Fossil Fuel Resources of the Coastal Plain

Region 3

Coal & Peat

During the last 100 million years in which the Southeast Coastal Plain has formed, the seas advanced and retreated several times, shifting the position of the shoreline back and forth. At different times, peat swamps accumulated along the old coastlines and far up the ***Mississippi River*** valley. These peats were buried and altered into lignites. Extensive resources of lignite occur throughout The Coastal Plain region, although most are not economic to mine today *(Figure 8.7)*. In contrast to the Carboniferous peats of the Inland Basins, which reached bituminous and anthracite rank, the Coastal Plain peats only reached the lignite stage of coalification because they were not as deeply buried, exposed to the same pressures, or "cooked" as long as their older Pennsylvanian-age counterparts. Peat is widespread along today's Atlantic and Gulf Coastal Plains, forming in swampy areas where there is poor drainage, low oxygen, and high biological productivity, so that organic matter can accumulate.

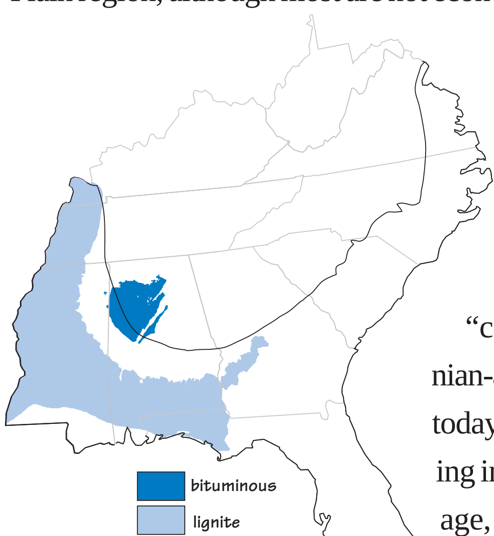

Figure 8.8: Peat deposits of the Coastal Plain Region. Some bituminous coal is present in the region (from the Black Warrior Basin), however, it is deeply buried by younger Coastal Plain sediment.

Some of the largest deposits of fuel-grade peat deposits cover about 677,000 acres in coastal North Carolina, where total reserves are about 500 million tons (moisture-free). Most of these deposits have formed in the past 10,000 years and occur at the surface with no overlying sediment. The peat ranges from 1 to 15 feet thick (0.3-4.6 meters) and averages 4.5 feet thick (1.4 meters). The largest deposits are in the Albemarle-Pamlico peninsula and the Dismal Swamp. Small-scale production has been for use in agricultural products such as soil conditioners and potting soil. Other potential uses of peat include fuel as a heat source, a feedstock for synthetic compounds, a waste treatment material, and as filter material. Major environmental concerns, however, make large-scale mining of peat unlikely.

In some parts of the **Mississippi River** *Embayment lignites are underlain by thick clays and the lignites are mined to get to the clays, which have greater economic value.*

Oil & Gas

> **Reworked** *sediment has been further eroded (after initial deposition) by wave, current, or wind action.*

Oil and gas trends of the Inland Basins region are mostly "mature" (major new discoveries are generally a thing of the past), however, the Gulf Coast of Mississippi, Alabama and far western Florida continues to have new discoveries *(Figure: 8.9)*. Here, ***reworked*** sediment from the modern and ancestral Mississippi River dip into the Gulf Basin, with Quaternary and Tertiary sediment overlying Mesozoic strata. Layers of sediment stack like shingles on a roof onto the Continental Shelf. Deep below the surface, Jurassic salt deposits may have at one time been more than a mile (1.6 km) thick. Locally thick occurrences of this salt are found in the Mississippi Interior Salt Basin, which extends from central Louisiana through central Mississippi and southwestern Alabama *(Figure 8.10)*. Salt is less dense than the rocks that surround it. With heat and pressure that result from burial at great depths, salt can "bubble up" towards the surface. This migration can bend the rocks above, forming anticlines, which may act as hydrocarbon traps *(Figure 8.11)*. This is the case in the South Carlton field in southwestern Alabama and dozens of fields in central Mississippi, with oil and gas production mostly in Cretaceous sandstones. In the case of extreme salt movement, salt flows can actually break through the rocks above. Known as "piercement domes", these occurrences are more common south and west in the coastal salt dome province of Louisiana, but they also occur in the Mississippi Interior Salt Basin of Alabama and Mississippi.

