Alabama Oil Sands

State Oil and Gas Board of Alabama
Geological Survey of Alabama

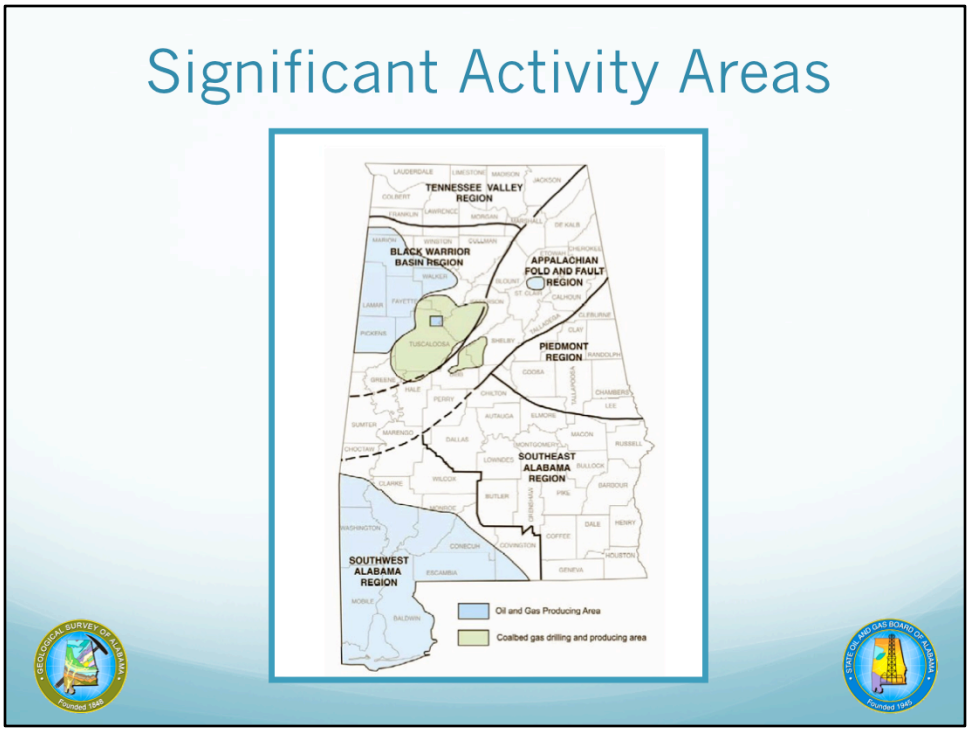
Oil Sands in U.S.

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

11 states are Alabama, Alaska, California, Kansas, Kentucky, Missouri, New Mexico, Oklahoma, Texas, Utah, and Wyoming.

Alabama's resource may extend into Mississippi.

Utah has largest oil sands resource in U.S., followed by Alaska, then Alabama. Texas has similar resources to Alabama.

