Oct 28, 1927

Drilling Began on Test Well West of Vernal

Seven miles southwest of Vernal, in the Twists, the Western Venture Corporation is driving a well with encouraging results. This well is known at Western Venture No 1, Krumvieda, and drilling is progressing at the rate of five feet an hour, or between fifty or sixty feet a day. A large flow of oil is expected to be struck at about 880 feet. The well is located on what is known as the Vernal Monocline which has a drainage area figured to be many times greater than that of any producing field in the Rocky Mountain region or in California, and should, therefore, produce oil in greater quantity.

A well drilled on the Vernal monocline fifteen years ago, found at 780 feet in depth an oil sand which, according to the written statements of drillers and the superintendent, was of 200 to 400 barrels daily capacity. Evidences of this production may still be seen by visitors to the old site. The well, however, was drilled in an unfavorable location with respect to the Vernal monocline. California has given ample proof in several of its great fields that the deeper sands along a monoclinal structure produce larger wells and lighter gravity oil. Therefore it is reasonable to expect, according to well known geologists who have studied the situation that very large wells of the gusher type, will be struck when the Vernal Monocline is tapped in the more favorable areas.

The Western Venture Corporation is hauling in a standard rig from Price which will be located at a point about 9 miles from Vernal, in what is known as Dog Valley, outside of the Twists. Altogether the outfit weighs 92 tons, and will take some time to get it into the valley. Water will have to be hauled several miles.

Utah Energy NEWS

VOLUME 12 | A Utah Division of Energy Publication | NUMBER 1

Drilling Horizontally

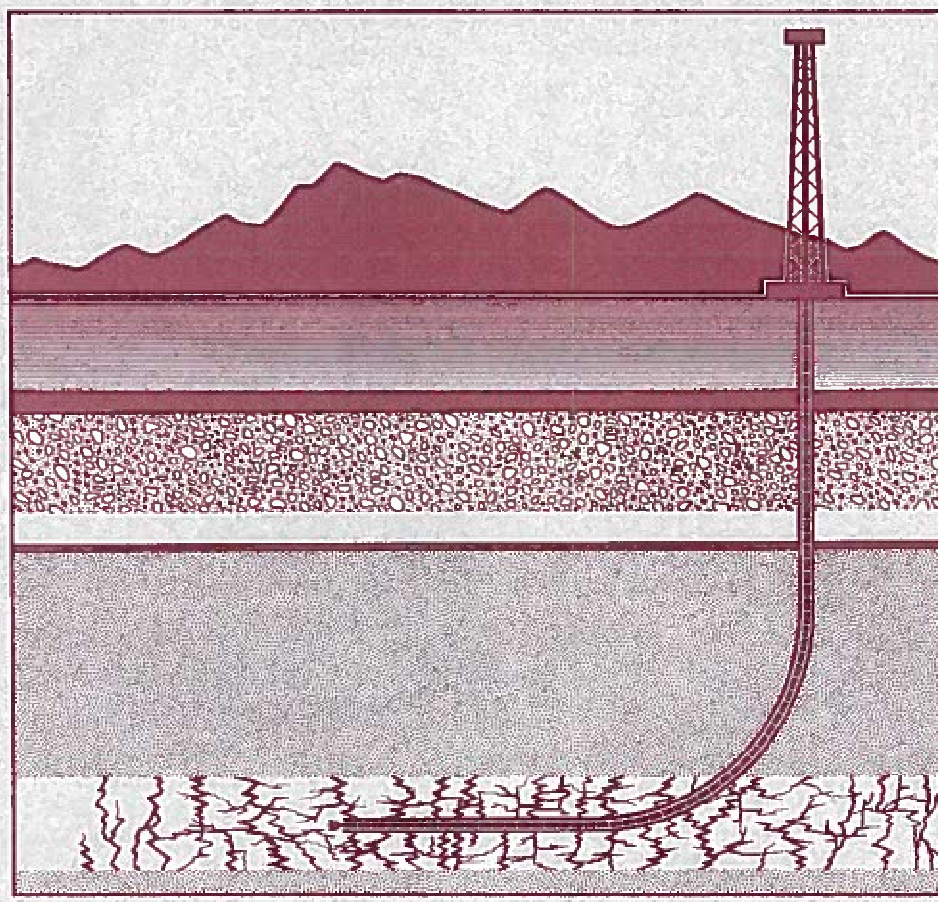
When an exploratory well struck oil in Utah's scenic southeastern desert last year, many observers of the Utah oil and gas industry proclaimed it the most important discovery in a decade.

The well, drilled by Houston-based Columbia Gas Development Corporation, is located 11 miles west of Moab, Utah, in the Cane Creek drilling area. It tested at having the potential to produce 914 barrels of oil and 290 thousand cubic feet of natural gas a day.

Excitement over the well's success is not because new oil reserves were discovered. Geologists and the oil industry have known for nearly a century about the peculiar reservoirs of oil beneath the desert there.

Rather, the excitement centers on the unique drilling technology Columbia used to tap the reservoirs. For the first time in Utah history, an exploratory well struck oil using *horizontal drilling*.

The horizontal drilling process begins by drilling vertically, the conventional method, but then a special bit is used to drill a gentle outward curve. Once the bit reaches the designated horizontal plane, the well is drilled sideways as far as several thousand feet.



Horizontal drilling is ideal for vertically fractured reservoirs. Unlike vertical wells, horizontal wells intercept the fractures from the side, which improves the chances of hitting oil.

"Horizontal drilling technology has the potential to tap additional sources for oil and gas development in Utah," said State Geologist Dr. M. Lee Allison. "The technology could revive drilling in abandoned fields where vertical drilling proved uneconomical. It could also lead to the discovery of new fields in areas traditionally overlooked," he added.

Horizontal drilling has breathed new life into the Cane Creek drilling area, a 25-mile-wide region that stretches 100 miles southeast from

Green River, Utah, to the other side of the Colorado border. It is located in the Paradox Basin Fold and Fault Belt.

Named for the Cane Creek Shale that lies a mile and a half beneath it, the Cane Creek drilling area attracted only moderate interest from oil companies in recent years and produced more economic failures than successes.

One reason vertical wells often failed here is because the oil — located in the Cane Creek Shale — isn't in a porous, easy-to-drain formation, but is trapped in vertical fractures.

The Cane Creek Shale was fractured vertically millions of years ago by the geologic forces that formed the Paradox Basin Fold and Fault Belt. Over time, the vertical fractures filled with oil that had migrated from permeable formations.

"The narrow vertical fractures are extremely difficult to intercept with vertical wells," said Craig Morgan, a petroleum geologist for the Utah Geological Survey.

"It's a game of hit and miss. When vertical wells hit fractures they can drain only a few at a time. When they miss, developers are left with dry holes and millions of lost dollars," Morgan explained.

Horizontal wells tap more fractures

Unlike vertical wells, horizontal wells are ideal for drilling in vertically fractured zones for several reasons.

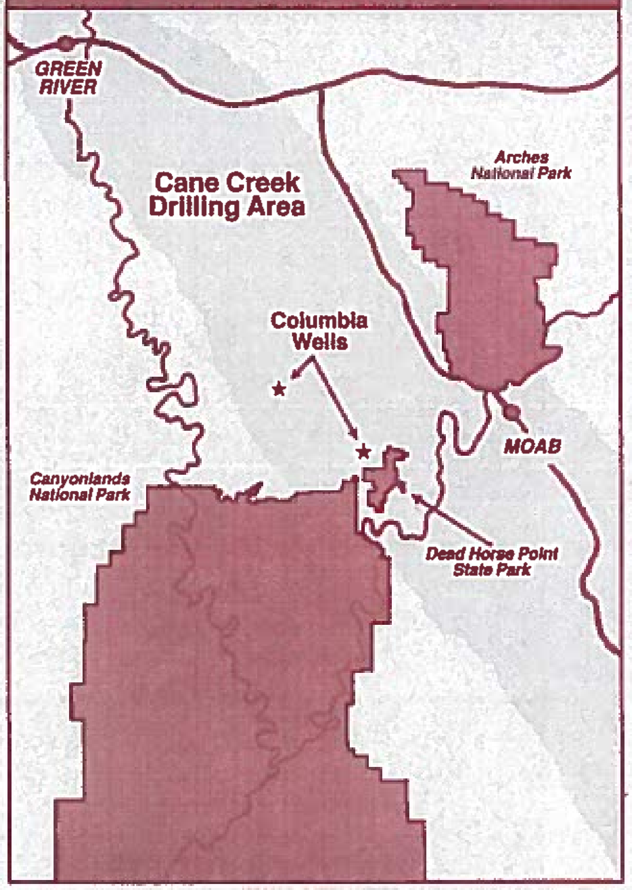
First, horizontal wells intercept the vertical fractures from the side, which enlarges the target.

Second, because the wells can drill thousands of feet sideways, they intercept many more fractures than vertical wells do. This not only improves the chances of hitting oil, but also increases the rate of production.

"The fractures act as pipelines in the reservoir, funneling oil to the wellbore from greater distances within the reservoir," said Robert Pier, Columbia's superintendent of Moab operations.

And third, because horizontal wells increase the drainage area, fewer are needed to develop a reservoir. "A typical horizontal well could, under ideal conditions, drain up to one square mile — the same size of area that would require 16 vertical wells to drain," Pier said.

Cane Creek Drilling Area



"This makes it possible to explore reservoirs with less impact on the environment. Fewer wells mean less surface disturbance, " he added.

Two wells strike oil

Word of Columbia's horizontal discovery set off a series of applications from other companies interested in trying the technology there. By April 1992 a total of 23 applications had been filed and 10 approved. The Bureau of Land Management and the Utah Division of Oil, Gas and Mining have approved 10 applications for permits to drill, eight on federal land and two on state land.

So far, only four wells have been completed. Columbia has drilled two. Its second horizontal well, located six miles southeast of the original discovery well, was completed in November of last year and tested at a potential rate of 1,158 barrels of oil a day. Both wells are still producing oil.

But the same can't be said for the other two. The Chevron USA Inc. and Meridian Oil Inc. wells, both located within 15 miles of Columbia's first well, did not produce commercial amounts of oil.

Although two of the four wells failed, observers consider that an encouraging figure. "With every oil field you can expect to have dry holes. During the past 10 years, only 39 percent of oil and gas exploratory wells in Utah were successful. So the 50 percent success rate is really quite good," said Tom Turner, an energy engineer for the Utah Division of Energy.

Salt bed major problem in drilling

While oil companies drilling in the Cane Creek area are optimistic they will tap the fractures and turn a profit, they are proceeding at a guarded pace.

Historically, the Cane Creek area has been very difficult to develop and has produced numerous failures. One reason for this is the difficulty involved with intercepting the narrow fractures. Another reason is that to reach the Cane Creek Shale, oil companies must first drill through thousands of feet of unstable salt.

The Moab area, known for its wealth in desert beauty, also sits above one of the nation's largest salt beds.

Drilling through salt-bearing formations is considered so difficult that when Columbia offered 33 companies a partnership in its first horizontal well, 30 declined. "They turned us down because they believed drilling horizontally through salt was too risky or even technically unfeasible," said Pier.

During drilling, the salt has a tendency to dissolve in the drilling fluid, widening sections of the wellbore. In areas where the wellbore is "washed out," cementing the casing properly can be extremely difficult. Cementing the casing supports and seals the wellbore, preventing oil leakage into other formations and reservoirs.

To combat wash out, oil companies use a special oil-based drilling fluid. (Salt doesn't dissolve in oil.) Oil-based fluid is extremely important for successful horizontal drilling because if wash out is uncontrolled, it can also prevent the drill bit from making the necessary curve to reach the horizontal plane.

Drilling horizontally in salt can also lead to "key seating," which occurs when the rotating drill string wears a groove or rut along the side of the soft wellbore. If the drill bit gets stuck in the rut while being pulled out of the well, it's nearly impossible to remove.

But the most fatal problem for oil wells in the Cane Creek area is salt bed shifts that collapse the well. Because the salt bed is under extreme "overburden" pressure from the enormous weight of the rock formations above it, the salt frequently moves toward the path of least resistance.

Just as squeezing a tube of toothpaste forces the paste out of the opening, the overburden pressure forces salt toward the wellbore. If the pressure is too great, the salt will collapse the steel casing. Depending on the severity of the damage, the well could have to be abandoned.

Pressure-drop phenomenon

The history of oil production in the Cane Creek area is enough to make any oil company think twice about drilling there.

"During the past 70 years, about 200 vertical wells were drilled in the Cane Creek area. Most of them either missed the fracture systems, damaged the reservoir, suffered casing collapse or just didn't produce enough oil," Pier said.

And many of the wells that were productive eventually fell victim to a phenomenon somewhat unique to the Cane Creek area.

"A lot of the wells that did strike oil started out with impressive production levels, but within two or three years production ceased," said Bill Stringer, BLM assistant district manager for minerals.

The cause for the rapid drop is unknown, but Stringer says one possibility is that Cane Creek Shale has very low permeability, so oil trapped within it is prevented from entering and replenishing the fractures. Another possibility is that when reservoir pressure drops below a certain level, the salt inside the oil crystallizes and seals the fractures.

The production-drop phenomenon simply adds suspense to the question that is on the mind of every Cane Creek observer: Will horizontal drilling technology reverse the area's production trend by allowing wells to maintain long-term production rates?

To increase their chances of accomplishing this, Columbia is taking every precaution possible to prolong the life of its wells. One of these is to ensure the oil is not produced too quickly.

Tests from Columbia's first and second horizontal wells indicate the "potential" to produce 914 and 1158 barrels a day, respectively. But the company is intentionally producing the wells at a more modest rate — currently 332 and 380 barrels a day — to prevent reservoir damage.

Developing a reservoir too quickly is like spraying an aerosol can that has too large a nozzle opening. Initially, the can produces a large spray while releasing a lot of pressure. Eventually the can loses pressure, leaving a significant amount of liquid still in it.

"With some reservoirs that lose pressure you can recover the remaining oil using secondary recovery techniques, such as pumping steam or water into the reservoir to force the oil out," said Turner. "But it's extremely difficult to control these techniques in fractures. If you pump water into a fracture, you don't always know where it's going to go," he said.

> ***"During the past 70 years, about 200 vertical wells were drilled in the Cane Creek area. Most of them either missed the fracture systems, damaged the reservoir, suffered casing collapse or just didn't produce enough oil."***
>
> — Robert Pier
> Superintendent of Moab Operations, Columbia Gas

Salt-bearing formations also pose problems for wells produced too quickly. A sudden drop in pressure causes salt in the oil to crystallize and plug the perforations in the tubing that draws oil from the reservoir. The cost of cleaning out a frequently plugged wellbore can make the well too expensive to operate.

"The key to successful oil production in the Cane Creek area is determining the optimal rate of production that will maximize oil recovery without damaging the well. That takes a lot of trial and error and a good understanding of the formation and how the oil in it acts," said Turner.

State, local governments to benefit from profitable wells

If the oil companies are successful in maintaining profitable production levels, they won't be the only ones making money; state and local governments could earn millions in revenue as well.

An oil well on state land producing 500 barrels of oil a day (at $20 per barrel) generates $456,000 in royalty payments and $126,000 in severance tax to the state each year.

Local governments earn $161,000 in property tax. A well on federal land producing at the same rate provides the state $228,000 in royalty fees.

Horizontal wells are costly

But to be profitable, the wells must produce enough oil to earn a return on what is an extremely expensive investment. Columbia's two horizontal wells cost $4.5 million each, said Pier.

Horizontal wells cost from one and a half to four times the price of their vertical counterparts. One reason why is that the companies drill more hole. For example, a horizontal well's total vertical depth could be 4,000 feet, while its horizontal leg could stretch another 4,000 feet.

Horizontal wells also face more drilling problems than vertical wells, which significantly increases operating expenses. Add to this the costs for specialized equipment such as direction-measurement tools, downhole motors and special drilling fluids.

"Horizontal drilling in the Cane Creek area is extremely challenging. It's a gamble. But the potential for increased oil production justifies the risks and costs," said Pier.

With experience, oil companies can improve their drilling techniques in the formation and reduce drilling problems and future costs.

"We think we can reduce the $4.5 million cost in the future, but we're not there yet," Pier added.

Principle dates back to 1880s

While the concept of horizontal drilling technology might be new to most Utahns, the principle dates back to the 1880s when oil workers dug tunnels under oil seeps and drilled holes in the ceilings so oil would drain into wooden troughs.

During the 1950s, many short-length horizontal wells, most of them less than 100 feet, were drilled to enhance production.

Then, in 1978, Esso Resources Canada Limited drilled the first modern horizontal well in the Cold Lake reservoir in northeastern Alberta, Canada.

Soon other companies began experimenting with horizontal drilling, but their successes were overshadowed by the high costs associated with using the technique.

To guide the drill bit through its outward curve, special tools were needed to send the wellbore's inclination and direction to the rig. The tools had to be lowered into the wellbore on electric cable, a time-consuming and expensive process.

It wasn't until the advent of the Measurement While Drilling (MWD) system during the early 1980s that horizontal drilling became mainstream in the oil industry. MWD sensors, located about 10 feet above the drill bit, send directional data to the oil rig by emitting coded pulses in the circulating drilling fluid. Surface equipment, including computers, signal decoders and plotters, receive the data and transform it into usable formats.

"The MWD system allows oil workers to know the position and trajectory of the drill bit in the formation without stopping to make a cable measurement, saving significant time and money," said Turner.

With the perfecting of the MWD system, horizontal drilling in the United States made giant strides. Large-scale horizontal drilling operations began to experience economic success. And by the end of the 1980s, the use of horizontal drilling technology had spread to oil fields throughout the world.

Division funds research in Uinta Basin

The Utah Division of Energy is funding research to identify other oil fields in Utah that could benefit from horizontal drilling. The division awarded the Utah Geological Survey a $42,000 grant to find potential areas for development along the Duchesne Fault and Fracture Zone in the Uinta Basin.

Like the Paradox Basin Fold and Fault Belt, the Duchesne Fault and Fracture Zone contains fractured reservoirs that have been poor oil producers during the past 30 years. The fractures are located in the sandstone and shales of the Wasatch and Green River formations between 2,000 and 8,000 feet deep.

"Horizontal drilling could reverse the downward trend in Uinta Basin oil production. It could eventually double the current amount of recoverable oil there," said Morgan.

The research involves studying surface faults and fractures in the field, standard well logs and state-of-the-art wellbore imaging logs to locate and document areas where fractures intersect with oil-bearing sandstone and shales. Their findings will be published to help companies select horizontal drilling sites with the highest potential for success.

> ***"Horizontal drilling could reverse the downward trend in Uinta Basin oil production. It could eventually double the current amount of recoverable oil there."***
>
> – Craig Morgan
> Petroleum Geologist, Utah Geological Survey

Groups oppose increased Moab-area development

The horizontal well discovery in the scenic southeastern desert has created as much controversy as it has excitement. Environmentalists and other conservation groups fear the current and proposed oil sites located just outside of Canyonlands and Arches national parks and Dead Horse Point State Park will damage the natural environment.

Columbia's second well is located one-half mile from Dead Horse Point State Park, one of Utah's most spectacular vistas. Coors Energy Co.'s well site at the mouth of Little Canyon, northwest of Moab, is less than three miles from Arches visitor center. A recent decision by the Board of State Lands and Forestry opens oil and gas development on 4,000 acres of state trust lands near Dead Horse Point State Park.

Environmentalists say that if drilling continues in these areas, the traffic from the trucks transporting equipment, and noise from the drill rigs' diesel engines will spoil the environment, threaten wildlife habitat and discourage tourism.

State wildlife managers say exploration in the area northwest of Moab will threaten the pristine habitat of the "Potash" bighorn sheep herd, one of two surviving native desert bighorn sheep herds in Utah.

"The desert bighorn sheep require a primitive environment for survival. Disturbing their habitat causes stress on the animals, eventually leading to increased susceptibility to disease and even death," said Catherine Quinn, assistant chief for the Utah Division of Wildlife Resources Habitat Section. "Disturbance could also cause them to abandon the habitat," she added.

Critical habitats that could be impacted by the proposed drilling include bighorn migration paths and areas used for wintering, summering and lambing.

Tourists visiting the parks and surrounding areas expecting solitude and undisturbed landscapes will also be impacted by the sights and sounds of additional drilling activity, the groups say. A 1990 study performed by Colorado State University for a national park in North Dakota indicates that oil and gas development near its boundaries negatively affected park visitors' experience.

"Visitors report that...such things...detract from their visit, and that they will spend less time doing a variety of activities in sections of the park where such development is present nearby," the study states. Some visitors said they might stop coming because of it.

A drop in visitors to Arches, Canyonlands and surrounding areas would hurt Moab's economy, which relies heavily on tourism, the groups say.

Oil industry officials say increased development of the Cane Creek area can be done in an environmentally sound manner. With horizontal drilling, fewer wells are drilled than with vertical development and surface disturbance is substantially minimized, they say.

Technology has yet to prove itself in Cane Creek

Although the advancement of horizontal drilling technology has given oil companies throughout the world another tool to improve oil and gas recovery, its long-term significance in the Cane Creek area is uncertain. Horizontal drilling could be the tip of the iceberg of new oil development here, or just an experiment with little long-term success.

One thing is certain, however, and that is oil companies cannot look to the past for encouragement. "All we have to go on is history, and history shows that it is a very rare occurrence to have long-term oil producers in the Cane Creek Shale," Stringer says. "It's very possible that a few years from now you won't see any horizontal well activity here."

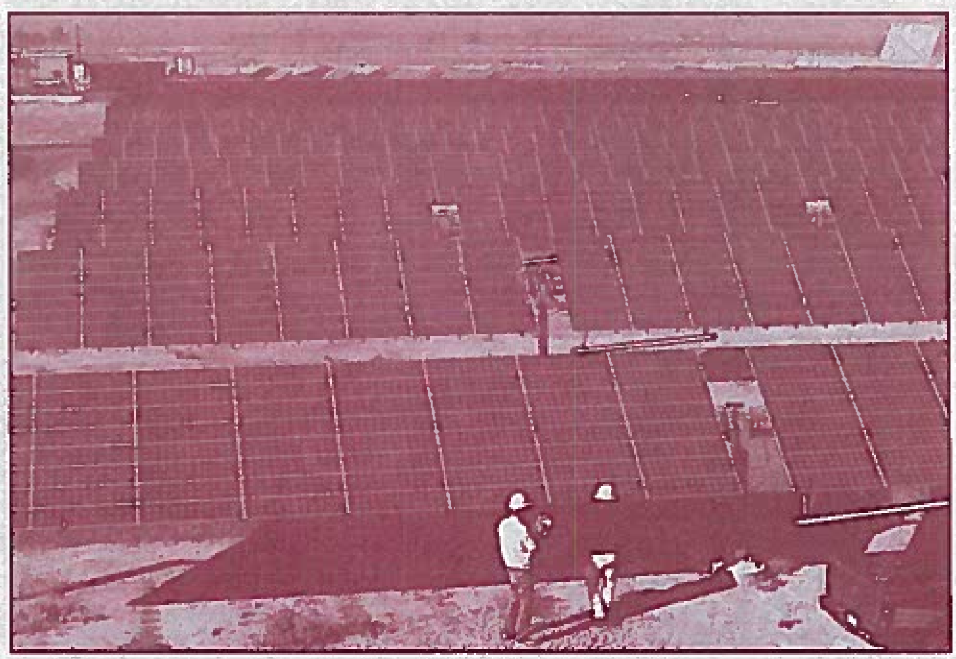
Time will be the true test of its success. ❑

Lake Powell Marina Targeted for Solar Power System

Lake Powell in southeastern Utah is one of our country's most scenic and unusual lakes. Formed when Glen Canyon Dam was built to harness the Colorado River, the narrow lake winds for 200 miles through sheer, red rock canyons and towering geological formations. It is an outdoor museum of natural desert beauty, ancient Indian culture and 650 million years of geologic history.

If a Utah Division of Energy project goes as planned, Lake Powell will also be a showcase for cutting-edge solar technology that converts sunlight into electricity.

The Utah Division of Energy, the U.S. Department of Energy and the National Park Service have



The solar power system to be installed at a Lake Powell marina could use photovoltaic technology. The system would use about 30 sub-arrays similar to those shown here at the PVUSA project in Davis, California. Photo credit: Pacific Gas and Electric joined efforts to install a large-scale solar-powered electric generation system at either Dangling Rope Marina or Halls Crossing Marina.

"The system will use the latest solar technology to generate at least 100 kw of electricity to power the marina's boat facilities, general store and employee residences," said Britt Reed, a Utah Division of Energy engineer and project coordinator.

Project in planning stages

The project is in the early planning stages, with partners reviewing potential solar power systems and collecting data on the sunlight hours and daily power needs at both marinas. Based on this data, a marina will be selected and a state-of-the-art solar power system designed. The analysis should be completed this July.

Each year more than 3 million people visit Lake Powell — the centerpiece of Glen Canyon National Recreation Area — to explore the red desert beaches and sandstone formations, or to enjoy the other recreational activities that abound there. Some 325,000 of those visitors stop at Dangling Rope and Halls Crossing marinas to refuel and purchase provisions for their next adventure.

Although both marinas are remote, between 50 and 100 miles from the nearest town or power line, they offer such necessities as fuel, boat repairs, fresh water, refrigerated food and ice. To power the refrigerators, pumps and other electrical equipment, the marinas rely on diesel-fueled generators running 24 hours a day.

Since the generators are always operating, they burn enormous amounts of fuel. Last year the marinas together consumed 175,000 gallons of diesel fuel — enough to fill 22 semitrailer fuel trucks. Halls Crossing Marina, located at the heart of Lake Powell, consumed 110,000 gallons of fuel to generate 1,430,000 kwh of electricity. Dangling Rope Marina, near the southern end of the lake, burned 65,000 gallons to produce 374,000 kwh. Since the marina is only accessible by boat, its fuel must be delivered by barge. Thirty times a year, a barge carrying a 2,000-gallon fuel truck makes the 90-mile round trip from Arizona's Wahweap Marina to Dangling Rope.

"Replacing the diesel-fueled generator with one powered by the sun makes sense considering solar energy's numerous economic and environmental benefits," said Denis Davis, chief of maintenance for Glen Canyon National Recreation Area.

The cost of electricity at Dangling Rope Marina last year — including fuel, generator maintenance and barge expenses — was more than 40 cents per kwh, according to the National Park Service. That is about six times more than Salt Lake City residents pay for power. Halls Crossing Marina doesn't have barge expenses so it paid less, about 14 cents per kwh.

While solar-powered electricity is initially more expensive than diesel-generated power, it pays off in the long run.

"The initial costs of a solar power system can be many times that of a diesel generator system. But since solar power eliminates expenses for fuel, transportation and generator maintenance, its long-term cost can be less than the price of diesel power," said Reed.

Environmental protection a major benefit

"And when you factor in the reduced 'environmental cost,' solar power clearly becomes the most attractive alternative," Reed added. The environmental cost of producing power is the environmental damage caused by diesel-fuel related pollution. Air pollution produced by the diesel generators include hydrocarbons and nitrogen oxides, which react with sunlight to create ozone; carbon monoxide; and PM10, a fine dust.

"While it is extremely difficult to attach a specific dollar amount to the cost of environmental damage caused by the diesel generators, we know it isn't zero," Reed said.

In addition to reducing the costs of air pollution, the solar power system reduces the potential costs of water pollution from a fuel spill. "So far we haven't had any problems barging the fuel truck to Dangling Rope. But when you're dealing with thousands of gallons of fuel, the threat exists for a major fuel spill," said Davis.

He explained that placing a dollar amount on water pollution is easier than air pollution. "One fuel spill could easily cost more than a million dollars in environmental damage and clean-up costs," Davis said. "Switching to solar power will cut the number of barge trips and significantly reduce this threat."

"The solar power system's ability to reduce both air pollution and the threat of water pollution are even more valuable to the National Park Service than the system's economic benefits," Davis added.

PV array a probable choice

With the recent advances in solar power technology, various solar electricity systems are in testing or on the market that could be used at the marinas. However, the partners are currently leaning toward the photovoltaic array as the system of choice, Reed says.

Photovoltaic (PV) systems consist of large arrays angled to face the sun. Each array contains small solar modules that respond to sunlight by producing direct current electricity. An inverter converts the DC current to AC.

PV systems are an effective means for producing everyday power, especially in remote areas. Current uses include powering mountain cabins and recreational vehicles, as well as freeway safety phones and domestic lighting.

While the solar power system will be the marina's primary source of electricity, it doesn't mean the National Park Service is scrapping the diesel engines. The solar system will be integrated with the diesel generators so that both systems can operate during periods of high power demand or no sunlight.

If Dangling Rope Marina is selected, the solar system will also be connected to deep-cycle batteries that store power for use at night and during overcast days.

Total cost for the proposed project is $2.25 million with $750,000 from DOE, $250,000 from the Division of Energy and $250,000 from other sources. Potential sources include Utah Power; solar power companies; ARA, the recreation area's concessionaire; and the National Park Service. Electrical Power Research Institute (EPRI) and Sandia National Laboratories are offering technical assistance.

So far, DOE has committed about $80,000 for preliminary engineering. If the project continues to demonstrate promising economic and environmental benefits, DOE will commit the remaining $670,000.

Division, DOE to promote energy technologies

The joint effort between the Utah Division of Energy and DOE that resulted in the Lake Powell project began last year when DOE sent a request to all state energy agency directors for proposals for innovative uses of emerging technologies. Two Division of Energy proposals were among the first few approved by DOE for funding.

"This collaborative approach was initiated by DOE to bring together public and private sector expertise to streamline the process of getting new technologies into practical use," said Richard Anderson, Utah Division of Energy director. "DOE chose to use existing state energy offices as the vehicle to unite these sectors because of the agencies' understanding of local needs and their well-developed local networks."

As part of the educational aspect of the project, a narrative display will be built at the marina to invite visitors to view the system and learn about its many benefits.

"Visitors will see first hand the reliability and efficiency of solar power generators. We hope that operators of diesel generators in other remote locations will see the effectiveness of solar power technology and adopt it for their operations as well," said Reed. ❑

Assistant Energy Director Honored for Heading Low Income Task Force

A Utah Division of Energy assistant director was recently honored by the Utah State Committee of Consumer Services for heading a task force that identified steps to help low income residents reduce their utility bills.

Leon Peterson, assistant energy director, left, receives award from Leland J. Hogan, chairman of the Utah State Committee of Consumer Services.

Leon Peterson received a Utility Consumer Service Award during the Committee's seventh annual presentation ceremony at the state capitol in January. The award recognizes individuals and organizations that have benefited Utah utility consumers.

"We salute the Utah Division of Energy for sponsoring the Low Income Weatherization Utility Task Force, which we expect will result in very worthwhile programs," said committee chairman Leland J. Hogan, who presented the award.

The task force, chaired by Peterson, examined how various government, utility and private weatherization and financial assistance programs could better assist Utah's low income residents. Task force members included representatives from low income advocacy organizations, Utah's two investor-owned utilities, other state agencies and members of the state Legislature.

Based on its findings, the task force made recommendations in a report given to the Utah Public Service Commission and Utah Issues, a low income advocacy organization.

"I believe the task force process was a success," Peterson said. "It brought together a broad coalition of often competing interests to find solutions to this very important issue."

Peterson said his goal as chairman was to create an environment where task force members could examine the issues and reach a consensus, rather than forming "majority-versus-minority" recommendations. "Fortunately we accomplished this and came up with recommendations that every task force member approved," Peterson said.

"Now it's up to the Public Service Commission and relevant state government agencies to act on our recommendations," he said.

Recommendations

Task force recommendations include:

• The Public Service Commission should hold a hearing to consider whether Mountain Fuel Supply Co. and Utah Power should participate with the division and 10 local weatherization agencies to create a low income weatherization program for Utah. Participation from other providers not regulated by the Commission should also be encouraged;

Continued on page 8

Energy CURRENTS

Oil Shale Publication Now Available

Current research and development efforts to produce synthetic oil from oil shale are described in a new Utah Division of Energy publication now available.

The publication, titled "Oil Shale," also describes the history of oil shale development, production techniques, commercial marketability and its potential role in our nation's energy future.

About 60 percent of the world's recoverable oil shale resources are found in the United States, with the richest and most easily recoverable deposits located in eastern Utah and western Colorado.

Today most research and development centers on finding alternative uses for shale oil in high-valued specialty products such as lubricants, waxes, white oils and anti-bacterial soaps.

The publication was produced by the Utah Division of Energy under contract with the U.S. Department of Energy and Western Research Institute. To obtain a free copy contact Denise Beaudoin, Utah Division of Energy information specialist, at (801) 538-5410 and 1-800-662-3633.

Continued from page 7

• The state should implement and enforce a state energy code to ensure building construction is energy efficient;

• The Department of Human Services should consider transferring up to 25 percent of Low Income Heat Energy Assistance Program (LIHEAP) funds allowed by federal guidelines to the division's Weatherization Assistance Program. LIHEAP, known in Utah as the HEAT program, is federally funded and administered by the Utah Department of Human Services. The task force concluded that transferring funds to weatherization would provide greater public benefit because the HEAT program — which helps low income residents pay utility bills — is a short-term solution, while weatherization assistance is a long-term solution.

• The creation of a Utah Energy Assistance Foundation, a non-profit tax-exempt corporation, should be considered to raise funds to help finance the division's Weatherization Assistance Program and/or HEAT program. Fund spending should be coordinated between the Division of Energy and the Department of Human Services to prevent duplication of services;

• The state Legislature should adopt legislation authorizing use of the "unclaimed utility credit balance" for the Division of Energy Weatherization Assistance Program; and

• The state Legislature should match funds up to $250,000 for *Lend-a-Hand* and *Reach* customer donations and appropriate it to the Weatherization Assistance Program. *Lend-a-Hand* is funded by Utah Power customers who include a donation with their bill payment. *Reach* is funded in the same way by Mountain Fuel customers. Both programs are administered by Red Cross. ❑

TAKE Pride IN UTAH

Utah Energy NEWS

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EMERALD OIL GOOD

A Fifteen Barrel Well in No. 5, Says the Driller, and More to Follow.

J L Milue, the driller for the Emerald Oil company, has been spending the week in Vernal Just before leaving the Rangeley distiict he completed well No 5 This is by far the best well of the five, although all of them are producers, from which can be pumped several barrels a day from each well No 5 is a fifteen barrel well, that is, fifteen barrels of pure oil can be pumped from it in one day and the flow is increasing, and could be doubled by shooting the well It is down 728 feet and at the bottom they struck a two foot streak of white sand

The boiler has been fitted up for burning oil so that the company wells furnish fuel for all power to drill with This requires several barrels a day.

Mr Milue has had experience in seveeral states drilling for oil and worked at the business for many years It is his opinion that the Emerald company has some very promising property and he thinks that the next well is going to be still better The quality is good and the steady producers, he considers, better than the gusher

VE Jan 18, 1945

EQUITY OIL ESTABLISHES OFFICES IN VERNAL

The Equity Oil Co has established an office in Vernal for the first time located temporarily in the Coltharp Building

The company has purchased the building east of the Sather Jewelery from Dr Loyd Shimin and will establish headquarters there as soon as the building has been remodled

Howard L Caldwell is the manager of the new office

Aug 9, 1945

Equity Oil to Drill Well East of Naples

Rig Spuds in on Heber Powell Land On Wednesday

Drilling started Wednesday on the Heber Powell land 2 1 2 miles east of Naples by the Equity Oil company on a deep test oil well The Cardwell all-steel rig is located on the bench east of Ashley Creek The drillers are prepared to go to a depth of five or six thousand feet, although producing sands are expected at far shallower depths it is reported The rig is equipped for either cable tools or rotary equipment according to A P Voorhies, field super intent for the Equity Oil Co Cable tools will be used for the initial drilling A 13 3 8 inch hole will be drilled

Ross Rooks well driller of Rangely will be in charge of the well

The drilling of the well will be watched with more than usual interest as it is the first test well to be drilled in the area

In February of 1928 the Ash ley Valley Test Well No 3 dril led eight miles east of Vernal and south of the Equity well encountered an encouraging showing of oil in the Morrison formation at a depth of 1790 ft The oil was of gravity 29 and of a parafine base It was reach ed after passing through a gas formation

FIRST FIFTY YEARS IN THE
RANGELY OIL "PATCH"

HAZEL JOHNS
12-1-86

In the early and mid 1800's people looking for wealth traveled to the gold fields and staked their claims. With pick and shovel they started digging for gold. They lived in tents and shacks; suffered from cold; heat, hunger, frustration, exhaustion, injury and failure. Some did become rich and those who did not "strike it rich" went on to other trades.

In the late 1800's and early 1900's fortune seekers were listening for rumors and reading geogological reports about oil seeps. They were looking for locations where gushers might produce "black gold", fame and wealth. Such was the case of Rangely and its beginning of oil developement.

One of the first observations to indicate the presence of oil at Rangely was Hayden's Tenth annual report of the US Geological and Geographical Survey of 1876. The first recorded company showing interest was the Denver Gas and Petroleum Co. hich came to Rangely in 1891 and filed a certificate covering 16,000 acres of petroleum land in Raven Park. Also the Raven Park Oil Co. was formed by J.B. Wheeler, of Aspen; Ben Price of Meeker; Herman Pheiffer of Routt and several "Pennsylvania Oil Men". This group also filed certificates. The county newspapers reported oil spring locations; intentions of companies to drill; surveys being taken and lots of speculation but no equipment moved into Rangely.

During this period a lot of activity was taking place in other fields of the United States showing greater promise than Rangely.

Although Rangely showed definite signs of oil it must be remembered that Rangely was a remote area with accessibility almost impossible. The climate harsh and it took more than one mule and a pick and shovel to drill a well. It took several mule teams to bring in equipment. Plus the rig could be brought in piece by piece or designed and built on location. This all took experience and lots of money.

So it wasn't til 1901 that California Oil Company came to Rangely and actually drilled a test well. They began in November and during the following year Meeker Oil Company moved in a rig. California Company drilled four holes between 600 ft. and 1000 ft. with signs of oil but no producer and spent $35,000. Finally in Jan. 1903 hey hit a producer, producing 3 b/d. By the end of 1903 with 13 companies in and out of Rangely there were 6 producing wells yeilding 2 to 10 b/d.

In the next 5 years some of the companies tried to go deeper but this created to many problems. Union Oil Company went to 3100 ft. only to have the rig burn down. By 1913 Emerald Oil Company was showing success and could ship 500 gallons per week hauled with a 6 horse team.

Then in 1919 Emerald Oil Company built a small refinery. Union Oil Co., Requenta Co., Colorado Pacific Co., Raven Park Oil Co., and California Oil Co., were some of the successful companies that operated in the Rangely field along with some independants. There were successes and many failures. Rigs were sold, traded, burnt and sometimes abandoned. The field was only producing from shallow wells.

Drilling equipment during this early period was unreliable and dangerous in the hands of both experienced and inexperienced men. Many times the driller and tool dressor were brought in from far away places where they had gained a reputation for their experience and skill. The experienced driller was as valuable as the rig and its equipment. Often the driller or tool dressor brought his wife who acted as the camp cook. They worked in 12 hr. shifts (tours). It was important to valadate holes to hold the claim. Therefore the cook tents and sleeping tents were on skids so they could move when the rig moved.

The company would often hire local people who lived close to the river to haul water in buckboards to drill with and run the steam engines. They used a steam engine to power the rig. Coal was hauled from Meeker to fire the boiler. It was general practice to throw open the fire box door and run when the gauges began registering "blue steam".

Most of the rigs were using the cable tool rig with a manila line. To check the bottom of the hole they would send a bailer down and pull it up to see if there was any sign of oil. If there was some oil found they would start drilling again. Often times when the drill stem was run back in it would part and they would have to try and back twist to get the tools connected again. Another problem encountered was having the hole go crooked, at first, they tried to straighten it, and if that was not successful they would just skid the rig over and start a new hole.

With the boiler close to the rig there was a risk if they hit a gas pocket, the rig would catch fire, this is what happened with Union Oil Co. So the fire box was often set quite aways from the rig and someone had to keep running back and forth to keep checking on the steam pressure and then run back and put more coal in the fire box.

Cave-ins were often encountered and drilling would have to be shut down until more casing could be sent for and hauled in or pulled from an abandoned hole and brought to the location. This could take a week to several weeks and this enabled the crew to take off and go home to family or go hunting or find work on another rig. When the casing did arrive, and the crew rounded up, it was installed and drilling resumed. Many times the tools would get stuck in the hole, sometimes they could jar them loose and sometimes the string would part and they would have to try and reconnect or give up and move over and start again.

When winter came the rigs shut down til spring and then a crew would have to be rounded up again. Many of the contracts let were for 500ft or 1000 ft. or oil. If the contract said 500 ft. or oil and at 500 ft. there was no oil they pulled the tools, and casing out of the hole and moved to the next contract location.

It was not unusual for a crew member to work just long enough to get enough money to buy some land and cattle, or move on to greener pastures and quit the oil patch. It was also not unusual for a driller to be offered more money from another company and just walk off the job, or for the hole to be in trouble and the driller be blamed and fired.

Another problem faced was injuries. The story is told about a geologist who fell and dislocated his shoulder. A rider was sent by horseback to Meeker to inform the doctor; and then rode back to meet the buckboard with the injured man in the back; that the doctor would be waiting for them to arrive.

In 1924 Texas Company announced a deep well test in the Rangely field. Their first try was with a 122 ft. rig, south of town on Douglas Creek. It just got started when a gasser destroyed it. All the casing blew out of the hole and the rig toppled over. Another rig was moned onto the location to complete the test but was struck by lightening and flames roared for weeks before they were extinguished. Then winter set in and everything shut down.

Shallow wells were still being drilled and production was rising. In 1928 there ere 23,800 barrels of oil produced from the shallow wells.

If a rig blew from gas pressure as above and a new rig built on the location extreme caution had to be used. Crew members had to be careful of being gassed. The rig made of wood and lots of the gas floating around, any spark could cause an explosion or another rig fire. Copper mallets were used as hammers to reduce the risk of sparks. Perhaps this is why there was a saying "Rigs of wood, Men of iron", about those who worked in the oil fields.

Some advances were being made as they began to cement casing in and use more valves to control pressure. After one rig blowing up the following account is recorded by Cecil W. Gross:

> "They got the rig built and we got it rigged up and had put another valve on the casing and were going to close it to hold the gas. We had run a cement back around the casing in the collar. The Superintendent of the Texas Company was there to watch the work. They had all been working around the well to make sure that everything was all right. They had a pressure guage on the valve and closed it and had been watching it and all of them but Melvin had gone to dinner. He was still watching the gauge. He said it registered 1100 pounds the last time he looked. He had started to dinner. I had just come on tower and Frank Quin had left. We had two two inch lines coming out of the boiler--a valve on each side of the boiler on top. The valve, cement block, and the casing started to come out of the hole and smashed the rig down and a steam line broke and the boiler was acting up. I had got up on one side and was closing a valve on that side. He said, "Did you see them tools?" I was inside and had not seen them. He said they went so high that they looked small. When they came back down they fell pretty close to the rig and fell over and were badly bent and had some cable on them, and the rig was mashed down again. We had another mess to clean up

and had to have another rig built. This time they were going to cement the casings from top to bottom. We had to get the gas shut out. We were pumping the mud out of the sump with what they called a mud hog and it was blowing the mud out faster than we could pump it in. So they were going to lubricate the mud in. We had some stuff that was heavier than mud (bentonite) and we were mixing it with the mud. We had about a 25 ft. joint of pipe screwed on the joint of casing that came out of the well and it had a valve on the bottom of it to let the mud in to the well. When it got empty we would close the lower valve to hold it in the well and open the top valve and let the gas out. We kept doing that until we had the gas shut out. First we cemented the outside casing. We had a wooden plug that just fit the casing. We put the plug in the casing and drove it to about 25 ft. from the bottom and pumped the cement around the outside of the casing until it stopped. We let it set for a few days and then drilled it out. We had a truck that mixed the cement and pumped it in the hole. After we drilled the cement out we ran a smaller string of casing with a packer on the bottom and we were holding the string of casing with a brake. We pumped cement around the outside of the smaller pipe between the two pipes until the cement commenced to show up the smaller pipe and let it down on the packer with the brake and then pumped some more between the two pipes. The gas was shut out and the hole was clear and they were ready to go again. They were trying to get to deeper sand. Buck and Perry were on tower. They run in and started to drill. Melvin was there and they stuck their tools. They fought them awhile and got them loose. Melvin drilled and made about 5 ft. and bailed out and Melvin told them to go ahead. They had not gone far when they stuck again and they never did get them loose. Blair had quit and Melvin had put me to dressing tools for John. They could not jar them loose. They ran a knife and cut the cable at the rope socket and run a fishing string in and got a good hold on them, but could not get them loose. I left to go to Price about this time and they were still jarring on the tools when I left."

In 1931 California Oil Company, now Chevron Oil Comapny, announced they would make a real effort to test the deep sands. They moved in 11 houses; 1 store to house their tools; an office; 5 bunk houses; wash and bath house; and 2 cook houses. They even built a 7 hole golf course wich can still be distinguished across the road from the new Chevron Office building. They drilled Raven A-1. Drilling began in March 1931 and 2 years later they hit 7135 ft. They swabbed the well to 6315 ft. and shot it with explosives twiceto expand the formation. Rumors were circulated that it flowed at 1000 b/d, however, for some unknown reason it was shut in and not reopened for 10 years. Perhaps because there wasn't a demand for oil or a local market. It has to be remembered that Texas, Lousiana, Pensylvania, and Wyoming were producing large quanities of oil with some wells boasting to as much as 50,000 b/d.

In Rangely oil leases were renewed, surveys taken and shallow wells continued to produce their small quanities of oil. Drilling into the deep sands was not tried again for 10 yrs.

Ten years later demand increased. Rangely had showed great promise of oil and accessability was easier. The cost of oil had risen and with it the demand because of WW II. It was then 50 years after the first speculation of oil in Rangely that the ...wer formation was made known and the deep sands yeilded large volumns of "black gold". The boom which had been dreamed and hoped for occurred.

Likethe gold seekers, oil seekers lived in tents, shacks, suffered from cold, heat exhaustion, disappointment, injury, fear, and failure with few success stories. Many desserted the "patch" to find other trades and some "struck it rich".

SOURCES

1. "An Isolated Empire" by Frederic J Athearn 1981. PP 104

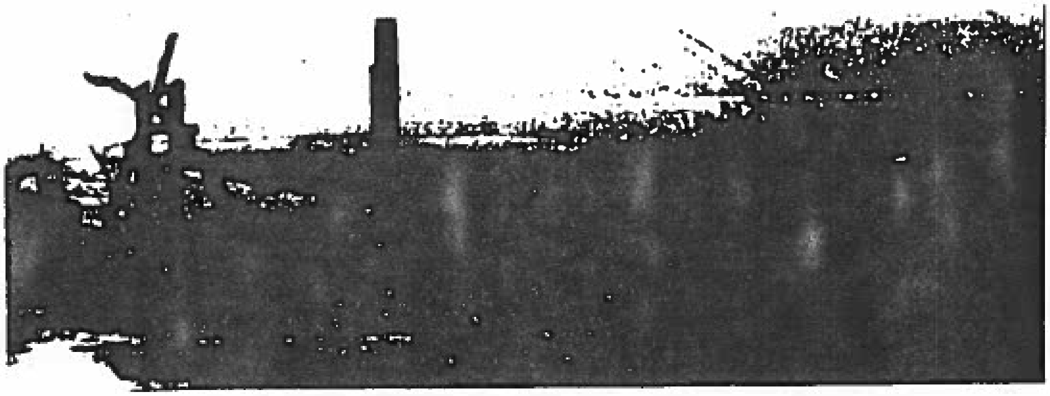
2. Thesis by Welton L. Pollard June 1957. "Development of the Western Frontier". PP 83-100

3. "Stories about the White River Valley and Life of Cecil V. Gross" 1972.

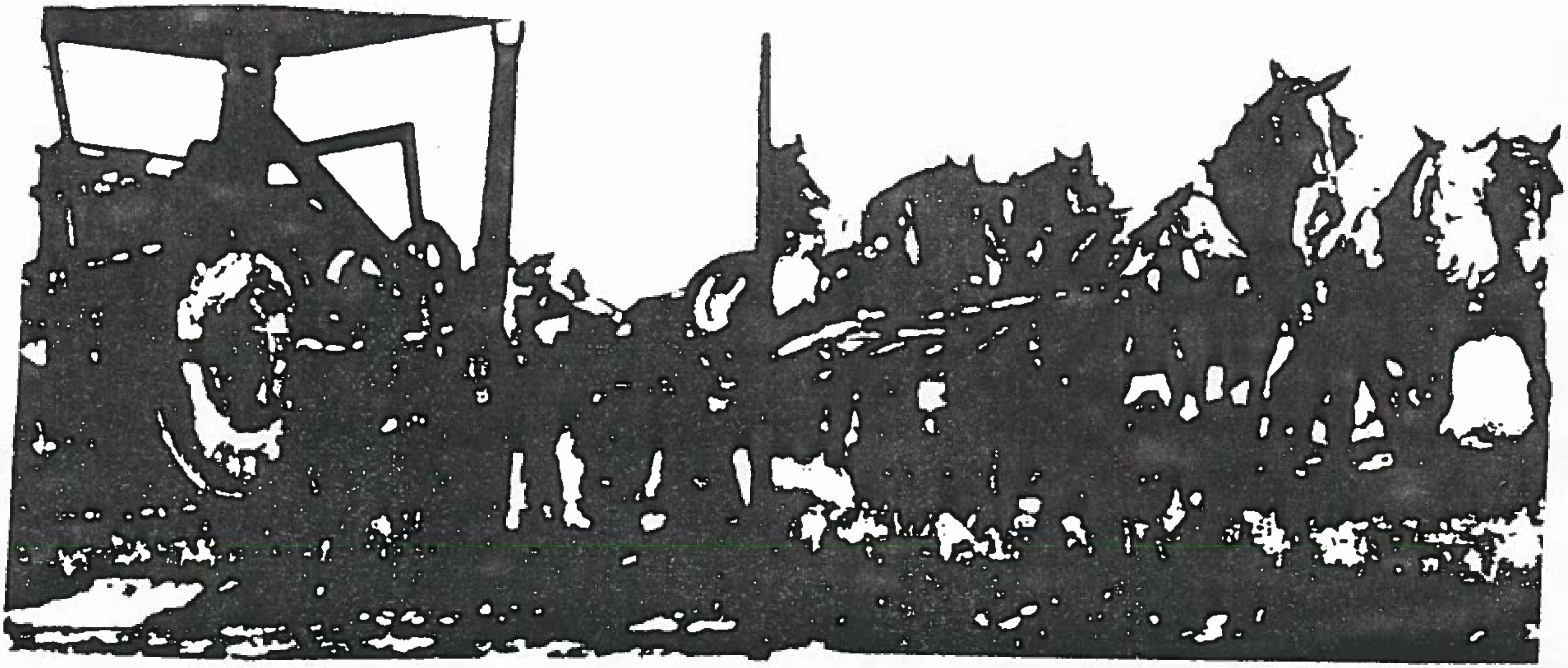
4. "Rocky Mountain Oil History" by Russ Roundtree. 1984. PP 12 and pictures.

5. "This is What I Remember" Vol 2. Compiled by Rio Blanco County Historical Society. PP 235.

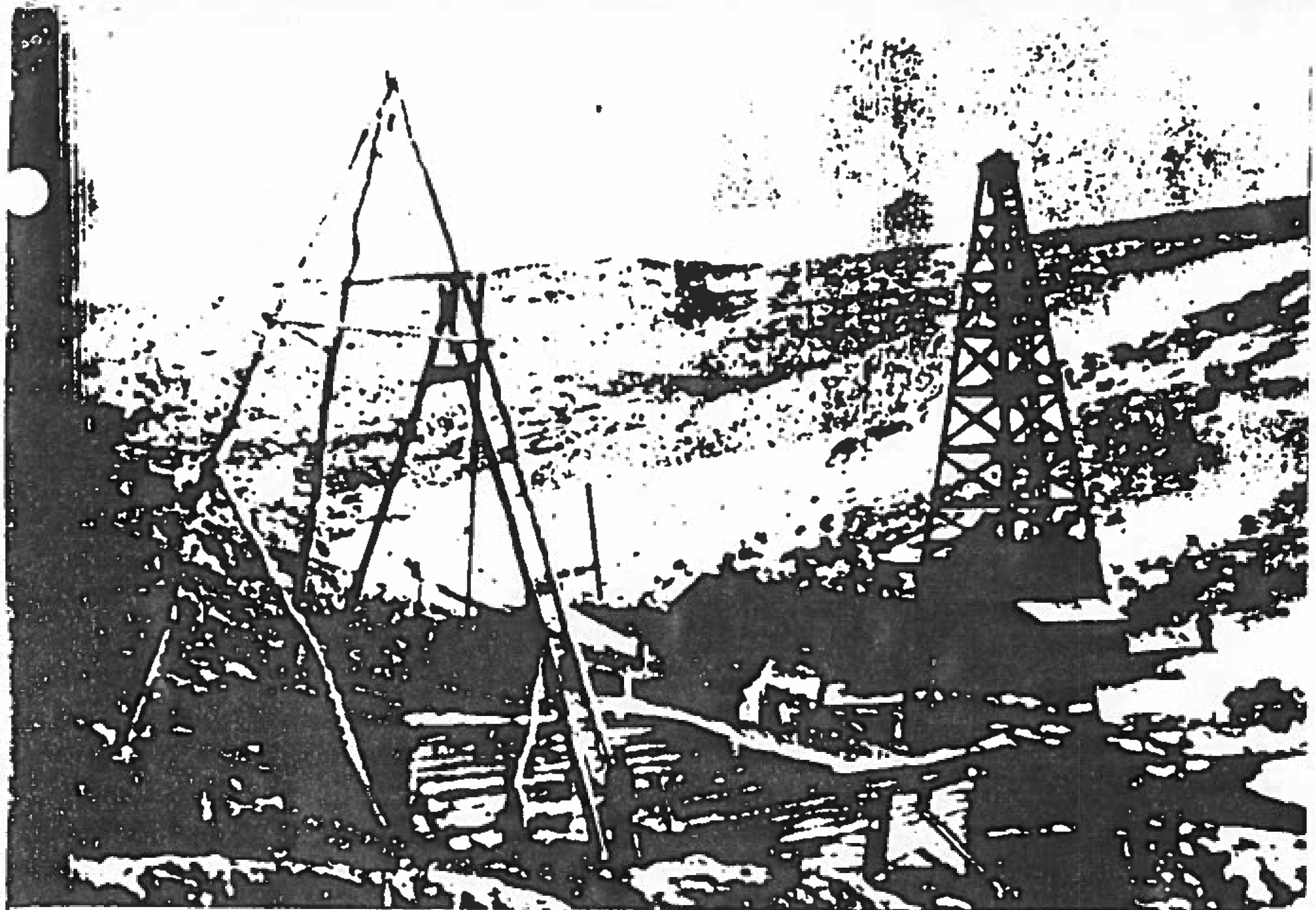
Excellent
20/20
Hope you don't mind.
I printed up 20 of these.

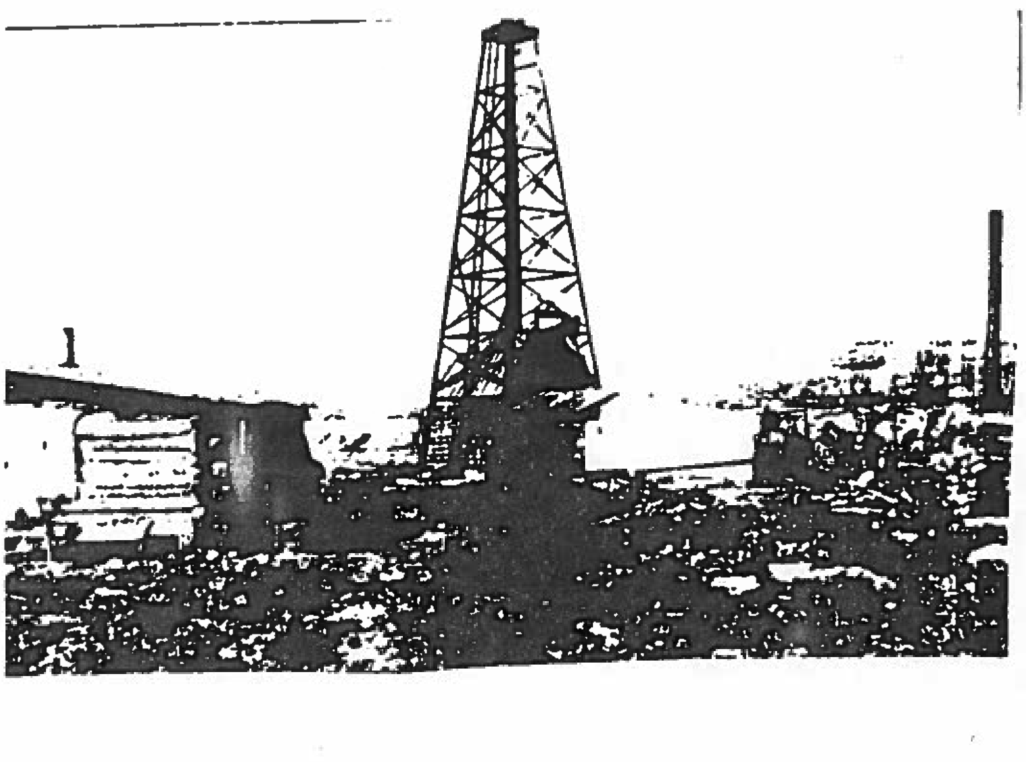


Prospectors filed placer claims on land near oil seeps (left). Drillers validated claims with spring-pole rigs (above).



MOVING AN OLD CABLE TOOL RIG.

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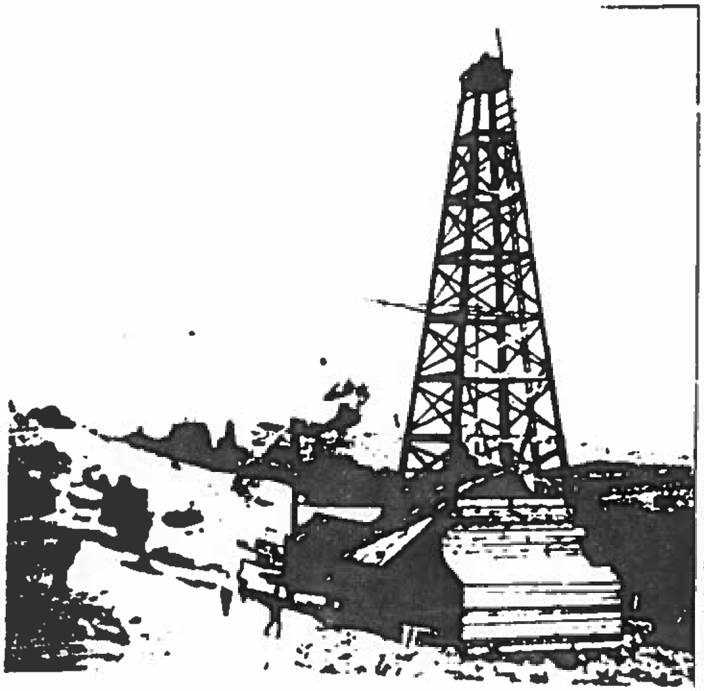
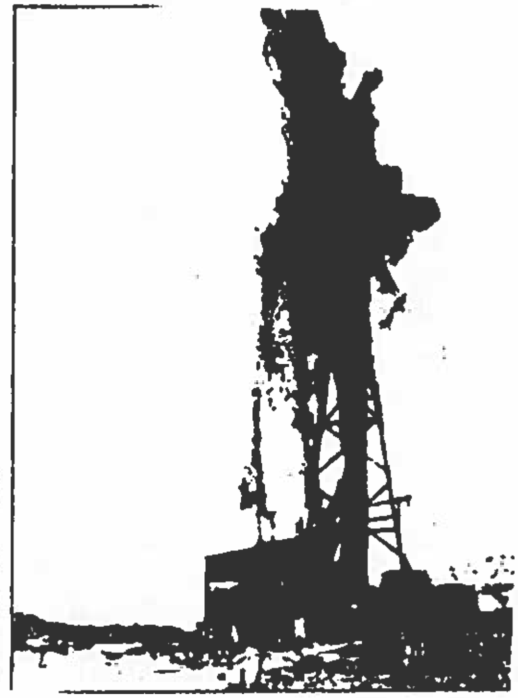
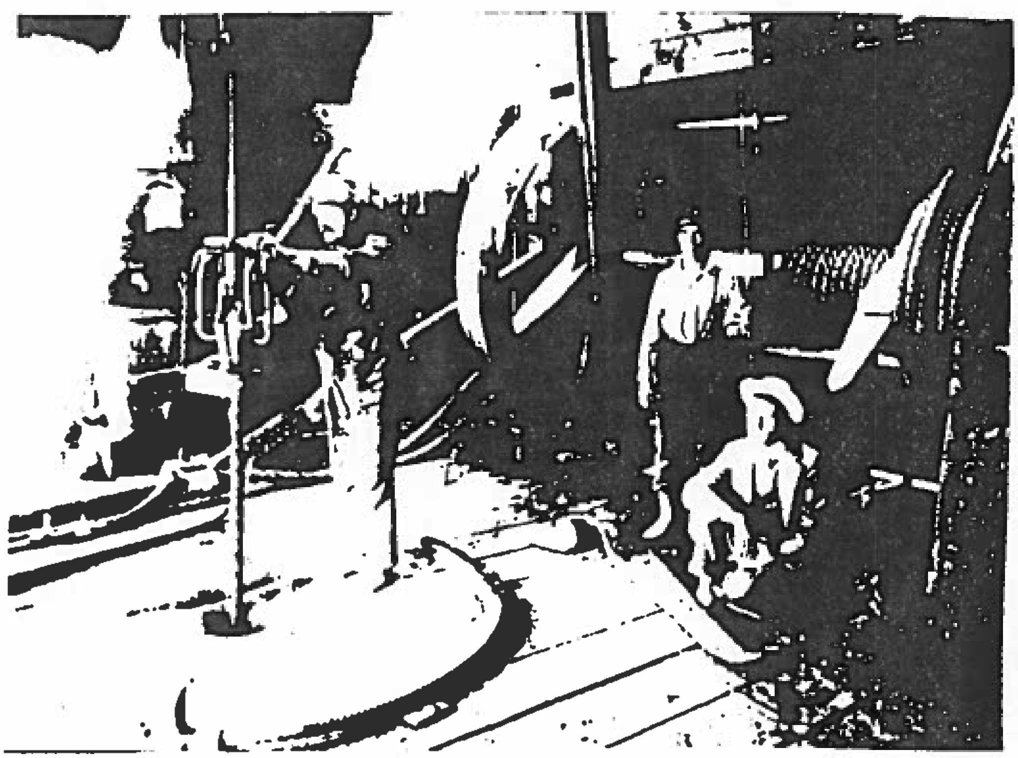






april 22, 1921

FIRST OIL SHALE CLAIMS TO BE PATENTED IN UTAH

Last week there was filed for record at the County recorder's office patents for eleven Doyle oil shale claims. The patents were issued to Verner Z. Red et al and are located near Watson, Utah. These are the first oil shale claims to be patented in Utah. Nile Hughel did the engineering work for the Reed interests.

VE April ?, 1906

Flow of Oil Increasing.

The owners of the Dewey oil spring have released the information that as a result of the campaign of development work inaugurated last winter, when J. M. Roseberry became interested in the property, they have secured a substantial increase in the flow of oil. Under the supervision of Mr. Roseberry's son they have driven a tunnel along the oil sands a distance of nearly 200 feet As the work on the tunnel has progressed the flow of oil has steadily increased until at the present time they are able to store about five barrels of oil every twenty-four hours. The normal flow of the spring before development work was attempted was only three gallons per day

Recently Jas Richardson became interested in the property and he has succeeded in interesting Eastern capital so that from now on the work of development will take on new life and energy. The oil is now being conducted by gravity from the tunnel through pipes to the storage tanks. Later on a refinery will be installed, the oil again being carried through pipes from the collecting or storage tanks for crude oil to the refinery and from the refinery to the permanent storage tanks for refined oil.

Later on, if the volume of oil justifies the expenditure, a pipe line from the oil tanks to the railroad, will be laid and the oil thus conveyed by the force of gravity from the oil sands to the railroad. The work on the tunnel the past winter has been performed without being heralded abroad. The owners of the property, including County Attorney Pope who still owns an interest

in the property, expect to make their money from the sale of oil & present indications are that their reward is near at hand.

HISTORICAL DEVELOPMENT OF OIL AND GAS PRODUCTION FROM UTAH'S [illegible] FIELD AND UINTA BASIN

Department of Natural Resources
Division of Oil & Gas Conservation

Paul W. Burchell
November 27, 1966

The first oil well drilled in the Uinta Basin was spudded in 1900. It was in Sec. 35, T. 15 S, R. 23 E, Salt Lake meridian, and was called the John Pope No. 1. The well was abandoned at 1,000 feet without encountering shows of oil or gas (Hansen, 1957). Sporadic drilling followed for several years until 1925 when gas was discovered at both the Cisco and Harley Domes. Gas is from the Jurassic Morrison, and the Cretaceous Dakota and Cedar Mountain Formations at the Cisco Dome and was used for a few years as a source of carbon black. The government finally closed the carbon black plant as a wasteful use of a natural resource, and the field has remained generally idle since (Quigley, 1958). The nearby, shut-in Harley Dome field had gas in the Jurassic Entrada Sandstone which contained 7% helium; this field was subsequently made a Federal helium reserve. However, in recent years the Government released the reserve status and opened the area to public leasing. A California operator has acquired the majority of the mineral rights and entered into a contract with the U.S. Department of the Interior for extracting the element helium.

During 1925, another discovery of gas in commercial quantities was found in the Cretaceous Frontier and Jurassic Morrison sands at the Ashley Valley Field. The Field supplied gas to the town of Vernal and Ashley Valley until abandonment in 1941. Deeper drilling on the Ashley Valley anticline in 1948 resulted in the discovery of oil in both the Pennsylvanian Weber Sandstone and the overlying Permian-Park City Formation. This finding is recognized as opening not only the first commercial oil field in the Uinta Basin, but in the State of Utah as well.

With the discovery of oil at Ashley Valley and new emphasis in exploration due to encountering hydrocarbons in nonmarine sedimentary rock in other states, drilling activity in the Uinta Basin increased. This new tempo resulted in discoveries of oil in the Tertiary Green River Formation at the Gusher and Roosevelt Fields during 1949, and the discovery of oil and gas in the prolific Red Wash Field in 1951.

[illegible] of hydro[illegible] is affected [illegible] (Fouch, [illegible] mstead and [illegible], 1969).

Subsequent drilling has resulted in development of additional fields with significant quantities of oil and gas. In particular is the Bluebell Field, which is located 9 miles [illegible]west of the town of Roosevelt in Duchesne County. Interest in the area was engendered initially by the belief that porous shoreline sands may exist in the area because of the proximity of the source of the sediments. By the time drilling operations were under way, the Roosevelt Field had been discovered and the unexpected basinward position of that field caused some feeling that Bluebell may also be too far basinward and the fracture reservoir possibilities of the area were advanced. Drilling by the Humble Oil and Refining Company (Carter) on the No. 1 well site in Sec. 6, T. 1 S, R. 2 W, USM, supported the fracture reservoir idea but, at the same time, offered encouragement that normal sand reservoirs might occur somewhere in the vicinity. The same company drilled their Victor Brown No. 2 well in 1954, located in Sec. 3, and the test offered some evidence that this was likely.

In 1957, Humble completed their No. 2 well from the middle Green River Formation as a gas producer, and supplied their Roosevelt Field facilities situated 7 miles to the east. After the well made 348,040 MCF gas, it became uneconomical to produce and in 1967, Humble sold their/[redacted] with Mr. Victor Brown other in Town traded [illegible] to Uqueahgut, Inc. (pronounced U-kwa-nāt), ~~for salvage value~~. The new operator re-perforated the well in May, at a depth of around 9,100 feet and converted it to an oil producer making 70-100 barrels of oil per day.

Approximately 10 years before Humble started producing their gas well, the Chevron Oil Company's Geological Department considered the Bluebell area as an exploration target. Chevron commenced their leasing activity in 1956, and spudded the Leonard Boren #1 well in Sec. 11, on July 21, 1967. The well was completed November

... Green River Formation in fractured ... at a depth between ... feet and ... feet. The ... discovery was completed for 1,080 barrels of oil per day. Rapid ... resulted in 6 wells producing over 4,300 barrels per day by October, 1968. ... has 2 wells drilling and 2 additional locations staked. The field boundary has not been delineated and extension tests are being conducted on 320-acre drilling units.

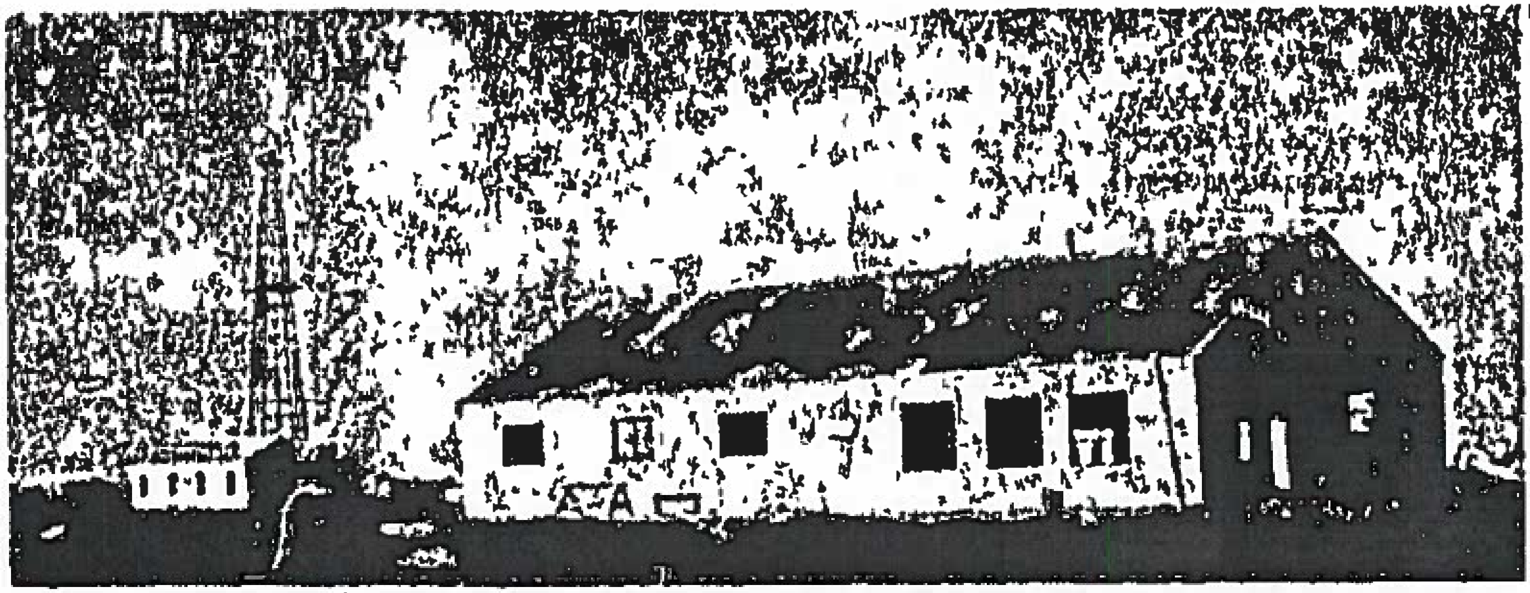
A map of the Bluebell Field and surrounding area is shown in Figure 1. All oil and gas fields in the Basin are located in Figure 2, and graphical curves representing the Basin's growth of production are shown in Figure 3. Figure 4 lists the producing areas included within the Uinta Basin in chronological order, illustrating the increasing contribution of these fields to the Basin's reserves.

Recent tests of a Bluebell Field well by Chevron at the rate of 42 barrels of oil per hour, pointed up current significant growth of the Uinta Basin. Production curves in Figure 3 show that hydrocarbon sales progressively increased from 1948 to 1965, and then began to decrease due to a lack of discoveries. The graph begins to show a mark upturn in production in 1967 and this can be attributed to the "deeper pool" discovery in the Bluebell Field. The possibility of the curve surpassing the peak reached in 1965 is in the offing.

As can be observed from Figure 3, development of reserves in the late 1950's saw an unprecedented effort which can be directly attributed to the construction of pipeline outlets. The Uinta Basin is now served by 3 major pipeline outlets (fig. 2): The Rangely-Salt Lake Crude Oil Pipeline, the Pacific Northwest Pipeline - El Paso Natural Gas line, and the Mountain Fuel Supply - El Paso Natural Gas line. The second line services only a small northeast part of the basin while the third line provides the first accessible major outlet to market for Uinta Basin natural gas (Folsom, 1963).

The Uinta Basin ranks second to the Paradox Basin as the most productive oil and gas province in Utah. Oil production from the Uinta Basin is 32%, and gas production is 47% of the State's 1968 total. The largest part of both oil and gas production comes from the Red Wash Field. Although Ashley Valley [redacted] the second largest producer of oil. It ~~was~~ soon ~~came~~ dropped to third position upon the [illegible] of [illegible] Bluebell ~~field~~. The Bar X - San Arroyo - Westwater gas area is second largest in gas production and is followed by the Chapita Wells Field. As of 1965, water associated with hydrocarbons production from the Uinta Basin represented 53% of the water produced by oil and gas fields in Utah. Of this amount, Ashley Valley was responsible for 43%. It should be noted that the water produced from this field is of such a quality that it can be used for irrigation and livestock purposes (Goode and Feltis, 1962).

Beginning of Community at Red Wash



CALIFORNIA COMPANY buildings at Rec Wash to provide warehouse, office, garage and cafeteria. Other buildings under construction include 4 cottages and 3 duplex apartments.

Homes for Ten Families Being Built at New Oil Field

Oct 18, 1951

An extensive building program, including 4 cottages, 3 duplex apartments, office, warehouse, garage and cafeteria are under way at the Red Wash oil field, 35 miles southwest of Vernal.

Ashton Bros. of Vernal have the contract for the erection of the buildings and will have completed the warehouse and cafeteria this week. Ashtons are also constructing a boiler house for Battery "B" storage tanks at the field and a water pump station on Green river, where water is being pumped to the settlement.

This construction is being undertaken by California Company with the idea of a large company-type settlement to be located at the field in the near future. With improved roads to U.-S. 40, Vernal should benefit considerably from this new addition to the county.

The Engineers Limited Pipe Line Company has completed the 12-mile water line from Green River to the Red Wash storage tank. The line is a 3-

(Continued on page 8)

HOMES FOR TEN FAMILIES BEING BUILT AT OIL FIELD

Continued from page 1)

inch type, and will be buried to a depth of 5 feet as soon as wrapping and coating are finished

The intake for this pipe is 7 miles below Jensen on the Green River, and runs directly to Red Wash over a large area of rock and hard-packed clay. Water from the storage tank is carried to the many well settings where drilling is in progress, to keep the circulation cool.

It is understood that a survey for a new and shorter road to U. S. 40 has been made by California Company. The road will reduce the distance from Vernal to the field to about 35 miles. The route would take off the Bonanza road about two miles from U. S. 40, near the Siddoway reservoir, and come into the present road near the field.

HOW BIG IS THE OIL FIELD?

"How Big Is The Rangely Oil Field ?" is the question most asked in Denver and Colorado business circles these days. The question arises from the great state and national publicity that has been given the field, and the wide spread inestimates of ultimate production of the area.

Rangely is a great oil field, but it is not the "best field in the United States" as some of those interested in the field have said.

A leading geologist, with a large following among oil officials, has chilled enthusiasm for the field somewhat by estimating ultimate recovery at only 80 million barrels of oil. This figure is topped in responsible oil circles by an estimate of 400 million barrels. Most authorities mention 300 million barrels but say until 300 wells have been drilled in the deep Weber sand no accurate estimate of ultimate recovery is possible. The southeast section of the field, as yet an unknown quantity, must produce heavily to bring production figures to 300 million barrels, leading oil officials say.

Rangely is located in the north west corner of the state of Colorado along the northeast flank of Uintah basin in Rio Blanco county. Geologistt describe it as an asymmetric anticline, the surface closure of which extends eighteen miles along the axis and nine miles across the axis and has a closure of 1600 or 1700 feet. Gelogists, generally, think the Weber sand, the deep producing horizon, probably has an area of about 15,000 barrels an acre.

The field originally was known as Raven Park. In 1902 several oil placer claims were staked because of an oil seep along the White river. The local locators later drilled wells and found oil in fractures of the Mancos shale at from 400 to 700 feet. In 1917, Standard Oil Company of California acquired acreage and drilled some shallow wells. After that date, according to geologists, numerous deeper wells have been drilled by Richmond Petroleum, Midwest, Texas company and Associated Oil company.

A number of oil companies have spent large sums of money without satisfactory results. At various times, many individuals and oil companies have released all of their acreage at Rangely. They figured the field was a "dud."

The California company, subsidary of Standard Oil Company of California, completed the first Weber sand well in 1933. Production was around 200 barrels of oil a day but oil was selling at only about 40 cents a barrel. The well cost around $400,000 and was considered to be uneconomical. At that time, the California company had spent around one million dollars in the Rangely field, according to its officials, and had one well that produced a small amount of oil for which there was no market.

But the European war created a vast demand for oil for use of the armed forces and in 1943 the California company went back to Rangely and started drilling a second Weber sand well. To date, the company has completed around forty-five producing wells. There now are 117 Weber sand wells in the field. There has been only one failure to date.

A pipeline which transports the oil to market started operations in September, 1945. It has a capacity of only around 29,000 barrels of oil a day. As a result, wells are "prorated" by the company that buys the oil and are held down to a production of 200 barrels each a day.

The Weber producing section is around 700 feet in thickness according to best estimates. One difficulty in attempting to estimate the ultimate recovery of [illegible]

first discovery of oil in the Shinarump sand in Colorado. Oil was found in two zones, one thirteen feet thick, and the second about seven feet thick. The result obtained from drilling other wells to the Shinarump sand will have an important bearing on ultimate recovery figures, oil men point out.

The U. S. geological survey recently quoted an estimated production of 20,000 acres for the Rangely field. An operating committee now is working on plans to unitize the area. This will result in more regularity in well spacing, conservation of gas, etc.

So, it is a little early to do much accurate predicting in answering the query "How Big Is the Rangely Oil Field."

The first President to issue an annual Thanksgiving proclamation was Abraham Lincoln, in 1865.

The headquarters of the United States Custom court is located in the city of New York.

Cafes May Rebel Against OPA By Closing

If price rollbacks on meat meals are made effective in Denver, the Colorado Restaurant association will recommend that its members close their doors, Rex Reese, president of the association, said last week. Such action, he said, would result in the closing of most restaurants in the state.

At a recent meeting of the board of dreictors, Reese said, action ws deferred at request of regional OPA officials. He said restaurant owners are hopeful an adjustment will be made, and drastic action will not be required.

The rollback to June 30 ceilings is not being enforced in this area at present, Reese stated, and most restaurants are operating under the prices they adopted after the controls were lifted.

He said if the price rollback were made effective here, the Colorado Restaurant association would first seek an injunction against it, and if that failed, would recommend that its members close.

Meeker Cowboy Wins Rodeo Competition

Tex Crawford smiling buckaroo from Meeker, is the top cowboy of the Western slope, followed closely by Lester Yount and Jim Sheridan, also from Meeker. They won the most points in the contest held by the Western Slope Rodeo association this year and divided the $400 extra money offered by the association. Rifle, Vernal, Meeker, Steamboat, Craig, Hayden and Kremmling are members of the association.

Winner of the Western Slope Derby, and the added $400 at Kremmling was Scotty owned by John Chambers and trained by Ben Anderson.

Karl Allen of Vernal with Silver Dick was second and Kuter owned by R. A. Mock of Rifle was third.

It is expected there will be even greater competition next year for the special prizes hung up by the rodeo association.

Casper Company To Drill in Utah

Sixty thousand acres of land near Boulder, in Garfield county, have been leased by the Reserve Drilling Co. of Casper, Wyo. for a series of oil well tests.

First well drilled in the area several years ago was abandoned by engineers after reaching an estimated depth of 3212 feet.

K. A. Spitznagel and Bill King, company representatives, and Clyde King and Ott Haws, Boulder, after a trip by pack mules to the Circle Cliff valley stie of the old well, said that there is a possibility that the company would redrill the old well.

Home Building Cost May Show Drop in 3 Years

"A luxury five-room brick bungalow, that cost $7,500 to build in 1939 now costs $11,500 to build, and when prices become stabilized at postwar levels it probably will cost about $9,000," said C. J. Conroy, director of the Denver board of realtors, commenting on present and future trends in Denver.

Conroy pointed out that the same house, if it were built now would not have as good materials and would not be as well constructed as the prewar house.

Prices To Drop

Old houses which are selling at excessively high prices, he said, will be the first to drop in value when construction begins to affect the market.

"Prices of old houses are already beginning to decline," he said. "By next spring, I think the old house that now is selling for $10,000 will be down to $8,500.

Three Years

He predicted building costs would become stabilized in approximately three years at a level about midway between present and prewar costs.

"It all depends," he said "on when materials begin to roll. In my opinion, if controls were taken off building materials, prices would go up for about six months, and then drop to levels below the present ceilings."

Shinarump Rooth No. 2 Placed on P

Continental Oil Rooth No. 2 well west edge of the R which has been pr the Shinarump s placed on the pump

The Shinarump s known quantity in area and oil me watching the Rooth an effort to estimat mean in the way to the area.

Fine production

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Concrete	
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Overhead	
Other	
Profit	
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Commission	
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Vernal Express April 9, 1926

Huge Oil Derrick Looms Up Against Hills on Outskirts of Vernal

Maud Ellen Oil Company Will Spud In Neal Dome Next Monday or Tuesday

Vernal is now getting oil rigs at her very door. This week the derrick of the Maud Ellen Oil company on the Neal dome, 5 miles north of Vernal, was completed and the structure can easily be seen from almost any section of the city standing out on the face of the hills.

Officers of the company report that the well will be spudded in Monday and hopes are running high for the finding of oil at a shallow depth. This structure promises to be the best producer in the state.

Another well will be drilled at Dog Valley 7 miles northwest of Vernal.

Speaking of the remarkable possibilities of these two structures, the Deseret News says:

G. G. Phillips of Denver Colorado president of the Colorado Utah Oil company, who spent five months last year with geologists working out different oil structures in eastern Utah from the San Juan field to the Uintah mountains states that he found two most promising structures in the Uintah Basin, near Vernal. One, he says, is a Pennsylvanian (carboniferous) formation, located five miles north of Vernal, the other a Tertiary formation, comprising about 1000 acres located about seven miles southwest of Vernal.

Mr Phillips states that the Maud Ellen Oil company, who are drilling a test for his company on the Pennsylvanian structure and known as the Neal dome, will complete the building of their derrick this week and will probably spud in the well next week. The shinarump formation, which the Marland Oil company, at Greenriver, found at 2400 feet with a good showing of oil will be reached on the Neal dome about 700 feet, he believes and the Moenkopi formation which is the objective of the Marland will be reached at about 1400 feet while the Pennsylvanian formation which is the objective of the Neal dome will be reached at about 2300 feet. It was this same objective that was reached on the Cane Creek structure at 2024 feet.

Mr Phillips is completing arrangements to drill a test well on the Tertiary formation known as the Dog Valley structure and he says they expect to reach the Wasatch sands at about 1400 feet and reports made by his geologists indicate that production should be encountered there. The Tertiary formation is one of the heaviest producers per well in the country. It was from this formation that the gusher wells of California have produced a majority of their oil, the largest well on record from this formation being the Lake View gusher in the Midway Sunset field of California, which produced 81,000 barrels daily.

Mr Phillips will move his office to Salt Lake on the first of April, as he believes Utah is the coming oil field and he and his associates demonstrated their confidence in the future of Utah as an oil field last year by spending several thousand dollars in working out different structures and he believes they have found two worthy of aggressive testing.

The company also owns half interest in a permit located on the east anticline near Bluff where the Midwest Utah Southern is drilling Canyon well No 1.

Officers of the company besides Mr Phillips are E. P. Snowden, president of the Bankers' Mortgage company vice president, R. S. Sphar of the Bankers' National Life Insurance company secretary treasurer and A. P. Preston and George Christensen district judge of Price directors.

The following extract from a report on the Neal dome and Dog Valley structures by Geologist F. J. B. Sur which has been rechecked for the Maud Ellen Oil company by Geologist J. W. McGee for the Maud Ellen company is of interest owing to the activity in the district.

The Neal Dome. "A Pennsylvanian (carboniferous) formation which has been known as a prolific produ

(Continued on page 8)

Maud Ellen Company to Spud in Well on Monday

(Continued from page 1)

cer of high grade petroleum and gas throughout the Mid Continent Oil fields of the United States"

Exposed upon the surface the lowest rocks found were those of the Upper Aubrey, or Park City group of the Triassic rocks, in depressions near the crest of the structure indications of the top of the Pennsylvanian (carboniferous) formation and designated by Powell as the Lower Aubrey group were found"

What has great bearing upon the structure are the seepages in the Uintah mountains one to the north of Skull Creek in Colorado and one in the vicinity of Whiterocks in Uintah County Utah, these seepages show complete saturation of hydrocarbons of a liquid form which are the residues of a very high-grade oil, they are in the Pennsylvanian formation and show that these rocks do contain petroleum they lie to the east and west of the structure'

Conclusion The Neal Dome is hereby recommended and it is advised that drilling operations be undertaken for the above mentioned reasons and findings, from tabulations the total depth of a complete test through the Pennsylvanian and into the Mississippi sands should not exceed 2 500 feet It is my belief that this test can be made with all the assurance that it holds forth every possibility for commercial production of oil and gas and this opinion is governed by as careful unbiased study as we can give"

The Dog Valley Structure "A tertiary formation it has been known that surrounding the Uintah Basin, in the Wasatch exposed rocks at numerous places where they have been tilted that great quantities of sand completely saturated with oil of a fresh quality occur In the vicinity of Vernal is an outcrop of oil sand covering many acres over 100 feet in thickness which seems to replenish itself as time goes on With the object of finding where this oil came from we spent many weeks in investigation and examination under the instruction and at the expense of Geo O Phillips of Denver Colorado'

'The type of structure found is known as plunging anticline, this type of structure has been a prolific producer of petroleum in many parts of the world including the United States The structure is a closed one and should allow for the trapping and gathering of all of the hydrocarbon contents of the surrounding country from which it draws'

'The tertiary formation has produced in the United States more oil and in greater quantities per well than any other known formation, it is from this formation the great gushing wells of California have produced their oil, the largest well of record from this formation was the Lake View gusher of the Sunset field of California which produced 81 000 barrels daily It is in this formation which we are working and reporting upon in the Uintah Basin and the evidence of the sands where they are exposed upon the surface leads us to believe if we can find structures in it folded in the proper attitude we can expect wells of great production"

'The well that was drilled many years ago into this formation and into the sands which we have seen exposed upon the surface shows us that oil does exist seemingly without a doubt This well was drilled off the structure in a poorly located position but it goes to prove that a well drilled on the structure in a favorable position will get oil A test well to prove this structure will probably not have to go more than 1 500 feet in depth and at the most not over 2 000 feet will be required to exhaust all possibilities'

'Conclusion This Dog Valley structure is hereby recommended and it is advised that drilling operations be undertaken for the above reasons and findings It is my belief that this test holds forth all of the possibilities that a geologist can see and find for commercial production of asphaltic base oil'

7-25 1974

In the Good Old Days

20 YEARS AGO

JULY 22, 1954

Frontier Airlines will observe its 10,000th flight in Vernal during the dedication of the new terminal building at the Vernal Airport this Saturday.

Sharon Searle and Ralph Earl Olsen will be married August 5. The bride-elect is the daughter of Mr. and Mrs. Carl E. Searle. The benedict-elect is the sone of Mr. and Mrs. Isadore Olson, Lewiston, Utah.

Lorn Richens arrived Monday to spend a 30-day leave from the U. S. Navy with his wife, former Stella Jenkins, and his parents, Mr. and Mrs. Lynn Richens. He has spent sometime in Korea and just returned from a world cruise. He will return to Norfolk, Virginia, accompanied by his wife, then launch out on a Carribean cruise.

DUE TO the forest fire dangers connected with the discharging of fire works, the Ashley National Forest has been closed to the use of fireworks during the 1954 season. The order provides that until further notice it shall be unlawful to throw or place a burning cigarette, cigar, match, pipe heel, firecracker, or any ignited substance in any portion of a national forest closed by the order.

Clair Ross Hopkins was one of two boys chosen at Utah Boy's State to attend Boy's Nation at the University of Maryland from July 23 to July 30. The other youth was Paul Liston of Knysville. Both were from Jansen City in Lee County of Boy's State.

Clair Ross, who is the son of Rep. and Mrs. Clair R. Hopkins, 91 North 1st West, left on Wednesday morning for Washington and Boy's Nation.

UN-MIGHTY DOLLAR

To have a dollar, years ago,
Would fill you with assurance;
But the dollar of today
Is built for spending and not endurance!

30 YEARS AGO

JULY 27, 1944

The first field class in geology to be conducted in Uintah Basin, commenced Monday when students from the University of Utah, BYU, and Utah State Agricultural College arrived in Vernal.

The students have been busy this week taking tours to interesting places in the Vernal area.

Dr. I. O. Horsfall, head of the University of Utah Extension Service, was here Sunday and Monday to assist in getting the school under way. Dr. Horsfall was accompanied by Mrs. Horsfall. Dr. Horsfall also met with the Museum committee of the Vernal Lion's Club Monday morning.

THE INTERMEDIATE Current Topics Club entertained at their annual children's party Friday afternoon at the city park. A program and games were enjoyed and refreshments served to approximately 45 guests.

It has long been known that deposits of oil in the United States are almost inexhaustable, some sources estimating them to be 400 billion tons from which 100 billion barrels of oil might be obtained. While oil shale is fairly well distributed over the entire country, the most valuable deposits lie in the Green River and Wyoming. The richest shales in the formation will produce as high as 60 to 80 gallons of oil per ton of shale, according to U. S. Commerce Weekly.

The latest available figures show that there are in Scotland between 480 and 884 million tons of recoverable oil shale. The industry did exist under its own power, however, until 1923 when it was subsidized by the government as a defense measure. Six plants are said to be in operation at the present time, using 5,000 tons of shale daily.

Since Estonia, on the Baltic Sea in Europe, has no hard coal deposits, approximately one-third of the shale mined there is for fuel, the largest consumers being railways, stationary furnaces and power plants.

With deposits of some 5 billion tons of shale, from which 7 billion barrels of oil may be obtained, this Estonian region, after the war, may look forward to an active export trade with neighbors on the Baltic and in Scandinavia.

76 YEARS AGO

JULY 28, 1898

Mr. and Mrs. O. B. Calder started this morning for Salt Lake City on a visit to relatives and friends.

Mr. and Mrs. Joseph Hacking arrived in Ashley last week. They report a splendid trip, the roads being in extremely good condition.

JUDGE RHODES and daughter left Vernal Wednesday. They will remain at the Fort a day or so, visiting friends there, before going to Salt Lake City.

LOST — A bundle containing a lady's black waist, some valuable letters, etc. Said parcel was lost between Vernal and Vernal Roller Mills. The finder will confer a great favor by leaving the same at the Express office.

—Annie Snyder

An officer from Heber is here looking for an escaped prisoner.

A SHOOTING affray between Jack Watson and County Attorney Warf, took place at Price, July 23, the result of which cost Watson his life. The tragedy was caused over a bitter feud, and it is alleged Watson was the aggressor. This is the second shooting affair Warf has been connected with. Watson was 59 years of age and an old resident of Colorado. Warf is out on bail in the sum of $2,000 to appear for trial.

Had it not been for our more energetic neighbor nothing of note would have taken place in Vernal on Pioneer day. In the evening the parade from the Fourth Ward came to Vernal. Much praise is due the committee and those taking part for the success which attended their efforts.

Will Green was over from the Fort enjoying the quietude of the Vernal Twenty-fourth.

THE LAWN party at the home of Mrs. J. C. Dillman last evening was a very pleasant affair. About 50 guests were present, among them visitors from Salt Lake City, Ogden, Provo and Heber.

June 1, 1923

Indian Land Rule Causes Rush for Oil Lands

Regulation prohibiting the leasing to aliens of mineral or other rights on restricted allotted land of Indians were revoked Wednesday by Secretary Work on the appeal of the Roxana Petroleum company.

Secretary Work based his decision on the ground that the lands are owned in fee simple by the Indian allottees and that "while there is a restriction of the right of conveyance and a quasi guardianship deprives the title of its character of a fee simple estate."

Provisions of the leasing act of 1920 are not applicable to the restricted allotted Indian lands, Secretary Work held, because that act is limited to the public domain or to lands owned by the United States.

The decision does not affect the legal provision that citizens of another country which deny similar or like privileges to Americans and American corporations may not hold leases, it was stated officially.

Secretary Work said it was his purpose to give full force and effect to the leasing act of 1920, which contained that provision but he could not apply that act "either in its words or its principles to privately owned lands of the Indians"

It is expected that many applications from foreign and domestic oil companies for oil land leases will follow this ruling by Secretary Work.

Indians Offer More Land For Oil Leasing

Bidders May Bid on 10 Separate Units Totalling 397 Acres

An invitation to prospective bidders to bid for oil and gas leases on 40 acres of Indian tribal land and 356.86 acres of Indian allotted lands in township 1 South, range 2 west, Uintah special base and meridian, in the Uintah and Ouray Indian Reservation, was issued this week by Forrest R. Stone, agency superintendent.

The allotted land is comprised of 10 individual units averaging 40 acres each. The tribal land and each unit of allotted land is offered for separate lease for a cash bonus in addition to the stipulated royalties and rental at $1.25 per acre per annum. In addition, each successful bidder will be required to pay his proportionate share of the cost of advertising, a filing fee of $5 for each lease obtained, and post a surety bond in the amount of $15,000. A deposit of 20 per cent of the bonus bid and 20 per cent of the advance rental for the first year must accompany the bid. Terms of the leases are 10 years from the date of approval by the Commissioner of Indian Affairs.

Bids received will be referred to the Ute Business Committee on the 40 acres of tribal lands and to the owners of the allotted lands before they are referred to the Commissioner. Leases will not be granted until the bids are approved by the individual land owners.

Bids will be opened at 2 p.m., October 30, at the Fort Duchesne office.

On a previous offering, bids on which were opened August 19, the Carter Oil Company and the Stanolind Oil and Gas Company were high bidedrs on 15,134 acres with a bid of $4.08 bonus in addition to the $1.25 annual per acre rental. The California Company, the only other bidder, bid $1.25 per acre bonus.

However, the Indians recommended to the Secretary of the Interior that he reject the Carter-Stanolind bid as they felt that a bonus of $15 an acre would be more in line.

Those lands were located in townships 1 and 2, ranges 1 and 2 south, range 1 east, Uintah Special Meridian, and adjoin on the southwest the Carter Oil Company's unit block on which the company's Knudson No. 1 wildcat well is located in the Twists Section of Highway 40, 6 1-2 miles west of Vernal.

Going Up Fast

WE'LL SOON HAVE A FIELD HOUSE. Construction of the new Utah Field House of Natural History at the Utah State Park just east of the Uintah County Courthouse is moving at a rapid rate. Twenty Vernal men are employed on the $200,000 project. Nearly all material to be used in the structure was purchased locally. The contractor, C. H. Dorland Construction Co. of Salt Lake City, expects to complete construction by winter. Funds for the construction of this Lions Club sponsored project were appropriated by the Utah State Legislature following its approval by the Utah Publicity and Industrial Development commission. Dedicatory rites will be held within the near future.

FARMERS ARE URGED TO INVENTORY GRAZING LANDS

Herd Numbers Should Be Adjusted to Forage Supply of Ranges

Now is the time for ranches in Uintah County to take inventory of their grazing land and plan adjustments of herd numbers to the forage supply for the coming year, suggests Grant E. Parrish, U. S. Soil Conservation Service conservationist.

Forage available in this year's grass crop now can be estimated closely, Mr. Parrish says, and he suggests that action based upon this estimate can mean the difference between profitable production, good calf crops and heavy weights, or low production with poor weights, low calf crops, high death losses, and depleted and weedy ranges that result from continous overgrazing.

A rancher getting good forage production may graze cows weighing around 1,000 pounds and gets a 90 per cent calf crop with weights averaging more than 400 pounds at six to seven months, Mr. Parrish points out.

However, range forage growth fluctuates in this area, and the livestockman who hopes to use his range to the best advantage, and maintain these profitable levels of beef production, must have a plan of operation flexible enough to allow him to strike a continuous balance between stock numbers and feed.

"The rancher isn't likely to be able to do this unless he understands how to appraise the forage supply on his range," Mr. Grandy says. "Guides to assist ranchers in making forage inventories are available at experiment stations, and Soil Conservation Service technicians working with solid conservation districts are available to give 'on-the-ground' assistance in checking the current forage crop and calculating the carrying capacity for the year."

Stockmen must be as much interested in dry, matured grass as in green forage, and should see that adequate quantities of dry grass are reserved for use after the growing season, according to Mr. Parrish.

It is of great importance that sufficient feed be available at all times, in quantities in excess of a mere maintenance ration, and as insurance against a poor forage production year.

It is also to the operator's benefit to leave enough plant growth to check run-off so that water will penetrate the soil to be used for plant growth, Mr. Parrish explains. A saving of moisture of 20 percent, made possible by grass, leaves, and mulch on the ground, may increase forage by as much as 50 per cent, he says.

Highway Patrol Checks on Vehicle Inspections

The Utah State Highway patrol is working at the present time on an extensive program of equipment checks on the highways and farm roads. Various road-blocks are being set up on the blockaded roads as a follow-up of the state motor vehicle inspection.

A through inspection is given every car and driver; warning

CIRCULATION AUDIT INSURES NEWSPAPER ADVERTISERS

Game Boa[rd ...] To Protec[t ...]

Request of Stockmen That Herd be Allowed To Rehabilitate Denied

Although stockmen have b[een] charged by many with wan[ting] to increase the deer kill, th[...] was disclosed this week a s[itu]ation wherein a group of Uin[tah] County stockmen had reque[sted] that their lands be closed [to] hunting in order to rehabili[tate] a deer herd only to have t[heir] request denied by the U[tah] Board of Big Game Control.

