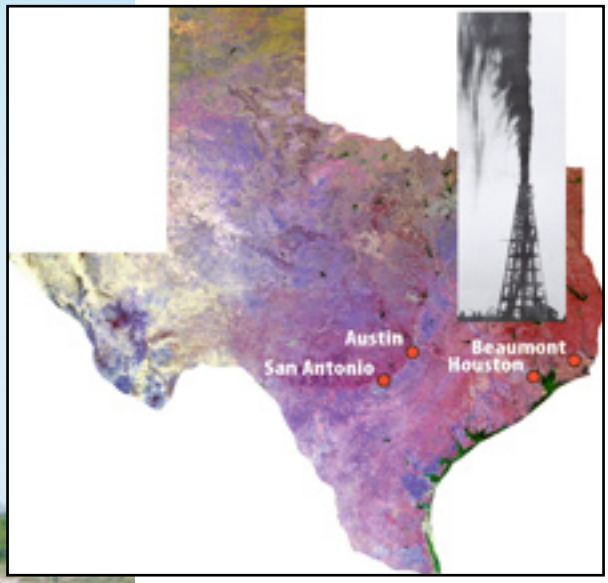
The Discovery that Change

The 1901 discovery of oil at Spindletop, Beaumont, Texas, not only changed the oil industry for ever; the blowout had such a large impact that the world would never be the same again. Geoscientists and engineers should also remember that the Lucas discovery only became reality because of innovative geological ideas and novel engineering solutions.

Photo: Halfdan Carstens

d the Oil Industry for Ever



Beaumont lies on the flat plains in the south-easternmost part of Texas where the few, small hills that existed more than hundred years ago were caused by moving salt that also generate many types of traps.

Spindletop 107 years later
Spindletop as it appears today. The well location on what used to the "Big Hill" can be found on the Texan prairie some few kilometres outside Beaumont. Visitors can mount this small platform with historical and geological information on small signs. The area was mined for sulphur in the 1950's, and what was known as a hill in the old days has become a depression filled with water because of the extraction. The actual location of the Lucas Gusher is marked with a flag that can be seen in the background.

Halfdan Carstens

It was January 10, 1901. Late in the morning, on a clear winter day, tons of clay, sand and water, and eventually a towering column of black, sticky oil, erupted roughly 50m into the air – twice the height of the derrick. The Texas oil era had begun, first with the sound of a cannon shot and then with an ear-shattering roar caused by a blowout that would prove to be hard to control.

"The news flashed across the nation and was soon on its way around the globe. The Texas oil boom was on

DANIEL YERGIN; THE PRIZE

The Perspective

There was no significant oil production along the Gulf Coast until this spectacular discovery at Spindletop. Total Texas oil production was only 2,300 bopd in 1900, while the total US production was approximately 170,000 bopd (For comparison, today's world daily production is about 85 million barrels.). Those numbers explain why the estimated 100,000 bopd "eruption" in the blowout for 9 days caused so much excitement and revolutionized the oil industry. It should be added that, even today, wells with this kind of productivity are extremely rare.

The American oil era had begun more than 40 years earlier when oil was discovered by the famous colonel Drake at Titusville, Pennsylvania, in 1859. Later in the 19th century, oil was also found in Europe and Asia, and notably in Baku, Azerbaijan, where it was characterized by several blow-outs, one of which lasted for five months at a rate of more than 40,000 bopd. But it was the sheer volume of oil produced at Spindletop that made the difference.

The Lucas discovery well produced twice as much per day as all the producing wells in Pennsylvania combined. When developing the Spindletop field in the months to come, it turned out that the first six wells produced more barrels of oil per day than the rest of the world put together.