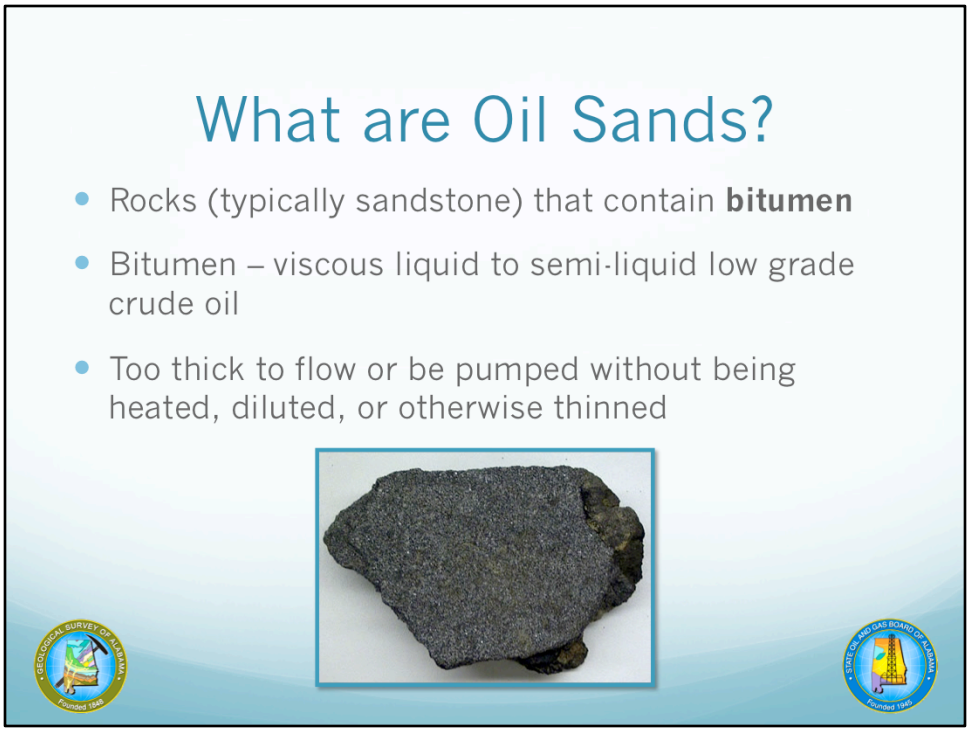


Coal - Black Warrior Basin Coal Measures, Coastal Plain Lignite

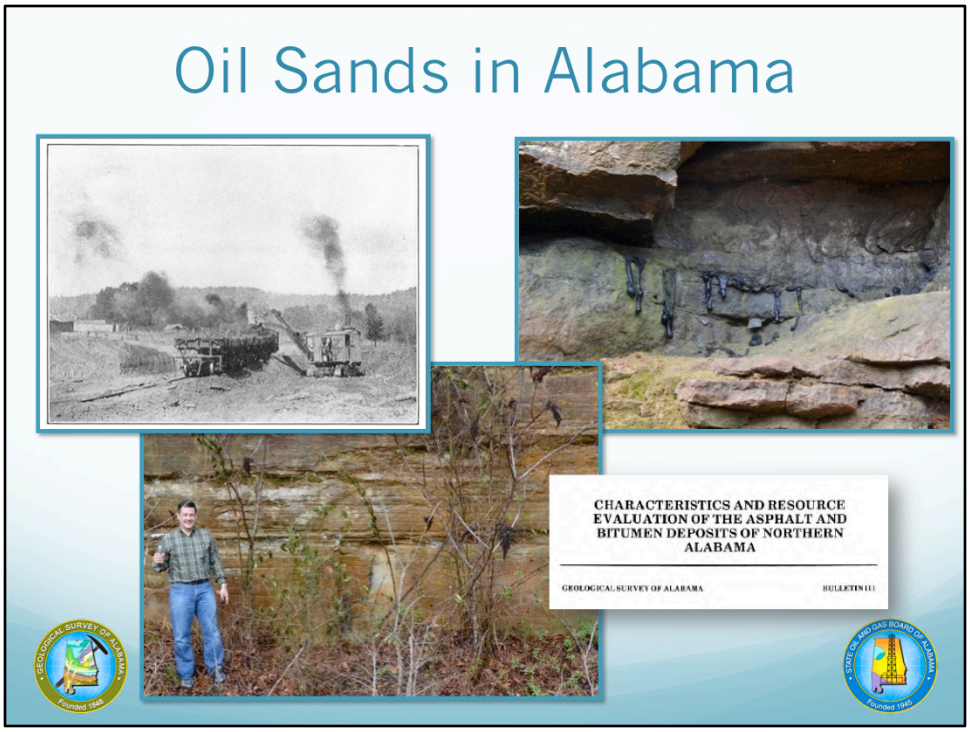
Conventional Oil and Natural Gas - SW Alabama, BWB