Make Request in May

Under date of May 9 a le[tter] was sent to Ross Leonard, di[rec]tor, Utah Fish and Game C[om]mission, on behalf of the Wi[llow] Creek stockmen and the Bu[reau] of Land Management, sta[ting] that a joint investigation by stockmen and the bureau disclosed that deer had [been] found shot in the Willow C[reek] country with only the [hind] quarters removed, and that condition existed during as [well] as out of the hunting se[ason]. Also, continued the letter, [in]vestigation revealed that [there] had been a material decrea[se in] the number of deer in the [...]

Because many stockmen asked that the area be clos[ed to] hunting a request was made [that] the region be closed for at [least] one year and possibly two [...]

THE VERNAL EX

 Vernal, Utah, Thursday, September 25, 1947

Indians Want $15 An Acre Oil Lease Bonus

Ute Tribe Considers $1.25 plus $4.08 an Acre Bonus Too Low

It was learned this week that the Ute Indian Tribal Council recommended to the Secretary of the Interior that he reject the joint bid of Carter Oil Company and Stanolind Oil and Gas Co. for the leasing of oil and gas rights on 15,134 acres of Indian Tribal and allotted lands, because the Council feels that a bonus of $15 an acre should be paid rather than the bid bonus of $4.08 per acre.

The two companies, which bid $1.25 an acre plus $4.08 an acre bonus, in addition to various royalties and drilling stipulations, one of which provided that drilling of a 7,000 ft. deep well begin within one year from date of lease, were high bidders.

The California Company's bid of $1.25 per acre plus a $1.25 per acre bonus was the only other bidder. Bids were opened August 19.

The lands involved are within the Uintah-Ouray Indian Reservation in townships 1 and 2 S., Ranges 1 and 2 E., Uintah Special Meridian. These lands adjoin on the southwest the Carter Oil Company unit block on which the company is now drilling its Knudson No. 1 wildcat well in the Twists Section of U. S. 40, 6 1-2 miles west of Vernal.

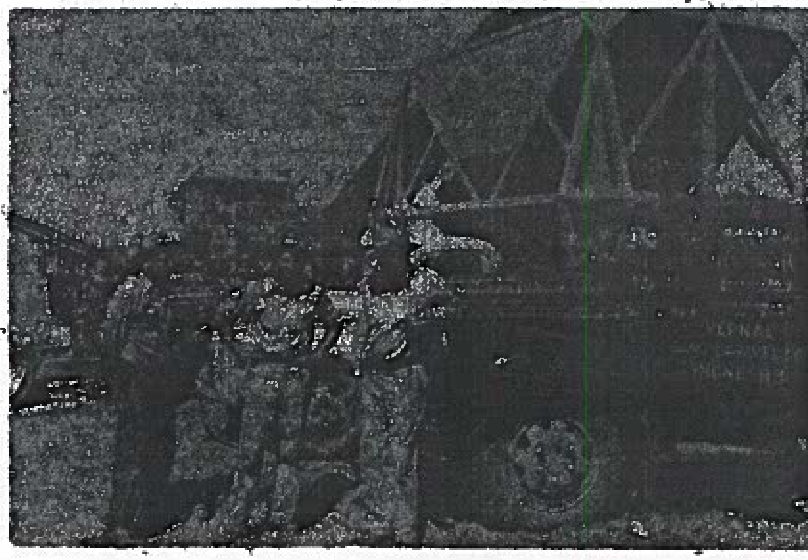
The lease period would be for 10 years and the successful bidder would be required to post a $15,000 surety bond.

The Secretary of the Interior is not obligated to follow the recommendation of the tribe, although tribal wishes are usually complied with.

Funeral Services Held for John S. Hacking Sunday

Funeral services for John

Ready to Go



A FAST GROWING INDUSTRY. Standing in front of their new $40,000 portable crushng plant and fleet of trucks are three of the four partners in the Vernal Sand and Gravel Company. Left to right: Niles Haslem, Ercil Oaks, Stan L. Robbins. The fourth partner, Henry H. Merkley is not shown.

VERNAL SAND AND GRAVEL CO. MAKES RAPID GROWTH IN YEAR

Beginning With Truck, Company Now Has $75,000 in Equipment

When organized in February, 1946, the Vernal Sand and Gravel Company's full equipment comprised only a small rented crusher and one truck. Today the organization has $75,000 of new modern machinery.

Affairs of the company are guided by a partnership of four, comprising Stan L. Robbins, Niles Haslem, Ercil Oaks, and Henry H. Merkley.

The campany's gravel pit and plant are located on a 30-acre tract on the Henry H. Merkley farm 1-3-mile west of Jensen.

Just acquired is a 10 ft. x 36 ft. roll portable crushing plant at a cost of $40,000, with a capacity of 100 to 160 tons of 1 inch minus road gravel per hour. This plant is so constructed that it can be easily moved to various locations. Other equipment includes a semi-trailer truck, four 3-ton dump trucks, a heavy-duty tractor with bulldozer, and a tractor with a high lift loader to load the gravel from the stockpile to the trucks.

building trades, gravel crushing, and dirt hauling. No job, according to Mr. Robins, is too large or too small

Some of the projects on which they have already worked were the laying of the base and the furnishing of the gravel for the 29 blocks of Vernal City streets which the city has just finished paving; furnishing of gravel for the improvement work on Highway 40 between Vernal and Jensen which the State Road Commission has just begun; and the furnishing of concrete gravel for the Stanolind Camp at Rangely.

The company has just been licensed by the State of Utah as highway contractors.

Each of the four partners has had much experience in road construction with the state and with private contractors. Mr. Robins, who resigned in February following many years' service as maintenance foreman with the Utah State Road Commission, has also been employed as construction superintendent by the W. W. Clyde Construction Co., the J. W. Whiting Construction Company, and the Sumsion Construction Co.

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May 31, 1918

LARGE BATCH OF OIL CLAIMS ARE FILED BY R. S. COLLETT

R S Collett has located 165 oil claims which he has had recorded at the county recorder s office this week Associated with him in the claims are Jas Murdock, J W. Musser D H Gustaveson Harden Bennion and several others

The land is located in a section about 55 miles sounth of Vernal It is said that this land will be turned over to and worked by the Utah Consolidated Oil company This company has several other oil land holdings in Uintah and Duchesne counties and the locators on the above claims are all officers and directors in the company.

INCORPORATED UNDER THE LAWS OF UTAH

No. 17

3153 Shares

Lead Bell Mining Company

Mines in Port Neuf Mining District,
Bannock County, Idaho

Capital, $100,000 — One Million Shares

This Certifies THAT B. Tone is the owner of Three Thousand One Hund Fifty three Shares of the Capital Stock of

Lead Bell Mining Company

Cancelled

transferable only on the books of the Corporation by the holder hereof in person or by Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, the duly authorized officers of this Corporation have hereunto subscribed their names and caused the corporate Seal to be hereto affixed at **Vernal, Utah,** this 8 day of January A.D. 1914

LEAD BELL MINING COMPANY • CORPORATE • VERNAL, UTAH

Don B. Colton
Secretary

Sterling D. Colton
President

SHARES 10c EACH

Incorporated under the Laws of the State of Utah

No. 99

2000 Shares

Capital $99,000.00

1,980,000 Shares

WAR TAX PAID

Cub Oil & Gas Company

FULLY PAID AND NON-ASSESSABLE

This Certifies that J. O. Woody is the owner of Two thousand Shares of the Capital Stock of

Cub Oil & Gas Company

transferable only on the Books of the Corporation on surrender of this Certificate properly endorsed In Witness Whereof *the said Corporation has caused this Certificate to be signed by its duly authorized officers and its Corporate Seal to be hereunto affixed*

At Ogden, Utah, *this* 7th *day of* April *A.D. 19*

SECRETARY

PRESIDENT

CUB OIL AND GAS CO.
CORPORATE
Seal
OGDEN, UTAH.

SHARES 5c EACH

July 16, 1926

Maud-Ellen Oil Company Spud in at Neal Dome On Outskirts of Vernal

AFTER DELAY OF SEVERAL MONTHS COMPANY SPUDS IN ON MOST PROMISING LOCATION

The Maud Ellen Oil Company have finally spudded in at their location five miles north of Vernal on what is known as the Neal dome A rather difficult formation was encountered but the drillers have hopes of passing this at about 2000 feet At the present time the hole is down about 100 feet.

C Guy Wakefield, general manager of the company came to Vernal Tuesday and returned to Salt Lake city Wednesday, to see that everything was going along alright at the well He was accompanied by J C. Millick, capitalist of Blackfoot, Ida., who also returned to Salt Lake city with Mr Wakefield

The well was spudded in Su day with a 12½ inch hole, The driller in charge is E Dustin Charles Jenkins of Butte Mont., is tool dresser and A B Wakefield is local manager

The lower part of the La Platta foration was encountered when the well was spudded in This formation is of such a character that it is necessary to mix it with clay in order to bail it out of the hole It sets as hard as cement when left on the bit

June 17, 1921

NEW LOCAL MANAGER FOR THE CONTINENTAL OIL

On June 9, Harmon S Sowards took over the local management of Continental Oil company in Vernal, taking the place of Anton Strebel the former manager.

A R. Ellison district superintendent with headquarters at Price was in and made the transfers Mr. Ellison left for Price Monday

Les Ashton and son took over the hauling of the oil from the Rangely oil field They put on two new White trucks with a capacity of 700 gallons each The old trucks carrying only 600 gallons. These trucks are the same weight as the others but have a greater carrying capacity It is their intention to put on two more White trucks in the near future to supply oil to other points

Manager Sowards has placed his brother Harold in charge of the work until after stock taking at the Ashley Coop, which will be about July 10

Recently R A Thurman assistant district manager from Salt Lake city made a trip to Vernal and the Rangely oil fields and was much impressed with the quality of the oil furnished from these wells.

intah County, Utah, Friday, January 28, 1910.

arge. First on the program ... a song by Mrs. ... Young. ... interesting paper was ... ower dealing on the ... ty. A beautiful song was ... by Mrs. Wells Ashby. Prof. Manwaring spoke of the relation between parent and teacher. ... ser also gave a few remarks ... was interested in our children ... wished to help them.

... ediate B gave a party Friday ... e 21st. They had a good ... dancing and a fine program rendered.

... Johnson returned from ... Fork and Robertson, Wyo., ... day. He has been hunting ...

... Austin has returned from ... . He has been away for two ... He is at his sisters, Mrs. ... dges.

... Hardy was a visitor on ... at meeting and Sunday ... Don B. Colton was a visitor ... meeting.

... Bingham is home from ... . She has been at her ... Mrs. Maggie Billings, the ... months.

... ave electric lights in the ... house and it is a great im- ... nt over the lamps.

... pass word' in Maeser this ... have you seen the Comet ... seen in the west.

... ou seen Wallace Oaks these ... days. Well, don't mistake; ... lace all right. The cause of ... ge is a nine pound boy, and ... auty. Mother and child are ... e, and so is the father, at ... hope he will recover.

... aturday night in the Social ... Maeser second team" were ... in a game of Basket Ball ... Academy and Vernal team. ... team is very anxious to ... and will look for a challenge ... same team.

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p. m.

Rt. Rev. F. S. Spalding D. D. Bishop of Utah, will officiate.

All the old Sunday School scholars are urged to come to meet Miss Ellis Farris, the new church worker who expects to remain in Vernal and assist Rev. M. J. Hersey in the work of the church.

New Oil Company Organized.

The Duchesne Oil company has been organized with the following officers:

President, H. C. Means; vice-president, Geo. H. Mulvey; secretary, C. L. Bailey; treasurer, H. C. Ward.

The company has large holdings 10 to 15 miles southwest of Vernal and at Powder Springs. Negotiations are now being made with Denver parties to put down wells next spring.

Wool Growers to Build Bridge.

The Uintah County Wool Growers association met last Monday and re-elected the officers as follows:

President, Enos Bennion; vice-president, Ed. Samuels; secretary, H. W. Woolley, treasurer, Snellen Johnson.

The association has in view the building of a bridge across White river, at what is known as the dam, for the benefit of the sheep. For the purpose of discussing the matter a meeting will be held in the office of the Uintah Abstract company February 12.

INDEPENDENCE ITEMS.

J. H. Keller is building a large and comfortable house, with logs sawed by himself while in charge of the Mosby mountain sawmill.

S. B. Rush is hauling hay from Vernal to Myton.

Miss Taylor, from Randlett, is teaching the first term of school the settlement has ever had.

James N. Peacher is building a conspicuous and suspicious addition t...

PRICE OF LAMARTINE'S POEM.

Pecuniary Value Which the Great Poet Set Upon His Work.

The Gaulois tells a good story of Lamartine's estimate of the pecuniary value of his poetry, says the Westminster Gazette.

It was in 1848, when he was at the acme of his glory and a cabinet minister. He had just contributed "La Marseillaise de la Paix" to the Revue des Deux Mondes and Buloz, the editor, called on him at the ministry. "I believe I owe you £80. Here is the money," said Lamartine, producing a bundle of bank notes.

"Pray deduct the amount of the Revue's indebtedness to you for your poem," said the editor.

"I meant to make you a present of it," rejoined the poet.

"Not at all; I insist on paying you."

"How much?"

"Your own price, whatever it may be."

"Ah, well; if you will have it so, I must oblige you," said Lamartine, and with a magnificent gesture he swept up the whole bundle of notes representing the £80, and restored them with solemn dignity to his pocket.

Pleasant Vacation Pastime.

Two Philadelphia medical students employed their summer vacation hunting rattlesnakes and copperheads in the mountains near Emmittsburg. They captured a number of large reptiles, from which they obtained about $1,500 worth of venom, which will be shipped to Paris.

The Ashl...

READY FOR TOUR—A group of local residents gather outside the Hotel Vernal ready for a tour of Red Wash oil field Thursday of last week. They saw various stages of drilling and production at this prominent oil activity area.

Francis Lewis
Charlie Lewis
Glade Sowards
Frank Lewis
Mary Hatch
Crystal Lewis

Oct 13, 1932

Oil at Rangely Shoots To Top of Derrick When Mud is Taken From Hole

That the California company had brought in a producer on the deep test well at Rangely, were unconfirmed reports reaching Vernal Thursday (today).

The drillers were drawing mud from the hole to make a test of the well and the oil suddenly shot to within ten feet of the top of the 130 foot derrick. The oil is of a good grade.

The bringing in of the well at Rangely will mean the drilling of another hole on the Ashley Valley structure east of Vernal.

Nov 21, 1924

Oil Company Files Incorporation Papers

The Ashley Valley Oil company filed incorporation articles recently which gave the capital stock as 1,000,000 shares of stock at 10 cents a share. The officers are: R. C. Hills, president; James H. Ball, vice president; W. H. Lovesy, secretary.

Feb 7, 1952

Oil Growth of Basin Looks Bright for Future

The following is a talk given by J R. McWilliams, vice president of Carter Oil Company to the Vernal Chamber of Commerce on Wednesday of last week.

One thing is certain in this U. S. A. of ours.

The business of living seems never to go stale, never to reach the rocking chair tempo of humdrum existence. There always is something new on the horizon, a new hero, a new national emergency, a spectacular movement in education, in business, in religion, in national and international affairs.

Men philosophized years ago that there were no more worlds to conquer—that the best of all pioneering and of all adventure was at an end.

Your organization—the growth and substantial development of your community—the steady advances of your state industrially and economically are plain and practical proof that enthusiasm, enterprise, determination for better livelihoods and business teamwork still pay dividends.

There are new fields to conquer, always will be. Certainly your city is powerful evidence that you have been and are alert to such new opportunities.

Here in the shadow of the Echo Park Project, this thriving community stands as a progressive force creating new wealth, inviting growth, stimulating development.

An annual banquet such as this doesn't necessarily have to be a season for rousing back patting, for glowing over successes, for throwing out chests and celebrating—although there is cause aplenty here, surely.

In visiting with some of you, I catch the feeling you are taking this impetus of 1952 with all of its possibilities and its problems in stride, that the successes of the past are just a stimulating challenge for still more sound and lasting and permanent growth in the years ahead.

You are cognizant of it, here on the ground. But a stranger can but look around Vernal at the saw and flour milling, the mining and fir timber operations, your business district, new buildings and improvements—and know that things are humming. You are in a focal spot for petroleum development in a large and promising area.

Thousands of persons heard of Vernal about three years ago when three churches—representing an expenditure of about $1,000,000—were dedicated on the same day. You have a new half-million dollar hospital, your museum here is a showplace for the multitudes.

Your county leads the state in livestock production. 40% of the county's income is from sheep. Your population has increased to about 3700, I'm told, and there are more than 100 new houses here than there were several years ago.

A Storehouse of Minerals

You have the Uintah Basin with its rich store of mineral resources—what would hundreds of other American cities give for such a storehouse of possible future growth right in their own backyard!

Utah has been in the mineral spotlight of this nation for a hundred years.

About one-fourth of the nation's copper comes from your good state. You had natural gas 60 years ago. There are some 210 known minerals recovered for man's use in your state. In total value of mineral produc-

(Continued on page 13)

OIL GROWTH OF UINTAH BASIN LOOKS GOOD FOR THE FUTURE

(Continued from Page 6)

tion, Utah ranks a high second in this nation.

In the past 80 years the mountain ranges and valleys and rugged terrain of Utah have yielded basic and precious metals valued in excess of two billion dollars.

No one forgets for a minute it takes more than just having these resources at hand to make a state or a city click. It takes vision, foresight, action. You can't take progress for granted, no matter what raw materials a good providence provides. Far seeing men, banded together in a group to foster sane and sound and sensible growth, are at the hub of community growth in every case.

Now, petroleum bids for an opportunity to join your other growing and established industries in building for the future. Oil was first discovered in 1906 in southeastern Utah, in the San Juan country, but it was 40 years later before prospecting brought in the Ashley Valley field. Since then there has been an intensive search for additional fields and important development of your state's petroleum resources has begun.

Figures do some sound talking.

In 1948, the total oil production in the state was 840,000 barrels.

Last year, in 1951, thanks to new oil development near your city, more than 1,210,000 barrels of oil were recovered—a 100% jump. That is all the more impressive when you realize how last year's production compares with the 1,800,000 barrels of oil which represents Utah's all time total recoveries up to January 1 of 1951!

Four Oil Fields

There are 20 wells in the Ashley Valley field producing about 2600 barrels daily. The Duchesne discovery is making about 100 barrels daily, the eight wells at Red Wash are doing some 800 barrels daily, and the wells in the Roosevelt field are returning 800 barrels daily.

That is moving fast. Talk about new frontiers. When a state so increases its production of a mineral resource in one year that it pushes the state's all time production for honors, that is giving normal progress a real shot in the arm.

Thirty-nine wells were completed in your state last year, but—29 of these were dry. These 29 dry holes represent a big investment with no return. From $6,000,000 to $10,000,000 sunk in the ground—illustrative of the capital required in the oil business today. It's not all profit—it takes a lot of trial and error and time and effort to find what we're looking for.

Let's look at the oil finding efforts and how they have zoomed in Utah. Last year there were the equivalent of 93 crew months of seismograph work. It costs about $18,000 per month to operate a seismograph crew. The total cost was $1,423,000. The 93 crew months is comparable to operation of a crew every working day for eight years. Today, in areas all over Utah, these skilled men are working to tap nature's pulse in the hope of finding conditions favorable for petroleum.

We in Carter are happy to have a part in the new development of the petroleum industry in your state, and especially the Uintah Basin. I know other oil operators share this view.

Some great sums have already been spent for bonus and rentals on leases on fee, state, Indian and Federal lands. Several millions of dollars have been spent on geological and geophysical work and wildcat drilling. Many more millions will be invested in the future. Costs of drilling a well vary, but the deeper ones range from $250,000 to $500,000.

50 to 70 New Wells

At the present time Carter has eight wells drilling in Utah. For all industry, it is a good guess that some 50 to 70 wells will be drilled this year in the Uinta Basin. The number of wells which probably will be drilled in Utah this year, divided about evenly between wildcat and development wells, will double the 39 wells completed last year.

Utah's oil progress is watched with interest because, with the demand for crude oil and products mounting year by year, the nation looks for new supplies and new outposts to help meet this need. Let us pause for a moment to get an overall picture of the petroleum industry, as of today, in the United States.

Last year, 44,810 wells were completed in this country, an all time record. This year, it is estimated that 45,410 wells will be completed and the total footage drilled may reach 178,500,000 feet.

Total daily production of oil in the United States in 1951 was 6,144,000 barrels daily. This year, daily production will be increased an estimated 4.7%.

In Utah, forecasters predict that the increase in daily production will exceed the anticipated national average increase of 4.7% with transportation of crude being one determining factor in how great the increase will be.

The daily demand for crude in this country last year was 7,467,000 barrels daily, an increase of 9.8% over 1950. But even we have an additional 537,000 barrels coming from natural gas cycling plants and imports of about 840,000 barrels daily, the daily available supply still exceeds the demand.

The demand this year is expected to reach 7,939,000 barrels daily. This figure is staggering when you realize that it represents an increase of 71% in the last 10 years.

Based on construction and expansion programs announced or already under way, the daily capacity of U. S. refineries in 1952 will reach 7,360,000 barrels. And, the Petroleum Administration for Defense estimates that more capacity will be necessary to meet the civilian and defense needs in the immediate future.

Crude oil and products and natural gas have to move, and there are at present some 110,000 miles of pipeline in this country including crude oil and product lines and gas transmission lines. There are 180,900 miles of pipelines handling crude and products.

In the past year the industry has spent three billion dollars in meeting this increased demand for oil and oil products.

I think it noteworthy that since the end of World War II, the industry in this country has made a total capital expenditure of about 13 billion dollars, plowing money back into the business to meet an ever growing need. In the first years after cessation of hostilities in World War II, the demand did not fall off abruptly as some anticipated, but rather—with a short breathing period for adjustments—domestic usage soared and soon far outdistanced the highest figures for the war years. The need for more petroleum has been increasing since that time.

Your current development in Utah could not have come at a better time.

Oil Future in Utah

As I see it, the further growth of the oil industry in Utah will depend, to a great extent, upon (1) the degree of success attending a continued and diligent search for oil, utilizing the most modern and adaptable exploration equipment and methods available, and (2) practicing the most efficient development and production methods possible.

Once an oil reservoir has been found, the methods used to develop it and to produce the oil from it should be those which will permit the recovery of every barrel of oil that it is possible to recover economically. This is true conservation, but effectuating it is no simple matter because of the varied and often conflicting interests involved. To better understand some of the problems, I believe it would be worthwhile to review with you, very briefly, some of the history of the oil industry.

For the first 65 or 70 years after the discovery of oil—a little more than 93 years ago—the discovery of a new oil field resulted in a mad rush to drill as many wells as rapidly as possible. These wells were produced "wide open" if they would flow, or were pumped to the capacity of the pumping equipment. The driving motive behind each lease owner was to get as much oil as he could and as quickly as possible. This naturally resulted in what was later recognized as a most reckless waste of an irreplaceable natural resource. A large percentage of the oil remained underground, millions of cubic feet of gas were blown into the air and wasted, and there was also an indeterminate loss of oil on the surface—around the wells, in earth pits, around tanks, etc., and millions of dollars were spent in drilling and equipping unnecessary wells.

It was assumed that this method of developing and producing recovered all the oil there was in a given "pool" or field. But later on, it was discovered by drilling new wells in some old, depleted pools and analyzing cores of the reservoir rock that from 50 to 80 per cent of the original oil was still there—"dead"—and only 20 to 40 per cent had been produced. This waste—underground waste—was the greatest waste of all, though not visible. Today some of this oil is being recovered through secondary recovery methods on a profitable basis but with added costs.

Oil Waste Curtailed

The visible waste of oil and gas, the chaotic conditions prevailing, and the threat of an inadequate supply of oil for domestic and military use shortly after World War I prompted the Federal Government and some of the state authorities to seek some equitable means of reducing this waste, and of encouraging the building up of more adequate reserves. In the meantime, the legal profession and the courts had become interested in the principles of property rights involved in developing and producing oil properties, and based on a meager facts at hand concerning the nature and behavior of oil, some fundamental laws were established. With this as a background, some of the states passed laws calling for regular and orderly spacing of wells and the prohibition of wasteful producing practices. This tended to reduce waste and to protect the rights of the various owners to the oil under their land.

With order established, industry leaders and universities became interested in the study of oil and gas reservoirs. Courses in petroleum engineering were established, and petroleum engineers began gathering, organizing and analyzing factual data, such as effect of well spacing, gas-oil ratios, reservoir pressures, effect of producing rates on reservoir pressures, calculating from cores the approximate amount of oil in each acre-foot of reservoir rock, and in the entire pool, determining the type of reservoir, most efficient method of drilling and producing to secure maximum recovery of oil, etc.

Out of these studies evolved the fact that any given pool represents a common source of supply of oil, and that it is impossible for any owner to produce only the amount of oil under his land without affecting the rights of his neighbors. But of far greater importance was the discovery by petroleum engineers that a reservoir also contained a common source of energy without which oil could not be pushed through the pore spaces, the cracks, and fissures of rocks to the well bore. This energy is pressure—water or gas—and cannot be divided and allocated to the various leases. Once this energy has been wasted the field becomes dead, for oil cannot move itself through the rocks—it must be pushed. Hence, to recover the maximum amount of oil from a reservoir, the pressure or energy must be maintained by control of producing rates, and/or by forcing gas or water back into the reservoir.

Oil Conservation

This concept of a common source of supply of oil and of reservoir energy constitutes the greatest advance yet made in oil and gas conservation, and forward-looking lawmakers are providing the legal means with which it can be accomplished. Nearly all the oil producing states have adopted comprehensive oil and gas conservation statutes and have set up commissions to make and administer rules and regulations which will make the statutes effective. Wyoming and Colorado adopted such statutes last year. Among other things, these statutes authorize unit operations, on a voluntary or cooperative basis, not only of a drilling unit, but also any part or all of a pool. Two states—Oklahoma and Arkansas—have passed laws which give their respective commissions power to order the unitizations of entire pools after certain percentages of the lease and mineral owners have agreed among themselves that such a course is desirable.

Many successful unit operations are located in the Rocky Mountain area. I cite the Elk Basin and Salt Creek pools in Wyoming as examples. But of even greater interest to you is the unitization of the Roosevelt pool in the Uintah Basin. This ambitious program covers some 23,000 acres. The plan has already been approved by almost all of the lease owners, by the State of Utah, by the Tribal Council of the Utes, and by the Director of the United States Geological Survey. Such a cooperative plan, entered into by industry, by individual citizens, and by state and federal agencies represents conservation in its broadest and truest sense.

What does this stepped up program of oil finding and producing mean for Vernal and for Utah?

Logically, one expects increases in population, in payrolls, in related businesses to follow any such development. Already you have seen the first effects of oil activity on a community. Developing wells and increasing overall production may seem like a slow process to the outsider. But in retrospect, it's a fast moving program that jumps the state's daily production from about 800 barrels daily to 4300 barrels daily in a three-year span particularly at the great depths wells must be drilled in this area.

I am no crystal ball advocate and wish to make no predictions, but it seems to me that you can appraise the future of the oil business in your state with assurance, and see the present oil development as not being an unhealthy oil boom, but indicative of vital, substantial, lasting growth.

As I remarked at the outset, there are new frontiers. You have in Vernal a new frontier.

I'm sure I speak for all segments of the petroleum industry when I say we're glad you have us here. We're glad you were here making it possible for us to be here. We join you in looking toward a greater and soundly successful future.

Oil in the Uintah Basin

A Prophet is Not Without Honor, Save in His Own Country

(By WM O NEIL)

In glancing over the oil news contained in the Salt Lake Telegram and Salt Lake Tribune of March 27, I find the wonderful news of a new oil dome being discovered on Hill creek, Uintah county, Utah and that geologists of national fame have so pronounced it and given it the name of the Hill Creek Dome, and in glowing terms describe its great oil possibilities Now this is no doubt news to many people right here in the Uintah Basin but it would not be startling news if we had kept track of the progress of oil and oil shale development as it has been going on for the last three years In 1918 the writer located five sections of oil shale land in Hill Creek and named them oil Dome No 1 to 20 A company was formed and named the Hill Creek Dome Oil and Shale Company Later on other lands were taken up in this same dome, and all this land was taken over by the Standard Shales Products Company of San Francisco, California, in 1920 This company spent $20,000 in development work This company took over about forty-five sections, a majority of which is in the Hill Creek Dome, so named by the writer three years ago This company has the required amount of assessment work done on all their holdings a splendid evidence of faith in the Hill Creek Dome and for the information of the would-be discoverers of this new dome I cite them to the mining records of Uintah county where they will find on record the Hill Creek Dome, also they will find affidavit of prof of labor covering the greater part of the Hill Creek Dome. We are not jealous of the honor of discovery but on the other hand we welcome this vindication of the writer's judgment We are glad that our friends did not change the name from the name given and recorded by the writer of this and recorded by the writer of this article I may further state for the benefit and encouragement of our friends that the Standard Products Company have signed up to drill a well on the Hill Creek Dome, the drill to be in operation July 1st, 1921, and at the same time push to patent all their holdings We welcome our friends into the Hill Creek Dome and only ask that they avoid complications in their search for oil lands in that vicinity. The Hill Creek Dome is about 12 miles long and 7 miles wide It is pear shaped with the large end to the south. The outer walls dip at an angle of 5 per cent each way around the entire dome

This land was surveyed by Ed F Harmston and its dip taken and Mr Harmston can join with me in saying that the Hill Creek Dome is not a new discovery, but none the less important This is not the only oil dome in the Uintah Basin Roosevelt, Utah is situated in the center of a most splendid anticline with an unbroken structure The area of this dome is 15 miles long and 12 miles wide This is also a perfect dome and I predict that some eminent geologist will in the near future verify the writer's judgment in this statement, as in the matter of the Hill Creek Dome Myton also can boast of an oil structure not to be dispised or overlooked I don't want you to overlook Randlett, Bennett, and the Cedarview country for in all of these localities you will find structures not to be despised. This country will come into its own just as soon as oil experts and geologists give it the attention it deserves — Roosevelt Standard.

April 18, 1921

Vernal Express Oct 16, 1952

Oil Industry Provides Top Payroll Of Third Million for Uintah Basin

Inspect New Rangely Refinery

Pictured in front of the towers of the Wasco Refinery at Rangely are officers of the company and visitors. Ira Cramper, secretary; John H. Baker, superintendent, American Asphalt; Bo-hanan; Glenn Cooper, president Vernal Chamber of Commerce; LeRoy [illegible], secretary, Grand Junction; E. B. Bamerman, mayor of Rangely; Jack Forbes, vice president; R. M. Goldston, superintendent; W. R. Hall, president, Grand Junction; Dr. T. [illegible], president Vernal Lions club.

ONE THOUSAND EMPLOYED BY INDUSTRY

"Your progress and oil progress go hand in hand."

Vernal, and the Uintah Basin are good examples of this Oil Progress Week slogan as each grow more and more rapidly each year as oil production in the area increases.

Forty-one oil drilling and servicing companies have moved into the area, and now hire more than 1,000 employees for a payroll of approximately one-third million dollars every month.

Thirty wells were drilled this year between January 1 and July 1 adding to a total of 960 wells that have been drilled during this period in the Intermountain area.

Annual oil production for the state of Utah is now near 2 million barrels with a daily refining capacity of some 75,000 barrels of products. To care for the ever increasing amount of oil production in the state millions of dollars are going into refineries and distribution facilities.

At Jensen, the Utah Co-operative Assn. and its subsidiary, the Uintah Oil Refining Co. is planning a $500,000 enlargement project to increase production to 70,000 barrels per month. Similar improvements are going on at the giant refineries in Salt Lake City.

Investment in refining and distribution facilities in Utah is now estimated at $75 million.

Here in Vernal, evidence of progress can best be seen in the buildings being constructed. More than $700,000 went into homes and businesses in the city during the first ten months of this year.

During Oil Progress Week, the city of Vernal, Uintah County, and the whole Uintah Basin are paying honor to the following oil, drilling and servicing companies: Carter Oil Co., Continental Oil Co., Equity Oil Co., Hollandsworth and Travis Oil Co., Newton Oil Co., Shell Oil Co., Stanolind Oil and Gas Co., Union Oil Co., Diamond Oil Well Drilling Co., Western Oil Co. Inc., Baker Tools Inc., Baroid Sales Division, Black

(Continued on page 4)

OIL INDUSTRY PROVIDES

(Continued from Page 1)

Swalls and Bryson Inc., Chrestensen Diamond Products Co., Dowell Chemical Co., Gulf Research and Development Co, Halliburton Oil Well Cementing Co., Hughes Tool Co., Johnson and Bunn, Johnston Testers Inc., Lacy R. Inc., Schlumberger Well Surveys Corp., Peyton Machine Shop, Liscomb Oil Well Supply Co., Magcogar and Magnalog Co., Magnet Core Barium Corp., Southern Geophysical Co., Seismic Explorations Inc., Rocky Mountain Engineering Co., Drilling and Service Inc., MuCullough Tool Co., Mud Control Labortories Inc., Buckley Explosives of Wyo. Inc.: Petroleum Distribution, Continental Supply Co., and Ashton Bros. Co.

Mar 18, 1921

OIL PROSPECTING PERMITS AT VERNAL LAND OFFICE

Since November 1, 1920, the Vernal Land office has been busy issuing permits to prospecters to prospect for oil in the Vernal Land district. With the opening of spring the rush is increasing.

According to Register A F Young there have been 105 permits issued as follows: November 11, December 24, January 28, February 13, and so far in March 29. As each permit is for 800 to 2,560 acres, quite a large acreage has been taken over to prospect. Nearly all the permits have been given to individuals rather than companies.

The work must commence within a short time after the permit is taken out and all done within a space of two years. Before or at the end of that time, the prospector can then lease the property from the government, if he has complied with the law.

6. OIL SHALE

By Russell J. Cameron

The Intermountain oil-shale deposits are estimated to be equivalent to 1.5 trillion barrels of petroleum (mostly in Colorado; at least 100 billion bbl in Utah; perhaps somewhat less in Wyoming). Oil shale should be the source of a well-established major industry in this area in the next decade, with a likely daily production of more than one million barrels of shale oil products by 1975 or 1980, requiring an investment of almost five billion dollars and providing direct employment of as many as 50,000 persons in the Intermountain Area.

OIL-SHALE DEPOSITS

The Intermountain area has in its oil-shale deposits probably the largest accumulation of fossil hydrocarbons on the earth. The exact amount of the reserve is not really important. Estimates are in excess of 1.5 trillion barrels, the major reserve being in western Colorado. Utah reserves certainly are in excess of 100 billion barrels, with Wyoming somewhat less perhaps. Recoverability of reserves is unknown, although ultimately a high percentage recovery should be attainable.

In Utah, some of the shales appear to be mineable economically from the surface. Much larger reserves are deeply buried and, if produced at all, probably will be retorted in situ. Appreciable production of shale oil can be expected in Utah as early as 1975 or 1980. Commercial shale-oil production is expected to begin in Colorado within the next 2 or 3 years.

PROBLEMS ARE SOLVABLE

Although oil-shale problems are many and varied, and have been the subject of numerous papers, reports, meetings and committees, none appear to be unsolvable and most everyone expects oil shale to be the source of a new major industry in the west within the next decade.

Some of the techno-economic factors which have thus far retarded shale include the immature status of the technology, the distance to markets, and the uncertain status of foreign oil supplies. New processes are under development for the retorting of oil shale. None of the processes now under consideration has been fully tested and time still will be involved in this stage of development before full scale commercial production can begin.

ROBERT E. COVINGTON

Robert Edward Covington is geologist and partner in Caldwell & Covington, Petroleum Consultants, Vernal, Utah. He attended Loyola University, Northwestern University, University of Colorado, and Colorado School of Mines. He served in the U.S. Navy in World War II and received a commission as an ensign, SE, USNR, 1948. He has worked in his field for Phillips Petroleum Company, Carter Oil Company, Rotary Engineering, Salt Lake Pipeline Company, and Johnson & Bunn. He has been a partner in Caldwell & Covington from 1954. He has several publications on various fossil hydrocarbons in the Uinta Basin and in adjacent areas. He is an authority on bituminous sandstone and limestone deposits in Northeast Utah. He belongs to the Green Circle, Sigma Gamma Epsilon, Sigma Alpha Epsilon, American Association of Petroleum Geologists, Intermountain Association of Petroleum Geologists, Utah Geologic Society, and American Association for the Advancement of Science.

and low gravity, viscous crudes. The oil industry is entering a cycle which should rejuvenate the independent operator, stimulate major company action, and improve the economy of the industry. Judicious use of the system, when combined with American ingenuity, will be a most stimulating effect upon the oil business. One last mention of the possible use of the thermal systems would be in fractured shale reservoirs, such as those in the Ute Tribal Roosevelt field, where communication between wells within the fractured Green River shale reservoir has been established between wells more than one mile apart. What tremendous possibilities exist for such a system, which, when combined with the natural gas and oil within the fracture system, could lead to extremely high recoveries of oil. This should lead to the oil industry's taking another look at fractured reservoir fields such as Gusher, Bluebell, the Joseph Smith, County Field and the Ute Tribe Duchesne fields, all in the Uintah Basin. Further what would be the effect if this system were used as a secondary recovery technique in fields where high-pour-point crudes are produced, such as at the Red Wash, Wonsits, Brennan Bottoms, and others?

Well Name & Number	Location	Saturation (ft)	Depth
Superior	Sec. 2 T 24 S R 13 E	100	2200
Carter	Sec. 21 T 24 S R 14 E	45	2295
Shell No. 1	Sec. 19 T 24 S R 16 E	43	2552
Pan American	Sec. 24 T 25 S R 12 E	20	2400
Texaco	Sec. 14 T 25 S R 13 E	120	2176
Texaco No. 2	Sec. 22 T 25 S R 14 E	150	2042
Standard Cal. # 1 Moonshine Wash Unit	Sec. 32 T 25 S R 15 E	200	2250
LaRuae	Sec. 17 T 26 S R 13 E	?	? (shows
Tidewater	Sec. 25 T 26 S R 13 E	75	2560
Carter	Sec. 9 T 27 S R 12 E	30	2700
Superior	Sec. 30 T 27 S R 13 E	120	2316
Texaco	Sec. 32 T 27 S R 15 E	50	2320
Carter No. 2	Sec. 35 T 27 S R 15 E	100	2000
Murphy # 4	Sec. 14 T 28 S R 14 E	Shows	2300 Appr
Tennessee Gas Trans	Sec. 33 T 29 S R 12 E	100	2260
Phillips	Sec. 27 T 30 S R 16 E	150	1394
Tenn. Gas Trans	Sec. 4 T 31 S R 12 E	100	2274
Stand. Cal.	Sec. 13 T 31 S R 13 E	50	513
Superior	Sec. 19 T 31 S R 15 E	Shows	?
Mobil	Sec. 33 T 30 1/3 S R 16 E	140	1462

With regard to water supply, ample water can probably be obtained from the Green River, which lies east of the area under discussion, although it is possible that the water may have to be treated.

LEGAL PROBLEMS INVOLVED IN THERMAL RECOVERY

There is a legal conflict between the holders of oil and gas leases on federal lands and the owners of federal bituminous sandstone leases. In the Sunnyside area, in the fall of 1963, the Bureau of Land Management held competitive bidding on federal lands. Bidding prices were depressed since the notice was so short that few companies were given sufficient time to examine and evaluate the leases which were put up for bid. Further oil companies, holding oil and gas leases under the lands put up for bituminous sandstone lease-bid, claimed, perhaps with some justification, that their leases entitled them to produce the oil from the bituminous sands, if they could do it through secondary recovery techniques (i.e. thermal recovery). With regard to the State of Utah, the oil and gas lease issued specifically excludes any solid hydrocarbon which it is necessary to remove through the use of heat, and further stipulates that the lease only refers to oil in its native liquid state, gas, and drip gas. Before any commercial development can take place on bituminous sands under federal lands, it will be necessary that the legal problems involved be clarified.

CONCLUSION

The future is tremendous for the thermal recovery of hydrocarbons from formerly "depleted" reservoirs, from the vast reserves of bituminous sands throughout the United States, and from reservoirs with low energy shows of oil or dead oil staining or bituminous sandstones encountered within the Green River formation in the No. 2 Whiterocks well drilled by the Carter Oil Company in Section 6 of Township 1 North, Range 1 East, U.S.M.

Structural conditions suggest a deeper, Paleozoic (Weber) source. Overburden on fee land in Whiterocks Canyon ranges from 10 to 40 feet, and, on the benches southwest and northeast of the river, ranges from 600 to 1000 feet or more. The oil has an A.P.I. gravity of 12 degrees and is low in sulphur. In summation, the relative uniformity of bitumen saturation of the Navajo sandstone of the Whiterocks area make this prospect extremely attractive from the standpoint of either strip mining or thermal recovery. Due to the thickness of the Navajo sandstone and the depth of saturation, this deposit has the unique distinction of having perhaps the greatest recoverable reserves of oil of any bituminous sandstone on the North American continent. Recoverable reserves approach 132,000 barrel per acre, while the Athabasca tar sand deposits have recoverable reserves of 90,000 barrels per acre, although, of course, the areal extent of the latter is many times greater than those of the Whiterocks deposit.

4. Bituminous Sands of the Green River Desert, Utah

An active lease play has recently developed in the Green River Desert area of central Utah, principally in Sevier, Wayne and Garfield Counties. Two of the most active leasing areas within this province are the French Seep and the Nequoia Arch plays. The total area includes Townships 24 and 31 South, Ranges 12 and 17 East. Shell drilled stratigraphic core tests early this year to the west of this play on the San Rafael Swell but recently dropped this particular acreage. Shell now has leased southwest of the Swell toward the Green River. Other companies, holding acreage on this play involving bituminous sand within the Coconino formation at depths ranging from 1700 to 2600 feet, are Pure, Union, Amax, Sinclair, Richfield, Forest, and Sun. Daniel Meyer and John Osmond also hold acreage in this area.

An example of the type of deposit under consideration for steam injection in this area is a play centered around the old Standard Oil Company of California No. 1 Moonshine Wash well in Section 32, township 25 South, Range 15 East. This hole was cored in the Coconino sand; it recovered over 200 feet of bitumen or dead oil saturation at a depth ranging from 2000 feet to 2200 feet. Core analysis showed the permeabilities to average 50 millidarcies, and porosity to average 15%. Oil saturation within the zone averaged 44%, while water saturations averaged 12%. The following list gives an idea of the saturations and areal extent of the future thermal recovery potential of this area from the Coconino sandstone:

federal government). The Shell Oil Company is core drilling in the Asphalt Ridge area, and other companies have exploration work planned here. Uintah County is still mining asphalt at the County Pit tract for local use. The product is so rich that it is mixed with dry sand, hauled by dump truck, and rolled cold on roads and driveways. The material makes an excellent surfacing material, because the bitumen is extremely tenaceous and holds together well in hot weather. It is also very resistant to wear. Some of the streets in Denver, Colorado, were patched with the material several years ago; today the patches stand up as "bumps" while the original surfacing material made with crude oil has weathered away.

3. The Bituminous Sands of the Whiterocks Area

The bituminous sandstones of the Whiterocks area are located in Township 2 North Ranges 1 East and 1 West, Uintah Special Meridian, about 20 miles northwest of Vernal, along the mountain front on the south flank of the Uinta Mountains in northeastern Utah. The property can be reached by paved road from Vernal to Lapoint, from Lapoint to Tridell, and from Tridell to the Uintah & Ouray Indian Reservation, and thence north along Whiterocks River on the benchlands to the mouth of Whiterocks Canyon, crossing the reservation boundary a mile south of the outcrop.

The bitumen fills the pore spaces and coats the sand grains of the Jurassic Navajo sandstone. This formation strikes northeast - southwest and dips 60 degrees to the southeast; it has a total thickness in the area of approximately 1000 feet; and the tar saturation within the tilted formation extends to a depth of approximately 550 feet. The proven reserves of this deposit, based upon core drilling, are 125,000,000 barrels of oil in place, with possible additional reserves of another 120,000,000 barrels to the northeast and to the southwest of the Whiterocks Canyon area. Federal oil and gas leases on both sides of the fee lands (which lie in the center of the deposit) are held by the Shell Oil Company. This company has just completed exploratory core drilling on the extreme northeas edge of the prospect.

The Navajo sandstone is a clean, fine-to-medium grain sand with porosities ranging from 26 to 39%. Permeabilities range from 10 to 127 millidarcies. Water saturation in the bituminous zones ranges from 34 to 82%, and averages 44%. Oil saturation ranges from 13 to 33%. The base of the zone of bitumen saturation within the sand body drops 375 feet in elevation from the east side of Whiterocks River to the southwest, along the strike. It also drops 1000 feet per mile in a southeast direction, perpendicular to the strike of the beds. Several tar seeps, or "brea," occur on the west side of the Whiterocks River. They are related to fracturing within the Navajo. With regard to the bitumen saturation within the Navajo sand body, there is no increase or decrease of any significance from the surface downward to the bitumen-water contact. Further, although the Tertiary Green River formation has been proposed as a source for the bitumen in the eolian "sand dune" Navajo formation, there is no saturation along the unconformity between the Navajo and the overlying Duchesne River formation, along which the bitumen or oil would have had to migrate from the downdip, basinward-lying Green River beds. There were no significant

Probable reserves are approximately 500,000,000 barrels, with additional reserves indicated in a downdip, basinward direction.

The bitumen is in the Cretaceous Asphalt Ridge and Rim Rock sandstones of the Mesaverde formation and in the unconformably overlying Eocene Duchesne River formation. The richest impregnation lies along the close to unconformities. The oil has an A.P.I. gravity of 10° and is extremely low in sulphur content. The Cretaceous sands which are saturated are not as indurated as those of the Sunnyside area. In the County Pit area, for example, after the "hardpar" on top of the Rim Rock sand is removed by blasting and ripping, the bulk of the sandstono can be mined with a dozer and ripper.

Since the two Cretaceous sands which are saturated are fairly uniform in saturation, water content, thickness, porosity, permeability, and in areal extent, the thermal recovery techniques can be employed with a high degree of success. With reference to the saturation in the beds of the Duchesne River formation, problems will arise when employing steam or fire flooding, due to the highly erratic depositional pattern of the individual beds, lower porosities and permeabilities, high silt content and a clay matrix.

An ample supply of excellent quality water is available for both mining and for steam flooding operations in the Asphalt Ridge area. The water should require little or no treatment. Electricity is also available; so is natural gas. A crude oil pipeline lies 14 miles to the south. Adequate housing and supply facilities are available at Vernal. The bitumen content within the Cretaceous sands ranges from a few gallons to as high as 53 gallons per cubic yard, and probably averages 38 gallons per cubic yard. Porosities range from a low of 6 to as high as 38%, and average about 34%. Water saturations range from 1 to as high as 20 gallons per cubic yard of material, and average 3 gallons per cubic yard. Sand which averages 30 gallons of bitumen per cubic yard or less will probably produce 6 gallons of water per cubic yard. The sands are noticeably free from sulphur, averaging about 0.09 per cent. The sand grains are water wet, a factor which makes efficient extraction possible.

During 1954 and 1955, detailed mapping, core drilling, core analysis and engineering studies were made of certain patented and unpatented mining claims in the Asphalt Ridge area by the author for the Knickerbocker Investment Company and for the Barnes Engineering Company of New York City and Los Angeles, California, respectively. Various mining methods and methods of extraction were explored. These properties were later turned to Sohio Petroleum Company, and additional detailed work was done on them, including the first "in situ" fire flood in the state. The fire flood was done within the Asphalt Ridge sandstone member of the Mesaverde formation. The results are not available but it is believed that they were extremely encouraging.

Detailed mapping and sampling were also done in the area by the Shell Oil Company, the Husky Oil Company, and lately, by the State of Utah (the state is applying for a part of this acreage as "in lieu" lands from the

BITUMINOUS SANDSTONES OF UTAH WITH THERMAL RECOVERY POTENTIAL

There are two areas in Utah which have bituminous sandstones which are of economic significance with respect to thermal-recovery methods of oil production. The most important area is within the Uinta Basin, in Uintah, Duchesne, and Carbon Counties in northeastern Utah. The second are is the Green River Desert in central Utah in Sevier, Wayne, and Garfield Counties. In the Uintah Basin, the most important deposit lies in the Sunnyside area, Carbon County. Next in order of importance are the asphaltic sandstones of the Asphalt Ridge area, the Whiterocks Canyon area, the Peor Springs area, the Chapita Wells area, and the Dragon - Asphalt Wash area, all in Uintah County, Utah. Other deposits of lesser importance are the Deep Creek area, North Tabiona area, Lake Fork-Yellowstone River area, South Myton Bench area, Indian Canyon area, and the Raven Ridge Area. Three deposits in the Uinta Basin and one deposit in the Green River Desert will be discussed.

1. Bituminous Sandstones of the Sunnyside Area

The Sunnyside deposits are located in Townships 13 and 14 South, Ranges 13 and 14 East, Carbon County, Utah. They can be reached from U. S. 6-50, 7 miles northeast of the coal mining town of Sunnyside, Utah. The Denver and Rio Grande Railroad has a spur into the town. The tar sand is exposed throughout a stratigraphic interval of 1000 feet, and occurs in the Eocene Wasatch and lower Green River formations. The outcrop is along a northeast to north trending escarpment which is the topographic expression of the south flank of the Uinta Basin, with the formations dipping north to northeast from 3 to 10 degrees. Estimates of measured and indicated reserves range from 475,000,000 to 500,000,000 barrels. If recovery rates are as high as 70% of total reserves, the recoverable oil should approach 300,000,000 barrels. The Sunnyside reserves are adequate for large scale strip mining, in part. Over one-half of the total reserves contain at least 9% bitumen by weight. With reference to reservoir data, the bituminous sandstones range from 25 to 30% by volume. Permeability ranges from 150 to 650 millidarcies. Little or no water is present interstitially. The bitumen has a low sulphus content but a high percentage of aromatic hydrocarbons and resins, and would thus make good feed stock for motor oils, lubricants, petroleum coke and petrochemicals. The major drawback to the area, from the point of view of thermal recovery, is the lack of a large source of fresh water for steam injection. Within the past year, the deposits have been core drilled by the Shell Oil Company and the Atlantic Refining Company.

2. Bituminous Sandstones of the Asphalt Ridge Area

The bituminous sandstones of the Asphalt Ridge area lie 3 to 4 miles west of the town of Vernal, Utah on U.S. Highway 40, approximately 180 miles east of Salt Lake City, Utah and 330 miles west of Denver, Colorado, in the northeastern part of the state and in the northeastern portion of the Uinta Basin. The deposit is exposed along a series of northwest - southeast trending ridges and hogbacks. The area extent is approximately 11 miles in length and is several miles in width. Proven reserves are 475,000,000 cubic yards of material containing 250,000,000 barrels of oil.

$50.00 to $70.00 per day.

EVALUATION OF A THERMAL RECOVERY PROJECT

In evaluating a steam prospect, careful attention should be paid to both engineering and geologic data. Laboratory tests should be conducted to determine oil displacements in cores. Viscosity measurements must be run to determine the effect of steam on the crude. Core analysis should be run and field production and reservoir engineering data, if available, should be evaluated. Recovery efficiencies should be recorded. Ideally, it is desirable to evaluate many variations of both spacing and well injection patterns. A complete economic study should be made, including a study of present wells, new wells, the existence of old holes which may not have been plugged properly upon abandonment, water supply and treatment, fuel supply for steam generation (lease crude, natural gas, coal), depth to the objective oil zone, reservoir temperature, nature of the crude, cost of surface handling equipment, and markets. Steam-injection or fire-flooding is especially adaptable to the production of crude oil from reservoirs with little or no reservoir energy, such as abandoned oil fields, bituminous sand reservoirs, or where problems or high viscosity, combined with relatively low reservoir temperatures make the production of this type of crude uneconomic. The effective use of these methods, like anything else worthwhile, requires good engineering practices and good management.

There are other methods of producing viscous or waxy oils where some reservoir energy is present, including the use of electric or gas bottom-hole or mid-bore heaters, the use of hot water circulating heaters, and hot oil circulating systems (Kobe pump system). Each of these has been employed with varying degrees of success. Another method which offers some promise for the production of viscous crudes is the use of the carbon-dioxide-condensing, gas-drive process. Exhaust engine gases or carbon dioxide is injected directly into the reservoir from large, "thermos type," CO_2 trucks. This is an effective viscosity-reduction technique.

THERMAL RECOVERY COSTS

The cost of production of oil from the bituminous sandstones will determine the extent and the time of development of these large reserves of oil. Initial investment will be in exploration work, especially in geologic and topographic mapping and in core drilling and core analysis. The second phase of investment costs will be in the establishment of pilot plant construction and operation. Cost analysis must then be employed to determine the economic merits of further large scale production. There is presently, in the Rocky Mountain area, a relatively strong demand for asphalt and asphalt products. The upswing and demand for petrochemicals could mean the development of this product for a raw feeder stock for this mushrooming industry. Therefore, market research and analysis will be the final deciding factor in determining what sands will be produced, and where, when, and in what manner. The fourth and final phase will be the actual commencement of large scale production.

Operation "Plumbob" was conducted in 1958 by the Atomic Energy Commission with a 1.7 kiloton atomic bomb at a depth of 900 feet below the top of a mesa in Nevada. Some of the purposes of the test were: (1) to determine what temperatures were generated; (2) what chemical reaction occurred; and (3) at what rate the heat was dissipated and in what manner From the thermal-energy standpoint, the test was disappointing, for the hea was dissipated rapidly as a result of the vaporization of formation waters.

It has been estimated recently that there are between 30 to 40 steam-drive projects underway in the United States. Current leasing of low-gravity oil-sands at relatively shallow depth by major producers has infused a new vigor into the oil industry, and interest in thermal recovery methods.

THE MECHANICS OF THERMAL RECOVERY

Since it is energy that causes oil to move through porous rock into the well bore, the addition of new energy will displace more oil. Steam-flooding adds energy from the heat content of injected fluids, as well as mechanical energy from the reservoir pressure increase from injection. Steam at 300° F. has 1179 British Thermal Units per pound, or four times as much energy as water at that temperature. The steam gives up heat, cools, and condenses into water which is pushed farther into the reservoir. The viscosity of thick, heavy crudes decreases dramatically with an increase in temperature. Further, as the crude is heated, its volume decreases, thus adding mechanical energy to the reservoir. Also, steam distillation takes place, for the steam tends to vaporize substantial quantities of a heavy crude in conformance with the vapor pressure of each constituent in the oil. Then too, the gas-drive displacement effect of the steam is important. Some of the unexpected reservoir pressure increases are attributable to changes in the mobility ratio due to the intimate mixing of steam, oil, and water.

Steam-injection methods can be classified into four, basic, heat-application techniques, two of which can be classified as true thermal-recovery methods. These four methods are: (1) the straight-forward-drive technique; (2) the modified-forward-drive; (3) the steam-soak method (often called the "huff and puff" technique); and (4) the packer technique. In the straight-forward-drive technique, steam is injected into injection wells, and the fluid recovered at a center bore. The modified-forward-drive technique is similar to the first, but fracturing techniques are utilized to establish communication between the injection and the production wells. In the steam-soak method, steam is applied for several days, and then the well is shut in for an established period of time. The well is then allowed to flow back or is pumped, and the process is repeated intermittently. The packer technique utilizes a packer set high in the saturated section; steam is injected above the packer, and oil is produced through the tubing below the packer.

Any steam-injection system demands the availibility of large amounts of fresh water. If the water source must be treated, this often poses a problem of the costs of such treatment. Fuel costs for steam generation run from 25¢ to 35¢ per 1000# of steam. If a 5-spot-well injection-recovery system takes 100 tons per day of steam, fuel costs may vary from

from the air injection well to a production well, moving oil ahead of it. The second thermal recovery method was a logical outgrowth of the first. It involves the use of injected steam and chemicals to create the required energy needed to move the oil to the production well bore, and to decrease the viscosity to the point where the oil is sufficiently mobile to permit highly efficient recovery. This method is especially applicable to the secondary recovery of oil, and for the recovery of oil from the bituminous sandstones such as of the Canadian Athabasca area where it is being used.

The first known attempts to apply "in situ" combustion in the United States was in Oklahoma in 1952 by Magnolia and by Sinclair, both working independently. Since then, California has been the focal point for pilot plant and experimental work on "fire flooding." Tight security measures have been employed at all of these projects, except at the project of Mobil Oil Company in South Belridge, Kern County. Hence the success or failure of these experiments is relatively unknown.

With regard to South Belridge, Mobil stated that, after a year and a half of ignition, up to 50% of the oil in place had been recovered. The zone tested was a depleted oil sand at a depth of 700 feet in the upper portion of the Tulare formation, which contained an oil with a gravity of 13°. Some of the problems which arose were: (1) the disposal of toxic, explosive gases resulting from the operation; (2) the handling of high pressure air for injection; (3) the problems of high voltage electricity, if an electrical igniter were used; and (4) protection against well blowouts caused by high pressures induced by combustion. Other troubles were: (1) severe corrosion, due to elevated temperatures; (2) failure of steel pipe and regulating valves; and (3) difficulties associated with packer failure, due to "baking" effects.

The first application of "in situ" combustion were confined to oil located in sandstone reservoirs. Subsequent experiments showed that limestone reservoirs were equally adapted to this recovery technique. Data have revealed that the average bottom-hole temperatures in fire flooding probably average 1200° F.

Since 1959, recently acquired data from the original pilot plant work on fire flooding have given a tremendous boost to the thermal recovery method which involves the use of steam injection into the reservoir, together with chemicals. Steam flooding was attempted in the Vernon County area along the Kansas-Missouri border in the early 1950's by the Carter Oil Company. Here the famed Bartlesville sands lap over the Bourbon Arch. The sands contain an inert oil which has no associated gas and has a gravity of 18° to 20°. Sand permeabilities are from a few millidarcies to as high as two darcies, and porosities are from 18 to 25%. Oil content ranges between 600 barrels per acre foot to as high as 1500 barrels per acre foot. The sand thickness measures from 15 to 40 feet. Carter abandoned the project in the late 50's, and Shell Oil moved in and began leasing. To date Shell Oil is credited with approximately one million acres, and is conducting both steam and fire-flooding, pilot-plant experiments. Other companies in this area are Continental, Marathon, Mobil, Tenneco, Texaco, and Sinclair.

BITUMINOUS SANDS AND VISCOUS CRUDE OILS

By Robert E. Covington

The bituminous sandstone deposits of the intermountain region contain hundreds of millions of barrels of liquid asphalt heretofore unproducible from an economic standpoint. New engineering techniques of viscosity reduction, in-situ thermal recovery, and the use of heavy machinery in strip-mining methods have caused an intensive industry-wide re-evaluation of this potential crude-oil reserve.

INTRODUCTION

Bituminous sandstones of the Rocky Mountain region contain large reserves of low gravity, highly viscous oil that can be recovered at costs equal to or less than the cost of finding and producing oil from conventional methods. Heavy crude oil is defined as "oil which cannot be produc through the normal reservoir mechanisms of gas expansion or water drive du to the low gravity and the high viscosity of the crude."

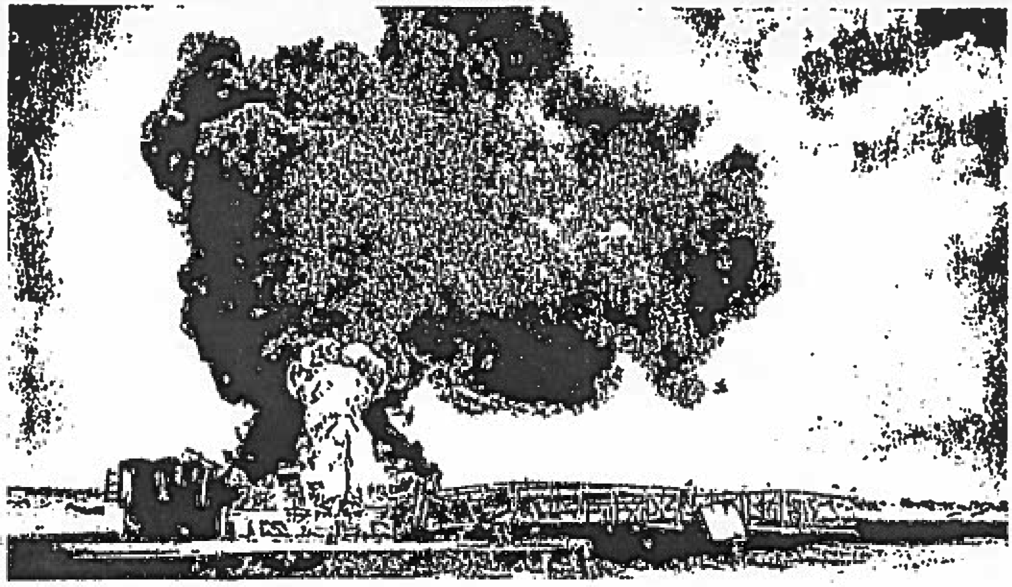
Today the American oil industry is in the process of a revolution of such magnitude that its implications are yet to be understood thoroughly. This is the "Quiet Revolution," which will double the proven oil reserves of the world within the next ten years, and will more than triple those reserves by the year 2060. The "Quiet Revolution" is the engineering application of thermal recovery to (1) low gravity, viscous crude oils heretofore unrecoverable by conventional and secondary recovery techniques and to (2) tremendous reserves of bituminous sandstones. This paper will show what thermal recovery is, how and when it can best be applied, and what its implication are to the oil industry and especially to the Rocky Mountain region. A brief discussion is given of two major areas of bituminous sandstone deposits in the State of Utah.

U.S. recoverable crude oil reserves at the beginning of 1963 stood at 31.4 billion barrels. This reserve figure is computed on the basis of a recovery of 29% of the original crude oil in place. If the recovery rate could be increased to 60%, then we could double the present reserve estimates. Many oil companies now believe that this will be possible through the use of thermal recovery methods, especially since more than one-third of these reserves exist in reservoirs at depths less than 3000 feet where porosities and permeabilities tend to be high.

THERMAL RECOVERY, A BRIEF DISCUSSION

Thermal recovery methods can be broken down into two categories: (1) fire flooding or in-situ combustion, and (2) steam-caustic injection systems. In the first system, the energy which is required for moving crude oil through the reservoir and into the production well bore, is created by injecting air into the reservoir and burning a portion of the oil. The process forms a slow-moving, narrow-burning zone, which advances

Vernal Express
1971-09-16



THIS SHELL OIL WELL near Altamont burned like this for five and a half days before finally dying out. The rig structure, at right, toppled over after an explosion set off the fire which melted the structure.

Oil Well Fire Provides Week of Excitement

After burning for five and a half days, a spectacular oil well fire near Altamont lost pressure and was easily snuffed out with water hoses Monday morning at 7:40 a.m.

THE ALTAMONT gusher oil fire has been among the top news stories in all the daily newspapers and television stations throughout the week. The event has caused more publicity and travel to the small, rural town than anything that has ever happened in this part of Duchesne County.

The excitement began Tuesday, September 7, at about 11 p.m. when an explosion occurred at the well known as the Shell-Tenneco-Sabine Exploration - Chevron-King Silver-Evans No. 1-31A4 well, five miles west of Altamont, and caught fire, sending flames 100 feet into the air with a massive pall of smoke.

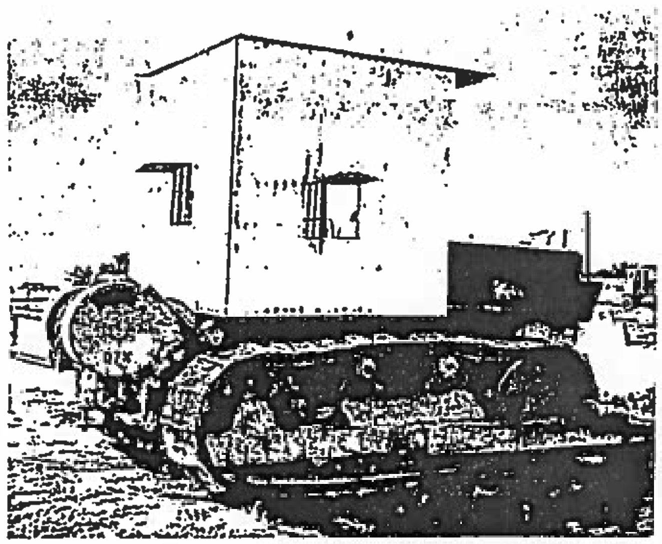
THE WELL had previously been drilling at the 13,800-foot level when the combination of gas, mud and oil began spewing out of the seven-inch diameter well stem. Apparently the vapor seeped to the nearby engines and was ignited, causing the explosion, officials surmise.

Automatic blowout preventors designed to prevent such accidents apparently did not work and the rig took off like a Roman candle.

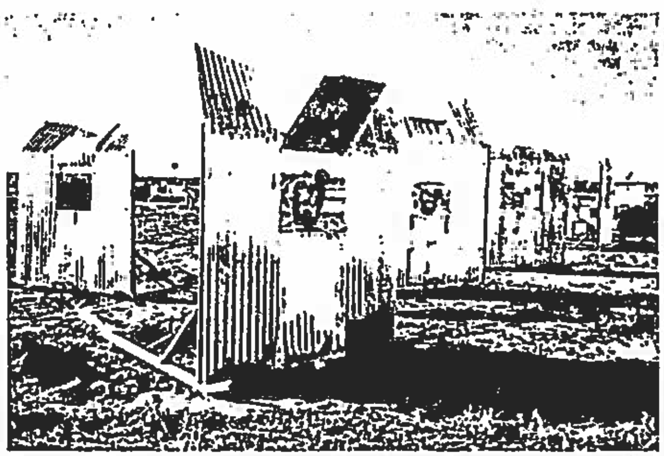
THREE MEN on the drilling platform were injured in the initial blast. Most serious was Louis A. Primm, 38, Lewiston, Colorado, a Shell engineer, who suffered second and third degree burns. William Rogers, 35, Salt Lake City, and Joe Wiesgerber, 44, Duchesne, employees of Brinkerhoff Drilling Company, suffered minor burns.

Oil well fire fighters from the Red Adair Company, Houston, Texas, were called to the site to immediately organize the procedure of controlling and extinguishing the fire.

THE FIRST few days of the fire crew operation was spent in construction of a large 60,000 barrell water reservoir

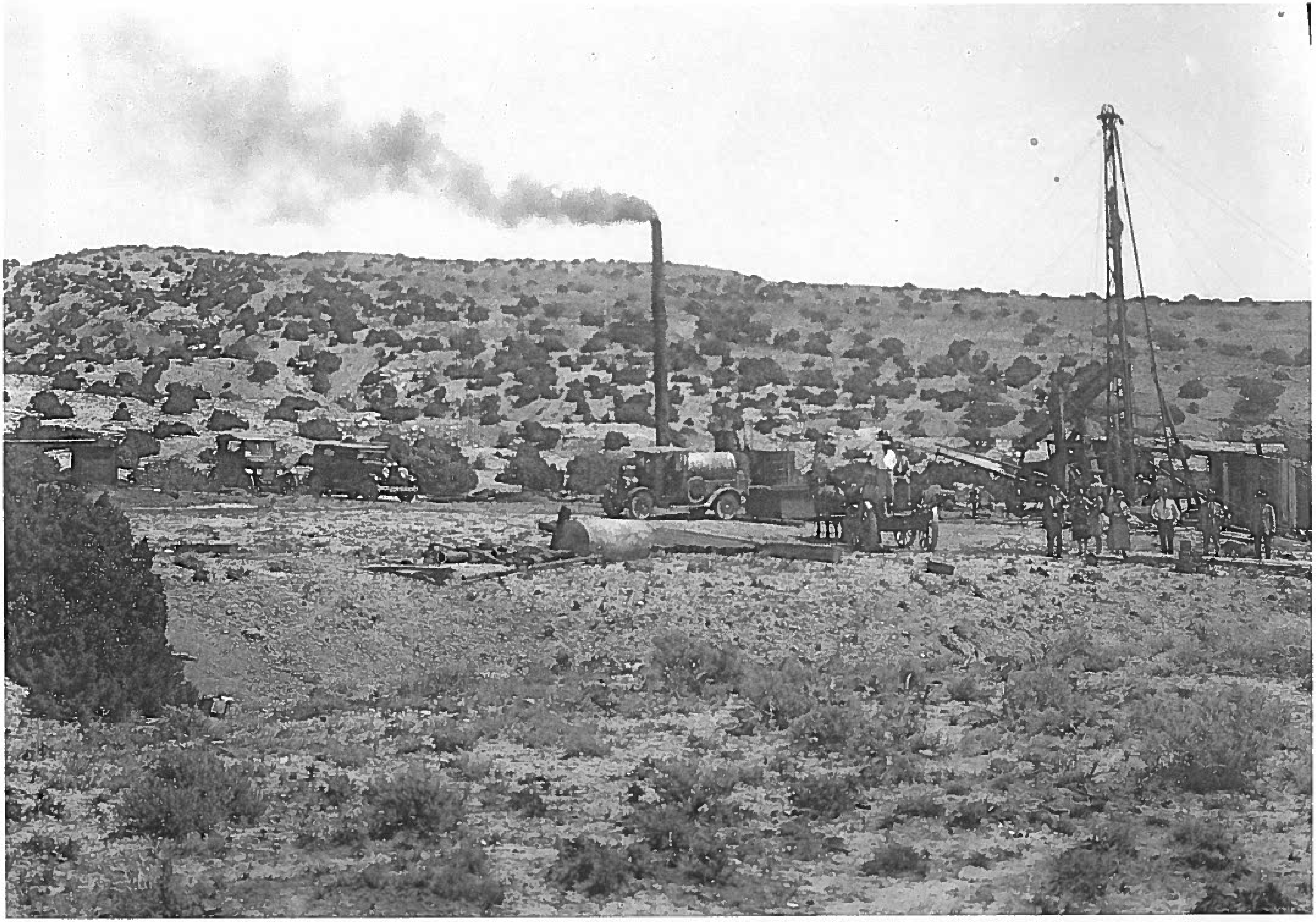


LARGE CATS were equipped with heat shields to keep the operator from being burned when working close to the oil well fire. Water hoses sprayed the metal covers to keep them from becoming too hot.



METAL SHIELDS were fabricated to protect operators of the high volume water spray nozzles used to cool the oil rig structure. The sprayers were on skids so they could be left on fixed positions. Spray direction is controlled by hand cranks on the spray unit.

49325C Western Venture Corp



4931SC Western Venture Corp.

44305C Western

4929SC

Western Venture Corp

Showing is about same as yesterday - better, if anything -

Gas enough to run boilers & [illegible] sand to run auto truck.
WER

Could not burn lights last night account of gas

Must move forge outside
WER

Looks as if there was considerable lubricating oil in sample taken

We have struck a very good showing of heavy black oil — As it is getting lighter with every screw we are [illegible] in hopes of getting it in lighter [illegible] the next day or two —

I will wire as soon as I can judge more accurately but think the well is going to be a good one — Soon as we get it lighter it will send you sample — W.G.R.

W.G.R.

~~This report was made about 36 hours before gusher was encountered to the best of my present information - detail of [illegible] not reached~~

Well No. 4 Section 5

Report No. 70 For 12 Hours Ending June 21 1913 Nov

Depth of Hole *Casing in Hole*

Last Report 811 Out

Last ~~24~~ 12 Hours 0 In

Total 811 220 — 11

Kind of Casing $2\frac{1}{4}$

FORMATION

From ft. to ft.

From ft. to ft.

From ft. to ft.

From ft. to ft.

WATER, GAS AND OIL

Struck Water at ft. Rose to ft. from top

Struck Gas at ft.

Struck Oil at ft. Tticknes of Sand ft.

MEN

P. M. A. M.

Driller Tamah Jr. Driller

Tool Dresser Ashby Tool Dresser

REMARKS

reamed casing to under

seam of gas in second sand

[illegible] to shell [illegible]

Well No. 4 Section 5

Report No. 65 For 12 Hours Ending [illegible] 191[illegible]

Depth of Hole *Casing in Hole*

Last Report 788 Out

Last 24 Hours 15 In

Total 803 770-[illegible]

Kind of Casing [illegible]

FORMATION

From 788 ft. to 803 ft. oil sand

From ft. to ft.

From ft. to ft.

From ft. to ft.

WATER, GAS AND OIL

Struck Water at ft. Rose to ft. from top

Struck Gas at ft.

Struck Oil at ft. Thickness of Sand ft.

MEN

P. M. A. M.

Driller [illegible] Driller

Tool Dresser [illegible] Tool Dresser

REMARKS

[illegible]

Well No. 4 Section 5

Report No. 62 For 12 Hours Ending June 20 1913 12 Pm

Depth of Hole		*Casing in Hole*	
Last Report	802	Out	
Last ~~24~~ 12 Hours	3	In	
Total	811		770 - 11
		Kind of Casing	8 1/4

FORMATION

From 802 ft. to 811 ft. Oil sand

From ft. to ft.

From ft. to ft.

From ft. to ft.

WATER, GAS AND OIL

Struck Water at ft. Rose to ft. from top

Struck Gas at ft.

Struck Oil at ft. Thickness of Sand ft.

MEN

P. M.		A. M.	
Walsh	Driller		Driller
Massay	Tool Dresser		Tool Dresser

REMARKS

Sand caving bad and
we will bail to get for
fifty Oil showing the
bailer and sand smoke Gas

Well No. 4 Section 5

Report No. 62 For 12 Hours Ending June 17 1917 Noon

Depth of Hole		Casing in Hole	
Last Report	742	Out	
Last 24 Hours	19	In	
Total	761		780 – 9 (730-9)
		Kind of Casing	8 1/4

FORMATION

From 742 ft. to 750 ft. red clay

From 750 ft. to 755 ft. fine sand

From 755 ft. to 761 ft. asphalt sand

From ft. to ft.

WATER, GAS AND OIL

Struck Water at ft. Rose to ft. from top

Struck Gas at ft.

Struck Oil at ft. Thickness of Sand ft.

MEN

P. M. A. M.

Driller Yacht Driller

Tool Dresser Nabby Tool Dresser

REMARKS

(from) 755

good oil showing at 755

hole in good condition

Well No. 4 Section 5

Report No. 62 For 12 Hours Ending June 19 1912 - 12 PM

Depth of Hole *Casing in Hole*

Last Report 780 Out

Last 24 Hours 8 In

Total 788 221 in 11

Kind of Casing 8¼

FORMATION

From 780 ft. to 788 ft. oil sand

From ft. to ft.

From ft. to ft.

From ft. to ft.

WATER, GAS AND OIL

Struck Water at ft. Rose to ft. from top

Struck Gas at 780 ft.

Struck Oil at 780 ft. Thickness of Sand ft.

MEN

P. M. A. M.

Pohl Driller Driller

Murray Tool Dresser Tool Dresser

REMARKS

Strong showing oil and gas - Think we have good well - Gas burns steadily when ignited

Walsh Driller .... Drill[illegible]

Murray Tool Dresser .... Tool Dress[illegible]

REMARKS

Closing down [illegible] [illegible]

[illegible] think we have [illegible]

Well - Gas burns steadily

when ignited

(O. K.) W. E. Russell Drilling Su[illegible]

[illegible] on Hanging in Rigil[illegible]

Tomorrow - bits would [illegible]

oo oo oo oo bbls Well

Ed Walsh

PROCEEDINGS
of the
FIRST INTERMOUNTAIN SYMPOSIUM
on
FOSSIL HYDROCARBONS

October 9 - 10, 1964, Hotel Utah
Salt Lake City, Utah

Sponsored by

BRIGHAM YOUNG UNIVERSITY

With the Cooperation of

UTAH-WYOMING COAL OPERATORS' ASSOCIATION
UTAH MINING ASSOCIATION
UTAH PETROLEUM COUNCIL
ROCKY MOUNTAIN OIL & GAS ASSOCIATION

And the Assistance of

Intermountain Association of Petroleum Geologists
Utah Section of the American Chemical Society
Utah Section of the American Institute of Mining,
Metallurgical, and Petroleum Engineers
Utah Chapter of the American Society of Mechanical Engineers
Utah Association of Petroleum Landmen
Utah Engineering Council
Utah Geological and Mineralogical Society
Utah Chapter of the Institute of Chemical Engineers
Utah Chapter of the Institute of Electrical & Electronic Engineers

Edited by Dr. B. J. Pope, Dr. J. V. Harry, Mr. L. B. Lyon
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200 North Main Street, Salt Lake City, Utah
February, 1965

Prepared by: ROBERT BOCELL,
ALAMO CORPORATION.
ROBERT E. COVINGTON,
CALDWELL & COVINGTON.

LOWER HORSE DRAW
(Formerly Hell's Hole) Field
CASTLEGATE POOL
T. 2 S., R. 104 W.
RIO BLANCO COUNTY, COLO.

DISCOVERY DETAILS

Method
Surface and photo-geology.
Well
Phillips Petroleum Company No. 2, sec. 12, T. 2 S., R. 104 W. (Formerly Johnson & Bunn No. 1, Gov't-Barrows.)
Completed: May 1952, T.D. 2195', 8" casing set at 2248'.
Initial Potential: 11,500 Mcf/day estimated.

GEOLOGY

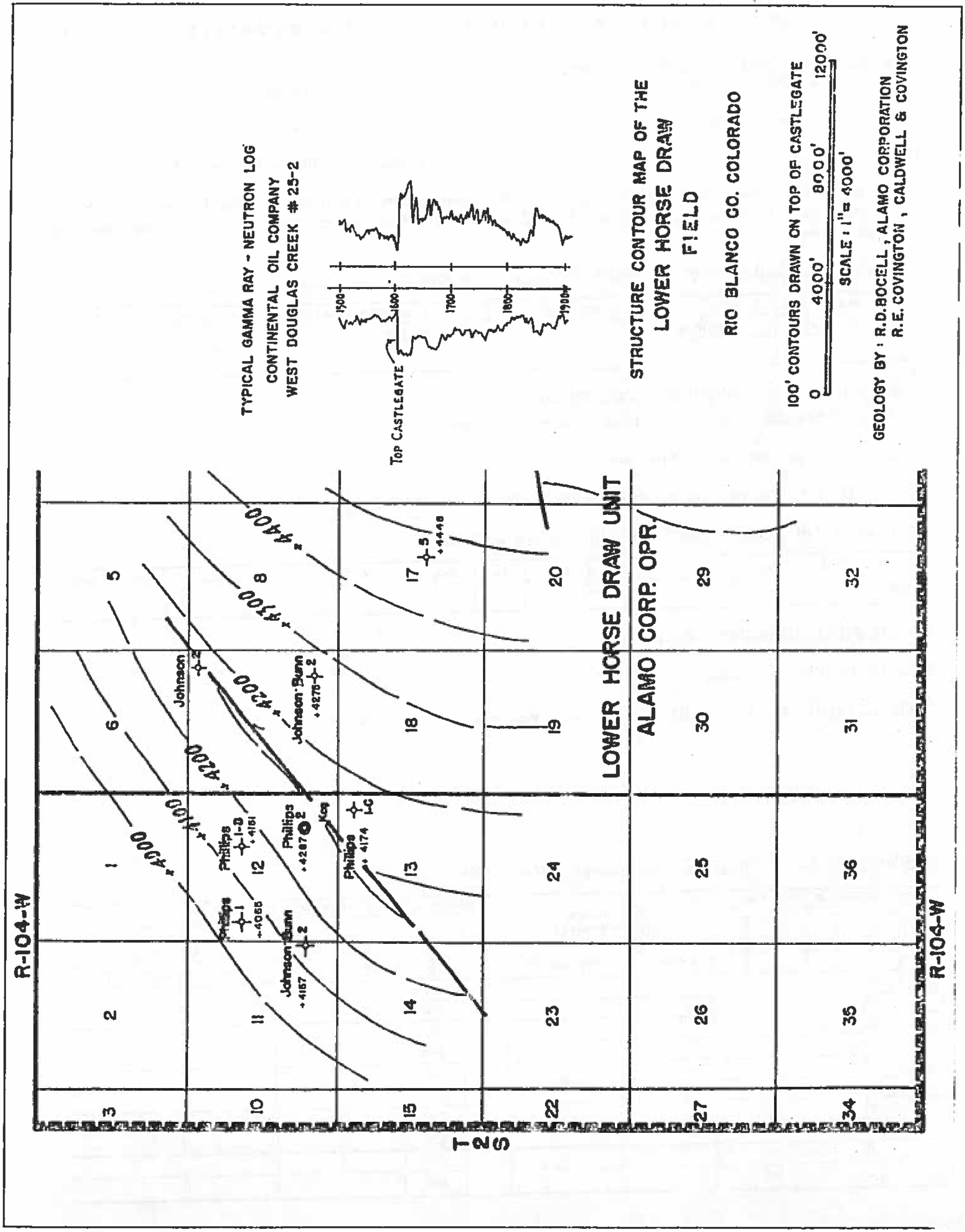
Producing Zone
Castlegate sandstone member of the Mesaverde formation, upper Cretaceous.
Trap Type
Fault trap on structural nose.
Lithology
Light grey to white, fine to medium coarse grained, friable, sub-angular to sub-rounded and porous.
Maximum Reservoir Thickness: 100'.
Regional Setting
This one well field is located 14 miles south of the city of Rangely, Colorado. The basal Mesaverde sandstone and Mancos shale forms the highly irregular topography. Structurally this area is situated on the eastern shoreline of the Uinta Basin and along the west flank of the Douglas Arch.

DEVELOPMENT DATA

Total Wells
Completed and shut-in: 1; Dry and abandoned: 7.
Well Spacing
320 acres.
Logging Practice
Gamma Ray-Neutron [illegible] overy well not logged.
Completion Practice
90' to 150' 8-5/8" surface casing. 5½" casing cemented on top pay. Drill through pay with air or cable tools. Produce through casing.
Type of Drive
Water.
Gas Zone Thickness
Nil.
Porosity
Not reported.
Permeability
Not reported.
Area
320 acres.
Gas Characteristics
994 BTU, 0.567 sp. gr.
Static Pressure
Bottom hole 52[illegible] psi.
Associated Water Characteristics
Not reported.

PRODUCTION

Well shut-in—waiting on market.


TYPICAL GAMMA RAY - NEUTRON LOG
CONTINENTAL OIL COMPANY
WEST DOUGLAS CREEK # 25-2
TOP CASTLEGATE
1500
1600
1700
1800
1900
STRUCTURE CONTOUR MAP OF THE
LOWER HORSE DRAW
FIELD
RIO BLANCO CO. COLORADO
100' CONTOURS DRAWN ON TOP OF CASTLEGATE
0
4000'
8000'
12000'
SCALE : 1"= 4000'
GEOLOGY BY : R.D.BOCELL , ALAMO CORPORATION
R.E. COVINGTON , CALDWELL & COVINGTON
R-104-W
T 2 S
LOWER HORSE DRAW UNIT
ALAMO CORP. OPR.
Johnson
Johnson-Bunn
Phillips
+4000
+4100
+4200
+4300
+4400

Data prepared by: JOHN R. BUNN & ROBERT E. COVINGTON

Affiliation: Johnson & Bunn

Date: October 25, 1954

Field Name: HELL'S HOLE

Location: T. 2 S., R. 104 W.

County & State: Rio Blanco County, Colorado

PAY ZONE: Basal Mesaverde sandstone, Upper Cretaceous series. Sand is light gray to white, fine to medium coarse grained, friable to medium hard, porous. Sand thickness is 100 feet: with 210 feet dark grey slightly bentonitic shale interval above.

TYPICAL CORE ANALYSIS OF A PAY INTERVAL IN THIS FIELD: Not available.

PERM. IN MILLIDARCYS		% POROSITY	LIQUID SATURATION (% OF PORE SPACE)	
HORIZONTAL	VERTICAL		WATER	OIL

OTHER SHOWS ENCOUNTERED IN THIS FIELD:
Show oil 575-580; show gas 1140-1150; show gas 1370-1380; show of gas 1560-1565.

TRAP TYPE: Fault trap on structural nosing.

NATURE OF GAS: Specific gravity: 0.567 by Pod., 0.559 by wt., 994 B.T.U., no sulfur.

NATURE OF PRODUCING ZONE WATER: No data available.

	TOTAL SOLIDS	NA+K	CA	MG	FE	SO_4	CL	CO_3	HCO_3	OH	H_2S
ppm											

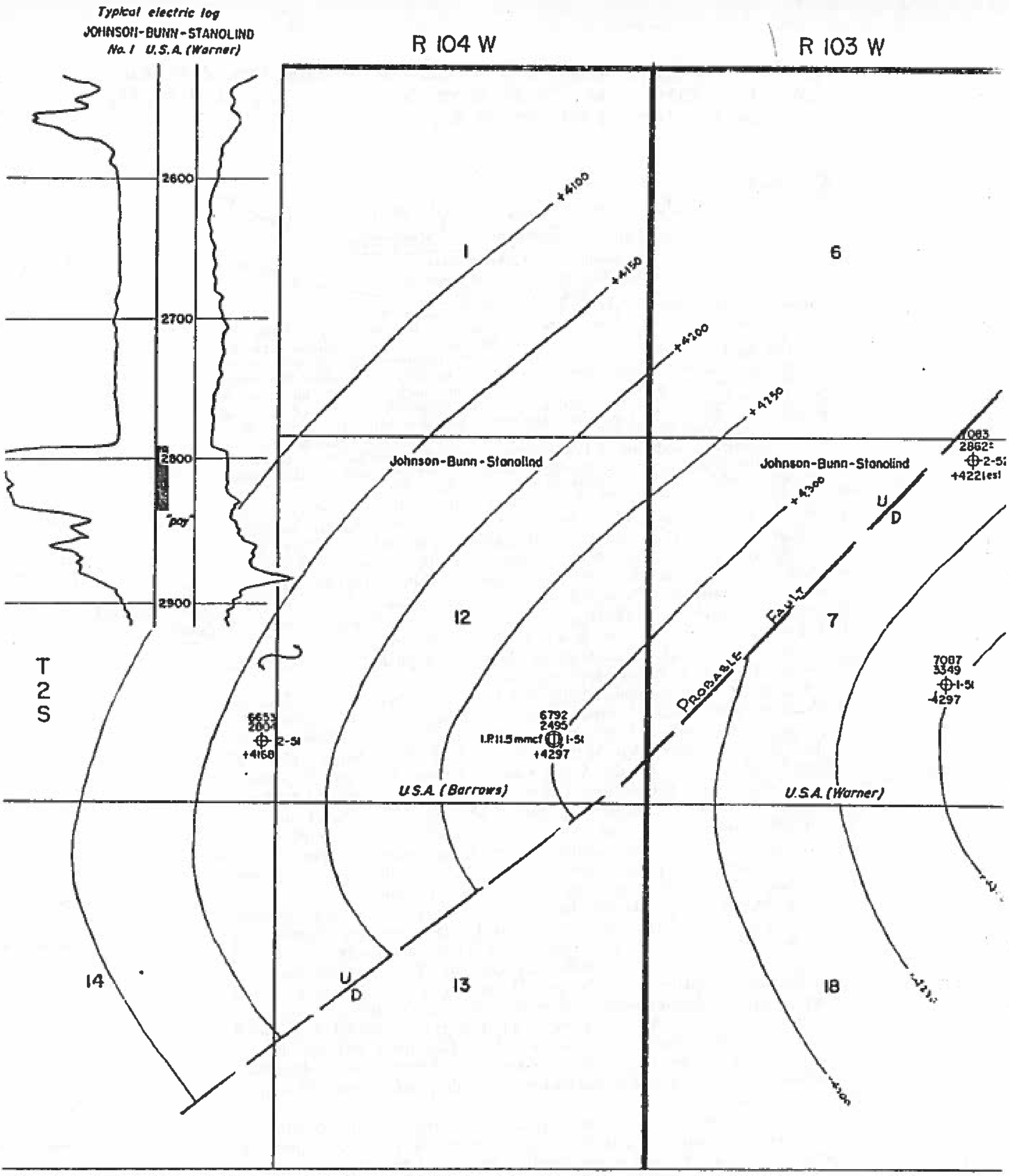
INITIAL FIELD PRESSURE: 525 lbs. psi.

TYPE OF DRIVE: Hydrostatic.

NORMAL COMPLETION PRACTICES: Discovery well was cable tool well.

PRODUCTION DATA: (Discovery well completed May, 1952).

YEAR	TYPE	NO. OF WELLS @ YR. END: PROD.	SHUT-IN	PRODUCTION OIL IN BARRELS GAS IN MMCF: ANNUAL	CUMULATIVE	YEAR	TYPE	NO. OF WELLS @ YR. END: PROD.	SHUT-IN	PRODUCTION OIL IN BARRELS GAS IN MMCF: ANNUAL	CUMULATIVE
1952	oil		1				oil				
	gas						gas				
1953	oil		1				oil				
	gas						gas				
1954	oil		1				oil				
	gas						gas				
	oil						oil				
	gas						gas				
	oil						oil				
	gas						gas				



STRUCTURE CONTOUR MAP OF THE

HELLS HOLE FIELD

T. 2 S., R. 103-104 W., RIO BLANCO CO., COLO.

Basal Mesa Verde Sand Production

50 foot contours drawn on top of sand.

0 1000 2000 3000 4000 5000

Scale: 1 inch=2000 feet (1:24,000)

Geology by John R. Bunn & R.E. Covington

October 1954 Revised ______

Drafting by Roy Wendelin

For explanation of symbols and abbreviations see pages 68 and 69.

Presented at the Geological Society of America Annual Meeting, Salt Lake City, Utah, 1975; also, in Brigham Young University Geology Studies (1976) Volume 22.

Oil-Impregnated Rocks of Utah: Distribution, Geology and Reserves

line #

Robert E. Covington
Hiko Bell Mining and Oil Company
Vernal, Utah 84078

line #

ABSTRACT.—Oil impregnated rocks of Utah contain in excess of 24 billion barrels of gross oil in place. All the major deposits are located in the eastern half of the state in two areas, the Uinta Basin of northeastern Utah and the Central Southeast area. Oil in most of the Uinta Basin deposits originated in the lacustrine Green River Formation of Eocene age and, on the south flank of the Basin, are all located within this formation or in the underlying Wasatch Formation. On the north flank, the oil occurs in rocks of Jurassic, Cretaceous and Tertiary age. The largest oil-impregnated sandstone deposit in the Uinta Basin, the Sunnyside deposit, has gross oil in-place estimated at 4 billion barrels. This deposit is discussed in detail. In the Central Southeast area, most of the oil-impregnated rocks are of Permian and Triassic age. The Tar Sand Triangle is the largest deposit and contains 12.5 billion barrels of gross oil in-place in the Permian White Rim Sandstone. Recent activity on these deposits is discussed.

line #

Oil-impregnated rocks of Utah contain very significant reserves of oil, estimated to be in excess of 24 billion barrels. The deposits are located in two areas of eastern Utah, the Tar Sand Triangle of central southeastern Utah, which contains an estimated 14 billion barrels of oil, and the Uinta Basin of northeastern Utah, which contains an estimated 11 billion barrels. The location of the known deposits is indicated on the index map (Figure 1). The deposits will be reviewed briefly, except for the Sunnyside deposit, ~~and~~ which will be. discussed in more detail. A brief resumé of the *in situ*, reverse combustion process to recover oil from tar sands along Northwest Asphalt Ridge is described by Lee C. Marchant in the accompanying paper.

The Uinta Basin contains 25 deposits (Ritzma, 1974) of which four are classified by size as "Giant" (more than 500 million barrels of in-place oil). These include the Asphalt Ridge, Hill Creek, P. R. Springs, and Sunnyside deposits. There are three Utah deposits classified as "Very Large" (100-500 million barrels). These are the Argyle Canyon, Raven Ridge, and Whiterocks deposits. the Asphalt Ridge Northwest, Cottonwood-Jack's Canyon, Littlewater Hills, Minnie Maud Creek, Pariette, Rim Rock, and Willow Creek deposits. Nearly all of the deposits in the Uinta Basin contain oil which originated in Tertiary age source beds, the lacustrine Green River Formation. Over half of these are *in situ* type deposits, with the oil originating in the Green River Formation and remaining there or in the subjacent Wasatch Formation.

line omitted

o

The Asphalt Ridge and Northwest Asphalt Ridge bituminous sandstone deposits are located a few miles west of Vernal, Utah. Bitumen saturation occurs in beds of Cretaceous and Tertiary age. In-place oil reserves are estimated at 1.3 million barrels, with approximately one-half of the reserves occurring in each of the two different age groups. The author believes that the oil in the Cretaceous Mesaverde Formation originated in adjacent Cretaceous source beds. Substantiating data is that the Mesaverde bitumen is very similar in chemical analysis to an intermediate-base crude oil and the fact that a very definite oil-water contact is present (fossil oil-water contact). Bitumen in the Duchesne River Formation more closely resembles the very high, paraffin base Green River Formation crude oils.

The bituminous sandstones of Asphalt Ridge area are the remnants of several Mesaverde and Duchesne River oil fields that have been exhumed by Quaternary erosion. The oil in the Asphalt Ridge and Rim Rock Sandstones is found on two prominent anticlinal noses, one near the north end of Asphalt Ridge and the other near the south end. These anticlines had their inception in late Cretaceous or early Paleocene time as the result of Laramide Orogeny. Additional uplift, faulting and regional tilting occurred in Eocene, Oligocene, and Quaternary times. Pre-Duchesne River regional tilting and truncation exposed the oil bearing sands, allowing the lighter fractions of the oil to escape. The immobile, asphalt like bitumen was left.

e

In the "Large" category (10-100 million barrels) there are seven deposits,

2r

Bitumen saturation in the Duchesne River Formation is stratigraphically trapped by updip pinchouts of lenticular, fluvial sandstones and conglomerates. The bitumen deposits show no relationship to the unconformities along which the Duchesne River Formation overlaps the Mesaverde, Wasatch, Green River, and Uinta Formations. The bitumen is distributed in sandstones and conglomerates throughout the formation as much as several hundred feet above the unconformity (i.e., many authors in past have thought that the oil in the Duchesne River Formation migrated from Green River Formation up and across ~~the~~ unconformity into the Duchesne River sandstones and conglomerates).

In most cases on Asphalt Ridge, if porosity and permeability are developed in the Duchesne River sandstones and conglomerates, they are oil saturated and the degree of saturation is directly related to porosity. There also is a decided higher concentration of oil saturation on anticlinal features. Some of the thicker, more extensive sandstones show definite oil-water contacts. align

The source for the oil in the Duchesne River sandstones and conglomerates is probably the organically-rich lacustrine beds of the Green River Formation from which the oil migrated through open fractures during the intense period of Post-Duchesne River faulting. Post-Duchesne River faulting and fracturing has been mapped on Asphalt Ridge in great magnitude and abundance, some of which exhibit shows of oil or bitumen.

In Whiterocks Canyon, Uintah and Duchesne Counties, Utah, T2N-R1E and R1W, SLM, the Jurassic Navajo sandstone is oil impregnated. The formation is 1,000' in thickness and has a 62° southeast dip. Bitumen saturation extends vertically to an average depth of 550' and is present 200' above the canyon floor for a total saturated interval of 750'. Proven in-place reserves are 125 million barrels, with another 125 million barrels possible to the northeast and southwest. A Tertiary source has been proposed for this deposit, with the oil moving updip from Green River lacustrine beds in the eolian Navajo along the Tertiary-Jurassic unconformity. However, there is no evidence of bitumen saturation along this unconformity. Two wells drilled downdip by the Carter Oil Company had no significant shows of oil or dead oil staining in the Green River Formation to indicate that this formation was the source of the Navajo oil. The author believes that the Whiterocks prospect was a structurally controlled oil field of very large proportions, now exhumed. The source beds were either the Jurassic Twin Creek limestone or the Permo-Pennsylvania Phosphoria limestones.

broken type

into the eolian gte

The Hill Creek deposit is located in the south flank of the Uinta Basin in Townships 13, 14, & 15 South—Range 18, 19, 20, & 21 East, Uintah and Grand Counties, Utah. Bitumen saturation is in sandstones and siltstones of the Douglas Creek and Parachute Creek Members of the Green River Formation, the probable source beds of the oil. Reserves are estimated to be 4 to 5 billion barrels of oil in-place. The deposits are highly lenticular.

The largest deposit of oil-impregnated rock in the Uinta Basin is known as the Sunnyside deposit. The bitumen impregnated sandstones and siltstones are located in Carbon County, Utah in Township 12, 13, & 14 South—Range 13, 14, & 15 East. In-place oil reserves are estimated to be in excess of 4.6 billion barrels, of which 1.25 are measured, 1.75 are indicated and the remainder is inferred. The oil-impregnated sands occur at topographic elevations which range from 8,500 to 10,000 feet. The bitumen-bearing beds are in the upper third of the Wasatch and the lower part of the Green River Formation. The Wasatch Formation is primarily fluvial and the Green River Formation is primarily lacustrine, although considerable intertonguing of the two occurs in the Sunnyside area. Wasatch sands are highly lenticular, with varying degrees of porosity and permeability. Sandstones of the Green River Formation, although they have greater lateral continuity, in general have lower porosities, lower permeabilities, and consequently are less richly saturated than the Wasatch sands.

This deposit is the remnant of a stratigraphically trapped oil field that has been exhumed by recent erosion. The stratigraphic factors which directly control the accumulation in this deposit are:

(1) The proximity of the sands to overlying, underlying and downdip (basinward) source beds. The closer the reservoir beds are to the source beds, the higher the degree of saturation, assuming other factors such as structure, porosity and permeability to be constant.

(2) The degree of saturation is directly related to the porosity and permeability of the reservoir rock.

(3) The original oil was trapped in a delta complex which extended to the north into ancient Lake Uinta during Eocene time. This has been determined by the construction of isopachous, islith and sand percent maps. isoliths

(4) The deposits contain three major types of reservoirs: (a) deltaic, (b) offshore bars and (c) barrier bars associated with ~~the~~ ancient delta. align

Lithofacies maps point out a zone or band around the edge of the lake having the greatest percentage of reservoir ~~quality~~ sand in juxtaposition to organic lacustrine sediments. This is where the greatest accumulation of oil occurred. a

align

The structural factor which strongly influenced and directed the movement of hydrocarbons from the source beds into the reservoir rocks is the regional monoclinal dip which ranges from three to ten degrees to the northeast. Monoclinal structure is interrupted by gentle, north plunging anticlinal noses.

A brief review of the vital economic data of this deposit may be of interest. The sands contain an average of 9% bitumen by weight, or 38.2 gallons per cubic yard, or 1,457 barrels per acre foot. Core analyses show the sands to have porosities which range from 25 to 30 percent by volume, and permeabilities ranging from 150 to as high as 650 millidarcies. Water saturations are extremely low, probably averaging 5%. Problems associated with thermal recovery by steam injection or by fire flooding are as follows: (1) the lenticularity of the sands, (2) the fact that bitumen-rich sandstones grade both vertically, laterally, and in a downdip direction into lean to barren sandstones, often within several hundred feet, (3) the lack of a nearby, adequate supply of large volumes of good quality water, and (4) lack of local markets. These are the major drawbacks to economic development. 5

During the period from 1955 to 1967 Signal Oil & Gas Company undertook an exploratory program to determine the economic feasibility of an *in situ* mining operation. The objective was to drill horizontal test wells into the Wasatch oil-impregnated sands to determine the economic and technical feasibility of producing oil by application of steam.

