A changing landscape: Environmental conditions and consequences of the 1920s...
J Scott Parker
Arkansas Historical Quarterly; Spring 2001; 60, 1; Research Library
pg. 30
A Changing Landscape: Environmental Conditions and Consequences of the 1920s Union County Oil Booms

J. SCOTT PARKER

In a 1976 article in Science, John S. Gilmore described the response of communities to mineral booms occurring in their midst. He identified succeeding stages of enthusiasm, uncertainty, near-panic, and problem solving.¹ Union County, Arkansas, experienced all four of these phases after the discovery of oil there in January 1921. The sequence Gilmore described emphasized the impact of mineral booms on human lives more than on the non-human environment, however. The oil boom in southern Arkansas also created environmental problems that continued long after the original boom faded. These problems, and the lack of attention given them, exemplify attitudes that people living in the area developed toward the resources surrounding them—attitudes that, ironically, would ultimately limit the area’s ability to produce petroleum.

Two communities in Union County were particularly affected by the discovery of oil—El Dorado, the county seat, and Smackover. On January 10, 1921, a well drilled by journeyman oilman Samuel T. Busey, which was visible from downtown El Dorado, blew in with a force that changed Union County forever. El Dorado was transformed almost overnight from a struggling farm and timber community of four thousand into “a seething mass of conglomerate humanity” in which “diamonds and costly furs rubbed elbows with oil soaked khaki.”² The city soon became the destina-

²Main Street El Dorado (El Dorado, AR: Main Street El Dorado Project, 1994).

J. Scott Parker received a master’s degree in history from the University of Arkansas, Fayetteville. The author would like to thank Elliott West, Don Lambert, and Jeannie Clements for their assistance.

THE ARKANSAS HISTORICAL QUARTERLY
VOL. LX, NO. 1, SPRING 2001

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
tion of trains departing from as far away as New York, and they, along with Model T’s, open touring cars, mule teams, and air-planes, brought up to fifty thousand souls to the newly discovered oil patch. Oil promoters, lease hounds, swindlers, beggars, prostitutes, experienced oil workers, and young men and women looking for a life off the farm populated this kaleidoscopic community. The rush of population overwhelmed El Dorado, and, in the beginning, its housing, dining, education, transportation, and public safety facilities were grossly inadequate. Fires ravaged the city on several occasions, and crime ran rampant. El Dorado’s civic and political leaders were at a loss as to how to handle the situation at first, but eventually dealt with most of the problems that confronted them. They were aided in their efforts by the massive influx of capital drawn by the oil. In the span of just four years, El Dorado went from a town where chaos reigned and only four roads were paved to a cosmopolitan city filled with sprawling homes, a thriving business community, modern conveniences (including indoor plumbing and electricity in most homes and businesses), and an active social calendar, which included everything from the Galli-Curci opera to an amusement park.3

The initial problems El Dorado experienced recurred just over a year later in the tiny hamlet of Smackover, approximately fifteen miles to the north. On May 14, 1922, just south of town, the Murphy No. 1 well blew in with a roar of epic proportions. The well’s drill bit struck the apex of the Norphlet Dome, a geologic structure that housed mammoth amounts of natural gas. Almost instantly, gas was released toward the surface of the earth, at an astonishing rate of 65 million cubic feet per day, destroying an eighty-four-foot derrick, trees, and anything else in its path. Red-hot sand blew up to 7,000 feet into the air and eventually covered the ground as far as ten miles away. A vast crater measuring about 450 feet across and 70 feet deep formed. It burned for months afterwards, spurting gas at different intervals and sending flames over thirty feet into the air.4

The scale and sensation of the crater was matched only by the discovery it signified. It was a harbinger of the development of one of the world’s largest oil and gas fields, and put Smackover on the map. The explosion of the Murphy No. 1 served as the catalyst for exploration elsewhere in the field, and on July 29, 1922, a well drilled by a team of investors headed up by local lumberman Sid Umsted and the VKF Drilling Company of Shreveport, Louisiana, discovered crude in what would soon be known as the Smackover field. A flurry of drilling activity quickly followed, and oil

4Ibid., 217-220.
was found at an unheard of 92 percent success rate. Suddenly, the town of Smackover was alive with news from the oil field, and soon the scene at El Dorado was repeated in a place even less prepared to handle it.

Like El Dorado, Smackover felt the full effects of an oil boom. In the mad rush to capitalize on the new field, its population swelled to more than twenty-five thousand. Clapboard and cardboard structures referred to as “slap-ups,” cot sheds, and cot houses greeted the luckiest new arrivals. Others rented chairs and even treetops to sleep in. The crime rate soared, as gambling, prostitution, and bootleg alcohol dealers set up establishments on the north side of town in a district commonly referred to as “Death Valley.” In the first year after discovery, the town had five mayors. Children went to school in shifts at the windowless Baptist Tabernacle. It was not until a one-legged college student named Clyde Bird became mayor that the situation improved. Eventually Bird and local law enforcement agents, with the help of newly taxable oil industry income, eliminated the least desirable elements from the city limits and improved the town’s transportation and education facilities to a point where they were the envy of communities throughout the state. Within five years of discovery, Smackover, much like El Dorado, had evolved from a wild booms-mountain into an affluent community.

Oil provided financially in a way that none of the county’s other non-human resources, which included pine and hardwood forestlands and adequate farmland, could even approach. As a result, the people of Union County developed a relationship with the non-human environment that valued oil over any other resource. This outlook often took a heavy toll on other natural resources that came into contact with oil and, ultimately, even crippled petroleum production.