Unconventional Gas – CBM BWB, Gas shale of N AL

Unconventional Oil – Oil Shale, Oil Sands of N AL

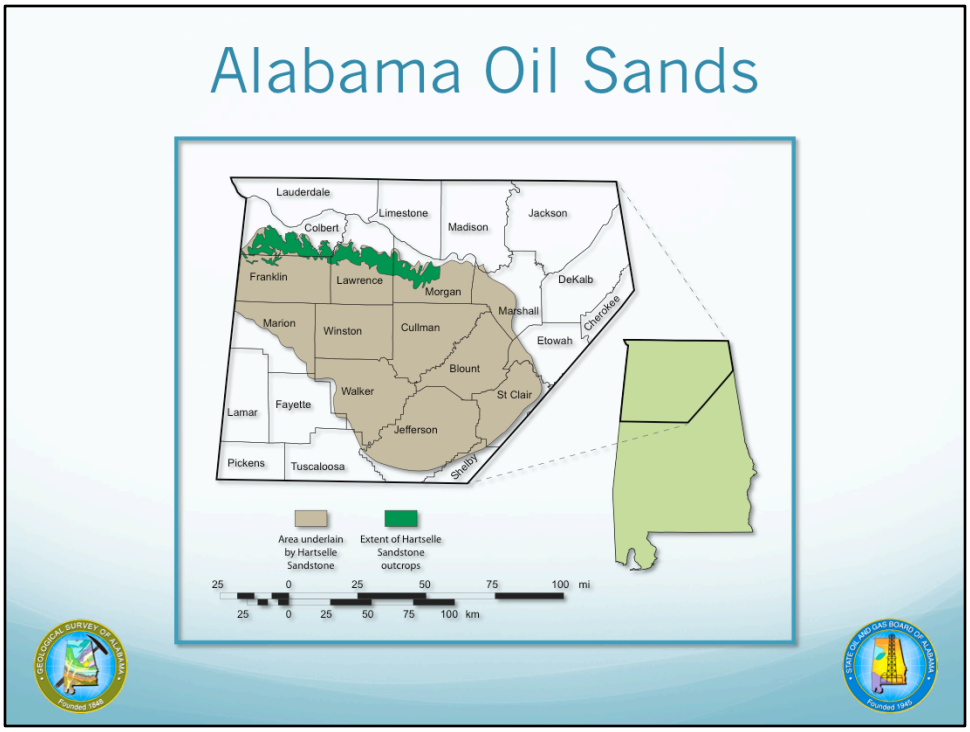


Oil sands, generally speaking, are rocks that contain bitumen. Primarily, these rocks are sandstone, although limestone can also be impregnated with bitumen. Bitumen, also termed “asphalt” or “asphaltum,” is a sticky, black, highly viscous liquid or semiliquid form of petroleum. Bitumen is soluble organic matter and is the lowest grade of crude oil, meaning that density and viscosity are increased compared to conventional crude oil. It is too thick to flow or be pumped without being heated, diluted, or otherwise thinned. (Note that when “asphalt” is used in relation to oil sands, it is not the same as the paving material “asphalt concrete,” which is often abbreviated to just “asphalt.”)



The hydrocarbon potential of the Mississippian-age Hartselle Sandstone in northwestern Alabama and northeastern Mississippi has long been known. McCalley (1896) recorded the presence of bituminous sandstones at scattered locations in Colbert, Lawrence, and Morgan Counties. Also reported "tar springs."
Clark (1925) stated, "The occurrence of bituminous sandstones in Alabama has been a matter of scientific record for over thirty years."
In those early years, semi-liquid asphaltum was extracted by crude heating methods. However, this was not found profitable and never went beyond experimental.
Pictured here are photos published in the 1925 report, taken in Cherokee, AL – Stripping operation in progress (upper left)

