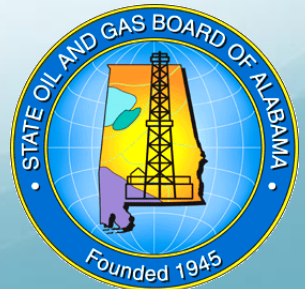


Alabama's Oil Sands: Research and Regulation

State Oil and Gas Board of Alabama
Geological Survey of Alabama

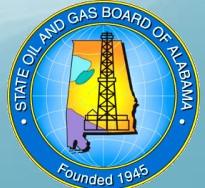
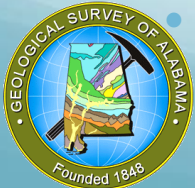


SSEB 54th Annual Meeting
Mobile, AL
September 28-30, 2014



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 Basin
 - Paleozoic Gas Shales of North Alabama



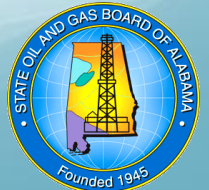
What are Oil Sands?

- 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

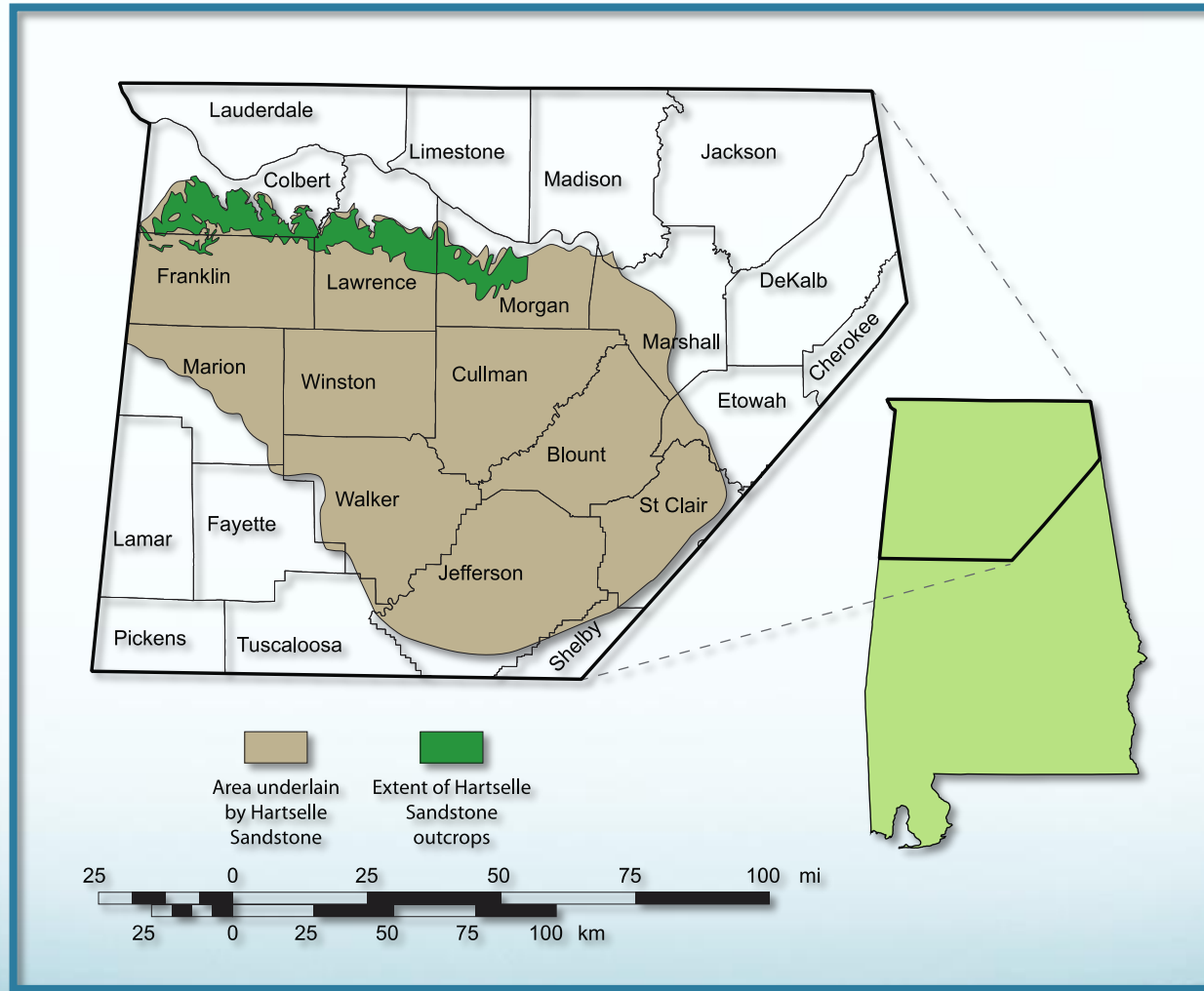


Oil Sands in U.S.

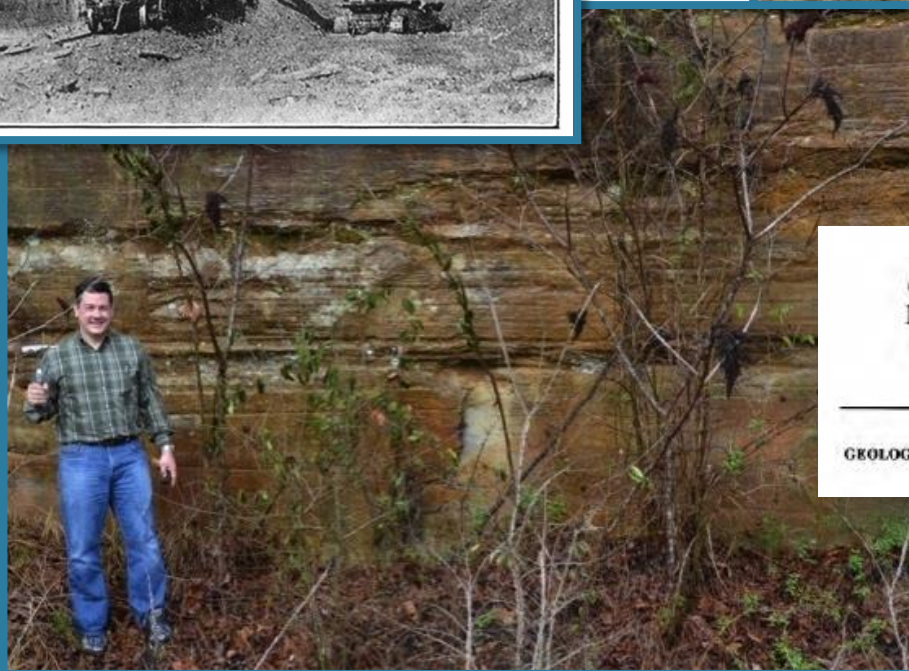
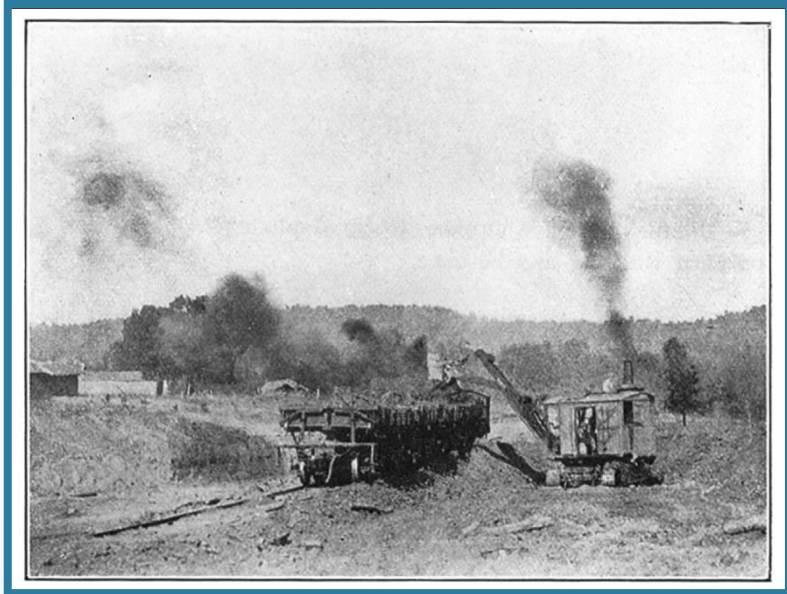
- Most significant deposits located primarily 11 states
- Alabama has the third largest oil sands resource in the U.S.