In Oil Booms: Social Change in Five Texas Towns, Roger and Diana Olien identify oil booms as a distinctive type of mineral boom. The common law of capture gave ownership of oil to those who drilled it, regardless of where beneath the earth’s surface the oil had come. Operators raced to drill as many wells and to produce as much oil as possible before their competitors began draining oil from their leases. The key to success was to get into the field and take as much oil as possible.

The Union County fields offer a dramatic demonstration of this mentality. The speed and amount of drilling in the early days of the El Dorado

---

7Roger Olien and Diana Olien, Oil Booms: Social Change in Five Texas Towns (Lincoln: University of Nebraska Press, 1982), 4-5.
field is remarkable when one considers the state of the American oil business in 1921. Surpluses left over from World War I had reduced drilling nationwide by 55 percent. Oil prices fell to all-time lows. Nevertheless, 459 wells, producing 10.4 million barrels of oil, were drilled in the original El Dorado field during its first ten months of operation. Peak production for a one-week period in August, 1921, was 74,700 barrels. Oil prices had improved by the summer of the next year when the Smackover field was discovered. Increased amounts of investment capital and the success of the El Dorado field fueled the frenzy of exploration in Smackover. The result, according to one author, was "spectacular." In its first ten weeks production jumped from 5,000 to 130,000 barrels of oil per day from only 44 wells (2,954 barrels per well per day). In its first year of commercial production, Smackover produced 25 million barrels of oil from its reservoirs. Wells with an output of 500 to 1,500 barrels per day barely merited mention by owners, who felt that only wells producing 10,000 barrels a day were worthy of note. As success rates soared and money flowed in, producers searched a larger land area and deeper into the earth for more oil producing zones. They struck it rich again when three additional zones were found in 1923 and 1925. The oil-producing area covered more than 25,560 acres, and by 1925, Smackover was producing more oil than any other field in the world. During that year, more than 73 million barrels were pumped out of the ground by 3,483 wells. Smackover was truly a "giant" field.

Getting oil out of the ground ought to be both a delicate and complicated process. Unfortunately, promoters and drillers caught up in the rush to produce as much as possible from as many wells as possible often ignored the intricacies of production. The repercussions were many. Nearly all of the non-human resources that were related to oil, such as natural gas, or that came into contact with it, including trees, water, and wildlife, were subject to gross exploitation, waste, or contamination. To properly understand the impact both on the landscape and upon oil production, it is important to understand first the nature of oil, how it is formed beneath the earth's surface, and the products that accompany its formation.

---

Four specific conditions must be present to form an oil pool like those found in El Dorado and Smackover: a source rock containing organic matter that can be transformed into oil by high temperatures and pressure beneath the surface; a reservoir rock (most commonly sandstone or limestone) that is porous and permeable enough to store or move the oil; a set of geologic conditions that create an oil “trap,” which prevents oil from escaping into other formations; and burial deep enough to “cook” the oil out of the organic matter from which it originates.

In southern Arkansas, as elsewhere, natural gas is often found in association with oil because oil and gas form and accumulate under the same conditions. Together they make up what is commonly referred to as petroleum. In Arkansas, oil and gas formed when the Gulf of Mexico and other seas encroached upon the area at different times over thousands of years and left behind sediment containing organic matter. Some of the salt water from the seas was also trapped underground with what became petroleum. Because oil and gas are less dense than water, they float to the top in a formation where all three substances are present. For example, the entire thickness of the Nacatoch formation, which produced more oil than any other formation in Arkansas, measured 150 to 200 feet. Only the top fifty feet produced oil or gas, however. The rest of the formation held large quantities of salt water. All three substances can migrate in and out of formations as pressure and temperature dictate. Gas is by far the most mobile and sometimes acts as a propelling agent for the other two.9

The intricacies involved in petroleum formation and accumulation, as well as petroleum’s migratory nature, make it difficult to predict accurately where to drill an oil well. This was especially true in the early 1920s when geological techniques had yet to develop to a point where seismographs and other instruments could be used to locate oil. Most independent producers in the El Dorado and Smackover fields instead relied on observations from other fields, “reports” that usually were little more than rumors, or on simple ingenuity.

This lack of experience in locating oil sites was matched by a similar lack of experience in the drilling of wells. The technology of the time was not always sufficient to effectively control oil flow. Most of the drillers were newcomers to the oil business and initially ill equipped to handle its unique situations. The most basic questions, including how to drill a well or produce and store oil, required quite some time to understand. Unfortunately, a mad rush led to flush production before effective answers to these problems had been found, and the environment suffered as a result.

---

Once it was known that oil was present, almost every effort was made to pull it out of the ground as quickly as possible. Technology had advanced to a point where the tools used to get to oil were quite effective. Both early Union County fields were drilled primarily with rotary drill bits, particularly the two-cone rotary bit invented by Howard Hughes, Sr.\textsuperscript{10} The bit was especially effective in south Arkansas for two reasons. It could drill into the soft, sandy formations where oil was found without “caving in,” a problem that plagued the more traditional cable-tool bit, and it reached the oil sands quickly, which was cost effective.