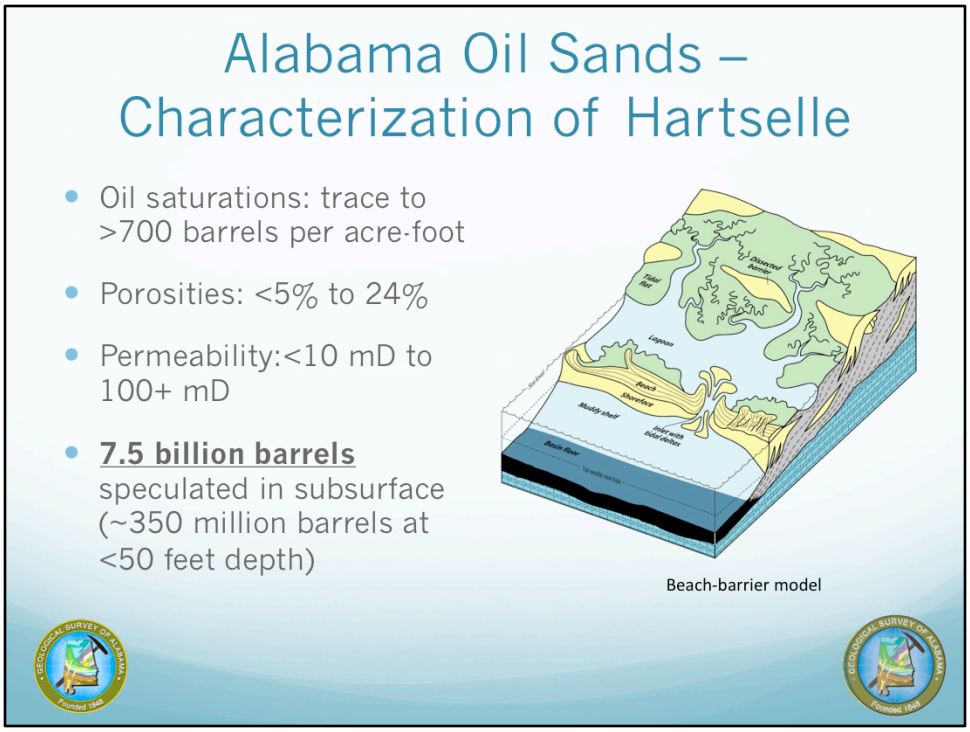
Next major study Wilson (1987), available at http://www.gsa.state.al.us/documents/pubs/onlinepubs/Bulletins/B111.pdf
Notes that debris-filled pits and small, abandoned quarries, most of which were excavated between 1890 and 1925, can still be found throughout the area.
Pictured here are some of the outcrops of Hartselle Sandstone near Littleville, AL, showing seeps/tar springs.



Estimated extent of Hartselle Sandstone in AL – note that the extent in Mississippi is not as well known. (modified from Wilson, 1987)

Outcrops along a 70 mile (112 km) belt in northeast Alabama that extends into Mississippi

No commercial exploitation of these resources for the purpose of extracting oil has occurred to date, owing to various economic and technical factors, including that these are privately owned lands so any development needs involvement of the property owners.



Character of the bitumens in Hartselle is "primarily that of a typical asphalt containing hydrocarbons that have been variably biodegradated." The depositional model (i.e., how the Hartselle originated) is that of a beach-barrier system as shown above.

Porosities: <5% to 24%
Permeability:<10 mD to 100+ mD
Oil saturations: trace to >700 barrels per acre-foot
>12,000 barrels of bitumen per acre

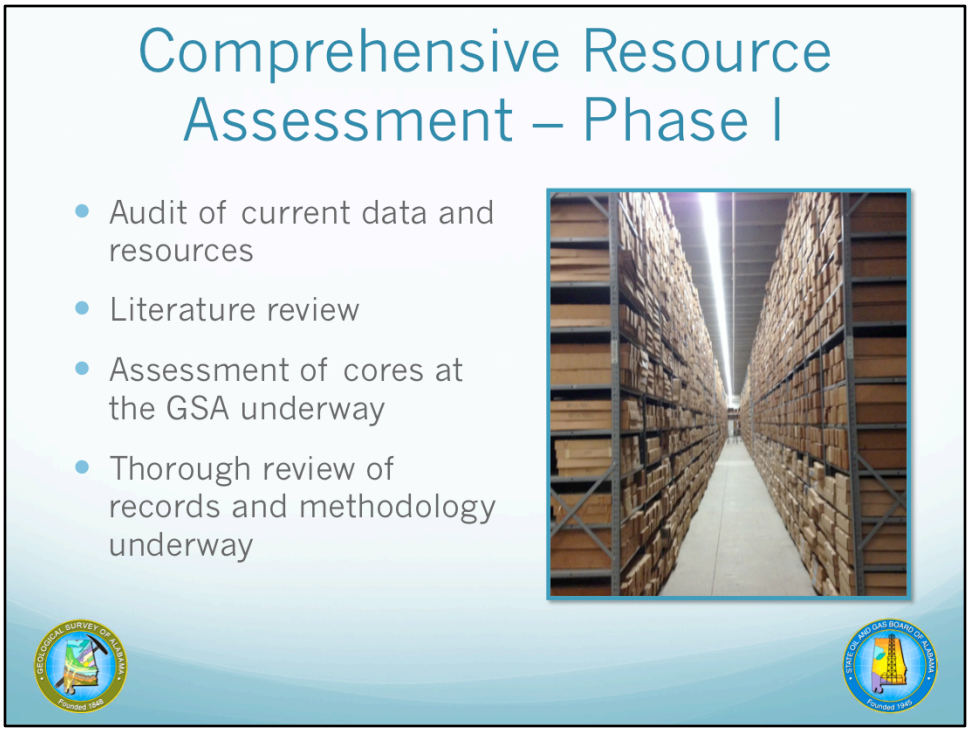
Wilson estimated that Alabama's surface and subsurface oil sands deposits contain up to ***7.5 billion*** barrels of hydrocarbon, with ***up to 350 million barrels within 50 feet*** of the surface – and the vast majority of this is contained within the Hartselle.