Three horizontal wells were drilled and equipped for steam injection and production operations. A 5.8 MM BTU/hr. steamer was used. The holes were drilled into the westerly cliff face of the old Utah Rock Asphalt Quarry to a depth of about 370' (horizontal). The central well was used as a producing well and the other two were used for steam injection. The holes were cored to obtain engineering data on porosity, permeability, oil saturation, water saturation, and to help maintain a straight hole.

Steam injection pressures by Huff & Puff test were kept at about 300 psig and injection temperatures ranged between 350° and 450°F. Total input during the test was 400 bbls. of water equal to about 138 MM BTU of heat input. No oil was recovered in this test.

A steam injection test was undertaken using 5.8 MM BTU/hr. with injection pressures and temperatures averaging 140 psig to 370°F respectively. and The production well first began to flow colored water and then a "rope-like" emulsion of about 16 barrels of bitumen. The wells were produced for 4 days during which time a fairly constant water cut was observed. The economic and mechanical feasibility of this project is unknown.

The bitumen from the Sunnyside deposits is low in sulphur, contains a relatively high percentage of resins and aromatic hydrocarbons, and makes excellent road paving material. It may be economically feasible to combine petroleum coke derived from cracking the bitumen with coal presently being mined in the Sunnyside area to produce a coking coal of high quality.

A vertical strat test well was drilled by Signal Oil Company in Section 4, Township 14 South—Range 14 East to a total depth of 1,450 feet. This well penetrated most of the oil-impregnated sandstones. The following data were derived from core analyses:

Total thickness of oil-impregnated sandstone:	645'
Net oil sand, thickness:	366'
Average oil saturation:	55%
Average porosity:	25%
Average permeability:	0.75 - 1.75% Darcies

RE

The oil-impregnated sandstones of the Central Southwest area lie on the northwest flank of the Monument upwarp. Surface beds dip gently to the northwest at about 100 feet to the mile. The oil reserves are primarily located in the Permian White Rim sandstone and were stratigraphically trapped by the southeast (updip) pinchout of the sand. Erosion breached the sandstone, diffusing the reservoir energy and allowing the light ends to dissipate. Dispersal of the original water drive has permitted some downdip and downward migration of the oil. broken type

May 20, 1921

Professor Earl Douglass Declares Interest In Oil Outside Means Turn of Tide

Some time ago the Vernal Express published my opinions as to the prospects of oil in the Uintah Basin. My beliefs at that time were summed up in "fourteen articles" which I thought would be startling and might help to arouse an interest. If so there was a little more which I intended to say. But people, who live in a country of big things, where truth is stranger than fiction, and where they live their every day lives amid such scenes are not apt to get much excited about these conditions. Then too, they are tired of oil talk, and railroad talk and efforts to booom the country.

But it is different outside. The oil interest of late has been intense There is a beginning of the turn of the tide. Nearly every structure which seems favorable for the production of oil is being tested, or companies are preparing to test it. Though in some places the strata to be penetrated with the drill show no certain evidence of being oil bearing. Oil prospecting in many places is simply the discovery of domes and anti-clines. There will of course be many disappointments. Many holes will undoubtedly be as dry as the United States is now.

The tide will turn to a part of the country where the surface showing is the greatest in the known world and where the structure is all that could be desired. The more superficial one-sided methods, will change to more common sense and scientific methods of prospecting, then there seems little doubt as to results.

Whether the people are interested here or not others are turning their attention this way and this immense field will be tested. My trip to the western part of the basin, in fact, all of my investigations since writing the articles mentioned above, have tended to confirm all the statements made there and I could add much more. In Salt Lake city, and undoubtedly in other places, substantial men are turning their attention this way and some are going to go at it right and try to find what is in the country.

Just one word to the people here. If you have property where conditions are favorable you will have opportunites to lease. Before you sign these leases, know what you are doing and be sure that the lease is fair to you as well as to the company.

Jan 21, 1921

Prospects of Oil in the Uintah Basin

By Professor Earl Douglass — Jensen, Utah

Those who are acquainted with me are aware of the fact that I appreciate, as much as any one, the natural resources of the Uintah basin. I sometimes think that we talk of its wonders and its opportunities until people get tired. Like a formal prayer, we may repeat our story so frequently that we don't realize ourselves, what we are saying. People from other places besides "Missouri" want to be shown. We can show them some things and sometimes we can show them more.

When I was a boy, two other boys and myself got after a mouse in a grain bin. After we had scrambled around for some time, in hot pursuit, the mouse suddenly vanished. We couldn't see how in the world he could get out, but we had to give it up. One of the other boys discovered the mouse when he least expected. When it made a struggle, Fred found him—up his sleeve. I think we have something bigger than a mouse up our sleeves and many of us don't know, ourselves, where it is.

Undoubtedly as long ago as when veins of gasonite and mountains of asphaltic sand were discovered, it was surmised that they were not always there but they had come from somewhere. At intervals, ever since, there has been some prospecting, scrambling to take up oil lands, drilling for oil etc, but, as yet, nothing to justify the promise of surface indications. Doesn't it seem strange? Yes, the human side does, at least.

For many years, as a fascinating geological problem, I have been interested in the occurence of oil in Uintah basin. Had it not been for the other interesting work in which I was engaged and for financial hinderences, I would have cut loose long ago, at least for a time, and would have made a careful study of the geology of the whole region. Why some one has not done this is, to me, one of the strange things about human nature. I suppose it might be partially explained, and some of the reasons may appear later. It seems to me, that if one ten thousandth of the surface indications of oil occured almost any where else, there would have been no let up of investigation, labor and expenditure of money, until the thing was found or proven to be absent.

In searching for the remains of creatures which lived, "In a world that is no more," I have always endeavored from the rocks and the relics entombed in them, to read, so far as I could, the past history of the earth and to learn how it was that things came to be as they are—as Artemus Ward said, "To learn the reason of all this thusness." The oil problem, as I have observed more and more, has become apparently clearer and clearer. I have talked with many who are interested in oil, oil promoters and oil geologists. I have been frank with them, have told them that I was confident, from my observations, that there was much oil in the Uintah basin and that the geological structure ought to show where it is; but it don't seem to produce much effect. I shall, in the future, try to present my views where they will produce some impression. I predict, that within a year, it will be proven whether I am on the right track and whether, or not, geology has any thing to do with the oil business in the Uintah basin. I am confident enough however, to express some of my opinions in public and let them stand the test. I am going to speak out no matter where it strikes. If I do this, I will at least, have the satisfaction of the preacher who fired away at his congregation with the biggest guns and the strongest powder at his command. He accused them of sins, urged repentance, promised them heaven and gave them hell in terrifying doses, until finally wiping his face and breathing more normally he said, "Now, I've done my duty and it rests on your pates."

If people want to ignore the geological conditions and think it is not a geological problem, if they think it wholly a game of chance and a greenborn is as apt to strike it as anybody, if they want to spend their hard-earned money where a well to the center of the earth would not strike oil, or not enough to fill a lamp, if they think that all promoters are working to get honest money from the earth instead of out of the peoples pockets, then let them go ahead; I will try to do my duty and it will rest on their "pates."

It is natural for us to want to get rich quick. Most of us have been poor so blamed long that, like the old prospector, we'd, "Like to strike it rich and have all the sardines we want for once."

People know the great material treasures come from the earth. Many look out over this "torn up" country. It looks like a chaos. They read on its surface fearful catastrophes. The earth has been terribly shaken up sometimes. There have been "blowout" and explosions. If there is something remarkable in the way of mineral products, it has been "shot up" or "slid in." These awful shake-ups have buried treasures and there are very pleasing and entertaining stories about greenhorns striking it rich even where scientists said there could not be any thing there.

People say, "I would hate to have been here when this country was torn up." Or, "I am glad I was not here when these mountains wer upheaved." I want to tell them that they probably were here, a part of the time, but this would give them a worse jar than any physical upheaval that has occured here would have done. The same forces that carved hills, mountains and bad lands out of vast masses of rocks are at work at the present time and the, as yet unknown, cause of the upheavel and folding of the rocks may be going on at the present time, though so slowly we cannot measure it. The process of events here has been very long, but quietly and orderly, and it is a most excellent place to study that process.

But the region is extensive. Things are on a grand scale and it takes time and labor to read the history of events and the origin of natural products. Though geology deals with big problems and its revelations extend to vast undreamed of periods of time yet its underlying principles are comparatively simple and can be comprehended by any one who can understand physical geography. Truly it is some times exasperating to see how few have sane and true ideas of the history of their home—the earth. The revelations are so startling that it has taken the place of the myths and fairy world of the past and popular articles and books of today are about as dependable as the fairy books of old.

Now a word as to the greenhorn striking it rich. They do sometimes but people think only of that one greenhorn and forget the ninety-nine or more who went to work at some thing else or died in poverty.

Let us suppose that oil prospecting was done entirely ignoring geological conditions. In many places scattered over a territory at least 200 miles in length and eighty miles in width there are many signs of the presence or the former presence of oil. In a tract 80 by 200 miles there would be 16,000 square miles or 25 sections. Suppose that on an average a well were put down to every twenty square miles. This would make 800 wells. At a cost of $5,000.00 per well it would amount to $4,000,000.00. Most of these wells would undoubtedly be dry, or nearly so. Suppose however, that we could find the formation or formations in which the oil originated, and by the position (dip, etc.) of the rocks and their texture could tell where it would most likely migrate and were to find some porous stratum to serve as a reservoir. Suppose that this common sense knowledge reduced the area of possible productive wells to 400 square miles and 20 wells were put down in this area at the same average cost as the above. This would reduce the cost from $4,000,000.00 to $100,000.00. Wouldn't it pay to spend a few dollars for investigating?

But if this area of 400 square miles could be studied with great care and one or two areas were found where indications were most favorable and five or six wells could be put down to test the thing and this at a cost of only $25,000 00 to $30,000.00, wouldn't it be better to expend more in sensible, intelligent prospecting and less in experimental drilling?

There is much to be said on this subject that ought to be known by those who are interested in the prosperity of themselves and the country and much that I want to say but must be given in some later article

Cost less to know the geology of area instead of testing holes everywhere

Feb 21, 1952

Rapid Development at Red Wash Sets New Oil Record For Utah

BY ROBERT CAMPBELL
Geologist for California Co.

Within one year after completing the wildcat Red Wash Unit No. 1, the California Company successfully finished 10 wells in the new Red Wash Field, southeast of Vernal. Five rotary drillings rigs have been operating at Red Wash, and within a month should complete the fourteenth Red Wash well. Daily production of over 1300 barrels of oil a day has been established.

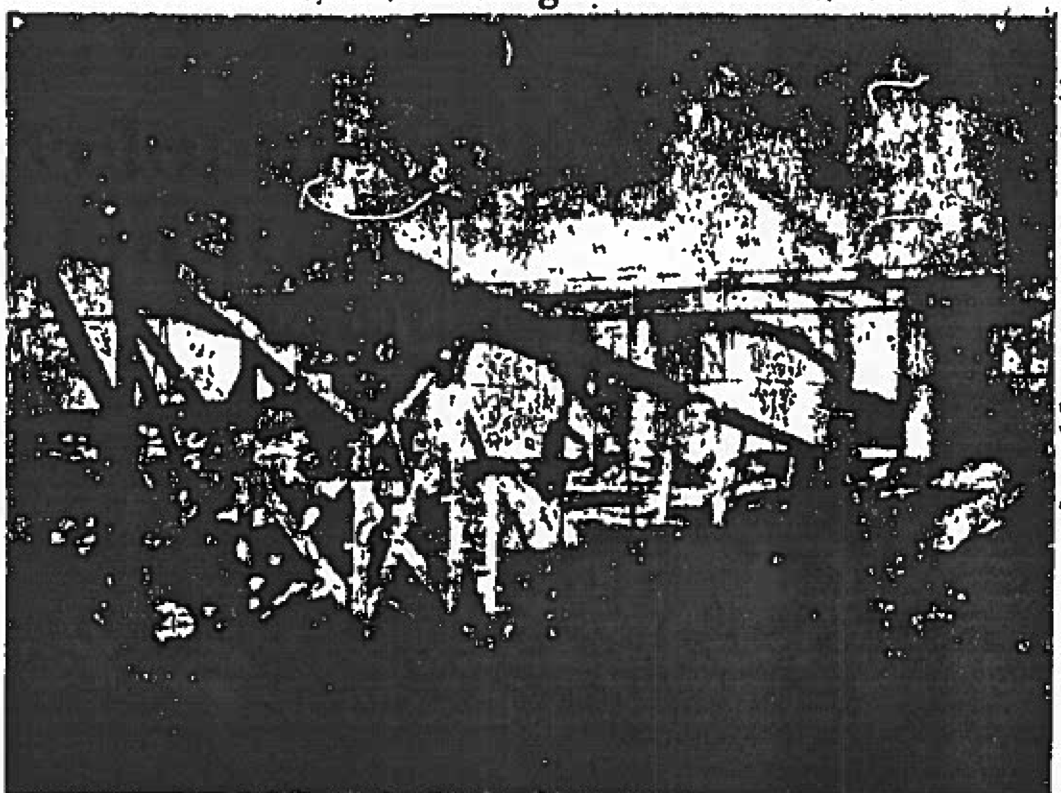
The California Company has rapidly proved up the Red Wash area by drilling exploratory-outpost wells, often a mile from the nearest producer. This unusual method of development has proved 100 per cent successful and has made possible evaluation of a large area which by usual development procedure could have taken years of work.

Oil Presents Production Problems

A little over a year ago Red Wash Unit No 1 was completed, but immediately presented production problems. The produced oil, although containing a good percent of gasoline, becomes a solid when its temperature drops 90° F. This is due to the high

(Continued on Page 8)

First Oil Loading Dock at Red Wash



The first battery of storage tanks at Red Wash a year ago when a few hundred barrels of oil was produced per day. Now the production is 1300 barrels per day and with warmer weather and improved transportation facilities will be greatly increased.

RAPID DEVELOPMENT AT RED WASH SETS NEW OIL RECORD FOR UTAH

(Continued from Page 1)
wax content. Methods of heating this oil and keeping it fluid has to be initiated. Boilers fueled by natural gas from the producing horizons were set up and insulated lines run from each well to the storage tanks. Five tank batteries, each costing approximately $25,000 have been constructed to store the oil. Close to each battery is a boiler capable of producing 2,000,000 B.T.U's per hour for keeping the oil fluid and hot enough to remain fluid when taken in tankers to Rangely.

Camp Built

As soon as a fair amount of production became apparent, the California Company let contracts for camp construction. A warehouse, a temporary office, and a cafeteria were soon constructed. Mr. and Mrs. Steele from Meeker operate the cafeteria and soon established a reputation for the best food in the oil industry.

Four houses, two duplexes, and a bunkhouse, making nine living quarters are rapidly reaching completion. Four families, the Gressetts, Callans, Kellys and Pittmans will have moved in by the end of this week. All houses, built by Ashton Bros., have hardwood floors, gas heat and full basements. Power plants, water treating equipment and gas line supplying the camp have all be installed Camp construction cost is estimated at $130,000.

54 Miles Of Road Built

A system of roads totaling 54 miles and giving access to the area, each well, and the tank batteries have been constructed. In the winter the problem of keeping these roads open and the oil moving is difficult. During January alone the snow removal costs were $3,000.

Approxmately 40 miles of gas and water lines have been laid and buried. This includes 12 mile line drawing water from the Green River.

Seven miles of telephone line stretch from 'highway 40 to Red Wash. This line had to transerse Walker's Hollow, a large area of badlands to reach Red Wash.

The phone line has supplemented the FM radio network already installed. The radio network connects the California Company's Rangely office and the Red Wash office as well as the various phone-radios in the company cars.

Personal Increase

Tom Gressett is the field superintendent at Red Wash. with seventeen personnel working out of the Red Wash office. In addition to these are petroleum engineers Robert Meason, Jim Nolan, Charles, Clarke and civil engineer Jim West working in the area. Robert Jackson and Robert Campbell are the geologists at Red Wash. A new geological office has been opened in Vernal at 160 West Main St. to handle Red Wash field and Uintah Basin wildcat wells.

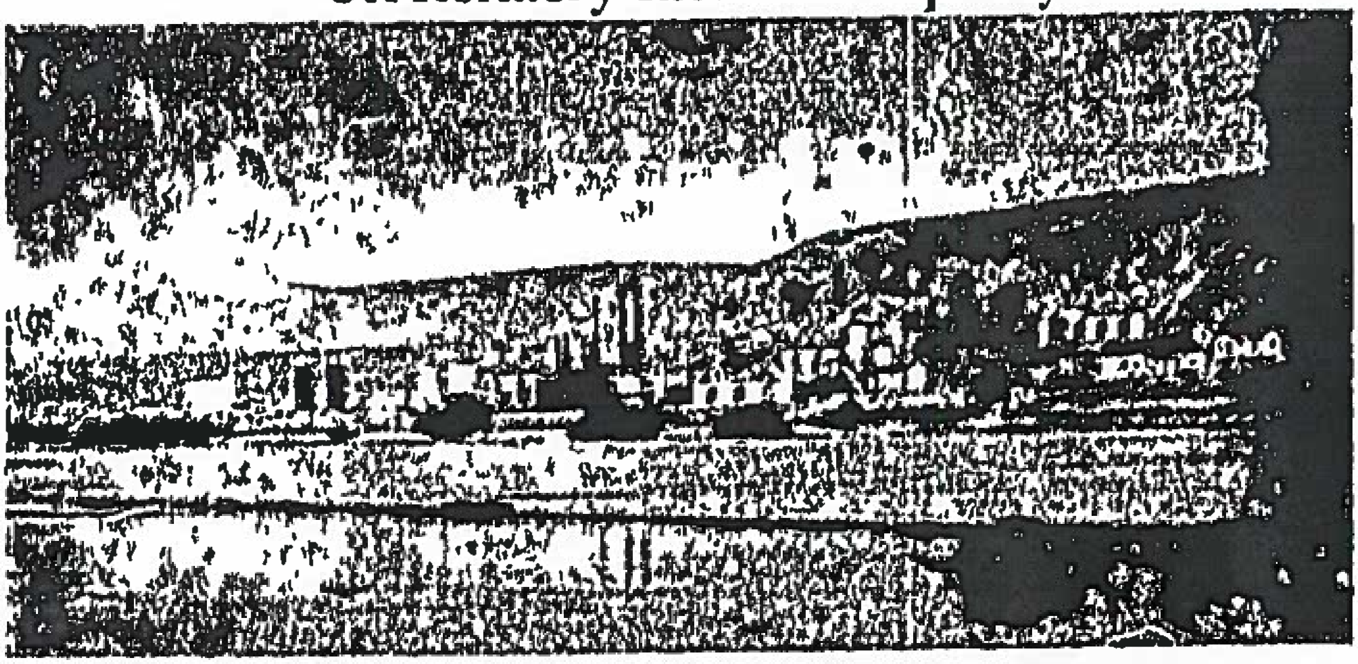
A year ago Red Wash was badlands and plateau county marked only by the lonely grave of "Bill Redman, killed at 16 years of age, 1890, by a Meeker Sheriff". From this incident out of the old west Deadman's Bench, on which Red Wash is located, was named.

Now a forest of derricks is springing up to mark the drilling progress of California Company. A settlement has begun and another addition to the oil industry of Utah, is made, as California Company sets a new record for oil field development.

Red Wash

Dec 27, 1951

Oil Refinery Increases Capacity



Uinta Oil Refinery on the banks of Green River at Jensen marketed 14,000,000 gallons of products during 1951.

REFINERY AT JENSEN BOOSTS CAPACITY TO 1,200 BBLS. DAILY

By Justin Stewart

The Uinta Oil Refinery at Jensen, owned and operated by the Utah Cooperative Association of Salt Lake City is among the most important industrial installations in the Uintah Basin. During 1951 it processed more than 13 million gallons of product and paid Uintah Basin residents over $96,000 in salaries and wages.

The Utah Cooperative Association is a wholesale organization which supplies some twenty member retail cooperatives with petroleum products and farm supplies. Among these are the Ashley Farmers Union Co-op at Vernal and the Uintah Farmers Union Co-op at Roosevelt.

The Refinery which will soon enter its eleventh year of operations was built in the fall of 1940 and was first put "on steam" in April, 1941, by the Equity Oil Company, long-time crude oil producer in the Rangely Field. According to J. L. Dougan, Equity's president, the plant was built to provide a market for the company's shallow well production at Rangely.

Construction of the plant was under the supervision of Charlie Halstead, long-time basin resident, who stayed on as superintendent of the plant which then had a capacity of 500 barrels of crude a day.

Following the construction of adequate pipeline connections between Salt Lake City and the Rangely Field in 1945, Equity decided to confine its activities to production and in July of that year sold the plant to several individuals, including Mr. Halstead who stayed on as superindentent. During the following three years the plant capacity was increased to 700 barrels per day.

In the summer of 1948 Uinta was purchased by the Utah Cooperative Association to assure itself of a supply of refined fuels for member retail cooperatives. Earlier that year, the Coop's principal supplier had reduced supplies to 40 percent of the previous year.

Pursuing a progressive policy of improvement under cooperative management, the plant has been steadily improved and capacity increased over 70 percent, to 1,200 barrels per day during the past 3½ years.

Charlie Halstead, who stayed on as superintendent following the purchase by the Utah Cooperative Association resigned in September, 1949, to enter business for himself following nearly ten years as builder and superintendent of the plant. He was followed as superintendent by R. M. Goldston and later by the present superintendent, Leslie M Cochran. Mr. Cochran is a veteran refinery man with many years' service with the Bay Refining Company of Denver and the Blue Island Plant of the Great Lakes Refining Company. Mr. Cochran now resides with his wife and small daughter, in Vernal.

Some Possible Applications of Thermal Recovery in Utah

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Vernal, Utah

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THERMAL PROSPECTS

Some Possible Applications of Thermal Recovery in Utah

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Abstract

The bituminous sandstones of the Rocky Mountain region have significant reserves of oil. Production costs of the reserves must be reduced to be equal to or lower than the cost of crude oil produced by conventional methods. Three Utah deposits alone, Sunnyside, Vernal (Asphalt Ridge) and Whiterocks contain proved reserves of 875 million bbl of oil and "possible" reserves in excess of one billion bbl. In addition, there are at least six more deposits of asphaltic sands which contain substantial reserves within the state.

The most important deposits in Utah from the standpoint of thermal recovery are those of the Sunnyside area, Carbon County, Utah and the Asphalt Ridge-Vernal deposits, Uintah County, Utah. Two other areas which have thermal recovery potential are the bituminous sandstones of the Whiterocks area, Uintah County, Utah and the San Rafael Swell-Nequoia Arch area in Emery, Wayne and Garfield counties, Utah.

A preliminary evaluation of these four areas is discussed from the standpoint of geology, reservoir engineering, costs, markets and future development possibilities. These four, and perhaps three of the six areas of lesser importance, compare favorably with areas now being developed by thermal methods in California, Oklahoma, Texas and Kansas.

Introduction

The threat of large-volume, low-cost imported oil moving into the United States, combined with ever increasing exploration, drilling, completion and production costs, makes it imperative that the American oil industry take a long, hard look at the tremendous amount of oil in the bituminous sandstone deposits, in oil shale reserves and in shallow-to-moderate-depth depleted or semidepleted fields where production has declined beyond the point of profitable return on production costs.

For example, prior to 1950 the only method considered at all feasible for producing the bituminous sandstones of the Rocky Mountain region was by either conventional or strip mining and extracting the bitumen through various types of separation processes.

In the early 1950's experimental work was started in California on the in situ combustion techniques. During the last eight years, work has been undertaken on extracting low-gravity, viscous crude oil or bitumen from tar sands through the application of steam injection. Consequently, one of the most significant factors which is giving the American oil industry a much needed "shot in the arm" is the

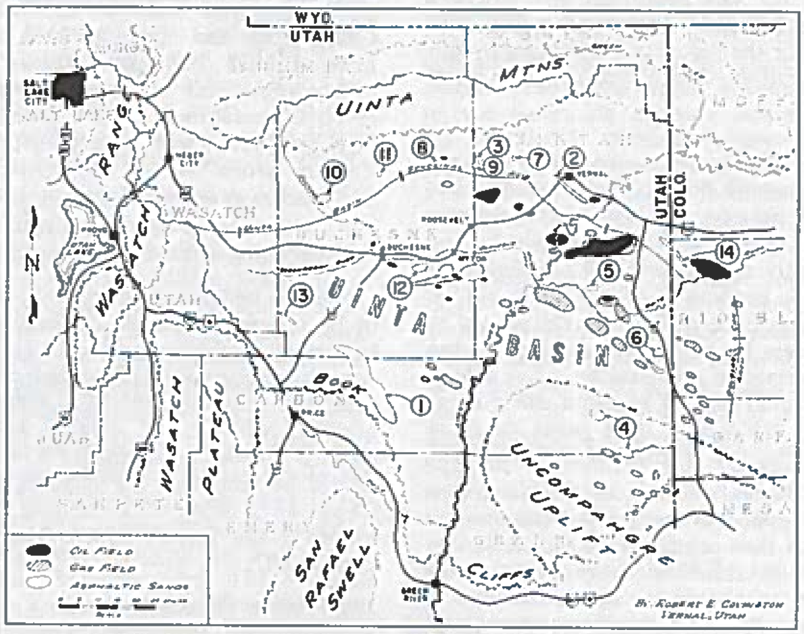

Fig. 1—Index map showing the location of the bituminous sandstone deposits of the Uinta Basin as well as the oil and gas fields. The circled numbers indicate the deposits, and the formations in which they occur are included in parentheses in the following list: 1. Sunnyside (Green River and Wasatch); 2. Asphalt Ridge (Duchesne River and Mesaverde); 3. Whiterocks (Navajo); 4. P.R. (Peor) Springs (Wasatch); 5. Chapita Wells (Uinta); 6. Dragon (Uinta and Green River); 7. Deep Creek (Duchesne River); 8. John Starr Flat (Duchesne River); 9. South Whiterocks (Duchesne River); 10. Tabiona (Currant Creek); 11. Lake Fork-Yellowstone River (Uinta); 12. South Myton (Uinta); 13. Argyle Creek (Green River); 14. Raven Ridge (Green River).

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fact that these two basic techniques have sound, economic merit and thus afford an economical means of producing deposits of bituminous sandstones and heavy, viscous crude oils which have heretofore been unproducible, whether due to economic factors or to mechanical problems.

Further experimentation may also reveal the fact that fireflooding may possibly work in converting the highly organic oil shale into crude oil within the reservoir, allowing it to be produced through conventional oilfield methods. In addition, thermal recovery techniques can be profitably applied in many existing oil fields.

Based upon a recovery factor of 29 per cent of the crude oil in place, United States recoverable reserves of crude oil at the beginning of 1963 were 31.4 billion bbl. It has been estimated that the application of steam flooding techniques to these reserves can increase recovery rates to over 60 per cent, and that fireflooding can give recoveries as high as 70 per cent. If the national over-all recovery rate can be increased to an average of 60 per cent, the present crude oil reserves of the country can be doubled.

Basic questions which arise with regard to thermal techniques are: (1) at what cost can this additional oil be produced? (2) where is the market for this additional oil? and (3) which thermal technique is best suited for the recovery project under consideration—fireflooding or steam injection?

Secrecy has been the policy of those companies who have run experimental firefloods and steam injection projects, but now much information has been released which will greatly stimulate thermal recovery. It is the purpose of this paper to outline some of the problems involved and to present both geologic and engineering information and data on a few selected areas and to pinpoint other areas in Utah which have good potential for the use of the techniques.

Thermal recovery methods can best be applied to relatively shallow reservoirs that contain very viscous crude oils at reservoir temperatures. The key to success lies in the fact that a crude oil with a reservoir viscosity of 1,000 cp at 100F would have a reservoir viscosity of 50 cp at a temperature of 200F. Although steam stimulation requires lower capital investment than fireflooding, combustion may be more effective in over-all oil recovery. However, certain formations are more amenable to steam injection than fireflooding, and vice-versa.

The bituminous sandstones of the Rocky Mountain region contain very significant reserves of oil. For production, the deposits must be mined, fireflooded or steamed at costs equal to or less than the cost of crude oil produced by conventional methods. It remains to be proved that we can do this, but we believe that the time is rapidly approaching when this development will take place.

The cost of this development is a direct function of the geographic location of the deposits to markets; the geologic setting of the deposits, including topography; and economic considerations such as local labor supply, construction costs, water availability, royalty rates on production and state and local taxes.

Within the state of Utah, the areas of most interest to potential operators of thermal recovery projects are the bituminous sandstone deposits of the Sunnyside area, the Asphalt Ridge area, Whiterocks, Peor Springs and the Green River Desert-San Rafael Swell areas. Other interesting areas are the Red Wash-Walker Hollow-Wonsits-White River oil fields, where thermal techniques may be of tremendous value in secondary recovery, and in the fractured oil shale-marlstone reservoir of the Ute Tribal Roosevelt and Ute Tribal Duchesne oil fields. There are many areas within the Uinta Basin where beds of the lower Green River and upper Wasatch formations have had good shows of highly viscous oil, but where the reservoir temperature was not sufficiently high to allow these high pour-point Tertiary crude oils to flow into the wellbore on drill-stem tests.

Evaluating a Thermal Prospect

We can better understand the areas to be discussed if some of the more important problems and factors involved in evaluating a thermal prospect are pointed out. The primary question will be, of course, which thermal recovery method, if any, should be employed for a given reservoir. In arriving at a decision, the following are factors which must be considered.

Depth to the Oil Sand

A depth of from 600 to 2,400 ft is the most attractive from a financial standpoint, although some projects have been successful with both greater and lesser depths.

Thickness of the Pay Zone

This means not only the thickness of the sand, but the number of feet of saturation, the position, if any, of the oil-water contact and the fact that extremely thick pay sections are more amenable to fireflooding than to steam injection.

Gross Oil in Place

The higher the net barrels per acre-foot, the more chances for success the prospect has. Generally, 1,000 bbl/acre-ft is considered a minimum.

Porosity and Permeability of the Zone

The higher the porosity and the permeability, the more efficient will be the fireflood or steam sweep.

Nature of the Reservoir Matrix

If the reservoir matrix is arenaceous or calcareous, porosities or permeabilities will not be greatly reduced by thermal techniques. If the matrix is shaly to clayey, then critical reduction of porosity in steam flooding may result.

Crude Oil Viscosity

The viscosity of thick, heavy crude decreases dramatically with temperature increase. For example, a 13° API gravity crude at 50F is reduced from 100,000 to 30 cp at 250F, or more than 3,000-fold.

Formation Temperature

Low formation temperatures are often the prime cause of producing problems when low-gravity, high-viscosity crudes are present within the reservoir, or when high-gravity, high-pour-point crudes are considered. In both cases thermal recovery techniques should be of great value in aiding recovery, although the most effective sweep will result from the former condition.

Oil-Water Saturation Ratios

Where water saturations are high, the effectiveness of thermal steam injection is reduced. Generally speaking, unless water saturations exceed 52 per cent the effectiveness is not critical.

The Bounding Planes of the Reservoir

A sandstone which is bounded both above and below by either dense shale or limestone will be more effectively steam or fireflooded because there is less heat loss and the injected fluid or fireflood is more effectively confined to the target reservoir.

Areal Extent of the Reservoir

In the case of a depleted oil reservoir, the areal extent can be determined from subsurface information. With regard to tar sands which outcrop and dip beneath the surface, geologic data can be utilized to approximately their extent, which when combined with core data can be predicted with a fairly good degree of accuracy. For example, in calculating the bituminous sandstone reserves of the Sunnyside area, the USGS used the assumption that a bed of bituminous sandstone will extend downdip 1,000 ft and beyond that uniformly to a zero line.

Specific Reservoir Characteristics

Some of the reservoir characteristics which will affect any thermal recovery program are the presence or absence of a well-developed fracture system, the homogeneity of the reservoir (i.e., if there are shale or lime stringers or thin beds within the sandstone which could affect the sweep efficiency) and the possible presence of a well segregated gas-oil system due to gravity segregation. This segregation could cause channeling of the sweep pattern.

Economic Factors

Briefly, a few of the factors which must be considered are the availability of a large supply of mineral-free, fresh water if steam injection is contemplated, fuel costs for steam generators, capital investment required for steam generators and special equipment, and the added cost of drilling closely spaced holes, including an estimate of the quantity and volume of steam needed, etc.

Many other criteria also will play an important role in determining whether or not the pilot flood will be successful. Among these are the problems of: analyzing the laboratory results of displacement tests on cores; reviewing core analysis where available; plotting the relationships of viscosity vs temperature for the specific crude being considered; and examining the production histories (if any) of all wells within the pilot area, including reviewing the present status of each well drilled into or through the potential zone with the idea of possibly utilizing some wells for the pilot food.

In the case of bituminous sandstones, the important conclusion is that the cost per barrel of oil produced through thermal methods will be substantially lower than oil produced from tar sands through either conventional mining or strip mining methods and consequent separation processes. No large-scale mining plans are needed and there is no need for a million dollar investment in a separation plant. Further, if fireflooding is used, the end product will be a relatively high gravity crude which can be pipelined without further treatment.

The Bituminous Sandstones of the Sunnyside, Utah Area

The bituminous sandstones of the Sunnyside, Utah area represent one of the largest known reserves of tar sands in the United States. The USGS estimated that the deposits contain approximately 500 million bbl of bitumen. Assuming thermal recovery techniques are used rather than conventional mining methods, then the total recoverable reserves exceed 300 million bbl if a 70 per cent recovery factor is applied. The deposits are located on the south flank of the Uinta Basin in northestern Utah, near the top of the Book Cliffs, a south-facing topographic escarpment. The area can be reached by traveling westward on U. S. Highway 6-50 approximately 135 miles from Grand Junction, Colo., or by traveling from Salt Lake City east on U. S. 6-50 118 miles east to Price, Utah, and then 15 miles east of Price to the Sunnyside-Dragerton turnoff on Utah 123, north to the coal mining town of Sunnyside, a distance of 7 miles and then 4 miles north to the deposits. The Denver and Rio Grande Railroad has a spur line into Sunnyside. The outcrop of bituminous sandstone covers parts of Townships 13 and 14 South —Ranges 13 and 14 East, Salt Lake Meridian, Carbon County, Utah. The tar sands occur at elevations which range from 8,500 to over 10,000 ft.

The bitumen-bearing beds occur in the upper third of the Wasatch formation and in the lower part of the Green River formation. The top of the West Tavaputs Plateau is about 500 ft above the uppermost saturation in the Green River beds, and the plateau forms a northeast dip slope into the Uinta Basin.

The beds of the Wasatch formation are primarily fluvial, while the beds of the lower Green River in the area are lacustrine, although considerable intertonguing of the two occurs in the transition zone. The Wasatch sands are highly lenticular, with varying degrees of porosity and permeability, while the sandstones within the Green River formation are more uniform and have greater lateral continuity. Bitumen saturation within the sandstones ranges from lean to rich; degree of saturation is directly proportional to the relationship of the sands to overlying and underlying organically rich shale and limestone source beds in a downdip direction from the outcrop.

The individual sandstones which are bituminous range in thickness from a few inches to more than 350 ft. Many of the sands occupy broad channels cut in the underlying shales and limestones, and shale-out both laterally and vertically. Many of the beds which are highly inspissated with bitumen near the top of the sand, grade downward to lean or barren near the base, as if there has been insufficient bitumen to occupy all of the available pore space.

Core analyses of the sands show that porosities range from 25 to 30 per cent by volume and permeabilities range from 150 to as high as 650 md. Little or no water is present interstitially. The bitumen has a low sulfur content and contains a high percentage of aromatic hydrocarbons and resins, and would thus make a good feedstock for motor oils, lubricants, petroleum coke and petrochemicals. The major drawback to the deposits from the standpoint of thermal recovery is the lack of large amounts of fresh water if steam injection is contemplated.

However, from the standpoint of fireflooding, the deposits are extremely attractive. Within the last two years extensive core drilling has been done by the Shell Oil Co., Atlantic Refining Co. and Phillips Petroleum Co. If an adequate water supply could be obtained for steam injection projects, one of the biggest advantages of the Sunnyside deposits would be the availibility of large, cheap fuel supplies from coal mines of the area. Power could be obtained from Sunnyside, and the spur line of the railroad is another economic asset.

Because of the favorable topography and geology, a large amount of the bituminous sandstone reserves can be produced through conventional mining, although it is probable that most of the oil contained in these deposits will be recovered by a combination of mining and thermal recovery techniques. Another economic asset of these deposits is the fact that the sands containing 9 per cent bitumen by weight contain 38.2 gal/cu yd, or approximately 1,457 bbl/acre-ft; this is well over the average saturation needed for successful thermal recovery.

The Asphalt Ridge Bituminous Sandstones

The bituminous sandstones of the Asphalt Ridge area are exposed along an east-facing, topographic escarpment which is located 4 miles west of the town of Vernal, Utah. The deposits can be reached by traveling west on U. S. Highway 40, 330 miles from Denver, or by traveling east 180 miles on the same highway. Asphalt Ridge trends northwest-southeast from the center of Township 4 South—Range 20 East to the northeast part of Township 6 South—Range 22 East. The area is approximately 11 miles in length and several miles in width.

Proven reserves are in excess of 900 million bbl of oil. Of this amount, 400 million bbl occur in the Mesaverde formation and 500 million bbl occur in the Duchesne River formation. The Mesaverde sandstones have an average oil saturation of 31 gal/cu yd and the Duchesne River sandstones have an average saturation of 28 gal/cu yd. The net thickness of oil-saturated Mesaverde sands range from 24 to 200 ft and average 100 ft. The net thickness of oil-saturated Duchesne River sandstones and conglomerates ranges from 11 to 254 ft and average 98 ft in thickness.

Vernal lies in a Mancos shale valley, rimmed by the more resistant Cretaceous Mesaverde sandstones whose upper portion is overlapped and truncated by the Duchesne River beds. Regional dip is to the southwest, with Mesaverde dips averaging 10° and Tertiary beds averaging about 6°.

The bitumen occurs in the Cretaceous Asphalt Ridge and Rim Rock sandstones of the Mesaverde formation and in the unconformably overlying Oligocene Duchesne River beds. The richest impregnation occurs on two prominant structural anticlinal noses. The structural grain of these two features parallels the trend of the Rangely and Ashley Valley oil fields. Some faulting has taken place in the area, and ranges in age from late Laramide through Oligocene accompanied by periods of regional tilting.

Throughout the entire length of Asphalt Ridge, beds well up in section in the Duchesne River formation are saturated with bitumen. The degree of saturation is a direct function of the proximity of these beds to unconformities and to the porosity and permeability within those beds.

Core drilling on the ridge has shown that both the Rim Rock sandstone member and the Asphalt Ridge sandstone member, where the latter is bituminous, have a definite water-asphalt contact. It is therefore probable that the Cretaceous oils were highly mobile, moving into a structural trap east of the ridge area, which trap was denuded by erosion, thus allowing the lighter, more volatile ends to escape; then oxidation of the residual oil took place.

Chemical analysis shows the Mesaverde bitumen to be similar to an intermediate base crude, and the Duchesne River bitumen to be similar to the high-paraffin-base crude oils found in the Green River and Wasatch formations of the Uinta Basin. These data substantiate the idea that the Cretaceous oils were localized in a structural trap during late Laramide time. Thus the bitumen accumulation is the result of erosion which allowed the lighter ends to escape. The bituminous sandstones of the Cretaceous formation are all water wet, with the bitumen covering the water-wet sands, a physical characteristic which gives the bituminous sandstone a "cool" feeling.

The bitumen has an API gravity ranging from 8.6 to 12° and has less than half of 1 per cent sulfur. The Vernal bitumen has a specific gravity of 1.01 and the bituminous sandstone has a specific gravity of 2.1. A cubic yard of the bituminous sandstone weighs 1.77 tons and contains 318.8 lb of bitumen. One gallon of bitumen weighs 8.345 lb. The color is black. Carbon residue of the crude is 15.1 per cent. The oil extracted from the Vernal bitumen by the USBM by adsorption, using Fuller's earth, is naphthenic and free of wax. Distillation tests showed that 23 per cent of the bitumen or 71 per cent of the oil can be distilled by vacuum distillation. The rest can be recovered by stripping the reduced bitumen with steam under a vacuum distillation. When this was done, no evidence of coking was noticed.

Suggested uses for the bitumen are roads and pavements, roofing materials, protective coating and waterproofing, and raw material for manufacturing oils and cracked gasoline. The acid anhydrides and resins can be used for paints and protective coatings, waterproofing fabrics such as tents and roofing, wood staining, electrical insulation, for additives to asphalts deficient in resins, as a flotation agent, as a filling for natural and synthetic rubber and for thermoplastics. The oil can be used for lubrication, other than in automotive engines, as a flotation agent and as a feed stock for making high octane gasoline.

From the standpoint of thermal recovery, the prime target in the Asphalt Ridge area should be the Rim Rock sandstone member of the Mesaverde formation. In a few selected areas the Asphalt Ridge sandstone member may be an objective. It is the author's opinion that few of the sandstones within the beds of the Duchesne River formation will be amenable to thermal recovery because of the lenticularity of the sands and conglomerates and their high clay content. Rapid changes vertically and laterally in both permeability and porosity, and the inherent difficulty of predicting the reserves are further problems.

Reserve calculations for a typical steam injection pilot flood project in the southwest Vernal area, involving only reserves of the Rim Rock sandstone, are shown in Table 1.

Favorable factors when evaluating the Rim Rock sandstone member of the Mesaverde formation for thermal recovery techniques are: (1) the uniform thickness of the sand both vertically and laterally with consistently uniform porosities, permeabilities and bitumen saturation; (2) favorable viscosity characteristics; (3) depth to reservoir ranging from zero at the outcrop to more than 2,500 ft in a southwestward direction; (4) the availability of a good supply of fresh, mineral-free water; (5) the availability of local oilfield supplies; (6) skilled labor; (7) adequate housing facilities for personnel; and (8) the fact that the sands are water-wet, permitting high recovery rates.

Spacing for thermal injection wells will either be on 2½-or 5-acre spacing with a five-spot pattern. Unfavorable aspects of the area, at present, are the lack of a railroad, no local refinery, and a market which, although relatively small now (600 B/D in the Salt Lake area) can be expanded without too great an effort. A few years ago the Gulf Oil Corp. tried a fireflood in the NE ¼ of Section 16, Township 5 South—Range 21 East, which was not considered as being too successful. However, the thermal recovery was attempted in beds of the Tertiary Duchesne River formation, and the author believes

TABLE 1

Sand thickness, minimum, ft	60
Average saturation, gal/ton	18
Average saturation, gal/cu yd	27
Porosity, average, per cent	27
Permeability, average, md	1500
Bbl/acre-ft	1000
Recovery factor, steam injection method	50%
Bbl/acre, stock-tank oil in place	60,000
Recoverable stock-tank oil, per acre	30,000
Acreage under lease	800
Acreage amenable to thermal recovery, depth of 300 ft or more	520
Gross recovery	15,560,000
Less royalty of 18.75 per cent	2,925,000
Net recoverable stock-tank oil to working interests (bbl)	12,675,000

that the reasons given previously explain this apparent lack of success.

The Bituminous Sands of the Whiterocks Area

The bituminous sandstones of the Whiterocks area are located in Township 2 North—Ranges 1 East and 1 West, Uintah Special Meridian, Uintah and Duchesne counties, Utah, about 20 miles northwest of Vernal, Utah. The deposits are located on the steeply dipping north flank of the Uinta Basin, along the mountain front. The area can be reached by paved road from Vernal to LaPoint to Tridell and then west into the Ute Indian Reservation to the top of Indian Bench, then north by gravelled road to the Indian Boundary-Forest Service fence line and then north up the canyon of Whiterocks River, a ruggedly beautiful area. At this point the outcrops on either side of the river consist of beds ranging in age from Jurassic Curtis to the pre-Cambrian Uinta quartzites. The beds strike northeast and dip to the southeast with an average dip of 62°. The upper parts of the older beds are bevelled and the Tertiary Duchesne River formation lies unconformably on top of them, dipping gently into the Uinta Basin.

The Jurassic Navajo sandstone is saturated with asphalt which fills the pore spaces and coats the sand grains. The Navajo has an average thickness in the area of 1,000 ft. Bitumen saturation extends vertically to a depth of approximately 550 ft from the mean sea elevation of the canyon floor. The proven reserves of this deposit, based upon core drilling, are in excess of 125 million bbl of oil in place; additional reserves of another 125 million bbl are indicated to the northeast and to the southwest of Whiterocks Canyon. The Navajo sandstone is a clean, fine- to medium-grain sand with subrounded to rounded grains which are frosted to clear. Porosities range from 26 to 39 per cent and permeabilities range from 10 to 127 md. Water saturations range from 33 to 82 per cent, and oil saturations range from 13 to 33 per cent. The base of the zone of bitumen saturation drops 375 ft in elevation from the east side of Whiterocks River to the southwest, along the strike. The base also drops 1,000 ft/mile in a southeast direction, perpendicular to the strike in the beds.

There are several active tar or "brea" seeps on the west side of the river. Tar seeps onto the floor of a tunnel which has been driven back into the Navajo sandstone. The seeps appear to be related to fracturing, for several other seeps are located at the base of trees where the rocks have fractured the formation. The bitumen zone within the Navajo has a definite bitumen-water contact and there is no significant increase or decrease of saturation with depth. Although the Tertiary Green River formation has been proposed as a source for the oil which originally filled the pore spaces within the sandstone, field examination by the author revealed no saturation along the unconformity between the Navajo and the overlying Duchesne River formation. The Carter Oil Co.'s No. 2 Whiterocks well, which was drilled downdip and basinward from the outcrop a distance of approximately three miles, encountered no important shows of oil or dead oil staining of bituminous sandstone which would indicate that this formation was the source of the Navajo oil. The Carter well was located in Section 6 of Township 1 North—Range 1 East, U.S.M. The author, in previously published papers, proposed a Pennsylvanian Weber sandstone source for the oil in the Navajo sandstone. This conclusion was arrived at from plane table mapping of the Whiterocks area. Paleozoic and Mesozoic rocks on the outcrop are bowed in a broad, south plunging structural nosing. Surface mapping indicates a northeast trending normal fault, downthrown on the northwest. Surface evidence of the fault is the presence of a line of hot springs, now dry, where siliceous sinter with asphalt has been deposited, with the fault cutting beds of the Duchesne River formation.

All of the Navajo sandstone, with the possible exception of that within the canyon of Whiterocks River, is well suited for thermal extraction methods. This is well demonstrated by core data, which indicate a remarkable uniformity of bitumen saturation, together with uniform porosity and permeability. The bituminous sandstone of this deposit averages 24.4 gal of bitumen/cu yd. Because of the thickness of the Navajo sandstone and the depth to the base of the bitumen saturation, this deposit has a unique distinction of having the greatest recoverable reserves per acre of any bituminous sandstone in the United States. Stock-tank oil in place exceeds 132,000 bbl/acre. Athabasca tar sands have reserves of 90,000 bbl/acre. The over-all reserves of the Athabasca deposit are much greater, however, since the areal extent of the deposit greatly exceeds the Whiterocks deposit.

Bituminous Sandstones of the Green River Desert

The bitumen contained in the sandstones of the Coconino-White Rim formation of central Utah, especially in Sevier, Emery, Wayne and Garfield counties has attracted the attention of would-be operators of thermal projects, especially in the San Rafael Swell area and in the Green River Desert. The area involved in a recent lease play based upon this recent interest in thermal projects includes most of the area in Townships 24 to 31 South—Ranges 12 to 17 East, SLM. Within the area outlined above, the Coconino sand can be reached at depths ranging from 600 to more than 2,600 ft. The Coconino is asphaltic in many places along the outcrop along the canyon of the Green River to the southeast. Many wells which were drilled for oil encountered good shows of bituminous sands in the Coconino formation. Unfortunately, few of these wells cored the sand. Extensive core drilling will be necessary to delineate the most attractive plays for thermal recovery projects.

The Standard Oil Co. of California drilled their Moonshine Wash No. 1 well in Section 32, Township 25 South—Range 15 East. This well cored the Coconino, which was bituminous throughout a 200-ft interval. Core analysis showed that oil saturations averaged 44 per cent and water saturations 12 per cent. Porosity within the zone averaged 15 per cent and permeability averaged 50 md. The sand was encountered at a depth of 2,000 ft which is a good depth for thermal techniques, especially in view of the low water saturations, high oil saturations and good porosities and permeabilities.

The list in Table 2 gives some idea of the potential of the Coconino sandstone within the area discussed; this does not include additional shows encountered in beds of the Moenkopi and older formations.

The White Rim sandstone outcrops in a line running north and slightly east from the south center line of Township 32 South—Range 15 East to the northeast corner of Township 28 South—Range 17 East, and the sandstone is asphalt inspissated on the outcrop in the west half of Township 29 South—Range 18 East and in the approximate center of Township 31 South — Range 16 East, Garfield County, Utah. Laboratory analysis of samples taken from surface outcroppings in these areas of the White Rim

TABLE 2

Well Name & Number	Well Location	Saturation (ft)	Depth (ft)
Superior Oil Co.	Sec. 2, T24S-R13E	100	2200
The Carter Oil Co.	Sec. 21, T24S-R14E	45	2295
Shell Oil Co.	Sec. 19, T24S-R16E	43	2552
Pan American Petroleum Corp.	Sec. 24, T25S-R12E	20	2400
Texaco, Inc.	Sec. 14, T25S-R13E	120	2175
Texaco No. 2	Sec. 22, T25S-R14E	150	2042
Standard of California #1 Moonshine Wash	Sec. 32, T25S-R15E	200	2250
E. B. LaRue	Sec. 17, T26S-R13E	shows	?
Tidewater Oil Co.	Sec. 25, T26S-R13E	75	2560
Humble Oil & Refining Co.	Sec. 30, T26S-R14E	40	2614
Carter Oil Co.	Sec. 9, T27S-R12E	30	2700
Superior Oil Co.	Sec. 30, T27S-R13E	120	2316
Atlantic Refining Co.	Sec. 13, T27S-R14E	170	2500
Texaco, Inc.	Sec. 32, T27S-R15E	50	2320
Carter Oil Co. #2 Unit	Sec. 35, T27S-R15E	100	2000
Murphy Oil Corp. #4 Unit	Sec. 14, T28S-R14E	shows	2300
Tennessee Gas Transmission	Sec. 33, T29S-R12E	100	2260
Continental Oil Co.	Sec. 20, T29S-R15E	50	2205
Phillips Petroleum Co.	Sec. 27, T30S-R16E	150	1394
Mobil Producing Co.	Sec. 33, T30½S-R16E	140	1462
Tennessee Gas Transmission	Sec. 4, T31S-R12E	100	2274
Standard Oil Co. of California	Sec. 13, T31S-R13E	50	513
Superior Oil Co.	Sec. 19, T31S-R15E	52	198

show that it has varying degrees of porosity, ranging from 7 to 26.7 per cent and permeabilities ranging from 88 to as high as 900 md. Analysis of the bitumen indicated that the oil recovered in the laboratory before retorting had an API gravity of 20°.

The regional dip of the Green River Desert is to the northwest at about 100-ft/mile. The Nequoia Arch interrupts the regional dip, plunging northwest through Townships 25 and 26 South—Ranges 13, 14 and 15 East. Many smaller folds are superimposed upon this large structural trend. Within the Green River Desert province, the anticlines and synclines mostly have the same northward trend. Examination of core data, electric logs and other geologic data leads to the preliminary conclusion that an oil-water contact in the White Rim sandstone occurs at a mean sea elevation of a +4,500 ft, although some variation will undoubtedly be found with additional core drilling.

The oil-water contact trends in a broadly curving arc from the southwest part of Township 32 South—Range 14 East to the nortwest corner of Township 29 South—Range 16 East. Between this hypothetical line and the outcrop the White Rim sandstone will be found at depths ranging from 0 to 2,000 ft. This, then, will probably be the area of most interest to those interested in thermal recovery. Also, this area is not too far from the Green River which could serve as an excellent source of water for steam injection projects, although the water will probably have to be treated before use.

Good shows of dead oil from depths of 970 to 1,120 ft in the Jurassic Wingate sandstone were encountered in the Phillips test located in Section 1, Township 20 South—Range 13 East, and upon perforation no water was recovered. The Tennessee Gas Transmission wells in Sections 4 and 5, Township 31 South—Range 12 East, Garfield County encountered good shows of live oil in the Hermosa and Rico formations.

The Paradox Production Co. well in Section 34 of Township 30 South—Range 13 East, Wayne County encountered 25 ft of oil staining in the Hermosa sand at 4,026 to 4,050 ft. In passing it should be mentioned that the oil possibilities, and perhaps thermal recovery potential, of the Kaibab limestone in the area above discussed, are very good. The depositional edge of the Kaibab strikes approximately N30°E and crosses the basin from the southeast corner of Township 29 South—Range 12 East to the northeast corner of Township 23 South—Range 14 East.

Many good shows have been observed in the Kaibab in wells drilled west of this line, and the area may offer an attractive site for future exploration.

In review, the Green River Desert has many areas of interest for both oil and gas exploration and for potential thermal recovery projects. Some of the better areas have oil-in-place saturations within the White Rim sandstone in excess of 1,000 bbl/acre-ft at shallow depths with a good supply of water available at not too great a distance. Some of the drawbacks are the remoteness of the prospects, lack of markets, poor roads, no adequate living quarters for personnel, no pipelines and no local source of oilfield and industrial supplies. However, the advantages outweigh the disadvantages, and this part of central Utah will probably undergo rapid transformation if the success of pilot thermal projects takes place. Preliminary study seems to indicate that the best thermal recovery prospects will be located on structural highs, although this may not always hold true. The southeast flanks of the San Rafael Swell, downdip from bitumen saturation, may be an area of economic interest.

The Bituminous Sandstone of the P. R. Springs Area

The geology, structure and topography of the bituminous sandstone deposits of the P. R. Springs area are very similar to the Sunnyside deposits. They are located on the southeast flank of the Uinta Basin in southern Uintah County, although minor deposits are located just south of the Grand County line. The bitumen occurs in beds of Wasatch-type lithology, and the southeastward-facing cliffs along which they are exposed form the topographic expression of the Roan Cliffs.

The bitumen-bearing sands are erratically exposed throughout a large part of Townships 15 and 16 South—Ranges 23 and 24 East, Salt Lake Meridian. Regional dip of the beds is to the northwest, with dips averaging 4 to 8°. The geologic occurrence and origin of the inspissated oil in this deposit is the same as that of the Sunnyside area. The richest saturation occurs in small, local, northwest plunging anticlinal nosings where porosity and permeability is high. Field examination of the outcropping bituminous sandstones indicate that the individual beds with saturation range from a few inches to more than 250 ft in thickness, although the latter is not common. The beds vary rapidly in thickness along strike, and continuity of the bitumen-bearing sands will pose a major problem in any thermal recovery project. The lenticularity of the beds and lack of core data make an estimation of the reserves difficult. The area also has the drawback of being located in the most remote part of the basin, with inadequate roads for transporting materials and supplies. The most serious problem is the lack of large quantities of water for steam recovery projects. An oilfield road has been built up the face of the Book Cliffs, and can be used during dry weather for oilfield operations, connecting the area with U.S. Highway 6-50.

Bituminous Sandstone of the Chapita Wells Area

The Chapita Wells bituminous sandstones are located in the east-central part of the Uinta Basin about 30 miles southeast of Vernal on the north side of White River in the northwest quarter of Township 9 South—Range 23 East and in the northeast part of Township 9 South—Range 22 East, SLM, Uintah County, Utah. The bitumen occurs in the fluvial sandstones of the Uinta formation. Regional dip is to the north and northwest; the dips range from 4 to 8°.

Saturation within the individual beds varies from lean to moderately rich. The degree of saturation is a direct function of porosity and permeability, although it appears, from field examination, that the richer zones of bitumen saturation are directly related to small faults and fracture systems within the Uinta formation. The oil has undoubtedly moved upward in these faults and fractures to the beds of the Uinta formation. Although the reserves of this deposit are not large, it is interesting in that the area can be strip mined, and also because there are possibilities of additional sands cut by faults and fractures which may be asphaltic or very bituminous at depths. These would be of interest to an operator who is interested in thermal recovery. A good supply of water is available from White River which flows westward a few miles south of the deposit. Examination of well logs and cuttings from wells drilled in the area should be extremely interesting.

The Dragon-Asphalt Wash Bituminous Sandstones

The bitumen-bearing sandstones of this area are located about 20 miles southeast of the Chapita Wells deposit and are in the east half of Township 12 South—Range 24 East and the west half of Township 12 South—Range 25 East, Uintah County, Utah. The richest bitumen saturation lies in a sandstone which is cut by the Black Dragon gilsonite vein, and is updip from the vein. Field mapping with plane table indicates that the saturation decreases rapidly as distance to the vein increases. The author is of the opinion that the bitumen saturation is directly related to the origin of the gilsonite and that the gilsonite vein served as a feeder into the sandstone while the bitumen was still in a highly mobile state prior to oxidation and subsequent induration of the gilsonite; and, further, that the oil in the sandstones represented the lighter ends of the oil which filled the veins.

In the Little Bonanza area there are gilsonite veins with soft, tarry pockets of semi-plastic gilsonite. In the south Red Wash area, 1 mile southeast of the junction of the Rangely-Salt Lake pipeline with the Red Wash pipeline, there is a north-trending gilsonite vein which clearly demonstrates that the oil or bitumen which filled the vein before it became solidified was not viscous but rather must have been of high gravity since the rather low-porosity, low-permeability of the sandstone cut by the vein precludes anything but a mobile, high-gravity oil from saturating the sandstone walls of the vein. Also, saturation decreases markedly as the distance from the vein increases.

While the reserves of the tar sands of the Dragon-Rainbow-Asphalt Wash area are not known, the outcrop exposure of the sands is of wide areal extent. From the standpoint of thermal recovery, their significance lies in the fact that at depths which would be relatively shallow there are undoubtedly many of these sands which could be exploited commercially.

The Moab Drilling Co.'s No. 1 Gem well, which was located in Section 22 of Township 10 South—Range 24 East, recovered black, gilsonite-looking, high pour-point oil from a sand in the lower Green River formation at a depth of 2,560 to 2,580 ft. The well was completed as a gas producer in the upper Wasatch formation at 3,315 ft, and the oil sand is now behind the casing, but this is the type of zone that the potential operator of thermal recovery projects should be looking for. An evaluation of electric logs, mud logs and samples of wells drilled in this area may be merited. It is interesting to note that the geologic map by Pruitt* shows a northwesterly trending gilsonite vein which crosses the southwest corner of Section 22, not more than 1,000 ft from the Moab No. 1 Gem well.

Miscellaneous Localities With Thermal Recovery Potential

Within the Uinta Basin there are many other areas which offer good potential for thermal recovery projects. To initiate development of these will require careful mapping, and examination of outcrop samples, well logs, mud logs, well samples, drill-stem test data and well histories and production histories, if any.

Many shallow core tests can be drilled downdip from the numerous out-croppings of bituminous sandstone, especially on the north and northeast side of the basin. A few of the more interesting areas have been described in the literature. The author feels that the John Starr Flat area deserves re-evaluation in view of the thick saturated intervals in the wells. However, the most serious drawback of this area is the great depth (9,000 ft plus) and the rapid facies change both basinward and laterally within the Tertiary beds.

Another area of interest will be the Deep Creek nose in the southwest part of Township 3 South—Range 19 East SLM, Uintah County, Utah, about 15 miles northwest of Vernal where the basal sandstones and conglomerates of the Duchesne River formation unconformably overlap and truncate the Cretaceous Mancos shale.

At this point, along Deep Creek, the basal beds of Tertiary age are saturated with black, tarry oil. The origin of the oil is probably the downdip, basinward Green River formation and the oil has probably migrated updip along unconformities. Erosion exposed the beds and let the lighter ends escape. The lands immediately downdip from the outcrop are within the Ute Indian Reservation.

Another area of possible interest to thermal recovery operators will be the bituminous sandstone deposits of the Raven Ridge area on the northeast flank of the basin. Sheepherders tell of a small spring of water adjacent to these bituminous sands which, in the spring, would gush oil in a stream the size of a pencil. The author has examined these deposits and, although he has not seen the spring described, is inclined to give some credence to its existence. These deposits are located in Townships 6 and 7 South—Ranges 24 and 25 East. Many of the tar sands are lean, although a few of the sands are moderately rich in bitumen. The deposits in Township 6 South—Range 24 East are located in sandstones along unconformities at the top of the Mesaverde and the base of the Wasatch formation. The bituminous sandstones in Township 7 South—Range 25 East are located in beds of lower Green River formation and seem to be also related to unconformities, for here the Green River is truncated and overlapped by both the Uinta formation and by the Duchesne River beds. A core hole downdip from the tar sands in this area would be interesting; it may have possible economic importance.

Another deposit of bituminous sandstone which may have economic merit is located in Sections 5 and 6, Township 1 North—Range 4 West, Uintah Special Meridian, Duchesne County, Utah in the Lake Fork-Yellowstone River area along the mountain front 45 miles northwest of

*Pruitt, R. G., Jr.: "Mineral Resources of Uintah County", *Utah Geol. & Min. Survey Bull. 71.*

Vernal. The saturated beds are in the Duchesne River formation. Several samples were analyzed by the author and the oil compared closely with other Tertiary Uinta Basin crudes. Several small tar seeps are present in this area. The Duchesne County Road Commission cored a part of this deposit in 1957 and 1958 with the idea of using it for county roads but title to the land was in question and the project was abandoned.

There are three deposits of bituminous sandstones in the area south of the town of Myton on Leland and Pariette Bench. The bitumen is contained in beds of the Uinta formation and are all located updip and adjacent to a well developed fault-fracture zone which trends east-west from a location south of the town of Myton westward to Duchesne, along the top of the bench. The origin of the oil was probably the underlying lacustrine Green River formation. The oil moved updip along the fractures and faults from a fractured oil reservoir into the highly lenticular Uinta sands. The area may have some special interest to prospectors of thermal projects, and, again, well logs, subsurface data and other criteria can be employed to aid the search for bituminous sandstone which may be amenable to thermal recovery techniques.

Conclusion

In conclusion, one should consider the secondary recovery possibilities of thermal techniques to such fields with high-pour-point oil problems such as Red Wash, Wonsits, Brennan Bottoms, Ute Tribal Roosevelt (fractured shale reservoir) and the now abandoned Ute Tribal Duchesne (fractured shale reservoir). The Uinta Basin is replete with oil seeps, bituminous sandstones, exotic hydrocarbons such as gilsonite, ozocerite, elaterite, wurtzilite, tabbyite; and it offers the geologist, engineer and oil operator a challenging area to try new methods of recovery for the tar sands, the high-pour-point oils and other reserves of hydrocarbons which nature has placed there. Many of the areas mentioned can be developed profitably when sound geology, engineering and common sense, sprinkled with spice of a little imagination, are combined.

References

1. Abraham, H.: *Asphalts and Allied Substances,* Fifth Edition, D. Van Nostrand, N. Y. (1945).
2. Bunn, John R.: "Petroleum Possibilities in the Uintah Basin" (1962) 24, No. 3, A62.
3. Covington, R. E.: "The Bituminous Sandstones of the Asphalt Ridge Area, Northeastern Utah", *Guidebook,* Eighth Annual Field Conference, Intermountain Assn. Pet. Geol. (1957) 171.
4. Covington, R. E.: "Bituminous Sandstone and Limestone Deposits of Utah: Oil and Gas Possibilities of Utah, Re-Evaluated", *Bull. 54,* Utah Geol. and Mineralog. Survey (1963) 225.
5. Holmes, C. N., *et al.*: "The Geology of the Bituminous Sandstone Deposits Near Sunnyside, Carbon County, Utah", *Guidebook,* Seventh Annual Field Conference: Intermountain Assn. Pet. Geol. (1956) 171.
6. Kinney, D. M.: "Geology of the Uintah River—Brush Creek Area, Duchesne and Uintah Counties, Utah", *Bull. 1007,* USGS (1955).
7. Pruitt, R. G.: "Mineral Resources of Uintah County, Utah", *Bull. 71,* Utah Geol. and Mineralog. Survey (1961).
8. Spieker, E. M.: "Bituminous Sandstones Near Vernal, Utah", *Bull. 822-C,* USGS (1930). ★★★

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ERNAL EXPRESS

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Vernal, Utah. Wednesday, March 10, 1948

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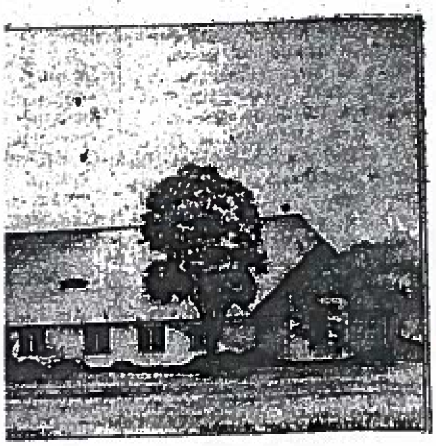


ILT THIS. The New Glines Ward
laints, which is nearing completion.
er of Vernal, this $100,000 structure
iunity.

10 class Scout room, rest rooms and lava-
1, library, (Continued on Page 16)

Stanolind And Carter To Drill Indian Oil Well

Hole Will be Sunk To 7,000 Feet Within Six Months

A well will be drilled within six months to a depth of 7,000 feet on Indian tribal-owned lands southwest of Vernal in Uintah County as a result of the Ute Tribe's acceptance last week of a joint bid submitted by the Carter and Stanolind Oil Company for the leasing of 4,085 acres.

Biding for the lease rights were Pacific Western Oil Company, Carter Oil Company, Stanolind Oil and Gas Company, and the California Company.

Carter-Stanolind opened with a joint bid of $50,000. Pacific Western and the California Company raised the ante to $67,000. Carter-Stanolind then upped their offer to $67,500 with the added sitpulation that they would drill a 7,000 foot test well

(Continued on Page 13)

SLEEPWALKER . . . This early riser, Robin Knott, age 2, armed with a toy revolver and clothed in sleeping attire, slipped out of her home early one morning and took a walk. This resulted in a frantic search by the mother and neighbors. The child was found at a Los Angeles police station.

City Manager Explains Bldg. Ordinances

Measures Designed To Protect Property Owners and Tenants

Vernal's new building ordinances, said City Manger LeRoy Taylor this week, are based on similar ordinances which have been adopted and proved effective in other cities. They are designed, he continued to protect property owners and occupants of buildings from danger of loss and injury.

While the city administration can and will examine the qualifications of tradesmen desiring licenses to ply their trades, it is not competent to interfere in dealings between property owners and tradesmen. Licensed by the city, means simply that the licensee has attained a satisfactory standard of knowledge

(Continued on Page 16)

Four Alterra High School seniors were honored for their scholastic achievements during the year, at a special assembly held February 24.

In recognition of their outstanding school records the following students were awarded the following honorary titles: Wilma Gilstrap, valedictorian; Ona Bartlett, salutatorian; Jayce Halsem, representative girl; Max Holfeltz, representative boy.

The honor students were surprised when they were unexpectedly, without forewarning, brought into the school auditorium and upon their entrance were greeted by the entire school body and the Alterra band singing and playing the school song.

Miss Gilstrap has had very high grades during her high school career. They have been almost consistently straight "A" She was also one of the class leaders. Among her scholastic achievements are: freshman year, art editor of school paper, sophomore year, earned a No. 1 rating in typing at the Basin Activity Day; junior year, class representative to student council, secretary of school band, representative of band to student council, exchange editor on school paper, member of baseball team which received a No. 1 rating at Basin Activity Day; senior year, class president, treasurer of the Home Economics Club, and a cast member of the school play.

Miss Bartlett, also a class leader, received the second highest grades in her class. Her record shows the following achievements: 1947, vice-president of the Spartanette Club, secretary of the Junior Class, associate editor of the school paper, awarded "excellent" rating in extemporaneous speaking, winner of girls' division in extemporaneous speaking contest, Home Economics Club delegate to Utah Girls State at Logan; 1948, Won first prize, a scholarship to Brigham Young University, for writing the best editorial in the high school divison of the Intermountain Journalism Contest conducted by the University, editor of school paper, president of school chorus, and member of Student Council.

Miss Haslem was also outstanding in scholastic ability and extra-curricular activities. Her achievements inluded: sophmore year, class president; junior year, prom chairman, Seminary treasurer, associate editor of yearbook, member of one-act play cast presented during Uintah Basin Activity Day, awarded top rating for oboe solo during Activity Day; senior year, editor of yearbook, senior class secretary, Seminary treasurer, member of cast in school play.

Mr. Holeftiz scored the highest scholastic rating of the boys in his class. An outstanding athlete, he was a member of the track, basketball, and football teams during his sophomore, junior and senior years. He has also held the following positions: sophomore year, class president; junior year, sports editor of school paper, member of student council, named most popular

A special committee [illegible]ed the records of all members of the senior class, and named Misses Gilstrap, Bartlett, and Haslem, and Mr. Bartlett, the four outstanding students.

CARTER OIL TO DRILL WELL ON INDIAN LEASE

(Continued from Page 9)

within six months. Pacific Western made a final offer of $100,000 without any provision for a well. Members of the Tribal Council voted to accept the Carter-Stanolind bid.

The bidding was the result of a impasse which was brought about when bids were originally opened on the leasing of 15,138 acres of Indian lands December 18, 1947. At that time, Carter submitted bids on all-or-nothing basis. The California Company submitted top bids on several individual units which were embraced with the boundaries of several areas covered by the Carter-Stanolind all-or-nothing offer. The Tribal Council indicated that it would accept the Carter-Stanolind bid for the disputed areas. The California Company protested the awards. The Commission of Indian Affairs recommended to the Council that the bids of both Carter-Stanolind and California be rejected and the disputed area, known as units 5 to 12 be readvertised. The Tribal Council followed the recommendation of the Commissioner and again invited bids.

Five major oil companies— Carter, Stanolind, California, Texas, and Pacific Western, submitted bids for various tracts of the 15,138 acres of allotted and tribually-owned Indian lands which were offered for lease a second time, last fall. These bids, which were opened December 18, disclosed that all companies bid the standard yearly rental of $1.25 an acre for a 10 year lease, with bonus offers ranging from $2.21 to a high of $21.11 an acre. The bulk of the leases were awarded at a bonus of $7.19 an acre.

Carter and Stanolind submitted joint high bids for approximately 90 per cent of the lands offered. Their bonus bids ranged from $2.21 to $11.25 an acre with the bulk at $7.19 an acre.

California Company bid the highest bonus when it offered $21.11 an acre for 120 acres. It also bid $8.08 an acre for 1141 acres. It was this $8.08 bid which caused the conflict between California and Carter-Stanolind and which has just resulted in another submission of bids with the award being made to Carter-Stanolind.

Texas Company bonus offers ranged from $2.50 to $10 an acre.

The Pacific Western Oil Company bid $11 an acre bonus for 80 acres.

None of the bids opened December 18 included an offer to drill a well within a specified period.

The first time these lands were offered for oil lease in the summer of 1947, Carter-Stanolind won the award for the full tract with an offer of $1.25 an acre. This bid was rejected by the Tribal Council on the grounds that the bonus offer was too low.

The lands involved are within the Uintah-Ouray Indian Reservation in townships 1 and 2 south, ranges 1 and 2 east, Uintah Special Meridian.

married at Vernal in August 1937. The couple have one child, Pamel Jean, three years old.

PTA Honors Central School Teachers

The Central School Teachers were honored Friday evening at a dinner given by the Parent Teachers Asociation officers and the "room mothers" of each class.

The affair was held in the IOOF Hall. Guests were seated at long tables which were decorated with bowls of yellow jonquils and purple heather. Yellow candles and placecards carried out the spring theme. Mrs. C. R. Jeffries, P.T.A. president greeted the guests and announced the following program: piano solo, Mrs. Barbara Adams,; toast to teachers, Mrs. Marie Yates; ballet dance, Miss Francis Allen; response from teachers, Mrs. H. M. Snyder; chairman of committees for the PTA carnival, which will be held Friday of next week, made brief reports; piano solo, Mrs. Adams. A clever skit was presented by Mrs. Don Hacking, Mrs. Robert Olsen, and Mrs. Robert Helzen.

Committee members responsible for the entertainment were: Program, Mrs. Wanda Caldwell, Mrs. Bertha Witmer, Mrs. Berdie Allen. Decorations, Mrs. Billie Hall, Mrs. Mexine Hatch and Mrs. Blanch Cluff.

parents, Mr. and Mrs. [illegible] Hatch.

Mr. and Mrs. David Roberts had their neighbors in Friday evening for a party. They were Mr. and Mrs. Jep Oaks and Mr. and Mrs. George McConkie and Mr. and Mrs. Merrill Anderson. A luncheon was served to those present.

Leland McNeill Receives Future Farmer Calf

Leland McNeill has been named by the officers of the Uintah Chapter of the Future Farmers of America as the member to be awarded a calf this year.

The calf is an offspring of the purebred calf which was awarded to Lorin Merkley by the Uintah Bank three years ago.

Tar Heel Mules

In an age of mechanization, the much-maligned mule is making a comeback on Tar Heel farms. In fact, North Carolina's Robeson county ranks second in the nation in the number of mules on farms. North Carolina has 15 counties in the top 100 counties with the nation's highest mule population. Missouri, storied in mule lore, placed only two counties in the first 100, according to U. S. agricultural census.

Oct 4, 1951

Statistics

U of U Research Bureau Notes Uintah's Mushrooming Oil Industry

What do you know about oil?

The Bureau of Economic and Business Research of the University of Utah, in tribute to Oil Progress Week, Oct. 14 to 20, Saturday made known these facts:

1. *First* commercial discovery of oil in the state occurred at Ashley Valley field, Uintah County, in the fall of 1948. Since that time, four other new oil fields have been uncovered in the state—at Red Wash and Roosevelt Pool, Uintah County; Duchesne, Duchesne County, and Boundary Buttes, San Juan County.

2. Production has risen from a trickle—despite enormous transportation problems—to 648,507 barrels for first six months of 1951.

Production Breakdown

That production breakdown includes: Ashley Valley 509,939 barrels; Boundary Buttes, 2410 barrels; Red Wash, 24391 barrels, and Roosevelt, 118,767 barrels. (Duchesne is unlisted. It was not on production.)

During the first six months of this year, oil production was 24.3% greater in Utah than during a comparable period in 1950.

With the exception of Ashley Valley field and Boundary Buttes, the three other producing areas are in the stage of active development, promising significant increases in production in the year ahead.

3. One company estimates that it cost $715,000 to drill a deep test wildcat in the Uintah Basin, at $90 per foot. The figures are averaged from seven wells with depths of from 6000 to 12,500 feet.

4. One exploratory well creates employment for 130 persons, and wages paid in the exploration branch of the petroleum industry for the first three months of 1951 aggregated $429,000.

61,000 Barrels Capacity

5. The bureau said Utah's five refineries have a processing ca-

(Continued on Page 8)

U OF U RESEARCH NOTES UINTAH'S OIL INDUSTRY

(Continued from Page 1)

pacity of 61,000 barrels of crude per day, 48% greater than is needed to supply demand for products in this state alone

(Most of the crude oil—nearly 75%—comes to these refineries from Rangely Field, Colo, largest oil field in the Rocky Mountain area)

Under defense demands, however the refining industry here is operating at 94% of capacity

"This is a far cry from the seven barrels per day which were refined in the state of Utah some 40 years ago in 1910," the bureau says

6 Refining represents one of the largest manufacturing industries in the state, with a total investment of 34,000,000 or $38,000 for each of the 892 employes.

Wages paid by the petroleum industry in Utah during first six months of this year totaled $2,000 000.

7. The one petroleum product and two crude oil lines in Utah represent investment of another $31,000,000, the bureau said. These crude oil lines from Rangely Field, Colo, have a combined capacity of 62,000 barrels per day The products line, now under expansion, has a capacity of 22,000 barrels of Diesel oil, gasoline, fuel oil and stove oil per day.

1963

THE GUSHER OIL FIELD
Uintah County, Utah

Robert E. Covington

The Gusher oil field is located approximately 12-½ miles southwest of Vernal, Utah in T5-6S, R19-20E, S.L.M., Uintah County, Utah. There are two wells in the field which produce from sand and fractured shales of the Green River formation of Eocene age. The wells are currently shut in awaiting more favorable markets.

The field is located 5 miles south of the axis of the Uintah Basin syncline on the crest of the northwest plunging Red Wash – Gusher – Roosevelt anticlinal nose. The initial well was drilled by the California Company in 1949 on the basis of seismographic control.

The reservoir rock of the Gusher field is in fractured shale of the lower Green River formation. The fractured reservoir is developed on, and draped over, the subsurface anticline. The shales which overlie the fractured reservoir are relatively more plastic and serve as a "caprock." The source rock for the oil is the highly organic shales of the Green River beds within which the reservoir is developed.

The discovery well, the California Company's No. 1 Gusher Unit is located in section 35 of T5S-R19E. The well was completed in 1950 for an initial potential of 35 barrels of oil per day from a depth of 8711 - 8950 feet. Shortly thereafter the well was shut in as a non-commercial producer.

The No. 2 Gusher Unit was drilled in section 21 in the same township and range to a total depth of 10,491 feet. The location is two miles northwest of the No. 1 Unit and is structurally 238 feet lower. Although some free oil was recovered from the Green River, it was considered non-commercial. The well was abandoned on July 11, 1951.

The No. 3 Unit well was drilled 5 miles southeast of the No. 1 Unit in section 10 of T6S-R20E. Better sand development was encountered in this well but the sands were of low permeability and porosity. The initial potential was 23 barrels of oil and 4 barrels of water per day from a producing depth of 7741 - 7989 feet. This well was also shut in as non- commercial.

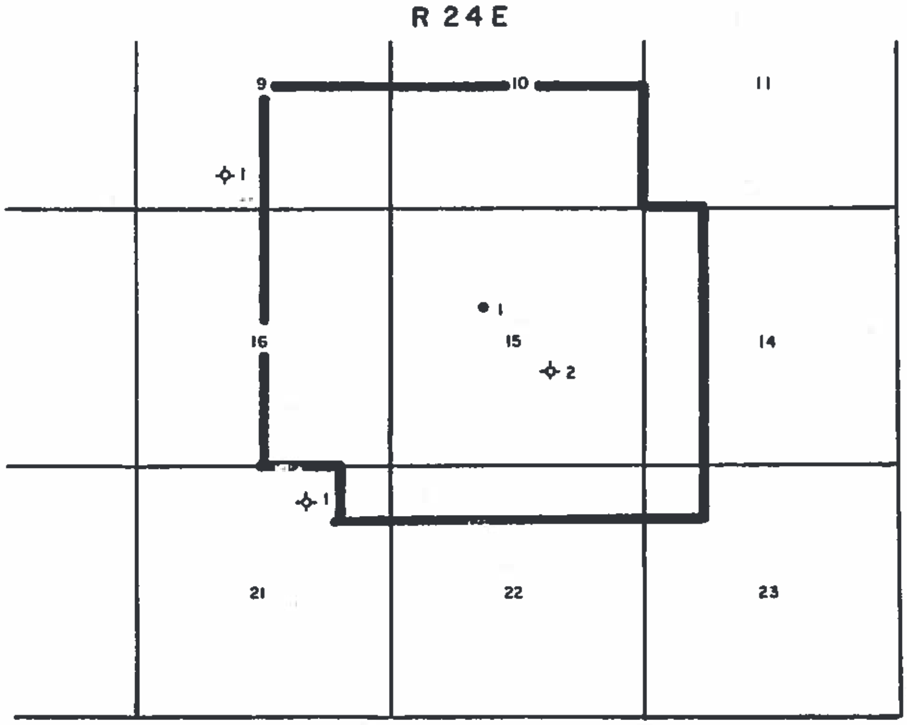
In 1957 Caldwell and Covington acquired the wells and fractured the No. 3 Unit which stimulated the production to 50 barrels of oil per day. The wells were turned over to Minerals Consolidated and the No. 1 Unit was placed on production shortly thereafter. Production has since been sporadic due to lack of markets. Cumulative production to 12-31-60 has been 27,507 barrels of oil.

During 1958 Minerals Consolidated farmed out a part of the acreage block to the Uintah Investment Company. This group drilled the 44 x 35 well which tested the upper Green River sands, which are gas bearing but are too low in porosity and permeability for production. Encouraging gas shows were logged on the gas analyzer unit from well developed sands in the basal Uinta formation, although no drill stem tests were run throughout this section. Total depth of the well was 6186 feet.

It is believed that sand oil fracturing treatment will be highly effective in stimulating the fracture type production found in the Gusher field. Stratigraphic studies indicate that sands which are well developed in the area immediately northeast of the Gusher Block pinch out up the flank of the Gusher anticline and should thus offer excellent chances for stratigraphic type traps. Wasatch and Mesaverde zones are relatively untested and may afford additional reservoirs for gas and oil production, as may the basal Uinta formation sands.

PARADOX BASIN
T 38 S, R 24 E

HATCH FIELD
SAN JUAN COUNTY



HATCH FIELD
LOCATION MAP
SCALE: 1" = 4000'

PRODUCTION CHARACTERISTICS

RESERVOIR

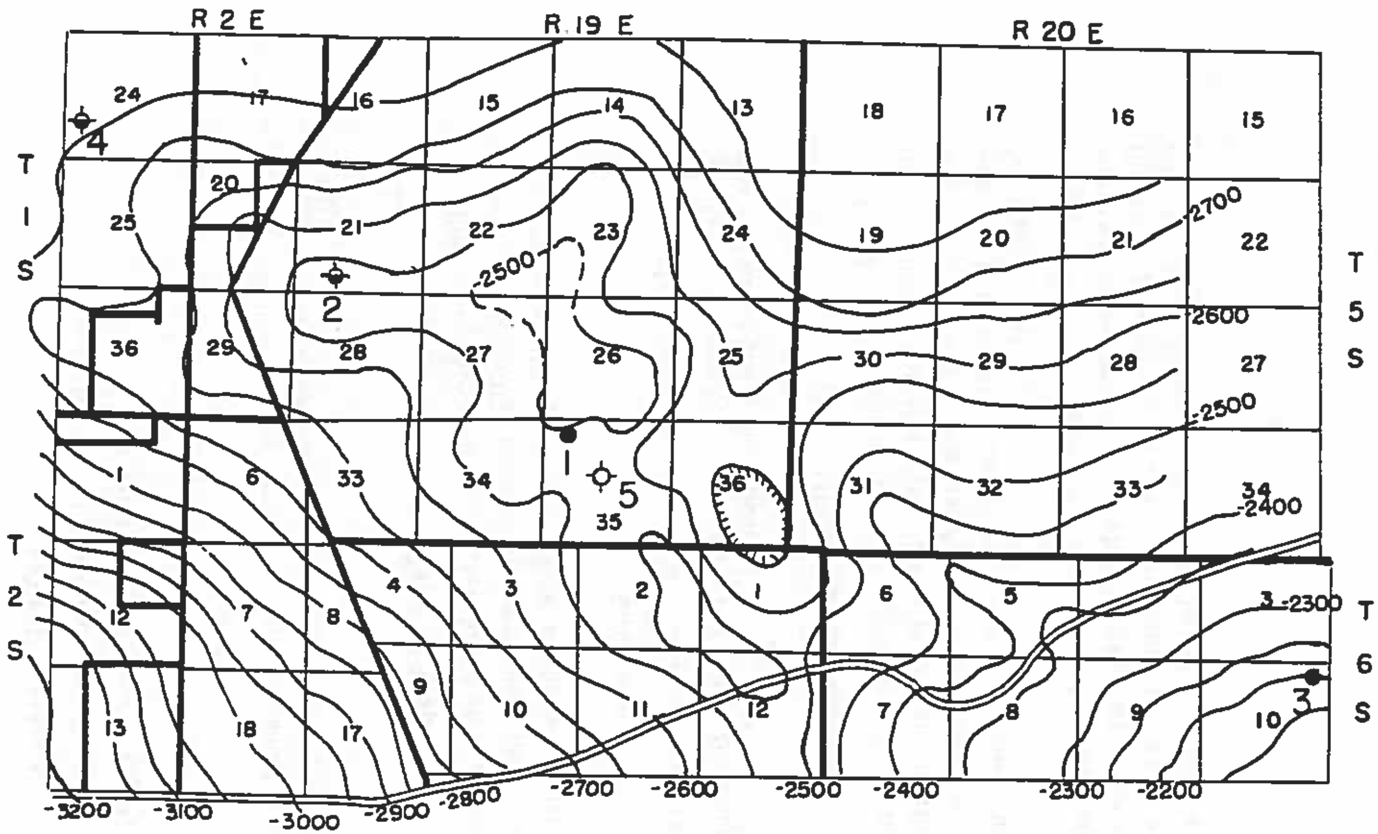
FORMATION NAME	AGE	LITH.	AVE. DEPTH	NET PAY	INIT. PRESS.	CURR. PRESS.	TYPE DRIVE	% POROS.	PERM. MD.
DESERT CREEK	PENN.	DOLOMITE	5977'	13'	1155 PSI BHSIP		SOLUTION-GAS	12.9 %	

FLUIDS

FORMATION NAME	GRAVITY	POUR POINT	SULFUR CONTENT	G O R	BTU / FT³	METHANE	ETHANE	WATER SALINITY	OTHER FLUIDS
DESERT CREEK	42.2°			1080:1				NONE	

ECONOMICS

FORMATION NAME	PROD. WELLS	PROD. 1-1-60-1-1-61	CUMULAT. PROD. 1-1-61	$ / BBL WELL HEAD	$ / MCF WELL HEAD	ULT. RES.	PROVEN ACREAGE	TOTAL WELLS	SPACING
DESERT CREEK	ONE	1077 BO 4107 MCF	9395 BO 10776 MCF	2.85			80 ACRES	ONE	



SCALE: 1" = 8000

DATUM: SEISMOGRAPH HORIZON APPROX. 1200' ABOVE BASE TGR

-LEGEND-

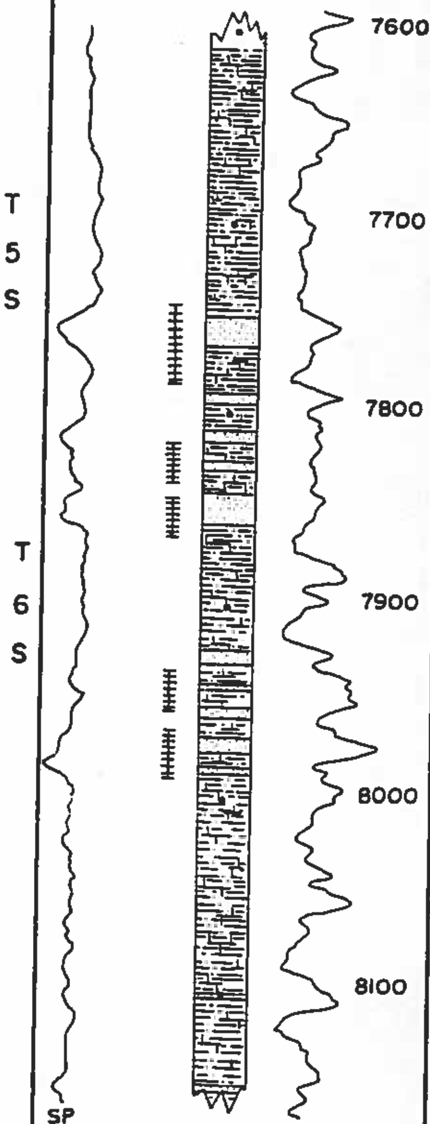
1 CALIFORNIA CO. GUSHER 1
2 " " 2
3 " " 3
4 CARTER 1 R. LLOYD
5 UINTAH INVESTMENT CO. 44X-35

STRUCTURE CONTOUR
C.I. 50'

GUSHER FIELD

OFFICE: CALDWELL & COVINGTON VERNAL, UTAH

TYPE LOG



GOTHIC MESA
(West Desert Creek)
San Juan County, Utah

Location

The field consists of three wells one mile south of the San Juan River and six miles west of the greater Aneth pool on the south flank of the Blanding Basin in Utah.

Type of Trap

The trap consists of locally developed algal and oolicastic porosity, plus some intercrystalline porosity in limestones. Where such porosity is superimposed on local favorable structure, a trap is formed.

Structure

The structure is believed to be a long narrow nose trending NNW-SSE.

The most reasonable designation of source beds in this field are the Paradox formation black shale facies.

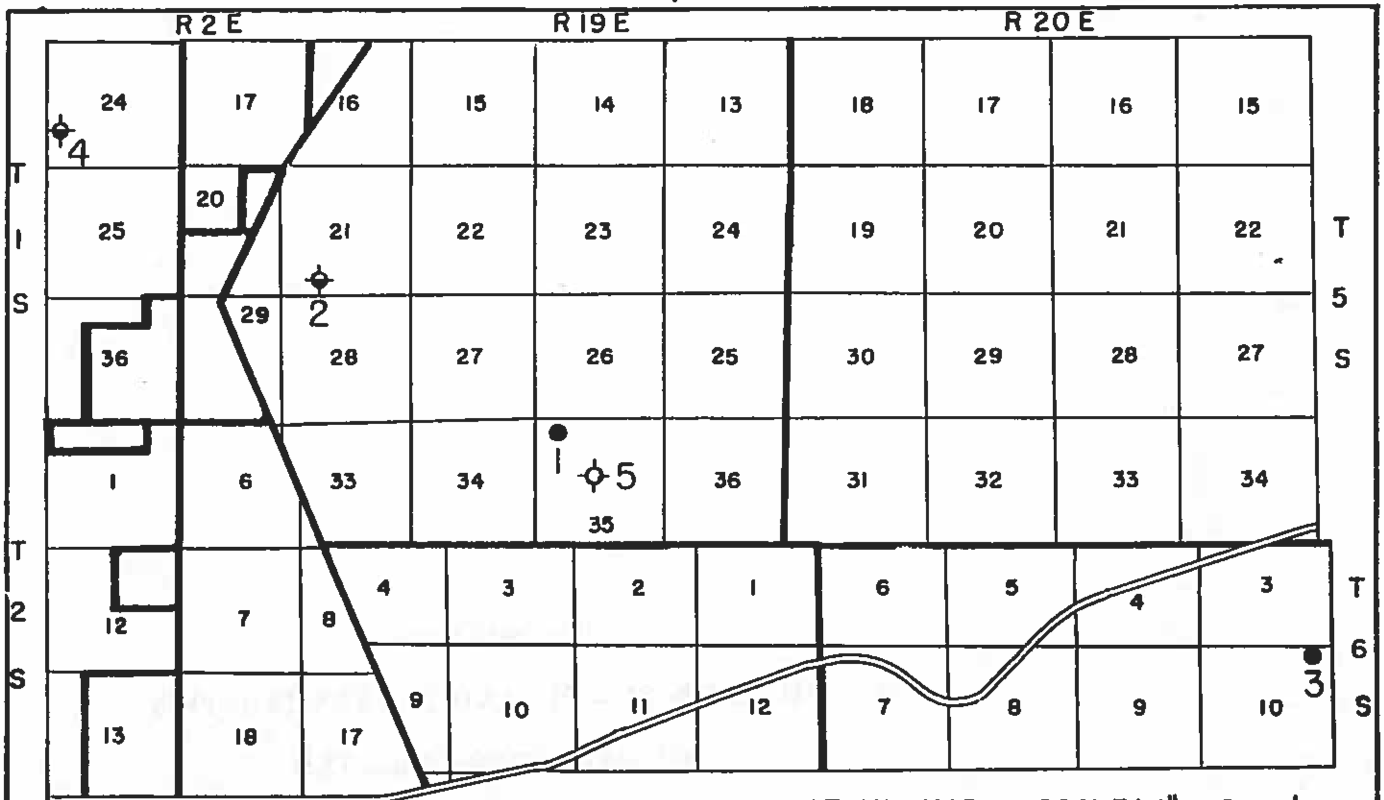
History of Exploration

A one-half interest in the lease was earned from Aztec by drilling a Paradox test in November of 1956. The area was interesting because of its proximity to the Desert Creek and Aneth Fields. The particular choice of acreage was based on regional stratigraphic considerations, plus local seismic closure. No surface work was done.

Pre-drilling interpretation consisted of an estimated ±75′ of vertical closure over 640 acres, of which 320 acres fell in the Aztec optioned block. Porosity was expected in the Lower Ismay (P-5) and Aneth (P-3) zones. Reserve estimates were placed at 4,000 barrels of oil per acre.

UINTAH BASIN
T 5 & 6 S, R 19 & 20 E

GUSHER FIELD
UINTAH COUNTY



GUSHER FIELD LOCATION MAP SCALE: 1" = 8000'

PRODUCTION CHARACTERISTICS

RESERVOIR

FORMATION NAME	AGE	LITH.	AVE. DEPTH	NET PAY	INIT. PRESS	CURR. PRESS	TYPE DRIVE	% POR.	PERM. CMD
GREEN RIVER	EOCENE								
WEST #1		FRACTURED SHALE	9000	194'	4500		RESERVOIR EXPANSION	1%	0.5 AV.
EAST #3		FRACTURED SILTSTONE	8000	127'	4400		"	1%	0.5 AV.

FLUIDS

FORMATION NAME	GRAVITY	POUR POINT	SULFUR CONTENT	GOR	BTU/FT³	METHANE	ETHANE	WATER SALINITY	OTHER FLUIDS
GREEN RIVER									
#1	30.6	90°+	0.09					8988	
#3	31.2	85°+	0.14					8000	

ECONOMICS

FORMATION NAME	PROD. WELLS	PROD. 1-1-60 1-1-61	CUMULAT. PROD 1-1-61	$/BBL. WELL HEAD	$/MCF. WELL HEAD	ULT. RES.	PROVEN ACREAGE	TOTAL WELLS	SPACING
GREEN RIVER	2	NONE (S.I.)	27,507	$2.50			640	2	

OFFICE: COVINGTON & CALDWELL VERNAL, UTAH

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OF UTAH, RE-EVALUATED

by the

Utah Geological and Mineralogical Survey

1963

Paper 23 BITUMINOUS SANDSTONE AND LIMESTONE DEPOSITS OF UTAH

by Robert E. Covington[1]

INTRODUCTION

The significant bituminous sandstone and bituminous limestone deposits of Utah are located within, or on the edges of, the Uinta Basin. They are all located within the boundaries of Carbon, Duchesne, and Uintah Counties. The Sunnyside deposits in Carbon County contain the greatest reserves of bituminous sandstone in the United States. The sandstone averages 8 to 10% bitumen by weight, (Holmes, 1956), totaling more than 1,600,000,000 cubic yards of bitumen. The second largest deposit in Utah is the Asphalt Ridge bituminous sandstone area in Uintah County, Utah. Reserves for this area have been estimated at more than 1 billion barrels, although this figure is probably high. The asphaltic sandstones of the Peor Springs area and the Whiterocks Canyon area are described. The Asphalt Ridge, Sunnyside, Peor Springs, and Whiterocks Canyon area deposits contain more than 90% of the asphalt reserves in the State of Utah.

There are many other small, relatively insignificant deposits of no commercial value, but of geologic interest: Among those discussed are the asphaltic sandstones in the Deep Creek area, the Chapita Wells area, the Raven Ridge deposits, the John Starr Flat accumulation, the Lake Fork-Yellowstone River area, the North Tabiona area, the South Myton area, the "argulite" deposits in Argyle Creek, the asphaltic limestone deposits in Indian Canyon-Lake Canyon, and the asphaltic sandstones in the Dragon-Asphalt Wash area.

ASPHALT RIDGE AREA

The Asphalt Ridge bituminous sandstones lie in the northeastern district, a topographic district 3 to 4 miles south and west of Vernal, Utah, on the northeast flank of the Uinta Basin. The area derives its name from the northwest-southeast trending topographic ridge which borders Ashley Valley (Figure 69). The lower 700 feet of the Mesaverde formation is exposed at the base of the ridge, dipping south to southwest from 8 to 12 degrees. The Oligocene Duchesne River formation overlaps and truncates the middle and upper Mesaverde sections. The Wasatch, Green River, and Uinta formations wedge out and are truncated in the Asphalt Ridge area (Figure 70).

The north end of Asphalt Ridge is cut by a normal fault which trends slightly east of north, repeating the saturated Rim Rock sandstone. The regional structure of the ridge area is monoclinal, with several small "bowings" or noses which interrupt the regional dip. Several strike faults, pre-upper Duchesne River in age, are present along the monocline. Only the fault at the County Pit is important as a structural control in the accumulation of bitumen. The County Pit fault strikes northwest-southeast and sharply delimits the saturation on the northeast, for the bituminous Rim Rock sandstone is downthrown on the southwest against lignitic shale which overlies the non-saturated Asphalt Ridge sandstone member of the Mesaverde on the upthrown (northeast) side. Tar seeps or "brea" occur along the fault plane.