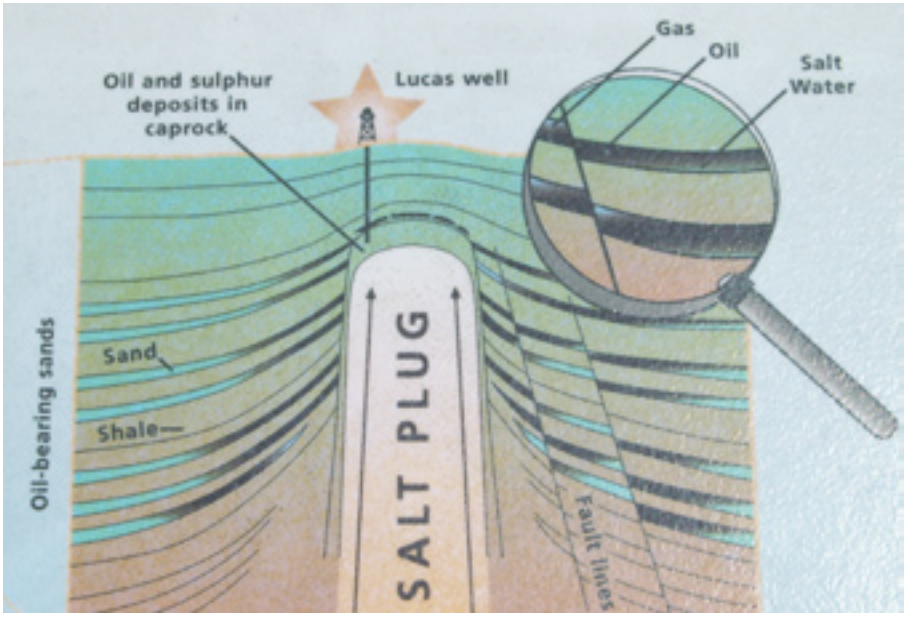


Photo: Halfdan Carstens

This geological sketch of the subsurface at Spindletop is found on one of the posters that have been put up at the original location. It illustrates that the trap is associated with characteristic steep-sided, relatively flat-topped, circular Gulf Coast salt domes. Its diameter is about 1.5km, and it is capped by limestone, anhydrite, and gypsum. The oil is found in the Middle and Lower Miocene and to some extent in the Middle Oligocene rocks. The sands are lenticular and so irregular that they cannot be correlated from well to well. The Spindletop field has been an extremely prolific producer. The old cap-rock area has produced approximately 50 million barrels of oil and a flank area produced approximately 75 million barrels of oil up to 1936.

"Spindletop was to remake the oil industry

DANIEL YERGIN; THE PRIZE

Easy access to oil made industry change from hard coal to liquid oil. Ships and trains changed from coal-fired to oil-fired steam engines, and the automobile industry made use of oil for the new combustion engine. The new, light fuel also made flying feasible; in 1903 Wilbur and Orville Wright did their first flight into the air.

From being used mostly for illumination and as a lubricant and trading at 2 dollars a barrel, oil now developed into a huge industry and soon traded for a lot less. At some point oil was down to 3 cents a barrel – less than the cost of water in some places.

Spindletop thus marks the transition to a world that is fuelled by crude oil, refined into various products that keep the world moving such as machinery, cars, trucks, trains and planes.

The incident at Spindletop had global consequences. The world would never be the same again. ▶

A real blowout
Nearly one million barrels were thrown into the air when the Lucas Gusher – as it has become known – blew out ten days into the 20th century near Beaumont in Texas. The drill bit had hit a high pressure sandstone reservoir at 308 m that could not be controlled with the available technology at that time. It took 9 days before it was capped by a new invention, the "Christmas tree", and since then Christmas trees have become the rule when drilling deep wells looking for oil or gas. This shot of the blowout instantly became world famous and was taken by Port Arthur photographer Frank J. Trost in the late afternoon of January 10.

The museum
The Spindletop – Gladys City Boomtown Museum – outside Beaumont is certainly not very impressive. In addition to some new-built and very clean replicas of old derricks, you will find replicas of old buildings that are filled up with some original hardware. Gladys City "serves as a historical clearinghouse by maintaining files of business papers, maps, pertinent news items, and photos relating to the history of the Spindletop oil field," according their own home-page.

Geological and Engineering Feats

The discovery at Spindletop was not due to either luck or serendipity, but was a result of pure geological and engineering persistence.