Alabama Oil Sands



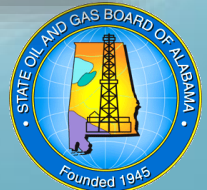
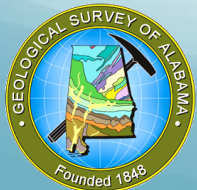
Oil Sands in Alabama



CHARACTERISTICS AND RESOURCE EVALUATION OF THE ASPHALT AND BITUMEN DEPOSITS OF NORTHERN ALABAMA

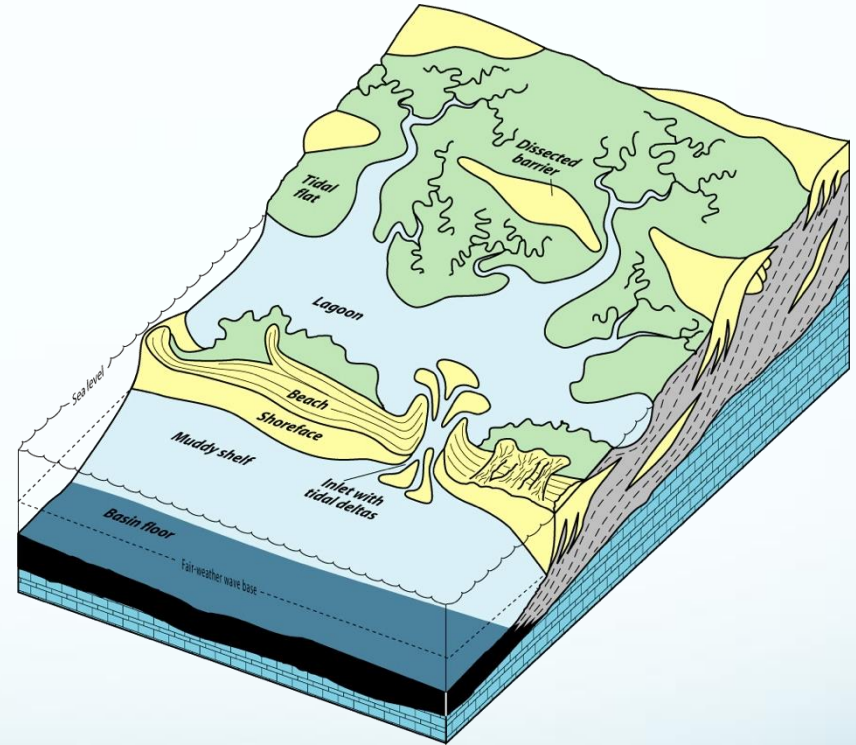
GEOLOGICAL SURVEY OF ALABAMA

BULLETIN 111