The short-term advantages of faster drilling with the rotary bit were offset by a host of long-term disadvantages associated with the region’s geology. Union County is primarily underlain by sedimentary deposition for the first six to ten thousand feet. Formations are predominantly tightly compacted sands, limestones, and shales with intermittent clays spread throughout. At six hundred to one thousand feet, depending on the location, the Sparta Sand aquifer, which holds large amounts of fresh water, is encountered. Other regions include unconsolidated sands and shales commonly referred to as “gumbo,” which often made it hard to tell where one formation ended and another began. Understanding formations and soils is essential to producing petroleum as efficiently as possible, and this in turn requires a series of complicated, time-consuming steps. Ironically, the success of the rotary bit discouraged drillers from completing this important work.\textsuperscript{11}

The Arkansas Conservation Commission recommended in the 1920s that once a producing zone was located a geologist should take samples when each new formation was reached to identify the sand or clay where the casing (pipe) would be set.\textsuperscript{12} Knowing when he was getting close to the oil sand allowed a driller to set casing at the right depth for maximum recovery and diminished the possibility of waste once oil began to flow toward the hole. Unfortunately, in the case of nearly all of the early wells, this practice was either unknown or ignored. Few geologists were trained in petroleum production in the early days of drilling in Union County. Many operators made the mistake of simply speculating about subsurface conditions or relied on insufficient or inaccurate data from maps when drilling their wells. Taking samples at the beginning of each formation was also time-consuming. Early producers felt they could not afford to take this


\textsuperscript{11}W. C. Spooner, \textit{Oil and Gas Geology of the Gulf Coastal Plain in Arkansas} (Little Rock: Parke-Harper, 1935), 19, 119-139.

\textsuperscript{12}Ferguson, \textit{El Dorado Oil and Gas Field}, 16.
step because operators nearby would get ahead of their production. They instead let the fast-working bit reach the oil without properly logging or testing the different formations.\textsuperscript{13} This created a series of problems. One of the most critical was the severe decrease in natural gas pressure in oil producing formations.

In most producing zones, gas, because of its lesser density, rose to the top of the formation and formed a roof or cap over it. If this gas cap were pierced, the pressure built up over thousands of years was released toward the point of least pressure (usually the well hole). Thus, when the drill bit perforated the formation, an uncontrolled release of pressure could follow. When proper precautions were not taken to handle this gas release, extensive “blowouts” resulted at the surface. Massive volumes of gas were released into the atmosphere, destroying anything in its immediate path and causing large sinkholes around the well. Huge blowouts and craters formed by the 40 to 75 million cubic feet of gas released per day from the Constantin and Murphy wells were examples of such waste.

The release of gas proved terribly detrimental to the recovery of oil. Gas lowered oil’s viscosity and made crude more fluid; it also reduced its surface tension, which made oil less slick or sticky. Each of these effects prevented unnecessary retention of oil in the reservoir rock and made it easier to pump out of the ground. Maintaining a maximum amount of gas, therefore, was essential to maximum oil recovery.\textsuperscript{14}

Unfortunately, retaining gas pressure would prove to be one of the most difficult problems faced in the oil field. The gains in the technology surrounding the rotary bit were offset by the lack of technology in dictating the waste of gas. “Chokes,” which held back the gas and oil and prevented rapid discharge, were the earliest available tools and decreased the flow of gas from smaller wells. It was not, however, until improvements in the materials used for casing and drilling mud in the middle and late 1920s that gas flow was effectively controlled, putting an end to most blowouts.\textsuperscript{15}

\textsuperscript{13}Ibid.


\textsuperscript{15}Ferguson, \textit{El Dorado Oil and Gas Field}, 54; \textit{Oil and Gas Journal} “Petroleum Panorama” edition, 1959, C-18-19. The use of mud in the oil field has been a very important technological advance. It helped reduce the size of the actual drilling hole and saved countless dollars by reducing the amount of casing string needed to drill deep wells. Mud helps keep out unwanted cuttings, or unconsolidated surface sands or water, by plastering the walls of the hole.
Unfortunately, advances in technology did not coincide with a shift in well owners' attitude toward gas. Most early producers either were unaware of, or ignored, the importance of gas. Many believed it was a nuisance with few practical uses and little market value. It was common practice, especially in wells that produced a lot of gas in proportion to oil, to let the gas escape freely with the hopes of securing greater oil production as the gas pressure declined—precisely the opposite of what followed. "Blowing in a well," whereby a producer would blow out most of the gas pressure in order to "clean out the hole" of mud and other debris, was thought necessary for some time. A large number of small independent oil producers felt that oil would not separate from water unless gas was allowed to blow out. They also believed that the oil sands would be flooded with water if gas was allowed to stay in the field. "I saw in that Smackover Field," recalled E. E. Dendy, "seven oil wells blowing over the derrick out of control . . . going a hundred feet or more above the top of the derricks." Flares burned copious amounts of gas once it reached the surface. In 1926, a lawsuit was brought by the state conservation commission and a group of larger oil companies against smaller oil companies and independent producers who continued to let gas blow wild in an attempt to recover oil. The state argued that each day up to 100 million cubic feet of gas was wasted "blowing in" wells. The plaintiffs asserted that this practice was in direct violation of conservation laws passed in 1917 and 1923, regulating the wanton waste of gas. Most defendants regarded the lawsuit as merely an attempt by the state and large oil companies to drive them out of business by forcing them to purchase expensive equipment. Ultimately, the state won the lawsuit but had a difficult time enforcing the ruling. There would be no money appropriated or taxes levied to carry out conservation work in the state for the next thirteen years. Only in 1939, when the Arkansas Oil and Gas Commission was formed with the passage of Act 105 in the state legislature, could the laws intended to prevent the waste of gas actually be enforced. By that time, however, the damage to the gas reservoirs in Union County's early fields was irreparable. 

