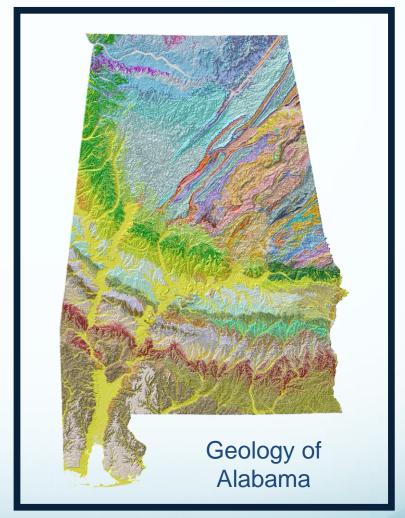
SSEB 54th Annual Meeting Mobile, AL September 28-30, 2014





Alabama's Fossil Fuel Energy Endowment

- Coal
 - Black Warrior Basin Coal Measures
 - Coastal Plain Lignites (low-rank coal)
- Oil
 - Conventional
 - SW Alabama Oil and Condensate
 - Black Warrior Basin Oil
 - Unconventional
 - Oil Sands of North Alabama
- Natural Gas
 - Conventional
 - SW Alabama
 - Black Warrior Basin
 - Unconventional
 - Coalbed Methane of Black Warrior BasinPaleozoic Gas Shales of North Alabama





What are Oil Sands?

- Rocks (typically sandstone) that contain bitumen
- Bitumen viscous liquid to semi-liquid low grade crude oil
- Too thick to flow or be pumped without being heated, diluted, or otherwise thinned



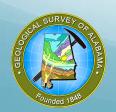




Oil Sands in U.S.

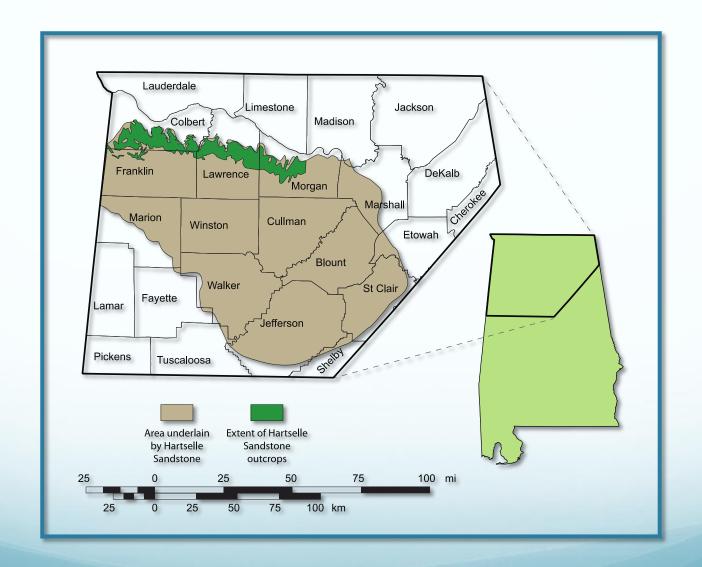
- Most significant deposits located primarily 11 states
- Alabama has the third largest oil sands resource in the U.S.







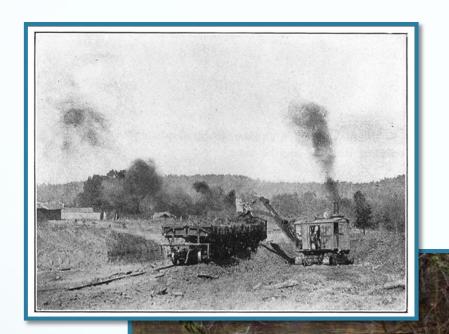
Alabama Oil Sands







Oil Sands in Alabama







GEOLOGICAL SURVEY OF ALABAMA

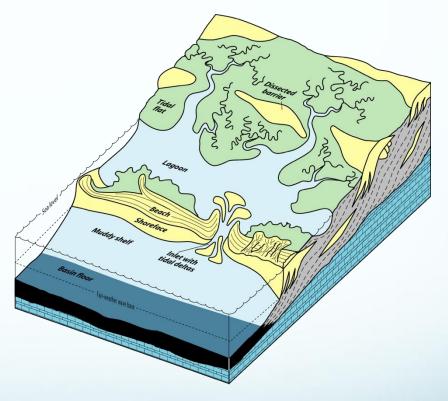
BULLETINIII





Alabama Oil Sands – Characterization of Hartselle

- Oil saturations: trace to>700 barrels per acre-foot
- Porosities: <5% to 24%
- Permeability:<10 mD to 100+ mD
- 7.5 billion barrels
 speculated in subsurface
 (~350 million barrels at <50
 feet depth)