Recently, there has been renewed interest in expanding resource development within the U.S.

There has not been a publically available, systematic scientific assessment of Alabama's oil sands since Wilson's 1987 report

Early in 2014, Governor Bentley established the AOSP at the GSA/OGB

- To provide a road map for an initiative that facilitates commercial development of Alabama's oil sands resources
- To assist in the realization of potential economic and societal benefits that accrue from prudent, orderly, and environmentally sound development of Alabama's oil sands
- To provide a focus for oil sands activities and initiatives in the state, conducting complete geological, geochemical, geophysical, and engineering analyses
- To evaluate and develop appropriate legal and regulatory frameworks



Phase I: Audit of Current Data and Resources (Achieves Goal of MOU)

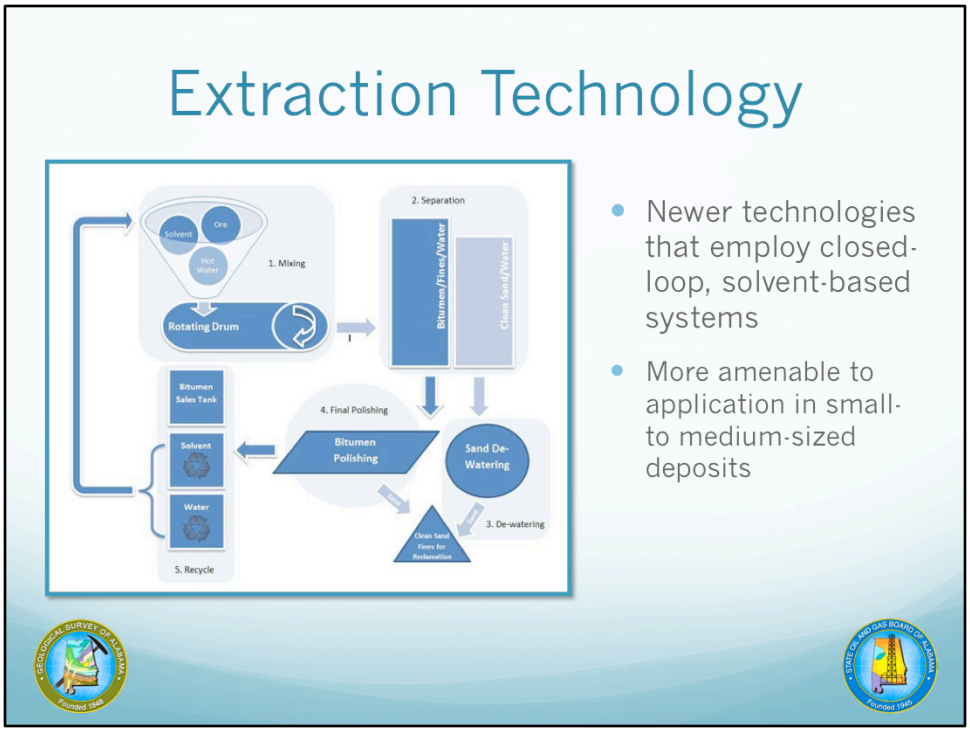
- Literature Search – 19 AL Specific, 1 MS Specific, 38 Heavy Oil
- Physical Samples -25 Possible Cores, All Permitted Hartselle Wells
- Records and Methodology and validity of method(s) used - underway

Work undertaken by GSA/OGB.