The waste of gas had grave and immediate consequences for the recovery of oil. The entire El Dorado field reported a decrease of thirty-three thousand barrels of oil in October 1921, two months after the peak production of August. The principal reason given for the loss was gas depletion. The area's discovery well, the Busey No. 1, offers a good example of the

---

fate of many wells. Adequate precautions were not taken in setting the casing, and little attention was paid to the formations the bit passed through. It was drilled too deep into the Nacatoch sand and hit an immense gas and oil pocket that gushed to the surface, and blew wild for nearly fifteen days. Gas pressure then decreased to a point where salt water was pulled into the oil solution, creating a brownish liquid. All efforts to control the well were unsuccessful thereafter, and its productive life was over in forty-five days. Astonishingly, this well that sparked the boom never produced any oil that was used commercially. Similar problems occurred in the Smackover field. Ed Thompson, an inspector for the Arkansas Department of Environmental Quality, estimated that if not for the depletion of gas in six wells, the Smackover field would have produced oil in the 1990s in amounts comparable to that of the 1920s and 1940s.

Another factor that retarded the ultimate recovery of oil was wells spaced too close together. The correct spacing of oil wells is important in controlling the operating efficiency of the entire pool. A drop in both oil and gas recovery occurs when a group of wells pull oil from the same reservoir. Other problems created by close well spacing include increasing the gravity of oil (less gravity meant more fluid oil, which was more profitable and thus preferred) and the reduction of recoverable oil in a reservoir. All this, of course, also reduced profits. In an area of extensive drilling, only the largest wells proved profitable once another group of wells surrounded them. Eventually, even the large producers had to be “put on the pump” in order to produce enough pressure to move oil to the surface. The prohibitive cost of an artificial pump caused many producers to abandon their wells once the oil boom quieted.

Producers continued to drill as many wells as possible in areas known to produce oil throughout the 1920s. Several circumstances encouraged this practice. The division of leaseholdings into small blocks of land hindered adequate spacing. When the wells of neighboring leases were closely spaced, operators were hesitant to shut down any of their own wells for fear of reducing their flow while their neighbor’s went unrestricted. Also, whenever the issue of restricting oil flow arose, a battle between larger companies and independent producers followed. Larger companies, such as Phillips and Standard, favored restricting the flow of oil as early as the mid-1920s, largely because they had the money to hire geologists who

17Ferguson, *El Dorado Oil and Gas Field*, 7, 70; Buckalew and Buckalew, “The Discovery of Oil,” 218.
18Ed Thompson, interview with author, Smackover, Arkansas, February 3, 1999. Thompson is a well inspector at the Arkansas Department of Environmental Quality (formerly the Arkansas Department of Pollution Control and Ecology) and has worked extensively in the Union County oil fields.
made it clear that curtailing flow was essential to increasing the amount that could ultimately be recovered from a field. By contrast, independent producers were worried they could not compete with the quality or amount of oil produced by larger companies if any restrictions were imposed. The lack of a powerful conservation commission hindered any efforts to solve the problem. One result was the continued unrestricted spacing of wells in Arkansas. "There was supposed to be one well spaced to every ten acres, but it wasn't enforced," said oil field worker D. D. Lewis, "You could drill them just as close as you wanted." Finally in 1939, Section 6 of Act 105 set boundaries pertaining to well spacing and placed production from all common sources of supply discovered after January 1, 1937, under the control of the newly formed Oil and Gas Commission. Since this legislation applied only to wells drilled after that date, irresponsible well spacing continued uncorrected in El Dorado and Smackover.19

Waste and the reluctance to deal with the loss of gas pressure and inadequate well spacing hastened the appearance of another problem that had a serious impact on most resources associated with the oil industry both above and below ground: the problem of water.

Salt water adjacent to oil or gas deposits, called "edge water," was normally located in the lower portion of the oil-bearing strata. In south Arkansas, edge water was usually ancient seawater trapped with oil and natural gas under the earth's surface millions of years before. The physical properties of oil and water are quite different. Water is heavier, more fluid at ordinary temperatures, and has a greater surface tension than oil. These factors help water in competing with oil for passage through reservoir rocks toward a well. Unless edge water pressure was controlled by uniform spacing of wells and uniform withdrawals of oil and gas, water coning, in which water pushed past oil and gas into a well and trapped them underneath, could occur. Water coning greatly increased the chances that oil and

19Howard, et. al., Mineral, Fossil-Fuel, and Water Resources of Arkansas, 107; Bell, Haury, and Kelly, Report on the Eastern Part of the Smackover, Arkansas Oil and Gas Field, 38-39; W. O. Butterfield and D. D. Lewis, interview, March 16, 1981, 16, oral history collection, Arkansas Museum of Natural Resources; Acts of Arkansas, 1939 (Little Rock: The Assembly, 1940), 221. The first field in Arkansas to have its production controlled by the state was the Shuler field in Union County, about fifteen miles southwest of El Dorado. Accomplishing this was no small feat, even though the number of producers in the field was small when compared to those of the El Dorado and Smackover fields. For more information on the Shuler field see John Ragsdale, The Shuler Field, Arkansas: An Historical Summary of Fifty Years of Oil Production 1937-87 (Little Rock: Arkansas Geological Commission, 1987).
gas could not be recovered. Drilling procedures in Union County employed during early oil production heightened the advantages that water held over oil.

Drilling too deep, removing gas too rapidly, or spacing wells too closely allows water to rush into a well and crowd oil back. Throughout the 1920s, these problems could have been dealt with by anyone possessing adequate knowledge of the geology of the producing area. Once geological structures were identified, a comparison of fluid levels would allow drillers to avoid areas with too much water. The best way to identify geological structures was, again, to take samples when a new formation was reached and record it in a well log. This gave those in charge of drilling the well (e. g., the driller, producer, or geologist) a picture of subsurface formations, and thus the means to determine where the oil was and where casing should be set so water could be avoided. But, the boom mentality undermined this process in Union County. Flush production of the 1920s made getting as much oil out of the ground in the least amount of time the top priority for producers. Few people had the time, or were willing to make time even if they could afford it, to study geology. Well logs, inconsistent at best, were often illogical or nonexistent.