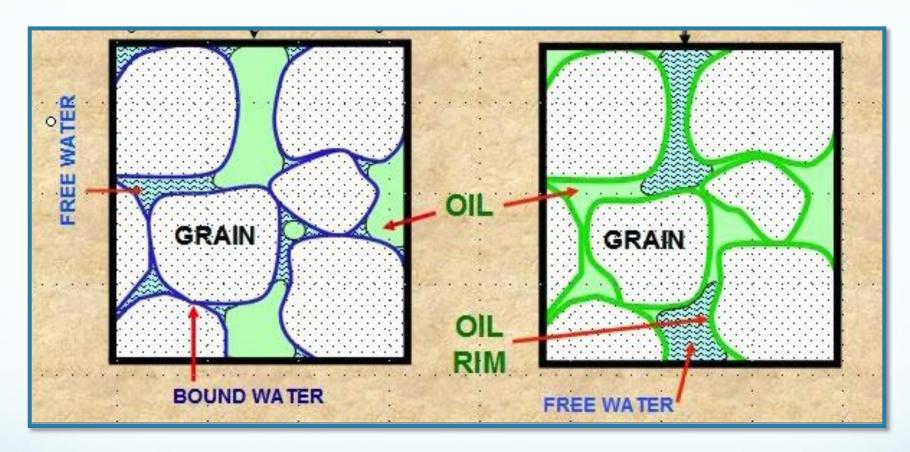


Beach-barrier model





Water Wet Oil Wet



Canadian vs. Alabama Oil Sands





Alabama-Mississippi Oil Sands MOU







Memorandum of Understanding

This Memorandum of Understunding (DOU) describes a coordinated effort between the Governon of the state of Alabama and Missiongly (State) and their designees to explore energy mergy resources in the States. The Governors recognize the need for a comprehenoive geologic and engineering assessment of the States oil sands resources and analysis of the legisl and regulatory frameworks applicable to recource development. The Governors understand the significance of the potential oil production from these resources and recognize the engineering and exceptional development opportunities that developments presents for the position of the States and the Southern States Intergreb Board development opportunities that developments presents for the position of the States and the Southern States Intergreb Board development opportunities that developments presents for the position of the States and the Southern States Intergreb Board development opportunities that developments presents for the position of the States and the Southern States Intergreb Board

Oil sands generally occur as natural mixtures of sand, clay, water, and bitumen, a heavy oil. When extracted from the suburdince, the bitumen is separated from the sand and upgraded to a reflerence or control of the State of Alabama has the third largest of a sink orecourse in the United States, which may extend into the State of Massingh. The Naturales Sandstone exists from north-central and north-west Alabama into north-central intelligence in particular protection of fasture oil exercision speciation of the Internativia States and suburdince lystochem has been the floor of attention for many of a states of the Internativia States or evolutional most of albeits of the solid solution for evolution of all states for evolutions of the solid solution for evolution of the solid solution of the solid solution of the solid solid solution of the solid soli

The Governors support a comprehensive geologic and engineering assessment of the oil sands resources in the States to be conducted as a joint effort between the Geological Screy of Albaman/State Cil and Gia Bourd, the Mississips State Cindeng, and the Societies States Cil and C

Forty-sieves percent of non-OFIC imports of crude to the United States originate in Canada. The largest commercial oil sands operations are originally in the Canadian Province of Alberta, which supplied the United States with 15 percent of its presence of the Canadian Province of Alberta, which supplied the United States with 15 percent of the supplied of the Canadian Province of Alberta Alberta Original Province of Alberta Alberta Original Province of Canadian Province of Canadian Province of Canadian Province of Alberta Alberta Original Province of Canadian Province of Alberta Alberta Original Province of Canadian Canadian Considera Connect in Alberta, Microbian Considera Connect in Alberta, Microbian Canadian Canadian Considera Connect in Alberta, Microbian Canadian Canadian Canadian Considera Connect in Alberta, Microbian Canadian Canadian Canadian Considera Connect in Alberta, Microbian Canadian Canadian Considera Connect in Alberta, Microbian Canadian Canadi

The Governors recognize that a partnership between the States, the energy industry, and major utilities can have a positive impact on the successful exploration for, and development of, these resources. To the exectin peritable, the Governors will call on industry, in cooperation with state officials, to provide scientific assessment, technical expertise, and itself call of the control of the control of the company of the control of the

This MOU demonstrates the Governors' willingness to explore the potential for oil sands resource development in the States and asserts the Governors' support of conducting the work outlined herein. This MOU shall not create any obligations or legal relationships that are binding or enforceable at law or in equity.