Alabama Oil Sands – Characterization of Hartselle

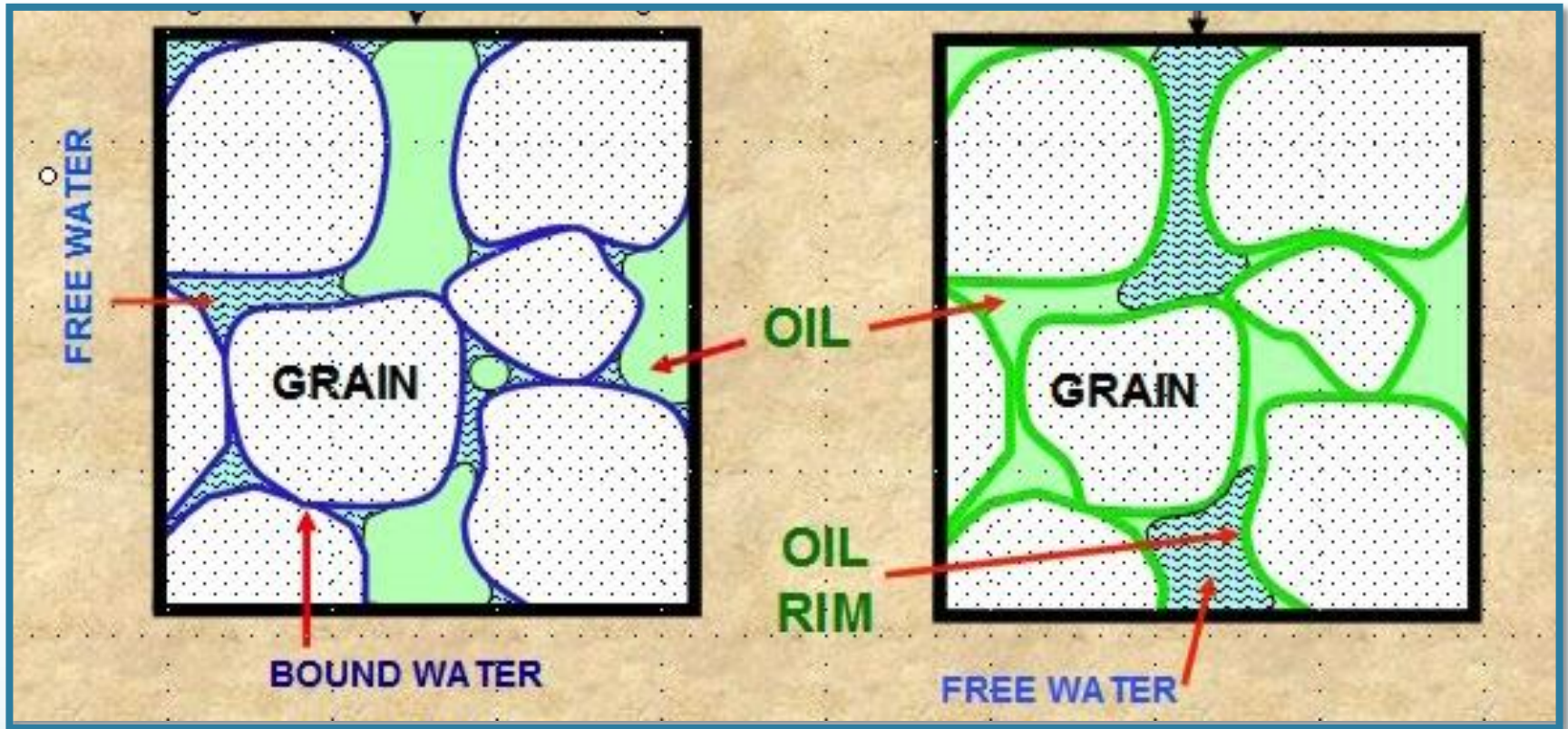
- Oil saturations: trace to >700 barrels per acre-foot
- Porosities: <5% to 24%
- Permeability: <10 mD to 100+ mD
- **7.5 billion barrels** speculated in subsurface (~350 million barrels at <50 feet depth)