1. Petroleum Consultant, Caldwell and Covington, Vernal, Utah.

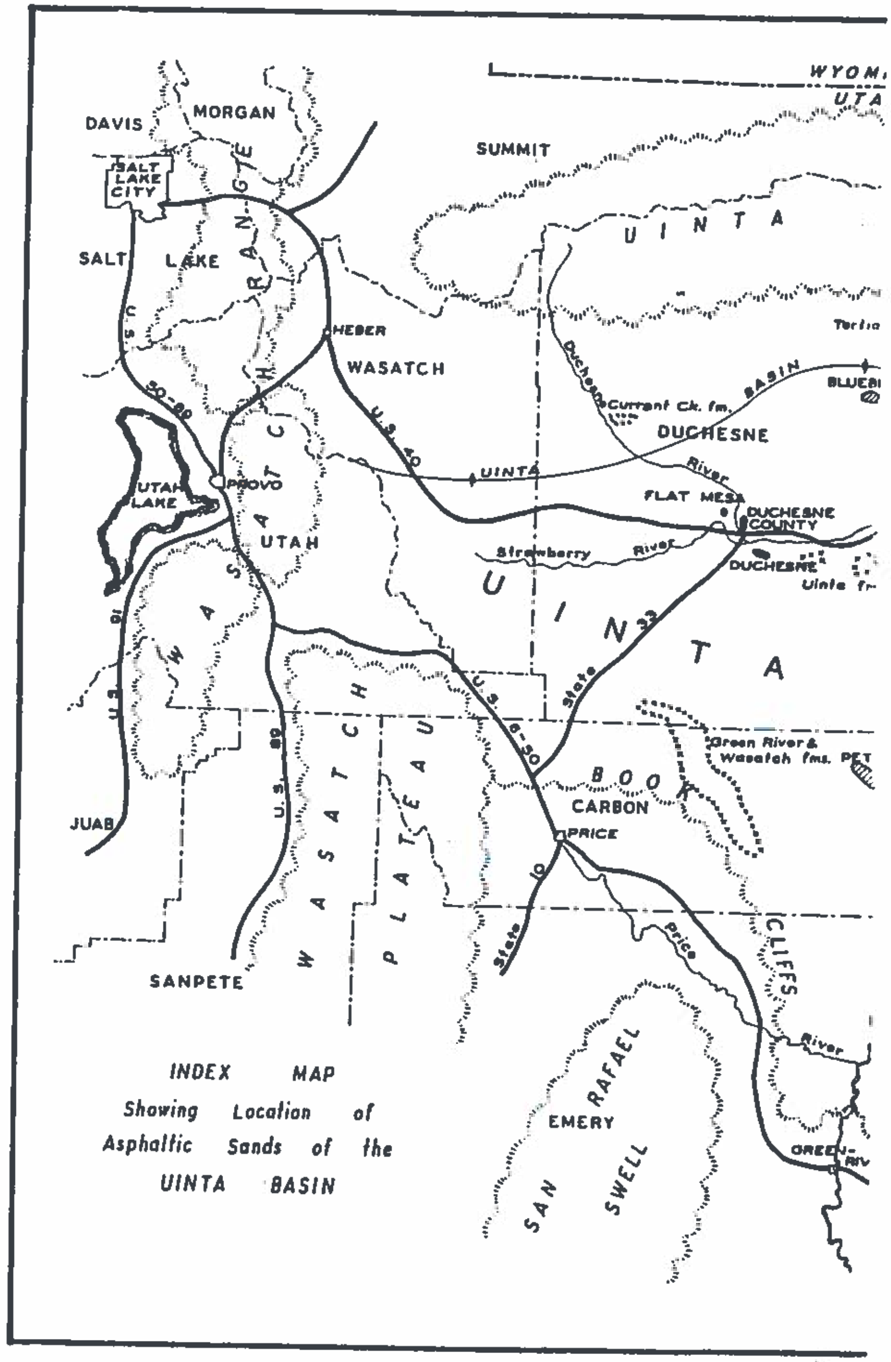
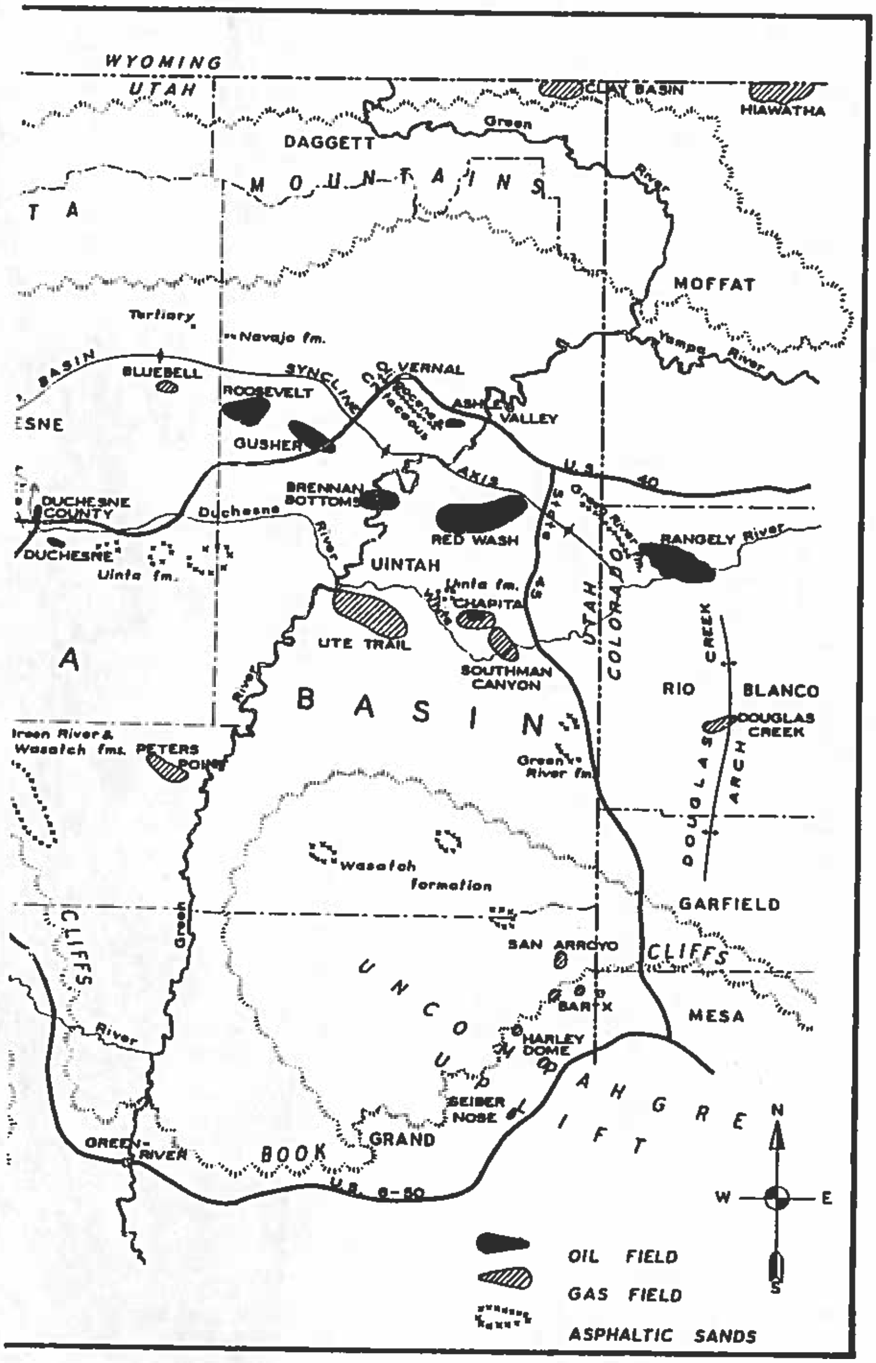

WYOMI
UTA
DAVIS
MORGAN
SALT LAKE CITY
SUMMIT
UINTA
SALT
LAKE
RANGE
HEBER
WASATCH
Tertia
BASIN
BLUEBI
Current Ck. fm.
DUCHESNE
Duchesne River
U.S. 40
UINTA
PROVO
UTAH LAKE
FLAT MESA
DUCHESNE COUNTY
UTAH
Strawberry River
DUCHESNE
Uinta fm
UINTA
State 33
U.S. 6-50
Green River & Wasatch fms.
BOOK
CARBON
PRICE
JUAB
U.S. 89
U.S. 91
WASATCH
PLATEAU
State 10
Price
CLIFFS
SANPETE
River
INDEX MAP
Showing Location of
Asphaltic Sands of the
UINTA BASIN
SAN RAFAEL SWELL
EMERY
GREEN RIV

Figure 6B.



WYOMING
UTAH
CLAY BASIN
HIAWATHA
DAGGETT
Green
River
MOUNTAINS
T A
MOFFAT
Tertiary
Navajo fm.
Yampa River
BASIN
BLUEBELL
SYNCLINE
VERNAL
ROOSEVELT
ASHLEY
VALLEY
ESNE
GUSHER
U.S. 40
AXIS
BRENNAN
BOTTOMS
DUCHESNE
COUNTY
Duchesne
River
RED WASH
RANGELY
River
DUCHESNE
Uinta fm.
UINTAH
Uinta fm.
CHAPITA
UTAH
COLORADO
UTE TRAIL
A
SOUTHMAN
CANYON
CREEK
RIO
BLANCO
B A S I N
DOUGLAS
CREEK
Green River &
Wasatch fms.
PETERS
POINT
Green River fm.
DOUGLAS
ARCH
Wasatch
formation
GARFIELD
CLIFFS
Green
SAN ARROYO
CLIFFS
UNCOMPAHGRE
BAR X
MESA
River
HARLEY
DOME
UPLIFT
SEIBER
NOSE
GRAND
GREEN RIVER
BOOK
U.S. 6-50
N
W
E
S
OIL FIELD
GAS FIELD
ASPHALTIC SANDS

Figure 69. Aerial photograph of Asphalt Ridge, looking northwest. The County Pit is prominent at the base of the ridge.

The asphaltic sands occur in the Rim Rock sandstone member of the Mesaverde formation and in the unconformably-overlying Duchesne River beds in the ridge area south of the Lapoint-Vernal highway. North of the highway, saturation occurs in both the Rim Rock and the Asphalt Ridge sandstone members of the Mesaverde and also in the Duchesne River formation.

Rim Rock Member of the Mesaverde

The Rim Rock sandstone member of the Mesaverde is approximately 250 feet thick at the north end of Asphalt Ridge and is highly charged with inspissated, tarry bitumen along the length of the outcrop and in the subsurface. The Union Oil Company's Cottonwood Springs well in section 21, T-4-S, R-20-E, penetrated bituminous Mesaverde sandstones. More than one-half of the asphalt reserves of the ridge area are in the Rim Rock sandstone. This member was recently described in detail (Pruitt, 1961).

Asphalt Ridge Member of the Mesaverde

The lowest sandstone member of the Mesaverde formation in the Asphalt Ridge area is the Asphalt Ridge member. This sandstone is separated from the Rim Rock sandstone by a shale interval which is approximately 100 feet thick in the central part of the ridge (Figure 73). The shale interval contains thin lignite beds and gray, bentonitic shales. There is no asphaltic material in the Asphalt Ridge sandstone member, except on the tract of land north of the Lapoint-Vernal road; this tract is on the downthrown side of a northeast-southwest trending fault (Figure 70). The relationship of this fault to the accumulation on this tract is uncertain.

Duchesne River Formation

A discussion of the stratigraphy of the Duchesne River formation is not pertinent to this paper. There are several intraformational unconformities within the Duchesne River series of fluvatile red beds, conglomerates, and variegated shales and sandstones. The formation unconformably overlies and truncates the more steeply-dipping beds of the Mesaverde formation. The unconformities and dip are probably a reflection of the uplifting of the Split Mountain and Blue Mountain anticlinal nosings. Regional monoclinal dip in the Duchesne River beds is interrupted by several small "bowings" or archings which are mappable on the surface. Several north-south trending faults cut the monoclinal dip between the outcrop and the Carter Oil Company Ruth Nelson No. 1 well in Sec. 33, T-5-S, R-21-E. The asphalt saturation in this formation is very definitely related to the unconformities present in the area (Figure 71). The richest saturation occurs along the planes of the unconformities, although it is controlled, in part, by the porosity and permeability of the subjacent and the superjacent beds. Nearly one-half of the total reserves of asphalt in the Asphalt Ridge area are in the Duchesne River formation.

Recent Development of the Asphalt Ridge Area

Development of the Asphalt Ridge was begun in 1954 by the Barnes Engineering Company of Los Angeles, California, and by the Ridge Development Corporation of New York City. The author (Covington, 1957) was in charge of the core-drilling and mapping program for the above firms and made the first preliminary estimates of reserves and "over burden" on certain properties. The mining properties were then turned over to the Sohio Oil Company. This company has been engaged in an active program of core drilling, mapping, and evaluation since 1956.

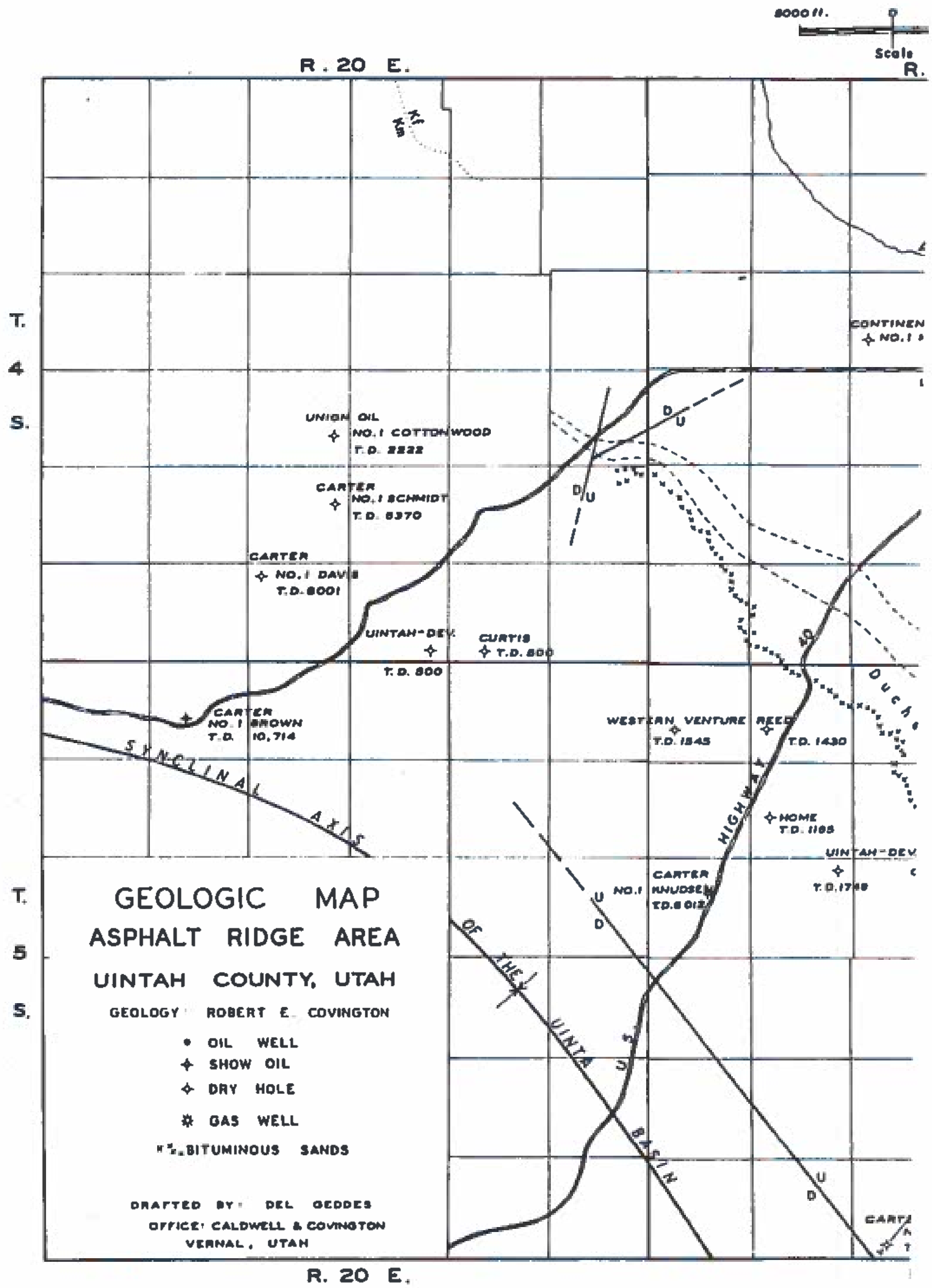
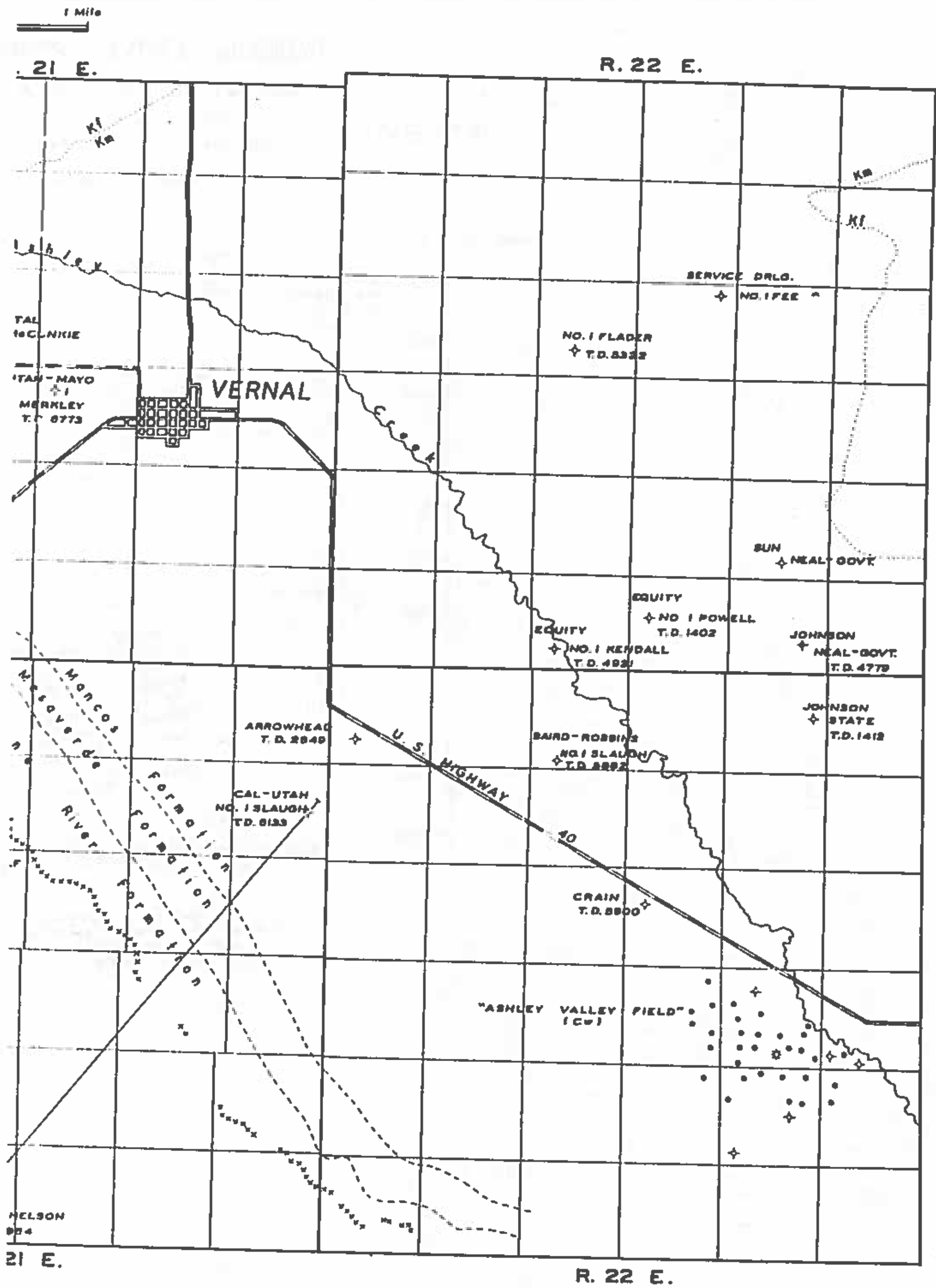

GEOLOGIC MAP
ASPHALT RIDGE AREA
UINTAH COUNTY, UTAH
GEOLOGY ROBERT E. COVINGTON
OIL WELL
SHOW OIL
DRY HOLE
GAS WELL
BITUMINOUS SANDS
DRAFTED BY: DEL GEDDES
OFFICE: CALDWELL & COVINGTON
VERNAL, UTAH
R. 20 E.
T. 4 S.
T. 5 S.
Scale
UNION OIL
NO. 1 COTTONWOOD
T.D. 2222
CARTER
NO. 1 SCHMIDT
T.D. 6370
CARTER
NO. 1 DAVIS
T.D. 6001
UINTAH-DEV.
T.D. 800
CURTIS
T.D. 800
CARTER
NO. 1 BROWN
T.D. 10,714
SYNCLINAL AXIS
OF THE UINTA BASIN
WESTERN VENTURE
T.D. 1545
REED
T.D. 1430
HOME
T.D. 1165
UINTAH-DEV.
CARTER
NO. 1 KNUDSEN
U.S. HIGHWAY 40
Duchesne
CONTINEN

Figure 70.


1 Mile
R. 22 E.
21 E.
VERNAL
Kl
Km
SERVICE DRLG.
NO. I FEE
NO. I FLADER
T.D. 5332
TAN-MAYO
MERKLEY
SUN
NEAL GOVT.
EQUITY
NO I POWELL
T.D. 1402
EQUITY
NO. I KENDALL
JOHNSON
NEAL-GOVT.
T.D. 4779
JOHNSON
STATE
T.D. 1412
ARROWHEAD
T.D. 2549
BAIRD-ROBBINS
NO. I SLAUGH
CAL-UTAH
NO. I SLAUGH
T.D. 6133
U.S. HIGHWAY 40
Mancos formation
Mesaverde formation
River formation
Creek
CRAIN
T.D. 5500
"ASHLEY VALLEY FIELD"
T.
4
S.
T.
5
S.
NELSON
21 E.
R. 22 E.

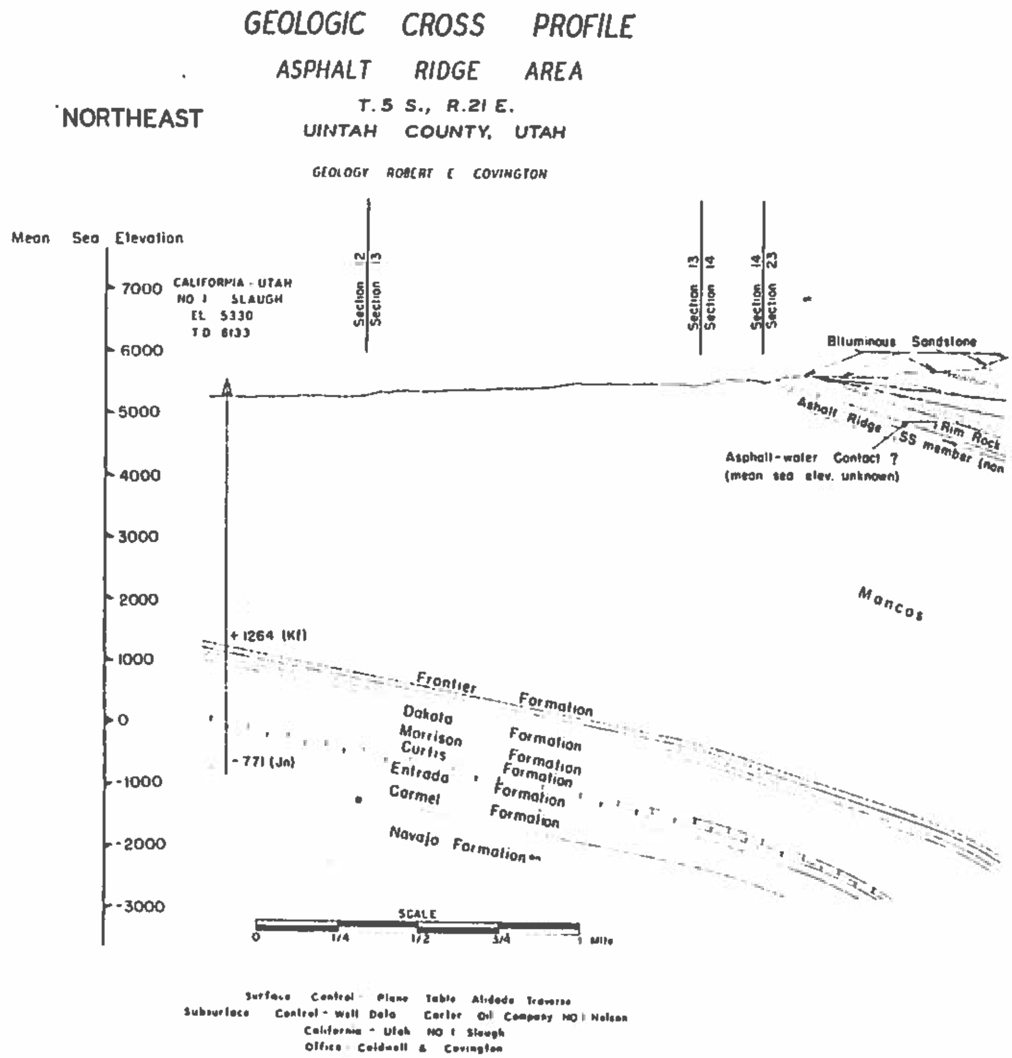
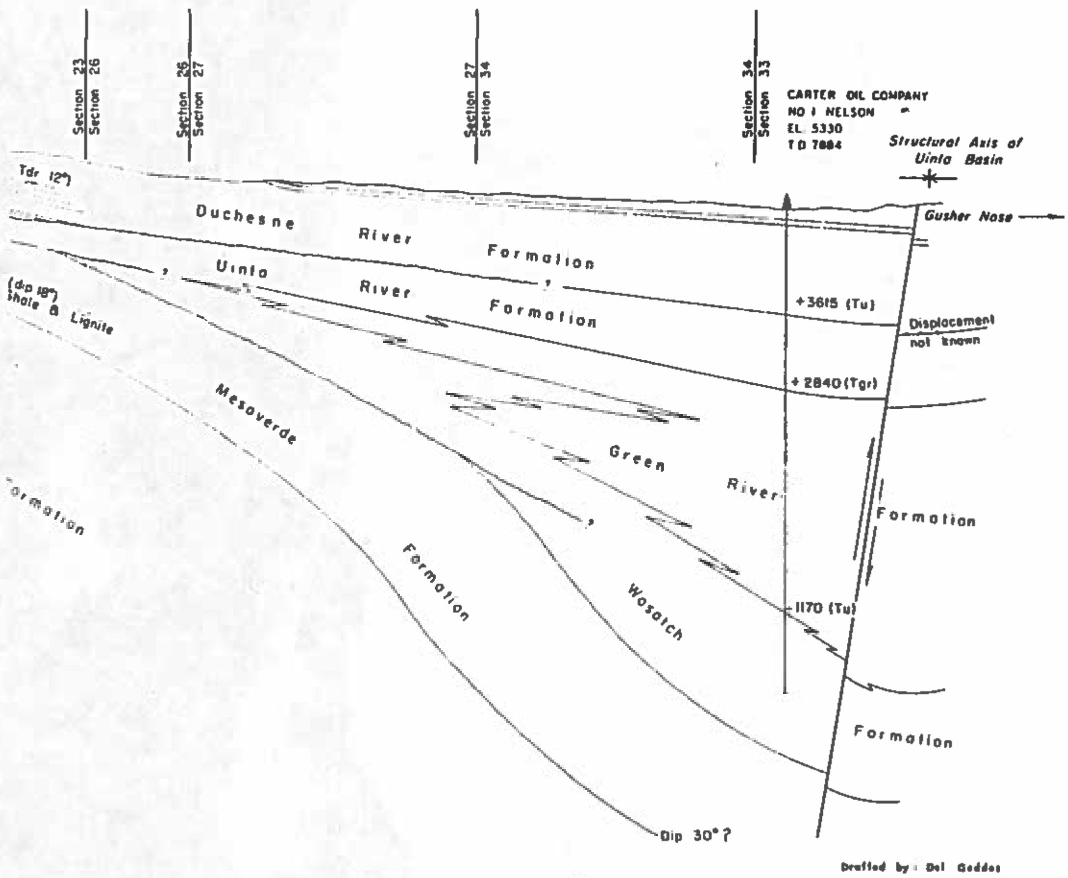

GEOLOGIC CROSS PROFILE
ASPHALT RIDGE AREA
NORTHEAST
T. 5 S., R. 21 E.
UINTAH COUNTY, UTAH
GEOLOGY ROBERT E COVINGTON
Mean Sea Elevation
7000
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
CALIFORNIA - UTAH
NO 1 SLAUGH
EL 5330
TD 6133
Section 12
Section 13
Section 13
Section 14
Section 14
Section 23
Bituminous Sandstone
Asphalt Ridge
Rim Rock
SS member
Asphalt-water Contact ?
(mean sea elev. unknown)
Mancos
+ 1264 (Kf)
- 771 (Jn)
Frontier Formation
Dakota Formation
Morrison Formation
Curtis Formation
Entrada Formation
Carmel Formation
Navajo Formation
SCALE
0
1/4
1/2
3/4
1 Mile
Surface Control - Plane Table Alidade Traverse
Subsurface Control - Well Data Carter Oil Company NO 1 Nelson
California - Utah NO 1 Slaugh
Office Caldwell & Covington

Figure 71.

SOUTHWEST



Section 23
Section 26
Section 26
Section 27
Section 27
Section 34
Section 34
Section 33
CARTER OIL COMPANY
NO 1 NELSON
EL 5330
TD 7884
Structural Axis of Uinta Basin
Gusher Nose
Tdr (12°)
Duchesne River Formation
Uinta River Formation
(dip 18°)
Shale & Lignite
+3615 (Tu)
Displacement not known
+2840 (Tgr)
Mesaverde Formation
Green River Formation
Formation
Wasatch Formation
1170 (Tu)
Dip 30° ?
Drafted by: Del Geddes

Figure 72. Photograph of the County Pit, Asphalt Ridge area, Uintah County, Utah.

The Rim Rock sandstone bleeds tarry, viscous oil on a freshly broken surface. This may be observed in the County Pit area (Figure 72). On fresh surface the sandstone has a decidedly cool feel, a property which Barb and Ball (1944) ascribe to the fact that the individual sand grains are water-wet. The fresh sample also has a "tacky" feel; this tenacious quality makes the bitumen an excellent material for road paving. The degree of saturation within the sandstone and conglomerate beds of the Mesaverde and the Duchesne River formations is dependent upon three criteria: (1) the porosity and permeability of the member; (2) the proximity of the member to an unconformity; and (3) the structural position of the member (greater enrichment is found associated with the small nosings or folds than with the sandstones off-flank or down the dip). The asphalt sandstones in the Mesaverde have a definite asphalt-water contact.

The saturation can be classified as follows: (1) tar, with sand grains interspersed throughout; (2) sandstone, semi-consolidated, with tar as the primary cementing agent, and with clay and silica as secondary binding material; (3) sandstone, lean, with some interstitial tar; (4) sandstone, barren, with trace of staining, water-wet. Saturation is often found in the conglomerates and in the shales along bedding planes or fractures in the Duchesne River beds.

The asphaltic sandstones weather a blue-white; however, the weathered surface is thin. The Mesaverde sandstones have clay pellets and lenses which are unsaturated, appearing as splotches against the fresh, black, tarry surface. The sandstones also have a distinctive speckled appearance, due to the small white clay inclusions.

A Brief Discussion of the Economics of Asphalt Property Development

The feasibility of mining an asphaltic sandstone deposit is dependent upon many factors. Some of these factors are the ratio of overburden to material, the degree of consolidation of material and overburden, the amount of interbedded "waste", local topography, and the degree of asphaltic enrichment. Also important is the mining method used, whether "open pit" or thermal recovery ("in situ"). Finally, one of the most important factors is the price obtainable per barrel of liquid bitumen. Other considerations are the local and state tax structure, interest rates, availability and cost of building material and equipment, local labor rates, cost of water and fuel, and the cost of transportation.

An overburden to material ratio of 0.5 to 1.0 would probably be a favorable ratio to make strip-mining economically feasible. The author feels that a part of the Asphalt Ridge property could be worked by strip-mining operations. Where the material is at too great a depth and where the overburden-to-material ratio is not favorable, perhaps an "in situ" or fireflood process could be successfully used. The Gulf Oil Corporation and the Sohio Oil Company have already conducted some tests to determine the efficiency and costs of a fireflood project on asphaltic sandstones.

Since the nearest railhead to the Asphalt Ridge properties is 120 miles to the east at Craig, Colorado, or 120 miles to the west at Heber, Utah, any plan for the development of the bituminous sandstones, whether for mining or extraction, must include the erection of a plant to extract the bitumen from the sandstones, or, possibly, even the building of a refinery near the quarry. The cost of the separation process will be a direct function of such factors as ease of separation of bitumen from the sandstone, cost of crushing material, cost of fuel for heating, cost of flotation chemicals, the quality and cost of an adequate water supply, costs of electricity, and costs of erection of the plant, including equipment for crushing, grinding, and retorting and flotation.

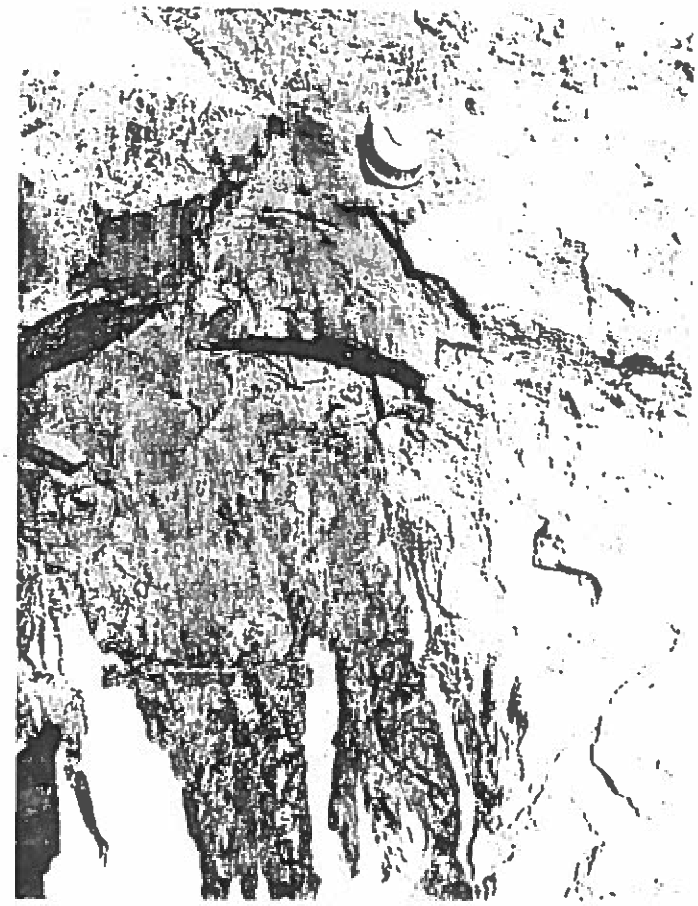


Figure 73. Photograph of outcrop of asphaltic sand and tar seep in the Rim Rock member of the Mesaverde formation, Asphalt Ridge area, Uintah County, Utah.

The bitumen, thus separated, is a heavy, viscous liquid with a gravity of about 10 A.P.I., which is not suitable for pipeline transportation. This tar can be "upgraded"; one of the most economically feasible methods of doing this would be to employ what is known as a "delayed coking process." A part of the coke from this process could be used to generate steam and power for the operation and part could be sold for metallurgical-grade coke. The other product is coker distillate, which can be readily utilized by the refineries as it produces a high yield of gasoline, kerosene, and fuel oils. It is highly possible that a fluid-coking process could be used successfully, or an oven type of coking unit might be employed, in which the hot oil is sprayed on the floor of a refractory-lined oven. This latter process is not adaptable to an operation involving over 1,000 barrels of bitumen per day. The coke produced by the former method of fluid coking can be used for fuel, and not for metallurgical-grade coke.

Origin of the Asphalt

Over 95% of the saturation on Asphalt Ridge occurs in the Mesaverde and Duchesne River beds. Of this amount, nearly half of the reserves are in the Mesaverde sandstones. Spieker (1930) has estimated the reserves in the Asphalt Ridge area as being in excess of 1 billion barrels. The author considers this figure to be excessive, although the reserves are believed to be of sufficient size to warrant commercial exploitation.

The author believes the source of the bitumen to be the down-dip (basinward) Green River shales and marlstones which grade into sandstones in a shoreward (eastward) direction (Figure 71). The interfingering of the lacustrine, highly organic Green River shales with the fluvatile to deltaic "Uinta-Wasatch type" sediments could have formed the original reservoir. Subsequent uplift in the Blue Mountain-Split Mountain area during Duchesne River time tilted the overlying Duchesne River beds, with the movements taking place through many local pulsating uplifts. The oil then migrated updip along the unconformities, losing its more volatile constituents during the movement. There is a preferential saturation which is evident in the field. Any slight increase or decrease in either porosity or permeability results in greater enrichment or in "barren" patches, respectively. This tends to augment the idea that the fluid was rather viscous at the time of the up-dip migration.

WHITEROCKS AREA BITUMINOUS SANDSTONES

The bituminous snadstones of the Whiterocks area are located in T-2-N, R-1 and 2-W, U.S.M., Uintah County, Utah, a distance of 20 miles north of Roosevelt, Utah, along the south flank of the Uinta Mountains (Figure 68). The asphalt saturation occurs in the Jurassic Navajo sandstone, which has a total thickness of over 1,000 feet in the area. Saturation is essentially complete, although it is not completely uniform. Degree of bitumen saturation is dependent upon the porosity and permeability of the sandstone. One local, thin zone which is extremely hard and tight was barren.

A surface cross section, north to south, and a subsurface cross section, north to south (Figures 76 and 77), are included in this report. A surface geologic map is shown in Figure 74. The Mesozoic beds dip 62 degrees to the southeast. A bowing in the Paleozoic beds has given the name of Whiterocks nose to the area (Kinney, 1955).

Occurrence of the Bituminous Saturation

An analysis of the bitumen has shown that the oil has about a 12° gravity. The asphaltic sandstone averages about 10% bitumen by weight. A well drilled by Caldwell and Covington in 1958, the No. 1 Merimon Ranch-Fee (Figures 74 and 77), cored 560 feet of asphaltic Navajo sandstone before reaching "barren" sandstone. Based upon available well data and surface plane-table mapping, the reserves of the area have been estimated to be approximately 50,000,000 barrels of liquid bitumen. Core analysis of the saturated Navajo sandstone has shown porosities which range from 14 to 19% and permeabilities which range from 110 to over 550 millidarcies.

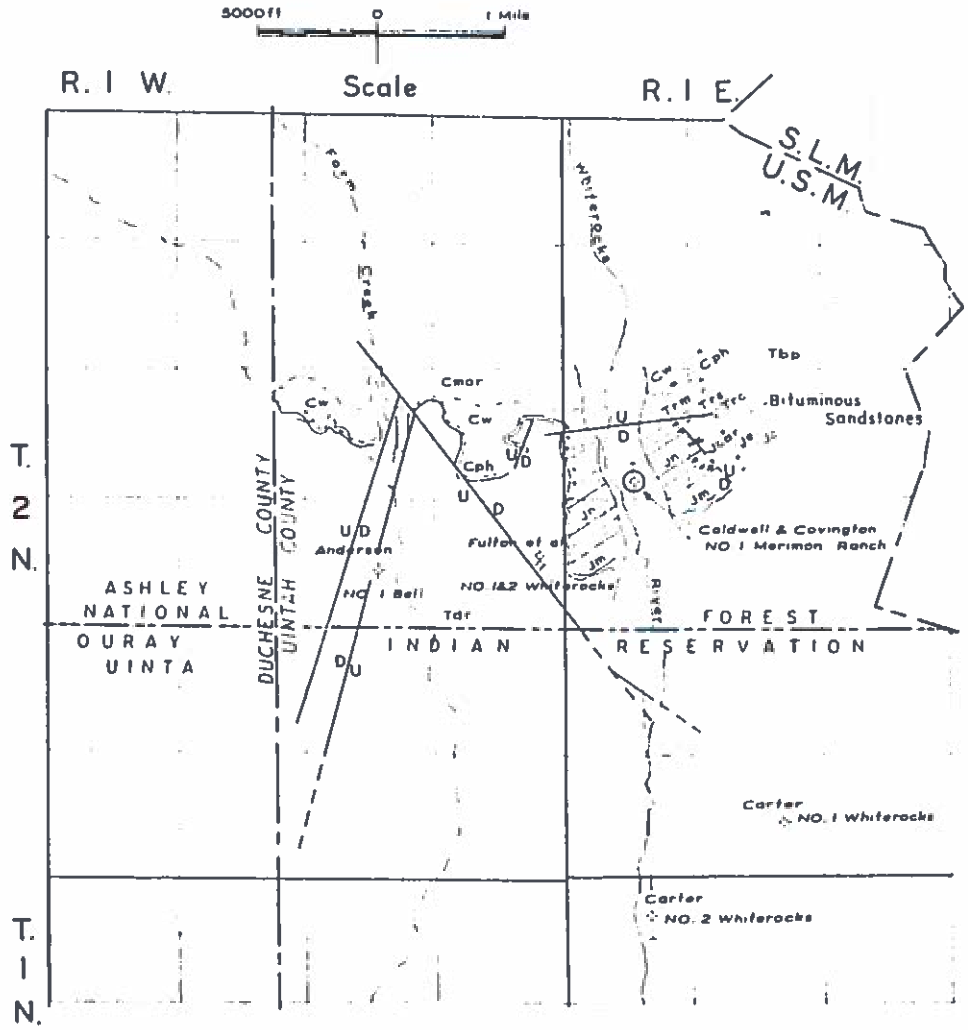


Figure 74. Geologic Map, Whiterocks Area.

GEOLOGY ROBERT E. COVINGTON

DRY HOLE

CORE TEST

Origin of the Oil

The Tertiary Green River formation has been proposed as a source for the oil in the Navajo formation. It is not thought that the oil is indigenous to the Navajo, as the formation is considered to be an eolian type deposit. The author is of the opinion that the oil is of Pennsylvanian age and migrated from the Weber

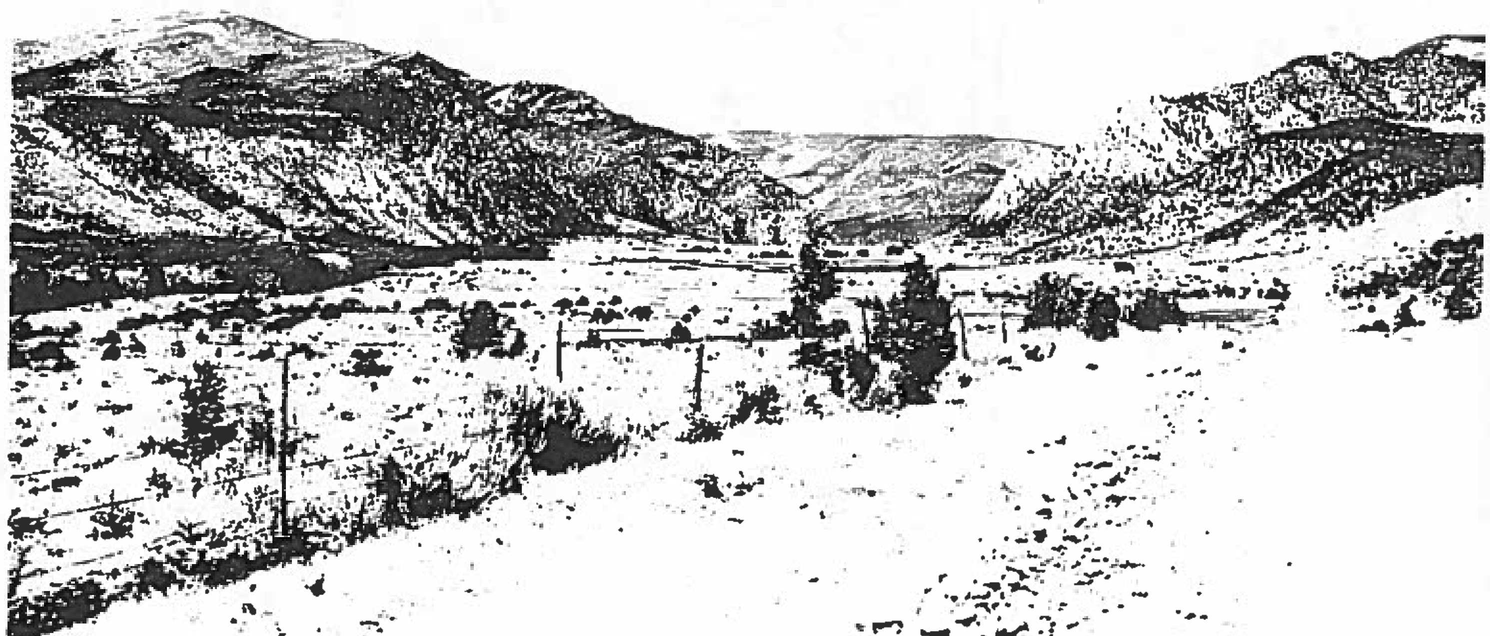


Figure 75. Photograph of Whiterocks Canyon area, looking north; white sandstone on low hill to right is the Jurassic Nugget sandstone.

The asphaltic sandstones weather a blue-gray and are similar in appearance to the weathered beds of the bituminous sandstones of the Asphalt Ridge and Whiterocks area. On a freshly broken surface, however, the Wasatch sandstones do not have the typical speckled appearance. Porosities vary greatly, ranging from 14% to more than 30% by volume, with the permeabilities varying from 100 to 600 millidarcies. The Wasatch sandstones are quite well indurated and require blasting to permit removal by dozers with rippers. The ore is carried down an aerial tramway from the quarry and is then trucked to the railroad at Sunnyside. Several of the Sunnyside properties appear to offer excellent possibilities for strip-mining operations. Other parts of the deposits may be well adapted to "in situ" or fireflooding recovery of the oil.

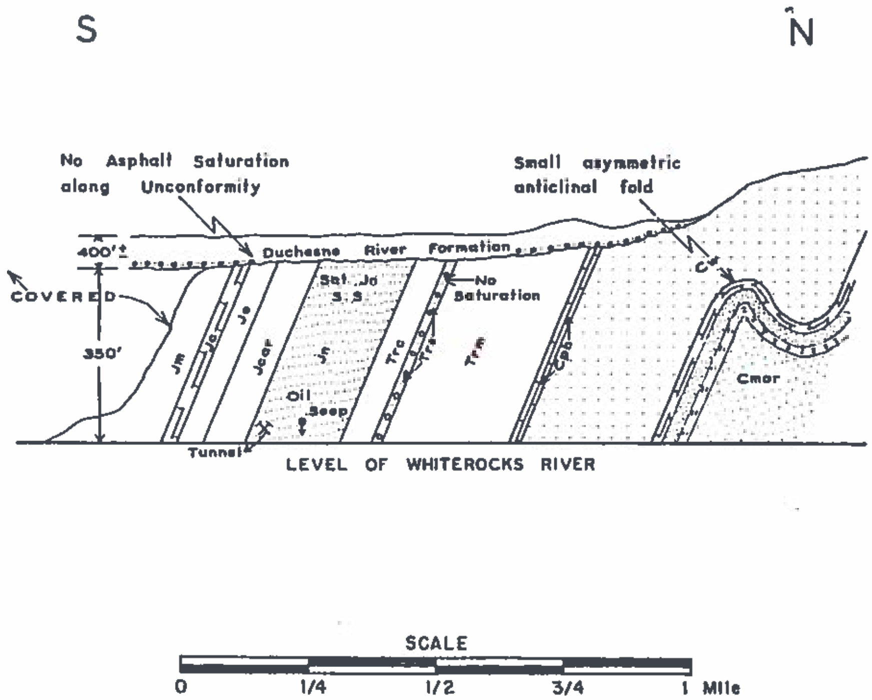


Figure 76. Surface Cross Section, west side Whiterocks River, Sec. 18, T-1-N, R-1-W, U.S.M. Uintah County, Utah.

MISCELLANEOUS LOCALITIES

A glance at the Index Map (Figure 68) will show the location of all of the properties herein described. The author checked reports of an asphaltic sandstone northwest of John Starr flat in the NE 1/4 of Sec. 24, T-2-N, R-3-W, U.S.M., Duchesne County, but was unable to locate the seep. The asphalt occurrence would have been in beds of Eocene-Oligocene age. Another tar seep was reported east of the Whiterocks river in the SW 1/4 of Sec. 16, T-2-N, R-1-E, U.S.M., in Uintah County, but the author failed to locate this also. This seep would have been in beds of Duchesne River formation at a point where the Duchesne River beds overlie beds of the Curtis formation.

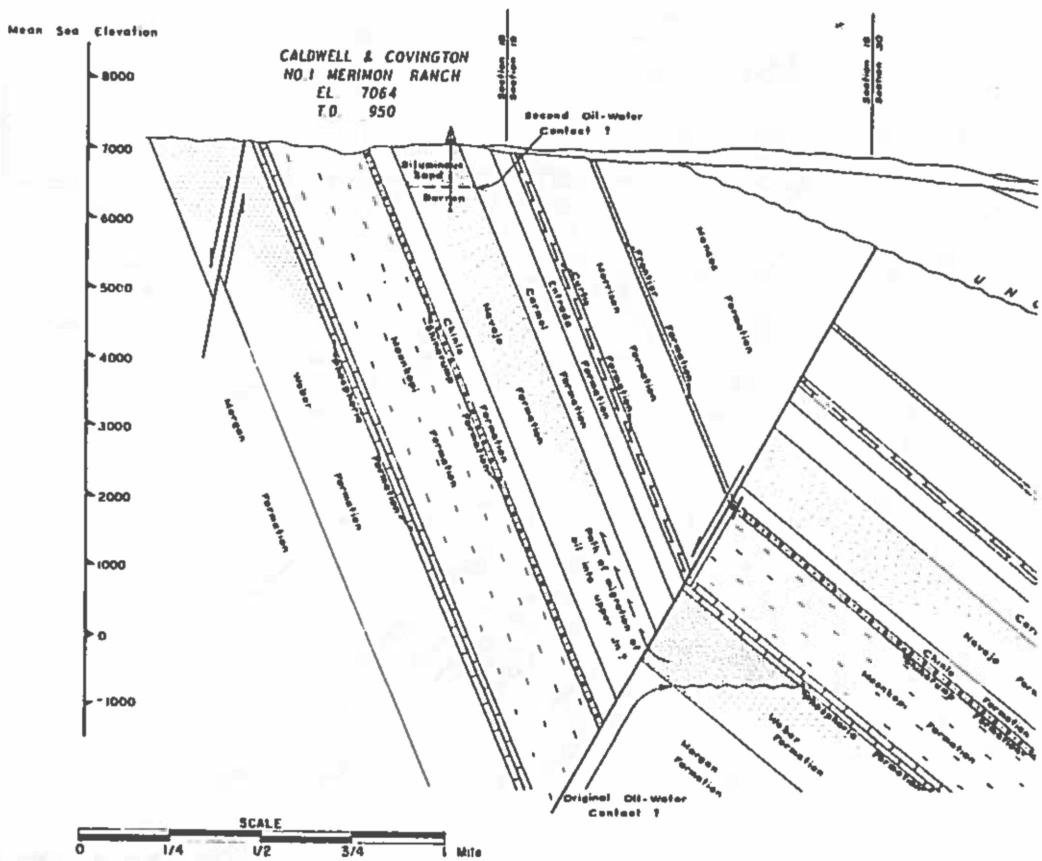
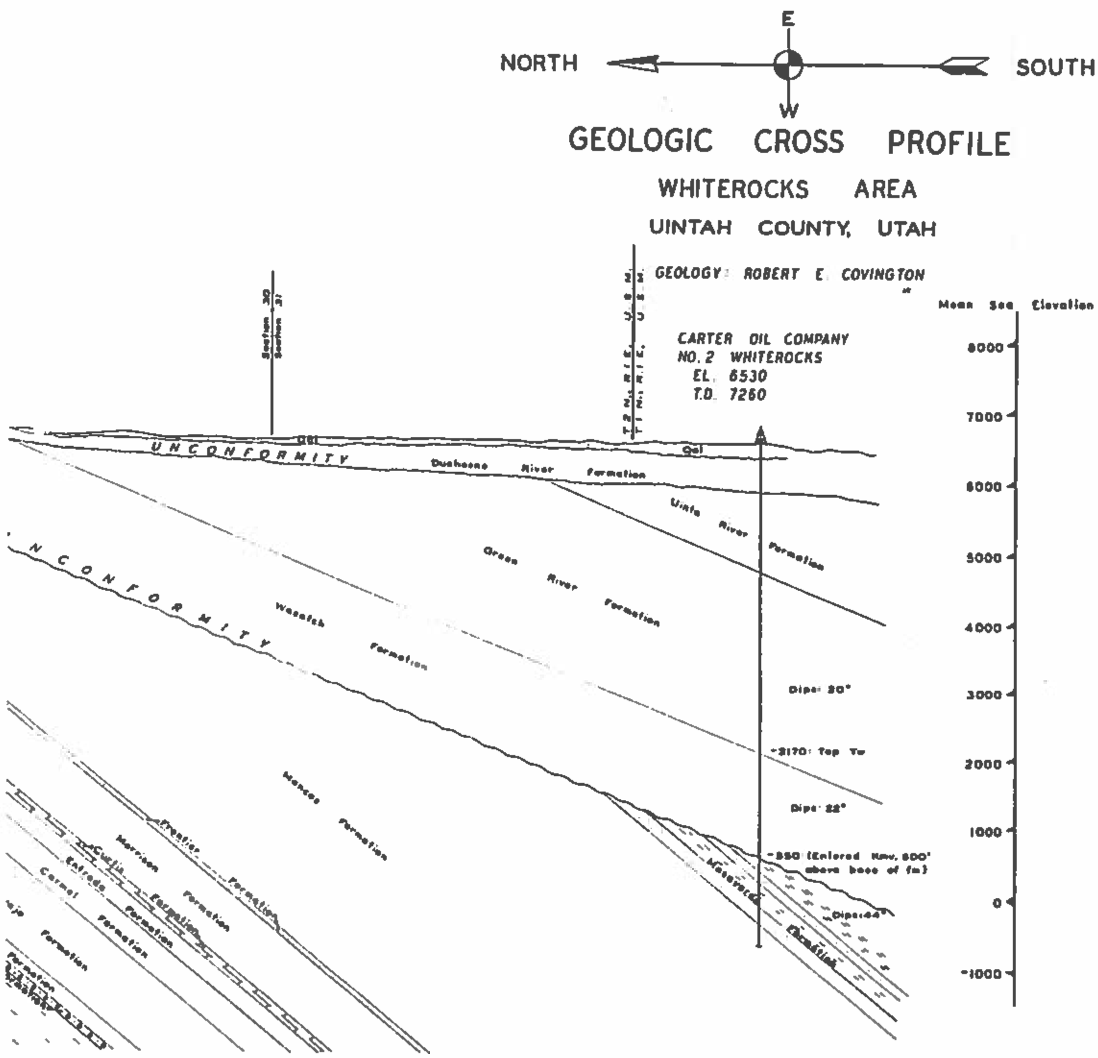

Mean Sea Elevation
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
CALDWELL & COVINGTON
NO.1 MERIMON RANCH
EL. 7064
T.D. 950
Second Oil-Water Contact ?
Original Oil-Water Contact ?
Morgan Formation
Weber Formation
Phosphoria Formation
Moenkopi Formation
Chinle Formation
Navajo Formation
Carmel Formation
Entrada Formation
Morrison Formation
Frontier Formation
Mancos Formation
SCALE
0
1/4
1/2
3/4
1 Mile

Figure 77.



Surface Control: Plane Table Alidade Traverse
Subsurface Control - Well Data: Fulton et al. NO. 1 & 2
Carter Oil Company NO. 1 & 2
Caldwell & Covington NO. 1 Mormon Ranch
J. R. Gilbergh NO. 1 Bell

Drafted by: Del Geddes
Office: CALDWELL & COVINGTON
VERNAL, UTAH

Peor Springs Bituminous Sandstones

The Peor Springs bituminous sandstone deposit lies on the southeast flank of the Uinta Basin in T-15 and 16-S, R-23 and 24-E, S.L.M., Uintah County, Utah The bituminous sandstones are in beds of late Wasatch age and the geologic occurrence is very similar to the geologic occurrence of those in the Sunnyside area. The best saturation is in beds which structurally lie on small nosings or "bowings" and where the porosity and permeability are high. The source of the oil is undoubtedly the down-dip, highly organic, Green River shales and marlstones, with which the fluvatile beds of the Wasatch formation interfinger. The extent of the reserves is not known, although the author has observed saturation in beds which covered an interval in excess of 250 feet.

Chapita Wells Bituminous Sandstones

The bituminous sandstone deposits of the Chapita Wells area lie on the eastern flank of the Uinta Basin in the northwest part of T-9-S, R-23-E, and in the north-east part of T-9-S, R-22-E, in the southwest part of T-8-S, R-23-E, and the southeast part of T-8-S, R-22-E, S.L.M., Uintah County, Utah. The bitumen occurs in the fluvatile sandstones of the Eocene Uinta formation. Although many of the sands are extremely "dry," there are several beds of asphaltic sand which are quite highly impregnated with a thick, tarry bitumen. The reserves are not known, although it is believed that they are not great. The origin is uncertain, but may be related to faulting or to the impregnation of the sandstones by a gilsonitic-type liquid hydrocarbon which moved upward along faults or fractures from a Green River formation source.

Dragon-Asphalt Wash Bituminous Sandstones

The Dragon-Asphalt Wash asphaltic sandstones are located on the southeast flank of the Uinta Basin, near the gilsonite camp at the Black Virgin mine in Uintah County, Utah, in the east half of T-12-S, R-24-E, and the west half of T-12-S, R-25-E. The size of the deposit is not known, although it is extremely doubtful that the deposits have any commercial value. Many of the sandstones are dry, tarry beds with light saturation. About one mile up the canyon from the Black Virgin gilsonite mine is a sandstone, about 25 feet in thickness, which is heavily saturated with a tarry oil. The deposit is adjacent to and updip from a northwest-trending gilsonite vein. Field evidence clearly shows that the gil-sonite vein has acted as the feeder to the porous Green River sandstone and has completely charged it with tarry bitumen.

The Deep Creek Nose Asphaltic Sandstones and Conglomerates

In the SW 1/4 of T-3-S, R-19-E, S.L.M., Uintah County, Utah, on the north flank of the Uinta Basin, is a small, south-plunging anticline which is locally known as the Deep Creek nose. The feature is developed in the Tertiary Duchesne River beds. At the point of overlap and along the unconformity between the under-lying Mancos shale and the Duchesne River beds of Oligocene (?) age are a series of sandstones and conglomerates which are charted with a viscous, tarry oil. The deposit is only of academic interest. The origin of the crude was the down-dip Green River organic shales. The oil probably moved updip into deltaic-type sandstones north of the organic shales and marlstones. When further uplift occurred to the north, the oil moved updip along the unconformities into the overlying Duchesne River beds.

South Whiterocks Tertiary Bituminous Sandstones

In the SE 1/4 of Sec. 19 in T-2-N, R-1-E, U.S.M., on the south flank of the Uinta Mountains and on the north flank of the Basin, there is a small isolated patch of fairly "dry" bituminous sandstone. The areal extent of the outcrop is small, and the saturation is related to a small northeast-trending fault. The thickness of the beds probably does not exceed fifteen feet.

John Starr Flat Area

About 12 miles west of the Whiterocks area, there is a small inlier of basal Duchesne River beds, a part of which is well saturated with an asphaltic material. This area is the NW 1/4 of the NE 1/4 of Sec. 24 in T-1-N, R-3-W, U.S.M., Duchesne County, Utah. The saturation is sharply delimited on the northwest by a small northeast-striking fault. The asphaltic sandstones are approximately 70 feet in thickness, although the areal extent is extremely small. The deposits are not commercial, but are of academic interest in that the saturation is controlled by faulting.

North Tabiona Bituminous Sandstones

A few miles north and east of Tabiona, Duchesne County, Utah, on the north flank of the Uinta Basin, in the south half of Sec. 17, T-1-S, R-7-W, U.S.M., on Ute Indian Reservation lands, are several small areas where the basal Currant Creek formation has been impregnated with asphalt. The saturation seems to be related to the unconformity between the Currant Creek beds and the underlying Mesaverde formation. The thickest sandstone observed was not over 25 feet in thickness and was extremely limited in areal extent. The Currant Creek formation dips approximately 23 degrees to the south in this area. No saturation was observed in beds above the basal Currant Creek or in the underlying Mesaverde beds.

The Lake Fork-Yellowstone River Bituminous Sandstones

In the summer of 1958 the author checked an asphaltic sandstone deposit on Ute Indian Reservation land, in Sections 5 and 6, T-1-N, R-4-W, U.S.M. The saturation is in the Uinta formation and is located on the north flank of the Uinta Basin, on the divide between Lake Fork and the Yellowstone River. There are three to four tar sandstones which range from 15 to 20 feet in thickness, although the degree of saturation is poor. One of the basal asphaltic sandstones is quite porous and permeable, and a small "brea", or tar spring, flows out of a fractured area and onto the ground. This deposit was cored by the Duchesne County Road Commission in 1958, but the cores were not evaluated. It is understood that the material is not sufficiently rich nor the beds of sufficient thickness to be used as a source of paving material for the county. The origin of the oil is not known. Another deposit is located in Sec. 33, T-2-N, R-4-W, U.S.M., just north of the Uintah and Ouray Indian Reservation line.

South Myton Bench Area Bituminous Sandstones

There are three bituminous sandstone deposits in an area which lies south of the town of Myton, Duchesne County, Utah, and on the Pariette Bench. The deposits are in the central part of the Uinta Basin and occur in beds of the Uinta formation of Eocene age. Due to the highly lenticular nature of the sandstone beds, it is believed that these deposits do not have any great commercial value, for many of the sandstones contain "dry" tar. The origin of the oil is not known,

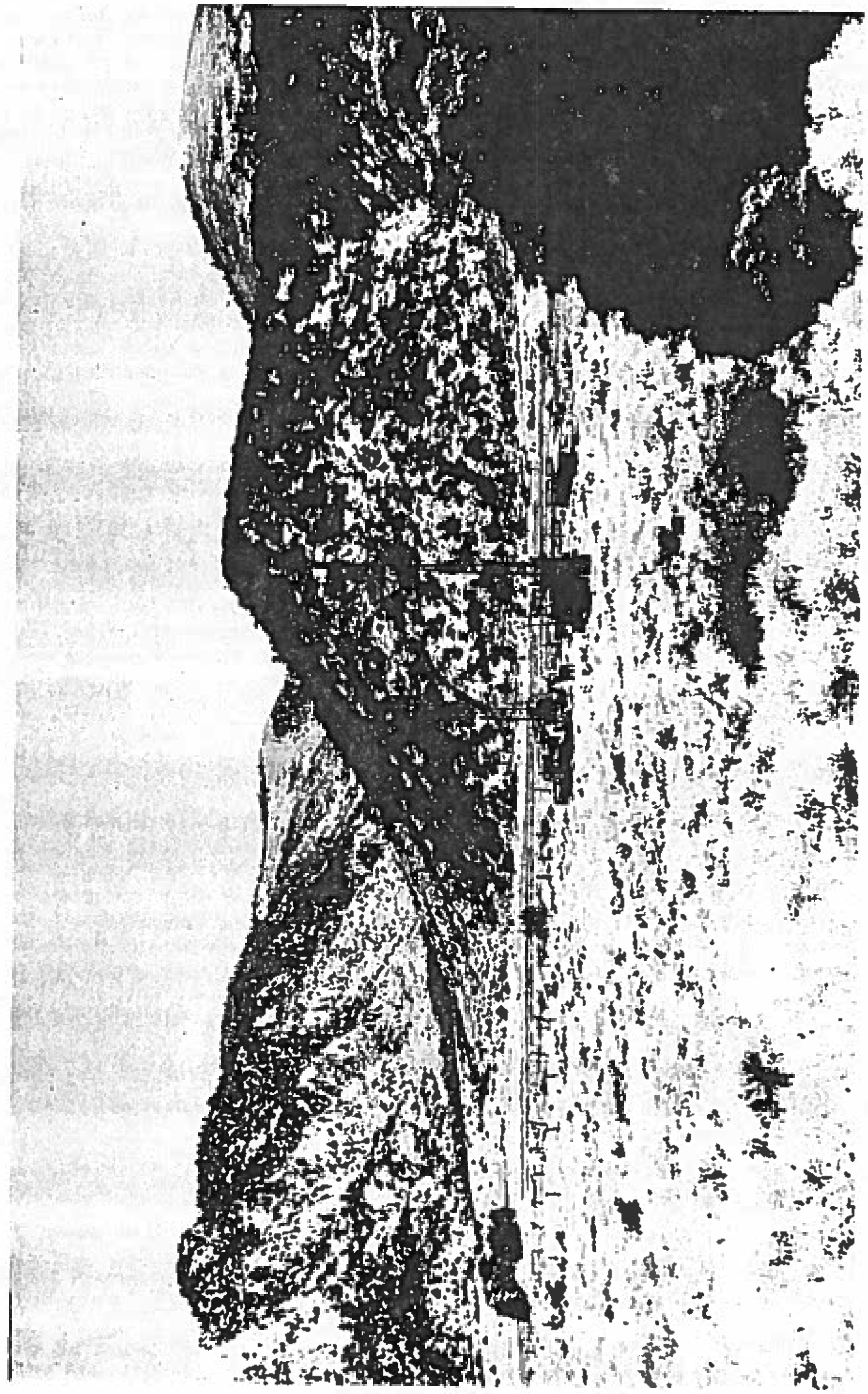


Figure 78. Photograph in Whiterocks Canyon, looking east at the outcrop of asphaltic Navajo sandstone.

although the author believes that the accumulation may have been related to the east-west trending Duchesne fault zone, for the saturated beds are south of and updip from the fault zone. North of the faults, there is no saturation or impregnation of asphalt. The oil could have migrated up the fault plane from the underlying Green River formation. It is also possible that the origin of the oil could be related to the interfingering of the lacustrine Green River sediments with the fluvatile Uinta-type sediments.

Indian Canyon-Lake Canyon Bituminous Limestone Deposit

In the Argyle Canyon area on the southwest flank of the Uinta Basin, there is an asphaltic sandstone which has been marketed under the trade name of "argulite" and which contains from 8 to 10% bitumen by weight. The deposits are in beds of the basal G een River (?) and lie south of the divide which separates the drainage of the Minnie Maude Creek from the north-draining streams on the dip slope of the Green River Formation. This deposit was mentioned by Abraham (1918).

The Raven Ridge Asphaltic Sandstone

On the northeast flank of the Uinta Basin in the area known as Raven Ridge in the west half of T-7-S, R-25-E, S.L.M., Uintah County, Utah, there is an asphaltic sandstone deposit which occurs in the deltaic sandstones of the lower Green River formation. The formation dips southwestward approximately 16 to 18 degrees, and the asphaltic sandstone beds are exposed on the northeast-facing, relatively low-lying escarpments. There are 6 to 8 beds which range in thickness from 2 to 10 feet. Much of the sandstone is "dry." These sandstones probably represent the near-shore facies of the Green River, and the source of the oil was the down-dip, highly organic Green River shales and marlstones. The reserves are not known, although it is believed that they are small.

CONCLUSION

The Uinta Basin in northeastern Utah is replete with asphaltic sandstones in formations which range in age from the Jurassic to the Oligocene. Bituminous limestones occur in beds of Eocene age in the southwest part of the Basin. Four of the deposits appear to have considerable economic merit; the rest are probably only of academic interest. The source of oil in the asphaltic sandstones is intimately related to the source of the solid hydrocarbons of the Uinta Basin. The source for all but the Whiterocks accumulation, which is possibly Pennsylvanian, is undoubtedly the Eocene Green River sediments.

CITED REFERENCES

Abraham, H., 1945, Asphalts and allied substances: New York, D. Van Nostrand Co., Publisher.

Barb, C. F., and Ball, J. O., 1944, Hydrocarbons of the Uinta Basin: Colo. School of Mines Quart., v. 39.

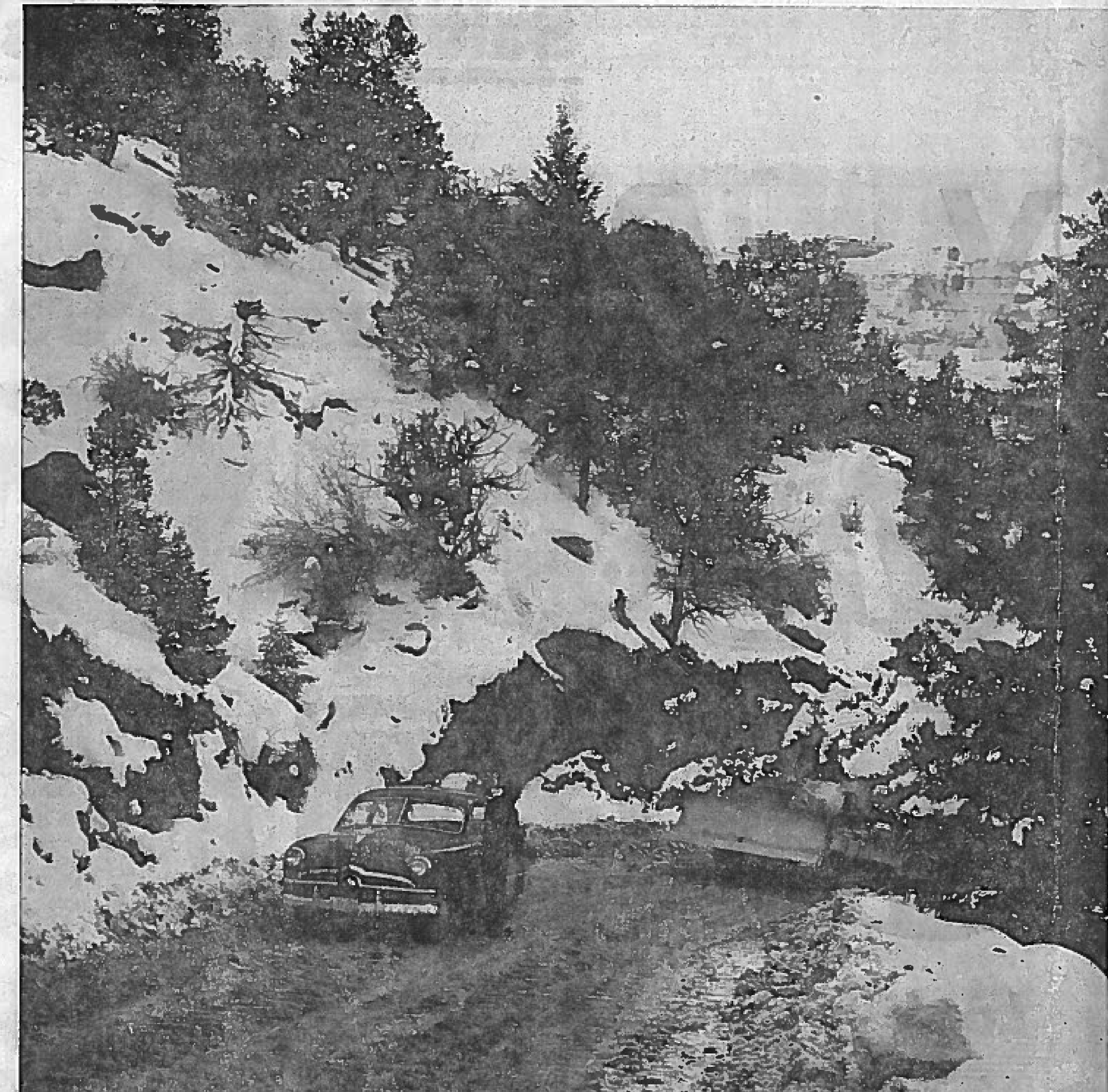
Covington, R. E., 1957, The bituminous sandstones of the Asphalt Ridge area, northeastern Utah: Intermountain Assoc. Petroleum Geologists Guidebook 8th Ann. Field Conf.

Holmes, C. F., and Page, B. M., 1956, Geology of the bituminous sandstone deposits near Sunnyside, Utah: Intermountain Assoc. Petroleum Geologists Guidebook 7th Ann. Field Conf.

Kinney, D., 1955, Geology of the Uinta River-Brush Creek area, Duchesne and Uintah Counties, Utah: U.S. Geol. Survey Bull. 100, p. 73-77, 150-159.

Pruitt, R. G., 1961, Mineral Resources of Uintah County, Utah: Utah Geol. and Mineralog. Survey Bull. 71, p. 11-22.

Spieker, E. M., 1930, Bituminous sandstones near Vernal, Utah: U.S. Geol. Survey Bull. 822-C.



MOST CARS stall about here on the steep road to the Jack Canyon wildcat. Tool pusher Kenneth Hayes waits for bulldozer tow.

The Lonesomest Wildcat

YOU NEED A BOOST FROM A BULLDOZER WHEN YOU CLIMB TO CARTER'S JACK CANYON TEST

EDITOR'S NOTE — We are grateful to the Carter Oil Company for permission to use this

Let's visit Carter's lonesomest wildcat, the No. 1 Canyon Government, perched atop a 75-

It's 88 rugged miles from Vernal, Utah, and you reach it by driving a road that tumbles

with a tiny creek which you cross and recross on the winter ice as you twist down one blind

with Kenneth Hayes, youthful tool pusher for the drilling contractor. From here up Carter built the road which follows an old sheep trail and clings dizzily to the walls of Prickly Pear Canyon. Jack Canyon which gives the wildcat its name is nearby. The road alone cost $45,000—or more than most oil wells in shallow fields. You never get out of low gear and about half way up the hill with the gas pedal floorboarded under Kenneth's big overshoe the car stalls and begins to roll backward. "That's just about my usual spot," Kenneth says as he eases the car into a snow bank at the side of the road and leans back to wait for a bulldozer.

A 200-yard tow from the clanking bulldozer gets Kenneth over a hump where the grade is 23 per cent or better. Then the car struggles in low for another mile and a half to reach the crest where it's an easy six-mile run on the flat, park-like cedar-covered mesa to the drilling rig.

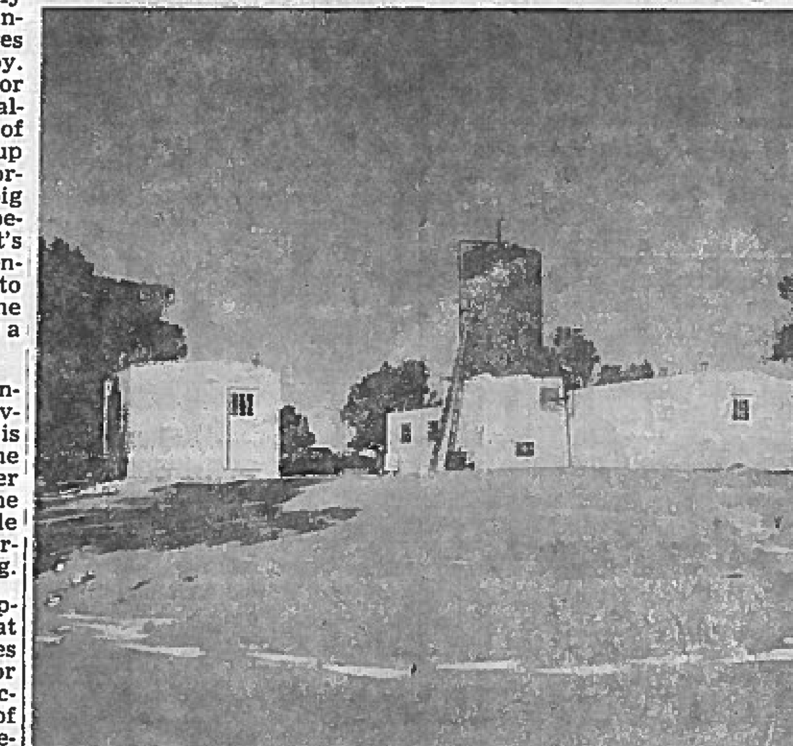
Charlie Reid, Carter development engineer, parks his car at the foot of the hill and switches to a four wheel drive Jeep for the ascent. He carries an Arctic-type sleeping bag capable of withstanding the 40-degree below zero cold of the high mesa country just in case he should be stranded along the road.

Because the road to town is so rugged the drilling crews live on the job. The men work 12 hours on and 12 hours off for 12 days. Then they have six days in town before they must return to the lonely mesa.

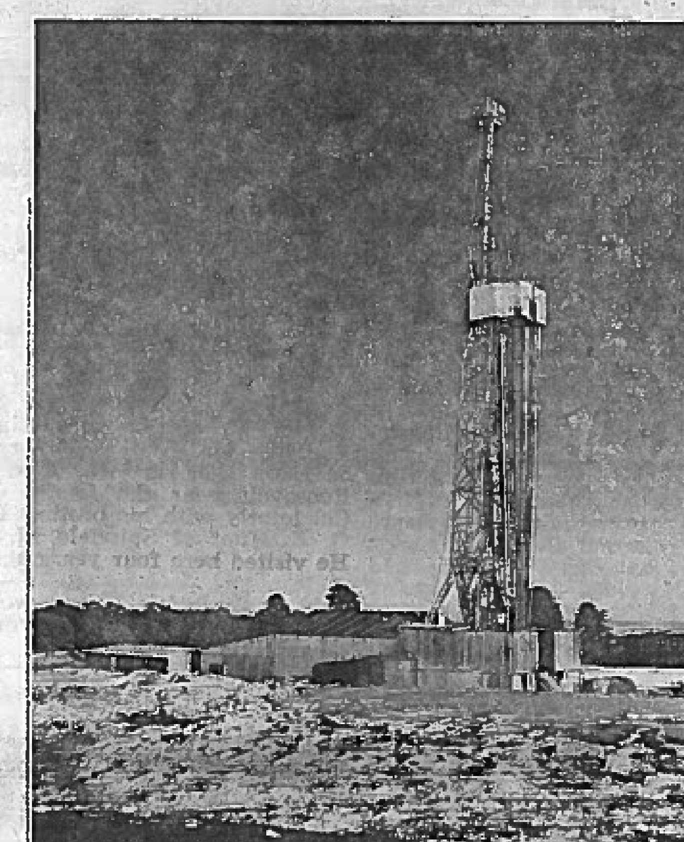
The camp is an eye-opener. Here, despite winter storms which lash the mesa, the men live and eat in snug white cabins complete with electricity and gas heat. The food is plentiful and the coffee pot is always full.

There's running water but it doesn't come the easy way. Last August a well was drilled to 800 feet seeking water. It was dry. On the wildcat itself one drill stem test after another was taken down to 2267 feet. Each time the tool was opened only drilling mud came out. All water for drilling must be hauled up the hill in trucks. Even powerful army six by sixes need a boost from the bulldozer to climb the hill. That's why it costs 80 cents a barrel for water on top of the hill and the contractor's big trucks run day and night.

Our geologist and engineer and the drillers living atop the mesa are real pioneers. No man ever spent the winter there before. Several times already storms have marooned the camp and stalled fuel and water trucks for as much as 30 hours until the hardworking bulldozers could clear the trail.



TO HOUSE the drilling crews it was necesary to build a snug camp of neat white cabins plus cook house and mess hall.



fine illustrations to run in the Vernal Express.

deep canyons and towering rock cliffs.

Nine Mile canyon. The road shares the breath-taking descent

ly park your car and climb in

men to hunt oil on the mesas.

EVERYTHING about the rig is housed in neat prefabricated metal buildings to shut out the winter storms which spawn on the mesa.

CARTER-BUILT road follows old sheep trail and clings to walls of Jack Canyon. Arrow points to water truck climbing to mesa.

THE MESA top is flat and almost park-like in appearance. Here a big truck rolls in with water for the drilling operations.

TOOL PUSHER HAYES, left, and Reid make final check on 10-inch pipe before having it cut off to install blow out preventer.

MOST POPULAR pastime for the hard-working crews is chow time in the mess hall. Former army cooks prepare all the meals.

WELDER D. C. ROBERTS, left, Charlie Reid, center, and Kenneth Hayes linger in the mess hall to discuss welding job.

LATER THAT night, in the cozy cabin he shares with the geologist, Reid handles paper work in connection with drilling well.

YOU NEED A BOOST FROM A BULLDOZER WHEN YOU CLIMB TO CARTER'S JACK CANYON TEST

EDITOR'S NOTE — We are grateful to the Carter Oil Company for permission to use this article and the loan of these fine illustrations to run in the Vernal Express.

Let's visit Carter's lonesomest wildcat, the No. 1 Canyon Government, perched atop a 7500-foot mesa and guarded by deep canyons and towering rock cliffs.

It's 88 rugged miles from Vernal, Utah, and you reach it by driving a road that tumbles wildly down to the floor of Nine Mile canyon. The road shares the breath-taking descent with a tiny creek which you cross and recross on the winter ice as you twist down one blind hairpin turn after another.

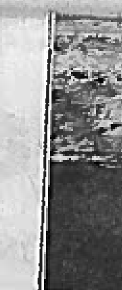
On the canyon floor you gladly park your car and climb in

mesa are real pioneers. No man ever spent the winter there before. Several times already storms have marooned the camp and stalled fuel and water trucks for as much as 30 hours until the hardworking bulldozers could clear the trail.

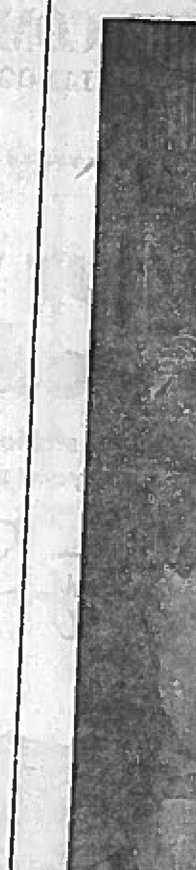
It takes big money and rugged men to hunt oil on the mesas.

CARTER-BUILT road follows old sheep trail and clings to walls of Jack Canyon. Arrow points to water truck climbing to mesa.

THE MESA top is flat and almost park-like in appearance. Here a big truck rolls in with water for the drilling operations.



EVERYTHI metal buildir the mesa.



TOOL PUSHE 10-inch pipe bef venter.

VE Jan 11, [illegible]

THE OIL OUTLOOK

C P. Vandruff Writes a Very Interesting Letter From Rangley

Rangley, Colo, Jan 6—The sight of the present well and where they are now working, is in what is known, in this neck of the woods, as Raven Basin, about four miles in a south westerly direction from Rangley

They have on the ground, an immense drilling machine, the drill itself weighing some 1,500 or 2,000 pounds The derrick is about 75 feet high Everything connected with the drilling, cleaning and hoisting is done with machinery, the simplicity and rapidity of which is truly astonishing

When they turn the immense drill loose on its homeward journey, the rapidity with which it drops some 1,100 feet, the depth at this writing, is astonishing

They are drilling in the Colorado shale which lies under the Mustang shale, and have struck a small seepage of oil and are able to dip up 2 gallons around the dump, each morning The product is a good quality of Petroleum with paraphine as a base and containing a small percent of Benzine.

There are three companies interested in making the experiment, two California companies and the Meeker Oil company, the latter being composed of the following well known and popular gentlemen Oldland Bros, C T Carney, D L Edwards, E E Fordham, F McCafferty, Thos Leonard, Jos W Rector

The outlook is considered as the very best, and most every one is anticipating a great stampede as soon as oil is struck in paying quantities, an occurrence that is hourly expected Mr Edwards himself having informed your humble servant that they confidently expect to encounter the oil in satisfactory quantities as soon as they get through the shale They only have a 1,200 cable, and should that be to short, another and longer one will immediately be ordered

Judging from appearences, I believe that they are in dead earnest and I believe myself that oil will be found If so I don't believe one need be excited as I believe the Ashley and most all of our bad land country offers just as favorable indications as this. These are the straight facts up to date.

Yours,

C P Vandruff.

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CAPITAL STOCK $1 000 000 00

Par Value $1 00 per share

Properties:

23 000 acres on the Vernal Monocline

Drilling:

About 6 miles southwest of Vernal

Objective:

The oil bearing sands of the ·satch formation of Tertiary age
Probable dep·h to producing horizon 900 feet

An illustrated report by E R Lovewell showing the great economic value of the oil possibilities of the Vernal Monocline and of the Uintah Basin as a whole will gladl· be mailed free to interested parties Write for it

WESTERN VENTURE CORP.

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Vernal Express - 1928

1964

Thermal recovery may brin

TODAY the American oil industry is in the process of a revolution of such magnitude that its implications are yet to be thoroughly understood.

This is the "quiet revolution" which will double the proved oil reserves of the world within the next 10 years and will more than triple those reserves by the year 2060. The quiet revolution is the engineering application of thermal recovery to low-gravity, viscous crude oils heretofore unrecoverable by conventional and secondary-recovery techniques and to tremendous reserves of bituminous sandstones.

Present state. U.S. recoverable crude-oil reserves at the beginning of 1963 stood at 31.4 billion bbl.

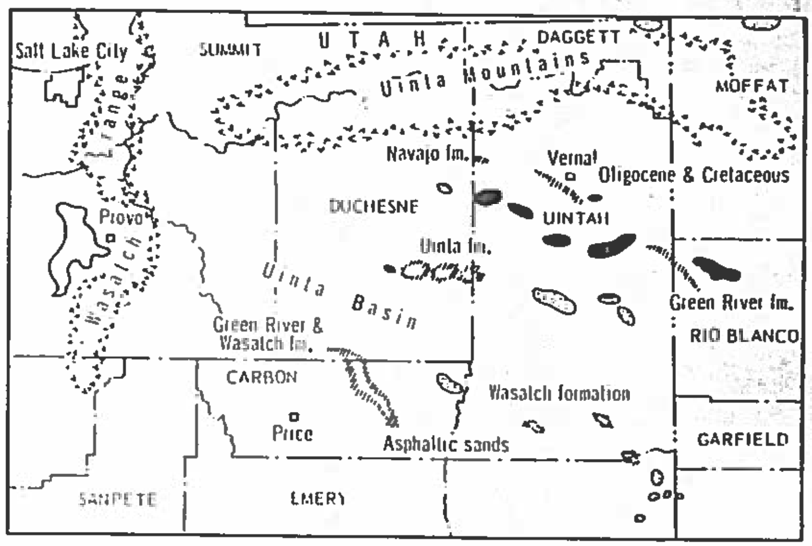
This reserve figure is computed on the basis of a recovery of 29% of the original oil in place. If the recovery rate could be increased to 60%, then we could double the present reserve estimates. Many oil companies now believe that this will be possible through the use of thermal-recovery methods, especially since more than one-third of these reserves exist in reservoirs at depths less than 3,000 ft where porosities and permeabilities tend to be high.

Thermal recovery. Thermal-recovery methods can be broken down into two categories: fireflooding and steam caustic injection systems.

The first known attempts to apply "in situ" combustion in the U.S. was in Oklahoma in 1952 by Magnolia and Sinclair, both working independently. Since then California has been the focal point for pilot-plant and experimental work on "fireflooding."

Since 1959, recently acquired data from the original pilot-plant work on fireflooding has given a tremendous boost to the thermal-recovery method which involves the use of steam injection into the reservoir. together with chemicals.

There are between 30 and 40 steam-drive projects under way in the U.S. now. Leases with low-gravity oil sands at relatively shallow depths are being acquired by major producers, infusing a new vigor into the oil industry.



SIGNIFICANT bituminous sandstones and bituminous limestone deposits are located inside or on the edges of Utah's Uinta basin. Sunnyside deposits in Carbon County contain the greatest reserves of such sands in the U.S. Fig. 1.

About the author...

ROBERT COVINGTON attended the University of Colorado, receiving the BA degree in geology in 1947. He attended the Colorado School of Mines for 1 year before taking a position as geologist with Carter Oil Co. in 1948. In 1949 he worked with the Rotary Engineering Co. as well-logging engineer and from 1950-'54 with Johnson & Bunn as geologist. In 1954 he became a consultant in partnership with Craig Caldwell. Covington is a member of the AAPG, Intermountain Association of Petroleum Geologists, and Sigma Gamma Epsilon.

Utah's bituminous sandstones. There are two areas in Utah which have bituminous sandstones of economic significance with respect to thermal-recovery methods of oil production.

The most important area is within the Uinta basin in northeastern Utah. This area lies in Uintah, Duchesne, and Carbon counties. The second area is the Green River Desert in Central Utah's Sevier, Wayne, and Garfield counties.

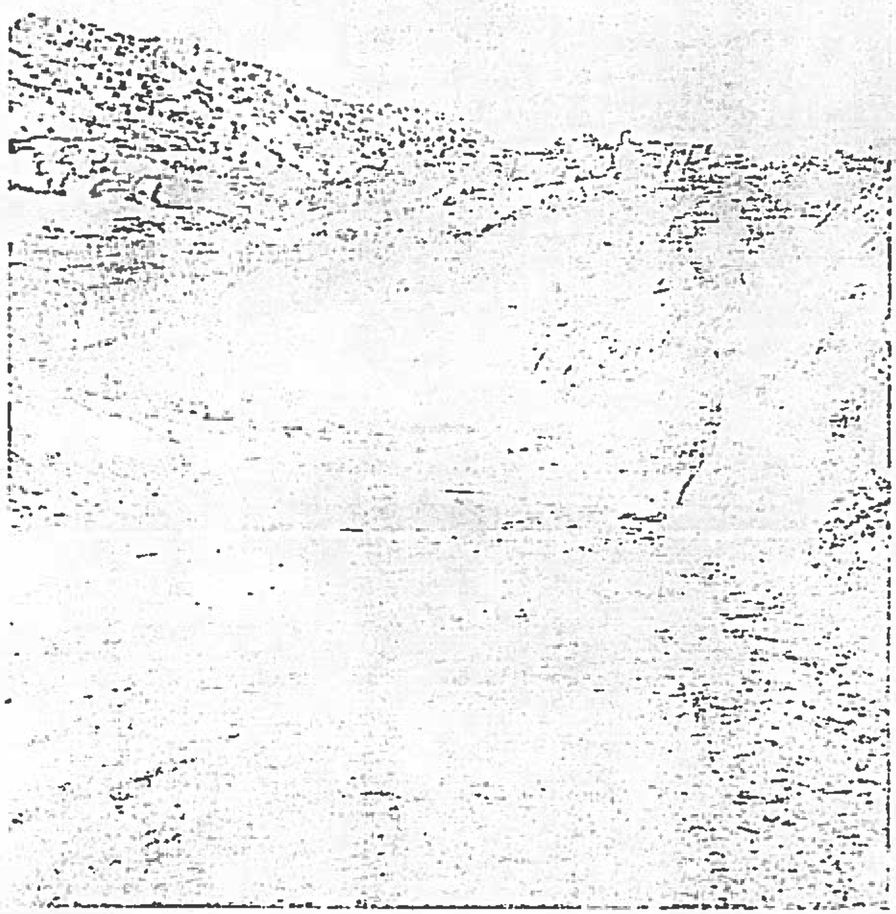
The most important deposit in the Uinta basin lies in the Sunnyside area of Carbon County. Next in order of importance are the asphaltic sandstones of the Asphalt Ridge area, the Whiterocks Canyon area, the Poor Springs area, Chapita Wells, and the Dragon-Asphalt Wash area, all in Uintah County. Other areas of lesser importance are the Deep Creek area, North Tabiona area, Lake Fork-Yellowstone River area, South Myton Bench area, Indian Canyon area, and the Raven Ridge area.

Sunnyside

The Sunnyside deposits are located in 13 and 14 south, 13 and 14 east, Carbon County. The tar sand is exposed throughout a stratagraphic interval of 1,000 ft and occurs in the Eocene Wasatch and lower Green River formations. The outcrop is along a northeast to north-trending escarpment which is the topographic expression of the south flank of the Uinta basin, with the formations dipping north to northeast from 3°-10°.

Estimates of measured and indicated reserves range from 475,000,000 to 500,000,000 bbl. If recovery rates are as high as 70% of total reserves, the recoverable oil should approach 300,000,000 bbl. The Sunnyside reserves are adequate for large-scale strip mining, in part.

Over one-half of the total reserves contain at least 9% bitumen by weight. With reference to reservoir data, the bituminous sandstones range from 25-30% by volume. Permeability ranges from 150-650 md. Little or no water is present interstitially. The bitumen has a low sulfur content and contains a high percentage of aromatic hydrocarbons and resins and would thus make good feedstock for motor oils, lubricants, petroleum coke, and petrochemicals. The major drawback to the area from the point of view of thermal recovery is the lack of a large source of fresh water for steam injection. Within the past year, the deposits have been core-drilled by Shell Oil Co. and Atlantic Refining Co.



AT COUNTY PIT, Uintah County, after the "hardpan" on top of the Rim Rock sand is removed by blasting and ripping, the bulk of the sandstone can be mined with a dozer and ripper.

Asphalt Ridge

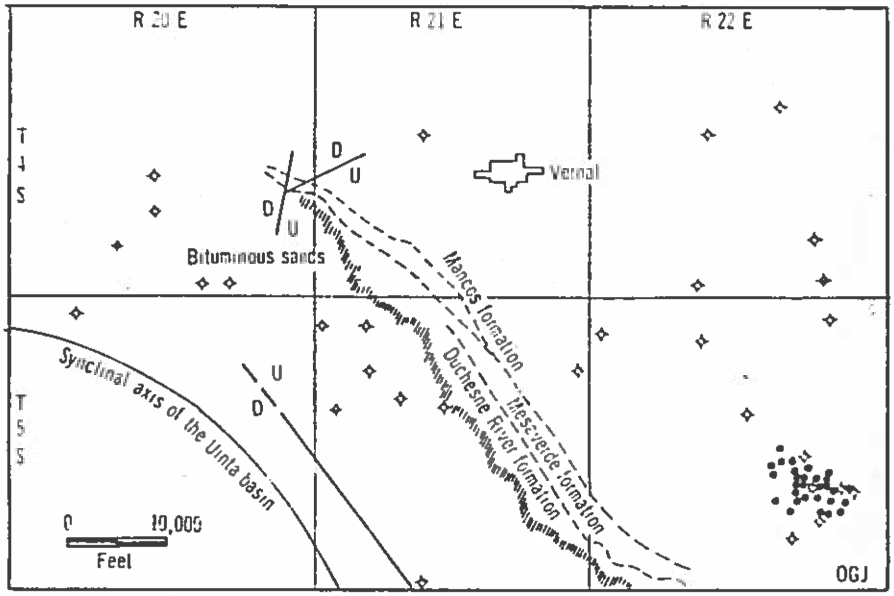
The bituminous sandstones of the Asphalt Ridge area lie 3-4 miles west of Vernal on Highway 40.

The deposit is exposed along a series of northwest-southeast-trending ridges and hogbacks. The area extends about 11 miles in length and is several miles in width. Proved reserves are 475,000,000 cu yd of material containing 250,000,000 bbl of oil. Probable reserves are about 500,000,000 bbl, with additional reserves indicated in a downdip, basinward direction.

The bitumen is in the Cretaceous Asphalt Ridge and Rim Rock sandstones of the Mesaverde formation and in the unconformably overlying Eocene Duchesne River formation. The richest impregnation lies along and close to unconformities. The oil has an API gravity of 10° and is extremely low in sulfur content. The Cretaceous sand which is saturated is not as indurated as the sands at Sunnyside. In the County Pit area, for example, after the "hardpan" on top of the Rim Rock sand is removed by blasting and ripping, the bulk of the sandstone can be mined with a dozer and ripper.

Since the two Cretaceous sands which are saturated are fairly uniform in saturation, water content, thickness, porosity, permeability, and in areal extent, the thermal-recovery techniques can be used with a high degree of success. With reference to the saturation in the beds of the Duchesne River formation, problems will arise when using stream or fireflooding due to the highly erratic depositional pattern of the individual beds, lower porosities and permeabilities, high silt content, and a clay matrix.

An ample supply of excellent



GEOLOGIC MAP of Asphalt Ridge area, Uintah County.

quality water is available for both mining and for steamflooding operations in the Asphalt Ridge area. The water should require little or no treatment. Electricity is also available, as is natural gas. A crude-oil pipeline lies 14 miles south. Adequate housing and supply facilities are available at Vernal. The bitumen content within the Cretaceous sands range from a few gallons to as high as 53 gal/cu yd and probably averages 38 gal/cu yd. Porosities range from a low of 6 to as high as 38% and average about 34%. Water saturations range from 1 to as high as 20 gal/cu yd of material and average 3 gal/cu yd. Sand which averages 30 gal of bitumen per cubic yard or less will probably produce 6 gal water per cubic yard. The sands are noticeably free of sulfur, averaging about 0.09%. The sand grains are water-wet, a factor which makes efficient extraction possible.

During 1954 and 1955, detailed mapping, core drilling, core analysis and engineering studies were made of certain patented and unpatented mining claims in the Asphalt Ridge area by the author for Knickerbocker Investment Co. and the Barnes Engineering Co. of New York and Los Angeles. Various mining methods of extraction were explored. These properties were later turned to Sohio Petroleum Co. and more detailed work was done on them, including the first in situ fireflood in Utah. The fireflood was done within the Asphalt Ridge sandstone member of the Mesaverde, and while the results are not available, it is believed that they were extremely encouraging.

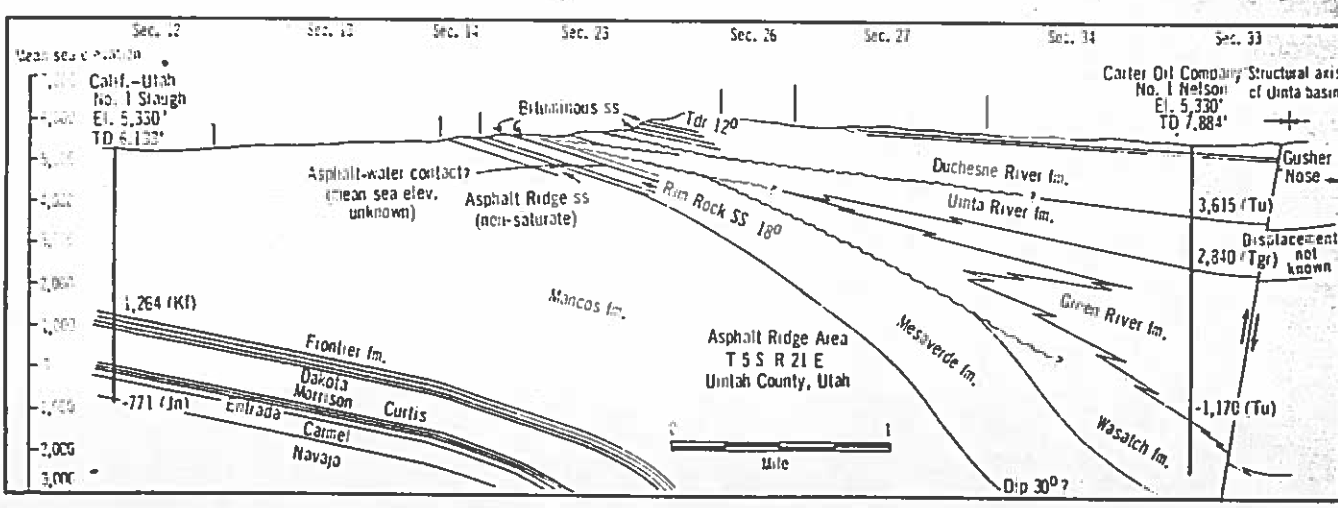
Detailed mapping and sampling was also done in the area by Shell, Husky Oil Co., and lately by the State of Utah, since the state is applying for a part of this acreage as in lieu lands from the federal Government.

Shell is now core drilling in the Asphalt Ridge area and other companies have exploration work planned there. Unitah County is still mining asphalt at the County Pit tract for local use. The product is so rich that it is mixed with dry sand and is hauled by dump truck and rolled cold on road and driveways. The material makes an excellent surfacing material as the bitumen is extremely tenacious and holds together well in hot weather. It is also very resistant to wear.