Patillo Higgins, originally a Beaumont rebel youngster who had lost his left arm in a shootout, was the one man who for many years had advocated the idea that the Big Hill was an anticline with accumulations of oil some 300m below the surface. The idea, suggested by geological data, such as bubbling gas from springs, and oil seeps, was ridiculed by the local community, and professional geologists that were brought in to evaluate his prospect did not give their support either. Rather, Higgins was advised by the state geologist of Texas to stay away from this crazy venture and look for water instead. But Higgins paid no attention to this and never gave up, despite the lack of either local or professional support. Higgins' persistence in believing in his own ideas serves as a lesson that has been followed by numerous, innovative geologists throughout the history of oil.

It should also be remembered that Higgins was a self-taught geologist with little or no education other than studying oilfields in Pennsylvania in detail and reading a few textbooks in geology. His success as an oil finder is largely a result of his belief in geological data.

> *"A visionary named Pattillo Higgins was the true prophet of Spindletop, based on his belief that a salt dome held commercial quantities of petroleum"*
>
> MICHEL HALBOUTY; WORLD ENERGY SOURCE

When Higgins ran out of money, Anthony Lucas, an Austrian engineer, was brought to the scene. He was a stubborn man who also, in spite of lack of support, strongly believed that there were great prospects in Texas. When he also ran out of money, he convinced two men from Pittsburgh, Pennsylvania, (Guffey and Galey, "the country's most successful firm of wildcatters") who had made their money on oil exploration, to invest in a new well. The deal, however, did not include Patillo Higgins, and when the well struck oil the real oil finder was not part of the team. In fact, citizens of Beaumont once signed a public letter declaring that Higgins deserved "the whole honour of discovering and developing" the field.

> *"A new language was born on the hill, for it was at Spindletop that a "well borer" first became a "driller", a skilled helper a "roughneck", and a semiskilled helper a "roustabout"*
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> DANIEL YERGIN; THE PRIZE

The drilling of Lucas 1 was no simple job. Rather, it was an engineering feat that solved ever increasing problems as the drill bit rotated downwards. Anthony Lucas had found the best drillers, the Hamill brothers, and the 3 of them managed the operations almost all by themselves, drilling day and night so as not to damage the hole. The ▶

Blowout

A blowout is an uncontrolled flow of reservoir fluids into the wellbore that reach the surface. A blowout can happen when the formation pressure in a reservoir interval is higher than the wellbore pressure as defined by the mud weight. A kick occurs when formation fluids begin to flow into the wellbore and up the hole. If the well is not shut in, a kick can quickly escalate into a blowout when the formation fluids reach the surface. In 1901 there was no technology to shut in a well. A blowout may consist of salt water, oil, gas or a mixture of these.


Photo: Halfdan Carstens

Spindletop today
Just 100m away from the Lucas Gusher, oil is still being produced. This "nodding donkey" stands next to the observation platform and proves that we are in an oily part of the world. New insight and new technology make it possible to find oil much deeper and to produce the oil in a more effective manner than in the old days.

"Christmas tree" has been mentioned, but the Hamill brothers were also the first to use drilling mud, instead of water, and from that time on, mud became a vital part of drilling.

A New Era

The Spindletop discovery made the world aware that oil was plentiful. The discovery also moved the focus of the American oil industry away from the north-east and the Appalachians to the south-west and the Gulf Coast, making first Tulsa, Oklahoma, the oil capital of the world, then Houston, Texas.

Two major oil companies, Gulf Oil and Texaco, both belonging to the "Seven Sisters" (Exxon, Shell, BP, Gulf, Texaco, Mobil, Chevron; the seven oil companies that dominated mid 20th century oil production, refining, and distribution), were also born out of the findings on and around Spindletop.

Spindletop certainly changed the oil industry for ever.


Photo: Halfdan Carstens

How to get there

Go to Houston and rent a car. Before you go, Google "Gladys City, Beaumont, Tx" and get a map and directions from your starting point. Be prepared for a boring drive lasting about one and a half hours through south-east Texas. Don't miss the refineries that are numerous in this part of the world and which also are a result of the oil boom more than 100 years ago.

Spindletop today
Driving around Spindletop outside Beaumont you will find drilling rigs, work-over rigs and production facilities everywhere. If the original high pore pressure has been reduced and the wells are not flowing by themselves, a nodding donkey will be installed. Wells in this area are still producing several hundred barrels a day, some of them from a depth of more than 1000m.