Set forth this 27th day of July, 2013 b

State of Alaban

State of Mississin











Alabama Oil Sands Program

at the Geological Survey of Alabama & State Oil and Gas Board of Alabama

- Announced by Governor Bentley in 2014 State-of-State address
- Funded in FY15 General Fund budget
- Oil Sands Program will:
 - Provide roadmap to facilitate prudent commercial development
 - Assist in realization of economic and societal benefits from prudent, orderly, and environmentally sound development
 - Provide focus for oil sands activities and initiatives
 - Evaluate and develop appropriate legal and regulatory frameworks





Alabama Oil Sands Program

at the Geological Survey of Alabama & State Oil and Gas Board of Alabama

- Geological Survey of Alabama
 - Established in 1848
 - Natural resource investigation, characterization, and development
 - Fossil-fuel Mineral, Nonfuel Mineral, Water, and Biological Resources
- State Oil & Gas Board of Alabama
 - Established in 1945, grew out of activities of GSA
 - Three member appointed Board
 - Staff Director State Geologist, serving as State Oil & Gas Supervisor
 - Oil and Gas Conservation and Regulation



 Prevent waste of resources, protect correlative and coequal rights, protect ground water





Geological Survey Camp, Wilcox Co., 1885

OGB & GSA—A long legacy of service to Alabama



Survey Team, Gas Test Well, Mobile Co., 1902





Comprehensive Resource Assessment – Phase I

- Audit of current data and resources
- Literature review
- Assessment of cores at the GSA underway
- Thorough review of records and methodology underway







Comprehensive Resource Assessment – Phase II

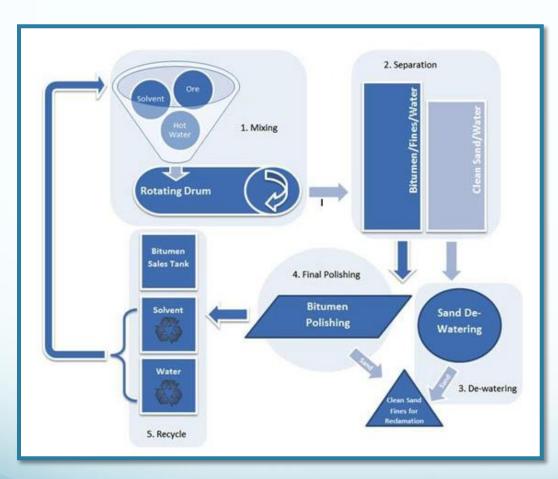


- Strategy for "Filling the Gaps"
- Distribution of porosity and permeability; fluid composition
- Understand rock mechanics





Extraction Technology



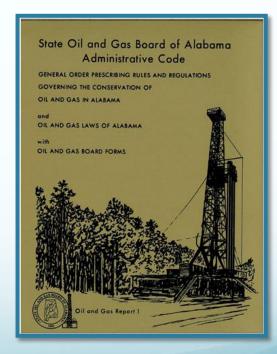
- Newer technologies that employ closedloop, solvent-based systems
- More amenable to application in small- to medium-sized deposits





Regulatory Framework

- Alabama House Bill 503 signed into law in May 2013, designating OGB as the authority for regulation relating to oil sands development
- Interagency interaction and coordination key
 - State agencies
 - Federal agencies
 - International agencies







Development of Regulations

- 1. Publication of proposed rule
- 2. Notice placed on OGB's docket
- 3. Rule officially proposed; published in the Alabama Administrative Monthly, initiating minimum of 35-day comment period
- 4. After OGB approves rule, sent to legislative committee to review



Process allows the public an ample opportunity to comment and be heard



Public Engagement



- Key function of the Alabama Oil Sands Program
- "Public" in this context includes:
 - Community
 - Non-GSA/OGB government
 - Industry







ALABAMA ABM AND AUBURN UNIVERSITIES

Oil Sands in Alabama

ANR-2192

The oil sands resources in north Alabama have recently generated significant interest as well as news reports, public meetings, and other activities related to their potential development. Below are common questions about oil sands in Alabama.