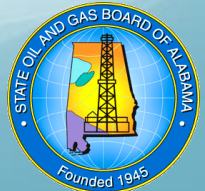
Beach-barrier model

Water Wet

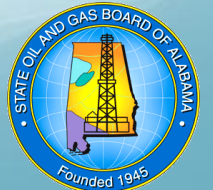
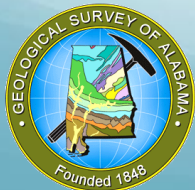
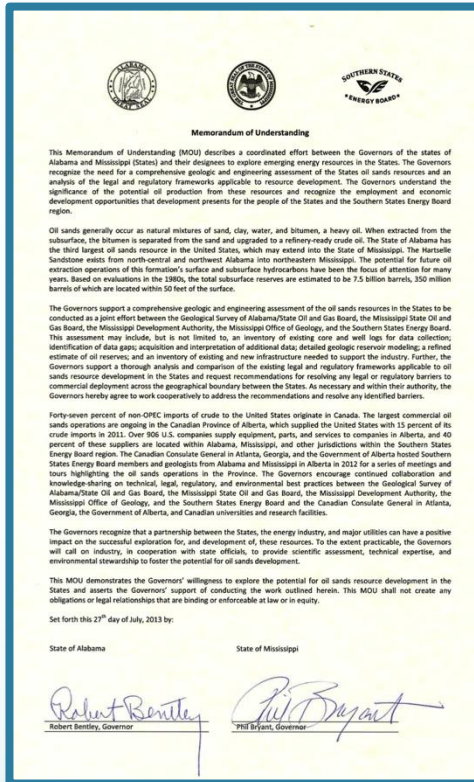
Oil Wet



Canadian vs. Alabama Oil Sands



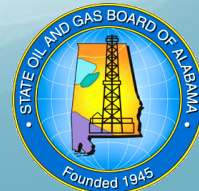
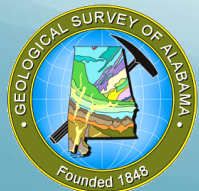
Alabama-Mississippi Oil Sands MOU



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

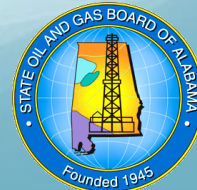
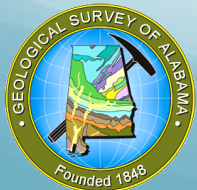
at the Geological Survey of Alabama & State Oil and Gas Board of Alabama

◆ 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**



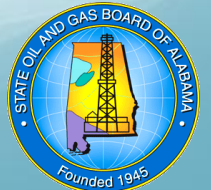


Geological Survey Camp, Wilcox Co., 1885

OGB & GSA—A long legacy of service to Alabama

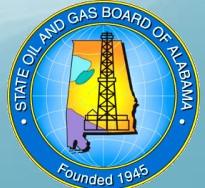
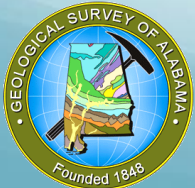


Survey Team, Gas Test Well, Mobile Co., 1902



Comprehensive Resource Assessment – Phase I

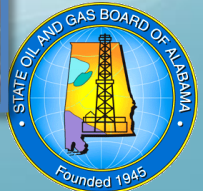
- Audit of current data and resources
- Literature review
- Assessment of cores at the GSA underway
- Thorough review of records and methodology underway