As technology improved, however, producers could at least restrict the flow of some of the bottom water. The state conservation commission recommended using cement plugs to seal off bottom water because cement would not bond with wet oil sand. This practice had been carried out effectively in a number of other oil fields throughout the United States yielding increases in oil production and decreases in water production. Most operators in El Dorado and Smackover hesitated to use the plugs, however, because they feared the cement would seal off the oil sand. Improper well spacing also created problems associated with the mobility of water and destroyed a number of wells. If only one in a group of tightly spaced wells showed water, it might infect the others near it. If the amount of pressure needed to push oil to the surface decreased on one well, it subsequently meant a drop in pressure on all nearby wells. This pressure reduction allowed water, which was more fluid, to freely migrate to the well hole and crowd out oil.

During the early days of oil exploration, salt water production in the El Dorado and Smackover fields was insignificant when compared to the

---


amount of oil being pulled out of the ground. As gas pressure continued to
decline and more wells were drilled, water encroached on oil producing
zones at an ever-increasing rate. By the end of October 1921, one-third of
the gross production in the El Dorado field was water. The state conserva-
tion commission called water the “most important question to solve” in the
El Dorado field and attributed rapid decline in the production of quality oil
to it. The same conclusion was reached two years later in regards to the
Smackover field. Unfortunately, problems with water were not confined to
below the earth’s surface. Salt water also proved extremely dangerous
when it reached the top of the hole.23

The mistakes producers had made in drilling were not fully understood
until the late 1920s. During the Great Depression of the 1930s, many of the
wells that had been productive began to dry up or were infected with water.
It was said that proration, or restriction of oil production, was not needed
in the El Dorado or Smackover fields because “nature was prorating the
wells” already. Act 105 and the formation of the Arkansas Oil and Gas
Commission in 1939 helped prevent the sort of waste that had occurred
during the early days of exploration in fields discovered later. But irrepa-
rable damage had already been done. By 1939, early production practices
had so fouled Smackover’s enormous underground reservoirs that the oil
produced up to that point represented an estimated 60 percent of what
could potentially be taken from the field. At the end of the twentieth cen-
tury, an estimated 70 percent of the total oil in the Smackover field re-
maindered underground and could not be recovered because of the loss of gas
pressure. Most oil obtained was heavily laden with water and had to be
separated in an expensive process.24

If the manner of drilling oil ultimately prevented an efficient exploita-
tion of that resource, it also had profound consequences for the larger en-
vironment in which drilling took place. Adequate facilities to store or
refine the millions of barrels of crude did not exist in either Smackover or
El Dorado for some time after discovery, and the facilities that did develop
were too small to handle the massive amounts of oil being produced. As a
result, a major storage problem developed. Oil producers addressed this di-
lemma in a number of ways, not all of which were conducive to the health
of the area’s landscape.

23 Ibid., 45; Ferguson, El Dorado Oil and Gas Field, 68-69.
24 House, Oil Boom, 160; Buckalew and Buckalew, “The Discovery of Oil,” 238;
John G. Ragsdale, interview with author, El Dorado, Arkansas, January 21, 1999; Jerry
Ramsey, interview with author, Smackover, Arkansas, February 10, 1999. Ramsey is an
independent oil producer in the Smackover field.
When the Busey well blew in, no space was designated for the storage of oil in El Dorado. Oil splattered the surrounding trees and drenched most of the plants in the cotton field surrounding the well. Eventually, oil and salt water, which appeared soon afterwards, drained into nearby streams or soaked up in the soil. This was an ominous beginning to what would become a lingering problem in the Union County oil fields throughout the 1920s—how to store oil. A number of factors contributed to the dilemma. First, there were transportation issues. Although two railways served El Dorado at the time of discovery, it was impossible for them to transport all the oil being produced in the field. Pipelines connecting El Dorado to large refineries in Shreveport, Louisiana, and Texas opened within a few months of discovery and helped the situation considerably, but even they could not keep up. The same could be said for the city’s refineries, which took time to build and were usually too small to handle the largest loads. In November 1921, fully eleven months after the Busey discovery, the state conservation commission estimated El Dorado’s five refineries could handle only 26,800 barrels of crude per day—at a time when average daily production was estimated at 30,864 barrels a day. Oil production, furthermore, was inconsistent. One day 5,000 barrels might be produced and refineries could keep pace, while the next day 40,000 barrels might spew to the surface, far outrunning refinery capacity. In the earliest days of the El Dorado boom much of the excess oil simply accumulated as runoff in streambeds, soaked into the soil, or evaporated. With good weather and the help of new workers, more than 4 million barrels of storage, 3.7 million in the form of steel tanks, was erected in El Dorado during the summer of 1921. While these tanks helped by getting the oil off the ground, they often did not have effective tops and their contents were thus subject to evaporation.

The scene in Smackover was much worse for a number of reasons. The expeditious drilling and unbelievable success that accompanied it proved to be a nightmare when it came to storing oil. One major railway served the town when oil was discovered, but it could not keep pace with production in the oil field. In a three-month period in 1924, 25,083 tank cars of oil made their way out of the Smackover depot to various refineries throughout the United States. This was proclaimed by historian Boyce House to be the greatest single tank car movement in the history of the United States up to that point. A year later, 28,380 tank cars left the depot.