Phase II: Strategy for Filling the Gaps (Proposed Work)

Scope of Work (exploratory coring program)

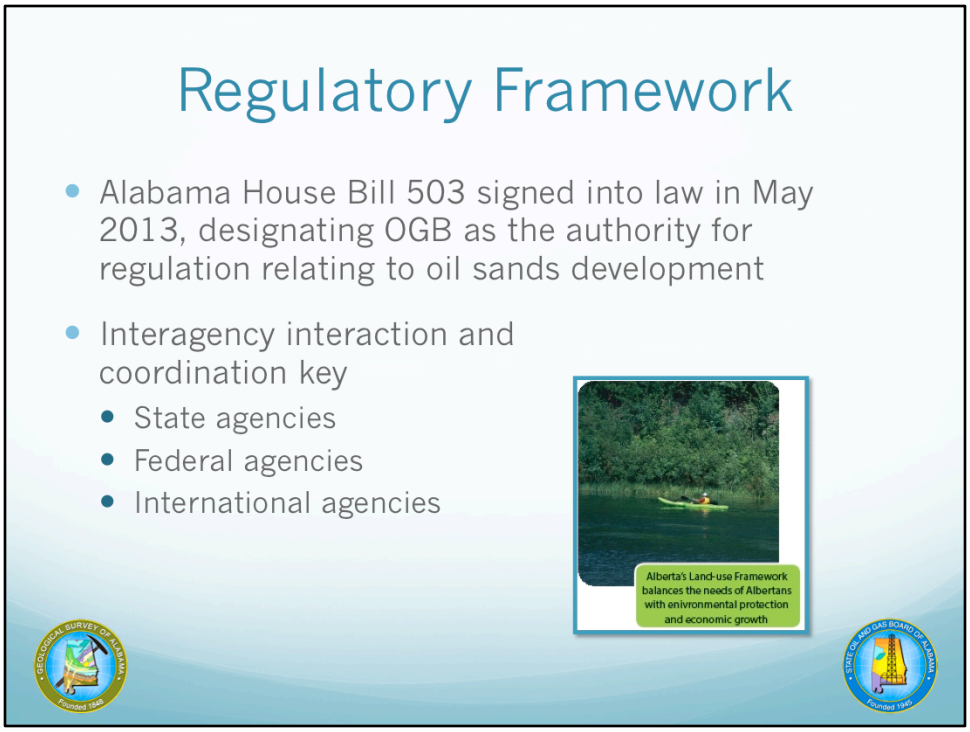
- Sample prep and testing, including thin sections.
- Determine distribution of porosity, permeability, fluid composition in the Hartselle.
- Understand rock mechanics. Grindability will be an important determinant of economics for near-surface development. Mechanical properties also will help identify viable techniques for drilling and well completion for deeper subsurface operations.
- Develop a predictive model that can guide exploration and development.



Current focus is for bitumen extraction from surface operations centering on newer technologies that employ closed-loop, solvent-based systems, which address many environmental issues and are more amenable to application in small- to medium-sized deposits. Techniques explored for *in situ* recovery of deeper deposits include traditional methods employing steam, as well as other techniques using solvents to mobilize the bitumen.

Image from http://www.usoilsandsinc.com/index.php?page=extraction_process This is the extraction technology that is proposed for the Utah oil sands.

Deeper deposits would utilize *in situ* recovery techniques, most likely using solvents.