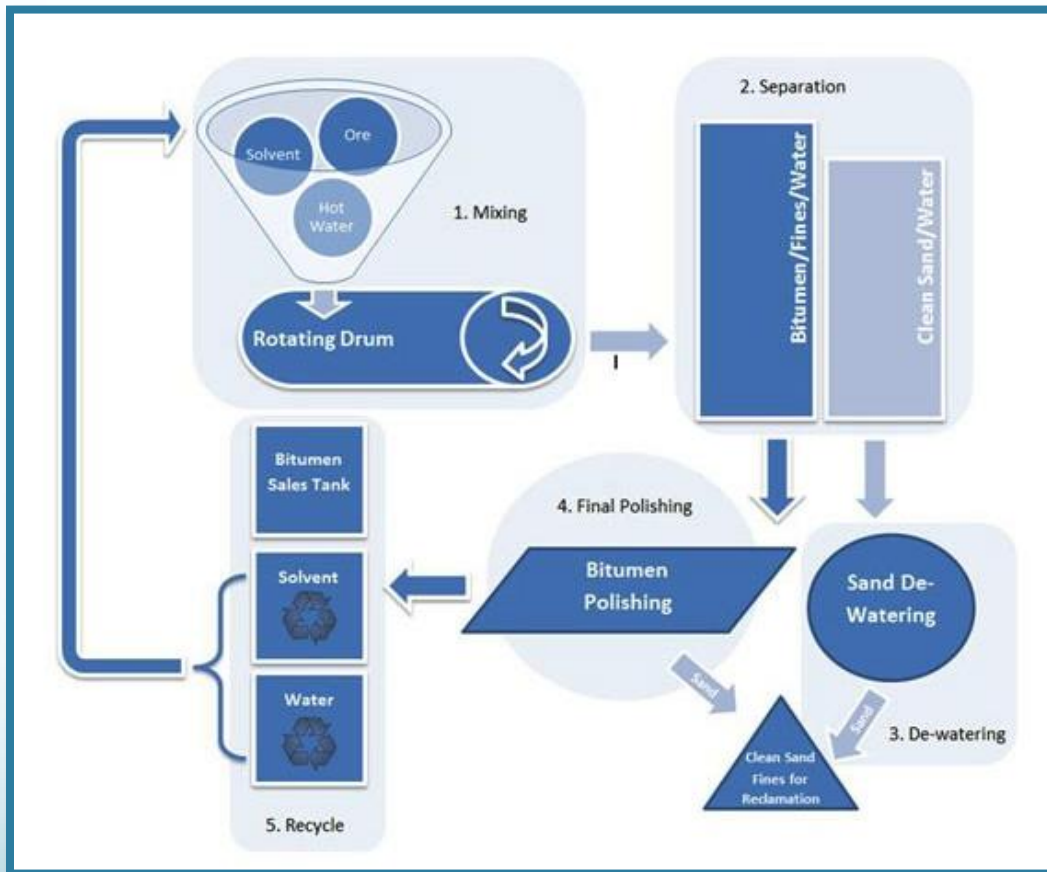
Comprehensive Resource Assessment – Phase II



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



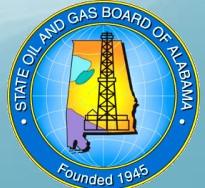
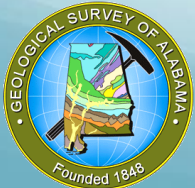
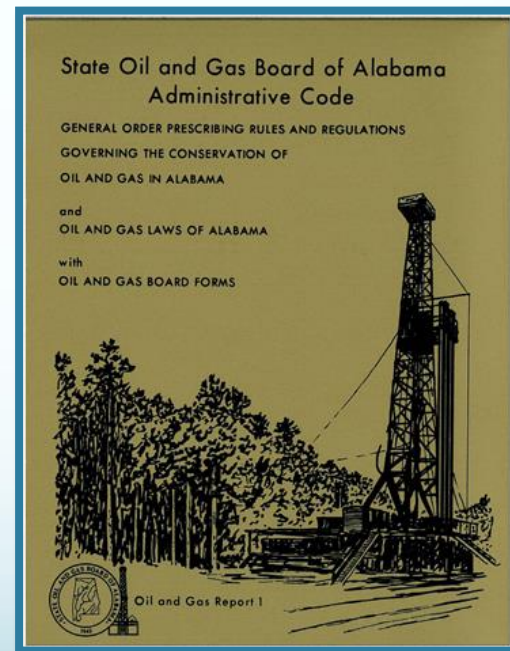
Extraction Technology