25Ferguson, *El Dorado Oil and Gas Field*, 9-11. The average was calculated by counting up the number of days that the field had been open by the end of November (324) and dividing it into the number of barrels Ferguson estimated that the field produced (10 million). Obviously, this is not an exact measurement, but it suggests something of the amount of oil that was left unrefined and needed to be stored.

26Ferguson, *El Dorado Oil and Gas Field*, 11, 49.
in a single month. Despite this, 13 million barrels of oil remained in storage in the field. Mud-choked roads leading to and from town made any other form of speedy transportation impossible during the winter, and although the Ouachita River, located just to the east, ran barge traffic, it, too, was unable to handle the vast quantities of oil sent its way. With great human effort pipelines eventually connected the Smackover field to local refineries as well as those in El Dorado and other cities. Yet the amount of oil being produced in the field still outpaced transport capacity. Somehow the remainder had to be stored until it could be transported to a refinery. Constructing enough tanks to hold all of Smackover's oil would be a costly venture, both in money and time. Instead, most producers elected to dig huge earthen pits that could hold large amounts of crude in one place relatively cheaply. By January of 1926, 17,807,496 of the 24,891,097 gallons of storage in the Smackover field were in the form of these earthen pits. Constructing the pits was often a major engineering feat. Storing oil in pits often brought disastrous consequences, both to the oil itself and to the surrounding environment.

Before digging an oil pit, a surveyor would come to a designated area near a group of oil wells to determine where it should be located. He usually sized the pit according to the proximity and production of the oil wells and their access to a pipeline. So much oil was being produced in the Smackover field that some pits were built to hold up to 300,000 barrels, covered 200,000 square yards of land surface, and were 25 feet deep, yet still could not hold the oil assigned to them. If the gravity of the crude were low enough, engineers would gauge the amount of oil they had in a pit by floating into the middle of the "black sea" in a flat-bottomed boat.

Digging a hole of these dimensions required a host of men and mules. Most pits were dug with plows, with dirt hauled out of the pit with rudimentary tools called fresnos and slips. Three mules or big horses plowed into the soil and loosened it up, then a fresno scraped the plowed soil onto a slip that the mule team carried out of the hole. Once all of the broken-up soil had been cleaned out of the hole, the process started over. Pit digging was a job reserved primarily for African American oil field workers, who were paid twenty-five to thirty cents per hour (twenty cents less than the average white worker on a well, but a far better wage than those on local farms). Most pits were sealed with crude oil that hardened at the bottom

27House, Oil Booms, 155-157.
28For more information on the condition of the oil field roads in south Arkansas during the 1920s, see Buckalew and Buckalew, "The Discovery of Oil," 228; Don Lambert, "It was Miles of Mules 'n Mud" in Smackover: Arkansas Boom Town (Monroe, LA: Century Printing Company, 1988).
29Oil and Gas Journal 24 (March 11, 1926): 156.
over time. A sandy surface was preferred when it came time to seal a pit because it closed off better than clay, which had a tendency to hold the oil. Production from wells was then turned into the pits. Some wells were so big that they could fill a pit by themselves, while other pits stored oil from a number of wells. “I’ve seen four, five, six, and sometimes seven wells going in the same pit, just flowing wide open,” said W. O. Butterfield. From the pits the oil was pumped into a treater tank (also known as a gun barrel) and then into a pipeline.\(^{30}\) Unfortunately, before this final step could be taken, much of the oil that had originally flowed into the pit might be somewhere else. Some evaporation occurred, but other phenomena caused a greater toll on oil and happened to be much more dangerous to the natural environment.

If a surveyor was incorrect in his estimates, too much oil could drain into the pit and it might overflow its banks. Even if the pit had been built to proper specifications, it could still overflow. The Smackover field is in a low-lying heavily forested area with a number of slow-moving streams or sloughs located throughout. During a rainy season, water collected in the pits with the oil. On other occasions, a number of creeks would flood, completely swallow the pits, and float out their contents.

Because of the Smackover field’s location, when oil poured over the top of the pit walls, it would most likely wash into a standing or slow-moving water source where it could collect on the trunks of trees or low-lying branches. To prevent this, several producers installed valves specially equipped to drain water out of pits. A mistake in handling the valves, however, could quickly produce its own disaster. O. Leland Bassham, a former oil field worker who had been in charge of a pit, recalled such an instance. “I went out there to open the valve one morning about 7 o’clock and about 9 o’clock the next day a man rode up on his horse and said . . . ‘There’s oil all over the Ouachita River.’ I said, ‘Uh, oh. I know what happened.’ I forgot about the valve being open. I ran down and shut them off.” Bassham’s mistake sent an estimated 45,000 barrels down the Ouachita River. No wonder Emory Dendy remembered seeing “jillions of barrels of oil” going down Smackover Creek and watching the river “when it was six inches [deep in] oil from bank to bank.”

This waste did not seem to concern producers terribly. Perhaps they were spoiled by the tremendous success they had enjoyed with the wells they drilled and felt the crude would never run out regardless of the waste. When Bassham reported the amount of oil he had let trickle down to the creek, he was not even reprimanded by his superiors. When his boss found out what happened, he told Bassham not to tell anyone about it. “It was all

\(^{30}\)Butterfield and Lewis, interview, 11.
reported as water run off,” said Bassham. “We never heard any more about it.”