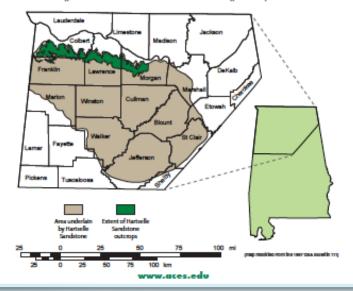
What are oil sands? Where are the oil sands in Alabama located? What studies have been done?

Oil sands, generally speaking, are rocks that contain bitumen. Primarily, these rocks are sandstone, although limestone can also be impregnated with bitumen. The largest oil sands resource in

Alabama is within the Hariselle Sandstone and has been known and studied since at least the 1890s.

The Hartselle Sandstone is Misstsstpplan-age quartzose sandstone. It is generally light colored, fine grained, and thick bedded to massive and often contains interbeds of randomly distributed clay shale. Formation thickness ranges from 0 to more than 150 feet. It shows extensive asphalt impregnation in some localities in northwest Alabama where it is exposed at the surface.

The Hartselle Sandstone is found throughout a 70-mile-long, approximately east-west belt that extends from central Monan County westward to the far





ALABAMA A&M AND AUBURN UNIVERSITIES

Alabama Oil Sands Educational Team

ANR-2196

State Oil and Gas Board of Alabama



The State Oil and Gas Board of Alabama, established in 1945, is the state agency with statutory authority to promote conservation and prevent waste of Alabama's Oil and natural gas resources, while ensuring the protection of the State's groundwater resources and environment in association with Oil and natural gas development. This is accomplished by the promulazion and enforcement of rules and

regulations that protect correlative rights of owners and other stakeholders and provide for safe and orderly development of and natural gas resources. Contact: Berry H. (Nick) Tew Jr., State Geologist and Oil and Gas Supervisor, (205) 247-3679; www.gsa. state a.lus/ogh/ogh.html.

Geological Survey of Alabama



The Geological Survey of Alabama, established in 1848, is the state agency with the mandate to explor for, characterize, and fuel), water, and biological resources in support of economic development, conservation, management, and public policy for the betterment of Alabama's citizens, communities, and businesses. Contact. Berry H. (Nick) Tew Jr., State Geologist and Oil and Gas Supervisor, (205) 247-4709. www.sas.state.liur.

Association of County Commissions of Alabama



The Association of County Commissions of Alabama is a statewide organization representing county government in Alabama. ACCA promotes improved county government services in Alabama, offers educational programs for county officials and their staff

members, administers insurance programs for county governments and employees, offers legal advice, and represents the interests of county government before state and federal organizations and agencies. Contacts: Sonny Brasfield, Executive Director, (33d) 263-7594; www.alabmacounties.org.

Alabama Department of Environmental Management



The mission of the Alabama Department of Environmental Management (ADEM) is to assure for all citi-

zens of the State a safe, healthful, and productive environment, ADEM fulfills this mission through the detailed review of permit applications, the issuance of permits that are protective of natural resources (air/land/water), the performance of compliance inspections, and the completion of enforcement actions as needed. In addition, ADEM collects as wide range of data that is utilized to guide its efforts and support as science-based decision making process. Through the implementation of major environmental laws, such as the Clean Air Act, the Clean Water Act, the Safe Drinking Water Act, and others, ADEM works to fulfill its mission each and every day on behalf of today's citizens as well as future generations. Contacts: Jeff Kitchens, Chief, Stormwater Management Branch, (334) 271-7794; Catherine McNell, Chief Mining and Natural Resource Section, (334) 271-7835; www. adem alabama.gov.

Alabama Cooperative Extension System



Alabama A&M and Auburn Universities The Alahama Cooperative Extension System operates as the primary outreach organization for the landgrant functions of Alahama A&M and Auburn Universities. Alahama Extension collaborates with many partners to help people and communities improve their quality of life and economic well-being by providing educational opportunities and information grounded in research-

based science. Extension has offices in all 67 counties, nine urban centers and a family life center, and eight research and Extension centers as well as a state-of-the-art youth environmental education center and two plant diagnostic labs. Contacts: Dr. Gary Lemme, Extension Director, (334) 844-4444, and Dr. Virginia Caples, 1890 Administrator, (256) 372-5710; www.acesedu.

For more information, call your county Extension office. Look in your telephone directory under your county's name to find the number. Published by the Alabama Cooperative Extension System (Alabama A&M University and Aubum University), an equal opportunity educator and employer.

New June 2014, ANR-2196

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Public Engagement



Moving Forward

- Develop comprehensive resource assessment that addresses industry and community questions and concerns
- Develop comprehensive regulatory framework with input from all stakeholders for prudent, economic, and environmentally sound development





Moving Forward