Whiterocks

The bituminous sandstones of the Whiterocks area are in 2 north, 1 east and 1 west, USM, 20 miles northwest of Vernal, along the mountain front on the south flank of Uinta Mountains in northeastern Utah.

The bitumen fills the pore spaces and coats the sand grains of the Jurassic Navajo sandstone. This formation strikes northeast-southwest and dips 60° to the southeast; it has a total thickness in the area of about 1,000 ft and the tar saturation within the tilted formation extends to a depth of about 550 ft. The proved reserves of this deposit, based upon core drilling, are 125,000,000 bbl oil in place, with possible additional reserves of another



ASPHALT SATURATION in Duchesne River formation is very definitely related to the unconformities present in the area. Cross profile of Asphalt Ridge area. Fig. 3.

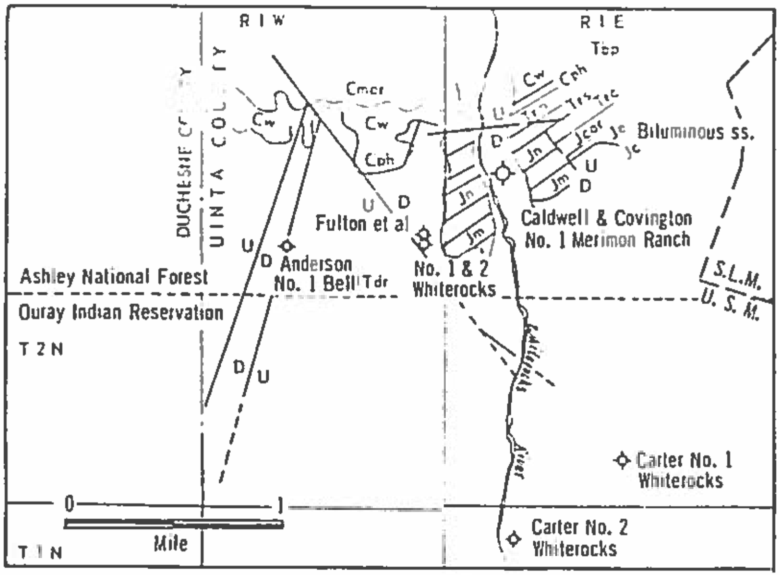
120,000,000 bbl to the northeast and to the southwest of Whiterocks Canyon. Federal oil and gas leases on both sides of the fee lands (which lie in the center of the deposit) are held by Shell. This firm has just completed exploratory core drilling on the extreme northeast edge of the prospect.

The Navajo sandstone is a clean, fine - to - medium - grain sand with porosities ranging from 26-39%. Permeabilities range from 10 to 127 md. Water saturation in the bituminous zones ranges from 34 to 82% and averages 44%. Oil saturation ranges from 13 to 33%. The base of the zone of bitumen saturation within the sand body drops 375 ft in elevation from the east side of Whiterocks River to the southwest, along strike. It also drops 1,000 ft/mile in a southeast direction, perpendicular to the strike of the beds. Several tar seeps or brea occur on the west side of the Whiterocks River. They are related to fracturing within the Navajo. With regard to the bitumen saturation within the Navajo sand body, there is no increase or decrease of any significance from the surface downward to the bitumen-water contact.

Although the Tertiary Green River formation has been proposed as a source for the bitumen in the eolian sand-dune Navajo formation, there is no saturation along the unconformity between the Navajo and the overlying Duchesne River formation, along which the bitumen or oil would have had to migrate from the downdip, basinward-lying Green River beds. There were no significant shows of oil or dead-oil staining or bituminous sandstones found in the Green River formation at 2 Whiterocks drilled by Carter Oil Co. in 6-1n-1e, USM.

Structural conditions suggest a deeper, Paleozoic Weber source. Overburden on fee land in Whiterocks Canyon ranges from 10-40 ft and on the benches southwest and northeast of the river ranges from 600-1,000 ft or more. The oil has an API gravity of 12° and is low in sulfur.

The relative uniformity of bitumen saturation of the Navajo sandstone of the Whiterocks area makes this prospect extremely attractive from the standpoint of either strip mining or thermal recovery. Due to its thickness and the depth of sat-



ASPHALT SATURATION OCCURS in the Jurassic Navajo sandstone which has a total thickness of more than 1,000 ft in the Whiterocks area. Geologic map of area. Fig. 4.

uration, this deposit has the unique distinction of having perhaps the greatest recoverable reserves of oil of any bituminous sandstone on the continent. Recoverable reserves approach 132.000 bbl/acre, while the Athabasca tar sands have recoverable reserves of 90,000 bbl/acre; of course, the areal extent of the latter is many times greater.

Green River Desert

An active lease play has recently developed in the Green River Desert of Central Utah.

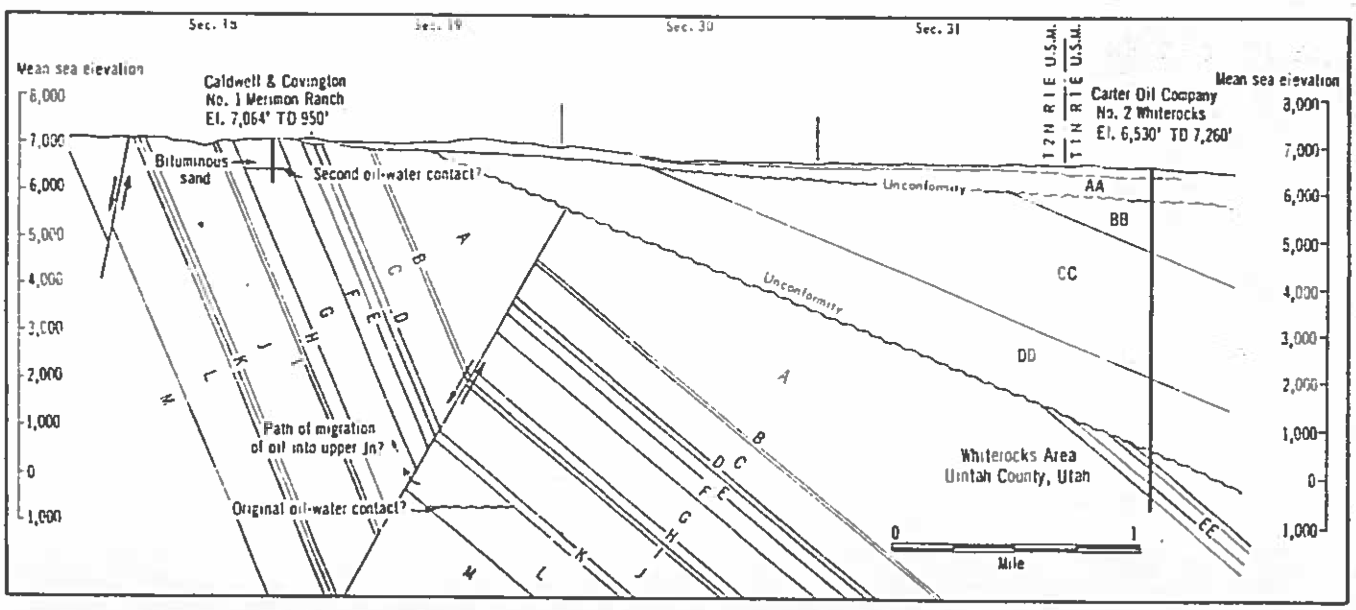
Total area involved in the play includes Townships 24 and 31 south, Ranges 12 and 17 east. Shell drilled stratigraphic core tests early this year to the west of this play on the San Rafael swell, but have recently dropped this particular acreage. They have now leased southwest of the swell toward Green River. Other companies holding acreage on this play which involves bituminous sand within the Coconino formation at depths ranging from 1,700-2,600 ft are: Pure, Union, Amax, Sinclair, Richfield, Forest, Sun, and Daniel Meyer and John Osmond.

An example of the type of deposit under consideration for steam injection in this area is a play centered around the old Standard Oil Co. of California 1 Moonshine Wash in 32-25s-15e. This hole was cored in the Coconino and recovered over 200 ft of bitumen or dead oil saturation at a depth ranging from 2,000 to 2,200 ft. Core analysis showed the permeabilities to average 50 md; porosity averaged 15%. Oil saturation within the zone averaged 44% while water saturations averaged 12%. Table 1 shows the saturations and areal extent of the future thermal recovery potential of this area from the Coconino sandstone.

Legal problems

There is a legal conflict between the holders of oil and gas leases on federal lands and the owners of federal bituminous sandstone leases.

In the Sunnyside area in the fall of 1963 the Bureau of Land Management held competitive bidding on federal lands. Bidding prices were depressed since the notice was so short that few companies were given sufficient time to examine and evaluate the leases which were put up for bid. Further, oil com-



A, Mancos; B, Frontier; C, Morrison; D, Curtis; E, Entrada; F, Carmel; G, Navajo; H, Chinle; I, Shinarump; J, Moenkopi; K, Phosphoria; L, Weber; M, Morgan. AA, Duchesne River; BB, Uinta River; CC, Green River; DD, Wasatch; EE, Mesaverde.

THE AUTHOR THINKS that the oil is of Pennsylvanian age and migrated from the Weber at a point where the Navajo sandstone is faulted against the Weber. Cross profile of Whiterocks area. Fig. 5.

panies holding oil and gas leases under the lands put up for bituminous sandstone lease bid claimed, and perhaps with some justification, that their leases entitled them to produce the oil from the bituminous sands if they could do it through secondary-recovery techniques. (i.e. thermal recovery). With regard to the State of Utah, the oil and gas lease issued specifically excludes any solid hydrocarbon which it is necessary to remove through the use of heat, further stipulates that the lease only refers to oil in its native liquid state, gas, and drip gas. Before any commercial development can take place on bituminous sands under federal lands it will be necessary that the legal problems involved be clarified.

Thermal-recovery potential from Coconino

Table 1

Well name and number	Location	Saturation (ft)	Depth
Superior	2-24s-13e	100	2,200
Carter	21-24s-14e	45	2,295
Shell 1	19-24s-16e	43	2,552
Pan American	24-25s-12e	20	2,400
Texaco	14-25s-13e	120	2,176
Texaco 2	22-25s-14e	150	2,042
Standard Cal 1 Moonshine Wash Unit	32-25s-15e	200	2,250
LaRuae	17-26s-13e	(?)	*(?)
Tidewater	25-26s-13e	75	2,560
Carter	9-27s-12e	30	2,700
Superior	30-27s-13e	120	2,316
Texaco	32-27s-15e	50	2,320
Carter 2	35-27s-15e	100	2,000
Murphy 4	14-28s-14e	(*)	†2,300
Tennessee Gas Trans.	33-29s-12e	100	2,260
Phillips	27-30s-16e	150	1,394
Tennessee Gas Trans.	4-31s-12e	100	2,274
Standard California	13-31s-13e	50	513
Superior	19-31s-15e	(*)	(?)
Mobil	33-30½s-16e	140	1,462

*Shows. †Approximate.

Conclusion

The future of thermal recovery from formerly "depleted" reservoirs, from the vast reserves of bituminous sands throughout the United States and from reservoirs with low-energy and low-gravity, viscous crudes is tremendous.

The oil industry is entering a cycle which should rejuvenate the independent, stimulate major company action, and improve the economy of the industry. Judicious use of the system, when combined with American ingenuity, will be a most stimulating effect upon the oil business.

One last mention of the possible use of the thermal systems would be in fractured shale reservoirs such as those in the Ute Tribal Roosevelt field where communication between wells within the fractured Green River shale reservoir has been established between wells more than 1 mile apart.

There are tremendous possibilities for such a system, which, when combined with the natural gas and oil within the fracture system could lead to extremely high recoveries of oil.

This should lead to the oil industry's taking another look at such fractured reservoir fields such as Gusher, Bluebell, Joseph Smith, County, and the Ute tribe Duchesne fields, all in the Unit basin. Further, the industry should consider the effect of using this system as a secondary-recovery technique in such fields where high-pour-point crudes are produced such as at the Red Wash field, Wonsits, Brennan Bottoms, and others. **End**

Ohio's Cambrian search spreads out

OHIO'S Cambrian search is spreading out and away from Morrow County. Drillers are moving north, south, and west from Trempealeau fields in the central portion of the state.

New permits to drill have been issued for one well in Sandusky County, one in Adams County, and two in Miami County. Of the 32 new permits issued during the week of Nov. 6, 15 were for wildcat tests.

Emme Oil Co. will drill the Sandusky County wildcat at 2 J. Cunningham in SE 29, Ballville Township. Location is 6 miles east of Trenton gas production in an old area. Mount Gilead field lies 40 miles southeast.

Cabot Corp. will drill a Cambrian test at 1 A. Bailey in southern Ohio's Adams County at 1 A. Bailey in the VM Survey 2663, Jerferson Township. This one is 90 miles south of Delaware County oil.

Robert C. Pettit will drill to basement in Miami County's Staunton Township. The 1 M. D. Knoop is to be in NW 4 South; the 1 Trojan Farms in NW 15. Both wells lie 65 miles southwest of Delaware field, a Cambrian producer in Delaware County.

Ten-well slate. Juniper Oil & Gas Co. of Denver will drill 10 wells to look for Cambrian oil in south Bloomfield Township, Morrow County.

Operator is moving in cable tools to drill 1 Hulse in SE 9 and 1 Morris Martin, Jr., in SW 15. Armstrong Drilling Co. has contract for these. These locations were selected on basis of gravity and seismic work. Three more wells will be drilled soon and five early in 1965. The Hulse and Martin leases are part of 5,000 acres that the company leased in the township. An additional 3,000 acres are under options. Juniper has 4,000 acres more leased in scattered areas of Central Ohio. The Denver company plans further work after the 10-well program is finished up.

Ohio releases new geological bulletins

The Department of Natural Resources, Division of Geological Survey, State of Ohio, Columbus, has released two new geological bulletins.

Report of Investigations No. 51 deals with the geology of the upper Niagaran and Cayugan stratigraphy of northeastern Ohio and adjacent areas. It is authored by John R. Ulteig.

Report of Investigations No. 52,

Dec 11, 1925

Two Big Oil Companies Consolidate to Drill Structures in Field Near Vernal

The consolidation of the Border Oil company of Denver, Colo., and the Maud-Ellen Oil company of Pocatello and Blackfoot, Idaho, which occured in Vernal last week, will assure the drilling of the dome 8 miles west of Vernal and the Neal dome, 7 miles northwest of this city. Officers of both companies and geologists are here making arrangements to start work immediately, according to F. J. S. Sur, geologist and local manager for the new company. The first well to be drilled will be the Neal dome.

Joseph Sloan, geologist of Wyoming and John McGee of Tulsa, Okla., and New Mexico, made a careful inspection of the possibilities for oil at these two locations and verified Mr. Sur's report, that they were two of the most promising structures in the country.

With the bringing in of a well at Moab, south of Vernal, added enthusiasm will be given to the drilling of these wells.

Two Wells Will Be Drilled Seven Miles Southwest of Vernal by Nevada Co

The Western Venture corporation incorporated under the laws of Nevada with principal office in Reno and branch offices in Vernal and Los Angeles has acquired all holdings of the Border Oil company, formerly operating in Uintah county These holdings are comprised of three oil drilling contracts and applications for government oil and gas permits totaling about 750 acres, located seven miles southwest of Vernal The corporation also has holdings of 40 acres of asphaltum deposits under contract adjoining the 7600 acres mentioned in the preceding 300 acres on the Middleton structure 10 miles east of Vernal and a test now down 500 feet located seven miles west of Vernal

The corporation has other holdings in Uintah and Duchesne counties, embracing the Krumvieda drilling contract, containing 2560 acres five miles southwest of Vernal, a drilling contract on the Don Hegne tract of 2475 acres, nine miles west of Vernal, lease on 80 acres of prospective gilsonite land in Uintah county, lease on a group of gilsonite claims near Myton, option to purchase 800 acres of selected asphaltum claims located in Uintah county The total holdings of the corporation in Uintah and Duchesne counties embrace aproximately 13,000 acres

The corporation also has preferential rights to lease on a one-eighth royalty basis up to 2000 acres of potential oil and gas land near Ventura, Calif Much of this acreage is well located right in line with the present producing field and should prove of great value The Ventura oil field is producing thousands of barrels of oil daily and many new wells are being drilled The lands are to be selected by F J S Sur president of the corporation and by Frank E Davis, vice presiden In addition the corporation has a lease on 160 acres of oil and gas land in Morgan County Colorado

A crew is now installing a Armstrong rig on the holdings seven miles southwest of Vernal to complete a test now 1300 feet deep This test is within 400 feet of the well in which a production of 240 barrels daily was secured some years ago by the old Uintah Development company A Star rig is being shipped in from Los Angeles to drill a second test on holdings in the same territory

The officers of the Western Venture company are F J S Sur of Vernal president Frank E Davis of Los Angeles Calif vice president LeRoy F Pike of Reno Nevada second vice president James O Stewart of New York secretary and treasurer, V A Wilder of Reno Nevada assistant secretary The corporation is capitalized at $1 000 000 divided into one million shares of a par value of $1 00 No stock is on the market and the corporation is amply financed to prosecute the development work undertaken in drilling oil and gas tests, as well as other activities

Mr Sur the president of the corporation is a geologist of wide experience in the United States and other countries and for the past two and one half years he has resided in Vernal while assembling the geological data that resulted in the organization of the corporation He has made many inspection trips to all sections of the Uintah basin and to other parts of the state Mr Davis vice president is an experienced mining engineer and Mr Stewart secretary and treasurer is a successful developer of oil and mining properties in various parts of the United States

Vernal Express
May 6, 1927

VE July 21, 1916

UINTAH BASIN CAN HELP WORLD'S OIL SHORTAGE

United States Geological Survey Members Declare Basin's Possibilities Are Enormous—Say That Basin May Be The Salvation of Oil Shortage— All That Is Needed Is Development.

Experiments which are being conducted by members of the United States geological survey with deposits of gilsonite and oil bearing shale in the Uintah Basin have already demonstrated that some of the shales will yield as much as 50 barrels of oil to the ton J E. Pettit, state coal mine inspector, who has been on a tour of inspection over the Basin, vouches for this statement It opens up a heretofore comparatively unknown industry in the Basin which can be developed into one of the leading industries

Fifty barrels of oil to the ton is enough to make this business highly profitable Besides this oil shale there are numerous oil wells which experts have declared ought to prove very valuable. This oil is valuable in the crude state John T. Pope recently presented the Express with a five gallon can of crude oil, direct from the well near Dragon. This week it was utilized in oiling the floor of the Express office It has proved to be almost as good as the high priced floor oils and dressings.

Mr Pettit said another important discovery is that reduction of the shale gives off a considerable quantity of highly explosive gas and the government experts are working out a process whereby that gas can be utilized to furnish the power for the distillation process If a shortage should ever occur in the world's supply of oil and gasoline, Mr. Pettit declared the Uintah basin will be in a position to make up a considerable portion of the shortage, as the oil bearing shales are deposited eighteen feet deep over a country 175 miles long and from fifty to sixty miles wide

The gilsonite mines in the Basin are not working full force just at present, Mr Pettit said, but the production for the first six months of the fiscal year will be more than that of the first six months of last year The total production for last year was 35,000 tons, valued at approximately $40 per ton.

NOV 30, 1917

Uintah Basin In Utah Great Undeveloped Oil Region, Says Dr. Day

Unobtrusively but steadily and increasingly, there has set in an oil development in the Uintah basin, Utah, which has attracted one or more of the companies of the Standard Oil group, Eastern and California capitalists and practical oil operators of the Mid-Continent fields says the Denver Post, and which will in time according to geologists among them Dr David T Day of the federal bureau of mines, undoubtedly reveal one of the greatest oil fields ever known

Dr Day has stated that this district is "the greatest undeveloped oil region in the world," and he believes, as do other geologists that beneath the vast deposits of gilsonite for which this section is world-famous, there will be found a lake or pool of petroleum of the highest grade, which will astonish the world That the government agrees with this scientist is proved conclusively by the fact that an immense area has been withdrawn from entry, though this great tract is a mere patch upon the entire mineralized district

Several concerns are drilling and others have completed wells which yield from two to fifty five barrels of high grade crude oil of parrafin base These wells are completed at from 500 to 1,200 feet It is estimated that at a depth of from 2,500 to 3 500 feet a rich lower sand will be found which coincides with the rich sands of the Wyoming oil areas

J M. Russell, president of the Commercial club of Roosevelt, Utah, who is in Denver on business and who is interested in two companies which have been financed to develop large tracts held under lease yesterday said that next spring he expected to witness a big drilling campaign over an immense area and that at least one of the Standard Oil groups would be represented in the work.

"We do not know which of the Standard Oil companies is in the field now," said Mr Russell, "but there are a number of experts out our way, who are undoubtedly acting for concerns which have the best financial backing These men are leasing immense tracts and one of our companies has turned over to them more than 40,000 acres One group of men who have taken leases is composed of California oil men another has its headquarters in Kansas City and still others are known to represent some of the big bankers of New York

"When I tell you that the Uintah basin covers an area of seventy-five by 175 miles, most of it underlaid by immense deposits of hydro carbons such as gilsonite, you can see that the possibilities for discovering oil in great quantities are enormous The two wells that have been brought in show good production of a high grade light oil, similar to that of the Wyoming fields Remoteness from railroad communication is all that has held us back, and that obstacle is sure to be overcome as soon as it is proved that this region is one vast oil pool Tests are to be made in the next year to seek for the lower sands, which geologists tell us should be very prolific It may be that the drill will have to be sent down 4,000 feet, for some of our gilsonite beds are known to be 3 500 feet in thickness However, from the character of the people who are taking an interest in the development, I should say that deep tests will surely be made in the near future

This gilsonite, according to the United States geological survey, can be put to 160 commercial uses Eighty thousand tons of it were shipped to Germany alone in a few years preceding the war, and this raw stuff, which scientists say is a sort of oxidized petroleum, was converted by the clever Germans into the dyestuffs which gave that country millions of revenue every year and established a monoply in that line for the Teutons It is the geological theory that underneath this oxidized material there still exists an immense reservoir of petroleum, and if this theory is tenable we are going to see the Uintah basin developed into one of the greatest, if not the greatest oil fields the world has ever heard of."

April 12, 1918

Uintah Is Center of Great Oil and Shale Movement

Extraordinary activity has been displayed all over the Uintah basin in Utah the past year in the locating on oil anticlines, and oil shale and oil sand lands acquirements It is roughly estimated that more than 375,000 acres have been located. One of the western counties has located more than 100,000 acres It is expected that before the present year has expired that considerable work in the way of new drilling for oil will be started, and that a number of shale and sands plants may be created and in operation

Among the companies preparing to begin work at an early date, is the Utah Consolidated Oil Co. This company, recentl organized, controls about 20 000 acres of oil and shale lands in the basin. It has a strong board of directors, the members of which are enthused with the purpose of developing Utah oil lands

Jos R Murdock, the president of the company states that during the many years he has been familiar with the Uintah section as a colonizer and in the livestock business, the oil possibilities have appealed to him strongly. He states "For this reason, I have subscribed both money and property in the new company and I feel sure the company will meet' with genuine success Personally, I should greatly dislike seeing Utah become a great oil state without my having taken part in making it so"

Less enthusiasm over the possibilities of the Uintah basin for oil development is Joseph B Keeler, vice president of the Utah Consolidated Oil c ompany. Mr. Keeler says "I believe that the Uintah section is desined to become a leading oil field of the west I believe it so strongly that I have subscribed my own money for stock in the company of which I am vice president, and which was forced to develop this section"

J W Musser, who assisted in procuring the various holdings of the Utah Consolidated Oil Co, states that he has spent a number of years in that section and is convinced that a large production of oil will be developed there Mr Musser states that near his company's property in the Vernal district, and dipping directly under the property is a large outcrop of saturated oil sands extending several miles to the northwest and southeast Mr Musser says his company's shale lands, near the railroad at Waton, are among the richest to be found These lands are near the property of the Emerald Oil company which has drilled 15 wells at shallow depth the last bringing in an estimated production of 50 barrels

D H Gustaves consulting engineer of the compa. has improvised a small reduction plant which he operates at the company's offices —Deseret News

Mar 18, 1921

Uintah Oil Field Future Bright

Drilling With Two Rigs Planned for Development of Rado Association

Developments of remarkable interest should occur during the summer in the Uintah oil field, according ot the prediction of Lyman D. Pettit, president and general manager of the Rado association, which holds near Dragon, under the old placer mining law, a total of 4960 acres in the district. Conditions indicating the existence of oil in commercial quantity could hardly be more favorable than those existing in the Uintah field, said Mr. Pettit the other day. So favorable are the indications that a number of subsidiary companies of large oil drilling immediately or making reconnaissances right now. To the south of the Rado association's property the Kasoming Oil company, says Mr Pettit, is putting down a twelve-inch hole. A large-sized rig has been erected and all preparations of the company point to a thorough drilling of the structure.

Near or on the holdings of the Rado association oil sands outcrop in several places, according to Mr Pettit. Moreover, the structure is such that all conditions indicate that substantial production should follow the drilling of the three oil sands which lie at a comparatively shallow depth. The claims of the Rado association join on the north and the east the property of the Urado Oil company, which has one of the strangest oil flows in the world. Out of a tunnel run into the sidehill to pierce an oil sand exposed on the hillside above, petroleum is running. This oil is said to be one of the highest-grade petroleums in the world. Right at present every tank of the Urado Oil company is full, and John Pope, president of the company, is at the property, according to Mr. Pettit, attending to the work attendant upon the resumption of activities at the refinery.

Up to date no drilling work has been done by the Rado association. All of the annual assessment work has been performed by the building of roads, so that drilling rigs can be easily hauled on to the different claims. However, at least two rigs, and possibly three, will be drilling on the property within thirty days, according to Mr. Pettit. Already the company has made arrangements whereby two outfits have contracted to start drilling operations within thirty days A third contract of a similar nature has almost been closed.

With regard to timber, water and transportation, the property is unusually well situated, says Mr. Pettit. The gilsonite narrow-gauge railroad from Mack to Watson runs right through the center of Rado ground Adequate water for all purposes can be developed right on the property at little or no expense, and there is enough timber for all ordinary purposes, it is said.

Mr Pettit, one of the oldest of the placer mining men in the west, has mined in mining districts scattered over the territory stretching from the Comstock lode of Virginia City, Nev., to the Bering sea in Alaska. During the last four years, however, the greater part of his time has been devoted to the oil business. Soon after his return from Alaska in 1901 he became interested in the manufacture of a friction-proof grease After eight years of intensive work, he invented a friction-proof grease which is being manufactured from petroleum products on a large scale in several places.

Officers and directors of the company are as follows: Lyman D. Pettit, president and general manager; D N Swayze, vice president; F. R. Morgan, secretary, Thomas Gavin, C E Parks, Mono S. Iba and P. J. O'Carroll —Tribune

VE Feb 14, 1908

UINTAH OIL FIELDS.

Uintah Pioneer Oil Company Organized By Nevada Men with $1,000,000 Capitalization.

Something like one hundred and thirty-six placer locations have recently been made near the half way hollow, between Vernal and Ft. Duchesne by L. L. Mushett, W. S. Johnson, W. O. LaGrange, J. S Wilder, John T. Pope, D. D. Houtz, and W. M. Hunger. It is given out that these men propose to prospect for oil in the near future. A number of them are also interested in the Uintah Pioneer Oil company lately organized. It is claimed that company has acquired a large acreage of ground near the property of the Tunnel Oil company and that a plant of machinery is soon to be installed and that oil wells will be put down.

The Inter-Mountain Republican of Salt Lake has been filling its columns of late with what it calls exclusive articles about the wonderful explotiations by Nevada and Utah men in the Uintah oil fields and of the extensive development work being carried on. In its issue of Jan. 26 the Republican printed two or three columns, which would lead the public to believe that there have been many new discoveries of oil fields and that a rush to the scene of the excitement may be expected at any time. The people of this county believe that there is much oil here but up to date the development has been on a small scale and the output on a yet smaller scale. Such article as those printed by the Republican tend to remind one of the "wild cats" We are of the opinion that they will not do this section of the country much good. The location of the placer ground in the half way hollow is not a startling piece of information. That same ground has probably been located many times before. It has been said that these gentlemen have located 23,000,000 acres of ground in that section.

In its issue of February 6 the Republican has this to say:

"As a sequel to the story printed exclusively in this newspaper a few days ago giving the history of the Tunnel Oil company, a Utah concern that has brought in a producing well and has built and placed in operation a refinery, the product of which is sold to four railroad companies—all this having been accomplished without previous exploitation in the press—the Tonapah Sun tells of the incorporating by Nevada and Utah men of the Uintah Pioneer Oil company, capitalised for 1,000,000 shares of the par value of $1 each. The officers and directors of the company are W. S. Johnson, president; John T. Pope, president of the Tunnel Oil com-pany, vice president; J. M. Gregory, secretary; L. L. Mushett, treasurer, and James Richardson."

In speaking of the incorporation of the Uintah Pioneer Oil company the Tonapah Sun says:

"The company has control of 800 acres adjoining the ground of the Tunnel Oil company, which at the present time is producing 2,000 gallons of refined oil daily. W. O. LaGrange, expert of the company, is now on the ground superintending the drilling of a well. He says that there can be no doubt that oil will be struck, of the character as that found on the adjacent ground, for the formation is identical and the seepage marked.

"The oil from the Tunnel Oil company's refinery is now sold to the Denver and Rio Grande, Salt Lake, Oregon Short Line and Uintah railroads for thirty cents a gallon and is said to be superior to anything the Standard produces. The Standard wished to take the entire product for $1.15 a barrel, but Pope would not sell. The oil has many uses and is considered the highest class lubricating oil. One of the strong recommendations for it is that the Interlocking Switch company uses it entirely.

"Samuel Newhouse and other Salt Lake capitalists, it is learned, wanted to get in on the deal, but Pope kept things to himself until Tonapah men came along. Messrs. Johnson and Mushett had intended to keep the thing quiet and say nothing until they had their wells down, but the story leaked out. It is their intention to go ahead and prosecute the development of the territory. They are both very much elated with their holdings and are sanguine that they will be able to reap a great financial harvest".

Mar 4, 1921

UINTAH OIL WELL OUTPUT GROWS

Entire Production of Gasoline and Kerosene Is Marketed in the Valley.

Production of the Emerald Oil company, a Vernal corporation, for the year 1920 totaled 14,645 barrels. The entire production is handled by the Raven Oil & Refining company of California, which contracted for the output two years ago, with a minimum of 15,000 barrels a year. Last year's production of gasoline and kerosene was all marketed in the Uintah basin. Enos Bennion is head of the holding corporation, and A. A. Brigman is local manager for the operators and refiners.

The Emerald Oil company has patented fifteen claims, and is pressing development work to perfect title to seven more. Between the period of 1908 and 1918 sixteen wells were driven to depths varying from 400 to 800 feet, and oil was secured in all but one. Since 1918 eleven more have been put down, every one giving a production of from two to twenty barrels a day. It is now a matter of history that the company's well No. 16 is the sensation of the district.

The accepted geology of the field was completely upset when well No 16 "came in" with a yield of 120 barrels a day. Up to that time it was the prevalent theory that the oil sands lay in blanket formation, and would, in the nature of things, be shortlived. But the advent of No. 16 dispelled this theory, and argues that Emerald oil comes from deeper sands through the crevices made by the uplift in the formation that has produced the Raven Park oil dome. The company stake of twenty-two claims, or 3520 acres, is on the west side of the dome where the cap rock shows the stratum to be on an incline of 45 degrees. What further borings may be made in quest of the point of supply has not been determined.

The Emerald people are watching with great interest the outcome of drilling operations now being pushed by two other corporations in the field. On the east side of the dome the Richmond Refining company is drilling, and to the south is the Associated Oils concern, backed, it is said, by the Southern Pacific railroad.

These companies are using the largest and best standard rigs built today. Each company, it is reported, has set aside $500,000 for drilling purposes in the effort to reach the Dakota sands, which are estimated to lie at a depth of from 3800 to 4000 feet. From supposedly reliable sources it is said the Richmond Refining well is down now about 3600 feet, so that the year 1921 may usher in a great future for the field.

During the process of drilling the Richmond company has tapped one deep stratum of hot salt water that gave a considerable flow, and two stratums of gas. The first gas flow was of such a high pressure as to collapse the heavy casings used in drilling.

The present supply of crude oil from the Emerald wells has a heavy paraffine base, carrying 41 per cent gasoline.

Dec 20, 1918

URADO OIL CO. OPENS UP A NEW TUNNEL AT ITS DRAGON PROPERTY

The Urado Oil Co, whose plant and wells are located near Dragon, has undergone somewhat of a rge in the management and con- and additions have been made B Stewart Jas M Bowman, o n t capitalists o Salt Lake, to ether with D N Swayze are the n w additions Plans have been per- e ted for an expansion of the production of the company, and improvements made at the well and refinery

The holdings of the company are located near Dragon and the oil is inneled, somewhat similar to that o quartz mining The product is unique for the fact that it contains gasol ne or kerosene, the only well in the United States, it is said, that produces crude oil containing gasoline or kerosene

Mr Swayze was in Vernal last w ek interviewing the local busi. nes r en and merchants regarding the marketing of the oil products The company not only manufactures all kinds of lubricants, such as auto oils and mach'nery oils but all kinds of paint oils, roof paint, and elaterite roof paint

It is reported that a new tunnel has been opened up and together with the old an unlimited supply of oil is at hand At the present time bout 40 barrels a day are being handled, but the capacity of the plan is 200 barrels a day

Mr Swayze is a great booster for the Uintah Basin and on all his cards and literature he features and advertises this section He says that whenever he is asked where the best place to locate is at, he always refers them to the Uintah Basin.

...ch of realism to the picture as ...moved into the colored lights. Eva Hatch, costumed to rep... the spirit of Christmas, read ...ory of the "Nativity" with fine ... and her appointment in the ...setting with Miss Jennie Lew... the Egyptian Waiting Maid, ...eted the picture. Just as a re... ...r of the passing year, Patriarch ...on Sowards, wearing a white ...e and carrying a scythe ideally ...sented Father Time, as also ...ttle Alice Colton, with bow and ...r, remind one of the little New ... The Angel children, children ...atitude and garland bearers, to... ...r with the singing of the carols ...e Relief Society Chorus, accom... ...d by the Hanson-Olson Orches... ...ll added to the charm and fin... ...f the production. It ought to ...peated.

...houses. A fine program was ... at the Recreation Hall in the ...ng. The numbers were: Song, ... the same glad story", children. ...ation, "Welcome", Donna ...kman. Recitation, "Sant a is ...g", Aaron Larson. Dialogue. ... is the Christmas story", Ten... Richens, Thursa Hodson, Eva ...ay, Inez Workman, Mareda ...ntinos, Veola Hatch. Song, ...tiful Star of Bethlehem", ... Larson. Dialogue, "A Christ... ...ree instead". Afton and Thursa ...on, Betha McCarrell, Inez ...man, Urby Smith. Song, ...s once was a little child", ...ren. Recitation, "Constant ...tmas", Veola Hatch. Song ...ord Due. Recitation, "Little ... Flakes", Betha McCarrell. ... "In a Manger" Eva McCarrell ... Erma Workman. Recitation ... Hodson. Reading, "A snow ... Santa", Mary Murray. Dia... ..., "Little Folks Christmas", ...e Smith, RoseMary Silka, Wil... Due, Velda Sarantinos, Donna ...n, Inez Smith, Donna Work... Afton Hodson, Mareda Sar...os. Violen Solo, "Bethlehem ...", Dale Johnson. Recitation, ... way Santa Claus comes", Erma ...rman. Song, "Sledding on a ... night", Children. Recitation ... comes in the night", Eva Mc... ...ll. Dialogue, "A row of Stock... ..., Wanda Richens, Erma Work... Sonny Mort, Inez Workman, ...n Larson. Song, "Christmas ...e Song", Children. Recitation, ...ta Claus", Tennie Richens. ... "Old Santa Claus" Children. ... very large tree was beautifully ...ated, on which lighted candles ...d.

... the close of the last song Santa ...

...sen for several years, and any information I can get from your papers regarding that section of the country is worth a great deal to me, and I appreciate especially since never having be in your town. The views or rather the cuts shown of your different buildings.

When my subscription expires, draw on me for the subscription for the year.

URADO TO OPERATE.

The Urado Oil Co., one of the producing properties of the Utah-Colorado asphaltum and oil shale region, is to re-open after being closed for the past year, according to John T. Pope, president of the company who was in Vernal several days this week. The Urado property had been known for many years by sheepherders and prospectors, as "the oil spring", from the fact that the oil did actually trickle out of crevice of rock on the side of a canyon about ten miles from the present site of Dragon, Utah, on the Uintah railway. When Mr. Pope and his associates took hold of the property and collected the native flow of oil, its volume proved to be about one barrel a day. Later development experiments was to drive a 300-foot tunnel into the hill at a depth below the spring, thought to be sufficient to get a big gravity flow of oil. This was more or less of a disappointment, but by sinking a shaft at the end of the tunnel it was found that a five-foot pump lift would yeild fifty barrels a day. With this supply achieved a refinery was built and the product put on the market. The Urado oil has a parafine base and yields by-products all the way from dainty face cream to roofing cement. In fact a number of the large buildings in Salt Lake city among them the Mormon tabernacle, are roof-coated with the Urado roofing cement according to Mr. Pope it is the intention to make some extensive developments to increase the oil output, and then put the plant into full operation at an early date.

The Uintah Packing and Provision company, which has been closed down for some time owing to the alleged financial shortage of the former manager C. A. Cawley, is to open again, according to J. A. Newlands, secretary and treasurer, and the man selected at the meeting of stockholders held Tuesday, to be the new manager. At the meeting it was determined that a stock subscription of $25,000 would put the ...

...der the auspices of the Republican state committee, will be one of the largest social affairs of the year. The ball will be formal but no invitations will be issued, the citizens of the state being urged by public announcement to meet on this occasion and tender their respects to the representatives they have chosen.

The former governors of the state, Heber M. Wells, John C. Cutler, William Spry and Simon Bamberger, will be in the receiving line with Governor and Mrs. Mabey. The reception will take place at 9 o'clock and will be followed by the grand march at 10 o'clock, after which dancing will be the order.

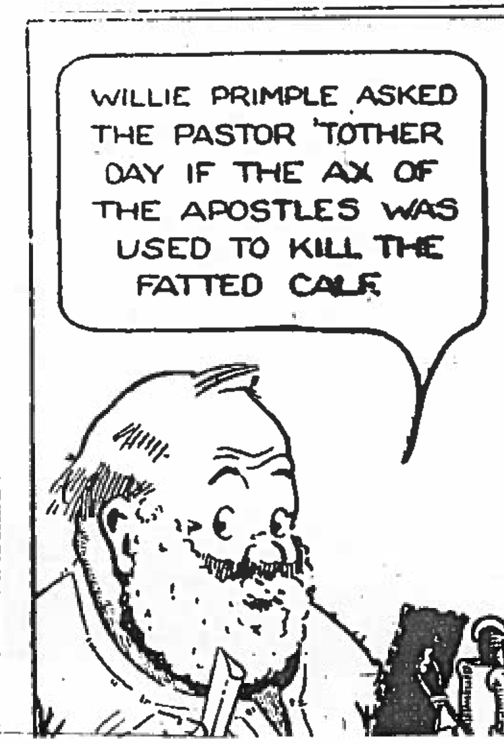
Committees arranging for the affair say interest is being shown in many towns of the state, indicating a general attendance. No admission fee will be charged.

SEEK TAX SETTLEMENT.

A dispatch to the Salt Lake Tribune from Manila, Daggett county, says, the board found the problem of financing the schools to the end of the year to be a serious one on account of the fact that 30 per cent of the taxes are unpaid. It is believed, however, that the schools will be able to continue through at least eight months. This committee on eight months. The committee on finance was instructed to take steps to bring about a settlement with Uintah County on past taxes which were paid into Uintah County and which are due Daggett county.

Jan 7, 1921

...cle John's Josh



Nov 4, 1927

Utah Center of Oil Drilling Activities Shift to Vernal

In horse racing, past performances and pedigrees determine the odds that back entrants when they take the place at the post. While it is not the purpose of this article to contend that there is a similarity between horse racing and oil drilling except that in both pursuits the rewards are great and hazards big, oil men will agree that in petroleum exploration 'dope' plays almost as vital a part as it does in following the ponies.

The genealogy, age and past performances of geologic formations are carefully studied. Data are ransacked from every source and if the pedigree of a formation shows that it has been an oil producer in other parts of the world financial backing for drilling can be secured provided structural conditions are favorable. If not money for drilling is as scarce as odds are long on a 'plug.'

All Information Favorable to Test

In so far as 'dope' is concerned the odds in favor of securing production could scarcely favor a well more heavily than they do the Ashley Valley test of the Utah Oil Refining company and associates near Vernal. Dope has not always favored the Ashley Valley well although at one time it was looked upon as one of the most promising tests in the state but after drilling in 19[illegible] to a depth of [illegible] feet and striking the [illegible] the field was abandoned and equipment moved to test structures in northeastern Utah.

Today finds the Ashley Valley structure considered as one of the best bets in [illegible] for oil production. The whole aspect has been changed by findings on the Iles dome and Craig Colo. At Iles as at Ashley Valley gas alone was developed on the top of the structure in the Morrison strata. Work was continued and on a day when the Midwest Refining company was preparing to abandon the field the Sundance below the Morrison blew in at a depth of 3442 feet with a flush production of 2600 barrels daily through an opening 'beaned' down to two inches.

Iles dome immediately returned to high favor and later events have considerably improved this opinion. The pioneer gusher Parkinson No. 4 is still producing heavily. Drilling by the Texas Production company of two wells on the east flank 350 structurally lower than the Parkinson No. 4 has brought in production in the Morrison, where previously gas only had been secured. Grade of the product from these wells, which are credited with a capacity of 600 barrels each daily is much higher than that of the Parkinson No. 4.

Oil Output Gained Also In Morrison Horizon

Following the discovery in the Parkinson No. 4 Utah Oil Refining officials immediately had a check made of the log of the Ashley Valley well with reference to that of the Iles dome gusher. It was found that the occurrences were practically identical. In all of the Iles dome tests drilling in the upper horizons as at Ashley dome struck first some oil and gas then water and next gas in the Morrison.

The gas production in the Ashley Valley well contrary to belief at first was proved to originate from the Morrison and not from the Sundance of Marine Jurassic age. Other geologic conditions known to favor belief that the Ashley Valley well will develop into an important oil field are:

All Geologic Data Point to Success

The Ashley Valley, the Iles dome and the Craig, Colo., field are all in the same geologic province. The sequence of formations is practically identical. At Craig nearly twenty wells with a flush production of 8,000 barrels daily have been struck in the Dakota.

2. The Ashley Valley pioneer well has one of the strongest and richest gas flows in the intermountain region. Today engineers say that alone this well could provide enough gas to heat and light all of Salt Lake City.

3. Development of the Morrison and the Sundance formations, the productive sands in the Iles field, can be more economically accomplished than in the Colorado structure. At Ashley Valley, nearly all of the Mancos shale has been eroded so that the Dakota can be reached at 1000 feet as compared with a depth of 2500 feet in the Iles dome wells.

There is one drawback however but this is of minor consideration. The surface geology is difficult to work out. The Ashley Valley structure is a hidden fold obscured by river gravel sand and shales.

To determine the subsurface contour lines drilling is necessitated. This explains why the location of the test was recently changed after considerable hole had been made to the present site, where drilling is proceeding below 700 feet. That the structure is closed there is no doubt since in the Frontier sands struck at about 650 feet in the three wells, there was a showing of live oil and gas.

Ashley Valley was named after General William Ashley, one of the most intrepid explorers who ever entered the west. It was General Ashley who led the first party of white men into that valley in the spring of 1826. He was one of the founders of the Missouri Fur company and an associate of Jedediah Smith. In November 1825 the general left Omaha and instead of following the then well known trail up the North Platte river then to the Sweetwater river and through the famous South Pass and on into the Green river country he decided to find a central route. Therefore at the forks of the Platte and in the dead of winter he kept a westerly course and followed almost the same route followed by the Union Pacific railway forty years later. Surprising as it may seem he arrived with practically no loss at the place where the town of Green River, Wyo. now stands. In May 1826 his parties of trappers already covered all the upper tributaries of Green river, perhaps the richest fur country of early days.

Perilous River Voyage Completed Successfully

Dividing his party into two trapping parties and one exploration party, the latter of which he personally led, he set about building boats of buffalo skins to ply the Green river. A rendezvous was arranged for July at a point about thirty miles south of Green River, Wyo., at the foot of the Uintah mountains where all the trappers were to gather, numbering almost three hundred. Then Ashley floated down the river in his buffalo skin boats and on through dangerous Ladore canyon and finally to a camp near Vernal in what has been known ever since as Ashley Valley.

It is unnecessary to recount his numerous difficulties and losses in descending the river. It suffices to say he did not attempt to ascend it. After buying a few ponies from what he described as poverty stricken and docile Indians he made his way around the west end of the Uintahs and in July arrived at the rendezvous which he had previously arranged. Neither did he find anything encouraging toward a rich trapping region and his report on the country was to the effect that it was a barren useless waste. Time has proved he was very much mistaken because Ashley Valley today is a very rich farming section. —Tribune

Mar 8, 1951

Utah Oil Industry Threatened By Attack On Depletion Allowance

The future of oil development in Utah, as well as the national defense program, is threatened by the attack on depletion allowances permitted to the oil industry, J. L. Dougan, head of Equity Oil Company, warned as he left Salt Lake City for Washington D. C. during the weekend.

Mr. Dougan serves as a member of the executive committee of the Rocky Mountain Oil and Gas Association.

He will appear before the tee in opposition to a measure to reduce the depletion allowance of 27½ per cent enjoyed by the industry for the last 25 years, to 15 per cent.

The tax allowance is permitted the companies because of the risk in drilling for petroleum and the fact that oil is a wasting resources.

Mr. Dougan said that the proposed reduction would affect not only the oil companies but the state of Utah, its schools, universities and a large number of the residents of the area who are participating in the development of a large, new industry.

Local oilmen were of the opinion that smaller outfits and those operating without foreign subsidiaries might "go broke" without the help of the present allowance.

One oilman said that if the depletion allowance had been reduced in the early stages of Uintah Basin oil development, that wildcat program would have been reduced and Ashley Valley producing field may never have been discovered.

It was expressed generally that the oil industry all over the country would be handicapped by the reduced allowance at a time when the country needed extra petroleum reserves.

The assets of oil companies are elusive and intangible and at the very best [illegible] be estimated very roughly. No one can tell exactly [illegible] oil is in a reservoir.

Mr. Dougan noted that more

(Continued on Page [illegible])

2.

UTAH OIL INDUSTRY THREATENED BY ATTACK ON DEPLETION ALLOWANCE

(... from Page 1)

than 600 wells were drilled in this state before commercial production was found in 1948 in the Uintah Basin.

He said that if companies and individuals had not been permitted to write off at least part of the cost of these failures, it is extremely doubtful the search for oil would have persisted in this state, where geology is complex and the distance from markets an obstacle to development.

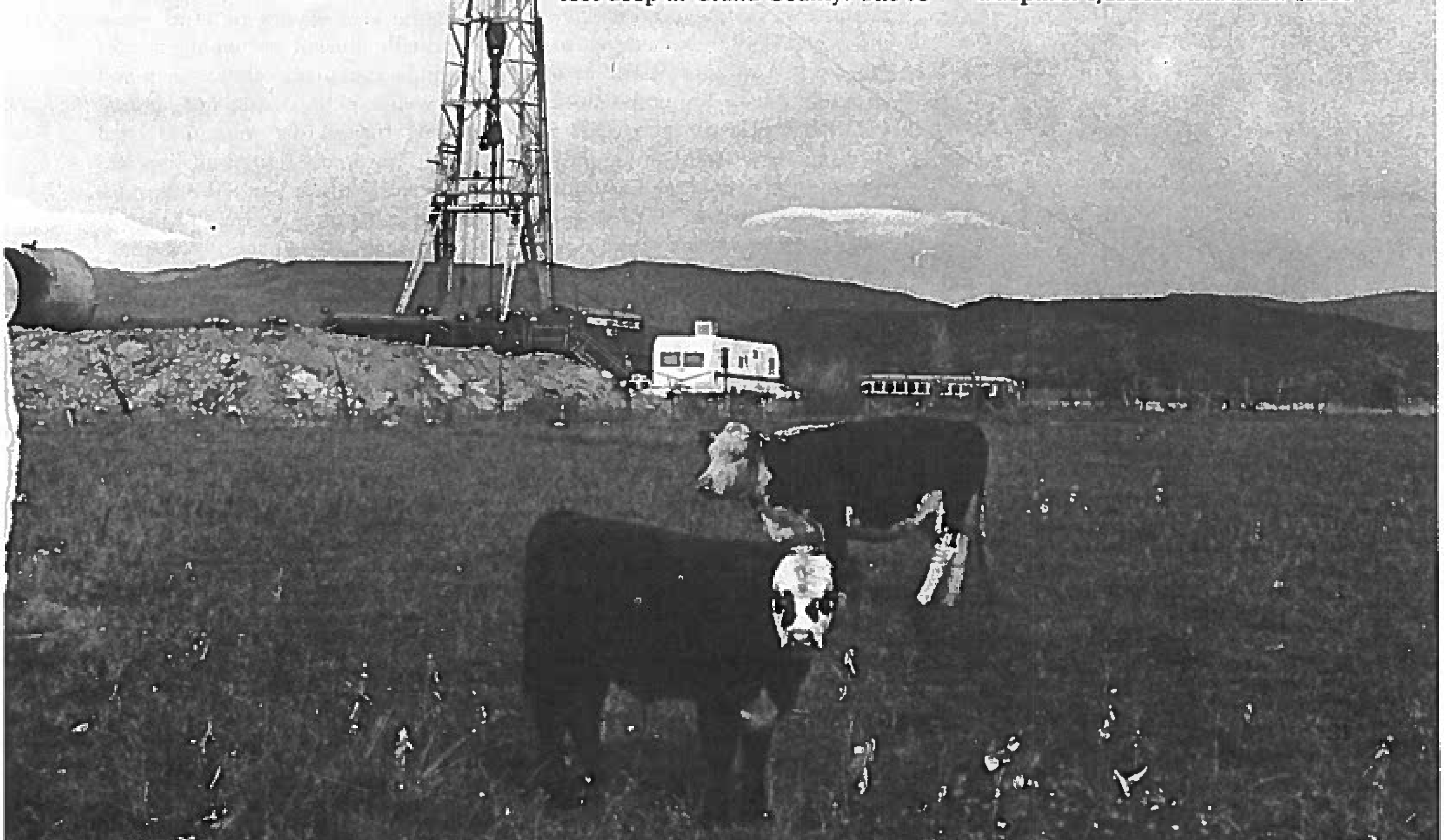
Sept/Oct 1975
Utah Magazine

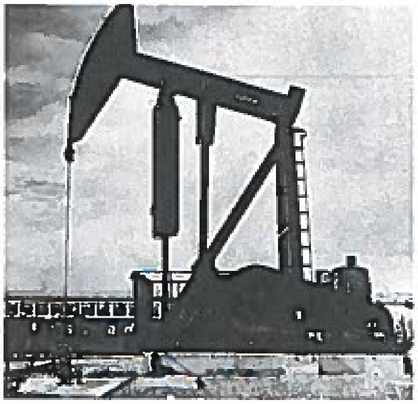
Utah Oil Makes Good Wagon Grease

by George Spel

Oil in Utah was discovered by Mormon pioneers about 80 miles east of Salt Lake City. William Clayton, a member of Brigham Young's first company recorded the event in his diary of July 11, 1847. "During the day some of the brethren discovered an oil spring. The substance which raises out of the ground resembles tar and is very oily. Some have oiled their shoes. Others have gone to fill their tar buckets and are sanguine it will answer well to grease wagons."[1]

Rumors of oil deposits in Utah were common and other seeps and springs were found, but it wasn't until 1891 that the first attempt at drilling for oil was made. Simon Bamberger, later governor of Utah, financed the drilling of a well 1,040 feet deep in Grand County. The result was a dry hole. Over the next fifty years, hundreds of other wells were drilled but none produced a sufficient quantity of oil to be commercially productive. However, while drilling for oil, several small natural gas fields were discovered. The first was the Farmington field in Davis County, which supplied gas to the Salt Lake area as early as 1895. The second was in Ashley Valley, which supplied gas to Vernal City beginning in 1928. Both of these fields have "sanded up" and quit producing, but they had served two purposes: First, provided a valuable source of fuel; second, helped to maintain interest in Utah's oil and gas potential. Finally, in 1948, again in Ashley Valley, the first commercially productive oil well was brought in at a depth of 4,152 feet and a flow of 300





Pumping oil at Blue Bell Field.

New sections are added to the pipe string that turns the drill bit.

barrels per day. This started a vigorous campaign of deep well drilling which resulted in new discoveries across the state.

Last year, production in Utah reached nearly 40 million barrels of crude oil. Utah's unique geography offers special challenges to the oil industry. The combination of high mountains, numerous buttes, and lofty mesas separated by deep canyon rivers, often make access nearly impossible. One oil company found it necessary to travel 170 miles between two wells that were only 3 miles apart "as the crow flies". Road and pipeline construction is often impossible or impractical.

The 9,569 foot elevation that the Rangely pipeline reaches at Wolf Creek Pass while crossing the Wasatch Range is the highest altitude attained by any major oil pipeline in the world. This presented special engineering problems both in constructing and operating the pipeline, but Utah's industry successfully met the challenge. Another unique feature to Utah is the high paraffin base waxy crude oil that is produced in much of the eastern portion of the state. This oil will set solid at temperatures less than 100 degress Fahrenheit. This has necessitated building a series of heater stations along the pipeline to reheat the oil so it can continue flowing. The sophisticated heater systems were built at large costs to ensure safety and environmentally clean operations while supplying crude oil to our refineries.

Petroleum refining in Utah began in 1907 with the construction of a kerosene, grease, and lubricating oil plant that processed about seven barrels of oil per day. Since that early beginning, Utah's refineries have almost continually expanded their capacity while adding the latest in technical advancements and refining methods.

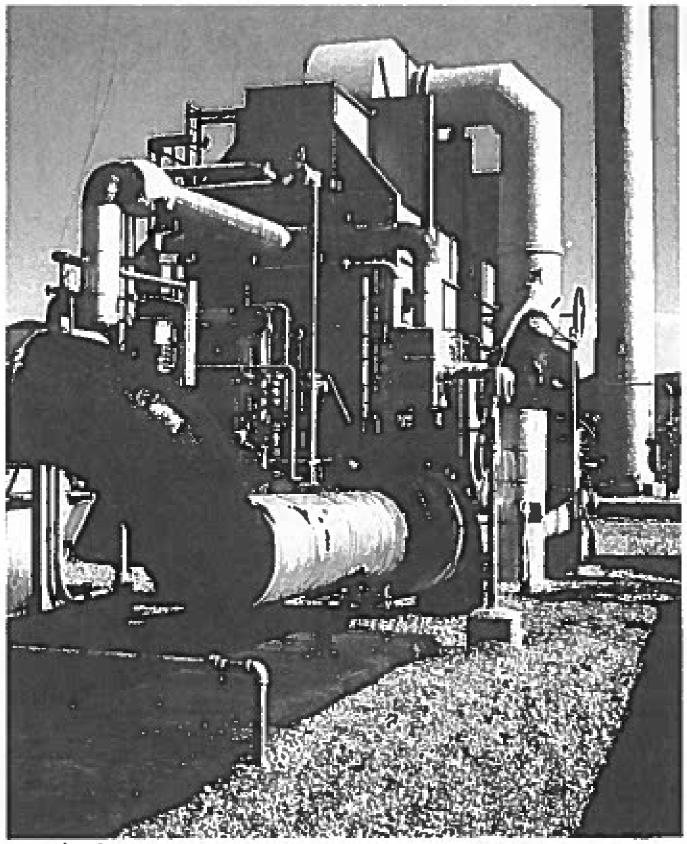
Utah now provides the full range of refined products to an ever-growing regional market. With new oil discoveries providing the crude supply, the refining industry will continue to grow in importance to the state, with Utah establishing itself as an important supplier of all conventional petroleum products.

Increased interest in energy resources have awakened interest in the state's abundant oil shale deposits. Oil shale accumulated as layers of organic ooze and mud at bottoms of ancient lakes, ponds, and shallow seas in places where plant and animal life were abundant. The organic rich layers of mud were gradually buried as younger sediments accumulated above them and the weight of the overlaying material slowly turned the mud into hard shale. The most significant deposits of oil shale in the United States are found in the Green River formation of Colorado, Utah, and Wyoming. The Uintah basin is estimated to contain over 500 million barrels of recoverable reserves. Federal tracts in Utah were leased under competitive bidding for a cost of 75 million dollars. Planned capacity of the initial project will be 100,000 barrels of shale oil processed daily. This production may be brought on the scene as early as 1977. A second site producing another 100,000 barrels is planned for future development. Oil shale covers a very small area of the three states but the shale oil contained there exceeds by many times the total proved reserves of this country, and in fact, is comparable to the total proved petroleum reserves of the entire free world. Utah is properly taking a leadership position in this development.

In the 127 years since Utah's first oil seep was discovered, the oil and gas industry has grown to significant proportions. Not only have the state's petroleum resources furnished increasing amounts of convenient fuel and energy to the intermountain region, they have furnished the foundation of important related industries including exploration, drilling, transportation, refining and marketing. In the process of well drilling, other resources have been discovered — carbon dioxide, helium, magnesium, and potash. Unexplored country has been opened up and scenic wonders have been made accessible to the public.

The economic indicators have also demonstrated the worth of the industry to the state. The 1,330 producing oil wells within the state produced over 40,000,000 barrels of oil in 1974. The assessed valuation of all oil property is over 194 million dollars and the state occupation tax paid last year was over $5,400,000.[2] New payrolls, increased royalties, higher lease and rental payments, additional tax benefits — with all of these the oil and gas developers have brought a new era to Utah. Even though the industry is young and at the threshhold of new development, its economic contribution to the state has been great and there is every reason to believe that the Utah industry's future can be viewed with optimism.

1. Vol 31, #3, Utah Historical Quarterly, 1963.
2. Utah Petroleum Assn.



A pipeline heating station. *Photos by Barry Gillette*

Drilling roughnecks use big power equipment to help handle pipe.

Maurice Abravanel, than 100 Percent

by Ruth Draper

Oil painting by Alvin Gittins

There are as many overtones in the personality of Maurice Abravanel as there are sounds in his symphony orchestra — and they complement each other just as well.

This conductor and musical director of the Utah Symphony can be charming, irascible, witty, grave, affable, sympathetic, demanding, suave, and pungent, all with undistilled intensity. Said one orchestra member, "The maestro is never less than 100 percent anything."

Under Abravanel's direction, the Utah orchestra has matured to a disciplined, finely-tuned ensemble ranking high among U.S. orchestras. He has accomplished this by hewing a new foundation from home-grown timber — recruiting almost all of his musicians from Utah. Following a concept he expressed upon his arrival in Utah, "I see no reason for importing players if someone just as good is available here".

Utah Petroleum Association
Data Book

December 1981

Utah Petroleum Association
A Division of Rocky Mountain Oil & Gas Association
10 WEST BROADWAY, SUITE 611 / SALT LAKE CITY, UTAH 84101 / PHONE (801) 363-5757

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The factual information contained within this publication is intended to act as a guide to Utah's oil and gas industry. The information was obtained through various sources. Those sources are appropriately cited within the text. The Utah Petroleum Association hopes this publication will become a valuable tool from which to draw facts and conclusions concerning Utah's oil and gas industry.

UTAH PETROLEUM ASSOCIATION

12/81

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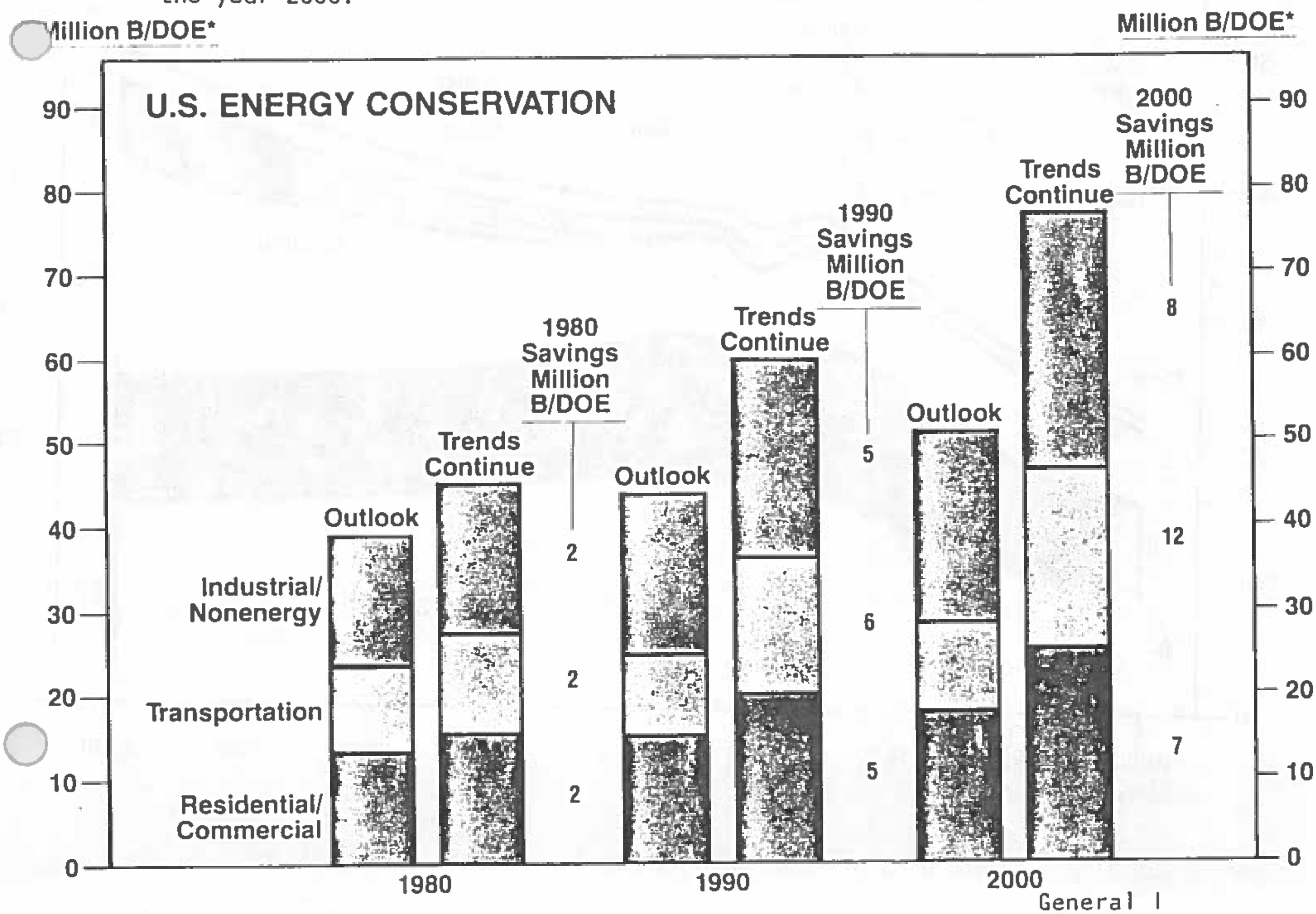
A few short years ago, foreign oil supply cutoffs, massive fluctuation in the price of petroleum products, and long gasoline lines were vivid evidence that Americans were losing control of their energy affairs. If this trend were to continue the lost control would affect job security, economic well-being, and in a larger sense, the American way of life. Luckily, common sense, rational thinking, and finite steps in the right direction have prevailed and today American's energy future looks brighter than it has in many years.

CONSERVATION

One of the first positive steps this nation took was in the direction of conservation. Between the end of World War II and the 1973-74 Arab oil embargo, America's energy consumption grew at a rate of 3% per year. Since then, however, a trend of restrained growth has begun to surface and the increase has dropped substantially. Energy use grew at less than 2.5% per year from 1976 through 1978 and held constant in 1979 as the Organization of Petroleum Exporting Countries (OPEC) doubled oil prices. In 1980 there was actually a decline in American energy consumption. Because of this, most forecasters now expect energy use in the mid and late 1980's to grow by 1 to 2 percent per year requiring us to use much less energy by 1990 than was predicted only a few years ago. The trend toward energy conservation in the United States is graphically demonstrated below. It is clear that serious conservation has been and will be essential in holding down future increases in energy consumption. In fact, it is conceivable that the United States can save over 27 million barrels of oil per day equivalent by the year 2000.

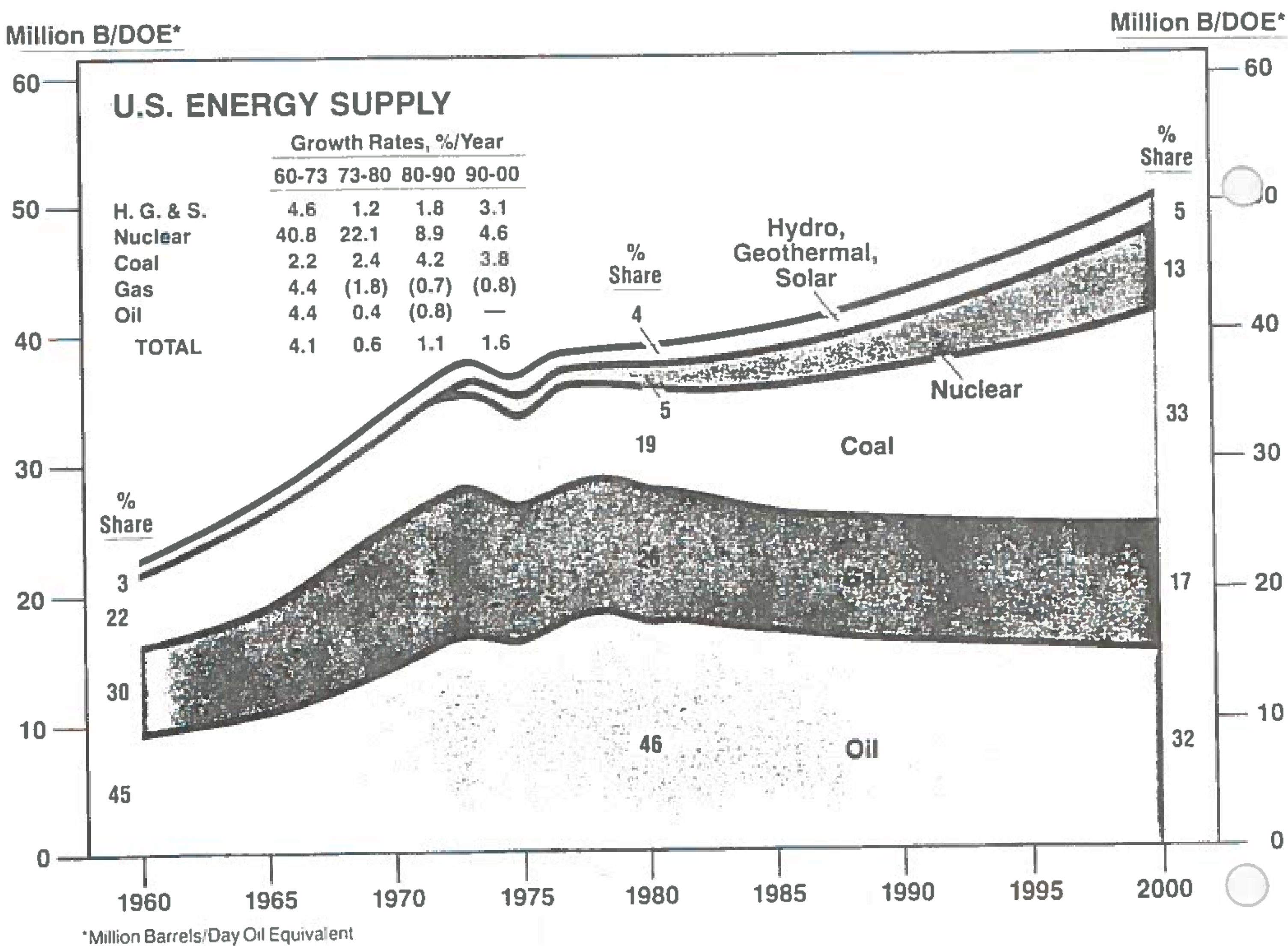


*Million Barrels/Day Oil Equivalent

ENERGY SUPPLY

Energy conservation is an important goal, but alone it cannot solve the Nation's energy problems. If the United States is to reduce its dependence on foreign oil, aggressive development of all U. S. energy resources must be carried out in conjunction with conservation. Presently, three fuels, oil, gas and coal, supply 93% of our energy. Oil will remain the primary source of energy until the end of the century, when coal will have an equivalent share of the total supply. Nuclear energy's share will also advance while the use of natural gas will steadily decline over the long haul.

Note from the chart below that by the year 2000 the breakdown of the United States energy supply will be as follows: Hydroelectric, geothermal and solar energy will supply only 5% of our needs; 13% from nuclear sources; 33% from coal; 17% from gas and 32% from oil. Naturally, extensive research and development efforts are underway to develop new, "inexhaustible" energy technologies. Unfortunately though, these potential energy sources are not expected to significantly contribute to the total energy supply prior to the year 2000.



*Million Barrels/Day Oil Equivalent

The United States does have vast energy resources, unlike most major industrial nations. For too long, however, the nation has ignored many of them. Government and industry studies indicate that this country can find and produce more crude oil and natural gas in the future than has ever been produced in the past. The U. S. has three times more coal than remaining oil and gas reserves and double the amount in oil shale. There is enough uranium to sustain the nuclear power industry well into the next century, and the country can turn increasingly to renewable sources including solar, geothermal and biomass energy.

Governmental policies over the years have limited the amount of energy that has been produced from all these sources. But government policy can and is being changed so that American sources can provide more American energy. If the nation decides to confront its energy problems, take advantage of available resources, and conserve even more, the country can reasonably expect to cut imports by as much as 50% by the year 1990. By the year 2000, 82% of energy supplies will be coming from coal, oil and gas. Since this is the case, it may be significant to examine those supplies.

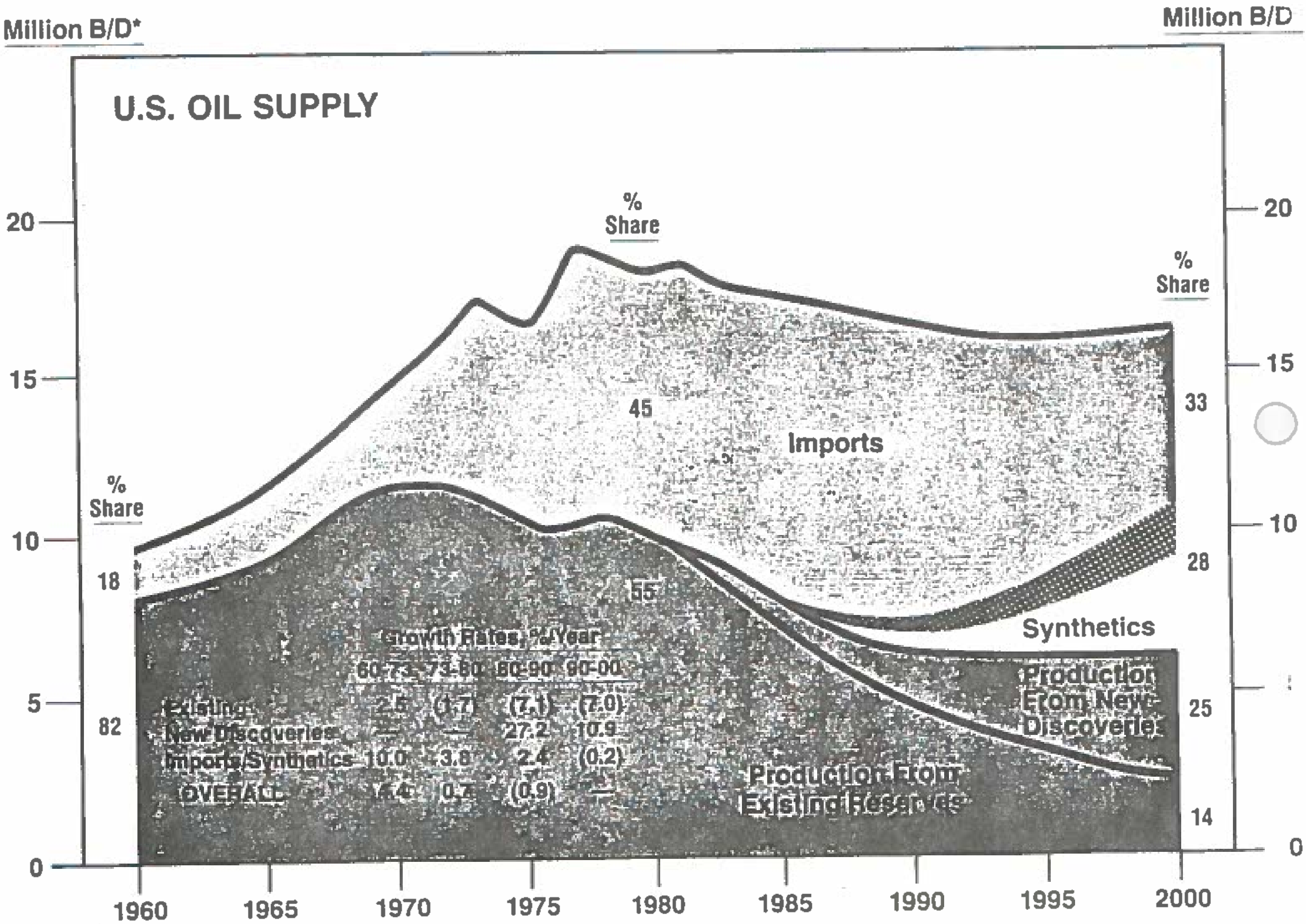
United States coal reserves are abundant, accounting for 90% of all known domestic fossil fuel resources. It is estimated that annual coal production will increase to 2.2 billion tons of coal. 47% of this will come from eastern reserves while 53% of the supply will, by the year 2000, come from western reserves. Western coal, however, is lower in sulfur content and lower in btu's. Gases and liquids produced from coal are expected to become commercially available in the mid to late 1980's. By 1985, 6 million tons of coal or 6% of the total U. S. output is forecasted to be used in manufacturing of synthetic fuels.

In 1973, natural gas production peaked at 22 trillion cubic feet (tcf) per year. This decline is expected to continue. By the year 2000, production is expected to drop to only 11.3 tcf per year or about one half of the 1973 level. Also by this same year, imports will make up approximately 16% of the U. S. gas supply, 18% will come from synthetics, 32% will be produced from new discoveries, and 34% will come from existing reserves. It is assumed that rapid exploration of our petroleum resource potential in the Outer Continental Shelf is essential if the decline in the natural gas production is to be offset.

Domestic oil production peaked in the early 1970's and is declining. The decline has been slowed by the advent of the Prudhoe Bay, Alaska discovery and the subsequent flow of oil through the Trans-Alaska Pipeline in 1977. North Slope production rose to 1.5 million barrels per day in late 1979.

The conventional domestic oil supply has declined from 10 million barrels per day in 1978 to approximately 6 million barrels per day projected for 1990. By the year 2000, 65% of conventional domestic oil supplies must come from reserves yet to be found. Further discoveries will be required not only to increase North Slope production but also to sustain production rates over the long term.

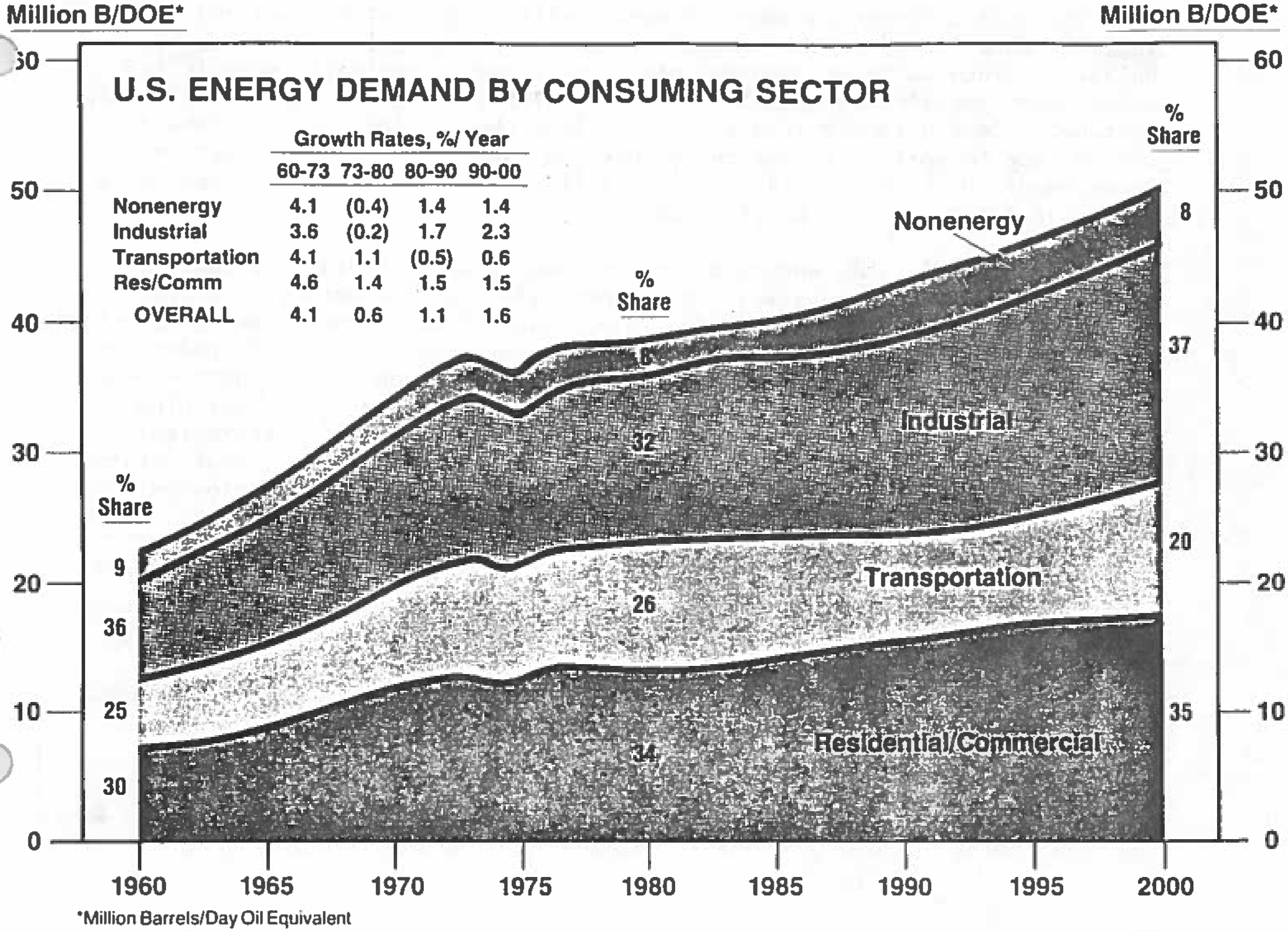
Although much has been said about the potential for petroleum discoveries within the Overthrust Belt in the western United States, and the massive shale oil reserves in Wyoming, Colorado and Utah, these discoveries will not have a great effect upon the United States oil supply until approximately 1995 or the year 2000. Though shale oil and coal liquids will become commercially available in the 1980's, production will amount to between 0.7 and 1.0 million barrels per day in 1990. In the year 2000, synfuels could comprise 20% to 30% of the U. S. oil supply. However, if development of synthetic oil production does not achieve these projections, additional imports would be required. This is shown by the shaded area in the chart below.



*Million Barrels/Day

ENERGY DEMAND

Now that America's conservation efforts and energy supply have been examined, it is appropriate to consider the U. S. energy demand. Total energy demand is projected to increase from 38.7 million barrels per day oil equivalent in the early 1980's to over 50.3 million barrels per day in the year 2000. Energy demand will grow to an average 1.1% per year from 1981-90 versus the 4.1% per year growth which occurred from 1960 through 1973.



The above graph depicts energy demand by consuming sectors. Note that by the year 2000, 8% of the country's energy demand will be from non-energy consumers. This is the sector of the population that uses energy supplies as feed stocks or raw materials rather than as fuels. Such products include petrochemicals used in fertilizers, asphalt, lubricants and steel, etc.

Industrial consumers will utilize 37% of the national energy supply by the year 2000. This group includes all mining and manufacturing industries that consume gas, oil, coal and electricity. Although gas has historically been the dominant industrial fuel, it will decline to only 26% of fuel utilized by the year 2000 while coal's share will increase significantly to 46%. Oil's share will drop to 12% while electricity will remain between 16% and 18%.

Transportation will consume 20% of the nation's energy demand. Transportation is almost entirely dependent on oil and will account for approximately 50% of the total oil consumed through the year 2000. Energy demand in this sector will decline through 1990, and then grow at an average annual rate of only 0.6% to the end of the century. Due to the increased mileage efficiency of motor vehicles, fuel demand is expected to decline to 4.5 million barrels per day by century's end.

The second larger consumer of energy will be the residential and commercial sector. This sector of the consuming public includes private and public buildings, such as homes, stores, office buildings, hospitals, schools and other governmental housing facilities. It will account for 35% of the energy consumed. Demand is expected to decline from that of the pre-Arab Embargo period, due to more efficient energy use and rate of household formation. Demand would be met primarily by electricity and gas. Gas is expected to be available for these high priority uses.

What does all this energy demand and supply mean to Utah? Because of Utah's vast shale oil reserves and the potential for the extension of the Overthrust Belt through the entire State, Utah's involvement in energy development is considered promising. However, promising potential and actual production are two different things. As will become evident as you go through the Utah Petroleum Data Book, the access to lands within the state, ever declining oil and gas reserves (even with new Overthrust and shale oil discoveries), prohibitive drilling and exploration costs, and ever increasing taxes, rents and royalties will act to diminish the incentives for further development of Utah's energy potential.

It is hoped, that Utah will increase its incentives for exploration and resource development. The U. S. petroleum industry will need to invest over 900 billion dollars domestically in the 1980's to explore for more oil and gas, to build or improve refinery facilities, and to provide marketing transportation facilities to meet the needs of consumers. The Utah Petroleum Association would like to see a majority of the 900 billion dollars spent here in Utah.

# # #

UTAH PETROLEUM INDUSTRY

1979 EMPLOYMENT

	Average Annual Employment	Total Wages	Reporting Units (Companies)
Exploration - Production			
Drilling Oil and Gas Wells	746	$ 16,069,349	49
Oil and Gas Field Exploration Services	502	6,904,633	42
Oil and Gas Field Services	1443	25,841,123	109
Other Oil and Gas Extraction	869	18,319,293	68
Exploration-Production Subtotal	3560	$ 67,134,398	268
Petroleum Refining and Related Industries			
Petroleum Refining	935	$ 19,986,709	9
Other Related Industries	133	1,555,645	8
Refining Subtotal	1068	$ 21,542,354	17
Pipelines (Except Natural Gas)	94	$ 2,094,074	6
Natural Gas Production and Distribution	2393	$ 44,514,636	17
Marketing			
Petroleum Bulk Stations and Terminals	1331	$ 16,920,424	103
Petroleum Product Wholesalers	354	4,758,261	24
Liquid Petroleum Gas	191	2,287,223	25
Gasoline Service Stations	4455	30,321,428	719
Marketing Subtotal	6331	$ 54,287,336	871
TOTAL PETROLEUM INDUSTRY	13446	$ 189,573,798	1179
TOTAL UTAH NONAGRCULTURAL EMPLOYMENT (PRIVATE SECTOR)	488,190	$ 5,090,753,370	28,500

Source: Utah Department of Employment Security 1979 Annual Report Volume III Labor Market Information

Without access to the land, the petroleum industry's energy search would come to an abrupt halt. Here in Utah, the availability of property for exploration is limited by a number of factors.

Approximately 68% of the State's 56 million acres is currently held by the Federal Government. This in the form of defense and recreation areas, National Parks, Monuments, and Forests, and public lands. Only 78% or 27million acres of this land has been made available for mineral exploration and, unfortunately, not all of this acreage holds the promise of future oil and gas reserves.

Additionally, further withdrawals of public lands from exploration are under consideration by both the U. S. Forest Service and the BLM. Some of these lands include that area of eastern Utah the U. S. Geological Survey estimates may contain more oil and gas than Prudhoe Bay, Alaska -- North America's largest oil field.

The State of Utah holds 6% or approximately 3,627,000 acres of land. Of this, an estimated 90% has been made available for mineral exploration but, again, not all of this acreage holds hope of future oil and gas reserves.

The remaining lands within the state are either contained within Indian reservations or are held by local governments and private land owners. For the most part, however, the petroleum industry continues to forge ahead in its exploration efforts, despite the tremendous limitations placed upon land availability through governmental agencies and adverse sub-surface geological configurations in the State.

# # #

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY CONSERVATION DIVISION
Oil and Gas and Mineral Leases, Licenses, and Permits
Public, Acquired and Indian Under Supervision December 31, 1979

Oil and Gas Leases Under Supervision in Utah

Public

Number	17,191
Acreage	20,919,888

Acquired

Number	157
Acreage	63,102

Indian

Number	2,152
Acreage	712,363

TOTAL

Number	19,500
Acreage	21,715,353

Mining Leases Under Supervision in Utah

Public

Number	263
Acreage	375,814

Acquired

Number	0
Acreage	0

Indian

Number	3
Acreage	2,860

TOTAL

Number	266
Acreage	378,674

G R A N D T O T A L

Number	19,763
Acreage	213,684,480

THE ABOVE REPORT DOES NOT INCLUDE THE FOLLOWING

Geothermal Leases

Number	281
Acreage	495,316

Source: U. S. Geological Survey

LAND OWNERSHIP AND ADMINISTRATION IN UTAH
1979

Federal	Approximate Acres
Public Lands	22,075,000
National Forests	8,048,000
National Parks and Monuments and Recreation Area	1,921,000
Department of Defense Withdrawals	1,874,000
Other Withdrawals	877,000
Total Federal	34,765,000
Indian Reservations	2,274,000
State, Other Govt., and Private Land	15,472,000
Total Land Area in Utah	52,541,000
Total Water Area in Utah	1,805,000
Total Land and Water Area in Utah	54,346,000

BLM-ADMINISTERED PUBLIC LANDS BY DISTRICT

District	Total Acres
Salt Lake	2,550,802
Cedar City	5,248,608
Richfield	6,902,612
Moab	5,727,696
Vernal	1,645,147
Total	22,074,865

Source: BLM Facts and Figures for Utah, 1980

Temporary Segregation from Mineral Development

	Acres
Glen Canyon National Recreation Area 1/	1,180,000
U.S. Forest Service Raodless Wilderness Study 2/	1,500,000
BLM - Oil/Gas Category Designation 3/	648,000
BLM - Green River Corridor (Browns Park) 4/	5,000
BLM - Deep Creek Mountains 5/	26,000
State Exchange Applications 6/	21,168
BLM - Simpson Springs Recreation Site 7/	710
BLM - Little Shara Recreation Lands 7/	3,542

1/ Under wilderness study and master plan development. May be partially opened to mineral leasing.

2/ Mineral leasing suspended pending roadless area/wilderness evaluation study and preparation of EIS before leasing is resumed.

3/ BLM Oil and Gas Management Category 4 - Closed to leasing. Large percentage segregated pending evaluation of potential primitive and natural areas. Open to mining.

4/ Proposed for withdrawal from mining.

5/ Emergency withdrawal under FLPMA FOR 3 years.

6/ Applications pending classification consideration by BLM.

7/ Two year protective withdrawal.

Summary

	Acres	Percent
Total Land - Utah	52,541,000	
Total Federal Land	34,964,000	68 (of Utah)
Withdrawal from Mining and/or Mineral Leasing	4,302,000	13 (of Federal)
Temporary Segregations from Mining and/or Mineral Leasing	3,384,000	9 (of Federal)
Total Withdrawn or Segregated	7,686,000	22 (of Federal)
Presently Available for Mining	27,278,000	78 (of Federal)

Source: BLM Facts and Figures for Utah 1980

MINING OPERATIONS IN 1980 ON PUBLIC LANDS - UTAH
(Exclusive of Sand, Gravel, and Other Construction Materials)

Commodity	Public Land[1/] Quantity	Public Land Production Value ($)	Public Land Royalty Value ($)	Total State[2/] Quantity	Total State Production Value ($)	Percent Production Value From Public Land
Petroleum, barrels	5,243,294	66,005,684	8,324,214	17,159,033	223,000,000	30
Natural gas, thousand cubic ft.	25,495,728	40,752,110	5,029,050	56,939,074	91,200,000	45
Natural gasoline, gallons	3,556,244	1,452,601	106,813	Not available		--
Carbon dioxide, thousand cubic ft.	4,030	440	5,500	Not available		--
Coal, tons	7,689,887	195,700,155	3,561,750	11,758,808	298,000,000	66
Phosphate, tons	0	0	0	Not available		--
Potash, tons	46,495	1,228,621	36,858	Not available		--
Other Minerals, tons	2,175	21,109	27,308	Not available		--

1/ Source: U.S. Geological Survey for fiscal year 1980.

2/ Source: Utah Geological & Mineral Survey for fiscal year 1980.

Source: BLM Facts and Figures for Utah 1980

PUBLIC LAND AND MINERAL ESTATE (acres)

County	Surface and all Minerals	All Min. and no Surface	Coal Only	O & G Only	Potash Only	Phosphate	Oil Shale Only	Other
Beaver	1,249,595	191,178	120	404	0	0	0	
Box Elder	818,644	110,174	0	12,984	0	0	0	
Cache	363	283,729	40	0	0	0	0	
Carbon	429,177	112,834	64,077	15,926	757	780	520	Nitrogen & Asphalt: 1,037
Daggett	78,348	256,926	160	871	0	2,181	0	
Davis	0	9,714	0	0	0	0	0	Gold, Silver, Copper: 320
Duchesne	201,200	808,542	2,597	4,045	0	0	2,085	Nitrogen: 280 Asphalt: 120
Emery	2,085,691	228,270	16,209	10,089	0	0	0	
Garfield	1,577,221	1,281,650	9,946	3,717	0	0	0	
Grand	1,534,292	70,067	5,904	7,010	2,672	0	0	Sodium: 953
Iron	915,218	291,076	16,608	4,050	0	0	0	Geo Stm, Coal, Pho, OG, OS, Sod, Pot: 64
Juab	1,501,882	138,867	0	5,121	180	0	0	
Kane	1,607,998	793,402	48,504	2,970	0	0	0	
Millard	3,029,788	121,341	0	7,107	0	0	0	
Morgan	4,941	69,441	0	718	280	600	0	Sodium: 280
Piute	162,084	195,708	0	520	0	0	0	
Rich	170,964	102,034	0	1,451	2,440	1,328	0	Sodium: 240
Salt Lake	2,941	90,946	0	0	0	0	0	
San Juan	1,700,528	795,703	3,525	57,582	23,984	870	280	Sodium: 9,762
San Pete	207,252	401,954	6,851	2,749	20	0	0	
Sevier	274,577	702,393	10,099	2,576	1,232	0	0	
Summit	3,746	520,718	5,198	3,414	136	480	0	Sodium: 136
Tooele	1,474,277	183,029	240	2,449	0	0	0	Sodium: 80
Uintah	1,343,261	458,528	2,860	29,141	398	4,220	16,688	Bit. Sand: 40 Gilsonite: 160
Utah	70,931	495,631	16,276	3,558	0	0	80	Nitrogen: 200
Wasatch	4,370	351,771	0	0	0	0	0	
Washington	588,581	426,241	4,861	20,451	514	0	0	
Wayne	1,036,642	257,714	160	3,798	0	0	0	
Weber	80	43,879	0	0	0	0	0	
TOTAL	22,074,592	9,793,730	214,235	202,701	32,613	11,421	19,653	Nitrogen & Asphalt: 1,637 Sodium: 11,451 Gold, Silver, Copper: 320 Bituminous Sand: 40 Gilsonite: 160

Source: BLM Facts and Figures for Utah 1980

MINERAL LEASES AND PERMITS

	Issued - FY 1980 No.	Issued - FY 1980 Acres		Outstanding Leases and Permits Cumulative Totals as of September 30, 1980: Permits	Leases	Total
Coal	2	1,869.97	Number Acreage		204 279,654.45	204 279,654.45
Potassium Permits (Potash)	0	0	Number Acreage	21 49,557.78	20 35,398.88	41 84,956.66
Phosphate	0	0	Number Acreage	0 0	8 8,799.59	8 8,799.59
Hardrock	0	0	Number Acreage	0 0	0 0	0 0
Gilsonite, Bit. Sands, Asphalt	0	0	Number Acreage	0 0	12 3,210.28	12 3,210.28
Oil & Gas Competitive Noncompetitive	 20 3,876	 5,673.64 984,450.72	Number Acreage	0 0	16,750 21,028,840	16,750 21,028,840
Geothermal Competitive Noncompetitive	 0 6	 0 12,630.06	Number Acreage	0 0	269 453,677	269 453,677

Source: BLM Facts and Figures for 1980

The petroleum reserve can be looked upon as the amount of natural resource speculated to still be available for recovery and ultimate use. Although this may be a simplistic definition, the factors that impact the reserve are indeed, very complex.

For example, recent discoveries of crude oil like those in Prudhoe Bay, Alaska and the multi-state Overthrust Belt are welcome additions to the reserve but, unfortunately, the millions of barrels of oil projected to be contained within these areas make up only a small fraction of the country's annual consumption.

Technologies of various types will add even more resource to the reserve. Daily, industry finds better methods to be used in the recovery of new oil, as well as enhancing the transformation of old fields into viable oil production fields. Advances are also being made in the development of synthetic replacements for crude oil, although these will at best, only offer a minimal addition to the reserve.

Conservation has played a major role in building up the crude oil reserve. Only a few years ago, energy consumption was increasing at a rate of three per cent (3%) per year. Through voluntary conservation efforts, the nation's energy consumption has slowed to a pace that is equal to the real annual increase in the Gross National Product (GNP), only one per cent (1%).

Despite all the aforementioned positive impact factors on the reserve, the fact remains -- the reserve will continue to diminish at an ever increasing rate. As a nation, we simply consume more petroleum than can be unearthed.

In Utah, the reserve as of December, 1978 was over 155 million barrels of oil. In 1979 this figure dropped to 144 millions barrels, a net reserve loss of over 11 million barrels.

ESTIMATED RESERVES OF CRUDE OIL

(Thousands of Barrels of 42 U.S. Gallons)

	Utah	United States
Proved Reserves as of December 31, 1978	155,371	27,803,760
Extensions	1,000	368,082
New Field Discoveries - 1979	3,701	239,406
New Reservoir Discoveries in Oil Fields	325	107,567
Production	26,882	2,958,144
Proved Reserves as of December 31, 1979	144,342	27,051,289
Net Changes in Proved Reserves During 1979	(11,029) 2/	(752,471) 2/
Indicated Additional Reserves from Known Reserves 1/	21,800	3,570,008

1/ Additional reserves include additional recoveries in known reservoirs (in excess of the proved reserves) which engineering knowledge and judgement indicate will be economically available by the application of enhanced recovery techniques, whether or not such program is currently installed.

2/ ( ) denotes negative volume.

Source
American Petroleum Institute
"Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the U.S. and Canada as of December 31, 1979"

ORIGINAL OIL-IN-PLACE, CUMULATIVE PRODUCTION

ULTIMATE RECOVERY AND PROVED RESERVES OF CRUDE OIL IN THE U. S.

ESTIMATED AS OF DECEMBER 31, 1979

(Thousands of Barrels of 42 U.S. Gallons)

	Utah	United States
Estimated Original Oil-In-Place	3,882,990	460,022,500
Cumulative Production	677,826	120,730,299
Estimated Ultimate Recovery of Crude Oil From Proved Reserves	822,168	147,781,588
Proved Reserves	144,342	27,051,289
Ultimate Recovery as Per Cent of Original Oil-In-Place	21.2	32.1

Source
American Petroleum Institute
"Reserves of Crude Oil, Natural
Gas Liquids, and Natural Gas in the U. S, and
Canada as of December 31, 1979"

ESTIMATED ORIGINAL OIL-IN-PLACE AND ULTIMATE RECOVERY OF CRUDE OIL BY TYPE OF ENTRAPMENT - DECEMBER 31, 1979

(Thousands of Barrels of 42 U.S. Gallons)

	Utah	United States
Estimated Original Oil-In-Place		
Structural	529,921	283,633,351
Stratigraphic	3,353,069	176,389,149
Estimated Ultimate Recovery		
Structural	133,999	97,759,835
Stratigraphic	688,169	50,021,753

Source
American Petroleum Institute
"Reserves of Crude Oil, Natural
Gas Liquids, and Natural Gas in the
U. S. and Canada as of December 31, 1979"

ESTIMATED ORIGINAL OIL-IN-PLACE AND ULTIMATE RECOVERY OF CRUDE OIL BY RESERVOIR LITHOLOGY - DECEMBER 31, 1979

(Thousands of Barrels of 42 U.S. Gallons)

	Utah	United States
Estimated Original Oil-In-Place		
Sandstone	2,253,177	324,146,181
Carbonate	1,590,300	129,787,696
Other	39,513	6,088,623
Estimated Ultimate Recovery		
Sandstone	357,617	108,868,067
Carbonate	459,231	37,723,904
Other	5,320	1,189,617

Source
American Petroleum Institute
"Reserves of Crude Oil, Natural
Gas Liquids, and Natural Gas in the
U. S. and Canada as of December 31, 1979"

Despite adverse economic conditions and significant overall increases in the cost of doing business, the petroleum industry is continuing to forge ahead with aggressive domestic exploration and production plans.

In Utah, where the drilling costs are some of the highest in the Nation and the potential for a major find one of the lowest, there is an increase in drilling activity. In 1979, 255 wells were drilled while in 1980 the preliminary drilling figure rose to 306 wells. Projections for 1981 are even higher.