It was not always by accident that waterways and landscape were befouled. Drillers produced as much crude as possible, and if a certain amount was deemed unprofitable or too much for them to hold, they simply poured it out or sent it down the creek. “If they got a bad tank of oil and they didn’t want to go to the expense of treating it or didn’t treat it, they just turned it loose and let it go down Smackover Creek,” recalled Tommy Blagg. W. T. Warren recalled a time when one well was emitting fourteen thousand barrels of oil a day and all of the nearby pits were full. When he suggested to his superiors in Tulsa that the flow of the well be restricted he was severely reprimanded. His boss said “Hell no don’t shut that well in.” When he asked his boss what to do he was instructed to “Turn it [oil] down the creek.” “I went up there and opened up the drain valve,” remembered Warren, “and it turned it down the creek for about 36 hours.”

Some enterprising individuals took advantage of this runoff. Stories abound of people setting boards across streams to catch the oil flowing down. Once the oil was stopped, a small pump skimmed it out of the water into a portable tank where it was treated and sold. Many times, “skimming” operators would sell the oil they had collected back to the companies that had drilled, stored, and released it in the first place.

When enough oil accumulated in an area, the slightest of sparks or a stray lightning strike could set an entire forest, camp, or, strangely enough, waterway ablaze. “It was . . . hardly a day . . . there wasn’t some oil fire somewhere throughout this Smackover Field,” said D. D. Lewis. Smackover Creek may be the only waterway in the United States that has burned numerous times. One such event occurred on July 3, 1930, when “It caught fire and . . . burned both ways plumb to the river [the Ouachita] . . . and up to the old Standard Umsted,” according to Tommy Blagg, who observed the fire. “It burned everything . . . within forty or fifty yards of the creek,” added Leonard B. Wells. Blagg remembered, “All this dead timber had fallen down . . . and [the fire] burned [the timber] all up. [The timber] was saturated with oil.”

31O. Leland Bassham, interview, June 18, 1987, 6, oral history collection, Arkansas Museum of Natural Resources; Dendy, interview, 9.

32Thomas “Tommy” Franklin Blagg, Sr., interview, November 5, 1986, 6-8; W. T. Warren, interview, 9-10; William Orrel Butterfield, interview, April 15, 1987, 6; Butterfield and Lewis, interview, March 16, 1981, 11, all in oral history collection, Arkansas Museum of Natural Resources.

33For more information on the skimming operations see Blagg, interview, 8, and Dendy, interview, 9; B. A. Morrison, interview, April 15, 1991, 34, oral history collection, Arkansas Museum of Natural Resources.

34Dendy, interview, 20; Butterfield and Lewis, interview, 11; Blagg, interview, 8-9. The distance from the Ouachita River to Standard Umsted is about four miles.
Oil and landscape, Union County, 1920s. *Courtesy Arkansas Museum of Natural Resources, Smackover.*

Waterways polluted by the black liquid suffered other kinds of damage. Sidney Jones remembered the scene at the Ouachita River Bridge at Calion, just south of where Smackover Creek emptied into the river, as “a mess.” “I stood on the bridge . . . and the Ouachita River was just a sea of oil,” said Jones, “I [saw] tons of fish floating down it.” Emory Dendy concurred, saying he saw “big, old fish . . . floating. They could [not] get air under there and it’d kill them . . . That river was full of dead catfish.”35 The pollution from oil on the Ouachita did not stop at the state border. In 1924 the city commission of Monroe, Louisiana began an investigation and had a bill ready to introduce to the legislature suing the state of Arkansas following numerous complaints that oil dumped there was killing the region’s game and fish. The pattern of dumping oil into the area’s waterways continued for the next thirty years. In 1939, the Ouachita River basin was the only major river basin in the state of Arkansas with pollution problems se-

rious enough to threaten the livelihood of other states. Louisiana again threatened to sue Arkansas for polluting its streams in the 1940s, and as late as the early 1950s, the state conservation commission reported significant fish kills every year along the Ouachita River Valley from Camden to Monroe.36

The county’s wildlife population also suffered. Fires in the oil fields destroyed habitat of deer, nesting birds, and small mammals dependent on the forests for their survival. Alligators and snakes, a host of amphibians, and migrating waterfowl suffered from the pollution of water. Ducks and geese making their way south during the winter mistook open pits of oil for watering holes and got stuck when they landed.

Air quality must also have declined due to the incessant burning of crude. “When I was a kid,” said Jeannie Clements, who grew up in Smackover during the 1950s, “you could smell the town before you saw it.”37

Perhaps the worst menace to the landscape came in the form of salt water. If salt water was an obstacle to be overcome when recovering oil below the earth’s surface, it was just as big a problem when it rose out of a well. It wreaked long-lasting havoc on the environment.

The salt in water produced with oil was much more concentrated than in the briny water sometimes found at the earth’s surface. Its fluidity allowed it to appear relatively early in the life of an oil well once gas pressure was sufficiently depleted. If released at the surface, high concentrations of salt can seriously damage an area’s soil in two ways. Because salts absorb all the available moisture in soils, seeds have no moisture with which to germinate and shallow-rooted plants have all of the water in their roots sucked out. Salt also inhibits toxic microbial activities that break down organic materials and allow soils to replenish themselves.38 But at the time of the Union County oil booms, neither the state conservation commission nor producers in the oil fields were sufficiently aware of the dangerous consequences of releasing salt water onto the earth’s surface. The result was a monumental and calamitous change in the appearance of the non-human environment.

36“North Louisiana and South Arkansas,” Oil and Gas Journal 22 (January 31, 1924): 62; C. Armitage Harper and L. A. Henry, Conservation in Arkansas (Little Rock: Democratic Printing and Lithographic Co., 1939), 75; Raymond Martin, “Death of a Watershed,” Arkansas Game and Fish 7 (April 1974): 4-5. Oil fields were not the only major sources of pollution on the Ouachita. Raw sewage from cities along its course and waste from paper mills also contributed.