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

Regulatory Framework

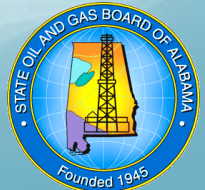
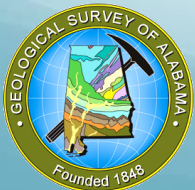
- Alabama House Bill 503 signed into law in May 2013, designating OGB as the authority for regulation relating to oil sands development
- Interagency interaction and coordination key
 - State agencies
 - Federal agencies
 - International agencies



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

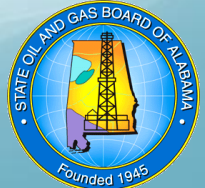
Process allows the public an ample opportunity to comment and be heard



Public Engagement



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





ANR-2192

ALABAMA A&M AND AUBURN UNIVERSITIES

Oil Sands in Alabama

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.

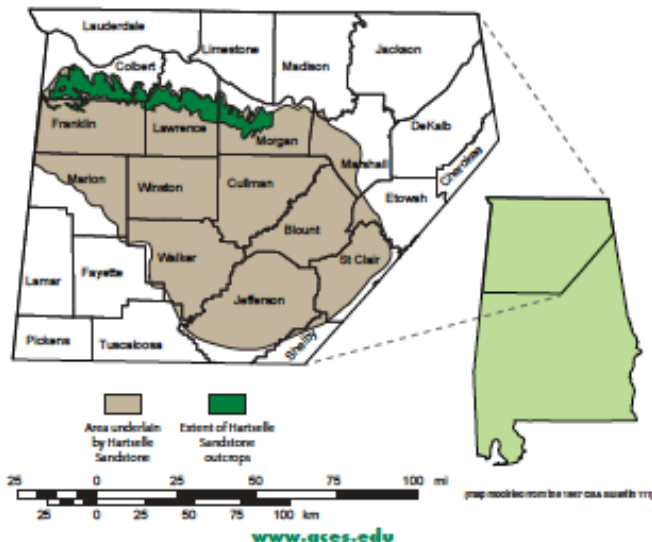
Q: What are oil sands? Where are the oil sands in Alabama located? What studies have been done?

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 Hartselle Sandstone and has been known and studied since at least the 1890s.

The Hartselle Sandstone is Mississippian-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 Morgan County westward to the far



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ANR-2196

ALABAMA A&M AND AUBURN UNIVERSITIES

Alabama Oil Sands Educational Team

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 promulgation and enforcement of rules and regulations that protect correlative rights of owners and other stakeholders and provide for safe and orderly development of oil and natural gas resources. Contact: Barry H. (Nick) Tew Jr., State Geologist and Oil and Gas Supervisor, (205) 247-3679; www.gsa.state.al.us/ogb/ogb.html.

Geological Survey of Alabama



The Geological Survey of Alabama, established in 1848, is the state agency with the mandate to explore for, characterize, and report Alabama's mineral, energy (fossil 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: Barry H. (Nick) Tew Jr., State Geologist and Oil and Gas Supervisor, (205) 247-3679; www.gsa.state.al.us.

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. Contact: Sonny Brasfield, Executive Director, (334) 263-7594; www.alabamacounties.org.

Alabama Department of Environmental Management



The mission of the Alabama Department of Environmental Management (ADEM) is to assure for all citizens 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 a wide range of data that is utilized to guide its efforts and support a 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) 271-7974; Catherine McNeil, Chief Mining and Natural Resource Section, (334) 271-7835; www.adem.alabama.gov.

Alabama Cooperative Extension System



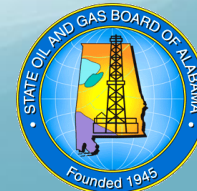
The Alabama Cooperative Extension System operates as the primary outreach organization for the land-grant functions of Alabama A&M and Auburn Universities. Alabama Extension collaborates with many partners to help people and communities improve their quality of life and economic well-being by providing 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.aces.edu.

For more information, call your county Extension office. Look in your telephone directory under your county's name to find the number.

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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