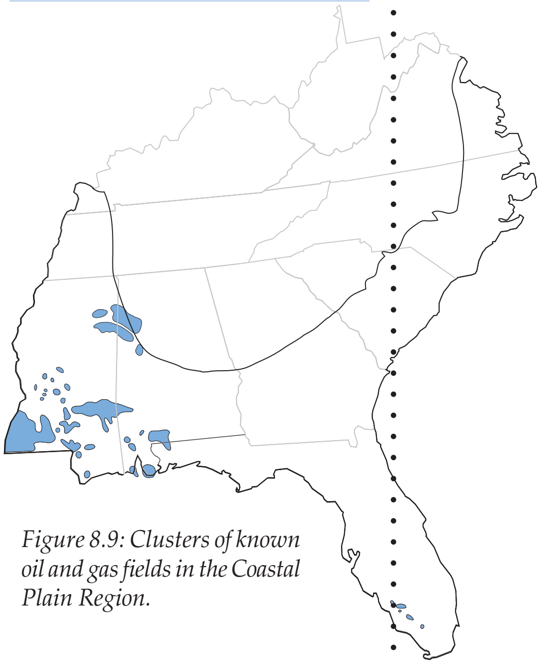

Figure 8.9: Clusters of known oil and gas fields in the Coastal Plain Region.

Figure 8.10: The Mississippi Interior Salt Basin.

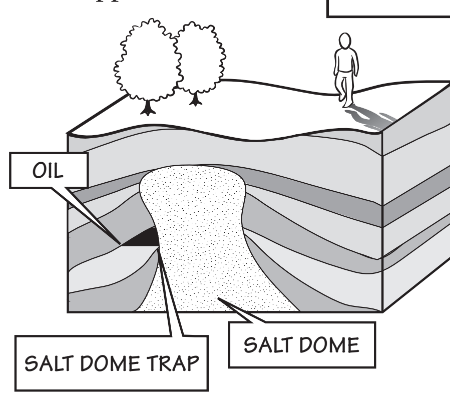

Figure 8.11: A salt dome can form a structural trap for oil.

On top of this salt is a layer of sand, which formed during a time of high aridity in the region during the ***Jurassic*** Period. Wind blown dunes recorded in this sand reach heights of up to 800 feet (~250 meters), and can be up to 8 miles (~13 km) long, bringing to mind the conditions seen today in the Sahara Desert of North Africa. This sand, known as the Norphlet Formation, has been a very productive reservoir rock in areas of central and southern Mississippi and Alabama. Immediately above this formation is the Smackover Formation, a very productive Jurassic-age carbonate reservoir rock located in the subsurface from Texas and Arkansas all the way east to Florida. The Smackover was deposited under conditions like those in the Bahamas today. Another important reservoir here is the Wilcox Formation or Group, a sandstone that was deposited in the Tertiary Gulf of Mexico when the shoreline was much further inland than today. The Wilcox is a known reservoir rock throughout much of the Gulf Coastal Plain.

see Geologic History, p. 7, for more on the **Jurassic** *Period.*

The Florida peninsula has produced oil since 1943, though in very small quantities, from the Cretaceous Sunniland Formation at depths of 11,000 to 13,000 feet (3350 to 3960 meters). Many of the carbonate rocks in the formation are very permeable and would act as high quality reservoir rocks, but there are very few source rocks, and therefore, no oil or gas with which to supply the potential reservoirs. Small amounts of oil are still being produced today in a belt of porous Cretaceous limestones from west of Miami to near Fort Myers *(Figure 8.9)*. Exploration wells continue to be drilled off of the Southeast coast. Exploration wells are now being drilled in water that is greater than one mile deep. The largest Gulf of Mexico oil field to date was found in 1999, with the discovery of an estimated 1 to 3 billion barrels of oil 155 miles (250 km) due south of the Mississippi coastline. The field, known as Thunder Horse, has Tertiary reservoir sands. As the technology of offshore drilling continues to improve, the trend of looking for oil in deeper and deeper waters of the Gulf of Mexico will continue.