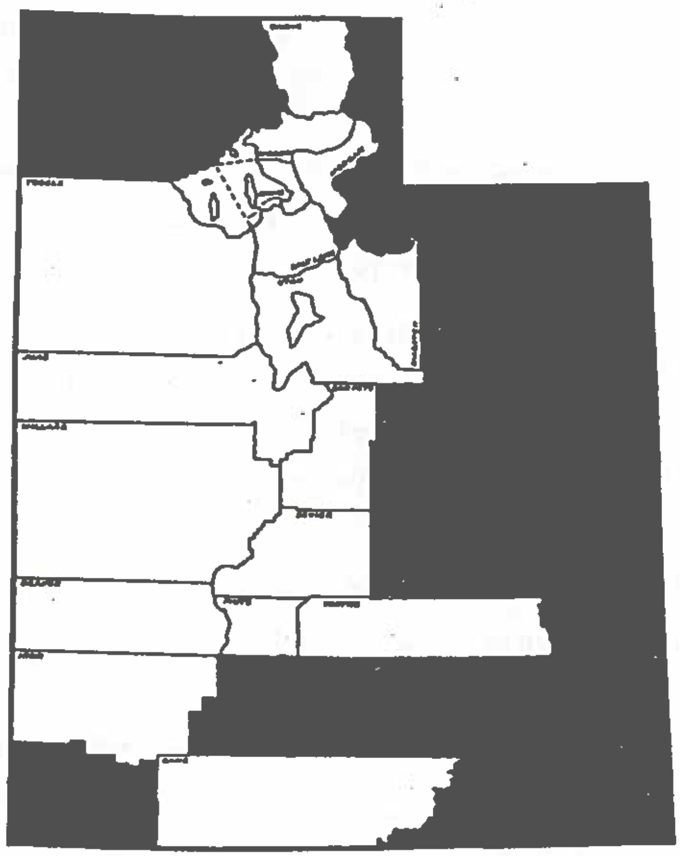
Although drilling activity has increased, Utah has dropped from this Nation's 10th largest producer of crude oil to 15th. In fact, over the past five years Utah's crude oil production has dropped over 32% from 123,003 barrels per day in 1975 to only 82,619 barrels per day in 1979. The latter figure lowering the State's barrels per well per day figure to only 59.0.

A majority of industry exploration is taking place in the northeastern sections of the State. This includes the counties of Duchesne and Uintah where exploration has been going on for many years and the areas of Rich, Cache and Morgan counties where present geophysical data places the assumed path of the Overthrust Belt.

If indeed, the Overthrust Belt turns out to be a major production belt for petroleum products, then Utah can expect to reap the rewards. However, a majority of the Overthrust Belt exploration is taking place in Wyoming and currently, only one significant discovery has been within Utah which would justify major investments into exploration within the State.

Additionally, major strides are being made in the development of oil shale and tar sands projects along Utah's eastern frontier. Production here, however, is limited to only a few "test barrels" and is far from being cost effective under current technologies. Also, some tar sands and oil shale methods require an enormous expertise in the mining field -- something that the country's oil companies are lacking.

Simply stated, Utah's energy future is precariously balanced. On one hand the industry awaits a major field discovery to increase exploration and production and place Utah at the top of the Nation's energy map. On the other hand the state continues to have mediocre energy findings which can only extend the state's downward trend within the industry.



Counties with oil and/or gas production

EXTENT AND ECONOMIC VALUE OF INDUSTRY

Number of Counties			29
Number of Counties with oil and/or gas production			12
Total land area of State (acres)			52,541,400
Area proved productive of oil and/or gas (acres)			260,800
Estimated non-productive area leased January 1, 1980 (acres)			28,630,000
Percent of total land area productive or leased			55.0%
Value at wells of crude oil produced all time to January 1, 1980		$	3,146,411,603
Average field price of crude oil per barrel in 1979		$	11.45
Value at wells of crude oil produced in 1979		$	312,081,000
Value at wells of natural gas produced in 1979		$	68,046,000
Total value of crude oil and natural gas in 1979		$	380,127,000
Percent petroleum value to total all minerals			30.5%
Principal mineral products in order of value:			
1st	Crude Petroleum		
2nd	Copper		
3rd	Coal		
Number of employees engaged in crude oil and natural gas production			3,551
First year of production of crude oil			1907
natural gas			1886
First recorded production of crude oil (barrels)	1924		3,000
natural gas (Mcf)	1927		927
Geophysical Activity — Crew months worked in 1979			106

Source: IPAA-The Oil Producing Industry in your State, 1980

PRODUCTION AND RESERVES

Year of largest production (crude oil)	1975
Crude oil produced in year of largest production (barrels)	42,301,000
Percent of crude oil produced by stripper wells	0.4%
Number of producing wells at end of 1979: Crude Oil	1,346
Gas & Condensate	182
Total	1,528
Average daily production of crude oil per well at end of 1979	59.0
Percent of wells pumping or on artificial lift	57.2%

Average production in barrels daily:

	1976	1977	1978	1979
Crude Oil	93,727	90,721	85,940	74,674
Natural Gas Liquids	7,131*	8,510*	7,267*	7,945*
Total Petroleum Liquids	100,858	99,231	93,207	82,619

Production and new reserves found in 1979:

	Crude Oil	Natural Gas Liquids	Total Liquids Petroleum	Natural Gas
	(Thousand Barrels)			(Mil. Cu. Ft.)
New Reserves Found	15,853	−949‡	14,904	25,225
Estimated Production	26,882	2,573	29,455	46,801
Net Change in Reserves	−11,029	−3,522	−14,551	−21,576

Production and new reserves found all time to December 31, 1979:

	Crude Oil	Natural Gas Liquids	Total Liquids Petroleum	Natural Gas
Total Reserves Found	819,677	79,644	899,321	2,043,085
Total Production	675,335	51,452	726,787	1,366,006
Proved Reserves Dec. 31, 1979	144,342	28,192	172,534	677,079

EXPLORATION AND DEVELOPMENT

Deepest well drilled to January 1, 1980 (feet)	*Dry Hole*	21,786
Deepest producing well drilled to January 1, 1980 (feet)	*Oil*	17,732

Wells and footage drilled in 1979:

	Wildcat Wells		Development Wells		Total Wells	
	Number	Percent	Number	Percent	Number	Percent
Oil Wells	8	9.3	50	29.6	58	22.7
Gas Wells	12	14.0	91	53.8	103	40.4
Dry Wells	66	76.7	27	16.0	93	36.5
Service Wells	0	0	1	0.6	1	0.4
Total Wells	86	100.0	169	100.0	255	100.0
Avg. Depth per Well	5,852		6,055		5,986	
Total Footage	503,244		1,023,241		1,526,485	

Total wells drilled all time to January 1, 1980 (Excluding service wells):

Oil		Gas		Dry		Total	
Number	Percent	Number	Percent	Number	Percent	Number	Percent
2,269	39.8	679	11.9	2,756	48.3	5,704	100.0

Rotary Drilling Rigs Active in 1979 (average) 29

*Estimated

‡Downward Revision of Previous Estimate

Source: IPAA-The Oil Producing Industry in your State, 1980

* DRILLING STATISTICS *

The following chart indicates the number of Notices of Intention to Drill filed with and approved by the Division of Oil, Gas, and Mining, for the period 1970 through November, 1979, inclusive:

	1979	1971	1972	1973	1974	1975	1976	1977	1978	1979
Beaver					1					
Box Elder					2					3
Cache						2	1			1
Carbon	4	0	0	8	5	5	5	3	4	6
Daggett	1	1	4	3	3		2	17	0	1
Davis					1			1	0	0
Duchesne	27	52	90	100	72	48	17	20	50	40
Emery	2	0	3	8	18	6	3	10	6	11
Garfield	7	20	8	7	4	3	1	5	1	1
Grand	14	14	42	65	41	43	60	83	71	105
Iron	1			1				1	0	0
Juab	1						1	0	2	3
Kane	2	1	1	2		1	3	1	0	0
Millard				2	3		1	1	1	5
Morgan								6	1	2
Rich							3	9	7	6
San Juan	5	23	28	44	80	48	82	70	58	56
Salt Lake					2	1	2	0	0	0
Sanpete		2	2				3	0	1	2
Sevier		2	2		1	4	2	6	0	4
Summit	1	1		2	5	7	16	34	25	28
Uintah	27	16	24	21	37	20	30	95	207	108
Tooele						3		3	0	5
Utah								2	0	2
Wasatch	1	1		1			1	0	2	2
Washington	1	3	1	5	4	8	2	6	1	0
Wayne	5	1	2	4	4	2	1	1	2	2
TOTAL:	11	137	207	273	283	202	236	376	443	393

Source: State of Utah, Department of Natural Resources
Division of Oil, Gas and Mining, Annual Report,
Fiscal Year 1978-1979.

OIL AND GAS WELLS DRILLED IN UTAH

	Wildcat Wells	Development Wells	Total Wells	Average Depth Per Well (Feet)	Total Footage
1965	--	--	169	-----	---------
1966	--	--	144	-----	---------
1967	--	--	144	-----	---------
1968	--	--	99	-----	---------
1969	--	--	175	-----	---------
1970	--	--	85	-----	---------
1971	--	--	87	-----	---------
1972	--	--	160	-----	---------
1973	70	126	196	8,592	1,683,960
1974	56	140	196	8,279	1,622,700
1975	66	130	196	8,434	1,653,028
1976	39	87	126	6,765	852,418
1977	94	183	277	6,116	1,694,144
1978	79	198	277	6,117	1,694,448
1979	86	169	255	5,986	1,526,485

TOTAL UTAH OIL AND GAS WELLS DRILLED TO ALL TIME

	Oil	Per Cent	Gas	Per Cent	Dry	Per Cent	Total	Per Cent
To Jan. 1, 1980	2,269	39.8	679	11.9	2,756	48.3	5,704	100.0

Source: The Oil Producing Industry in Your State - Independent Petroleum Association of America

ESTIMATED AVERAGE COST TO DRILL
AND EQUIP OIL AND GAS WELLS
(INCLUDING DRY HOLES)

	UTAH			UNITED STATES		
	Cost per foot (Dollars)	Avg. depth per well (Feet)	Avg. cost per well (Dollars)	Cost per foot (Dollars)	Avg. depth per well (Feet)	Avg. cost per well (Dollars)
1960	$18.67	5,464	$102,013	$13.01	4,223	$ 56,941
1965	20.71	5,209	107,878	13.44	4,573	61,461
1970	32.40	6,635	214,974	18.84	5,037	94,897
1975	84.38	8,260	696,978	36.99	4,806	177,774
1977	71.45	6,221	444,490	46,81	4,853	227,169
1978*	87.45	6,411	560,753	56.64	4,943	279,950

* Latest data available

Source: Independent Petroleum Association of America -
The Oil Producing Industry in your State

Exploration & [illegible]duction [illegible]
81-6

WELL STATISTICS FOR

UTAH

Total Wells Drilled (all time)	5,704
Total Wells Drilled (last 10 years)	1,855
Current number of producing wells	1,528

Although increased exploration and production are essential, this type of activity would be useless unless the newly discovered oil and gas could be transported from the wellhead to its ultimate destination, the service station. To facilitate this massive movement of oil and gas, an integrated and highly sophisticated transportation system is needed. The major link in this transportation system is the pipeline.

Currently, there are over 1,950 miles of pipeline that criss-cross the State of Utah. This will grow substantially with the addition of 420 miles of pipeline from the Rocky Mountain Pipeline Project as well as hundreds of miles from the proposed Grand Valley Pipeline running from Southern California to Salt Lake valley refineries.

From the 1,950 miles of pipeline running throughout the State, over $1,202,497 in property taxes were paid in 1980. This is an average of over $616.00 per mile. Of course, these figures do not include taxes paid on the products carried through the pipeline system. This system carries crude oil and natural gas into Utah from Sinclair, Wyoming, Rangely, Colorado and Canada. Additionally, a number of pipelines carry the refined products to Texas, Oregon, Colorado, Idaho, New Mexico and Washington.

The function of a pipeline system is very complex, not only in the physical operation but in regulation. On a physical operations basis for example, there must be constant monitoring of the mcf's and barrels flowing through a particular portion of a pipeline at any given moment. There must be a capability to shut down a section of a pipeline for maintenance purposes. And some pipelines must be held at specific temperatures and pressures to effectively move various types of crude oil and petroleum products.

The regulation of pipelines is also complex. Those that are interstate carriers, that is, crossing state lines, are regulated by the Interstate Commerce Commission (ICC). These pipelines fall under all federal regulations governing interstate commerce, including manditory utilization of tariff filing records denoting type, quantity, point of origin, and destination all petroleum carried in a pipeline.

Those that are intrastate, that is, not crossing state lines are regulated solely by the Public Service Commission. The Public Service Commission tracks the petroleum moving through these lines by the same process as the ICC - the tariff filing records.

Indeed, Utah's involvement within the petroleum industry would be practically non-existent without this highly regulated and physically complex transportation system.

# # #

CRUDE OIL AND REFINED PRODUCTS PIPELINES

Name	Operator	Crude Oil Gathering Lines (mi.)	Gathering Lines (dia.")	Main Lines (mi.)	Main Lines (dia.")	Main Lines (capacity) BPD	Origin	Destination
I. <u>Crude Oil</u>								
Amoco	Amoco Pipeline Co.	3 24	4" 6"	22 77 3	6" 8" 10"	40,000	Rangely, CO	N. Salt Lake, UT
Chevron	Chevron Pipeline Company	10	6" 3"	182 7 7 7 4 26	10" 3" 4" 6" 8" 8"& 10"	108,000	Rangely, CO	N. Salt Lake, UT
Four-Corners	Four-Corners Pipeline Company (Atlantic Richfield)	43 17 13 6	4" 6" 8" 10"	2 22	12" 16"	20,000	Aneth, UT	Farmington, NM
Texas-New Mexico	Texas Pipeline Co.	1 18 8 3	4" 6" 8" 10"	17	16"	16,000 to 18,000	Aneth, UT	Jal, NM
Ute	Pure Transportation Company (Union Oil)			67	10"	Not in Operation	Lisbon, UT	Aneth, UT
II. <u>Refined Products</u>								
Chevron Products	Chevron Pipeline Co.			214 6	8" 6"	62,000	N. Salt Lake, UT	Pasco, WA
Pioneer	Pioneer Pipeline Co.			3 74 5 2	6" 8" 10" 12"	24,956	Sinclair, WY	N. Salt Lake, UT

Source: Federal Energy Regulatory Commission, <u>Class A and B Pipeline Company Annual Report</u>, December 1979.

UTAH NATURAL GAS TRANSMISSION PIPELINES

Name	Operator	Pipeline Size O.D.(in.)/Length (mi.)															Origin	Destination
		<3	3.5	4.5	6.63	8.63	10.75	12.75	16	18	20	22	24	26	30	34		
El Paso[1]	El Paso Pipeline Company			12.9	20.7	21.5	18.7	12.0	11.1		12.3		12.2		25	1	Aneth, UT	New Mex./Texas
Mesa[2]	Mesa Pipeline Company	10.8	2.2	16.1	4.6	13.6		55.2									NE Grand Co., UT	MFS 20" line, Uintah Co.
Mountain[1] Fuel	Mt. Fuel Supply Co.	2.0	1.0	3.8	24.0	1.0	15.8	1.3	36.2	40.2	85.5		32.1				Eastern, CO Southern, WY	Salt Lake City
					41.4	15.2		38.4	16.4	63.3	106						Bonanza, UT; Emery and, Duchesne, Co., UT	Orem, UT; Carbon Co., UT
Northwest[2]	Northwest Pipeline Company				7			9.0			1.3	9.4		190			Canada S. Juan Basin, NM	Ore./Wash./Id. Utah/Colorado
Utah Service[2]	Utah Gas Service Company					53											Atonah, UT	Jensen, UT

Source: 1 - Federal Energy Regulatory Commission, Class A and B Pipeline Company Annual Report, December 1979.
2 - Utah Tax Commission, Form No. 2, Pipeline Company Annual Report.

Crude oil is a complex mixture of chemical compounds consisting of both hydrogen and carbon. These compounds or hydrocarbons must be separated from one another to transform crude into useful consumable products. To accomplish this goal, the crude oil must be refined.

The refining process begins by boiling the crude oil at temperatures that transform the complex hydrocarbons into groups of hot liquids and vapors, each covering a range of boiling points. In oil refining these groups are called boiling fractions or just fractions. Top fractions, those with a lower boiling point, go into gasoline, the next into aviation fuels and another into diesel and home heating oils. Finally, heavier fractions, those with higher boiling points, go into industrial fuel oil, coke or are separated into more fractions. (See Flow Diagram)

After the initial separation of these hydrocarbons, other refining processes take place. These include: the reforming process which takes the ligher fractions and reforms them to make a gasoline blending stock; catalytic crackers, where the gas oils are broken down into further separation; and cokers where the oils are reheated and thermally cracked into larger molecules thereby producing coke. Finally, these complex mixtures enter a treating and blending phase where they are mixed to form final products such as propane, fuels, plastics, lotion bases, coke, asphalt, etc.

As complex and expensive as the refining process is, it is no wonder that there are only three hundred refineries in the United States. Two-thirds of these have capacities of less than 50,000 barrels per day, and only about 30 have capacities of more than 150,000 barrels per day.

In Utah, there are eight refineries. The largest is the Chevron refinery in North Salt Lake which has a capacity to process 45,000 bbls of crude per day, and the smallest is Morrison Petroleum Refinery in Woods Cross, Utah where the capacity to process 2,500 bbls per day. Statewide the eight refineries have the capacity to refine approximately 165,000 bbls of crude per day.

Under present economic conditions, to build a refinery capable of producing what the state's eight refineries now produce, it would cost approximately one billion dollars. This is the construction cost alone and does not include the massive amounts of money it would take to run such a refinery.

1979
UTAH REFINERY CRUDE RUNS

	Crude Capacity BBLS per calendar day		Average Crude Runs (Barrels per calendar da
Amoco Oil Company Salt Lake City, Utah	39,000	Crude Run Percent of Capacity Finished Product Yield	35,400 91% 35,200
Caribou Four Corners, Inc. Woods Cross, Utah	8,300	Crude Run Percent of Capacity Finished Product Yield	4,980 55% 4,486
Chevron USA, Inc. Salt Lake City, Utah	45,000	Crude Run Percent of Capacity Finished Product Yield	44,300 98.4% 47,000
Dixon Oil Company Gunnison, Utah	Refinery under construction		
Husky Oil Company North Salt Lake, Utah	25,000	Crude Run Percent of Capacity Finished Product Yield	13,969 56% 15,149
Morrison Petroleum Woods Cross, Utah	2,500	Crude Run Percent of Capacity Finished Product Yield	1,200 48% 1,170
Phillips Petroleum Company Woods Cross, Utah	25,500	Crude Run Percent of Capacity Finished Product Yield	24,500 98% 24,255
Plateau, Inc. Roosevelt, Utah	8,500	Crude Run Percent of Capacity Finished Product Yield	6,000 60% 5,100
Wesreco, Inc. Woods Cross, Utah	13,400	Crude Run Percent of Capacity Finished Product Yield	8,700 64.9% 8,500
TOTAL (9)		Crude Run Percent of Capacity Finished Product Yield	139,049 82% 138,153

Source: Utah Petroleum Association

AVIATION FUEL REFINED AND CONSUMED
(Thousands of Gallons)

Fiscal Year[1/]	Refined in Utah	Consumed in Utah: Total	Government Agencies	Evaporation Allowance	Taxable Sales
1955	27,695	21,855	13,001	252	8,602
1960	66,516	31,503	14,629	337	16,537
1965	62,797	46,053	29,392	333	16,328
1970	112,357	87,578	46,959	812	39,807
1971	95,983	78,349	36,473	838	41,038
1972	100,904	85,993	42,870	862	42,261
1973	85,871	68,338	24,179	883	43,276
1974	94,040	74,158	30,624	871	42,664
1975	103,124	83,136	35,810	946	46,380
1976	99,536	83,213	37,688	911	44,615
1977	135,336	107,891	60,279	952	46,660
1978	137,271	113,328	55,874	1,149	56,305
1979	139,211	125,795	60,693	1,302	63,800
1980	126,565	119,096	52,440	1,333	65,323

1/ Fiscal year for the State of Utah ends on June 30 of each year.

Source: Utah Foundation

MOTOR FUEL REFINED AND CONSUMED IN UTAH

(Thousands of Gallons)

Fiscal Year	Refined In Utah	Consumed in Utah: Total	Government Agencies	Evaporation Allowance	Taxable Sales
1950	292,035	199,392	6,543	5,778	187,071
1955	455,613	257,006	5,014	7,144	244,848
1960	636,380	320,090	5,776	6,282	308,033
1965	726,284	385,568	12,081	7,469	366,018
1970	935,847	508,710	15,276	9,869	483,565
1971	945,467	543,225	15,240	10,560	517,425
1972	946,562	587,221	16,483	11,415	559,324
1973	948,915	626,897	18,206	12,174	596,517
1974	947,818	616,185	17,703	11,970	586,513
1975	942,314	631,451	17,400	12,281	601,770
1976	1,022,183	659,836	17,925	12,839	629,073
1977	1,057,951	694,855	17,741	13,542	663,572
1978	1,007,706	731,544	17,530	14,280	699,734
1979	1,052,630	752,597	21,068	14,618	716,912
1980	1,041,278	694,394	18,868	13,511	662,015

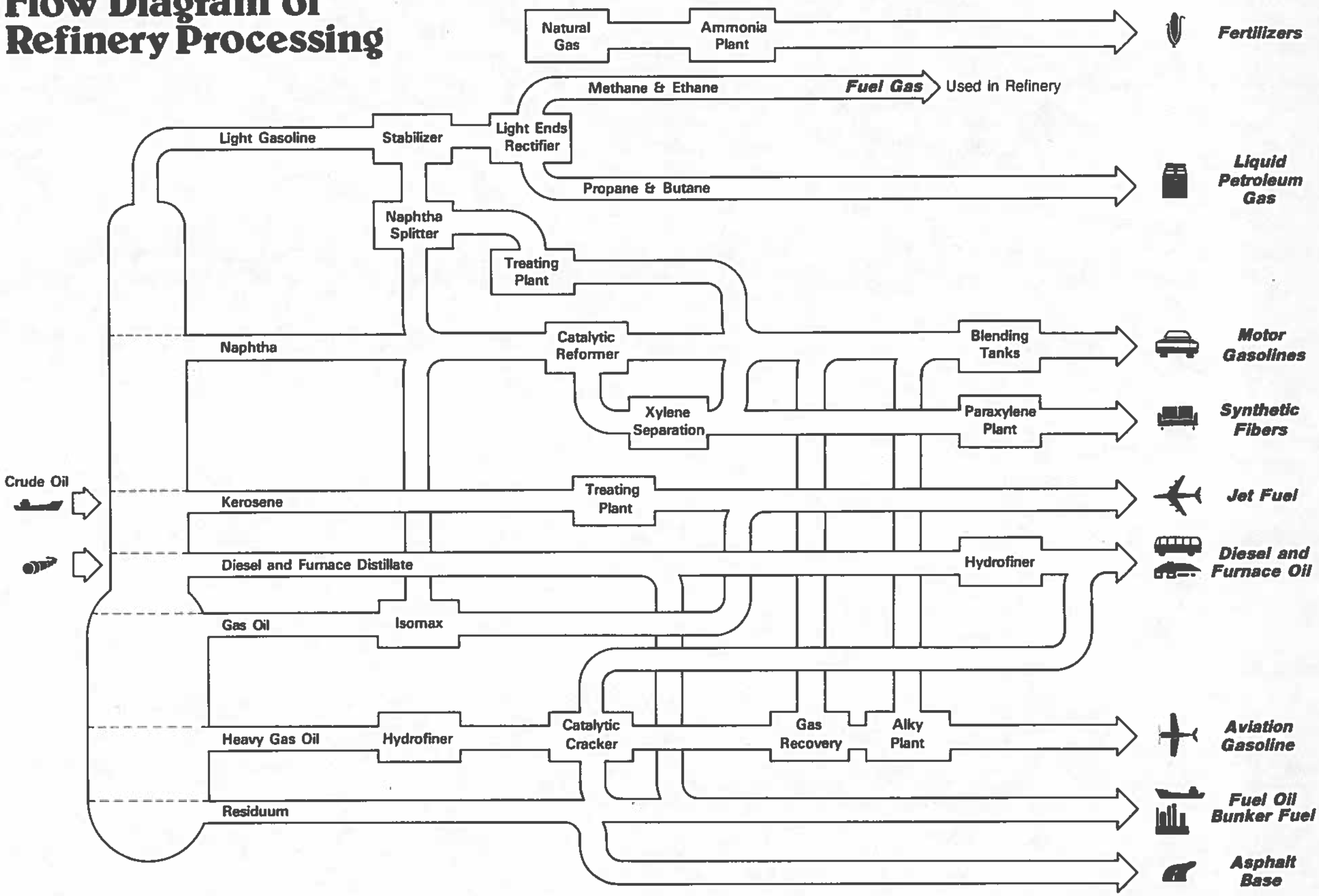
Source: Utah Foundation

AVERAGE ANNUAL YIELDS FROM A BARREL OF CRUDE OIL — 1976[P/]

Product	Gallons Per Barrel	% Yield
Gasoline	19.11	45.5
Jet Fuel	2.86	6.8
Ethane (including ethylene)	0.04	0.1
Liquefied gases	1.01	2.4
Kerosene	0.46	1.1
Distillate fuel oil	9.16	21.8
Residual fuel oil	4.33	10.3
Petrochemical feedstocks	1.39	3.3
Special naphthas	0.29	0.7
Lubricants	0.54	1.3
Wax	0.04	0.1
Coke	1.09	2.6
Asphalt	1.18	2.8
Road oil	0.00*	0.0
Still gas	1.55	3.7
Miscellaneous	.42	1.0
Shortage[1]	-1.47	-3.5
Totals	42.0	100.0

P/Preliminary
1/Processing gain (-) or loss (+)
Source: Percentage yield, U. S. Bureau of Mines; Gallons per barrel computed by American Petroleum Institute.

Flow Diagram of Refinery Processing



In the 1970's, the retail market for gasoline saw greater changes than any other comparable period. Primarily, this was due to inflation, major disruptions in the supply of imported crude oil and the accompanying rapid price increases. These changes in gasoline marketing which included the reduction in the number of service stations, have led to accusation that a conspiracy has been started by refiners in an effort to reduce or in some extremes, end competition. The "conspiracy" concept has led to a myriad of proposals for governmental action.

Actually, however, the changes that occurred in the petroleum market place during the 1970's were normal economic responses to new supply and demand situations and to a business environment tainted by overregulation. It was not, as some critics say, the result of actions designed to stifle competition in the marketplace.

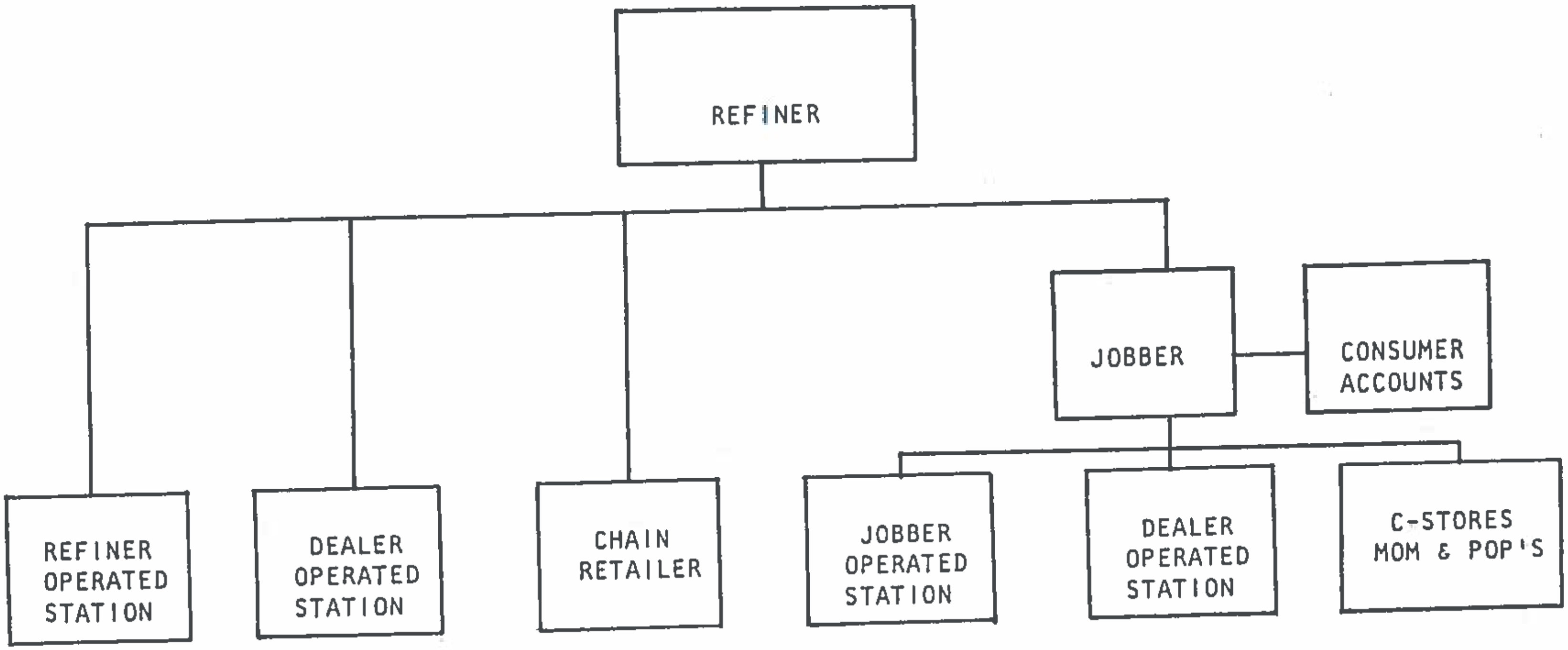
Today, the marketing of petroleum products has taken on an entirely new concept. Following is a diagram showing the structure of today's marketing system. It traces the petroleum product after it leaves the refiner. As can be seen, there are six different outlets through which the product may be distributed. This is considerably greater than in the earlier 1970's and obviously does not reduce competition.

The corner service station with its "full service" has given way to the "self serve" concept, particularly here in Utah which, according to National Petroleum News, has the highest rate of self service users in the nation, 81%. (See page #4). Although this trend has caused the number of service stations to dramatically decrease, the total dollar sales of these stations has seen a marked increase. In fact, the State of Utah has lost over 160 service stations in the past five years while increasing in total sales volume for the same period over $312,477,000, or an increase of over 185%.

With sales volume up and "self service" and "convenience stores" coming to the front of an already complex marketing system, petroleum marketing is experiencing a realignment that could only take place in a free enterprise system.

# # #

NUMBER OF STATIONS BY CATEGORY



MAJORS:	6,000	92,000	24,000	14,400	26,000	38,100
OTHERS:	8,000	9.700				

NOTE: ESTIMATES BASED ON 1979 DATA.

Sources: Department of Energy, National Petroleum News, American Petroleum Institute, National Oil Jobbers Council, Inc.

SERVICE STATIONS AND DOLLAR VOLUME IN UTAH

1977 vs. 1981

YEAR	NUMBER OF STATIONS	DOLLAR VOLUME
1977	1,149	$367,125,000
1979	1,072	461,060,000
1980	1,031	617,820,000
1981	989	679,602,000

Source: National Petroleum News
Fact Book, 6-81

SELF-SERVICE APPEAL TO MOTORISTS

STATE	PERCENT OF BUYERS	RANK
UTAH	81%	1
IDAHO	72%	4
COLORADO	71%	6
WYOMING	70%	9
NATION-WIDE AVERAGE	55%	

Source: National Petroleum News
Fact Book, 6-81

RETAIL STATION DATA

(PER 1977 CENSUS)

	NUMBER OF STATIONS	NUMBER OF GASOLINE PUMPS	TOTAL GASOLINE GALLONAGE
UTAH	993	5,758	352,251,000
UNITED STATES TOTAL	146,523	765,298	74,548,029,000

Source: National Petroleum News
Fact Book, 6-81

UTAH STATE
GASOLINE TAX COLLECTIONS

(9¢/gallon tax rate as of 12/31/80)

Total Motor Fuel Tax Revenue		Percent of Change	Motor Fuel Taxes as percent of Total Tax Revenues
1979	1980		
74,111,000	74,074,000	0.0	9.4%

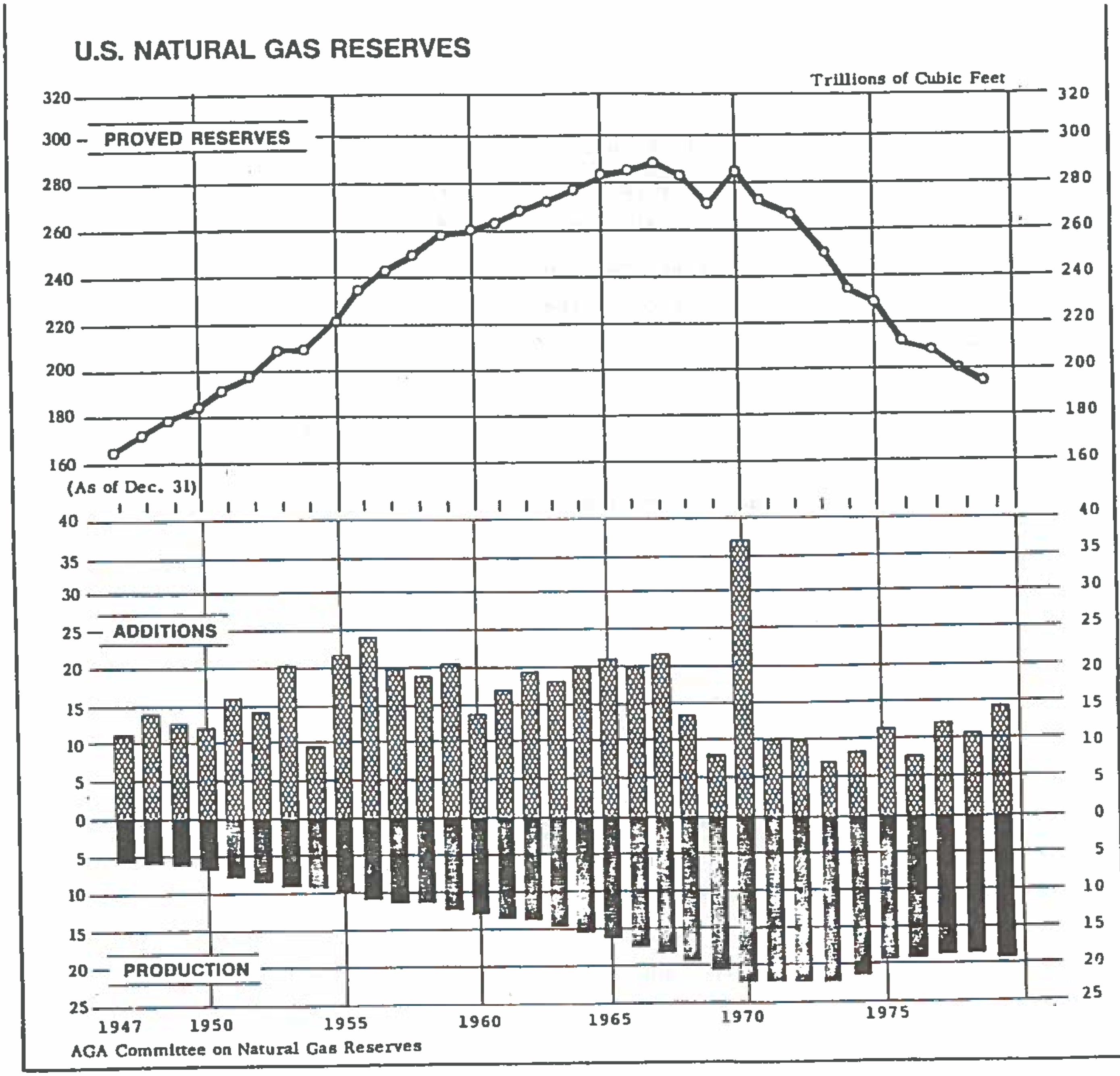
Source: National Petroleum News
Fact Book, 6-81

The search for oil is inseparable from the search for natural gas. Usually, when a discovery is made, the well will contain both of the substances. After their discovery, vast differences begin to appear. For example, while oil is measured in barrels, natural gas is measured in mcf's or thousands of cubic feet. Although 1 mcf may seem like a great deal, this is equivalent to 0.17 of a barrel of oil in energy output.

The difference does not end here because natural gas can come in two forms, sweet gas and sour gas. Sour gas differs from sweet gas in that it contains a multitude of chemicals that, until they are removed, makes the sour gas unuseable. The process involved in removing these unwanted and dangerous chemicals is an added cost to the company producing the product. This added cost can not be anticipated until a discovery is made. Additionally, after the unwanted particulant is removed from the gas, the gas changes its volume which has an effect upon its price.

Natural gas prices have not been deregulated and are subject to the pricing mechanisms established by FERC, the Federal Energy Regulatory Commission. These mechanisms are extremely complex and take into account whether the gas is sweet or sour, the depth at which the gas come from, the geological formation it comes from, and a number of other factors, including temperatures and pressures.

# # #



Source: American Petroleum Institute, "Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United State and Canada as of Dec. 31, 1979"

TABLE I

ESTIMATED TOTAL PROVED RESERVES OF NATURAL GAS IN THE UNITED STATES

(Millions of Cubic Feet – 14.73 psia, at 60°F.)

State		Reserves as of 12-31-78	Changes in Reserves During 1979: Revisions	Extensions	New Field Discoveries	New Reservoir Discoveries in Old Fields	Net Change in Underground Storage/e	Production/c	Reserves as of December 31, 1979: Total Gas	Non-Associated	Associated-Dissolved	Underground Storage /f
Alabama		751,219	(1,060)	85,116	156,691	896	0	59,710	933,152	911,142	22,010	0
Alaska		31,612,295	502,434	1,000	50,000	0	0	225,281	31,940,448	5,230,173	26,710,275	0
Arkansas		1,627,064	67,495	57,161	4,976	4,700	(611)	130,221	1,630,564	1,405,172	200,483	24,909
California	/a	5,095,082	129,162	54,108	5,413	68,647	22,431	330,378	5,044,465	1,862,249	2,785,989	396,227
San Joaquin Basin		3,945,963	105,024	50,880	2,600	28,647	7,203	260,710	3,879,607	1,745,456	2,000,522	133,629
Coastal Region	/a	848,070	40,932	2,666	2,813	40,000	13,537	44,822	903,196	116,047	568,562	218,587
Los Angeles Basin	/a	301,049	(16,794)	562	0	0	1,691	24,846	261,662	746	216,905	44,011
Colorado		1,965,765	6,640	233,511	22,163	2,601	3,264	190,863	2,043,081	1,826,831	177,496	38,754
Florida		160,296	(648)	0	0	0	0	51,019	108,629	0	108,629	0
Illinois		420,437	3,556	0	3,614	0	45,302	1,718	471,191	4,452	4,848	461,891
Indiana		56,710	12	0	0	0	(4,122)	151	52,449	929	13	51,507
Kansas		12,287,341	752,053	231,363	22,826	8,822	4,719	791,351	12,515,773	12,257,228	142,080	116,465
Kentucky		718,929	(331)	26,597	2,116	1,540	5,833	55,721	698,963	516,466	40,934	141,563
Louisiana	/a, /g	49,674,148	(77,279)	1,439,423	911,112	834,623	(4,028)	7,223,674	45,554,325	38,441,924	6,795,814	316,587
North		2,379,165	100,060	173,788	15,630	38,991	3,736	329,346	2,382,024	1,363,422	800,631	217,971
South	/a, /g	47,294,983	(177,339)	1,265,635	895,482	795,632	(7,764)	6,894,328	43,172,301	37,078,502	5,995,183	98,616
Michigan		1,768,581	101,536	0	29,437	0	61,485	163,116	1,797,923	605,819	531,784	660,320
Mississippi		1,410,514	(1,700)	134,131	33,302	19,707	(7,003)	159,591	1,429,360	1,276,854	68,239	84,267
Montana		991,668	42,250	50,699	4,074	1,915	7,757	62,272	1,036,091	807,645	63,483	164,963
Nebraska		72,839	2,293	654	5,000	0	6,993	2,777	85,002	10,680	12,696	61,626
New Mexico		13,261,489	359,531	893,821	44,642	22,349	(7,648)	1,113,446	13,460,738	11,218,049	2,222,349	20,340
North		9,646,466	32,086	720,282	7,739	0	(99)	558,071	9,848,403	9,790,867	52,468	5,068
South		3,615,023	327,445	173,539	36,903	22,349	(7,549)	555,375	3,612,335	1,427,182	2,169,881	15,272
New York		262,711	100	22,800	4,100	0	7,357	14,548	282,520	162,494	171	119,855
North Dakota		411,485	52,063	31,285	13,071	19,538	0	38,095	489,347	45,537	443,810	0
Ohio		1,560,478	0	255,397	2,760	2,330	12,782	124,665	1,709,082	1,170,455	142,878	395,749
Oklahoma		11,463,291	542,058	782,152	33,647	24,976	4,452	1,659,568	11,191,008	8,789,474	2,139,212	262,322
Pennsylvania		2,093,516	0	198,075	4,800	0	51,234	96,313	2,251,312	1,606,669	11,149	633,494
Texas	/a	54,600,235	156,784	1,880,850	1,120,074	654,154	11,469	6,812,795	51,610,771	39,454,582	11,892,171	264,018
District 1		1,067,071	22,228	46,734	10,669	9,561	0	110,017	1,046,246	806,737	239,509	0
District 2	/a	4,326,275	120,337	27,591	49,895	81,826	(453)	423,974	4,181,497	2,835,284	1,346,213	0
District 3	/a	13,273,295	(197,917)	191,870	551,043	41,100	(14,336)	1,731,969	12,113,086	10,089,855	1,942,477	80,754
District 4	/a	10,527,441	(624,538)	132,938	142,846	385,212	0	1,232,227	9,331,672	7,390,729	1,940,943	0
District 5		692,917	25,043	91,587	14,284	4,561	(3,776)	114,959	709,657	595,922	83,421	30,314
District 6		4,302,223	(110,121)	466,529	274,598	81,279	28,502	350,111	4,692,899	3,544,658	1,037,619	110,622
District 7B		860,879	(25,438)	309,539	19,561	19,316	171	148,599	1,035,429	695,563	314,845	25,021
District 7C		1,679,012	152,228	16,102	6,572	229	(13)	289,633	1,564,497	1,047,757	515,072	1,668
District 8		8,294,307	417,743	172,471	20,955	11,367	0	1,148,444	7,768,399	4,877,902	2,890,497	0
District 8A		1,075,564	137,369	20,187	262	175	0	143,134	1,090,423	81,349	1,009,074	0
District 9		990,496	27,942	21,337	6,782	3,948	1,559	119,945	932,119	648,615	267,865	15,639
District 10		7,510,755	211,908	383,965	22,607	15,580	(185)	999,783	7,144,847	6,840,211	304,636	0
Utah		698,655	6,764	7,657	9,996	581	227	46,801	677,019	397,233	277,521	2,325
Virginia		79,064	0	4,200	1,200	0	0	8,597	75,867	75,867	0	0
West Virginia		2,683,136	(199)	300,653	3,150	15,075	18,831	153,096	2,867,550	2,420,492	46,362	400,696
Wyoming		4,315,775	263,725	414,160	74,915	6,550	2,670	392,304	4,685,491	3,634,622	995,265	55,604
Miscellaneous	/d	258,984	312	8,300	12,700	500	(4,071)	2,282	274,443	56,844	2,999	214,600
Total United States		200,301,707	2,907,551	7,113,113	2,575,779	1,689,504	239,323	19,910,353	194,916,624	134,189,882	55,838,660	4,888,082
Gulf of Mexico Detail												
Louisiana	/b	30,733,863	1,297,540	860,855	771,692	583,991	0	4,703,633	29,544,308	25,414,544	4,129,764	0
Texas	/b	4,901,143	154,835	60,675	521,112	11,979	0	784,310	4,865,434	4,800,580	64,854	0
Total Gulf of Mexico		35,635,006	1,452,375	921,530	1,292,804	595,970	0	5,487,943	34,409,742	30,215,124	4,194,618	0

/a Includes offshore
/b Included with Louisiana and Texas
/c Preliminary net production
/d Includes Arizona, Iowa, Maryland, Minnesota, Missouri, Oregon, South Dakota, Tennessee and Washington
/e The net difference between gas stored and gas withdrawn from underground storage reservoirs, inclusive of adjustments and native gas transferred from other reserve categories. (Adjustments include change of reporting basis starting in 1974 to report only gas reserves considered recoverable, in effect, reducing gas reserves by 1,024,140 MMCF that would have been reported since 1972 using the former basis.)
/f Proved recoverable gas contained in underground storage reservoirs, including native and net injected gas. (First reported on a recoverable basis in 1973.)
/g Reported quantities include reserves estimated to be recoverable from some reservoirs considered natural gas bearing based on electrical logs, core data and other available engineering and geological data.
( ) Denotes negative figures

NOTE: Reserves on certain portions of the Atlantic OCS are not included because the A.G.A. Reserves Committee did not have sufficient data upon which it could base an estimate of proved reserves for this area as of December 31, 1979.

Source: American Petroleum Institute, "Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States and Canada as of Dec. 31, 1979"

TABLE II

ESTIMATED TOTAL PROVED RESERVES OF NON-ASSOCIATED NATURAL GAS IN THE UNITED STATES

(Millions of Cubic Feet – 14.73 psia, at 60°F.)

State	Reserves as of 12-31-78	Changes in Reserves During 1979					Reserves as of 12-31-79
		Revisions	Extensions	New Field Discoveries	New Reservoir Discoveries in Old Fields	Production /c	
Alabama	725,596	(4,188)	85,116	156,688	896	52,966	911,142
Alaska	5,324,733	26,642	1,000	50,000	0	172,202	5,230,173
Arkansas	1,446,011	(3,692)	52,206	4,500	4,700	98,553	1,405,172
California /a	1,942,374	23,142	37,760	2,600	28,600	172,227	1,862,249
San Joaquin Basin	1,823,012	23,458	37,760	2,600	28,600	169,974	1,745,456
Coastal Region /a	118,665	(516)	0	0	0	2,102	116,047
Los Angeles Basin /a	697	200	0	0	0	151	746
Colorado	1,712,594	17,735	219,700	19,440	2,295	144,933	1,826,831
Florida	0	0	0	0	0	0	0
Illinois	2,447	455	0	2,288	0	738	4,452
Indiana	1,068	10	0	0	0	149	929
Kansas	12,032,661	750,296	208,041	20,220	8,325	762,315	12,257,228
Kentucky	541,697	0	26,392	2,100	1,500	55,223	516,466
Louisiana /a, /e	42,213,444	(289,387)	1,365,596	893,322	778,457	6,519,508	38,441,924
North	1,318,005	125,895	168,320	15,630	38,991	303,419	1,363,422
South /a, /e	40,895,439	(415,282)	1,197,276	877,692	739,466	6,216,089	37,078,502
Michigan	607,556	94,248	0	3,375	0	99,360	605,819
Mississippi	1,251,184	(9,594)	132,061	32,172	19,707	148,676	1,276,854
Montana	768,683	39,259	49,196	2,907	1,530	53,930	807,645
Nebraska	4,907	666	561	4,999	0	453	10,680
New Mexico	10,978,198	131,127	876,324	43,368	12,553	823,521	11,218,049
North	9,596,315	20,972	709,725	7,668	0	543,813	9,790,867
South	1,381,883	110,155	166,599	35,700	12,553	279,708	1,427,182
New York	150,099	0	22,800	4,100	0	14,505	162,494
North Dakota	4,075	5,610	14,280	7,140	14,790	358	45,537
Ohio	1,037,333	0	241,897	2,620	2,050	113,445	1,170,455
Oklahoma	8,994,502	313,883	649,013	27,561	24,777	1,220,262	8,789,474
Pennsylvania	1,499,965	0	198,075	4,800	0	96,171	1,606,669
Texas /a	41,340,511	172,517	1,593,802	1,097,386	623,912	5,373,546	39,454,582
District 1	820,604	8,731	46,734	9,631	9,465	88,428	806,737
District 2 /a	2,890,408	110,009	27,316	47,308	74,628	314,385	2,835,284
District 3 /a	11,087,744	(211,476)	156,453	547,413	39,882	1,530,161	10,089,855
District 4 /a	7,987,715	(356,943)	131,629	141,435	374,121	887,228	7,390,729
District 5	566,160	23,837	90,050	13,600	4,550	102,275	595,922
District 6	2,969,646	70,568	453,209	273,450	77,873	300,088	3,544,658
District 7B	511,049	683	251,187	16,022	17,916	101,294	695,563
District 7C	1,134,915	116,805	404	5,344	191	209,902	1,047,757
District 8	5,343,872	233,534	76,679	18,398	10,810	805,391	4,877,902
District 8A	69,298	12,333	13,762	0	0	14,044	81,349
District 9	711,212	4,090	4,286	3,588	1,417	75,978	648,615
District 10	7,247,888	160,346	342,093	21,197	13,059	944,372	6,840,211
Utah	392,197	8,646	6,669	5,661	255	16,195	397,233
Virginia	79,064	0	4,200	1,200	0	8,597	75,867
West Virginia	2,253,645	0	300,564	3,150	15,075	151,942	2,420,492
Wyoming	3,649,637	(137,423)	342,160	59,374	5,763	284,889	3,634,622
Miscellaneous /d	37,141	200	8,300	12,700	500	1,997	56,844
Total United States	138,991,322	1,140,152	6,435,713	2,463,671	1,545,685	16,386,661	134,189,882
Gulf of Mexico Detail							
Louisiana /b	26,577,081	970,405	801,384	763,342	541,181	4,238,849	25,414,544
Texas /b	4,862,689	125,953	60,675	518,327	11,979	779,043	4,800,580
Total Gulf of Mexico	31,439,770	1,096,358	862,059	1,281,669	553,160	5,017,892	30,215,124

/a Includes offshore
/b Included with Louisiana and Texas
/c Preliminary net production
/d Includes Arizona, Iowa, Maryland, Minnesota, Missouri, Oregon, South Dakota, Tennessee and Washington
/e Reported quantities include reserves estimated to be recoverable from some reservoirs considered natural gas bearing based on electrical logs, core data and other available engineering and geological data.
( ) Denotes negative figures

Source: American Petroleum Institute "Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States and Canada as of Dec. 31, 1979"

TABLE III

ESTIMATED TOTAL PROVED ASSOCIATED-DISSOLVED RESERVES OF NATURAL GAS IN THE UNITED STATES

(Millions of Cubic Feet – 14.73 psia, at 60°F.)

State	Reserves as of 12-31-78	Changes in Reserves During 1979: Revisions	Extensions	New Field Discoveries	New Reservoir Discoveries in Old Fields	Production /c	Reserves as of 12-31-79
Alabama	25,623	3,128	0	3	0	6,744	22,010
Alaska	26,287,562	475,792	0	0	0	53,079	26,710,275
Arkansas	155,533	71,187	4,955	476	0	31,668	200,483
California /a	2,778,912	106,020	16,348	2,813	40,047	158,151	2,785,989
San Joaquin Basin	1,996,525	81,566	13,120	0	47	90,736	2,000,522
Coastal Region /a	524,355	41,448	2,666	2,813	40,000	42,720	568,562
Los Angeles Basin /a	258,032	(16,994)	562	0	0	24,695	216,905
Colorado	217,681	(11,095)	13,811	2,723	306	45,930	177,496
Florida	160,296	(648)	0	0	0	51,019	108,629
Illinois	1,401	3,101	0	1,326	0	980	4,848
Indiana	13	2	0	0	0	2	13
Kansas	142,934	1,757	23,322	2,606	497	29,036	142,080
Kentucky	41,502	(331)	205	16	40	498	40,934
Louisiana /a, /e	7,140,089	212,108	73,827	17,790	56,166	704,166	6,795,814
North	846,925	(25,835)	5,468	0	0	25,927	800,631
South /a, /e	6,293,164	237,943	68,359	17,790	56,166	678,239	5,995,183
Michigan	562,190	7,288	0	26,062	0	63,756	531,784
Mississippi	68,060	7,894	2,070	1,130	0	10,915	68,239
Montana	65,779	2,991	1,503	1,167	385	8,342	63,483
Nebraska	13,299	1,627	93	1	0	2,324	12,696
New Mexico	2,255,303	228,404	17,497	1,274	9,796	289,925	2,222,349
North	44,984	11,114	10,557	71	0	14,258	52,468
South	2,210,319	217,290	6,940	1,203	9,796	275,667	2,169,881
New York	114	100	0	0	0	43	171
North Dakota	407,410	46,453	17,005	5,931	4,748	37,737	443,810
Ohio	140,178	0	13,500	140	280	11,220	142,878
Oklahoma	2,210,919	228,175	133,139	6,086	199	439,306	2,139,212
Pennsylvania	11,291	0	0	0	0	142	11,149
Texas /a	13,007,175	(15,733)	287,048	22,688	30,242	1,439,249	11,892,171
District 1	246,467	13,497	0	1,038	96	21,589	239,509
District 2	1,435,414	10,328	275	2,587	7,198	109,589	1,346,213
District 3 /a	2,090,461	13,559	35,417	3,630	1,218	201,808	1,942,477
District 4 /a	2,539,726	(267,595)	1,309	1,411	11,091	344,999	1,940,943
District 5	92,667	1,206	1,537	684	11	12,684	83,421
District 6	1,250,457	(180,689)	13,320	1,148	3,406	50,023	1,037,619
District 7B	324,980	(26,121)	58,352	3,539	1,400	47,305	314,845
District 7C	542,416	35,423	15,698	1,228	38	79,731	515,072
District 8	2,950,435	184,209	95,792	2,557	557	343,053	2,890,497
District 8A	1,006,266	125,036	6,425	262	175	129,090	1,009,074
District 9	265,204	23,852	17,051	3,194	2,531	43,967	267,865
District 10	262,682	51,562	41,872	1,410	2,521	55,411	304,636
Utah	304,360	(1,882)	988	4,335	326	30,606	277,521
Virginia	0	0	0	0	0	0	0
West Virginia	47,626	(199)	89	0	0	1,154	46,362
Wyoming	613,204	401,148	72,000	15,541	787	107,415	995,265
Miscellaneous /d	3,172	112	0	0	0	285	2,999
Total United States	56,661,626	1,767,399	677,400	112,108	143,819	3,523,692	55,838,660
Gulf of Mexico Detail							
Louisiana	4,156,782	327,135	59,471	8,350	42,810	464,784	4,129,764
Texas	38,454	28,882	0	2,785	0	5,267	64,854
Total Gulf of Mexico	4,195,236	356,017	59,471	11,135	42,810	470,051	4,194,618

/a Includes offshore
/b Included with Louisiana and Texas
/c Preliminary net production
/d Includes Arizona, Iowa, Maryland, Minnesota, Missouri, Oregon, South Dakota, Tennessee and Washington
/e Reported quantities include reserves estimated to be recoverable from some reservoirs considered natural gas bearing based on electrical logs, core data and other available engineering and geological data.
( ) Denotes negative figures

Source: American Petroleum Institute "Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States and Canada as of Dec. 31, 1979"

TABLE IV

ESTIMATED TOTAL PROVED RESERVES OF NATURAL GAS LIQUIDS IN THE UNITED STATES

(Thousands of Barrels of 42 U.S. Gallons)

		Changes In Reserves During 1979					Reserves as of December 31, 1979		
State	Reserves as of 12-31-78	Revisions	Extensions	New Field Discoveries	New Reservoirs Discoveries in Old Fields	Production /c	Total Natural Gas Liquids	Non-Associated	Associated-Dissolved
Alabama	204,065	217	4,993	319	0	11,689	197,905	196,251	1,654
Alaska	407,791	3	0	0	0	635	407,159	0	407,159
Arkansas	5,361	7,973	545	63	86	1,188	12,840	830	12,010
California /a	102,321	(4,813)	970	147	82	9,311	89,396	1,371	88,025
San Joaquin Basin	79,612	(4,546)	793	0	82	6,504	69,437	744	68,693
Coastal Region /a	12,272	(692)	139	147	0	1,668	10,198	627	9,571
Los Angeles Basin /a	10,437	425	38	0	0	1,139	9,761	0	9,761
Colorado	61,199	1,257	634	1,047	0	8,689	55,448	40,328	15,120
Florida	21,490	4,997	0	0	0	8,795	17,692	0	17,692
Illinois	0	0	0	0	0	0	0	0	0
Indiana	0	0	0	0	0	0	0	0	0
Kansas	463,761	25,982	9,213	916	343	29,992	470,223	461,852	8,371
Kentucky	39,253	0	2,089	120	87	3,530	38,019	38,019	0
Louisiana /a, /d	1,315,545	(23,944)	47,252	13,472	26,065	192,358	1,186,032	1,045,267	140,765
North	52,521	6,518	5,874	156	390	12,558	52,901	34,259	18,642
South /a, /d	1,263,024	(30,462)	41,378	13,316	25,675	179,800	1,133,131	1,011,008	122,123
Michigan	65,693	13,587	0	2,278	0	10,032	71,526	28,245	43,281
Mississippi	12,707	1,064	266	301	51	2,385	12,004	10,660	1,344
Montana	3,299	0	0	0	0	380	2,919	2,329	590
Nebraska	457	160	0	0	0	116	501	163	338
New Mexico	451,672	25,591	298	2	0	38,314	439,249	320,219	119,030
North	291,736	14,718	0	0	0	16,366	290,088	290,088	0
South	159,936	10,873	298	2	0	21,948	149,161	30,131	119,030
North Dakota	54,126	(32)	900	500	65	1,804	53,755	1,465	52,290
Ohio	0	0	0	0	0	0	0	0	0
Oklahoma	268,670	31,343	19,284	837	528	45,140	275,522	184,100	91,422
Pennsylvania	323	0	0	0	0	57	266	266	0
Texas /a	2,268,284	53,624	64,643	17,850	15,565	280,215	2,139,751	1,089,768	1,049,983
District 1	26,253	4,252	1,092	252	224	3,386	28,687	20,986	7,701
District 2	92,660	715	491	901	1,496	9,128	87,135	53,528	33,607
District 3 /a	263,521	7,170	2,492	6,400	685	37,918	242,350	150,038	92,312
District 4 /a	322,273	(34,866)	3,737	4,015	10,918	33,890	272,187	217,692	54,495
District 5	64,315	(2,090)	513	418	4	3,371	59,789	52,636	7,153
District 6	310,184	2,096	9,973	3,124	489	25,713	300,153	113,839	186,314
District 7B	69,960	(3,226)	17,001	1,040	541	12,635	72,681	7,804	64,877
District 7C	91,594	3,000	933	0	0	16,204	79,323	31,683	47,640
District 8	433,259	8,407	6,923	109	28	49,390	399,336	126,644	272,692
District 8A	222,513	32,833	961	12	24	33,681	222,662	539	222,123
District 9	58,038	3,462	2,516	555	397	8,434	56,534	19,034	37,500
District 10	313,714	31,871	18,011	1,024	759	46,465	318,914	295,345	23,569
Utah	31,714	(949)	0	0	0	2,573	28,192	578	27,614
West Virginia	96,279	0	12,413	0	0	4,904	103,788	103,788	0
Wyoming	51,842	5,667	3,269	585	0	8,227	53,136	32,843	20,293
Total United States	5,925,852	141,727	166,769	38,437	42,872	660,334	5,655,323	3,558,342	2,096,981
Gulf of Mexico Detail									
Louisiana /b	675,005	6,557	18,376	8,699	16,015	85,566	639,086	558,896	80,190
Texas /b	18,212	4,490	727	4,903	219	3,727	24,824	24,753	71
Total Gulf of Mexico	693,217	11,047	19,103	13,602	16,234	89,293	663,910	583,649	80,261

/a Includes offshore
/b Included with Louisiana and Texas
/c Preliminary net production
/d Reported quantities include reserves estimated to be recoverable from some reservoirs considered natural gas bearing based on electrical logs, core data and other available engineering and geological data.
( ) Denotes negative figures

Source: American Petroleum Institute, "Reserves of Crude Oil, Natural Gas Liquids and Natural Gas in the United States and Canada as of Dec. 31, 1979"

TABLE XIII—43

ANNUAL ESTIMATES OF PROVED NATURAL GAS AND NATURAL GAS LIQUIDS RESERVES, 1945 THROUGH 1979

Utah

(Millions of Cubic Feet – 14.73 psia, at 60°F. and Thousands of Barrels of 42 U.S. Gallons

	NATURAL GAS				NATURAL GAS LIQUIDS		
	Year-End Reserves				Year-End Reserves		
Year	Non-Associated	Associated-Dissolved	Underground Storage	Total Gas	Non-Associated	Associated-Dissolved	Total NGL
1945	80,881	0	a	80,881	a	a	a
1946	76,477	0	a	76,477	0	0	0
1950	75,916	8,375	0	84,291	194	0	194
1955	416,326	2,285	0	418,611	92	16	108
1960	1,001,878	515,973	0	1,517,851	13,131	37,571	50,702
1961	1,361,119	657,515	500	2,019,134	13,318	37,100	50,418
1962	1,261,666	524,160	540	1,786,366	12,605	36,183	48,788
1963	978,846	658,690	788	1,638,324	509	46,082	46,591
1964	882,146	636,405	852	1,519,403	613	54,044	54,657
1965	851,438	586,322	1,036	1,438,796	616	50,742	51,358
1966	817,040	554,284	901	1,372,225	741	41,967	42,708
1967	762,697	462,750	1,070	1,226,517	776	41,972	42,748
1968	687,701	467,756	1,099	1,156,556	852	39,643	40,495
1969	644,180	445,276	1,312	1,090,768	1,337	37,452	38,789
1970	625,153	438,587	1,420	1,065,160	1,123	35,167	36,290
1971	559,592	420,787	1,575	981,954	1,081	32,866	33,947
1972	561,711	458,732	1,667	1,022,110	714	33,288	34,002
1973	541,376	481,697	1,650[b]	1,024,723	472	52,072	52,544
1974	553,738	474,629	3,042[b]	1,031,409	645	51,709	52,354
1975	493,885	420,266	3,282	971,433	561	48,806	49,367
1976	442,589	383,763	3,510	829,862	486	42,002	42,488
1977	404,905	341,639	2,363	748,907	413	33,904	34,317
1978	392,197	304,360	2,098	698,655	617	31,097	31,714
1979	397,233	277,521	2,325	677,079	578	27,614	28,192

a – Not estimated
b – See footnote e, Table I.

Source: American Petroleum Institute "Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States and Canada as of Dec. 31, 1979"

U.S. CONSUMPTION OF NATURAL GAS BY STATE (Continued)
(Million Cubic Feet)

STATE	1969	1970	1971	1972	1973	1974	1975	1976
Alabama	301,128	298,722	286,254	278,710	272,267	275,262	264,782	226,640
Alaska	42,914	63,990	67,805	75,407	64,059	63,971	85,995	91,350
Arizona	195,476	192,996	213,313	227,909	214,323	192,446	156,222	171,275
Arkansas	353,465	385,186	336,207	317,572	328,921	291,345	259,119	249,764
California	2,078,868	2,156,367	2,176,849	2,209,699	2,063,125	1,851,614	1,848,070	1,770,736
Colorado	276,495	285,733	293,521	313,817	328,681	319,266	317,392	314,228
Connecticut	57,485	60,574	61,434	64,008	62,609	66,343	64,011	65,855
Delaware	25,863	26,421	26,452	24,088	22,949	20,365	18,603	19,182
Dist. of Col.	2/	2/	2/	2/	2/	2/	2/	2/
Florida	313,608	338,645	336,901	301,121	314,384	292,920	289,265	302,882
Georgia	311,543	332,526	342,579	331,143	348,089	330,339	326,559	261,320
Idaho	41,436	46,570	50,096	56,630	56,045	53,057	60,451	47,156
Illinois	1,098,817	1,188,043	1,242,797	1,220,635	1,163,800	1,163,215	1,107,900	1,187,712
Indiana	530,981	545,368	566,996	576,948	542,300	531,872	477,341	425,221
Iowa	318,341	348,662	344,639	344,516	364,640	367,595	345,798	311,425
Kansas	583,040	614,537	646,730	668,847	648,369	630,429	541,490	556,172
Kentucky	243,461	254,622	250,493	261,271	250,913	233,560	212,993	251,198
Louisiana	1,942,072	2,034,049	2,078,996	2,137,729	2,216,692	2,202,693	1,978,129	2,216,289
Maine	1/	1/	1/	1/	1/	1/	1/	1/
Maryland	168,944	182,135	188,371	204,922	201,961	199,331	165,932	176,272
Massachusetts	136,988	147,307	156,451	160,280	155,547	155,268	153,967	156,247
Michigan	779,278	811,454	852,575	866,682	921,932	937,964	887,063	894,700
Minnesota	325,687	342,322	351,442	351,408	360,811	351,644	331,186	320,156
Mississippi	327,499	361,652	379,538	379,044	314,870	276,878	230,620	199,642
Missouri	398,697	429,526	429,105	425,215	426,807	409,884	369,620	380,258
Montana	78,988	90,823	89,021	85,161	91,148	80,766	80,351	75,132
Nebraska	210,631	222,890	224,273	225,101	230,106	223,267	219,147	198,893
Nevada	44,140	52,558	66,511	69,522	73,072	63,438	61,251	66,797
New Hampshire	9,196	10,691	12,088	13,267	13,881	14,697	13,534	13,545
New Jersey	304,835	322,853	326,768	321,288	301,566	275,050	244,102	321,535
New Mexico	302,389	322,750	323,178	342,150	312,593	312,422	296,369	340,754
New York	683,688	710,885	716,550	692,730	682,547	627,493	576,883	595,933
North Carolina	136,651	151,227	160,567	163,897	160,871	140,217	114,822	101,175
North Dakota	37,389	37,207	37,169	39,672	35,397	38,030	39,230	43,598
Ohio	1,031,963	1,052,933	1,087,126	1,147,804	1,104,156	1,086,651	956,876	1,005,927
Oklahoma	603,461	656,095	667,496	686,133	673,385	722,870	728,827	812,197
Oregon	87,854	95,284	100,897	110,360	107,961	98,051	109,898	92,500
Pennsylvania	766,034	772,467	802,168	829,031	783,368	715,623	653,810	713,579
Rhode Island	22,555	25,093	25,662	22,494	20,559	23,781	23,129	20,697
South Carolina	140,826	159,830	156,263	144,120	153,147	131,991	122,949	148,989
South Dakota	33,826	36,319	31,832	34,077	31,221	32,076	32,534	39,207
Tennessee	247,857	256,148	265,011	277,275	293,620	260,171	217,328	212,326
Texas	4,324,701	4,559,373	4,813,016	4,882,741	5,087,521	4,912,481	4,379,948	4,403,942
Utah	123,291	123,430	125,225	127,475	126,595	124,973	127,819	150,237
Vermont	1/	1/	1/	1/	1/	1/	1/	1/
Virginia	128,748	136,523	144,014	155,658	152,848	143,650	121,320	123,509
Washington	144,521	149,992	156,663	170,448	197,861	182,723	164,334	148,781
West Virginia	178,280	192,340	189,319	208,552	195,744	191,975	167,693	159,007
Wisconsin	316,279	337,822	348,132	320,826	367,961	381,148	364,801	315,154
Wyoming	112,611	122,859	128,088	142,062	124,692	109,818	100,412	101,488
U.S. Total	20,922,800	22,045,799	22,676,581	23,009,445	22,965,914	22,110,623	20,409,875	20,800,582

1/ Included with New Hampshire
2/ Included with Maryland

Source: U.S. Energy Information Administration, Natural Gas Annuals

American Petroleum Institute
Basic Petroleum Data Book

April 1978

U.S. CONSUMPTION OF NATURAL GAS BY STATE (Continued)
(Million cubic feet)

STATE	1977	1978
Alabama	241,237	237,258
Alaska	116,278	145,025
Arizona	167,092	175,041
Arkansas	229,558	220,699
California	1,772,041	1,563,172
Colorado	282,215	267,838
Connecticut	64,068	65,191
Delaware	15,787	20,626
Dist. of Col.	[2]	[2]
Florida	302,344	318,344
Georgia	264,665	278,272
Idaho	45,537	44,210
Illinois	1,167,099	1,174,934
Indiana	398,268	440,955
Iowa	280,246	238,229
Kansas	506,910	519,346
Kentucky	219,521	212,913
Louisiana	2,190,848	2,249,172
Maine	[1]	[1]
Maryland	158,838	161,695
Massachusetts	160,343	160,503
Michigan	741,295	789,594
Minnesota	293,381	313,229
Mississippi	197,689	203,719
Missouri	366,970	358,905
Montana	70,956	72,649
Nebraska	188,804	163,051
Nevada	71,052	64,506
New Hampshire	13,609	14,039
New Jersey	247,120	228,843
New Mexico	229,813	213,698
New York	561,698	569,702
North Carolina	72,527	81,989
North Dakota	37,650	39,067
Ohio	847,497	929,593
Oklahoma	766,986	770,249
Oregon	72,521	86,140
Pennsylvania	668,337	673,770
Rhode Island	25,631	23,042
South Carolina	138,585	117,573
South Dakota	36,097	35,423
Tennessee	202,135	184,048
Texas	4,143,023	4,211,432
Utah	106,315	118,513
Vermont	[1]	[1]
Virginia	118,020	134,144
Washington	142,657	127,280
West Virginia	144,535	151,839
Wisconsin	349,160	370,726
Wyoming	83,623	87,292
U.S. Total	19,520,581	19,627,478

[1] Included with New Hampshire
[2] Included with Maryland

Source: U.S. Energy Information Administration, Natural Gas Annuals

January 1980

Taxes, rents & royalties have long since been an accepted part of the cost associated with doing business in the energy industry. In the past these costs have been manageable. Today, however, these costs are escalating at a rate which is actually beginning to discourage further development of our energy resources, even with deregulation of the industry.

In Utah, taxes on the petroleum industry can be found in various forms: A property tax, Mine Occupation Tax (severance tax), and a conservation tax. These three taxes accounted for over $24 million dollars in 1980. The industry is also contributing to the general welfare through Employment Securities Taxes and Corporate Income Taxes. Additionally, the various motor fuel taxes charged for the consumer for fuels produced by the industry accounted for approximately $74 million.

Through rents & royalties, the petroleum industry paid approximately $10.8 million directly to the state. Also, the state received 50% of the funds collected by the federal government from lands it holds within Utah. This amounted to $14,459,465 of which 35% goes towards higher education and 27% goes into the general fund for legislative disbursal.

During the past year, the State of Utah has received a total of $128,076,043.64 from the petroleum industry and consumers of petroleum products. It is expected to receive a substantial increase in this amount provided that incentives for exploration are not diminished through increased costs including those of rents, royalties and taxation.

# # #

TAX STRUCTURE OF UTAH -- FEBRUARY, 1981

Title and Legal Citation	Year First Enacted	BASIS OF TAX	RATES	ALLOCATION OR USE
General Property 59-1-1 to 59-11-16	1849	25% of "reasonable fair cash value"* of real and tangible personal property. Metalliferous mines assessed at $5 an acre plus two times average net proceeds. In addition, machinery and other property of mines assessed at 25% of reasonable fair cash value.	Varies in each city, county, and school district. In 1980, total property tax rates ranged from 30.20 mills in some unincorporated areas of Summit County to 100.85 mills in one section of Ogden located in Weber County.	School districts, municipalities counties, and special districts.
Sales and Use 59-15-4 59-16-3	1933	Retail sales or use of tangible personal property, admissions, meals, general services, hotel, motel, laundry and dry cleaning.	4% of purchase price	To General Fund
11-9-4 11-9-6	1959	Local option---(county, city)	Up to 3/4% of purchase price	Returned to local unit imposing tax
11-9-4 11-9-6	1974	Local option---(county for transit authority)	¼% of purchase price	Transit District (In Salt Lake Davis, and Weber Counties)
Individual Income 59-14A-5	1931	Taxable income as determined for Federal tax purpose with upward adjustment for state income taxes paid and downward adjustments for Federal income taxes incurred, interest on U.S. government securities, and designated retirement income.	Income / Individual / Joint / Separate: First $750 / 2 1/4% / 2 3/4% / 2 3/4% Next 750 / 3 1/4 / 2 3/4 / 3 3/4 Next 750 / 4 1/4 / 3 3/4 / 4 3/4 Next 750 / 5 1/4 / 3 3/4 / 5 3/4 Next 750 / 6 1/4 / 4 3/4 / 6 3/4 Next 750 / 7 1/4 / 4 3/4 / 7 3/4 Next 1,500 / 7 3/4 / 5 3/4 / 7 3/4 Next 1,500 / 7 3/4 / 6 3/4 / 7 3/4 Over 7,500 / 7 3/4 / 7 3/4 / 7 3/4	To Uniform School Fund; distribution to local school districts under minimum school program.
Withholding Provision	1959		26% of Federal withholding or amount from Tax Commission table.	
Corporation Franchise 59-13-65	1931	Net income allocable to State (Special gross receipts tax for certain exempt corporations)	4% of net taxable income. Minimum tax for state banks and corporations is $25	To Uniform School Fund; same as above
Unemployment Compensation 35-4-7	1936	First $12,000 of wages paid to each employee during calendar year	1.3% to 3% of covered payroll depending upon stability of payroll. Entire tax paid by employer.	To Unemployment Compensation Fund; used to pay unemployment benefits
Motor Fuel 41-11-6	1923	Gallons of motor fuel sold or used	9¢ per gallon (4¢ per gallon on gasohol)	To transportation fund for highway construction and maintenance. Portions of tax allocated to local units
Aircraft Fuel 41-11-6	1923	Gallons of fuel for airplane use	4¢ per gallon	25% for aeronautics administration; 75% to airports
Special Fuel 41-11-50	1941	Gallons of fuel used to propel motor vehicles except fuel subject to motor fuel tax law	9¢ per gallon	To transportation fund for highway construction and maintenance. Portions of tax allocated to local units
Motor Vehicle Registration 41-1-127	1909	Motorcycles, private autos, house trailers, manufacturers, transporters, dealers, and wreckers --flat fees. Motor vehicles, trailers, & semi-trailers used for transportation of passengers or property--unladened weight of vehicle.	Motorcycles and small trailers-$2.50;private autos-$5; housetrailers -$5; commercial vehicles - $7.50 to $550; extra for reflectorized plates - $1 per set.	Cities and counties get first $2,000,000 after admin. expense Balance: 3/4 to cities and counties, 1/4 to state transportation fund.
Automobile Driver Ed. 41-1-144	1957	Tax is placed upon each motor vehicle registered---collected at time of registration	$2.00	For driver education program
Nonresident Commercial Vehicles 41-1-88	1951	Interstate commercial vehicles operating in Utah must pay (1) fee based on proportional mileage driven in the state or (2) secure a temporary 96-hour permit.	(1) Proportional part of registration fee for commercial vehicles (must also pay proportional part of property tax on vehicles); (2) $5 for single units and $10 for multiple units.	To state transportation fund to be used for highway construction and maintenance.
Mine Occupation 59-5-67	1937	Gross amount received or gross value of metalliferous ore sold - $50,000 exempt	1%	To General Fund
Gas and Oil Occupation Tax	1955	Gross amount received or gross value of gas and oil sold - $50,000 exempt	2%	To General Fund
Tobacco 59-18-4	1923	1. Cigarettes weighing less than 3 lbs per 1000; 2. Cigarettes weighing more than 3 lbs per 1000; 3. All tobacco products except cigarettes	1. 10¢ per package of 20; 2. 20¢ per package of 20; 3. 25% of manufacturer's sales price	To General Fund
License Fee 59-18-2	1923	Each place of business selling cigarettes or cigarette papers	$10.00	To General Fund
Insurance Companies 31-14-4	1896	1. Ocean Marine Insurance---underwriting profit 2. Other insurance--total premiums less returned premiums, reinsurance premiums, and dividends paid	1. 5% 1. 2¼% with credits for property taxes and examination fees paid in Utah	To General Fund. 50% of tax on fire insurance premium and 10% of tax on life insurance premiums for firemen's pensions.
Inheritance 59-12-2	1901	Maximum credit allowed under Federal Estate Tax	Amount of credit against Federal Estate Tax as determined on Federal Form 706.	To General Fund
Liquor Control Profits 32-1-6	1901	Profits from operation of state monopoly	Price determined by State Liquor Control Commission. Markup may not be less than 55% for distilled spirits and 45% for wines	To General Fund - Appropriations totalling $3,000,000 made to cities and counties for various purposes.
School Lunch (Liquor Excise) 53-8-1	1943	Retail sale of wines and distilled liquors	8% of purchase price	For school lunches
Beer Tax 32-6-1	1935	Barrels of beer (consisting of 31 gallons) sold, imported, distributed, or consumed in Utah	$3.10 per barrel	To General Fund
Public Utilities Regulation 54-5-1.5	1935	Gross operating revenue for preceding calendar year, excluding income from interstate business	Established by Tax Commission Maximum rate - ¼%; minimum tax - $2.00	To Public Service Commission
Fishing & Hunting Licenses 23-19-1 to 23-19-38	1907	License required to fish, hunt, or trap game in the State. License fee depends on the residential qualification of applicant.	Resident of Utah: Fishing-$10.50(12-16-$4.50); deer-$10; small game $8 (12-16-$4); combination - $23. Nonresident of Utah: Fishing-$35(temp. permits-$5-15); deer - $120. Various fees for other special permits.	To Fish and Game

* "Reasonable fair cash value" is not necessarily current market value. Thus, the actual assessment ratio may be somewhere between 5% and 20% of current market value for the various classes of property. The aim of the State Tax Commission is to assess property at about 20% of current market value.

SOURCE: Compiled by UTAH FOUNDATION from the Utah Code Annotated 1953, as amended.

TRENDS IN PRINCIPAL STATE AND LOCAL TAX COLLECTIONS IN UTAH

Fiscal Year	Property Tax*	Sales Tax*	Income Taxes: Individual	Income Taxes: Corporate	Motor Fuel Tax**	Unemployment Compensation Tax	Vehicle Registration Tax#
AMOUNT (in thousands)							
1949-50	$ 35,857	$ 14,013	$ 4,092	$ 2,524	$ 7,605	$ 3,140	$ 2,361
1954-55	51,303	18,856	6,458	2,882	12,883	4,220	4,341
1959-60	83,297	31,771	16,234	5,992	20,377	6,779	6,515
1964-65	114,725	59,482	22,512	7,856	23,528	9,890	7,853
1969-70	144,473	102,349	61,335	11,839	36,046	12,206	9,266
1970-71	154,122	113,959	61,884	11,127	38,886	12,566	10,419
1971-72	167,880	132,417	74,096	12,691	42,621	13,938	13,760
1972-73	169,208	152,984	88,547	29,621##	46,265	16,741	13,425
1973-74	170,641	169,088	90,032	20,173	45,638	20,017	14,267
1974-75	181,090	197,611	104,919	18,003	46,238	21,404	13,090
1975-76	208,132	236,976	140,562	24,502	49,756	22,978	12,541
1976-77	240,135	278,864	158,271	24,867	52,560	37,584	15,046
1977-78	265,095	320,555	188,053	29,449	56,199	46,033	14,989
1978-79	309,669	365,033	226,783	32,874	71,223	51,770	15,649
1979-80	341,391	401,012	265,328	40,377	70,921	53,468	16,598
AMOUNT PER CAPITA							
1949-50	$ 53.44	$ 20.88	$ 6.10	$ 3.76	$11.33	$ 4.68	$ 3.52
1954-55	68.40	25.14	8.61	3.84	17.18	5.63	5.79
1959-60	95.74	36.52	18.66	6.89	23.42	7.79	7.49
1964-65	117.31	60.82	23.02	8.03	24.06	10.11	8.03
1969-70	137.99	97.75	58.58	11.31	34.43	11.66	8.85
1970-71	144.58	106.90	58.05	10.44	36.48	11.79	9.77
1971-72	152.90	120.60	67.48	11.56	38.82	12.69	12.53
1972-73	149.61	135.26	78.29	26.19##	40.91	14.80	11.87
1973-74	146.60	145.26	77.35	17.33	39.21	17.20	12.26
1974-75	151.79	165.64	87.95	15.09	38.76	17.94	10.97
1975-76	169.77	193.29	114.65	19.99	40.58	18.74	10.23
1976-77	189.98	220.62	125.21	19.67	41.58	29.73	11.90
1977-78	202.83	245.26	143.88	22.53	43.00	35.22	11.47
1978-79	228.71	269.60	167.49	24.28	52.60	38.23	11.56
1979-80	241.78	284.00	187.91	28.60	50.23	37.87	11.75
TAXES PER $1,000 PERSONAL INCOME							
1949-50	$42.94	$16.78	$4.90	$3.02	$9.11	$3.76	$2.83
1954-55	44.04	16.19	5.54	2.47	11.06	3.62	3.73
1959-60	50.64	19.31	9.87	3.64	12.39	4.12	3.96
1964-65	51.82	26.87	10.17	3.55	10.63	4.47	3.55
1969-70	47.14	33.39	20.01	3.86	11.76	3.98	3.02
1970-71	45.64	33.75	18.33	3.29	11.51	3.72	3.09
1971-72	44.80	35.34	19.77	3.39	11.37	3.72	3.67
1972-73	40.43	36.56	21.16	7.08##	11.05	4.00	3.21
1973-74	36.43	35.90	19.12	4.28	9.69	4.25	3.03
1974-75	34.41	37.55	19.94	3.42	8.79	4.07	2.49
1975-76	35.29	40.19	23.84	4.15	8.44	3.90	2.13
1976-77	36.24	42.08	23.88	3.75	7.93	5.67	2.27
1977-78	35.00	42.32	24.83	3.89	7.42	6.08	1.98
1978-79	35.63	42.00	26.09	3.78	8.19	5.96	1.80
1979-80	34.70	40.76	26.97	4.10	7.21	5.43	1.69

* Includes local tax collections.
** Includes special (diesel) fuel taxes but excludes taxes on aircraft fuel.
\# Includes temporary permit fees, special transportation permits, vehicle control fees, and special driver education tax.
\## Corporation income tax for 1972-73 includes $11,700,000 in taxes for prior years.
Prepared by UTAH FOUNDATION from reports of the State Finance Department, State Tax Commission, and the State Department of Employment Security.

Source: Utah Foundation - Statistical Review of Government in Utah - 1981

UTAH PETROLEUM INDUSTRY
PROPERTY VALUATION AND TAXES

SUMMARY OF ASSESSED VALUATION SET BY UTAH STATE TAX COMMISSION FOR INDUSTRY PROPERTY TAXES BY COUNTY

County	1978 Oil and Gas	1979 Oil and Gas	1980 Oil and Gas
Beaver	-	59,960	-
Carbon	740,081	991,436	848,235
Daggett	856,125	1,199,963	1,873,562
Duchesne	99,954,237	97,002,512	91,792,736
Emery	58,382	109,126	96,108
Garfield	3,659,388	3,412,553	3,593,713
Grand	2,051,116	2,321,785	3,372,498
Millard	-	1,550	-
Rich	-	1,010,783	4,092,864
San Juan	51,475,788	48,691,152	59,059,010
Summit	45,964,717	62,618,487	54,471,472
Uintah	28,145,476	37,860,827	47,771,584
Wasatch	1,125	1,125	300
Washington	100	100	100
TOTAL	$232,906,535	$255,281,359	$266,972,182

		Calendar Year	
Property Tax	1978	1979	1980
Oil & Gas Companies	13,206,115	13,338,078	14,123,683
Pipelines	1,132,614	1,128,822	1,202,497
Gas Distribution	2,544,714	2,260,116	2,456,822
Total Property Tax	$15,883,443	$16,727,016	$17,783,002

Source: Utah State Tax Commission - Property Tax Division, Statistical Study of Assessed Valuations - 1978-1980

BLM MINERAL LEASE COLLECTIONS FOR UTAH (FY 1980) 1/

Asphalt	6,021.15
Coal	3,974,483.74
Oil and Gas	28,918,831.97
Phosphate	13,410.00
Potash	35,406.00
Sodium	525,000.00
Geothermal	576,900.00
All other	279.99
Total	34,050,332.85

50% is distributed to the State.

FEDERAL LEASE PAYMENT DISPERSALS 2/

Community Impact Fund - Board distributes to communities with impact problems.	32.5%
Higher Education - Operate and maintain schools research.	33.5%
Water Research Laboratory Utah State University	2.25%
Utah Geological & Mineral Survey	2.25%
Public Education	2.25%
Legislative Dispersement Monies	27.25%

Source: 1/ Bureau of Land Management

2/ Utah State Office of Legislative Research

UTAH PETROLEUM INDUSTRY TAXES

Mine Occupation Tax 1/

	Calendar Year		
	1978	1979	1980
Oil and Gas	$ 6,159,893	$ 6,315,828	$ 6,853,167
Mineral	2,287,807	2,934,722	3,602,438
Total Mine Occupation Tax	$ 8,447,700	$ 9,250,550	$10,593,463

Conservation Tax 2/

	Fiscal Year Ending June 30		
	1978	1979	1980
Total Oil and Gas Conservation Tax	$ 442,230	$ 578,538	$ 759,437

Motor Fuel Tax 1/

	Calendar Year		
	1978	1979	1980
Gasoline Tax	$ 51,102,913	$ 64,445,615	$ 56,616,214
Special Fuel Tax	7,749,274	10,087,703	8,846,524
Aircraft Fuel Tax	2,201,117	2,660,167	2,766,150
Boat Fuel Tax	377,339	521,778	544,005
Total Motor Fuel Tax	$ 61,390,643	$ 77,715,263	$ 68,772,893

Source: 1/ Utah State Tax Commission - Report of Collections & Assessments 78-80

2/ Annual Report - 1979 State of Utah Division of Oil, Gas & Mining

UTAH STATE

PROPERTY TAXES FOR 1979

	Tax Dollars	Percent
Agriculture real estate not under F. A. A.	$ 8,591,977	2.51
Agricultural Buildings	1,516.822	.44
Agricultural Machinery	1,013,227	.30
TOTAL AGRICULTURE	$ 11,122,026	3.25
Range Cattle	587,991	.17
Other Cattle	181,602	.06
Horses & Mules	99,260	.03
Sheep	172,065	.05
Other Animals	31,562	.01
Poultry	7,331	--
TOTAL RANCHING	$ 1,079,811	.32
TOTAL RANCHING AND AGRICULTURE	$ 12,201,837	3.57
Gas Distribution	2,260,116	.66
Pipe Line Companies	1,128,822	.33
Oil & Gas Companies	13,338,078	3.91
TOTAL PETROLEUM INDUSTRY	$ 16,727,016	4.90
Mining - metalliferous	11,811,486	3.46
Mining - non-metalliferous	3,532,263	1.04
TOTAL MINING	$ 15,343,749	4.50
TOTAL PETROLEUM AND MINING	$ 32,070,765	9.40
STATE TOTAL ON ALL PROPERTY	$ 341,390,695	100.00

SUMMARY OF RESOURCE ACTIVITY

Project Name	County	Current Status	1990 Forecast Production (Capacity)
Chevron Pilot Retort	Salt Lake	Application submitted to EPA	0 (temporary)
Cottonwood Wash (Magic Circle)	Uintah	Site acquired	30,000 BPD
Geokinetics	Uintah	Pilot operational, site acquired	20,000-50,000 BPD
Paraho - Ute	Uintah	Site acquired	30,000 BPD
Plateau Refinery	Duchesne	Site acquired	20,000 BPD
Ramex	Duchesne	Site acquired	N/A
Sand Wash (Shale Development)	Uintah	Site acquired	10,000 BPD
Syntana - Utah	Uintah	Site acquired	10,000-50,000 BPD
Tosco Sand Wash	Uintah	Site acquired	43,000-47,000 BPD
White River Shale	Uintah	Permit evaluation	100,000 BPD

Additional Potential Projects

Project Name	County	Current Status
Exxon USA	Uintah	Resource acquired (insufficient for development)
Sohio-Cliffs	Uintah	Suitable resource acquired
Superior Oil Co.	Uintah	Resource acquired (insufficient for development)
Texaco USA	Uintah	Suitable resource acquired, technology development in progress
Illinois Institute of Tech./Halliburton Services/LETC	Uintah	Field experiment in progress

the support facilities needed at each stage of development, including facilities to supply water, power and access requirements.

The manpower requirements for the on-going operations of each phase are as follows:

	Mining Operations	Retort Operations	Year Occurring
Phase I	413	425	1986
Phase III	1,820	1,220	1993

These manpower requirements for the operations will build steadily from an initial need of approximately 200 people to 3,200 people in 1993. Thus, the oil shale operations rely on a very stable workforce.

The construction workforce, however, is of a temporary nature. Phase I's construction manpower requirements peak at 1,830 workers in 1983 and Phase III's construction requirements peak at approximately 4,000 workers in 1988-1989.

As a result of the differences in the nature of the construction workers and the operations workforce, different approaches will be taken to minimize the impact these workers may have upon the local communities. Since the individual construction workers will remain for only short periods of time, a construction camp will be established on-site. This housing will be temporary in nature.

Because the operations personnel will be a permanent workforce, every attempt will be made to assimilate these people into the existing local communities. This will require close coordination between WRSP and the local communities to develop a suitable plan.

Any development of tracts Ua and Ub is unlikely to occur, however, until the legal questions concerning the ownership of the leased lands is resolved. WRSP is currently working towards such a resolution.

# # #

re-establish wildlife habitat disturbed during plant construction. No impact on the agriculture of the largely arid region is anticipated.

Construction of a water impoundment facility on the White River to serve oil shale development in the Uintah Basin is the subject of an Environmental Impact Statement now being processed.

The current estimated population of Uintah County is 20,200 based on the 1980 U. S. census household count. Vernal, the largest city, has a population of about 6,500. About 10,000 new permanent residents will move into the region as a result of Tosco's Sand Wash project.

White River Shale Project

The White River Shale Project (WRSP) is involved with the development of two federal prototype leases - Tracts Ua and Ub. Both of the Utah leases went into effect June 1, 1974. Tracts Ua and Ub will be developed jointly by Phillips Petroleum Company, Sohio Shale Oil Company and Sunoco Energy Development Company.

In 1977, the owners were granted a preliminary injunction that indefinitely suspended the terms and obligations of the leases. This injunction was based on conflicting claims on the title and is still in effect.

Once the injunction is lifted, the White River Shale Project plans call for a staged development in three phases. Phase I comprises mining and retorting designed to generate specific information on ore body characteristics and information on the retorting process itself. Up to 30,000 tons of shale per day will be mined in this phase. This will result in an oil production of approximately 15,000 barrels per day by the end of 1984.

WRSP will use proven room and pillar technicques to mine the raw oil shale. Raw shale will be crushed and screened to produce the required size ranges. After crushing, the raw shale will be processed in surface retorts.

Phases II and III cover the expansion of shale oil production to a level of 50,000 to 100,000 barrels per day, respectively. Construction of Phase II is planned to begin in 1986, with operation of the 100,000 barrel per day commercial facility expected to begin in 1993. Included in all phases are

The Tosco Sand Wash Project

The Uintah Basin of Utah, about 35 miles south of Vernal, is the site of the Tosco Corporation's Sand Wash Project which will yield 47,000 barrels of upgraded shale oil per day when commercial production is reached.

The Sand Wash complex at commercial scale will use TOSCO II surface retorts to process daily 66,000 tons of 35-gallon-per-ton shale. The process will require 9,000 acre-feet of water annually.

The firm has spent $4.3 million through 1980 on its project.

Tosco received approval in January 1976 from the Utah Board of State Lands to unitize 29 state oil shale leases covering 14,688 acres and is now proceeding with project planning, design and permit acquisitions for its commercial-scale facility. Major permits to be acquired for Sand Wash are mine plan and surface rehabilitation approval from the Utah State Division of Oil; rights of way permits for production pipelines, power lines, conveyors, roads and water supplies, all from the Bureau of Land Management; air quality permits from the state and from the Environmental Protection Agency; and state and EPA approvals for any water discharge or reinjection.

The most likely product from Sand Wash is low sulfur hydrotreated shale oil which will be shipped by pipeline to either Salt Lake City or to midwest markets via Rangely. Local markets are preferred. Marketing outside of the region is heavily dependent upon the availability of exchanges.

Actions leading to a site specific Environmental Impact Statement have been initiated and detailed environmental impact analysis is underway. The plant, similar in design to the Colony plant in Colorado, should have no discharge of liquid effluents. However, there may be temporary disposal of excess mine water. Air effluent discharges will comply with all current federal and state regulations. Sulfur compounds and ammonia generated will be routed to processing units for recovery of elemental sulfur and ammonia for sale as by-products.

The disposal of spent shale will cause land disturbance at the project site. Topsoil will be removed ahead of filling and stockpiled for reuse in land reclamation. Revegetation of all disturbed areas is planned to

The key feature of the new process is the ability to develop heat throughout large quantities of oil shale, which is normally a very poor heat conductor. The new process, using controlled application of radio-frequency electric fields, does not depend upon the shale itself to act as a heat conductor.

This form of true in situ recovery of hydrocarbons offers advantages over the mining of oil shale deposits for surface processing. The surface land area is not disturbed and therefore requires no restoration after the hydrocarbons have been extracted. Moreover, the process eliminates major waste disposal problems associated with mining and surface processing and minimized the use of scare water supplies.

In theory the process will work this way: A specifically constructed heating-pumping unit would be lowered into a small vertical hole drilled where there are known oil shale or other hydrocarbon-bearing deposits. This unit provides not only a means to transmit electrical energy into the subsurface deposit, but also serves as a conduit for bringing liquid hydrocarbons to the surface. This energy does not radiate into the atmosphere.

Successful demonstration of the process would open up for economic production the vast U. S. reserves of shale oil, estimated to be in excess of one trillion barrels -- equivalent to more than 150 years' supply at the current rate of consumption.

The participating companies have extensive experience in the technologies necessary to the successful development of the new process. Raytheon, which has been active in a variety of energy programs and in commercial and government electronics, started the in situ radio-frequency work seven years ago at its equipment development laboratories in Wayland, Massachusetts. The Badger Company has been engaged for many years in the design, engineering, and construction of petroleum and synthetic fuel processing facilities. Texaco is a leader in the technology of oil producing and refining, and has been actively involved in the development of oil shale and tar sands technology for several years.

U. S. patents relating to the work have been issued, and other patent applications are pending.

selected and the module contract was executed with the Department of Energy (DOE) in June 1980. This contract calls for an 18 month program costing approximately $9 million.

Paraho manages the program. Costs are being shared approximately equally by the DOE and a group of industry sponsors: ARCO Coal, Chevron, Conoco, Davy McKee, Husky, Mobil, Mono Power (Southern California Edison), Phillips, Placid Refining, Sohio, Sun, Texaco, Texas Eastern, and The Cleveland-Cliffs Iron Company. Sohio, McKee, Cliffs, and three environmental firms serve as sub-contractors to Paraho.

The DOE, in September of 1980, awarded Paraho a grant of over $3 million. To prepare a commercial feasibility study covering the expansion of the single module retort into a commercial three-retort facility capable of producing over 30,000 barrels per day of shale oil. The successful completion of the module design and engineering effort and the commercial feasibility study should lead, with proper financial incentives from either the DOE or the Synthetic Fuels Corporation, to the construction of the Paraho-Ute Facility as early as mid-1982. Operations would begin in late 1984. The site of the facility is some 40 miles southeast of Vernal, Utah, on state oil shale leases and private subleases controlled by Paraho.

Texaco, Inc.

Economical extraction of liquid and gaseous hydrocarbons from oil shale and tar sands without mining may prove possible if a new process under development by Texaco, Inc., Raytheon Company, and its subsidiary, The Badger Company, Inc., is successful.

The technique employs radio-frequency electric fields to heat deposits containing immobile heavy hydrocarbons. This process produces liquid and gaseous hydrocarbons in place, without the necessity of mining, retorting, and waste disposal. Field tests are currently being conducted on Texaco-owned oil shale property in Uintah County, Utah.

Paraho Development Corporation

Paraho Development Corporation with its patented technology, has produced over 4.6 million gallons of crude shale oil under environmentally acceptable conditions. Paraho's initial oil shale work began in the early 1970's when a group of 17 industry sponsors (Sohio, Southern California Edison, Cleveland-Cliffs, Kerr-McGee, Gulf, Shell, Amoco, Exxon, Davy McKee, Mobil, Sun, Webb Venture, Texaco, ARCO, Phillips, Marathon, Chevron) participated in the Paraho-managed demonstration program. This demonstration program, privately funded at a cost of over $10 million, was carried out at the Anvil Points Oil Shale Mine and Retorting Facility near Rifle, Colorado. This facility is leased by a Paraho subsidiary from the Department of Energy. The program successfully demonstrated the Paraho technology in a pilot plant and semi-works retort.

Following the demonstration program, Paraho was selected by the United States Navy's Office of Naval Research and the Department of Energy to produce up to 100,000 barrels of shale oil. The purpose of this program was to produce and ship the largest amount of crude shale oil ever to be refined in a modern commercial refinery. This Paraho crude shale oil was refined by The Standard Oil Company of Ohio into petroleum products meeting strict military specifications.

Environmental problems have been minimized using the Paraho technology. There are no fugitive dust problems, no expansion or "popcorn" effect problems with the retorted shale, and finally no water problems. The Paraho retort itself requires no water. On a commercial basis, approximately one barrel of water would be required for every barrel of oil produced. This water would be used in mining for dust control, reclamation for initial vegetation growth and for plant needs.

The successful completion of the demonstration program, and then the production program, led to the next logical step in oil shale development. In July of 1979, Paraho responded to a solicitation by the Department of Energy for proposals to design and demonstrate a commercial, full-size oil shale retort or module. A module consists of a mine to produce the oil shale, a single, 10,000 barrel-per-day retort to recover the shale oil and gas, and all the supporting equipment required. Paraho's proposal was they have been limited to pilot plant or semi-works scale.

UPDATE ON INDIVIDUAL SHALE PROJECTS

Geokinetics, Inc.

Geokinetics, a publicly owned corporation, holds oil shale leases on 30,000 acres of land in Uintah County, Utah. Total in place reserves are calculated at 1.7 billion barrels.

The Company was organized in 1969. Since 1975 Geokinetics has been developing the Geokinetics Horizontal In Situ Retorting Process at its field test site 70 miles south of Vernal, Utah. In the Geokinetics process, a pattern of blastholes is drilled from the surface, through the overburden, and into the oil shale bed. The holes are loaded with explosives and fired, using a carefully planned blast system. The blast results in a fragmented mass of oil shale, with a high permeability. The void space in the fragmented zone comes from lifting the overburden, the producing a small uplift of the surface.

The fragmented zone constitutes an in situ retort. The bottom of the retort is sloped to provide drainage for the oil shale to a sump where it is lifted to the surface by a number of oil production wells. Air injection holes are drilled at one end of the retort, and off gas holes are drilled at the other end. The oil shale is ignited at the air injection wells, and air is injected to establish and maintain a burning front that occupies the full thickness of the fragmented zone. The front is moved in a horizontal direction through the fractured shale towards the off gas wells at the far end of the retort. The hot combustion gases from the burning front heat the shale ahead of the front, driving out the oil, which drains to the bottom of the retort, where it flows along the sloping bottom to the oil production wells. As the burn front moves from the air intake side of the retort to the off gas wells, it burns the residual coke in the retorted shale as fuel. The combustion gases are recovered at the off gas wells. This gas is combustible and can be used for power generation. Progress of the burn front is monitored by thermocouples set in thermocouple wells.

mining out a portion of the shale in a selected area which allows retorting of rocks underground. Shale removed from underground can be processed at the surface.