38Unpublished document issued by UTL Marketing Inc. (Niles, IL); 2. UTL puts out a product called Rodak Catalysts intended to clean up salt-affected soils. The document came from the field office of the Arkansas Department of Environmental Quality in El Dorado.
Producers used intensive heat and a water-softening agent or treating compound to separate salt water from the oil. When the two substances finally were separated, the question became what to do with the leftover water, which was seen as a nuisance with no redeemable value. The practice of most producers was simple. The salt water was, according to Tommy Blagg, "turned into Smackover Creek and it went into the Ouachita River."  

The decision to turn salt water loose onto the surface and into nearby waterways was devastating. The Smackover field is located in an area of gently sloping hills covered with hardwood forests and large stands of underbrush. As salt water migrated toward the lowest point in the field, which was normally located near a stream or body of water, it meandered through regions of timber and farmland, neutralizing the soil that supported these resources. As the production and subsequent release of salt water continued unchecked throughout the 1920s and early 1930s, whole sections of earth were laid sterile as salt accumulations increased. Healthy forest or farmland was replaced by eerily devastated terrain littered with scorched tree trunks and patches of hardened oil. Trees spared by earlier fires rotted and underbrush withered away to nothing. By the late 1930s, notable scars existed on the countryside. Charles Hoke was hired by Lion Oil as a geologist in 1937. He caught a train in Illinois and fell asleep on the trip, only to wake up while riding through the Smackover field on his way to El Dorado. "I wondered where I had come to," he said, "it looked like a moonscape."  

Once salt water reached the creek, it combined with oil and devastated the quality of the water as well as the marine life that depended upon it. This process continued for years after the boom era. In 1956, thirty-four years after the discovery of the Smackover field, the Arkansas Water Pollution Control Commission reported that the Smackover Creek drainage Basin was so grossly polluted as to render it unusable as a source of drinking water. In addition, the entire Ouachita River below the mouth of Smackover Creek was determined to be unsafe for consumption. The creek emitted 17,668 ppm (parts per million) or 51,100 tons of salt into the river daily. This significantly affected the chloride concentration in the river. At mile 315, its chlorides averaged 6.9 to 8.9 ppm respectively. Ninety-eight miles downstream, just below the mouth of Smackover Creek, the concentration of chlorides in the river rose to 363 ppm at 2 feet, 413 ppm at 8 feet.

39 A water softening agent could be anything from a bar of soap to chemical compounds such as Tretolite. This information was taken from Blagg, interview, 9.
40 Ibid.
41 Hoke, interview.
The impact on fish and wildlife is not easily measured, but the destruction of plant life due to the salinization of the soil, the increased amount of sodium in the water, and the large fires that periodically occurred surely had a devastating effect.\(^{42}\)

The problems created by salt water continued to plague oil producers in Arkansas. As late as the 1950s, people were allowed to dispose of salt water by simply pouring it into a creek. Pits to house salt water were built in the 1940s and 1950s and continued in use until the 1990s. The problems with these pits were similar to those with oil pits. Salt in the water seeped into the soil. A number of producers attempted to improve on the pits by installing jets filled with natural gas. The theory was that the jets would eliminate the salt as they evaporated the water. This, in fact, did little, if anything, to help the situation. It was not until the 1960s that salt water disposal wells were required in the El Dorado and Smackover fields. These wells served two purposes—disposing of salt water on the surface and repressurizing formations, which helped increase the recovery of oil. They were first used in the 1940s in the Shuler field, but were not required in the unregulated El Dorado and Smackover fields until much later.\(^{43}\)

Much of the waste of subsurface resources ended in Union County in the 1940s, due to improvements in technology, including better materials for casing, the use of geologists and seismographs to locate oil pools, better drilling materials, and the formation of the Arkansas Oil and Gas Commission in 1939 backed by laws and regulations approved by the state. With subsurface waste reduced, and aided by the discovery of new reservoirs, the oil industry in south Arkansas was revitalized after the Great Depression. Both the Smackover and El Dorado fields were consistently productive for thirty-five years after World War II. Oil became an even more entrenched part of the economy, society, and environment of the county.

Regrettably, much of the oil-related damage to the environment continued through the next four decades. Soil continued to be contaminated with salt, which stunted or prevented the growth of vegetation of any sort. Hardened oil clumps accumulated on the ground near old wells. The neglect of these polluted areas continued until the 1980s, when federal and state agencies began to demand that action be taken to clean up the waste in the oil fields. Attitudes toward oil and the other resources with which it came into contact changed, and a number of Union County producers began working with regulatory agencies in an effort to clean up the mess of

---


\(^{43}\)Thompson, interview; Ragsdale, interview. It should also be noted that the Shuler field was home to the first wells to use natural gas in repressuring oil producing zones.
the past and eliminate the possibility of its repeat in the future. By the year 2000, the befouled landscapes created in the search for oil had become home to a tremendously innovative project, the first of its kind in the world. Several federal and state agencies, along with several private firms, including Phillips 66, Lion Oil, and independent oil producers, donated money and time to re-vegetate the area’s worst salt water-affected regions. Using plants known as halophytes, which draw salt out of the ground, scientists and citizens alike hoped to clean up the pollution of years past and make the environment of south Arkansas’s oil fields productive again. Instead of relying on chemicals to flush out the salt or heavy machinery to remove the contaminated soil, the project thus attempted to use natural processes to assist in the healing of a ravaged landscape.\textsuperscript{44}

\textsuperscript{44}Arkansas Democrat-Gazette (Little Rock), November 19, 2000.