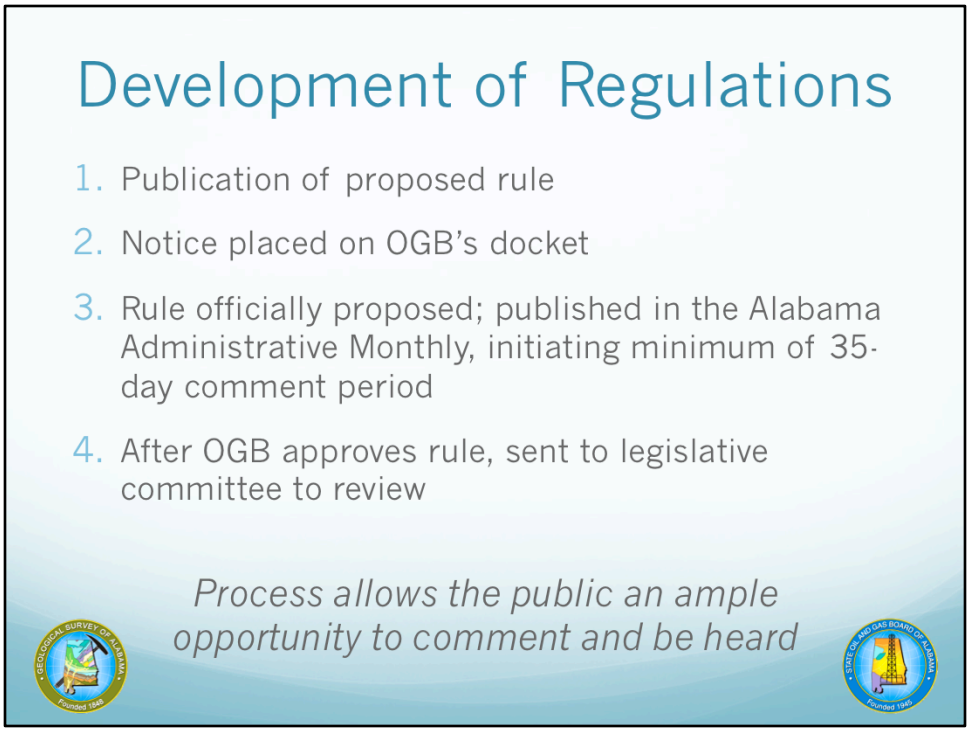


HB 503, signed into law May 2013, specifies the authority of the Oil and Gas Board relating to oil sands development; provides for fees to fracture a coal group or geologic formation; and authorizes the Board by rule to set fees for operations to recover oil from oil sands.

- Oil and gas statutes with legislative amendments as needed and necessary
- Regulations, with Administrative amendments and waivers as appropriate
- Special Field Rules for each new field established

Interagency coordination – interaction with, and assistance from, Southern States Energy Board, national associations of states (IOGCC, Groundwater Protection Council), other state agencies (both in and out of Alabama), and international organizations with experience

Picture from http://www.oilsands.alberta.ca/2831.html – Oil Sands > About the Oil Sands > Integrated Resource Management . Land Use Planning



1. Initially, the Board's staff publishes a notice of a proposed rule on the website of the State Oil and Gas Board, the website of the Secretary of State, and in statewide newspapers.
2. The notice of the proposed rule is placed on the Board's docket and remains on the Board's docket for several hearings over several months. At any hearing of the Board, an interested party may comment on the rules.
3. After the rule is officially proposed by the State Oil and Gas Board of Alabama, the Board's staff publishes the rule in the Alabama Administrative Monthly to formally commence rule-making under the Alabama Administrative Procedure Act. The Alabama Administrative Procedure Act requires that rules be published in the Alabama Administrative Monthly for at least 35 days. During this 35-day comment period, any interested party can submit oral or written comments to the Board. At a Board hearing following the 35-day comment period, the Board will hear any additional comments on the proposed rule.
4. After the Board approves the rule, a legislative committee, the Joint Committee on Administrative Regulation Review, has authority to review the rule. In most cases, the rule becomes effective without further review. However, the Committee can disapprove or amend rules. Thereafter, the full legislature can consider the rule and disapprove the rule or allow the rule to become effective.

PROCESS ALLOWS PUBLIC FREQUENT OPPORTUNITIES TO COMMENT AND BE

Examples of public engagement include:

- Community informational meetings (e.g., late June community townhall meeting in Tuscumbia, AL where public is invited to learn about what's happening, what could happen, and for the governmental agencies to listen to community perception and concerns)
- Interagency meetings (e.g., Mid-May meetings with AL state agencies to work on public FAQ, meetings in early June with the Alberta Energy Regulator)
- Stakeholder workshops (e.g., Oil and Gas seminar discussing the future of Alabama energy. Presentations relating to water use and development, conventional and unconventional development, including information relating to the Alabama Oil Sands Program)

Photo From TimesDaily.com (online version of a Florence, AL, newspaper, taken on March 5, 2014) – Members of the community listen as Jim Lacefield talks about the geology of Franklin, Lawrence, and Colbert counties at the Florence-Lauderdale Public Library during a meeting about strip mining. After Lacefield's presentation, a panel of experts on the topic answered questions from those who attended the meeting.

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