Processing

Shale oil processing, or retorting, involves the manufacture of shale oil from shale rock by using heat. Technically, the organic material in the rock is kerogen, and in the Green River Formation, the rock itself is marlstone, a dolomite limestone. The separation takes place in a chamber called a retort. Retorting can be done on the surface in metal vessels, or in underground chambers. Whether above or below ground, the rock in the retort must be heated to about 900 degrees farenheit so the shale oil can be made from kerogen.

Modified in situ is a good technology to illustrate the transition from mining to processing since the two operations are physically closer together than in other approaches.

A modified in situ retort is formed from the existing underground rock. The retort is created by removing a portion of the ore to form a void space. That material is brought to the surface. The target ore is then reduced to rubble with explosives to create porosity so that air can be passed down through the rubble bed, allowing the rock to be burned.

After the rubbling procedure is completed, a fire is ignited at the top. In the combustion zone, temperatures are controlled in the range of 1,500 degrees to 2,200 degrees farenheit. The heat causes the kerogen to decompose and the oil is driven from the shale in the form of a vapor at about 900 degrees farenheit, in advance of the downward-moving flame front. The vapor condenses in the cooler lower zone of the retort and liquid oil then percolates to the bottom where it is recovered and pumped to the surface. The carbon residue left on the rock after the kerogen decomposes serves as the fuel for the flame front. The primary differences in modified in situ retorting schemes relate to the amount of material initially removed from the retort, how the remaining material is broken into rubble, the size and configuration of the retort, the makeup of the combustion air supplied to the retort, and the rate at which the burn progresses downward through the chamber.

There are many successful methods of surface retorting, but so far

The mining method determines the retorting method. When the ore is surface mined, the retorting also will occur above ground. When underground methods are used, retorting can either occur above ground, or an in situ (in-place) or modified in situ (combination of above surface and below surface) retorting method can be used.

While many of the mining techniques have been proven in various industrial operations over the years, processing or retorting techniques have yet to be tested at commercial size. Those technologies which are most likely to reach commercialization are discussed in this section.

Mining

Surface mining is considered to be economically attractive for mining of oil shale deposits that lie fairly close to the surface and that are at least as thick as the overburden that covers them. One important factor in surface mining is that it yields a high percentage of the resource. More of the in-place oil shale can be mined and processed, compared to underground mining methods.

The room and pillar method is the most common method of underground mining. It is more useful in areas where the oil shale is fairly deep. Most deposits of commercial interest are thick and have relatively few natural faults and fissures. Access can be gained either through vertical shafts driven down through the overburden or via adits in the sides of a hill where a stream has cut through the overburden. Pillars of shale must be left to support the roof and intervals must be kept between mining levels. For this reason, some of the in-place resource is unrecoverable if underground mining methods are used.

The third technology used in oil shale development is in situ, a combination of both mining and processing. In situ means "in-place" and denotes that the processing or retorting is being done with the rock in place. In true in situ, no rock is removed from the ground -- the oil shale is retorted through bore-holes drilled from the surface. Techniques exist for doing this and they are in different stages of development stages. Geokinetics, Inc., has been developing and field testing a true in situ process in Utah for six years, and appears to be close to commercial production. Modified in situ involves

SUMMARY OF RESOURCE ACTIVITY

Project Name	County	Current Status	1990 Forecast Production (Capacity)
Enercor	Uintah	Site acquired	50 BPD
Great National	Carbon	Site acquired	30,000 BPD
International Tar Sands	Grand	Site acquired	60,000 BPD
Laramie Energy Technology Center	Uintah	Site acquired	100 BPD
Natomas Energy	Uintah	Technology acquired	2,000-20,000 BPD
Sante Fe Energy	Wayne	Site acquired	N/A
Sohio	Uintah	Site acquired	20,000 BPD
Standard Oil of Indiana	Carbon	Resource acquired	50,000 BPD
Western Tar Sands	Uintah	Site acquired	100 BPD
Additional Potential Projects			
Delco	Uintah	N/A	
Mineral Research Corp.	N/A	Preliminary planning	

Source: Utah Energy Developments 1981-1990
Utah Energy Office

The following pages will outline the geology, processing, and technology of this fledgling industry as well as give an overall view of the experimental projects now underway in Utah.

# # #

Legend has it that a pioneer in oil shale country used a dark colored rock to build a chimney for his cabin. When he lit the fire in his new fireplace, the chimney went up on smoke and the settler's cabin along with it; hence, the name "the rock that burns".

In reality though, oil shale is a rock formation from which liquid and gaseous hydrocarbons can be extracted. This synthetic fuel, or synfuel, is usually a crude oil comparable to natural petroleum that can be refined into gasoline, diesel fuel, or other fuels that perform no different than natural products.

The extraction of these synfuels is an old and very expensive process. The February, 1918 issue of National Geographic devoted a 20 page article to the "Oil Shales of Colorado, Utah, Wyoming and Nevada". The article noted the massive expense of the oil extraction processes and unfortunately the expense has only escalated.

Today, there are a number of indivdual oil shale projects utilizing a variety of processes but as of yet, no one has been able to extract crude oil from shale on a commercial basis. That is, in quantities great enough and at a price that is low enough to be in today's competitive world market.

Aside from the massive investments of time and money it would take to make an oil shale project viable, there are many other factors to be considered. For example, the federal government holds over 80% of the nation's most valuable oil shale lands, lands which developers have not been given access. Also, water is perhaps the most important ingredient in processing shale, cooling spent shale, and establishing a revegetation program. It is estimated that from the White River Dam Project alone, the shale industry will spend over $485 million a year just for water use. Other limiting factors include continuing overregulation regarding environmental factors and the socio-economic considerations, all of which demand an increase in expenditures and therefore, lower the viability of a cost-efficient oil shale industry.

THE GEOLOGY

The geologic events that shaped the North American continent millions of years ago did more than create land forms. They also created oil, gas, coal and oil shale.

During the time the earth's surface was evolving, there were two fresh water lakes -- Lake Goshuite, which covered southern Wyoming, and Lake Uintah, which covered parts of Colorado and Utah -- that became stagnant when the Rocky Mountains emerged. Over time, the remains of dead plants and animals settled on the lake bottoms and were in turn covered with volcanic ash and rocks from the rising mountains.

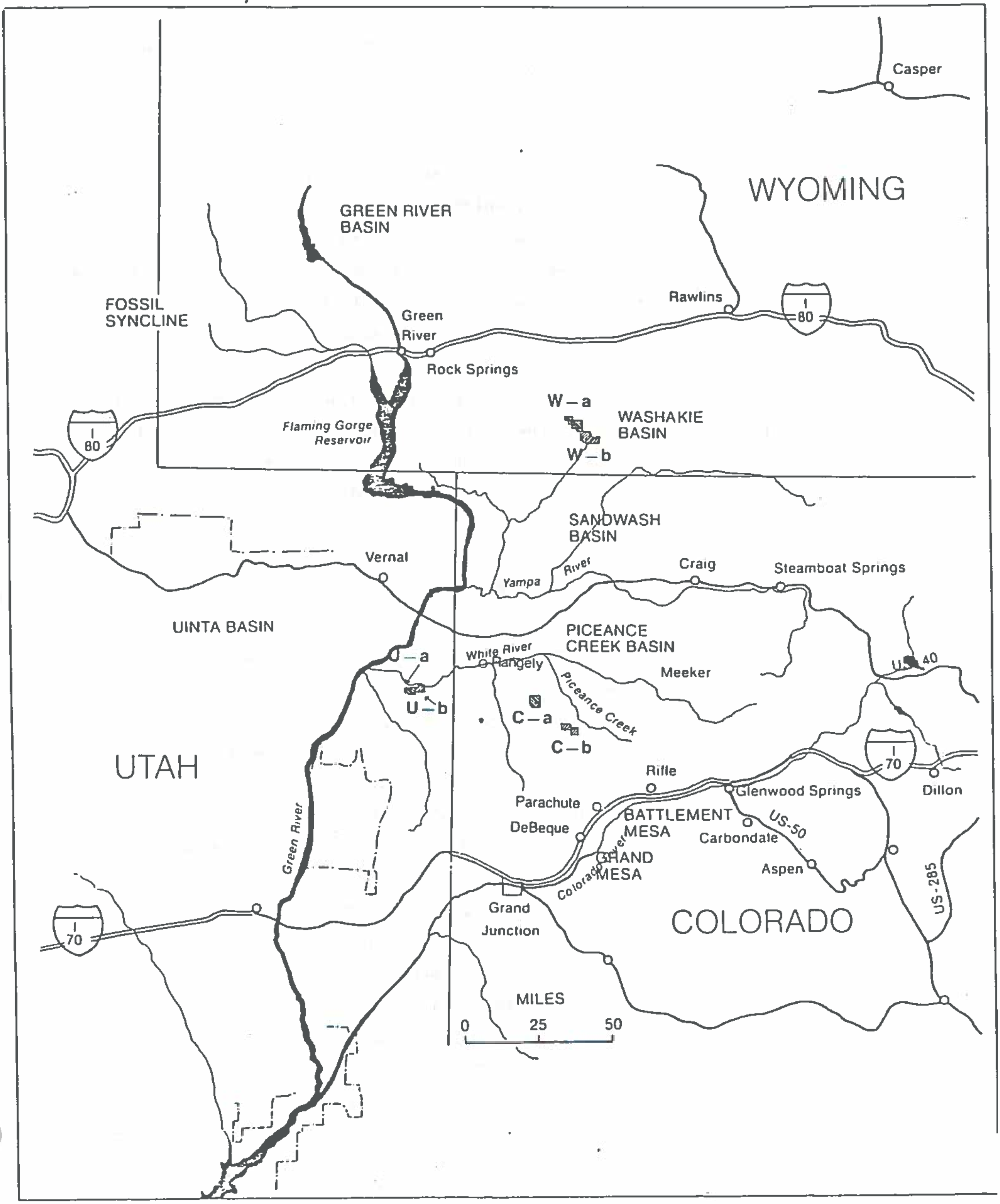
As the earth's surface continued to shift and put pressure on the organic sediment, some of the debris became oil and gas. In most of this region, however, the remains turned into marlstone, or oil shale, containing kerogen, which geologists believe never received sufficient heat or pressure to form crude oil.

THE TECHNOLOGY

Because most of the oil shale in the Green River Formation was not subjected to the heat and pressure required to form conventional oil and gas, it is an incomplete energy source and requires special treatment to separate the oil from the rock. The shale oil is produced by a heating process. But first the rock must be mined and broken into smaller pieces. Then it is retorted -- heated at a very high temperature -- to extract the oil. Thus oil shale technology involves both mining and processing.

The type of mining method used depends on economics and the geology of the area where the oil shale occurs. Where the amount of overburden -- the rock and soil overlying the deposit -- is small in proportion to the shale-bearing rock, surface mining can be used. If a large amount of material must be cleared to reach the shale, underground mining techniques are more economical and practical.

Shale Country



Source: Shale Country
1/81

Oil Shale X
81-3

Energy Unit Conversion Chart*

BRITISH THERMAL UNITS (Btu)	NATURAL GAS **		KILOWATT HOURS ELECTRICITY (kWhr)	BARRELS OIL (bbl)	SHORT TONS BITUMINOUS COAL (T)
	CF	Therms			
1	–	–	0.000293	–	–
1000	1	0.01	0.293	0.00017	0.00004
3413	3.413	0.03413	1	0.00059	0.00014
100,000	100	1	29.3	0.017	0.004
1 MILLION	1000 (1 MCF)	10	293	0.17	0.04
3.41 MILLION	3413	34.1	1000 (1 MWhr)	0.59	0.14
5.8 MILLION	5800	58	1700	1	0.23
25 MILLION	25,000	250	7325	4.31	1
1 BILLION	1 MILLION (1 MMCF)	10,000	293,000	172	40
3.41 BILLION	3.41 MILLION	34,100	1 MILLION (1 GWhr)	588	136
1 TRILLION	1 BILLION (1 BCF)	10 MILLION	293 MILLION	172,000	40,000
5.8 TRILLION	5.8 BILLION	58 MILLION	1.7 BILLION	1 MILLION (1 MMBbl)	232,000
25 TRILLION	25 BILLION	250 MILLION	7.32 BILLION	4.31 MILLION	1 MILLION
1 QUADRILLION (QUAD)(Q)	1 TRILLION (1 TCF)	10 BILLION	293 BILLION	172 MILLION	40 MILLION

* Based on the following nominal fuel heating values:
1 Cubic Foot Natural Gas = 1000 Btu
1 Barrel Crude Oil = 5.8 Million Btu
1 Pound Bituminous Coal = 12,500 Btu
M = 1000 MM = 1,000,000

* Revised 11/77

** Substitute Natural Gas (SNG) and Liquefied Natural Gas (LNG) will have approximately the same heating value.

IGT
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GLOSSARY

ALKYLATION - The act or process for producing high-octane fuel.

BARREL (bbl) - A liquid volume measure equal to 42 U.S. gallons. (159 liters)

BITUMEN - A general name for various solid and semisolid hydrocarbons. The nonmineral constituents are fusible and largely soluble in carbon disulfide. A mixture of hydrocarbons and their nonmetallic derivatives which may be gases, liquids, viscous liquids, or solids.

B.T.U. - British Thermal Unit. The amount of heat needed to raise the temperature of 1 pound of water 1 degree Fahrenheit. Equal to the standard unit of measurement of heat energy, such as the heat content of fuel.

COAL GASIFICATION - The conversion of coal to a gas, suitable for use as a fuel.

CONNATE WATER - Water that was laid down and entrapped with sedimentary deposits, as distinguished from migratory waters that have flowed into deposits after they were laid down.

CORE - A sample of material taken from a well by means of a hollow drilling bit. Cores are analyzed to determine their water and oil content, porosity, permeability, etc.

CRACKING - A process in which relatively heavy hydrocarbons are broken up by heat into ligher products, such as gasoline.

CREATED FRACTURES - Fractures induced by means of hydraulic or mechanical pressure exerted on the formation.

CRUDE OIL - Petroleum liquids as they are removed from the ground; formed from animal and vegetable matter which collected at the bottom of ancient seas and marshy areas.

DIRECTIONAL DRILLING - Drilling a well at a controlled angle instead of straight down.

DISTILLATE OIL - Any fuel, gas oil, topped crude oil or other petroleum which has a boiling range of from 550 to 1,200 degrees F. and is produced by boiling it off and condensing it during the refining process.

DRY HOLE - A drilled well which does not yield oil and/or gas in quantities or condition to support commercial production.

EMULSION - A suspension of one finely divided liquid phase in another.

ENTRAPMENT - A natural place, where oil and/or gas accumulates beneath the earth's surface.

FIREFLOODING - A synonym for in situ combustion.

FORWARD COMBUSTION - Air is injected, and ignition is obtained at the well-bore in an injection well. Continued injection of air drives the combustion front toward producing wells.

FOSSIL FUEL - Coal, oil, natural gas, and other fuels originating from geologic deposits of ancient plant and animal life and depending on oxidation for release of energy.

FRACTIONAL DISTILLATION - A process by which crude oil is separated into various products; the fundamental process of refining.

FRACTIONS (CUTS) - A refiner's term for the portions of oils containing a number of hydrocarbon compounds within certain boiling ranges, separated from other portions in fractional distillation. They are distinguished from pure compounds which have specified boiling temperatures, not a range.

FRACTURE - A general term to include any kind of discontinuity in a body of rock if produced by mechanical failure, whether by sheer stress or tensile stress. Fractures include faults, shears, joints, and planes of fracture cleavage.

GAS, MANUFACTURED - A gas obtained by the destructive, distillation of coal, by the destructive distillation of coal, by the thermal decomposition of oil, or by the reaction of steam passing through a bed of heated coal or coke. The amount of heat released in combustion varies widely.

GAS, ASSOCIATED NATURAL - Free natural gas in immediate contact but not in solution with crude oil in the reservoir.

GAS, NATURAL - Mixtures of hydrocarbon gases and vapors occurring naturally in certain geologic formations, with or without accompanying crude oil, or by the reaction of steam passing through a bed of heated coal or coke. The amount of heat released in combustion varies widely.

GAS, NON ASSOCIATED NATURAL - Free natural gas not in contact with, nor dissolved in crude oil in the reservoir.

GAS OIL - A petroleum distillate; diesel oil.

GAS-OIL RATION - The number of cubic feet of gas produced with each barrel of liquid when water also is produced.

GASOLINE - A liquid mixture of light hydrocarbons produced by refining ("cracking") crude oil. Used chiefly as a fuel in internal-combustion engines.

GASOHOL - A mixture of 90% gasoline and 10% alcohol, which can be used as a replacement for straight gasoline in cars.

INJECTION - (1) a fuel under pressure forced into a combustion chamber. (2) Forcing gas or water into an oil well in order to increase pressure within the well to force oil to the surface.

IN SITU COMBUSTION - In the natural or original position or location. In situ production of shale oil, for example, is an experimental technique in which a region of shale is drilled, fractured, and set on fire. The volatile gases burn off, the oil vaporizes, then condenses and collects at the bottom of the region, from which it can be recovered by a well. There has also been experimentation with in situ conversion of coal.

mcf - The measurement used for natural gas. One thousand cubic feet.

MISCIBLE - Refers to liquids and their ability to mix. Liquids that are not miscible separate into layers according to their specific gravity.

OFFSET WELL - A well drilled near the boundary of a lease opposite a completed well on an adjacent lease.

OIL SATURATION - The extent to which the voids in rock contain oil, usually expressed in percent related to total void.

OIL SHALE - A sedimentary rock containing solid organic matter (kerogen) that yields substantial amounts of oil when heated to high temperatures.

PERMEABILITY - The permeability (or perviousness) of rock is its capacity for transmitting a fluid. Degree of permeability depends upon the size and shape of the pores, the size and shape of the interconnections, and the extent of the latter. The unit of permeability is the darcy.

PETROCHEMICALS - Chemicals made from components of crude oil and/or natural gas. The cracking process for the manufacture of gasoline produces large quantities of gaseous hydrocarbons which were at one time waste products used only as illuminants and fuels in the refinery.

PETROLEUM - A naturally occurring material (gaseous, liquid or solid) composed mainly of chemical compounds of carbon and hydrogen. Fractional distillation yields gasoline, diesel, lubricating oil and other products.

RESERVES - The amount of a natural resource known to exist and expected to be recovered by present day methods and under present economic conditions.

RESERVOIR - A discrete section of porous rock containing an accumulation of oil or gas, either separately or as a mixture.

RESERVOIR FLUIDS - Fluids contained within the reservoir under conditions of reservoir pressure and temperatures; because of this fact, their characteristics are different from the characteristics of the same fluids existing under normal atmospheric conditions.

RESERVOIR LITHOLOGY - A type of rock in which oil or gas accumulate in a natural state beneath the earth's surface.

RESIDUAL OIL - The amount of liquid petroleum remaining in the formation at the end of a specified production process.

__RESOURCES__ - The estimated total quantity of a mineral in the ground.

__REVERSE COMBUSTION__ - In this process, the formation is ignited at the producing well and the combustion zone moves countercurrent to the injected air and reservoir fluid stream. Because the oil flows into a zone already heated, there is no tendency for it to solidify and decrease permeability.

__SECONDARY RECOVERY__ - Oil and gas obtained by the augmentation of reservoir energy, often by the injection of air, gas or water into a producing formation.

__SHALE__ - A fine-grained sedimentary rock formed by the hardening of clay. Splits into thin layers when broken.

__SHOT__ - A charge of high explosive, usually nitroglycerine, deposited in a well to shatter the sand and to expedite recovery of oil.

__STEAMFLOODING__ - Steam displacement (or steam drive) follows the same basic principle as the waterflood. Steam under pressure is fed into special injection wells, both to heat the oil in place and to drive it to producing wells.

__STEAM SOAKING__ - Steam is used as a stimulation medium to heat the area of the reservoir around the wellbore (also called steam stimulation, huff-and-puff, or cyclic steam injection). Steam under pressure is injected down the casing or tubing of a producing well. A typical steam injection lasts for 5 to 8 days. Following the injection period, the well is returned to production.

__STRIPPER WELL__ - A nearly depleted well for which income barely exceeds expense.

__TAR SAND__ - Any sedimentary rock that contains bitumen or other heavy petroleum material that cannot be recovered by conventional petroleum recovery methods.

__TERTIARY RECOVERY__ - Any method of augmenting the natural energy of a petroleum reservoir to increase production in the third and perhaps final stage of recovery.

__THERMAL RECOVERY__ - A petroleum recovery process that utilizes heat to thin viscous oil in an underground formation and allows it to flow more readily towards producing wells.

__ULTIMATE RECOVERABLE RESERVES__ - The total quantity of crude oil or gas that a well, pool, field, or property will produce. It is the total obtained or to be obtained from the beginning to final abandonment.

__VISCOSITY__ - The internal resistance offered by a fluid to flow.

__WATERFLOODING__ - A secondary recovery operation in which water is injected into a petroleum reservoir to create a water drive to increase production.

__WELL HEAD__ - Oil or gas brought to the surface, ready for transportation to refinery or ship or pipeline. Well head costs usually refer to the cost of bringing oil or gas to the surface and do not include costs of transportation, refining, distribution, or profit.

WELL LOGGING - The detailed record of the rocks passed through in drilling.

WETTABILITY - The relative tendency of the oil and water phases to adhere to the surface of the rock. If the rock has a greater affinity for water than for oil, the rock is said to be preferentially water wet. On a flat surface, wettability can be identified with the cosine of the contact angle.

WETTABILITY CONTROL - The term wettability as applied to petroleum reservoirs refers to the relative affinity of the coexisting oil and water phases to adhere to the surface of the rock. If the rock is predominantly in contact with water, it is said to be preferentially water-wet. Similarly, if the rock is predominantly covered with oil, it is referred to as oil-wet.

WETTING - The adhesion of a liquid to the surface of a solid.

WETTING AGENT - A substance which, when added to a liquid, increases the spreading of the liquid on a surface or the penetration of the liquid into a porous material.

VERNAL EXPRESS MAY 8, 1985

Utah professor edits book about history of the Basin

A University of Utah professor has edited a new book on the Uinta Basin, which covers the area's geological and archeological history, synthetic fuel reserves, and pros and cons on the Central Utah Project.

Dr. M. Dane Picard, professor of geology and geophysics, edited the 335-page illustrated book published by the Utah Geological Association. In 1980 he edited a similar book on the history and geology of the Henry Mountains, one of Utah's most pristine areas.

Picard says the new book, titled "Geology and Energy Resources, Uinta Basin of Utah," is a compilation of technical papers and essays. Many of the essays first appeared in the Journal of Geological Education.

Picard, immediate past president of the 8,000-member Society of Economic Paleontologists and Mineralogists, has written four other books and more than 1930 scientific papers. His research specialities are sedimentary petrology and depositimal environment reconstruction.

In an article on the archeological history of the Uinta Basin, Joel N. McNamara of the University's Anthropology Department says remnants of the Uinta Basin's earliest settlers are almost as varied as the ways they lived.

"People visiting the Uinta Basin have a unique chance to experience the prehistory of the region," says McNamara. "Few places offer such a wide array of locations where individuals can view the remains of past cultures in their natural settings, much as they were thousands of years ago."

In a separate article, Robert E. Covington and Kenneth J. Young of Hiko Bell Mining & Oil Co. of Vernal describe the basin as "Mother Nature's storehouse of exotic but realistically very valuable solid hydrocarbons, tar sands and oil shale."

They say the basin contains 21 deposits of bituminous sandstone, more commonly known as "tar sands." Asphalt Ridge, P.R. Springs (including Hays Canyon) and Sunnyside are classified as "giants", indicating each has oil reserves in place exceeding 500 million barrels.

William L. Chenoweth, a Grand Junction, Colo., geologist, offers a brief history of the short-lived Uintah Railway built in 1909 solely to export gilsonite from the mines to a railroad shipping point in western Colorado.

"The 64-mile railroad had the dubious distinction of possessing some of the steepest grades and sharpest curves ever built for a U.S. railroad line," says Chenoweth. The railroad was abandoned in 1939.

George P. Malanson of the Department of Geography at Oklahoma State University, writes about the rise and fall of the Uintah Valley Indian Reservation. He says white settlers abandoned the area in the 1960s only to return to encroach upon reservation land after the Ute Indians had proven the area's fertility for farming.

Picard and Dr. Lee R. High Jr., a Mobil Oil Co. geologist, collaborated in articles on the geological features of lakes and the sedimentology of the Great Salt Lake, the largest saline lake in North America.

The book also contains technical articles on surface and ground water, Mesozoic stratigraphy, depositional settings of upper Cretaceous and early Tertiary rocks, and the structure of the basin and the Uinta Mountains.

Copies of the book can be purchased at the Utah Geological and Mineral Survey, Salt Lake City.

"Thermal Recovery May Bring Industry's 'Quiet Revolution'," *Oil & Gas Journal* (November 23, 1964) v. 62, No. 47, pp. 1277-1280.

"Bituminous Sands and Viscous Crude Oils", Proceedings: *First Intermountain Symposium on Fossil Hydrocarbons*, Salt Lake City, Brigham Young University (1965), 364-374.

"Some Possible Applications of Thermal Recovery in Utah", *Journal of Petroleum Technology* (1965), v. 17, No. 11, pp. 1277-1280.

"Stratigraphic and Structural Controls of Bituminous Sandstone Deposits of Utah [abs]," *American Association of Petroleum Geologists Bulletin* (1965), v. 49, pp. 1577.

"Oil-Impregnated Rocks of Utah", Presented: *Annual Meeting Geological Society of America* (Coal Division, Salt Lake City, also, Brigham Young University Geology Studies (1976), v. 22.

"Oil-Impregnated Sandstones of South Central Utah," *Department of Energy Research Grant*, Laramie, Wyoming (1979).

"Brief History and Recent Developments in Tar Sand," (Deposits of Uinta Basin). *Geology and Energy Resources, Uinta Basin, Utah.* Utah Geological Association 12, Salt Lake City, Utah (1985), 227-241.

Rocky Mountain Association of Geologists

Sigma Alpha Epsilon (University of Colorado [Social])

Sigma Gamma Epsilon (University of Colorado; Colorado School of Mines, Professor of English [Honorary])

Utah Geological Society

Who's Who in Industry

Who's Who in the West

Wyoming Geological Society

PUBLICATIONS

"Oil & Gas Fields of Colorado," *The Hell's Hole Gas Field*, Rio Blanco County, Colorado (1954).

"The Bituminous Sandstones of the Asphalt Ridge Area, North-Eastern Utah". *Guidebook to the Geology of the Uinta Basin*, (Intermountain Association of Petroleum Geologists (1957), 172-175.

"Oil & Gas Fields of Colorado," *The Lower Horse Draw Unit*, Rio Blanco County, Colorado (1959).

"Oil & Gas of Utah," *The Gusher Oil Field* (1960).

"Bituminous Sandstones and Limestone Deposits of Utah," *Oil & Gas Possibilities of Utah, Re-evaluated*, Utah Geological and Mineral Survey (1963), Bulletin 54, pp. 225-247.

"Bituminous Sandstones in the Uinta Basin," (A History of Early Mining in the Uinta Basin), *Guidebook to the Geology and Mineral Resources of the Uinta Basin*, Intermountain Association of Petroleum Geologists (1964), 227 - 242.

"Bituminous Sandstones of Eastern Utah," *Guidebook to the Geology of the Uinta Basin*, Intermountain Association of Petroleum Geologists (1964).

strat sections, sell sitting, photogeologic work, uranium prospecting, regional tectonic basin analysis.

Caldwell & Covington: Consulting Geologist & Partner; Vernal, Utah (1954-1964). Work consisted of evaluating and drilling oil and gas prospects, surface & subsurface work, leasing oil & gas blocks, consulting on oil, gas, coal, uranium, and oil impregnated sands in Utah, Colorado, Wyoming, Nevada, Arizona.

Hiko Bell Mining & Oil Company, Inc: Vice-Pres. & Mngr. Exploration; Offices in Zion's First National Bank; Vernal, Utah (1964-1969); Secretary-Treasurer and Manager of Exploration (1969 to Present). Work consisted of evaluating oil and gas prospects, mineral prospects, engineering study of tunnels for contractor bids, coal evaluation work, uranium exploration, mineral exploration, consulting reports on field & office work, submitting A.F.E.'s for drilling and mining operations.

MILITARY SERVICE

U. S. Navy (1942-1945): Aviation Ordnanceman 2/c

U. S. Navy (1945-1955): Ensign, USNR (SE)

ORGANIZATIONS

American Association for the Advancement of Science (Elected Fellow, 1962)

American Association of Petroleum Geologists

American Biographical Institute

American Institute of Mechanical Engineers (AIME)

Association of Professional Geological Scientist

Dictionary of International Biography (1975)

Geological Society of America

Green Circle (Loyola University [Honorary])

Intermountain Association of Petroleum Geologists

Member of P. B. O. E.

PERSONAL HISTORY

OF

ROBERT E. COVINGTON

CERTIFIED PROFESSIONAL GEOLOGIST, NO. 1705

JANUARY 6, 1988

PLACE & DATE OF BIRTH

Waterloo, Iowa -- March 24, 1921

EDUCATION

Budlong Elementary School, Chicago, Illinois.

Roosevelt High School, Chicago, Illinois.

Northwestern University, Evanston, Illinois (1942).

University of Colorado (B.A., 1947, Geology), Boulder, Colorado.

Colorado School of Mines (1947-1948), Golden, Colorado (1 yr. on M.S.-Geology).

WORK EXPERIENCE

Phillips Petroleum Company: Worked with ib Seismograph Crew in Texas Gulf Coast area as Technical Trainee (1947).

Carter Oil Company: As Junior Geologist (Uintah Basin area -- Rawlins, Wyoming & Vernal, Utah [1948-1949]) -- provided surface mapping, photogeologic studies, measuring surface sections, well sitting.

Johnson & Bunn, Oil Producers: Utah, Nebraska, Colorado, Wyoming, & East Texas (1950-1954). Work consisted of surface mapping by plane table, measuring

PERSONAL HISTORY

OF

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CERTIFIED PROFESSIONAL GEOLOGIST, NO. 1705

JANUARY 6, 1988

Hiko Bell Mining & Oil Company, Inc., P. O. Box 1845, Vernal, Ut 84078 (801) 789-3233

April 27, 1921

UTE OIL SHALE PLANT COMPLETED

Watson, April 22—The Ute Oil Shale company plant, the largest in this section is expected to start operations on May 1. Construction of the plant, which is located thirteen miles north of Watson on the White River, was started four years ago and it is now completed and ready to run. It has capacity sufficient to treat 400 tons of shale every twenty four hours. Tests of the company's shale deposits show one barrel of oil to the ton.

The Western Shale company's plant, which is six miles east of Watson, is in steady operation and producing from four to six barrels of oil a day. The plant is small but is operating very successfully.

A shale plant is to be built in the Willow Creek section which is in the southeastern part of Uinta county. R. S. Collett now has a force of eighty men at work constructing a road from Rainbow, the terminal of a branch road of the Uintah Railway company, to Willow Creek where the plant will be built, which is a distance of from fifty to sixty miles. It will cut the road distance over the present road in half. Construction of the plant is expected to follow very quickly after the road is finished. Farmers and sheep and cattle men of the Willow Creek section will benefit by the road.

Considerable interest has been created here by the striking of gas in the Carbonero field. Captain Colley of Mack, Colorado has shipped two standard rigs to the field and will start drilling very soon. Moving pictures of the shale plants and deposits and the prospective oil fields in this district have recently been taken and will be exhibited in motion picture theatres throughout the country.

Mar 7, 1919

Vice-Prest A. A Brigman of the Raven Oil & Refining company, of Rangely, was in Vernal this week. He reports things progressing in a rapid stride at the plant, with the refinery working on a 24 hour basis

The popularity of the product of this company is increasing daily, and it is keeping the company working hard to supply the demands The local tin shop is constructing two large storage tanks of a 10,000 gallon capacity fcr the company, to be placed here at Vernal. Two tank wagons are now in operation between Vernal and Rangely and three more are on the way to Rangely, via Dragon and are expected any day.

The company has operated at an exceedingly good profit, and the quality of the products produced is of the highest. Seventy-three drums of gasoline arrivod in Vernal this week. The announcement is made that the company is anxiously awaiting the breaking up of the winter weather, to commence work of installation on the large refinery, the machinery of which is already on the ground.

Western Energy Update

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Newsletter No. 84-15
August 3, 1984

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WASHINGTON DEVELOPMENTS

CONGRESS

House Slashes Synfuels Budget; Prohibits Oil Shale Funding. The House of Representatives on Thursday approved, by a 410-2 vote, a cut of $5 billion in Synthetic Fuels Corporation funds and in addition specifically prohibited the agency from financing two Colorado projects. The vote is considered a victory for SFC supporters who managed to hold off an Administration-backed $10 billion cut that would have left the corporation with $3.25 billion. The final reduction will leave $8.25 billion of the $13.25 billion currently available.

The stage was set for the vote last week when the House defeated a rule for consideration of the FY 85 Interior appropriations bill that would have prevented the offering of any amendments to rescind SFC funds. The vote on the rule was an unexpected defeat for House Majority Leader Jim Wright (D-TX), a synfuels supporter. After the 261-148 defeat of the rule, synfuels supporters began to rally around the smaller $5 billion recision.

The amendment to prohibit funding for the Colorado projects was offered by Rep. Sidney Yates (D-IL), Interior Appropriations Subcommittee chairman, and seemed to catch both SFC supporters and opponents by surprise. The amendment prohibits funding for Union Oil Parachute Creek Phase II and Cathedral Bluffs oil shale projects. The vote against the two oil shale projects seems to have been a crucial part of the political maneuvering due to the recent criticism of the high costs of the projects. The SFC has signed letters of intent to provide price and loan guarantees of $2.7 billion for Union and $2.2 billion for Cathedral

Bluffs. A recent congressional study indicated that the price guarantees for Union agreed to by the SFC could rise as high as $92 a barrel by the end of this decade. Union completed its phase I project in October but has had further problems in bringing it into commercial operation. Yates, in support of his amendment, stated that since both projects would use technology developed for the Union I project, "no new kinds of technical knowledge would be developed." The amendment was approved on a voice vote with little debate. By removing this source of controversy synfuel supporters seemed to strengthen their case.

Both the Western Governors' Association and the National Governors' Association recently passed resolutions supporting continued funding of synthetic fuels projects. The resolutions state that all letters of intent which have been authorized or signed by the SFC should be honored.

The Synthetic Fuels Corp. could face a further loss of funds, however. Rep. Don Fuqua (D-FL), chairman of the Science and Technology Committee and a supporter of the $5 billion cut, said he would try in a separate vote to transfer an additional $2 billion of SFC funds to the Department of Energy for non-nuclear demonstration funds. The Fuqua plan was endorsed by the heads of four renewable energy groups.

The Interior appropriations bill, with the synfuels amendment attached, passed the House 336-57. Supporters of the Colorado oil shale projects hope to defeat the Yates' restriction in the conference committee but they also acknowledged that the Senate is likely to approve an even larger cut in the synfuels corporations spending than did the House. (*Wall Street Journal*, Aug. 3; *Rocky Mountain News*, Aug. 3; *Oil Daily*, Aug. 3; *EESI Weekly Bulletin*, July 30)

Congress OKs Hoover Dam Power Contract. On Tuesday, the Senate overrode charges by Ohio Senator Metzenbaum (D) that approval of the contract for the sale of power from Hoover Dam for the next 30 years was a federal "give-away" and approved the contract on a 64-34 vote. The House had earlier approved the contract after rejecting a move to auction the power to the highest bidder.

According to Metzenbaum, the contract, which expires in 2017, subsidizes Southern California, Arizona and Nevada at the expense of the rest of the nation. "This bill sets us on a course which could cost the Treasury $6 billion over the next 10 years, and countless tens of billions more over the long term," he claimed. Metzenbaum had sought to delay extension of the contract until Congress could study the issue more thoroughly. Senator Pete Wilson (R-CA) stated in his opposition to Metzenbaum's move "Ask not for whom the bells tolls. Friend, it will toll next for thee." The bill also authorizes $77 million for improvements and an upgrade of Hoover's capacity, the cost of which will be borne by power users. (*Wall Street Journal*, Aug. 1)

Bill to Limit State Severance Taxes Attacked in Hearing. At a hearing of the Senate Finance Subcommittee on Energy and Agricultural Taxation, a bill to limit state severance taxes was roundly criticized by representatives of energy producing states. The bill, sponsored by Sen. Alan Dixon (D-IL), would prevent states from imposing "excessively high" severance taxes. It would allow states to levy severance taxes only for the amount needed to pay the public costs directly associated with energy activities. Dixon said that energy severance taxes in some states "have risen to such levels as to constitute a burden on interstate commerce" and declared that "income from our energy sources should not be transferred from energy-poor states to energy-rich states." He claimed that severance taxes provide 73 percent of Alaska's revenue and 53 percent of Wyoming's.

Wyoming Senator Malcolm Wallop (R), chairman of the subcommittee, led the attack on the bill. The issue, Wallop said, is that the "so-called energy-producing states have something the so-called energy-consuming states do not." He also pointed out the U.S. Supreme Court has upheld the constitutionality of state severance taxes.

Other western senators also attacked the bill. Sen. Max Baucus (D-MT) called the bill "one of the most pernicious attempts to divide the country I've seen in a long time." He said the tax does not affect consumers greatly, amounting to 4.4 percent of energy costs in Illinois v. the 6.6 percent state corporation tax. Sen. Pete Domenici (R-NM) said the bill would bankrupt New Mexico and added that "if Congress can limit the tax on oil, gas, and coal to produce cheaper energy for the rest of the nation, it also can limit the tax on timber to produce cheaper lumber products and more affordable houses" and on other products. Sen. Frank Murkowski (R-AK) disputed that states' severance taxes get passed along to consumers particularly with Alaska oil. "Alaska oil is sold at the world market price. The world oil price structure prevents tax exportation to consumers. The burden of severance taxes is carried mainly by landowners and lessees who are forced to conform to the ultimate price dictated by the market," he said.

Sen. David Durenburger (R-MN) said he agreed with Dixon that severance taxes are a problem but does not like Dixon's proposed solution. He said the bill "strikes directly at the roots of Federalism -- the unfettered authority of the states to tax." He said a better alternative might be to limit the amount of severance taxes a state could levy on an energy resource extracted from federal land, or withhold a state's share of federal energy royalties when it levies excessive taxes on resources from federal lands. The federal aid formulas could also be revised to take better account of fiscal disparities, he added.

Sen. Dixon has conceded the bill has no chance to pass this legislative session but said that he will try for passage again next year. (*Oil Daily*, July 25; *Oil & Gas Journal*, July 30; *Energy Users Report*, July 26)

Group Hopes to Eliminate Tax Breaks for Alcohol Fuels. The Highway Users Federation has begun a campaign to phase-out tax incentives for alcohol fuels. The group claims that the incentives have served the purpose of encouraging development of the alcohol fuels industry and should now be phased-out of state and federal tax structures. The group is also obviously concerned about the amount of money that is lost from potential tax revenues that presumably would otherwise to available to the Highway Trust Fund. In fact, the federation says that the excise tax break of 6 cents per gallon that goes into effect on January 1, 1985 will result in the loss of $354 million to the Trust Fund in fiscal year 1985, $522 million in Fy-86, $522 million in FY-87 and $594 million in FY-88. It used Department of Transportation data for this estimate.

Speaking at a congressional field hearing in Sioux Falls, SD, Durand C. Young of the American Automobile Association and the AAA South Dakota Auto Club questioned whether anyone should be subsidizing the alcohol fuels industry and whether the incentives were necessary for alcohol fuels to compete. Oklahoma, was cited as an example -- being in the top 18 alcohol consuming states and offering no state motor fuel tax exemption of its own for gasohol. The group may try to kill the federal exemption in early 1985 a federation official said. State exemptions are illustrated in the following chart. (*Alcohol Week*, July 23)

HIGHWAY USERS FEDERATION: "GASOHOL – 1983"

State	Exemption ¢	Quantity – million gal.	Percentage of Market	Revenue Loss – million $	Revenue Loss – %
Alabama	3.0	30	1.6	0.9	0.28
California	3.0	481	4.4	14.4	0.65
Colorado	5.0	57	3.6	2.8	1.26
Florida	4.0	357	7.0	14.3	0.28
Illinois	5 (4%)	416*	9.0	20.8	2.74
Indiana	3.75 (3%)	936*	21.6	20.1	4.51
Iowa	3.0	510	36.6	15.3	4.62
Kansas	5.0	67	5.4	3.4	1.69
Kentucky	3.5	101	5.8	3.5	0.91
Michigan	4.0	566	15.4	22.6	3.26
Nebraska	5.0	183	23.6	9.2	5.39
New Mexico	11.0	27	3.6	2.9	1.82
Ohio	3.5	458	9.9	16.0	1.67
Oklahoma	0.0	76	3.9	0.0	0.00
South Dakota	4.0	32	8.1	1.3	1.53
Texas	5.0	282	3.4	14.1	0.94
Utah	5.0	29	4.1	1.5	1.30
Virginia	8.0	46	1.8	3.7	0.65
All Other States	2.0*	181	—	3.6	—
United States	5.0	4,435	4.2	221.2	1.8
Total Loss in 1983				391.6	

*Estimate

CRS Suggests Improvements in PURPA Rate Calculations. Congress should consider requiring the Federal Energy Regulatory Commission, possibly in conjunction with DOE's Energy Information Administration, to establish an information service that state regulators can use to set generating capacity credits for renewable energy producers, the Congressional Research Service advises in a recently completed report. (No. 84-1017) Congress should also consider enacting a tax credit for electric utilities based on a utility's expenses in performing computer modeling and data collection to calculate capacity payments. The tax credit would be an incentive for utilities that have so far found it "easier to resist requirements for capaicty payments than to accommodate the credit calculations," CRS says. Utilities are required, under the provisions of the Public Utility Regulatory Policies Act (PURPA), to pay small power producers the amount they save by avoiding construction of new capacity attributable to the small power producer's production.

PURPA recognizes two related components of power delivered by qualifying facilities. First, utilities' rates for power purchases must recognize the savings to the utility in energy costs. Second, the rates should recognize the savings from deferring or avoiding construction of new generating capacity. The first calculation, though complicated is "relatively easy to compute," CRS found. The second calculation, capacity credits, "defy straightforward calculation methods," in the words of CRS analyst Fred Sissine. As a result only California, Montana and North Carolina have established crediting methods for small power producers.

Along with the information issue, CRS identified four policy issues for capacity credit development. These are excess capacity, aggregate capacity from all small power producers, least-cost methodology and multi-state power pool regulation. Utility claims of excess capacity have led 16 state commissions to grant exemptions from developing methods of calculating capacity credits. "Nevertheless, in six of the 16 states...utilities are currently planning to begin construction of conventional plants during the next 10 years," CRS says.

With respect to capacity credits, most state utility commissions seem to be getting the message that the collective contribution from qualifying power producers will not be significant. But most states have significant renewable energy potential, and the absence of capacity credits could discourage its development, CRS believes. Only about a dozen states are experimenting with least-cost models to review utility growth plans. CRS believes that least-cost models "can be adapted fairly easily" to calculate capacity credits for wind and other alternative energy technologies. Again, the problem could be a lack of information-sharing among states that could be facilitated by the federal agencies, the report says. (*Inside Energy/Federal Lands*, July 23)

Congressional Notes. A recent General Accounting Office study concluded that until DOE demonstrates an acceptable form for solidifying liquid high-level radioactive reprocessing wastes for disposal, there will be little commercial interest in nuclear reprocessing. The Nuclear Waste Policy Act requires DOE to accept high-level waste from commercial reprocessors for final disposal, but does not specify the acceptable form for the waste. The standard contract for high-level waste disposal signed by DOE and the utilities states that DOE will describe the acceptable form by the time DOE submits its license application for the first high-level waste repository to the NRC, which will be some time after 1990. The NRC would then take several years to evaluate and approve the solidified form. In the meantime, however, commercial reprocessors cannot wait until the solidified form has been approved because federal law requires liquid reprocessing wastes to be solidified within five years after generation. Commercial reprocessors, therefore, must solidfy their wastes with no guarantee that the solidified form will be acceptable for disposal at the future DOE high-level waste repository. (*Nuclear Waste News*, July 26)

The General Accounting Office has found the federal pipeline inspection program plagued by a lack of inspectors and other resources. The GAO report noted that the Department of Transportation had 17 regional office inspectors as of April 1984. "GAO believes that this is insufficient to carry out the department's current inspection and enforcement responsibilities," the report said. "Moreover, state participation in the program is voluntary; therefore, the department cannot require the states to maintain their level of inspection activity, assume responsibility for additional intrastate pipelines, and/or correct deficiencies in their program." The report recommended that the department rely more on interstate operators to ensure the safety of their pipeline systems. It also suggested DOT improve the management workload and the extent on inspection coverage provided. Such changes, however, would not be enough to provide adequate enforcement of federal safety standards, the report warned. (*Oil Daily*, July 26)

The House Merchant Marine Committee staff has initiated momentum for a conference on Outer Continental Shelf revenue-sharing legislation by circulating for comments a draft set of recommendations regarding a compromise bill which key House and Senate leaders agreed to last year. The draft was reportedly sent to conferees' aides. A conference date, in fact, could be announced this week. Committee Chairman Rep. Walter Jones (D-NC) reportedly wants to complete a conference before the August 10 Republican National Convention. Jones could, however, face resistance from Senator Ted Stevens (R-AK). Stevens has sponsored a Senate revenue sharing proposal and he has reportedly been asked by the Interior Department to hold off while Secretary Clark tries to win the President's approval on an alternative revenue sharing proposal. The President has consistently opposed the revenue sharing concept for budgetary and other reasons. Interior reportedly is developing a proposal which would combine a new revenue sharing formula with one for sharing 8(g) common-pool tract revenues. The common pool tracts issue involves revenues derived from pools that underlie both federal and state territory while revenue sharing alone, as it is commonly understood, refers to revenues derived strictly from federal tracts on the federally controlled OCS. At a meeting of the Cabinet Council on Natural Resources earlier this year, Secretary Clark sought to win consent to develop an acceptable revenue sharing concept. Though permission was reportedly given to explore the issue, there is some discrepancy whether such permission applied to the current or the next budget year. (*Inside Energy/Federal Lands,* July 30)

In related news, House Merchant Marine Committee Chairman Walter Jones (D-NC) has set aside August 7 for markup of the House Outer Continental Shelf consistency bill (HR 4589). Jones claims that he has no position on the bill, but that is seen by some as his way of putting pressure on the Reagan Administration to consider revenue sharing legislation. At this point it is impossible to judge how a committee vote would come out, according to observers and that makes industry and the Administration nervous because they see the bill as giving coastal states greater ability to oppose OCS lease sales. Opponents to the bill are expected to seek to inject a series of exemptions from the state law consistency requirement for a number of activities. Another possible amendment would require the Interior Department and states to make consistency determinations on a tract-by-tract basis, which would be administratively overwhelming. Currently, the bill requires consistency determinations to be made on an activity wide basis, which could be as large as sale-wide. (*Inside Energy/Federal Lands,* July 30)

A suggestion on expediting the development of low-level radioactive waste repositories was made to Congress last week by South Carolina Governor Richard Riley. A major problem in low-level waste disposal has been the reluctance of the states with existing repositories (South Carolina, Washington, and Nevada) to continue allowing non-repository states to use their repositories in the absence of sufficient consideration of developing additional repositories. On the other hand, Congress has been reluctant to ratify regional compacts because, as of 1986, compact states will be allowed to refuse wastes from noncompact states without repositories. Riley's proposal would require existing repository states to consider allowing other states to use the repositories until they can develop their own, provided that Congress ratify the regional compacts so that serious discussion could begin on the creation of new repositories. Regional compact groups and independent states would be required to establish a schedule for developing new disposal sites and states with existing repositories would participate in all discussions concerning these new repositories. Jeanine Hull, congressional aide to the House Energy Subcommittee on Conservation and Power, commented favorably on Riley's proposal, but cautioned that Congress may not have time to act on the proposal this year. (*Inside Energy/Federal Lands,* July 30)

A bill authorizing a test drawdown of the Strategic Petroleum Reserve was approved unanimously by the House Fossil and Synthetic Fuels Subcommittee Tuesday. The bill, sponsored by subcommittee Chairman Philip Sharp, (D-IN) was amended prior to the vote during markup. Added to the bill were requirements for two studies. One, proposed by Rep. Tom Corcoran (R-IL) would look at the feasibility of options trading for SPR oil. The other study, sponsored by Rep. Tom Tauke (R-IA) would look at barter arrangements whereby countries would deposit oil in the SPR for which the United States would not have to pay. The oil could be used as collateral for loans which the depositing country could use to buy U.S. goods. Some experts have advocated such a system as a way of getting around OPEC quotas, since the U.S. would not actually be buying the oil. The drawdown test of the reserve will average about 37,00C barrels a day as the bill stands, and would be suspended if the SPR is actually needed for emergency use. DOE would have a 180 day period to begin the test after passage of the legislation. (*Oil Daily*, Aug. 1)

The Office of Technology Assessment, which has been asked by Rep. Morris Udall (D-AZ) to do a study of the limitations to reclaiming surface coal mined lands in the West and recent reclamation technology advances and progress in reclaiming abandoned mines, has set its work schedule. In September, OTA will convene an advisory panel to review the agency's study plans. Additionally, three workshops will be held during the course of the project, but no dates have been set. (*Inside Energy/Federal Lands*, July 23)

Utah may have a Project Bold "Part II" if the State Board of Lands and Forestry approves a new version agreed to by state and Interior Department officials. The new version reportedly improves legislation introduced in Congress last year for exchanging 2.5 million acres of federal land in Utah for an equal amount of state land. The current bill, HR 5229, introduced by Rep. James Hansen (R-UT), did not have the support of the entire Utah delegation but it did serve to push along the exchange concept and prompted Interior-state meetings in June resulting in the proposed revisions. The revisions were proposed to the State Board at meeting on July 11, 12. A central recommendation is that mineral revenues from exchange lands be split between the two governments regardless of which lands produce the minerals. Another key issue is the administration of current mining claims on the exchange lands: Who will administer the claims if the government owner is swapped in the exchange? The State Board is anxious for the state delegation to introduce a revised bill. (*Inside Energy/Federal Lands*, July 23)

JUDICIAL BRANCH

Texaco Files Suit Against DOE on Entitlements Lists. Texaco is the first of the major oil companies to file suit over DOE's decision not to publish the January 1981 and final entitlement lists. The suit claims that Texaco suffers "irreparable financial loss and injury," as a result of the decision. The lists were published regularly before oil prices were decontrolled in 1981. The entitlement program was intended to equalize the crude-oil acquisition costs to refiners by having those who used more than the average amount of price-controlled oil pay those who didn't a so called entitlement. Refiners who were sellers of entitlements have money owed to them by purchasers and are allegedly disadvantaged by DOE's decision. Texcao's suit claims that the company is entitled to $78 million from refiners and other firms for its participation in the entitlements program.

Chevron believes it would receive $132 million if the lists were issued and thus would be the largest beneficiary of their issuance, but it has not yet decided whether to file suit. The recovery could be reduced should the proposed merger with Gulf Oil be approved because Gulf is a company that would own more than $7 million if the list were issued. Chevron is also the beneficiary of an exception relief order which would net the company another $17 million. Any firm that can document losses because the lists are not issued can deduct those amounts from their federal corporate taxes as uncollectible debts, industry sources said.

Texaco, in its complaint, said that failure by DOE to issue the lists "will unlawfully subsidize those refiners and other firms who, because they had a greater proportionate access to lower-price crude oil, are required to buy entitlements upon the issuance of those notices. Unless said notices are issued, there is little if any likelihood that plaintiff will recover the millions of dollars which it would receive from other refiners and firms in fulfillment of their obligations under the entitlements program." (*Inside Energy/Federal Lands,* July 30)

Judicial Notes. A federal appeals court in Denver handed Kansas Power & Light a victory over Burlington Northern as it overturned a lower court ruling and found that BN had improperly applied a surcharge to its coal shipments to a Kansas Power & Light power plant. BN imposed a 75 cent per ton surcharge on the shipments on the assumption that a 1972 contract between the railroad and utility was dissolved by the Staggers Railroad Deregulation Act. The appeals court ruled the contract was valid. The ruling will result in a $19 million refund to the customers of the plant which is owned by Kansas Power & Light (64%), Missouri Public Service (8%), Western Power Division (8%), and Kansas Gas & Electric (20%). (*Wall Street Journal,* July 26)

EXECUTIVE BRANCH

NRC Grants Diablo Canyon Full Power License. Sixteen years after it received a construction permit, Pacific Gas & Electric was granted a full power license to operate the 1084 Mw Unit 1 of the Diablo Canyon Nuclear power plant on the California coast. The NRC voted 3-1 in favor of the license, with the newest Commissioner Lando Zeck abstaining. It will take two weeks before the NRC order becomes effective.

Mothers for Peace, a persistent critic of the plant, which is located three miles from an earthquake fault, plans to seek an injunction in the Washington, D.C. appeals court. The Government Accountability Project will probably join the appeal.

In its vote, the Commission rejected allegations by Isa Yin, one of 16 NRC plant investigators, of inadequacies in the plant's piping design. The one dissenting commissioner, James Asselstine, believed that more safety studies were needed. Diablo Canyon has been the NRC's longest-running licensing case. (*Wall Street Journal,* Aug. 3)

EPA Proposes to Reduce Lead in Gasoline. The Environmental Protection Agency has proposed reducing the amount of lead in gasoline by 91 percent starting in 1986 and said it may ban lead by 1995. EPA is proposing to reduce the amount of lead that oil refiners can put in gasoline from the current 1.1 gram a gallon to 0.1 gram beginning January 1, 1986. EPA Administrator William Ruckelshaus said the agency was taking the action "to eliminate lead as a threat to human health." The EPA decided on a tighter standard after studies showed projected reductions in lead use were not being met.

If the refining industry can show that the 1986 date "is expected to be adverse for a substantial portion of the industry," then EPA says it will phase in the 0.1 gram limit through January 1, 1988. Hearings on the proposed reduction in lead are scheduled for August 30 and 31. The American Petroleum Institute stated that the action "will increase the cost to produce all types of gasoline" and that the volume of crude oil imports will increase. While a majority of refiners might end up opposing the reduction, they are expected to do so for different reasons and to cite injuries from it.

In Congress, the action removed some of the impetus for banning lead in gasoline. Sen. David Durenberger (R-MN), the leading proponent of the ban, said he was "delighted" with the proposal and will "put off further efforts to pass lead-ban legislation until EPA issues its final rule." Rep. Henry Waxman, (D-CA), however, attacked the proposal, saying EPA is engaged in a "flimflam" in proposing a "hodgepodge" of regulations on lead in gasoline. Waxman, chairman of the House Health and Environment Subcommittee, stated his continued support for banning lead. Rep. Anthony Beilenson (D-CA) introduced a bill that would require retailers and wholesalers to sell leaded gasoline for as much as unleaded to stem the practice of fuel switching. EPA has estimated as much as 13 percent of the unleaded auto fleet may be misfueled with leaded gasoline but Ruckelshaus has conceded that the estimate is probably on the low side. Rep. Beilenson said that "we can greatly curtail fuel switching almost overnight by removing the economic incentive to buy leaded gasoline." His bill would also, like the EPA proposal, ban the addition of more than 0.1 gram of lead per gallon of gasoline by 1986. (*Wall Street Journal*, July 31; *Oil Daily*, July 31, Aug. 1)

DOE Studying Comments on HLW Mission Plan; Meets with States. The Department of Energy has received over 3,000 comments on its draft Mission Plan for selecting a high-level radioactive waste repository site. DOE expects to spend several months reviewing these comments and making numerous small changes to the Mission Plan. Because of these upcoming revisions, the House Interior's Energy and Environment Subcommittee has postponed its August 9 hearing on the Mission Plan. If DOE completes the revisions by September, the hearing may be rescheduled for this session; otherwise, hearings are expected to be held next year.

The Environmental Policy Institute (EPI) submitted extensive comments on the Mission Plan. EPI was especially concerned with DOE's preoccupation with meeting its deadline under the Nuclear Waste Policy Act to begin accepting high-level wastes by 1998. EPI felt that the waste acceptance deadline should not be allowed to unduly rush the DOE in selecting and developing the waste site. EPI also criticized the Mission Plan's lack of guidance regarding the circumstances which would justify developing Monitored Retrievable Storage (MRS) and DOE's intent to seek Congressional approval for a MRS based on reference site types rather than by naming the sites under consideration. Other areas which EPI felt were inadequately addressed by DOE included: the impacts on repository design and operation of combining civilian and defense wastes in a single repository; DOE's public consultation and cooperation program; the impacts of delays in establishing the first repository site on development of a second repository site; the two-stage licensing process; and DOE's inconsistency regarding the number of sites to be included in the characterization process.

The Natural Resources Defense Council's comments on the Mission Plan centered around DOE's failure to address the impacts on the repository design and operation of including defense wastes in the civilian waste repository. NRDC believes that the legislative history of the Nuclear Waste Policy Act creates a significant possibility of colocation, and, therefore, the following issues should have been addressed in the Mission Plan: impact on repository design if wastes are colocated; effect of defense wastes on repository capacity; cost allocation; differences in packaging, handling, and transporting different types of waste; and effect of colocation on the Mission Plan's waste acceptance schedule. Also, the NRDC cited a number of issues related to a defense-only repository which the Mission Plan did not address, including the procedures and timing of the site selection process.

State Legislators Meeting

Various state legislators have criticized the DOE for being unresponsive to state concerns in the development of a high-level waste repository. In a recent meeting between the National Conference of State Legislators and Bernard Rusche, DOE's new nuclear waste chief, the states expressed concern over liability for accidents at the repository and in the transportation of wastes to the repository site. The NCSL asked DOE to provide strict liability on the part of the federal government with full indemnity for the state in which the accident occurs, and asked Congress to clarify that DOE has the authority to make such provisions. Currently, the Price-Anderson Act limits federal indemnity to $500 million, and the Federal Tort Claims Act precludes imposing strict liability on the federal government, requiring proof that the government was at least negligent. Rusche promised to work closely with the states on this and other issues concerning the development of a high-level waste repository. In order to increase federal/state cooperation, Rusche announced that DOE had awarded a $217,000 grant to the NCSL to create an education/information program on nuclear wastes to develop a means for increased constructive interaction between DOE and the states. (*EESI Weekly Bulletin*, July 30; *Nuclear Waste News*, July 12 & 26; *Inside Energy/Federal Lands*, July 30)

Executive Notes. The Nuclear Regulatory Commission has completed a draft site technical position (STP) outlining the hydrologic testing strategy to be used in characterizing the Basalt Waste Isolation Project (BWIP) site in Washington as a potential high-level radioactive waste repository site. The STP is NRC's guidance to the Department of Energy on the types of information DOE must gather on the site and include in a future license application to the NRC if this site is selected for development of a high-level waste repository. NRC will prepare additional STPs for other technical areas and other sites to be characterized. Each draft STP will generally have a 60 day public comment period. Copies of the hydrologic testing strategy for the BWIP are available free upon written request to Nancy Still, Docket Control Center, Division of Waste Management, U.S. Nuclear Regulatory Commission, Mail Stop 623-SS, Washington, D.C. 20555. The comment period ends September 17. (*Nuclear Waste News*, July 26)

The Department of Energy expects new gas-supply contract arrangements in coming months in response to a decision by the Canadian government to allow lower export prices. With existing supply contracts, U.S. buyers can settle on a new price with the Canadians and are only required to inform DOE. In the case of new contracts, however, both governments must approve the deal. The decision to lower export prices could lead to significant reductions in the border price of Canadian gas. Currently, the price is required by regulation to equal the price of imported oil. Canada has been seeking, in negotiations with U.S. customers since the beginning of the year, to make its prices more competitive. DOE has greeted the Canadian move warmly saying that it will allow U.S. buyers greater flexibility to meet market conditions. The Canadians re-established the floor price for gas exports to that equal to the wholesale price in Toronto, currently about $3.10 per Mcf, U.S. dollars. The prognosis is that the Canadian's move will stabilize sales to the U.S. from Canada, which have been dropping, as well as help to lower the price of gas in the U.S. (*Inside Energy/Federal Lands*, July 23)

The Bureau of Land Management is reminding its field offices that it could lose the right to readjust federal coal lease terms if it fails to notify the lessee in advance of the date of readjustment. BLM may readjust coal leases, i.e. with new environmental stipulations or raising the royalty rate to a maximum of 12.5 percent, on the twentieth anniversary of the lease. BLM field offices were recently advised on what current and future action should be taken in order to preserve the agency's right to readjust lease terms by advance notification. In the past, BLM has failed to notify a lessee prior to readjustment and it lost the right as a result. BLM Associate Director James Parker sent out an instruction memorandum which included a timetable for sending out initial notices and following them up with a second notice. According to the memo, all lessees would receive the initial notice of readjustment not later than two years prior to the lease readjustment date. A second notice should be sent not later than six-months before that date. State directors are also required to report back by August 15 regarding actions taken to notify lessees. (*Inside Energy/Federal Lands*, July 23)

The Energy Information Administration (EIA) has proposed an annual spent nuclear fuel data form to collect information on past and projected spent fuel inventories, characteristics, and movements. The form is designed to serve several purposes: assembling information on nuclear power plants' spent fuel handling and storage capabilities; implementing DOE's high-level waste repository program; and gathering data for EIA's calculation of the one-time fee charged to nuclear power plants for spent fuel generated before April 7, 1983. To receive more information or to submit comments by August 19, contact James Finucane, Office of Coal, Nuclear, Electric and Alternate Fuels, Energy Information Administration, Dept. of Energy, Rm. BG057, Washington, D,C. 20585, (202) 252-2398. (*Nuclear Waste News*, July 26)

The Department of Energy has published the procedures it will follow in accepting and processing claims for refunds of portions of the $42 million plus in oil overcharge settlement funds obtained from Gulf Oil Corporation. Unusual circumstances surrounding this case make the procedures somewhat different than usual. At this time DOE's Office of Hearings and Appeals (OHA) will only be accepting applications from direct purchasers of the Gulf products at issue and others who successfully demonstrate that they were entitled to a refund based on a court settlement or judgement.

In a separate oil-overcharge case, OHA has approved the State of Minnesota's proposed plan for the use of its share of the Amoco oil-overcharge funds. The state will use its share of the refund ($1,001,339) for several programs including a crop production efficientcy program, an energy conservation program for commercial and industrial users, and community transportation programs.

Roger Gale has joined the Department of Energy's Office of Civilian Radioactive Management as director of policy, integration and outreach. Gale will be responsible for the office's relations with Congress, the states and the public. Before joining DOE, Gale served as a special assistant to Environmental Protection Agency Director William Ruckelshaus and as a speech writer for former Energy Secretary James Edwards. (*Inside Energy/Federal Lands*, July 23)

J. Emerson Harper, a veteran of the power marketing activities at the Department of Energy has replaced Daniel Ogden as Director of Power Marketing Coordination. Ogden left DOE last month. (*Inside Energy/Federal Lands*, July 23)

The Environmental Protection Agency's Science Advisory Board (SAB) criticized the adequacy of EPA's radionuclide risk assessment. The risk assessment forms part of the basis for EPA's national emissions standards under the Clean Air Act for airborne radionuclides from DOE facilities, some

NRC licensed facilities, underground uranium mines and elemental phosphorus plants. The proposed standards were issued by EPA on April 6, 1983. The standards have not been finalized yet, and the Sierra Club has filed suit to compel EPA to issue final standards. The Idaho Mining Association is actively opposing the proposed standards, stating that the required controls on phosphorus plants would not produce a statistically significant decrease in the health risk. The SAB recently presented the findings of its 7 month study of the standards. The SAB's primary criticism was that the scientific basis for the proposed emission standard was inadequate because the EPA did not develop a conceptual framework to explain how the scientific data was used to set the standard. Among the SAB's recommendations to improve future standard-setting procedures were: explicit definition and distinction between the risk assessment and management aspects of standard-setting; detailed analysis of the scientific literature; and increased communication with, and input from, the public, the SAB, the scientific community, and other EPA staff offices. (*Environment Reporter*, July 27)

A DOE task force held an intensive three day session of formal meetings aimed at gathering as much information as it could on various alternative energies -- including alcohol fuels -- available to the transportation sector. The task force was set up by Energy Undersecretary Pat Collins to look into the expansion of DOE's Office of Alcohol Fuels into alternative energy sources such as methanol, propane, LNG and hydrogen as well as the ethanol that the office has heretofore concentrated on. The task force grew out of the White House methanol working group, one knowledgeable staffer said. "Obviously, now that the White House is involved in methanol, there is more interest in alcohol fuels" at DOE, but not to the exclusion of "all alternative energies in general," he said. Attending the recent meeting were the American Gas Association, the National LP-Gas Association, the Oxygenated Fuels Association and the Renewable Fuels Association. These organizations spoke to DOE to define the characteristics, the availability and the supply of alternative fuels. No date has been set for future task force meetings. (*Alcohol Week*, July 30)

The U.S. Bureau of Reclamation is studying the feasibility of a 500 Mw pumped-storage hydroelectric facility at either Seminoe or Alcova reservoirs in Wyoming. Use of the Seminoe facility would require construction of a holding reservoir east of Seminoe Lake at an area called Dry Lake. The Dry Lake area is a natural depression, which would be able to hold the needed 10,000 acre-feet of water. When filled, the holding reservoir would cover 100 acres. The proposal calls for pumping water at night from the Seminoe Reservoir northeast of Rawlins, during non-peak usage hours. The water would then flow back into Seminoe during peak usage hours, generating electricity. The project could pose problems for boaters who might notice the four inch drop in the reservoir's elevation, or for fish affected by the increased suction and increased turbidity in the Miracle Mile fishery. Another site at Alcova, 30 miles to the north is also being considered. (*Denver Post*, Aug. 3)

Approaching Comment Deadlines on Key Proposed Rules

	Comment Deadline	Federal Register Reference
Advance notice of proposed rulemaking regarding federal consistency regulations under the Coastal Zone Management Act of 1972-NOAA	8/31/84	49 FR 22825 6/1/84
Extension of public comment period regarding revisions to the National Ambient Air Quality Standards for particulate matter, ambient air quality surveillance for particulate matter and ambient air monitoring reference and equivalent methods-EPA	9/17/84	49 FR 22109 5/25/84
Notice of availability of information and request for comments regarding hazardous waste storage and disposal facilities-EPA	10/25/84	49 FR 25885 6/25/84

New Federal Regulations and Notices

	Status	Federal Register Reference
Request for public comment and opportunity for public hearing on modifications to the New Mexico Permanent Regulatory Program regarding examination and certification of blasters-OSM	Comments by 8/15/84	49 FR 28742 7/16/84
Notice of exempt corporations and adequate reporting programs regarding the Industrial Energy Conservation Program-DOE	Notice of 7/16/84	49 FR 28757 7/16/84
Amendment to notice of sale #841 in the National Petroleum Reserve in Alaska-BLM	Notice of 7/16/84	49 FR 28771 7/16/84
Notice of intent to prepare EIS and meeting regarding the Rubi Mine Hydroelectric Power Project, CA-BLM	Notice of 7/16/84 Meeting 7/25/84	49 FR 28772 7/16/84
Notice of availability of draft technical position on hydrologic testing strategy for the Basalt Waste Isolation Project-NRC	Comments by 9/17/84	49 FR 28951 7/17/84
Final rulemaking regarding amendments to sales regulations to simplify the procedures for disposal of public lands-BLM	Effective 8/16/84	49 FR 29012 7/17/84
Final rule requiring the filing of motions for reconsideration of initial decisions regarding designated wholesale electric rate cases-FERC	Effective 7/13/84	49 FR 29056 7/18/84

New Federal Regulations and Notices

	Status	Federal Register Reference
Notice of indefinite postponement of competitive combined hydrocarbon lease sale in Utah-BLM	Notice of 7/18/84	49 FR 29156 7/18/84
Notice of intent to amend the Big Sandy Management Framework Plan in Sweetwater County, WY-BLM	Comments within 30 days of this notice	49 FR 29157 7/18/84
Final rule regarding revisions to the National Oil and Hazardous Substances Pollution Contingency Plan-EPA	Effective 8/17/84	49 FR 29192 7/18/84
Final rule amending the North Dakota Permanent Regulatory Program regarding water mining-OSM	Effective 7/19/84	49 FR 29214 7/19/84
Notice of temporary regulation establishing policies and procedures under EPA contracts for rights in data and copyrights, and requirements for data-EPA	Effective 7/15/84 Comments by 9/15/84	49 FR 29222 7/19/84
Notice of additions to rulemaking docket regarding National Ambient Air Quality Standards for particulate matter-EPA	Notice of 7/19/84	49 FR 29248 7/19/84
Notice of proposed mandatory new Form EIA-858, "Uranium Industry Annual Survey" to collect data on domestic uranium exploration, reserves, production, mining, milling and marketing-EIA/DOE	Comments within 30 days of this notice	49 FR 29256 7/19/84
Notice of solicitation of participants for manufacturing site visits to aid in design and development for a Manufacturing Energy Consumption Survey-EIA/DOE	Comments by 8/31/84	49 FR 29257 7/19/84

New Federal Regulations and Notices

	Status	Federal Register Reference
Notice of final call for expressions of interest in additional prototype oil shale leasing in Piceance Creek Basin, CO-BLM	Comments by 8/31/84	49 FR 29279 7/19/84
Notice of public meetings and draft EIS on conversion of oil and gas leases to combined hydrocarbon leases in Tar Sand Triangle, UT and proposed change to Henry Mountain Management Framework Plan, UT-BLM	Comments by 8/16/84 Meetings 8/21/84, 8/23/84 & 8/28/84	49 FR 29283 7/19/84
Notice of approval of Outer Continental Shelf official protraction diagrams for the Alaska OCS region-MMS	Notice of 7/19/84	49 FR 29286 7/19/84
Notice of meeting of the Coal Options Task Force-Pacific Northwest Electric Power and Conservation Planning Council	Notice of 7/19/84 Meeting 7/20/84	49 FR 29342 7/19/84
Notice of meeting of the Hydropower Assessment Steering Committee and the River Assessment Task Force-Northwest Power Planning Council	Notice of 7/24/84	49 FR 29342 7/19/84
Final rule regarding delegation to the Director of the Office of Hydropower Licensing and the Director of the Office of Electric Power Regulation-FERC	Effective 7/13/84	49 FR 29369 7/20/84
Notice of withdrawal of petition to amend regulations and advance notice of proposed rulemaking to amend regulations regarding minerals management mining and mining claims-DOI	Comments by 8/20/84	49 FR 29415 7/20/84

New Federal Regulations and Notices

	Status	Federal Register Reference
Notice of data availability and request for comment regarding amendments to the management standards for hazardous wastes that are recycled-EPA	Comments by 8/24/84	49 FR 29418 7/20/84
Notice of proposed new mandatory Form [illegible]-859, "Spent Nuclear Fuel Data" and solicitation of comments-EIA/DOE	Comments by 8/20/84	49 FR 29442 7/20/84
Notice of DOE/NRC meeting regarding DOE in-situ testing-NRC	Notice of 7/20/84 Meeting 7/25/84	49 FR 29493 7/20/84
Notice of procedures for the Coal-Water Fuel Projects solicitation pending the appointment of a Board quorum-SFC	Effective 7/16/84	49 FR 29502 7/20/84
Proposed rule to amend the hazardous waste management permitting regulations under the Resource Conservation and Recovery Act (RCRA)-EPA	Comments by 9/18/84	49 FR 29524 7/20/84
Final rule to approve Nebraska SIP revision to comply with federal requirements for new source review-EPA	Effective 8/22/84	49 FR 29597 7/23/84
Proposed rulemaking regarding revisions to the Montana SIP for carbon monoxide-EPA	Comments by 8/22/84	49 FR 29620 7/23/84
Correction to notice regarding availability of guidance manual for permit applications for hazardous waste land treatment storage and disposal facilities-EPA	Notice of 7/23/84	49 FR 29625 7/23/84

New Federal Regulations and Notices

	Status	Federal Register Reference
Notice of final revision to NOAA Directives Manual 02-10 establishing procedures for implementing the National Environmental Policy Act of 1969 (NEPA)-NOAA	Effective 7/23/84	49 FR 29644 7/23/84
Notice of DOE/NRC meeting to discuss candidate sites for high-level radioactive waste repository-NRC	Notice of 7/23/84 Meeting 7/26/84	49 FR 29690 7/23/84
Proposed rule and notice of public hearing regarding standards of performance for new stationary sources, volatile organic liquid storage vessels (including petroleum liquid storage vessels) constructed after July 23, 1984-EPA	Comments by 10/2/84	49 FR 29698 7/23/84
Notice of Outer Continental Shelf oil and gas lease sale #87 in the Diapir Field, Alaska-MMS	Notice of 7/23/84	49 FR 29726 7/23/84
Final rule regarding revisions to the existing regulations for the disposal of mineral materials from National Forest System lands-FS	Effective 8/23/84	49 FR 29779 7/24/84
Notice of correction to regulation amendments for the Sales-Federal Land Policy and Management Act-BLM	Notice of 7/24/84	49 FR 29795 7/24/84
Notice of public comment period and opportunity for public hearing on a proposed amendment to the Wyoming Permanent Regulatory Program under the Surface Mining Control and Reclamation Act of 1977-OSM	Comments by 8/23/84 Hearing 8/20/84	49 FR 29807 7/24/84

New Federal Regulations and Notices

	Status	Federal Register Reference
Notice of availability of first external review draft air quality criteria document for ozone and other photochemical oxidants-EPA	Comments by 11/9/84	49 FR 29845 7/24/84
Notice of correction to request for public comments on reducing maximum size of federal noncompetitive simultaneous oil and gas leases in the lower 48 states-BLM	Notice of 7/24/84	49 FR 29855 7/24/84
Notice of EA and finding of no significant impact regarding Washington Public Power Supply System Nuclear Project No. 2 in Richland, WA-NRC	Notice of 7/24/84	49 FR 29885 7/24/84
Final rule regarding generic determination of rate of return on common equity for electric utilities-FERC	Effective 8/24/84	49 FR 29946 7/25/84
Notice of proposed rulemaking regarding generic determination of rate of return on common equity for public utilities-FERC	Comments by 9/28/84	49 FR 29967 7/25/84
Notice of intent to revise wholesale power rates to become effective July 1, 1985 and request for recommendations and suggestions-BPA	Comments by 8/10/84	49 FR 30007 7/25/84
Notice of intent to revise transmission rates to become effective July 1, 1985 and request for recommendations and suggestions-BPA	Comments by 8/10/84	49 FR 30009 7/25/84

New Federal Regulations and Notices

	Status	Federal Register Reference
Order granting rehearing solely for the purpose of further consideration to annual charges for use of government dams and other structures-FERC	Effective 7/23/84	49 FR 30065 7/26/84
Notice of proposed extension of Form EIA-101, "Monthly Electric Bill Data" and solicitation of comments-EIA/DOE	Comments within 30 days of this notice	49 FR 30095 7/26/84
Notice of implementation of special refund procedures concerning funds obtained by DOE under terms of consent order entered into with Reinhard Distributors, Inc.-OHA	Comments within 30 days of this notice	49 FR 30105 7/26/84
Notice of availability of final EIS for the proposed Great Falls-Conrad 230 kv transmission line, MT-WAPA	Comments within 30 days of this notice	49 FR 30110 7/26/84
Notice of geothermal resource lease sale for East Brawley, Dunes, Glamis, Geysers-Calistoga, Lake City Surprise Valley, Mono-Long Valley, Salton Sea, Wendel Amedee KGRA's in Imperial Lake, Lassen, Mendocino, Modoc and Napa Counties in CA-BLM	Notice of 7/26/84	49 FR 30143 7/26/84
Notice of availability of EIS/EIR for the Exxon Santa Ynez Unit/Las Flores Canyon Development and Production Plan proposed for the Western Santa Barbara Channel, CA-MMS	Notice of 7/26/84	49 FR 30144 7/26/84
Final rulemaking regarding approval of New Mexico SIP revision to regulation No. 502 "Limitation to Control Wood Waste Burners"-EPA	Effective 9/25/84	49 FR 30177 7/27/84

New Federal Regulations and Notices

	Status	Federal Register Reference
Notice of additional public meeting for advance notice of proposed rulemaking regarding federal consistency regulations under the Coastal Zone Management Act-NOAA	Comments by 8/31/84	49 FR 30207 7/27/84
Notice of document containing guidance for completing the environmental analysis portion of applications for licenses filed for major unconstructed hydroelectric projects and major modified electric projects-FERC	Notice of 7/27/84	49 FR 30222 7/27/84
Notice of availability of environmental documents prepared for proposed oil and gas operations on the Alaska Outer Continental Shelf-MMS	Notice of 7/27/84	49 FR 30249 7/27/84
Notice of rescheduling of DOE/NRC meeting on DOE in-situ testing for high-level waste disposal-NRC	Notice of 7/27/84 Meeting 8/9/84	49 FR 30265 7/27/84
Agency forms under review:		
MMS-4070, 4071, Application for and disposition of royalty oil taken in kind	Notice of 7/24/84	49 FR 29855 7/24/84
FERC-6, Annual report of oil pipeline companies	Notice of 7/26/84	49 FR 30098 7/26/84
FERC-11, Natural gas pipeline company monthly statement	Notice of 7/26/84	49 FR 30098 7/26/84
FERC-423, Cost & quality of fuels for electric plants	Notice of 7/26/84	49 FR 30098 7/26/84

REGIONAL DEVELOPMENTS

ETSI Coal Slurry Pipeline Project Abandoned. On Wednesday, August 1, the sponsors of the 1800 mile proposed coal slurry pipeline announced they were abandoning the project. The partners in the project are Texas Eastern (29.5%), InterNorth (29.5%), KN Energy (20%), and Bechtel Group (21%). Current and former partners had invested a total of $125 million in the ETSI proposal. Construction of the line would have cost $3 billion.

Since the 1973 oil embargo, the coal slurry pipeline project of Energy Transportation Systems, Inc. (ETSI) has been the most touted and most likely to be built slurry line in the nation. The pipeline was designed to carry coal from the Powder River Basin in Wyoming and Montana to Arkansas and ultimately the Gulf Coast. ETSI faced stiff opposition from railroads -- opposition that was ultimately successful. Reduced growth in electric power demand also contributed to ETSI's demise, as did persistent questions about the use of water.

The ETSI project has had a difficult road. Initial proposals to use water from the Madison Aquifer underlying the Powder River Basin drew strong objections, as the impacts of the withdrawal of water from the aquifer were drawn into question. Later, ETSI signed a major agreement with South Dakota to move water from the Oahe reservoir on the Missouri River to the Powder River Basin. That plan was enjoined by the Eighth District Court which ruled that the Interior Department does not have the authority to execute the agreement because under the federal flood act the Secretary is only given responsibility for sales of water for irrigation use. ETSI had appealed the ruling.

ETSI also has had difficulty in securing a right-of-way for the pipeline. The firm successfully sued railroads 67 times for the right to cross tracks from Wyoming to Arkansas, but had not yet lined up other needed land for the right-of-way. ETSI's failure to secure no more than 30 percent of the needed right-of-way shook the confidence of potential customers.

The failure of coal slurry legislation in the Congress over the past two decades -- a failure highlighted by the House vote to kill the bill last year and no attempt to resurrect a bill this year -- forced ETSI to secure rights-of-way without the benefit of federal eminent domain legislation.

The biggest blow to the project, however, was the failure of ETSI to line up contracts with utilities in its delivery areas. This failure was highlighted last year when ETSI lost a lucrative 20 year coal contract by Arkansas Power & Light to the Chicago & North Western Railroad. ETSI has even acquired rights-of-way in Arkansas in anticipation of the contract. After the loss of the Arkansas P&L contract, ETSI diverted the pipeline's proposed route to Texas, but was still not able to secure utility contracts. Slipping electricity growth forecasts and current electricity surpluses dimmed the outlook for future contracts.

Thus ends the saga of one of the longest running proposed energy projects in the West. (*Wall Street Journal*, Aug. 2; *Denver Post*, Aug. 2)

Western Coal States Work to Put Federal Leasing Program Back Together.

On July 23-24, the Western Interstate Energy Board's Coal Committee met with the Department of Interior, the Western Regional Council's Coal Committee, and environmental/ranching groups to further efforts to get the federal coal leasing program back on track. The Committee, which consists of the major western coal producing states, met with Deputy Undersecretary Paul Trause, Deputy Assistant Secretary Steve Griles and members of the BLM to review various program changes proposed by the Department. The Interior Department is in the midst of a reform of the program as part of its response to reports by the congressional Office of Technology Assessment and the Commission on Fair Market Policy. The Department is also under pressure from the House Appropriations Committee, which suggested numerous reforms in the Committee Report language accompanying the FY 85 Interior Appropriations bill. That bill is pending in the Senate.

The states continued to push for a strong role for regional coal teams--a role which had been reduced under Secretary Watt's coal leasing decisions. Specific areas of discussion with Interior included: the form of the Federal-State Coal Advisory Board charter, the legal basis of the regional coal teams (RCTs); the role of the RCTs in determining the proposed action in the EIS; procedures to be followed for resumed leasing; continuing problems with leasing level methodologies; phased leasing; input into BLM's market analysis; the treatment of PRLAs in setting leasing levels; the development of resource management plans; the role of the science advisors to the RCTs; state access to proprietary data; and need for a supplemental EIS to accompany the program changes. The states, long-time advocates of a stable and predictable coal leasing program, also discussed with industry and environmental representatives the concerns of those groups and changes they believe are necessary.

The Interior Department has drafted proposed policies and regulations as part of its response to the recommendations of the Fair Market Value Commission, but has yet to prepare similar documentation on changes pursuant to the OTA report.

Great Plains Plant Producing Synthetic Gas. "Natural" gas from the Great Plains coal gasification plant began flowing into the interstate pipeline system last week, the first time the synthetic fuel has been sold commercially in the United States. Six of the fourteen gasifiers at the $2.1 billion plant are in operation. The synthetic gas is produced from lignite coal mined nearby and is mixed with naturally produced gas in the pipeline. The gas will be carried by four pipeline companies to Midwest and Southeast markets. (*Rocky Mountain News*, July 29)

Nuclear Industry Optimistic. Prospects for the nuclear industry appear good but depend heavily on the U.S. economy, according to a report released by the Atomic Industrial Forum (AIF). The report acknowledged that the first half of 1984 has been disappointing to the industry, with cancellation, conversion, or delay of nuclear plants, but notes several recent events that allow optimism for the future of nuclear power including: solid growth in demand for electricity; continuing, steady construction of 39 nuclear units; a "highly creative" financing package which seems to have rescued the Seabrook, NH power plant; and start-up of Unicon Electric's Callaway-1 in Missouri and Pacific Gas and Electric's Diablo Canyon.

Consistent with AIF's observation of increased energy demand, the Edison Electric Institute (EEI) reported on July 16 that sales of electricity for the first quarter of 1984 were up 11.3 percent over the same period in 1983. EEI stated that both industrial and residential sectors increased their purchases, due largely to a strong economy and severe weather. The average number of customers also grew, by 1.8 percent overall, according to EEI.

The general health of the electric power industry was also monitored and commented on in a recent report issued by the General Accounting Office, which declared that the electric power industry's prospects are improving and should be better than they were in the 1970's, assuming inflation and interest rates stay below previous levels. The report concluded that the industry is in good condition, with the exception of utilities with nuclear construction programs, and should continue to prosper, especially with investments in conservation and alternatives to construction of new plants. (*Energy User's Report*, July 26)

Solar/Renewables

Recap of Washington Developments.

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Idaho's Ruling on Contracts for Small Power Producers is Revamped. Long-term fixed-rate contracts for cogenerators and small power producers in Idaho may now be subject to periodic review and readjustment, the state's highest court has ruled. The ruling came in a rehearing of Afton Energy Inc. v. Idaho Power Company (No. 14777). Earlier this year the same court had ruled that the Public Utility Regulatory Policies Act (PURPA) authorized the state's Public Utilities Commission to insist on long-term fixed-rate contracts for qualifying facilities. The rates and terms of these contracts were only subject to review under the public interest standard. In its latest opinion, the court retreated and gave Idaho Power Company a victory. Now rates set in contracts are subject to the fair, just, and reasonable standard of review, rather than the public interest standard.

The court held that the commission should consider the effect of the contract rate on the utility, its stockholders, and customers, and the benefits to the utility power supply system which may be realized through the development of cogeneration facilities. "We emphasize, however, that whether the rate paid by the utility is fair, just, and reasonable is not dependent upon the profit or loss realized by the cogenerator at any given time," it said. "This test not only permits a utility to seek meaningful and appropriate review of a contract with a cogenerator and small power producer, but also enables a cogenerator and small power producer to proceed with cogeneration without fear of excessive regulation."

Idaho Power said it is pleased with the court's ruling. The utility is currently in a surplus power situation and believes it will not need any new resources until 1997. Ninety four projects with a potential of 219 megawatts were in the process of negotiating contracts with the utility at the time of the decision. Idaho's long-term contract rate had been set at 6.3 cents per Kwh by the commission. Idaho Power has been pushing for a 5.5 cent per Kwh figure. (*Energy Users Report*, July 26)

APPLICATIONS SUBMITTED TO FERC FROM SMALL POWER PRODUCERS AND COGENERATORS

State	Company	Type of Application	Capacity	Location	Federal Register Reference
CA	Television Communications, Inc.	Hydro Project, Minor License	1.12 Mw	Butte County	49 FR 30229 7/27/84
CO	City & County of Denver	Small Hydro Power Project Exemption	5.5 Mw	Park County	49 FR 29841 7/24/84
	Energenics Systems, Inc.	Hydro Project, Preliminary Permit	410 Kw	Montrose County	49 FR 30230 7/27/84
	Energenics Systems, Inc.	Hydro Project, Preliminary Permit	3.3 Mw	Montrose County	49 FR 30231 7/27/84
	Energenics Systems, Inc.	Hydro Project, Preliminary Permit	2.5 Mw	Montrose County	49 FR 30231 7/27/84
	Energenics Systems, Inc.	Hydro Project, Preliminary Permit	800 Kw	Montrose County	49 FR 30231 7/27/84
	Energenics Systems, Inc.	Hydro Project, Preliminary Permit	800 Kw	Montrose County	49 FR 30232 7/27/84
	Energenics Systems, Inc.	Hydro Project, Preliminary Permit	2.0 Mw	Montrose County	49 FR 30232 7/27/84
	A.M. Crews	Hydro Project, Preliminary Permit	326 Kw	San Miguel County	49 FR 30233 7/27/84
ID	Cogeneration, Inc.	Hydro Project, Major License	43.6 Mw	Twin Falls County	49 FR 30229 7/27/84
	Reeds Creek Hydro, Inc.	Hydro Project, Preliminary Permit	4.2 Mw	Clearwater County	49 FR 30230 7/27/84
	Beaver Creek Hydro, Inc.	Hydro Project, Preliminary Permit	4.2 Mw	Clearwater County	49 FR 30230 7/27/84
	Snake Creek Hydro, Inc.	Hydro Project, Preliminary Permit	1.0 Mw	Clearwater County	49 FR 30230 7/27/84
WA	City of Yakima	Hydro Project, Preliminary Permit	3.2 Mw	Yakima County	49 FR 30234 7/27/84

Coal Notes. ARIZONA: Black & Veatch has been selected as the architect/engineer for the third 350 Mw coal-fired unit at Salt River Project's Coronada Station. The new unit is scheduled to begin commercial operation sometime in 1991. Salt River officials are studying the possibility of developing state and private coal leases near the St. John station to provide coal for the new unit. (*Coal Week*, July 23)

CALIFORNIA/OREGON/ALASKA: Only eight of 26 West Coast ports that had announced plans to expand their coal export facilities are still going ahead with the expansion, according to a Western Coal Export Council study. The California ports of Los Angeles, Long Beach, Stockton, and the Levin-Richmond Terminal in San Francisco are still planning to expand when the export market picks up again. The Portland port and a project at Seward, AK are in the process of developing coal export facilities. They are scheduled to begin operation in September. The Sacramento port and a project at Redwood City, CA are also still planning coal export facilities. The other 18 ports have leased their facilities for other purposes or have moved toward port development for other commodities. (*Coal Week*, July 30)

COLORADO/WYOMING: The effects of coal mining on ground water in south central Wyoming and north central Colorado will be "much more severe and have a longer duration than the effects on surface waters," said the U.S. Geological Survey in a water resources report. The study, covering an 8,380 square mile area drained by the North Platte River and two of its tributaries, the Laramie and Medicine Bow rivers, analyzes the hydrologic conditions for permitting under the Surface Mining Control and Reclamation Act. (*Coal Week*, July 23)

MONTANA: The final Environmental Impact Statement has been issued for the Montco project's 24-year mining plan and it does not preclude the development of 100-million tons of adjacent and nearby federal coal. Montco does not own any federal coal at the southern Montana site at this time, however, the Office of Surface Mining says that even if the coal is not offered to Montco through competitive or emergency bypass leasing, it eventually could be developed. As stated in the EIS, the seven blocks of coal "contain a sufficiently large quantity of coal to constitute a separate mining operation, if and when the coal were made available for mining." OSM envisions a 16-year, 5-million t/y operation, with an estimated $10/t price for coal, that would gross $50-million/y on mine-life sales of $800-million. (*Coal Week*, July 23)

MONTANA/NORTH DAKOTA: Tenneco Coal has announced that it is closing its Montana field office indicating the company is, at least temporarily, shelving plans to build a synthetic gas plant. The proposed Beach-Wibaux plant, to be located near the Montana-North Dakota border, would convert 13.5 million tons per year of low Btu lignite into 280-million cubic feet per day of gas. The plant has been in the planning stages for ten years. Tenneco said it will maintain the lignite leases and will continue to seek water permits through its Houston, Texas office. It added though, the action means "there's just not any way we can stay with the 1990 construction date." The company said the decision to shelve the plant was made because of the static demand for natural gas, flat energy prices, and the poor outlook for national support for synthetic fuels. (*Coal Week*, July 30)

Meanwhile, legislative committees in Montana and North Dakota are putting finishing touches on a proposal to establish an interstate compact commission to manage the socio-economic impacts expected from Tenneco's proposed plant. The tentative proposal would allocate to the commission 10.5 cents per ton of the total coal severance taxes collected by each state on coal mined for the project. This should give the commission about $1.5 million annually to deal with the impacts of the project. (*Coal Week,* July 23)

UTAH: The Intermountain Power Project has finalized coal transportation contracts two years before the first power plant will come on line. The project sponsor, Intermountain Power Agency, has signed three separate rail contracts, planned for a trucking agreement and ordered two 84-car unit trains of its own, with an option for a third. Unit 1 of IPP is scheduled to start producing power on July 1, 1986 and Unit 2 is planned to begin commercial operation on July 1, 1987. (*Coal Week,* July 9)

Mountain States Resources has gained full control of a 14,000-acre tract in Sevier County that has been the subject of a court battle with Ute Energy. The two companies agreed to an out-of-court settlement. Mountain States Resources is now planning extensive exploration work to confirm the coal reserve base. Estimates have placed the coal reserves at 100 million tons. The company has not decided if it will develop the reserves alone or seek a partner. It also will need to receive an extension of federal diligence development requirements on a lease that makes up about 20 percent of the property before development can be assured. (*Coal Week,* July 9)

Oil & Gas Notes. ALASKA: State officials and representatives of the North Slope Borough are reportedly satisfied with the Interior Department's final notice of sale for OCS oil and gas lease sale #87 scheduled for August 27 in the Diapir Field (North of Alaska). A representative of the Borough said that Interior made good faith efforts to consider their concerns. The Interior Department will be establishing a 20 mile buffer zone around Point Barrow, a center for subsistence hunting and migration of bowhead whales. Interior also agreed to seasonal drilling restrictions which the state and the Borough had sought. Drilling would be restricted above and below the threshold depth during the whales' migration period. In the proposed notice of sale, Interior was going to restrict drilling below the threshold only. The Borough also wanted onshore support bases to be limited to previously-disturbed sites. Interior agreed to urge companies to consider such sites. The state and the Borough also won concessions regarding leasing east of Kaktovik. In all, Interior will offer 1,474 blocks encompassing about 8.4 million acres offshore. Thirty eight blocks were deleted from the sale due to low industry interest and encroachment on the buffer zone. An additional 3,400 acres were deleted from the current sale at the request of the state because they concern a border dispute between the state and the federal government. (*Inside Energy/Federal Lands,* July 30)

Sohio Alaska Petroleum Co. has reduced the tariff on its share of the trans-Alaska crude oil pipeline by 50 cents a barrel, down to $5.66 per barrel. Sohio's share is one-third of the pipeline capacity and the lower tariff should increase nominations for Sohio's line space, the company said. Sohio has filed the new tariff with FERC where approval is expected. The new rate went into effect on August 1. Burgeoning North Slope oil production led to the tariff cut. (*Oil & Gas Journal,* July 30)

Utility Notes. ARIZONA: Nuclear Regulatory Commission officials have criticized Arizona Public Service Co.'s management of the Palo Verde nuclear power plant at the end of a two-day visit. The officials criticized APS for what they called unprofessional attitudes in the control room. The officials said APS has little nuclear power experience. "We see you as a very green utility with regard to management of nuclear activities," said Director Harold Denton of the NRC's Office of Nuclear Reactor Regulation. He added that management expertise is needed because "this is a first-of-a-kind reactor." The utility hopes to begin loading fuel at its unit 1 in November but first must pass a series of crucial tests. The NRC will "act as though the November date is a firm date" but "a lot will ride on the outcome of those tests," Denton said. (*Rocky Mountain News*, July 7)

COLORADO: The Public Utilities Commission has approved an incentive plan that would require Public Service Company of Colorado to refund to its customers up to $3 million a month if the Fort St. Vrain nuclear power plant fails to operate. The power plant, which is the nation's only gas-cooled reactor, has generated electricity on only 30 days this year. Under the complicated PUC formula, which the utility vigorously opposes, the company would have to provide refunds to customers if the plant runs at less than 53 percent of its 200 Mw capacity averaged over each 12 month period. If the plant does not operate at all, the refunds would amount to $3 million a month. (*Rocky Mountain News*, Aug. 2)

MONTANA: The Public Service Commission adopted a staff recommendation calling the Colstrip Unit 3 generating plant unnecessary and said Montana Power Co. must exclude the costs of the plant from its rate increase request. The utility requested a $96-million annual rate increase; about 60 percent is related to Colstrip 3. A commission spokeswoman said an annual rate increase of between $3.5 million and $4 million had been approved. In addition to deducting the Colstrip costs, the commission rejected Montana Power's request for 16.5 percent return on equity, granting it 14.5 percent instead, and trimmed the company's request for rate boosts based on coal expenses. A Montana Power spokesman said the utility has several options following the decision, including appeals to the commission and to state courts. The utility said it has a case pending before the Montana Supreme Court to determine if the commission has jurisdiction to rule whether the Colstrip plant is needed. The spokesman said the state Board of Natural Resources and Conservation issued a certificate of need in 1976. Montana Power may have to sell its 30 percent share of the coal-fired power plant or sign long-term agreements to sell the energy to other markets without the rate increase, a spokesman said. (*Wall Street Journal*, July 30 & 31)

PACIFIC NORTHWEST: The Bonneville Power Administration has asked aluminum company executives to identify the electricity price that would increase production in the Northwest's aluminum plants and thereby boost BPA's revenue. If such a price can be decided, Bonneville may offer an incentive rate to its direct-service industrial customers. "The 1983 rate schedule allows us to offer an incentive rate," said BPA Administrator Peter T. Johnson. "But first we must demonstrate that such a rate will increase BPA's revenues compared to income levels at our standard industrial rate." An essential condition of any such rate is that it must be advantageous to BPA's other customers -- that is, the publicly owned and private utilities who serve residential ratepayers. By lowering the price to the industries it serves, BPA must realize an increase in total revenue. The region's ten aluminum plants are being hit hard by a decline in prices. The U.S. market price for aluminum has fallen from about 77 cents a pound to approximately 56 cents since January. Several plants have cut back on production. Northwest aluminum smelting is now about 88 percent of capacity. Johnson said the incentive rate may be offered for six months beginning Sept. 1, 1984. BPA may offer to extend it until June 30, 1985. However, both the incentive rate and any extension would be conditioned on showing an increase in BPA's expected revenue.

Nuclear Notes. REGIONWIDE: Pennsylvania's new enacted Radiation Protection Act requires spent nuclear fuel shipments to be accompanied by police escorts while they are in the state. The act also requires the state Emergency Management Agency to develop response plans for emergencies in the areas around nuclear power plants and the Department of Environmental Resources to monitor radiation levels at nuclear power plants and to strengthen inspection of other users of radioactive materials, such as medical facilities. Each nuclear power plant will pay $150,000/year to fund implementation of the act. Additional funds will be obtained through penalties and license and registration fees charged to other users of radioactive materials. (*Nuclear Waste News*, July 19)

COLORADO/UTAH: DOE has proposed three permanent disposal sites for uranium mill tailings in the western part of Colorado. In an August 1 Federal Register notice, DOE applied to withdraw land from the BLM for the disposal sites. The chosen lands are a 360-acre site near Cheney Reservoir southeast of Grand Junction, a 245-acre site northwest of Grand Junction on the Utah border and an 885-acre tract halfway between Rifle and Grand Junction. (*Rocky Mountain News*, Aug. 3)

Geothermal Notes. NEVADA: Three geothermal contracts presented by Sierra Pacific Power Company have been unanimously approved by the Public Service Commission. "Each contract covers a different type of geothermal resource and technology. The knowledge gained through this development will demonstrate whether Sierra Pacific can bank on geothermal as a component of its future energy needs," said Commissioner Fred Schmidt, hearing officer for the case. "Each contract guarantees Sierra Pacific electricity for 10 years at a fixed price. An additional benefit to shareholders and ratepayers is that Sierra Pacific puts up no money for development or construction. If, by some chance, none of the pilot projects are successful Nevada ratepayers won't be out a dime," Schmidt said. "Geothermal development could give Sierra Pacific the ability to quickly add incremental amounts of baseload capacity and energy, unlike coal- or oil-fired plants," he added. The three contracts add a total of 24 megawatts to Sierra Pacific's system. The first contract is with Phillips Petroleum at the Desert Peak site. The second is with Geothermal Development Associates who will build a 5 Mw plant on property owned by Sierra Pacific at Steamboat Springs. The third plant will be constructed as a joint venture by National Energy Associates and Sequoia Thermal Corporation in the Big Smokey Valley. (*NARUC*, July 23)

INTERNATIONAL DEVELOPMENTS

Crude Oil Prices Slipping; Will OPEC Pricing Regime Fall Again?

Since mid-June spot market prices for crude oil have taken a steady plunge. On the world market, the prices set for key crudes were well below their official levels. For example, Arabian Light is nearly $2 below the official price of $29 per barrel; Iranian crudes are $3-4 below the $28 official price; North Sea crude is selling at $2.50 below its official price; and Nigerian crude is down $1.75. These reduced prices are putting pressure on other crude supplies. On Monday, the Soviet Union, which exports 1.8 million b/d to Western Europe, cut its price by $1.50 per barrel. In the U.S., companies are cutting prices: Amoco reduced by 35 cents the price on Wyoming sweet, Colorado Eastern and Nebraska Western Panhandle; Ashland cut its price for various eastern states oil, as did Texaco, and Quaker State lowered its price for Pennsylvania crude by $2.

Some analysts believe that the price drop is due to cheating on production quotas by all OPEC countries who are now producing well above 18 million b/d as compared with the OPEC quota of 17.5 million b/d. Saudi Arabia appears to be the biggest cause of the crude oil flood as it is producing 5.4 to 5.5 million b/d; its quota is 5 million b/d. According to some observers, the Saudis are producing more oil to raise money for a recently announced agreement to buy 10 Boeing 747s.

If the falling prices continue through August, OPEC may be forced to cut its official price or try new methods to hold down production. The economic recovery in the U.S. and Japan that is pushing up oil demand may slow the price skid. (*Wall Street Journal*, July 25, 30; *Denver Post*, Aug. 1)

International Notes. The British Central Electricity Generating Board (CEGB) staged a crash test on July 17 to demonstrate the safety of flasks used to transport spent nuclear fuel to reprocessing plants. CEGB spent $2.1 million to program a three-car train, travelling at almost 100 mph, to collide with the metal flask on the railroad tracks. The crash caused the train to derail and a small fire resulted, but the flask remained intact. Greenpeace, an international environmental group, criticized the test as an unscientific publicity stunt which failed to simulate the worst possible conditions of a real accident. (*Nuclear Waste News*, July 19)

Western States Energy Pipelines

Issue No.		Pages	Price
84-27	Court Overturns OSM Federal Land Rules; State Cooperative Agreements Jeopardized	19	$1.90
84-28	DOE Announces Refund Procedures for $42 Million in Gulf Oil Company Settlement Funds	8	$1.00
84-29	GAO Report Favors Ethanol Tax Incentives	7	$1.00
84-30	BPA's New Pacific Intertie Access Policy	16	$1.60

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Westerr Venture Corp To Start Drilling Test No 2 Immediately

At a meeting of the board of directors of the Western Venture Corporation held in Vernal Saturday evening it was unanimously agreed that well No 2 consisting of standard cable tool equ pmert be placed in Dog Valley one half mile south of the Victory highway and seven miles west of Vernal and that the same be immediately prepared for spudding in not later than April 1

Those present at the meeting were F J S Sur president, Frank E Davis and Edward R Lovewell vice presidents, I O Stewart, secretary-treasure'

Messrs Sur, Lovewell and Stewart journeyed from Salt Lake City last week to meet with Mr Davis who is in charge of operations here, and after carefully studying the log of Well No 1 now drilling decided upon the second well approximately one and one-half miles south of Well No 1 Both Mr Lovewell and Mr Sur are well known geologists and believe that the Vernal monocline will produce many million barrels of oil

Approximately 25 000 acres of land are controlled by the company on the Vernal monocline Well No 1 is expected to reach its objective the Wasatch sands at a depth of 900 feet The well at the time of going to press is drilling steadily at a depth of 450 feet in blue shale Well No 2 however will be expected to bring production at 1700 feet

The company owns one small portable gasoline drilling rig used for validation purposes and one No 28 Steam Star now located on Well No 1 and capable of drilling to a depth of 2500 feet, if required and two standard drilling outfits of 4 000-foot capacity

Vernal Express - Feb 24, 1928

Dec 17, 1919

Wonderful Growth of Raven Oil Co.

We reprint the following article concerning the operations of the Raven Oil & Refining Co., because of so many calls for copies of our paper containing same, and which we were unable to fill, that edition being sold out.

The Raven Oil Company has struck another important well at their Rangely oil fields and one that bids fair to outstrip everything else. A fine flow of oil was struck at a depth of 550 feet, and expects to yield from 200 to 250 gallons per hour. A six and a half inch casing was sunk, and a two inch pipe enclosed, through which the oil is pumped. Ed Walsh who drilled the other wells, did the work on this one also, and unhesitatingly says that indications favor its becoming the best producer of them all. One pump has been running less than a year and has produced in that length of time, by actual measurement 420,000 gallons, or 10 000 bbls. The present capacity is 250 bbls a day, with 42 gallons to the bbl., or 10,500 gallons of crude oil every twenty-four hours. At the present time the company is refining an average of 50 bbls per day, but expects to run to capacity next summer. The Raven Oil Company pays the Emerald Oil company, which owns the land, a royalty of $1 on each barrel used. Each gallon of oil taken from the wells contains 35 per cent gasoline, 25 per cent kerosene and a residue of 40 per cent which will be manufactured into parafine wax and lubricating oils. A plant for this purpose is now being planned and will be built as fast as the weather permits. It will be completed in time for next summer's business. This plant, together with other contemplated extensions, will cost approximately $20,000, the money for which is already on hand.

The Raven Oil company commenced supplying the local trade with gasoline and kerosene on Thanksgiving day one year ago. Since then there has been no appreciable amount of outside product used. The local article is said to be better and purer and would supply outside markets if only it could be carried there profitably. In the last eight months sales amounting to over $40 000 00 have been made and this will go to $30 000 by the time the Raven people have been operating the wells a year. To give one an idea of the volume of trade of some of our local business houses with the gasoline alone, we are informed that one single customer has purchased over $11,000 in the past eight months, another $6,330, and a number of smaller concerns have taken from $1,000 to $2,000 worth of the product. In September the total sales amounted to 24 000 gallons. Already this month they have gone over 15 000 gallons, and there is no tourist travel like there was in the summer months.

A number of improvements are now under way, in addition to those we have mentioned in this article. Men have just got through laying the concrete floor for the new pumping plant and power house at the wells. A couple of extra stills for distilling the raw oils are being erected right at the wells. About fourteen miles of good road have been built on the way from Vernal to the works, the west end being at the Dipping Rock coal mine. All of this has been done by local people. In fact every dollar expended in improvements has been spent right here at home. Not a penny has gone outside which could be distributed in this community. When one considers the amount of money invested this fact becomes of more than ordinary interest. For instance, the refinery equipment totals $25,282 83; buildings and furnishings, $3 515 72, real estate in Vernal, tanks etc., $3,233 02, drums, $1,404 94, sales equipment, $981.66, producing equipment, $2,791.91; or a total of $37,202 92. The Vernal Tin Shop was paid over $3,000 for the tanks east of the Vernal Mill. In three of these tanks there are 6,650 gallons of gasoline now, and the fourth has 4,700 gallons of kerosene. They are to be filled to their capacity, or 20 000 gallons. Then when we have bad roads, and hauling is almost impossible, there will be sufficient of the products on hand to tide over the bad spots. When one compares the condition with that which existed only a year or two ago, when we often were without gasolene because of storms, it is certainly a cause of much gratification. The Raven people are now storing in three tanks against just such an emergency. A merchant can go down and load up with whatever amount he wants and get back to his store in a few minutes.

A week ago last Saturday the Roosevelt Merc. had delivered to them 1,000 gallons of gasoline and 1,000 gallons of kerosene. In 24 hours they had loaded it all out to different stores in Duchesne county. On the 12th of the month Wong Sing had 750 gallons delivered him. Every eight days the City Drug Store at Roosevelt has approximately 800 gallons. On the 16th over 700 gallons were delivered to the government at Ft. Duchesne. And so it goes all over the Uintah basin. If it were not for the expense of transportation, every service station in Salt Lake not controlled by the trust would use it because of its purity and better quality. We saw a letter from a Salt Lake house extolling the product to the skies and asking if it were possible to get it shipped to that point. Tourists loading up at Rangley for the west, always want to fill up as far as it is possible to get the local product. Roosevelt people are going to install large storage tanks at that point. Government tests show that the Raven oil is comparable with the best that Pennsylvania produces.

Dr. Bonner of the University of Utah worked at Rangley for the Raven people during the entire time that the University was closed this past summer. He was working out the details for the manufacture of lubricating oils and parafine wax from the residue left after distilling the gasoline and kerosene. The Raven people have had the sympathetic co-operation of the University of Utah from the very start. Much interest is being shown by Governor Bamberger and other outside parties because of the possibilities there are in the Rangley field for an important amount of tonnage that can be shipped from there when the proposed railroad through the Uintah basin is completed.

The officers of the Raven Oil company are for the most part local people. Andrew A. Brigman is president, Enos Bennion, vice-president, D M Keeney, secretary, Don B Colton treasurer; F G Carry of Lodi, Cal., completes the board of directors.

Jan 10, 1919

130 OIL CLAIMS ARE RECORDED IN TWO WEEKS BY LOCATOR.

There has been quite a flurry in the county recorder s office the past two weeks in the matter of mining locations There have been 130 claims filed during that period For the most part, however, there are re_locations It is expected that a large number will be continually coming in the balance of this month.

Among those to file claims were J W Musser, who filed notices for 65 claims Associated with Mr Musser are D C Gustavesen, C I Pierce, Robt R Sloan, D F. McCoy, J. Howard Garrett, E. D. Petrie and Walter Cox It is understood these gentlemen are affiliated with the Utah Consolidated Oil company who have extensive holdings in the Basin These claims are located in the Moffat district, where it is said the company intends to commence drilling in the near future

Dr P. S Coke filed seven claims which are also located in the Moffat district Dr Coke is managing director of the Cedar Butte company, who are erecting a reduction plant for oil sands at Whiterocks

Albert Halen who lives at Moffat, sent in 21 claims, which are situated near Ft Duchesne It is understood that Mr Halen is acting as agent for other interests

Wm O Neil had a batch of 37 claims which he had recorded

—W. S. S.—

For: Jan Campbell. Compliments of the author
R E Covington
11-8-84

A BRIEF HISTORY OF EARLY MINERAL EXPLOITATION IN THE UINTA BASIN

ROBERT E. COVINGTON

Introduction and Background

Early mining activities in the Uinta Basin can be summarized by saying that they included mining for gilsonite, coal, copper, iron, oil shale, ozocerite, wurtzilite, and oil and asphalt (under the placer mining laws). Of these minerals only coal and gilsonite were produced in commercially significant quantities, especially the latter. Since nearly all of the hydrocarbons discovered were originally on lands reserved by the government for the Indians, the story of how these lands were gradually obtained by the "whites" is of extreme interest. On October 3, 1861 President Lincoln, by executive order, designated the Uintah Valley as an Indian Reservation. In 1875 the boundary lines of the Reservation were surveyed and were found to contain two million acres of land. Prior to this survey, an act of Congress extinguished all Indian titles to agricultural and mineral lands throughout the State of Utah except on the Uintah Reservation.

Meanwhile, back at the ranch, at the old Meeker Indian trading post, 8 miles west of the present site of Meeker, occurred an incident which was to directly affect the mining industry in Utah. Angered because of the roughshod treatment by the Indian agent, Nathan Meeker, the White River Utes rose up and killed Meeker and all of the males at the agency. The "straw that broke the camel's back" occurred when Meeker, objecting to the Utes having horse races on Sunday, ploughed up the race track. Major T. T. Thornburg was sent with 14 soldiers to give assistance to the settlers, but he was ambushed and all of his party wiped out. As a direct result of this uprising, Act of June 15, 1880 (21 Stat. 199), removed the White River and the Uncompahgre Utes from their Colorado reservations and placed them on the Uintah Indian Reservation. By Executive order of Jan. 5, 1882, two million acres were set aside as the Uncompahgre Ute Indian Reservation, for the use of the two deposed tribes (see fig. 1).

Fort Thornburg was established in 1880 on the site of the present town of Ouray to help preserve the peace. In 1881 it was moved to the mouth of Ashley Creek, four miles northwest of Hatchtown (Vernal). Due to the Indian trouble in August 1886, troops were brought in and the Fort Duchesne Military Reservation was established. The fort was vacated in 1912 and became the property of the Department of the Interior and was made the Uintah Indian Agency headquarters and the Ouray Subagency.

ROBERT E. "BUD" COVINGTON is a partner in the firm Caldwell & Covington headquartered in Vernal, Utah. He received his academic training at the University of Colorado, graduating with a B.A. in geology in 1947. The following year he continued his study of geology at the Colorado School of Mines, but left after one year to join Carter Oil Company as a geologist. He joined the firm of Johnson & Bunn in 1950 and remained here until the formation of the partnership of Caldwell & Covington in 1954. The writer has published several earlier papers dealing primarily with the Uinta Basin and its economic resources as well as another paper in this guidebook. These papers have appeared in symposiums and guidebooks of the Intermountain Association of Petroleum Geologists and the Rocky Mountain Association of Geologists, as well as the recently published Bulletin 54 of the Utah Geological and Mineralogical Survey. Mr. Covington is affiliated with the American Association of Petroleum Geologists, American Association for the Advancement of Science (fellow), Intermountain Association of Petroleum Geologists, Utah Geological Society, and Sigma Gamma Epsilon.

The author gratefully acknowledges the able assistance of Jerry Barrett, a geologist and graduate at Westminster College who resides in Salt Lake City, and C. J. Neal, oil and gilsonite operator, and long-time resident of Vernal, Utah, in the preparation of this historical review.

Gilsonite Mining and Transportation

On May 24, 1888, because of the political pressure put upon the politicians, a triangular "strip" was removed from the Uintah Reservation by an act of Congress, providing for the payment to the Indians of 20 dollars per acre and requiring the Indians' approval. This act opened the Carbon gilsonite vein for development and was the reason for the legislation. Remington (1959) says, "there came into existence an area outside the Indian and Military reservations and yet a part of the federal lands neither under control of the Whiterocks or Fort Duchesne officials nor the jurisdiction of state and county authorities. It was, therefore, a territory without law enforcement." "The Strip," as it was known, because of gambling, selling whiskey to Indians, and prostitution was jokingly called "Sober City." This is now the present site of the town of Gusher (see fig. 1). Unruly activities continued until May 1906 when the land was sold by the Government at $1.25 per acre and then came under county supervision.

As early as 1860 Sam Gilson supplied horses to the Pony Express and was the U. S. Marshall

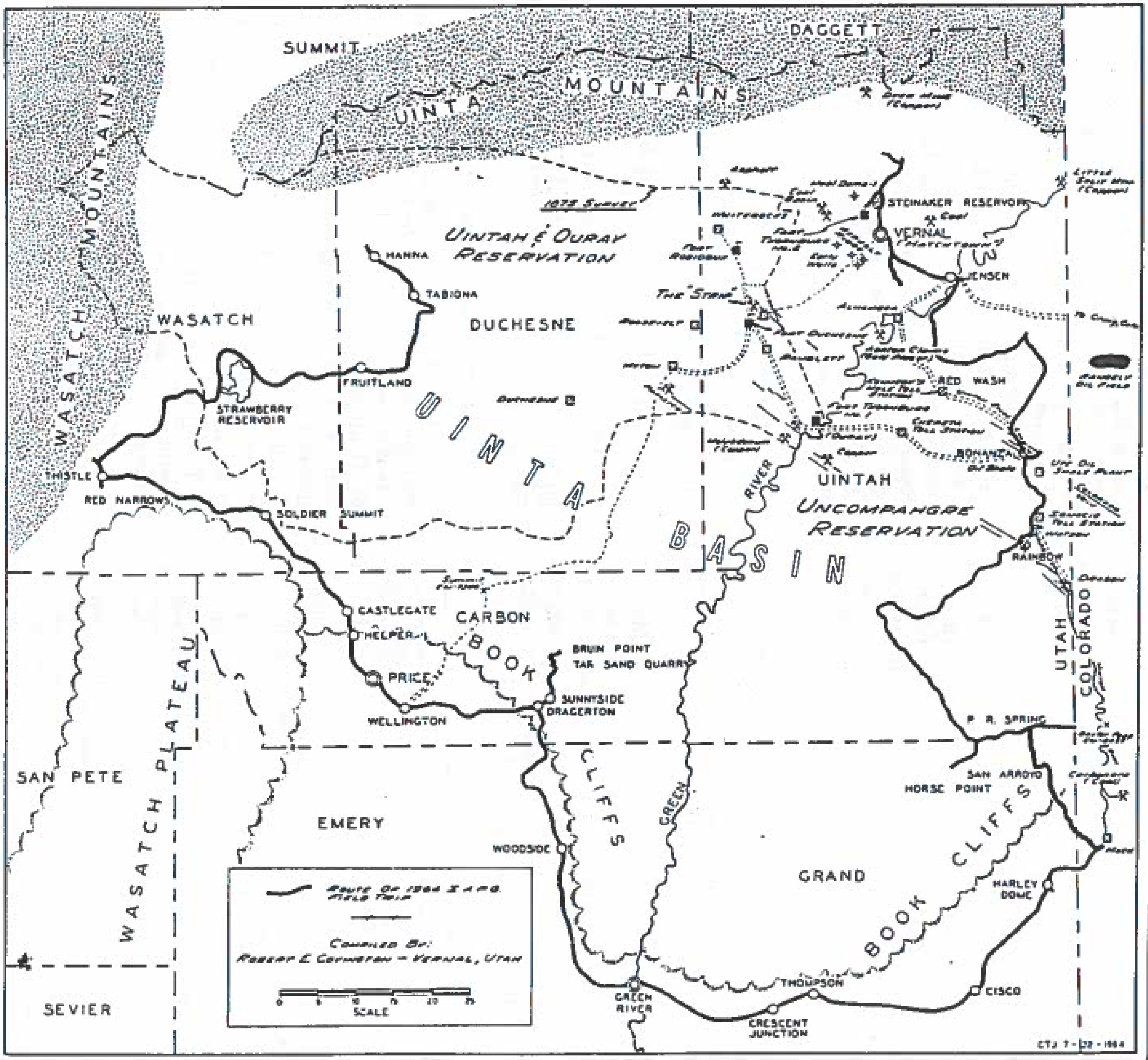


FIGURE 1.—Historical map of the Uinta Basin showing the Indian reservation boundaries, forts, mines, and the routes of the narrow-gauge railroad and the toll roads.

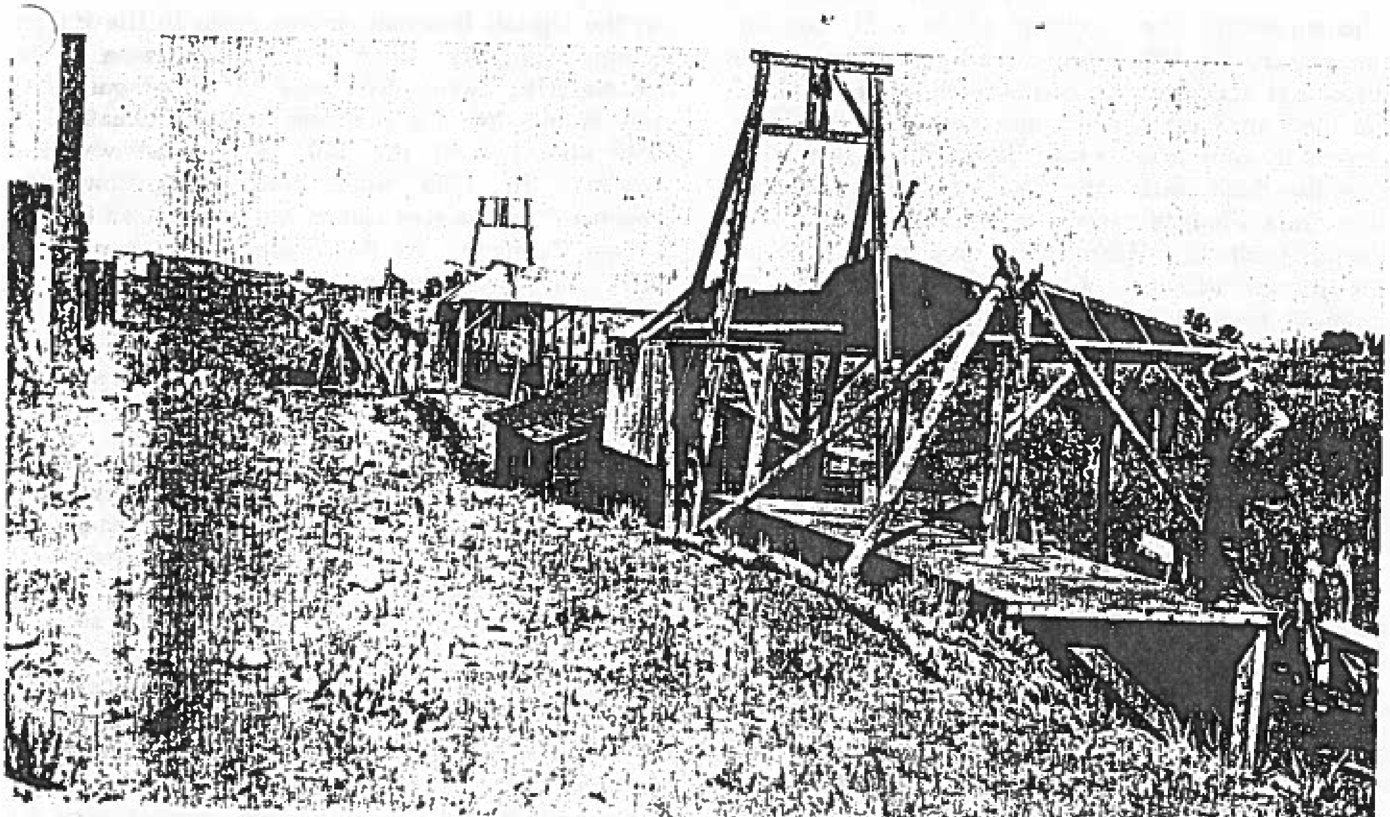
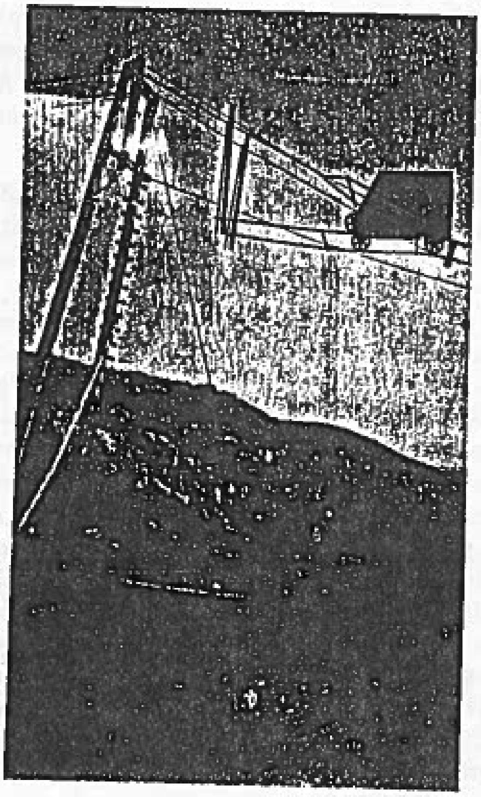


FIGURE 2.—Diamond gilsonite mine north of U. S. 40; west of Gusher, formerly in "The Strip," on the Carbon vein.



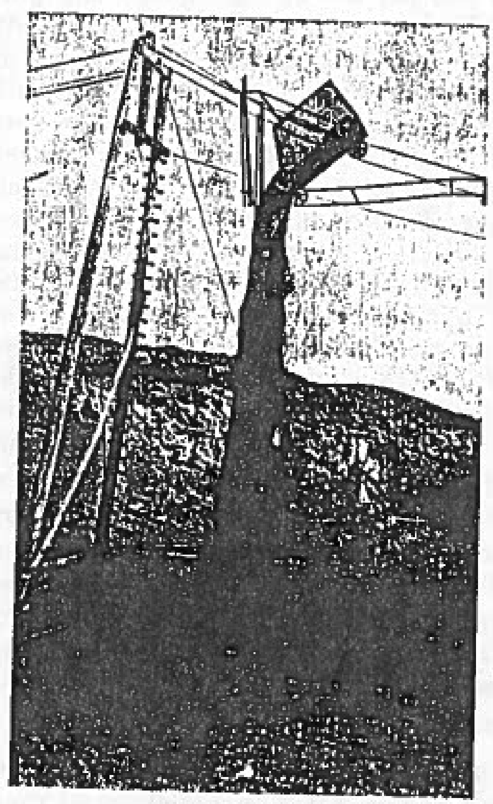


FIGURE 3.—Unique method of unloading gilsonite at the Black Diamond mine, north of Fort Duchesne. Devised by C. J. Neal. Note front wheels run on lower track, rear wheels on upper track until car dumps load.

who supervised the execution of John D. Lee for the massacre at Mountain Meadows. He was the discoverer and promoter of many mining properties. He lived in Juab County and derived part of his income by rounding up wild horses which he trailed over the Book Cliffs into the Uinta Basin and over the Uinta Mountains into Wyoming to the Union Pacific Railroad. Although he may not have been the first to "discover" gilsonite, he was the first to promote it and find new uses for this strange hydrocarbon. When the Gilson Asphaltum Co. was formed, he jokingly offered a silver dollar if they named the stuff after him; this was done and it has carried his name ever since.

Another problem arose in the Castle Peak area where additional gilsonite veins were discovered. These too were on the Reservation. Miners made locations and, as promptly as they did, Indian agents and inspectors would ride out and tear them down. When the west line of the Reservation was being surveyed, the local "whites" persuaded the survey team to make a jog of one mile to the east in the boundary line which then put the Pariette vein outside the reservation and open to filing.

In 1899 more than 2,000 tons of gilsonite were shipped from the "Strip." The average price received was $50 per ton at the railroad and production and hauling costs were $21 per ton. At the Carbon mine, the miners were ever aware of the danger of explosion. It is said that they would put their candles to little piles of gilsonite dust and thus create small explosions which they thought would prevent larger ones. Many miners singed hair and suffered burns in doing this. An explosion in the Saint Louis mine near Fort Duchesne in 1896 rattled windows and doors in Vernal, 24 miles away. Mine timbering was thrown 500 feet up into the air and flames as high as 200 feet were capped by dense clouds of smoke. Two men working in the mine were killed. Gilsonite mining of the Duchesne vein which runs northwestward out of the northern portion of the Fort Duchesne Military Reservation was unique in that the miners found it necessary each morning before commencing work to get rid of the soft, tarry gilsonite oozes which covered the mine floor. This they did by starting at one end of the vein and rolling it up like a carpet and then hoisting it to the surface where it was dumped on the pits (figs. 2 and 3).

In 1902, pressure of the "whites" again became so strong in Congress that by special act of Congress the privilege of locating 100 mining claims on the Uintah Reservation was given to the Raven Mining Company. Fifty of the claims were to be for elaterite, twenty-five were to be for gilsonite, and twenty-five for precious metals. Eventually, only sixty-two of the 100 claims allowed were located. In 1905 when the Reservation was "opened," the located claims were purchased by the Raven Company. At the "opening of the reservation" for mineral entry, nearly 100 men gathered in Avintiquin Canyon at the elaterite deposits, some carrying guns. However, trouble was avoided when the men decided to race to the land office after posting notices simultaneously.

Two years prior to the opening, by another act of Congress (?) the odd-numbered sections were opened for location, provided that they had been located prior to 1891 (at which time, of course, it was not legal to locate) and provided that the applicant and the location was the first of such locations prior to 1891, and provided that a new location be made within 90 days following the opening. The Gilson Asphaltum Company acquired most of the gilsonite lands within the odd-numbered sections by purchase from the original locators. The lands within even-numbered sections were set up into 40-acre tracts and sold; all such lands not sold by 1910 were to be reserved. In 1906 President Theodore Roosevelt proclaimed the sale of the lands and in September of that year seventy-five 40-acre parcels were sold. The Gilson Asphaltum Company purchased the remainder of the Bonanza vein for $126 per acre.

Contemporaneous with the opening of the Uncompahgre Indian Reservation for gilsonite location the General Asphalt Company, the holding company of the Gilson Asphaltum Company, proposed and commenced execution of plans for the building of a narrow-gauge railroad from the Black Dragon mine to the Denver and Rio Grande Western line at Mack, Colorado (see fig. 1). They also began construction and completed shortly thereafter a system of toll roads which connected Dragon with Vernal (see fig. 1). Over these roads traveled the company stage line and freighters (fig. 4). In addition, telephone lines and telegraph lines were built. All of these activities were combined under two companies named the Uintah Railway Company and the Uintah Toll Road Company. The railroad was completed in 1904 and abandoned in 1938 when competition from trucks doomed the economic operation of the line.

The narrow-gauge road had the distinction of having perhaps the steepest railroad grade in the

FIGURE 4.—Uintah Toll Road stage at Devil's Playground south of Red Wash. Trip from Watson to Vernal took 8 hours. C. J. Neal with camera, 1912.

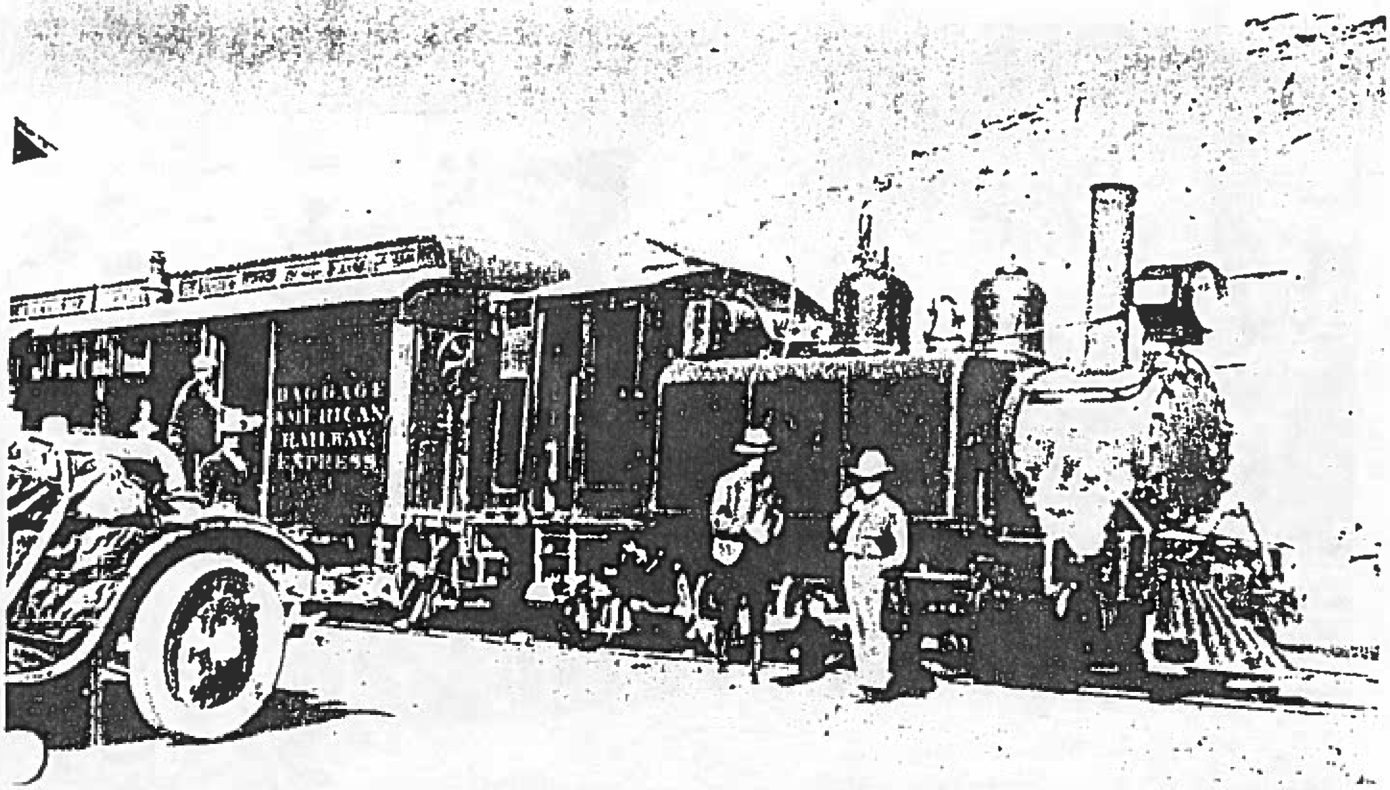


FIGURE 5.—Uintah Railway passenger engine at Watson, Utah, 1913.

northern hemisphere, ranging as high as 7½ percent. The grade over the 8,500 ft. high Baxter Pass was achieved by a bewildering series of loops, swirls, and hairpin turns, the most abrupt of which was 66 degrees. Crews who had worked head-on or braked on the Uintah smiled tolerantly at mountain railroading elsewhere. They had taken the graduate course. The railroad cost $230,000 to build and employed from 60 to 70 employees (fig. 5). In 1911 the railroad was extended another nine miles to Mack, Colorado.

The narrow-gauge road was proud possessor of one of the most powerful and distinctive engines built by the Baldwin Locomotive Company. They outshopped (built) a high pressure, articulated engine with a 2-6-6-2 wheel arrangement with 42,000 lbs. of tractive force and a rate of adhesion of 4.62. Eighty-two percent of the total weight of the engine rested on the 12 driving wheels. Water was carried in a pair of tanks on either side of the boiler. In addition, the road owned the only two Mallet locomotives built by the Baldwin Locomotive Company for a common carrier. Upon abandonment of the road the locomotives were shipped to Sumpter Valley in the Blue Mountains of Oregon where they were used another decade. They were then shipped to Guatemala where they are still in use.

The engines of the Uintah Railroad were run on coal from the company coal mine at Carbonera, on the south side of the pass. On steep grades, cinders from the stack would blow back across the gilsonite-loaded cars and often catch the ore on fire. One of the engines came from Venezuela, where it had been used on a mining operation in the mountains. Two of the passenger cars were old Denver and Rio Grande Western sleepers which had been on the Denver to Salt Lake City run when that line was a narrow-gauge system. They later ended their days as "outhouses" in the surrounding countryside.

Freight rates on the Uintah Railroad were raised from $8 to $10 per ton in 1906. This was a move on the part of the Gilson Asphaltum Company to force the American Asphalt Association out of business. In 1907 the latter obtained an Interstate Commerce Commission order which reduced the rates back to $8. When this happened, the Gilson Asphaltum Company cut the price of gilsonite $2 per ton, thus again reducing the margin of profit. It was the old-time version of the present day "gasoline price war."

The life of the gilsonite miner was not an easy one. The mines were located in remote, lonely country which was hot in the summer and cold in

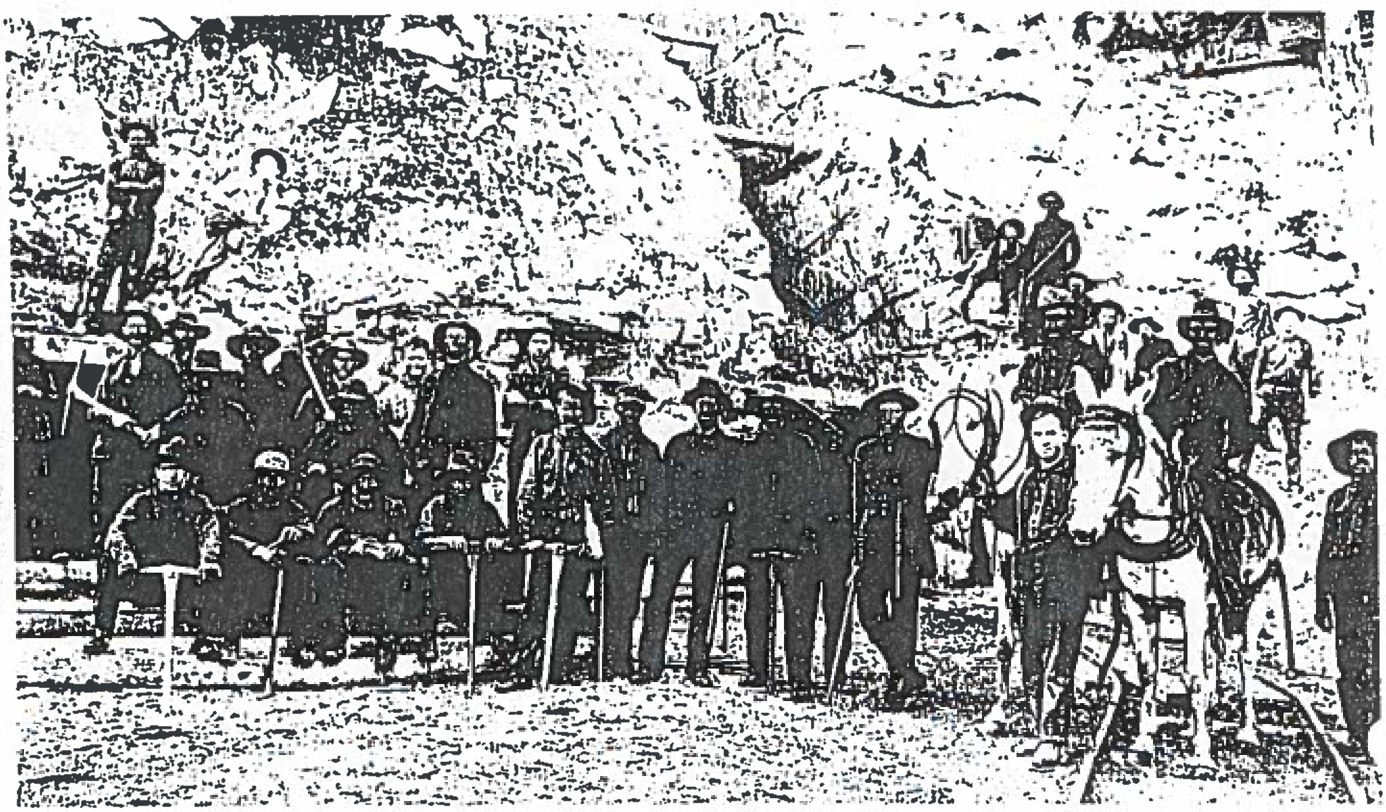


FIGURE 6.—Miners at Black Dragon mine, 1908.

winter. In 1907 wages for miners were $3 per 8-hour day. The miner paid 75c per day for board and furnished his own tent. Water was so short during the summer months that the miners were forbidden to waste any water by taking baths, the penalty being loss of job. Mining methods were extremely crude. Since the veins were vertical, shafts were sunk and drifting and overhead stoping techniques were employed. No safety precautions or safety ventilation was practiced during the early mining. The use of a water sprinkling system to "lay the dust" was put into effect in 1907 at the Black Dragon mine (fig. 6). Horses were used to draw the ore cars from the mines and to hoist ore from the shafts. Often mules were used for this purpose. In 1908 electric lights were installed in the Black Dragon mine; a 150-horsepower steam engine furnished the electricity.

In 1908 also occurred an explosion at the Black Dragon mine which killed two Greek miners and caused extensive damage to the mine. The force of the explosion hurled mine timber 2,000 feet across Dragon Canyon. After 14 months of labor the two bodies were recovered, both completely encased in melted gilsonite which had resolidified around them. The fires which were a result of the explosion continued to burn for several years thereafter.

Although the miners worked hard, there were quite a few activities which kept them busy during their off hours. During the summer each mining camp had its own baseball team, and the rivalry between the various camps was intense, highly impassioned, and often violent. A barrel of beer was the usual prize for the winning team. Independence Day was celebrated by all of the miners, local cattlemen, and ranchers and their families either at Columbine or atop Baxter Pass. The railroad sent special trains to carry the party and all the trimming (fig. 7).

The miners learned early to coat their bodies with mutton tallow or cream and to powder this greasy covering to prevent the gilsonite dust from sticking like tar to their skin, since the dust can only be removed otherwise with solvents. The protective layer thus applied can be washed off with hot water. In the early days miners would often go for months without a bath, the gilsonite forming a solid crustlike layer.

During the first years of its existence, Dragon was a tent town. The company refused to build houses for the miners, but in 1908 built a boiler

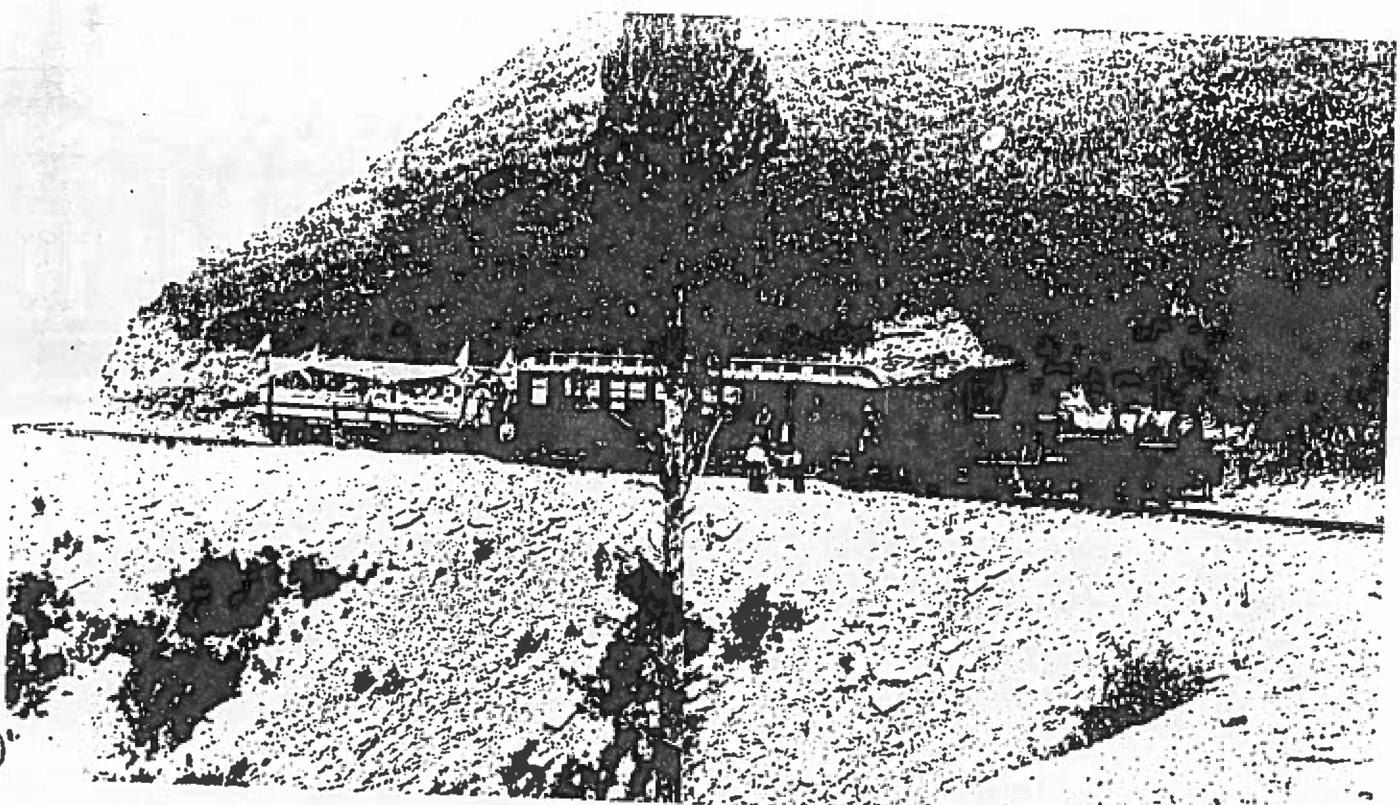


FIGURE 7.—Narrow-gauge Uintah Railway at Baxter Pass, with Gilson Asphaltum Company employees on Fourth of July outing, 1910.

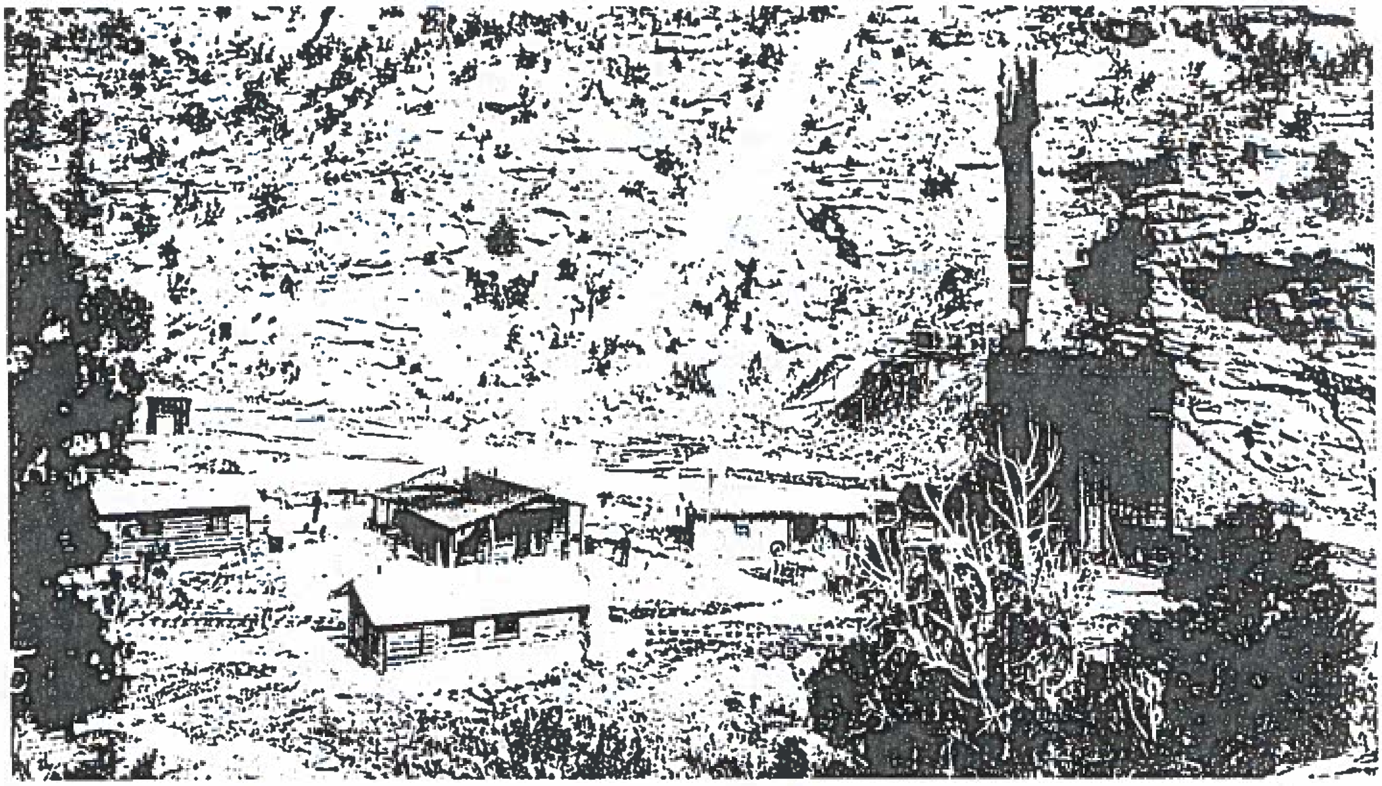


FIGURE 8.—Black Dragon mine and camp in 1908. View looking northwest. Note vertical Dragon vein.

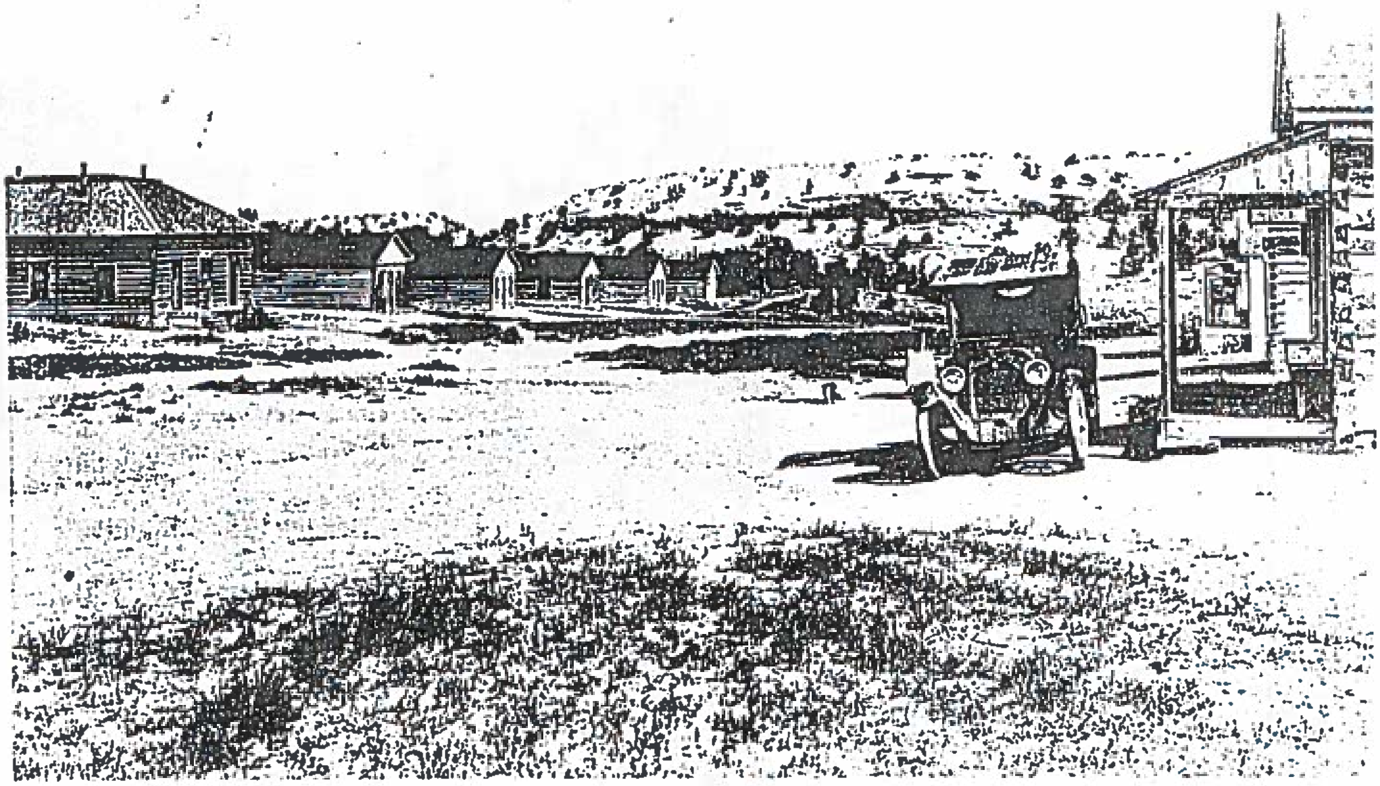


FIGURE 9.—Gilsonite mining camp at Rainbow, Uintah County, 1925.

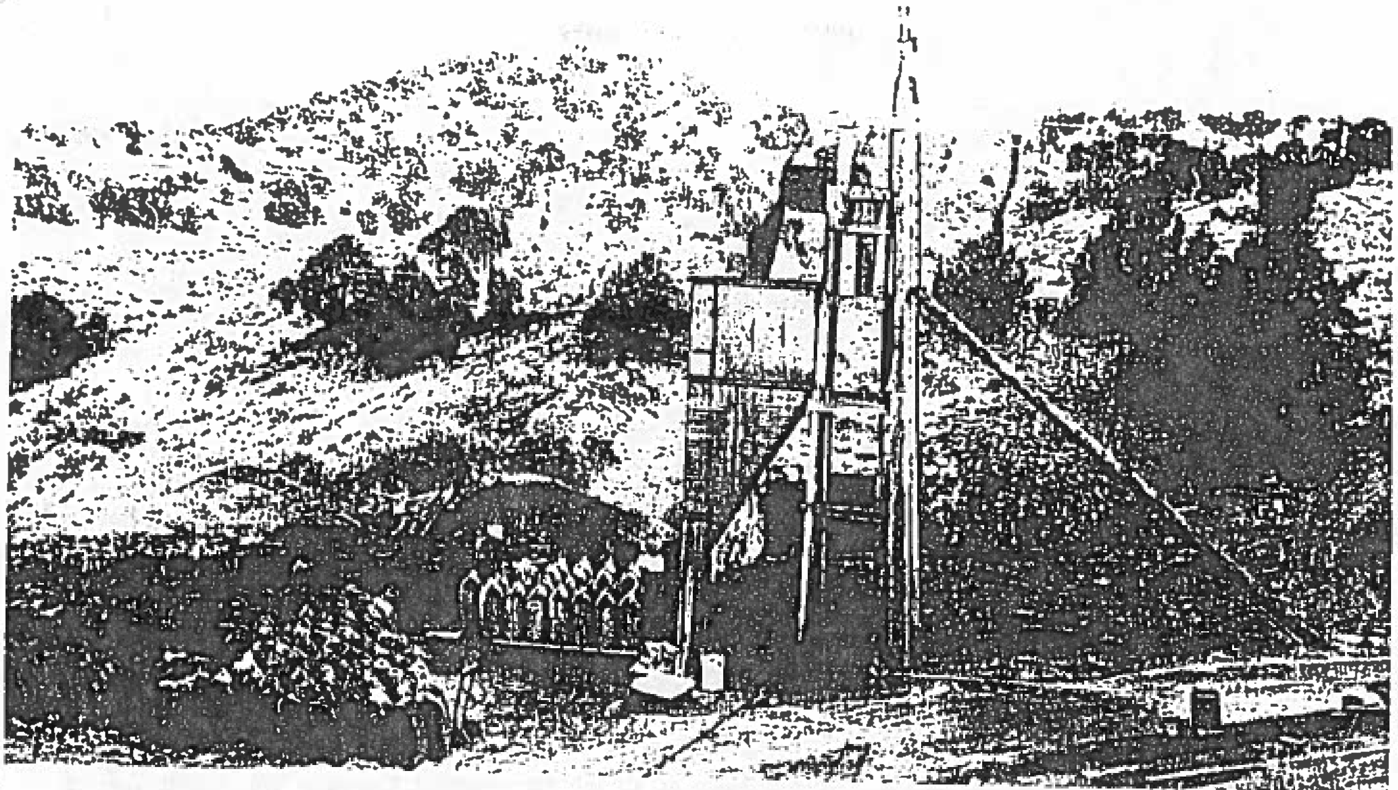


FIGURE 10.—Photo of C. J. Neal operations, 1940, at Rainbow gilsonite mine, Uintah County, Utah, showing vein in hill. View looking northwest. Gilsonite in 200 lb. sacks awaiting shipment.

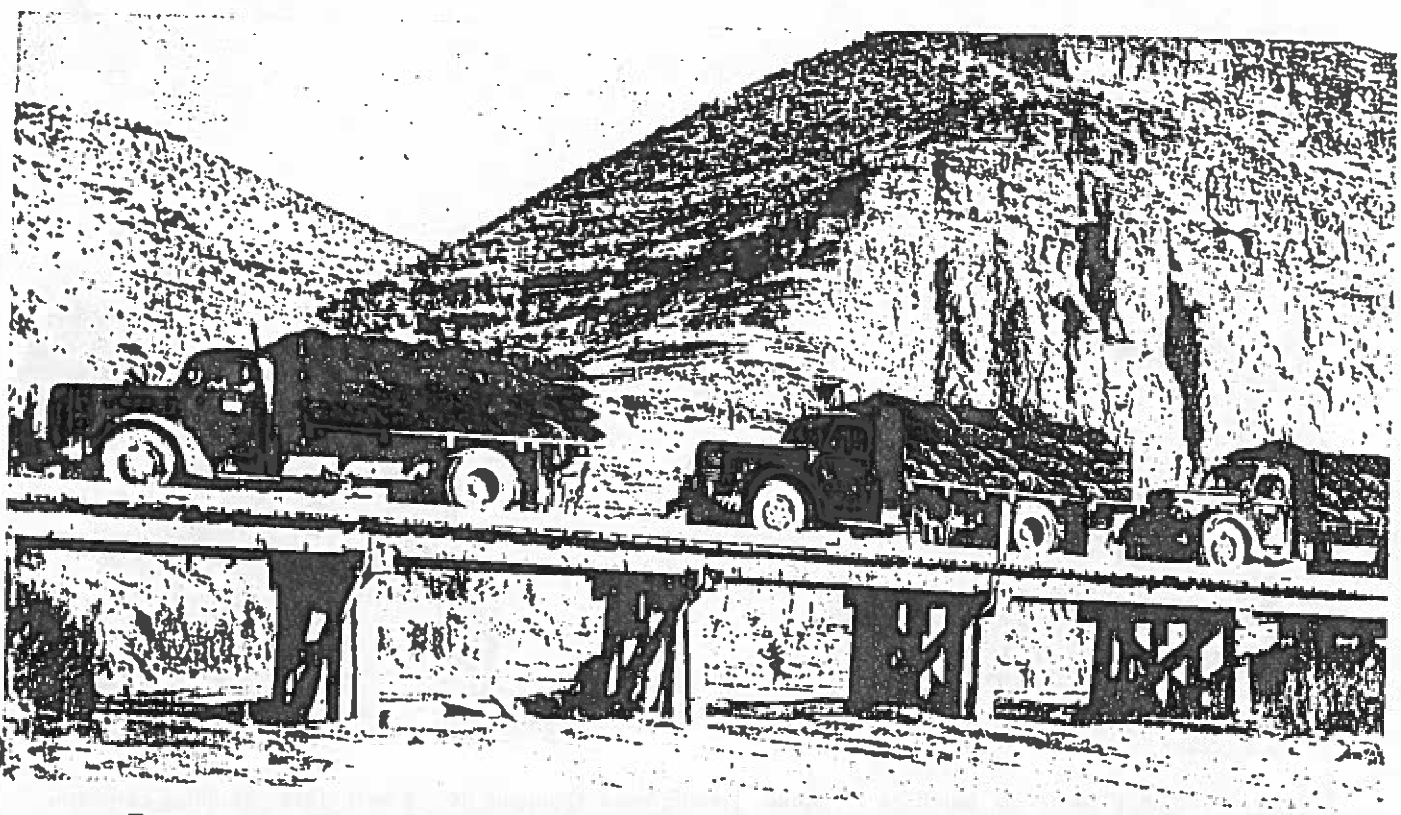


FIGURE 11.—Gilsonite trucks crossing Evacuation Creek at Watson, Utah, 1940, on the old Uintah Railway bridge.

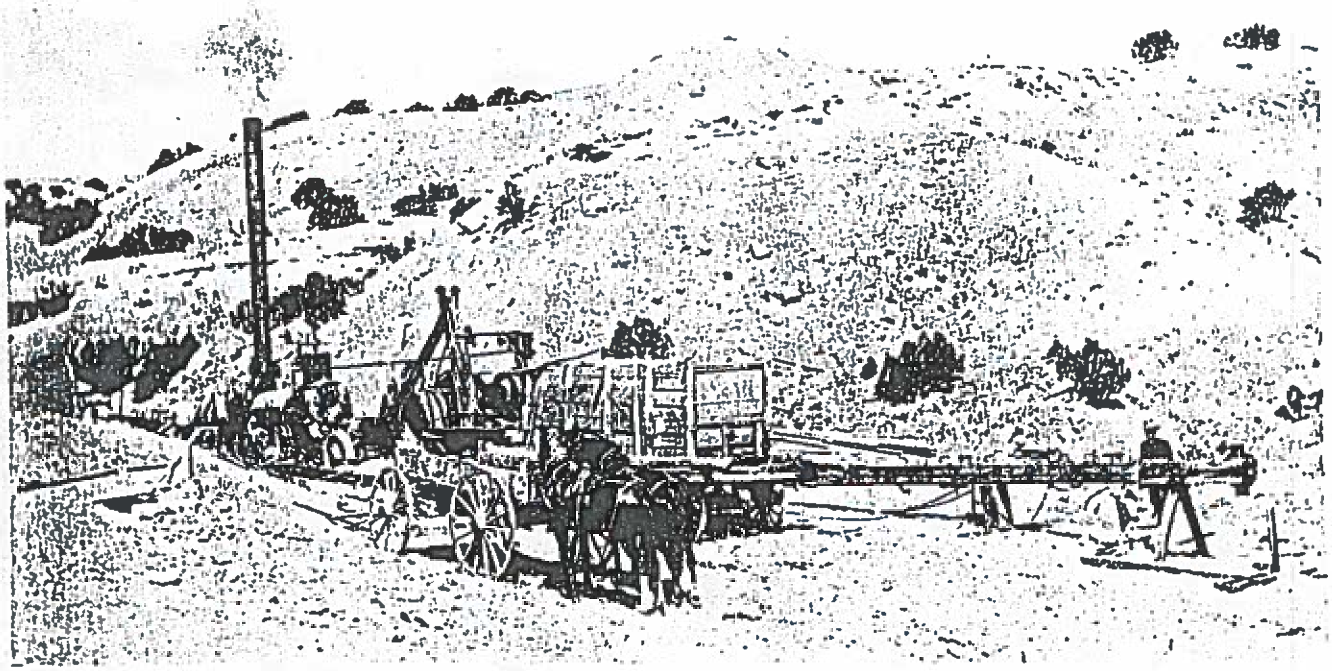


FIGURE 12.—Rigging up west of Asphalt Ridge at Uintah Development Company No. 3 well, sec. 17, T. 5 S., R. 21 E., Uintah County, Utah. T.D. 1,749'. Wooden mast on ground; boiler with steam up. April 26, 1913. C. J. Neal, operator.

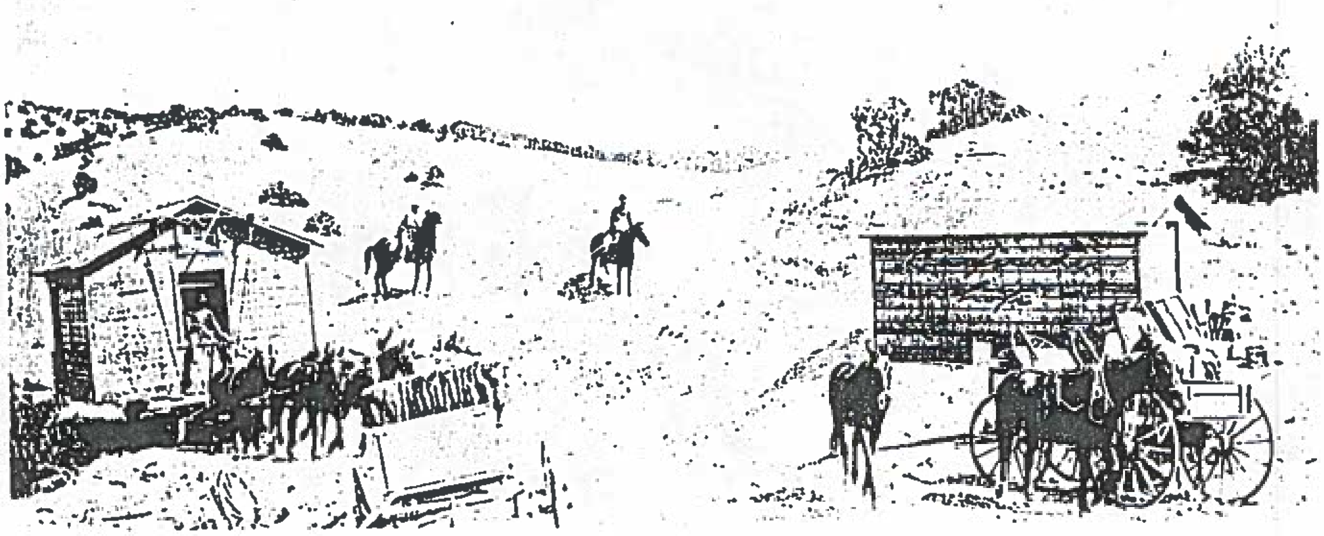


FIGURE 13.—Moving buildings to Uintah Development Company No. 3 well, 1913. Skidding carpenter shop and cookhouse with four-horse teams. Note horsemen in background "winching doghouse into place with lariats tied to saddle horns."

house and installed shower rooms for the miners (fig. 8). The town had corrals for the horses, loading bins, warehouses, a rock crusher for making cement, a company-owned sawmill, stores, a hotel and restaurant, saloons, feeding yards, blacksmith shop, bunk houses, boarding houses and later, a public school for the children.

Prior to the building of the school, all of the local dances and special events were held in the boarding house. Dragon even had a "free public library." As early as 1910 the miners even saw an occasional movie, silent of course. In the town culinary water was hauled to Dragon in tank cars from Columbine. Each house and tent had a water barrel which was filled frequently from the water car. Rain water was collected from the house roofs in barrels. Ice was stored in sawdust or gilsonite flakes in company ice houses. The houses and tents were heated by wood-burning stoves. Each house or tent had its own outdoor toilet. Kerosene lamps later gave way to gasoline lamps.

In 1911 another explosion in the Black Dragon mine shot mine timbers over Dragon Canyon, over the next hill, and almost to Whiskey Creek, a distance of more than 1 mile. Although no miners were killed the damage was so extensive that the Gilson Asphaltum Company began shifting its operations to the Rainbow mine and began extending the railroad to Watson. Mining operations continued here until 1935, when mining was commenced at Bonanza (fig. 9). The Barber Asphalt Company was the sole owner of the Gilson Asphaltum Company until 1946 when the Standard Oil Company of California became joint owner. Since that time the company has been known as the American Gilsonite Company.

In 1936 the Uintah Railway petitioned for permission to abandon services and in 1939 all services were discontinued. Later operations by C. J. Neal at the Rainbow mine (fig. 10) utilized trucks in hauling the gilsonite in 200 lb. sacks. The old railroad bed of the Uintah Railway was utilized and was built into a road over Baxter Pass (fig. 11). During the heyday of the railroad, regularly scheduled freight wagons and stages of the Uintah Toll Road arrived from and departed to Fort Duchesne and Vernal daily. The stages went to Bonanza where the Vernal stage left the Fort Duchesne stage and continued to Alhambra on the Green River, via Devils Playground and Red Wash (fig. 3), while the Fort Duchesne-Myton stage went on westward.

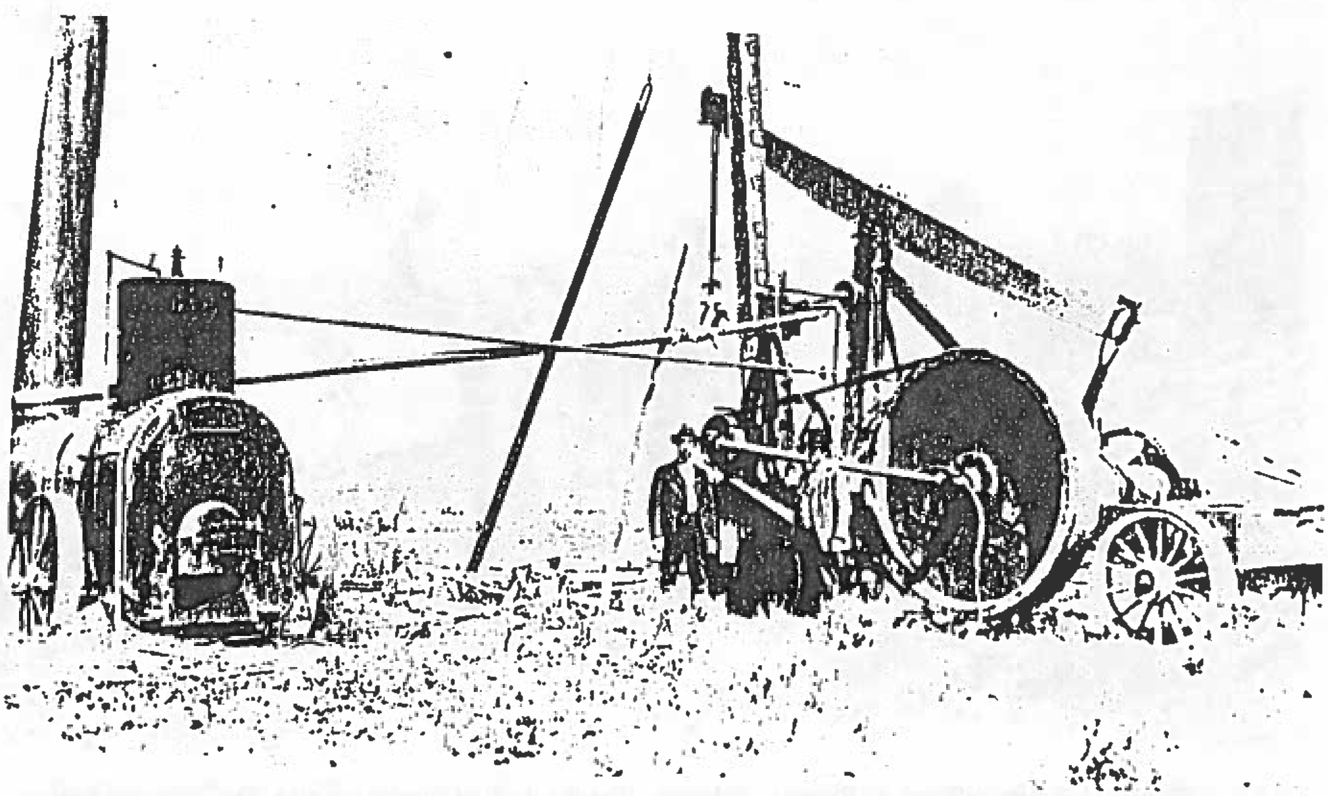


FIGURE 14.—Cable tool rig at Rangely, Colorado, 1918. Emerald Oil Co. lease. Note boiler and rig equipped with wheels.

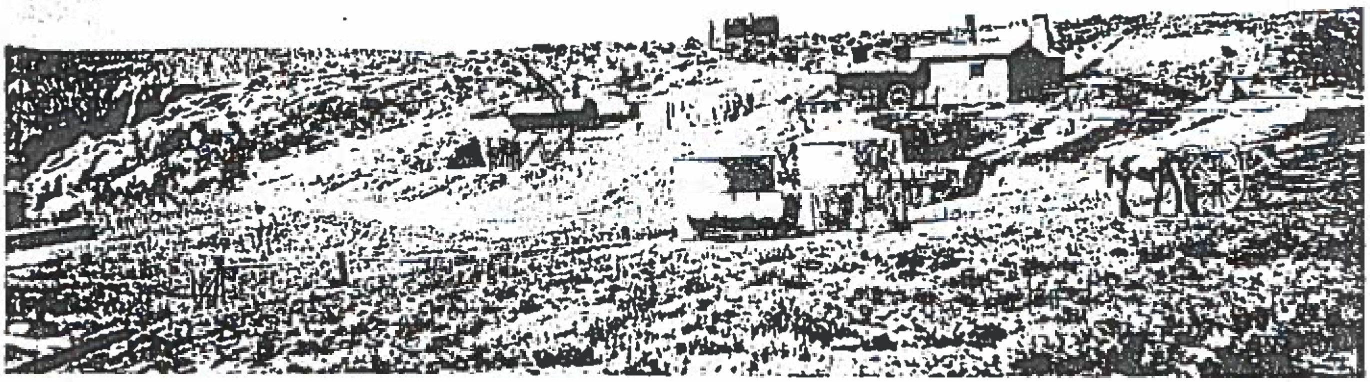


FIGURE 15.—First refining plant, Rangely, Colorado, on White River, 1918.

FIGURE 16.—First refinery at Rangely, Colorado, showing the first runs of gasoline. Operated and built by C. J. Neal, 1912. Dr. Bonner, Sr. of the University of Utah shown holding graduated cylinder. Note tank wagon, capacity 1,000 gallons, used to haul gasoline to Vernal.

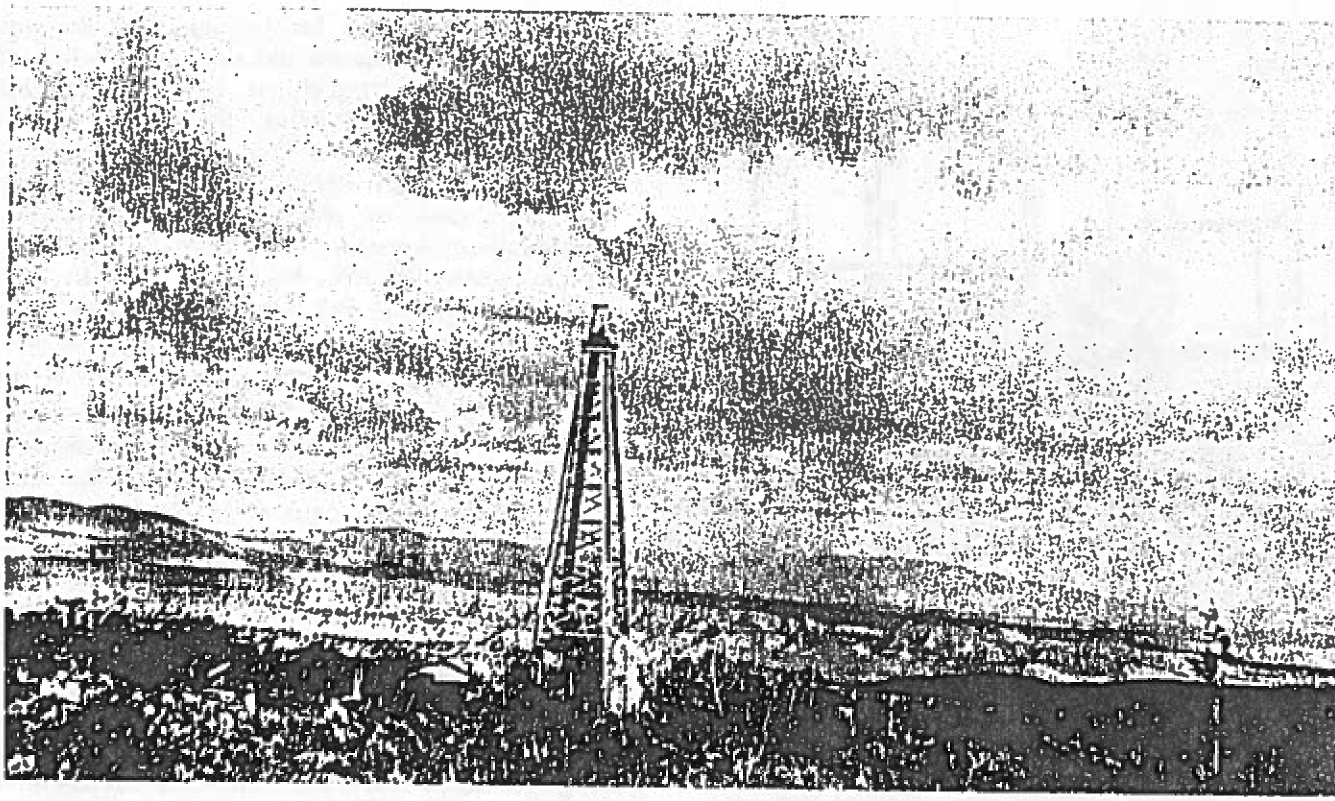


FIGURE 17.—Cable-tool rig on Neal Dome, north of Vernal. View looking northwest. First well drilled to Weber sand, 1922.

EARLY OIL AND GAS OPERATIONS

Prior to 1918 C. J. Neal of Vernal, Utah drilled, for the Uintah Development Company, several wells on the west flank of Asphalt Ridge. One of these, the Uintah Development Company No. 3 well which was located in the center of NE¼ SE¼ sec. 17, T. 5 S., R. 21 E., Salt Lake meridian, was drilled to a total depth of 1,749 ft. The cable tool rig had a coal burning steam boiler and a wooden derrick (fig. 12). The rig was moved onto location by wagons and horses (fig. 13). This well encountered tarry oil in the Tertiary in several zones, together with small shows of gas. Six cable-tool holes were drilled along Asphalt Ridge prior to 1947, many of which had shows of oil and gas.

In 1918 he drilled several shale wells for oil at Rangely on the Emerald Oil Company lease (fig. 14). Also that year he built the first refinery at Rangely on the White River at the present site of the California Company's pipeline station. The plant had a refining capacity of 350 gal. of gasoline per day (figs. 15 and 16).

In 1922 C. J. Neal put together a block of acreage on a small closed anticline a few miles north

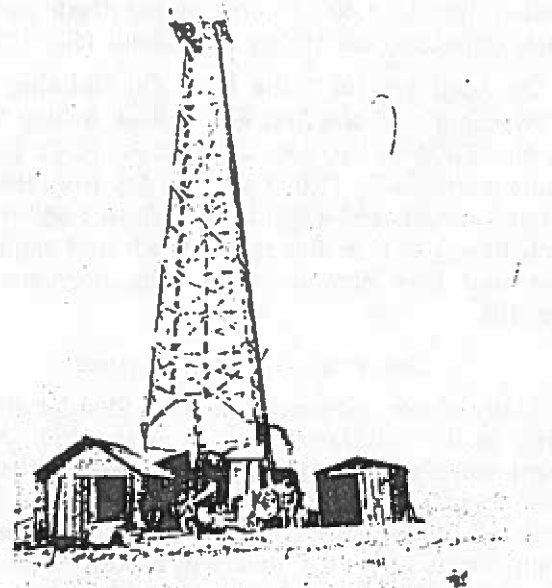


FIGURE 18.—First commercial gas discovery in Utah blowing in Utah Oil Refining Company's No 1 Ashley Valley, sec. 23, T. 5 S., R. 22 E., Uintah County, Utah, April 13, 1925. Gas from Morrison sand interval, 1,673 to 1,680 ft., gauged over 15,000 Mcf per day. Gas was later piped to Vernal and used domestically.

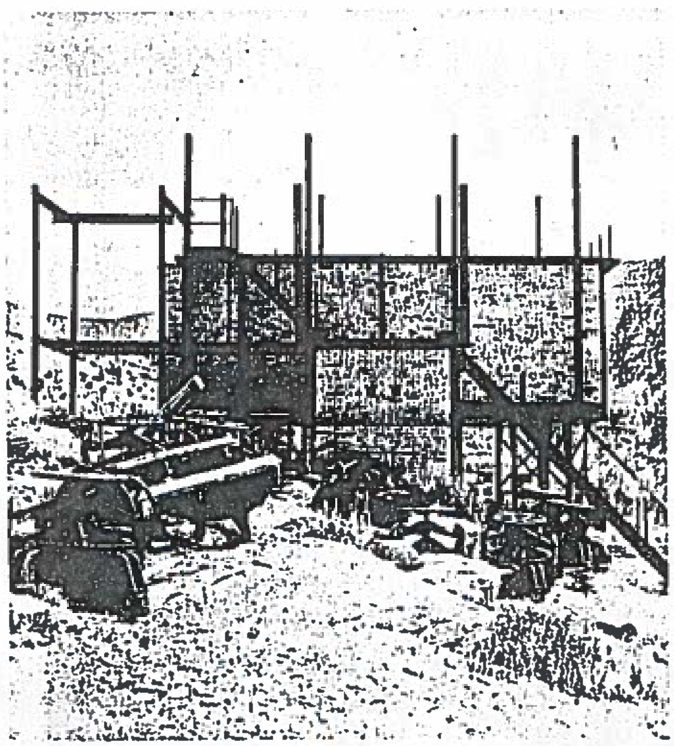


FIGURE 19.—Ute oil shale plant, under construction in 1920 on White River south of Bonanza, Uintah County, Utah. Never completed.

of Vernal, which subsequently became known as Neal Dome. A cable-tool rig was moved in and a well drilled to 1,800 ft., recovering fresh water in their objective, the Weber Sandstone (fig. 17).

On April 13, 1925, the Utah Oil Refining Company completed the first gas well at Ashley Valley in the SW¼ NW¼ sec. 23, T. 5 S., R. 22 E., Salt Lake meridian for 15,000 Mcf per day from the Morrison Formation at a depth of 1,673 to 1,680 ft. The well blew gas over the crown block and sand from the well bore showered over the doghouse (see fig. 18).

Early oil shale operations

Many placer mining claims were filed for oil shale prior to its withdrawal from filing in 1930. Assessment work was expensive and although many had the dream of immediate development and riches, only the few who held on over the years and brought their claims to patent, or are in a position to do so, may eventually benefit from the production of oil from the shale. In 1920 C. J. Neal began construction of an oil shale plant on the White River, south of Bonanza, for the Ute Oil Shale Company (fig. 19). The plant was never finished, and the remains of the structure are still in evidence.

Exploitation of metallic minerals

Hard rock mining for precious metals, copper, lead and other minerals did not play an important economic role in the growth of the population of the Uinta Basin. However, the copper ore which was produced from the Dyer Mine located in the Carbonate mining district, 25 mi. north of Vernal, was developed as replacement-type deposits in Mississippian limestone. In 1887 L. P. Dyer and others located the Ace, Antietam, and other claims. Between that time and prior to 1897 over 400 tons of copper ore which assayed in excess of 49.47 percent copper and 26 ounces of silver and $6 worth of gold per ton was sent to the smelter at Park City. In 1899 the operators erected a blast furnace which had a 42 in. water jacket. This furnace operated over two years, until October, 1901. At this time the tenor of the ore averaged 33 percent copper with 26 ounces of silver per ton. The copper which was produced here was 95 to 98 percent pure. Some iron from the nearly Pope claims was used in the smelting process.

Some early prospecting was done in the Browns Park area at Red Creek, Jessie Ewing Canyon, and Willow Creek Canyon. The ore deposits were irregular veins of quartz carrying copper carbonates with some copper sulfides and with small amounts of carnotite. The mention of carnotite in "The ore deposits of Utah" (Butler, 1920, p. 605) caused considerable excitement during the uranium boom of the 1950's, although no ore of commercial significance was found.

South of Ouray in Uintah County, some prospecting and development work was done for copper in beds of the Uinta Formation. Where the sandstone beds are highly carbonaceous small podlike deposits of copper carbonates occur. The ore is of limited areal and vertical extent and the deposits are of academic interest only.

Two miles west of Ouray on the south side of the Duchesne River is an occurrence of molybdenum; the ore is the hydrous sulfate ilsemannite. The deposit resembles the copper occurrences mentioned above and there is no history of production due to the limited extent of the reserves. The prospect was discovered in 1917 (Schaller, 1917).

During 1913 a gold dredge was set up above the present location of the bridge across the Green River at Jensen (fig. 20). Attempts were made with this machine to recover the fine flour gold from the channel and terrace sands although the operation met with little success.

Coal mining

Mining of coal was extensive in the Uinta Basin and for many years helped augment the economy of the local ranchers and townspeople. Here was a relatively cheap natural resource which could be utilized locally. Lynn Pack, long a Vernal resident, operated coal mines northwest of Vernal at Coal Mine Basin (personal communication). There were three grades of coal at the mine: Select sold for $4.50 per ton at the mine; $5.50 delivered in town from 1912 to 1930. The second grade coal sold for $3.75 per ton and the nut coal for $1.50 per ton at the mine. Laborers were paid $1 per car for mining the coal. Since it took 2 cars to make a ton, they received $2 per ton. The average man could mine 5 cars per day and thus earned $5 per day.

The coal is in beds of the Cretaceous Frontier Formation. There were four beds, the upper or top bed being 24 in. to 26 in. in thickness with shale and clay below; the second bed was 6 in. thick and was locally called the "Blacksmith vein"; below this was more shale and clay and underneath was the "bottom coal" which ranged in thickness from 12 in. to 14 in. and at the base of more shale was the "floor coal," which was 4 in. thick. The entire coal section was mined by inclines which averaged 17 percent grade. The mines had good sand roofs and good clay floors until water was reached at a depth of 1,400 to 1,500 ft. The roof was "shot" and room and pillar methods of mining were employed. Often the pillars were pulled and recovered. The coal was bituminous and had a very high Btu content, although the iron content was fairly high also, causing some local trouble with grates burning out. Some distillate was recovered in cans placed on the floor of the mine at seepage points and was used by the miners in their lamps. The deepest production was from an incline depth of 2,200 ft. Water encroachment, combined with increasing competition from truck-hauled coal from the mines at Price and Sunnyside, at the southwestern corner of the Uinta Basin, caused the abandonment of the workings in the late 1930's. During the years 1930 to 1931 no money was available for paying wages and so the miners took their wages in produce or other items of barter which the owners had taken as payment for the coal. The mine owners often took hay, calves, cows, beans, sugar and flour in payment for coal; these were stored in the company warehouse and on payday the miners would go down and take in produce the value of their wages. Then they would come into Vernal and barter what they had for what they needed.

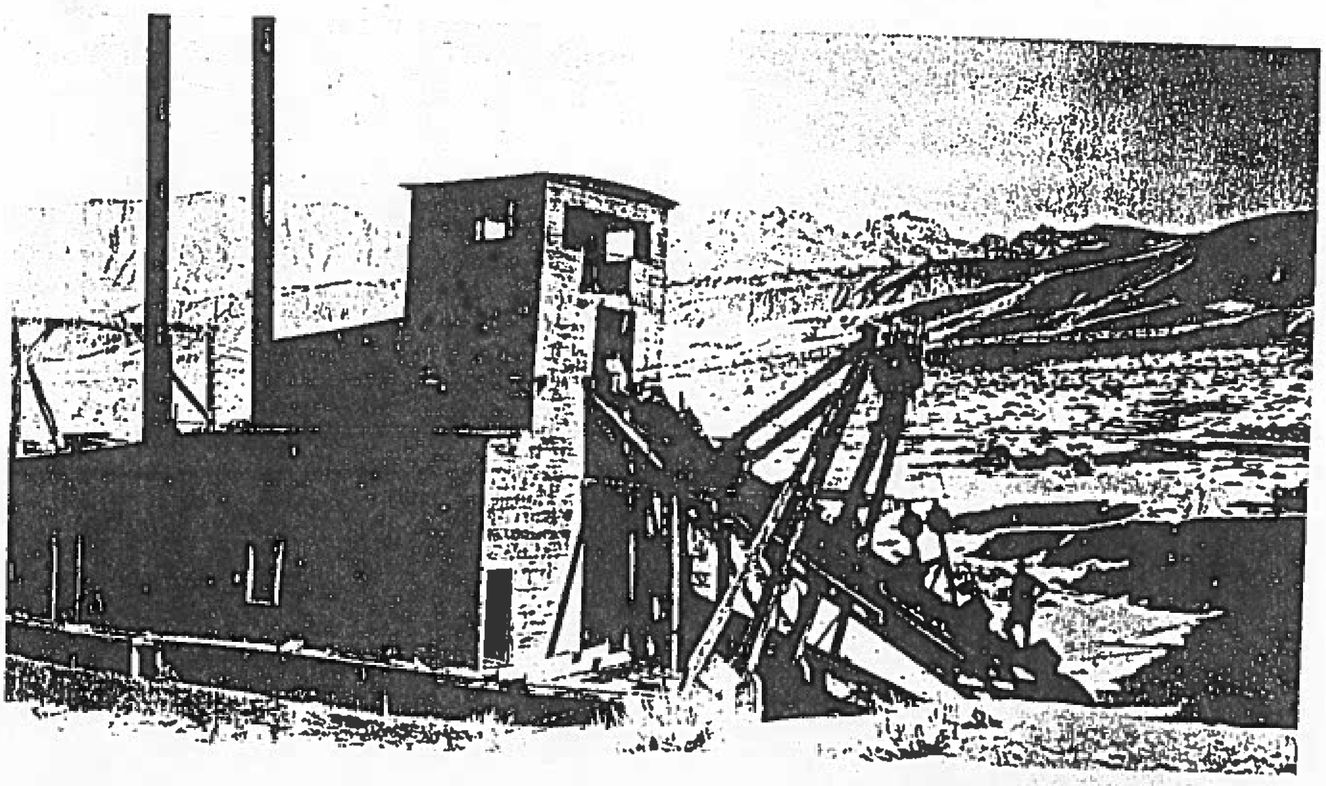


Figure 20.—Praefke's gold dredge on the Green River north of Jensen, Utah, 1913.

Epilog

In retrospect, it can be said that the mining industry in the Uinta Basin has contributed greatly to the growth and economic stability of the community. While gilsonite and phosphate mining are the only two minerals other than oil being produced in the basin today, economic utilization of the oil shale and bituminous sands may be at hand and we may shortly see an upsurge in mining activities which would surely gladden the heart of the old prospectors. Then too, there are still those of light heart and faith who may still scour the flanks of the western Uinta Mountains for the legendary, yet fairly well substantiated and documented, lost "Rhodes gold mine" which supplied the gold for plating the angel Moroni on the Latter-Day Saints Temple in Salt Lake City.

References cited

BUTLER, B. S., and others, 1920, *Ore deposits of Utah*: U. S. Geol. Survey Prof. Paper 111.

REMINGTON, N. C., 1959, *A history of the gilsonite industry*: unpub. thesis, University of Utah.

SCHALLER, W., 1917, *Ilsemannite, hydrous sulphate of molybdenum*: Washington Acad. Sci. Jour., v. 7, p. 417-420.

Additional selected references

CRAWFORD, A. L., 1957, *Gilsonite, it's discovery and the early history of the industry*, in *guidebook Eighth Ann. Field Conf.*: Intermountain Assoc. Petroleum Geologists, p. 149-151.

HANSEN, G. H., 1957, *History of drilling operations in Utah's Uinta Basin*, in *guidebook Eighth Ann. Field Conf.*: Intermountain Assoc. Petroleum Geologists, p. 165-167.

KRETCHMAN, H. F., 1957, *Story of gilsonite*: American Gilsonite Company, Salt Lake City, Utah.

ANONYMOUS, 1945, *The evolution of gilsonite transportation*: Mining and Contracting Rev., v. 47, no. 1, Jan., 1945, p. 5.

Dec 8, 1948

Anxious Public Still Awaits News Of Ashley Confirmation Well

Casing to be Ready For Testing By End of Week

Crain and Griffith Oil Co. confirmation well in the Ashley structure still has not been brought in, according to J. W. Griffith, partner of the firm.

Saturday may be the important day, however. Workers were setting casing early in the week. The cement will be set up by Saturday and will afford possible testing, according to reports.

Coring passed the 400 feet mark a week ago, but no well has been announced. Only comment made by the Texas firm's spokesman was that "we ran into some tough digging." He would release no information on depth.

He reported that he was "not discouraged" with progress.

Meanwhile observers report that tanks have been placed a short distance southeast of the operating rig to receive the crude when it is brought in. A still surer sign of the company's expectations of a producing well is leveling of a second location approximately 300 yards southeast of its first well, the Thomas Hall No. 1.

The location was completed nearly a week ago. Apparently commencement of the second well is awaiting results of the

(Continued on page 8)

Confirmation well
discovery well

Anxious Public Awaits News On Oil Well

(Continued From Page 1)

other drilling. The Thomas Hall No. 1 well is about half a mile southeast of the discovery well in the structure, the Equity Oil Co. Ashley No. 1.

Mr. Griffith reported a week ago that he has received a second derrick from his Longview, Tex., headquarters. The derrick is being set up over the second site.

Other Locations

Exploration activities have not been limited to the Crain-Griffith outfit, from all indications. It is reported that a location has been prepared on the Ben Slaugh place—the old Lorin Williams property — approximately three miles northwest of the Equity well. The site is only one-half mile away from Ashley creek and the first one prepared on the north side of the highway. Name of the oil firm or drilling contractor has not been disclosed.

Tape #113

Bud Covington

Uintah County Historical Society Meeting, April 9, 1983

Bud Covington (BC): ...little above the Uinta Basin and one of the reasons that the early activity in the Uinta Basin continued to make history in reference to all of the events with which you are familiar. For example, politics and economics are always very closely interrelated. Nothing happens in politics without a cause, nothing happens in history without an economic cause, in addition to historical and socioeconomic causes. By this what I mean to say, when you set things in a larger framework as that, all of the early migrations of the white man into the Uinta Basin were primarily a result of the tremendous interest in the minerals of this area.

Although agriculture was a prime source for the early Mormons in the Wasatch Front area, the exploitation of minerals were never really approved of by Brigham Young and his followers because of the fact that Brigham had a feeling that the people should stay with the land at least until they established a solid base for all of their activities. At a later date, mining activity developed in other parts of Utah. The early interest in the Uinta Basin was primarily because of the minerals.

So we say, "What minerals are these that we were interested in that caused people to come for thousands of miles, from the Salt Lake area, from places as far away as Canada and New England, from places as far away as South America, to see the unique minerals that are present here in this great Uinta Basin?" Well, we have a very unusual storehouse of hydrocarbons here. You are well aware of the oil shale which can be, and probably will be, a very important, significant source of oil in the future, providing economics are satisfactory. We have a tremendous source of tar sands here. We have coal. We had early mining in the copper industry. We had very early mining in the Gilsonite industry.

Prior to the mining of Gilsonite in the Uinta Basin, Gilsonite was an unknown substance. So most of the focus of the activity in the early times in the Uinta Basin was focused upon the exploitation and exploration and development of the very unique minerals. So what I'd like to do today is just give you a brief review of and outline as to what has happened in the industry and in the Uinta Basin since the earliest times.

First of all, I'd like to explain a few things about these products and minerals so you know a little more about what we're talking about. This is Gilsonite. Many of you have seen it, some of you may not have. Gilsonite is a solid oil, solid hydrocarbon, derived from an oil source which is moved up in the vertical fractures in the earth until they become solidified. It has many uses. It is used in plastics; it is used in paints, high-grade varnishes; it's used as a base for India inks, high-grade printing inks; it's used in rubber products. When added to tires of rubber, it keeps them from checking under cold weather to where your tires don't break. Five percent of this material added to asphalt in a playground prevents accidents from being worse than they are. Bruises from children falling on asphalt are reduced significantly. It is used as undercoatings on cars. It's mixed with [the] material wallboard is made from it. At one time in the last decade, Gilsonite was used as a feeder-stock for gasoline, gas, gasohol, but the ore itself proved to be much too valuable to use a source of gasoline. So this is one of the unique hydrocarbons found nowhere else in the world, mined nowhere else in the world except the Uinta Basin. One or two small deposits have been found in other countries, but nothing commercial.

Oil shale, we're all well aware of. Oil shale is shale which has a lot of highly organic material which, when ground, crushed and heated and retorted, can be converted into oil by a basic mineral known as carrageen. There is no oil in that block of shale right there, but if this were ground, crushed, heated and retarded, oil can be derived from it. The oil will then be a heavy, goopy oil which has to be up-graded.

Another one of the very unusual deposits found here in the Uinta Basin is tar sand, heavy, oil-impregnated sand. This is a sandstone with heavy, oil-impregnated saturation. This particular piece of rock here is similar to what is found up here in the quarry in the county pit. This stuff here will average about one barrel of oil per ton of material.

Unintelligible question.

This is asphalt, also called heavy, oil-impregnated sandstone, sometimes called tar sandstone. This oil here is the sandstone from which the lighter ends have escaped, leaving the heavy oils left. I'd like to show you this. This is a bottle of oil from a well we're producing out of the Pleasant Valley area. It has a pour point of 100 degrees. If the temperature is under 100 degrees, you can walk on it because of the high viscosity. The high viscosity is a result of a high paraffin content. The high paraffin content is a direct relation to the source-bed of this oil, which is organic shale similar to this. So these two are interrelated. This product here is interrelated to all three. This mother-source is highly organic material like this ... prototype oil like this into the veins and solidified into the Gilsonite.

Then another important mineral which was found in the early days, and mined in the early days of Uinta Basin, is copper. The Dyer Mine, north of Vernal, produced some very high-grade copper ore. This is a piece of copper ore that runs about sixty percent copper. This particular type of ore is called [malachite], it's a copper-carbonate. The way they handled this ore in the early days was to mine it, grind it and crush it, treat it with acid and then precipitate the copper by putting iron filings and scrap iron into the acid which would precipitate them into copper. This particular piece of copper here is refined copper. It was not produced that way, but it was produced partly that way. It was produced with the acid, then reduced by electrolysis product and made into about 99 percent pure copper from ore similar to this.

Well, these were the primary minerals, plus coal. I didn't bring a piece of coal because I found my hands so full. I couldn't find a box to put it in. You've all seen coal, especially you people, furnace and use coal in many different ways. You're all familiar with coal around the Uinta Basin here, especially up in Coal Mine Basin. But coal was another important product of the area from which the economy of this country began to derive its strength at the same time the agriculture base was building up.

So having presented some of these minerals as friends of the Uinta Basin and members of your society ... our own personal use, I'm sure that they are members because they're all affected directly or indirectly by the use by their industry. We haven't phosphate. Phosphate came in much later, much later development in the Basin here. So historically, these are the primary basis for the early mineral industry within the Uinta Basin.

On October 3, 1861, President Lincoln signed an order declaring the Uintah Valley an ill-defined area, an Indian Reservation consisting of approximately 2 million acres. All Indian lands and other areas within the state, titles of any other lands within the state at that time were completely extinguished. Shortly thereafter, about 1880, the White River Utes and the Uncompahgre Utes living over in the Meeker area were vastly disturbed by the antics of one

Nathan Meeker. Nathan Meeker was the Indian agent for the tribes of the Ute, the White River Indians. The Indians liked to raise horses. So they built a race track just west of the town of Meeker. Of course, Nathan Meeker was a very good, highly religious person and he did not think we should race on Sunday. Well, the Indians thought they should race on Sunday because Sunday was not an especially holy day to them. So they continued to race until finally Nathan Meeker said, "Well, we'll put an end to that." So he took his plows out there and he plowed up the racetrack.

The next day, of course, the Meeker Massacre occurred; and as a result of that, federal troops were sent to Meeker. On the way, fourteen of those troops were killed, one of them was General Thornburgh. As a result of that uprising, the killing of the federal troops, more federal troops were sent in and the White River Utes and the Uncompahgre Utes were moved to the Uinta Basin from the Colorado Reservation. At that time, they set up Ft. Thornburgh. It's an irony that the general who was sent to quell the uprising, that Ft. Thornburgh was named after him, which was vindicating. Well, Ft. Thornburgh was at the site of the present town of Ouray. That was in 1880.

In 1881, because of the problems of supply and demand and especially supplying the fort, they moved the fort to Ashley Creek, what was then called Hatch town, which is now Vernal. In 1886, Fort Duchesne was established. In 1888 a very curious thing happened. If you remember when I started talking, I mentioned the fact that all events have some economic basis. The understanding of those economic bases can make a lot of things look more clear. In 1888, there was a lot of pressure put on Congress because of the presence of Gilsonite veins in the Gusher area, present Ft. Duchesne area, to keep those Gilsonite veins out of the reservation, off the reservation of lands, so they could be exploited. This pressure became so great that an area was set aside, completely withdrawn from the reservation, known as "The Strip."

When this happened, that land became a no-man's land. It was not under the jurisdiction of the county, of the state, or of the federal government. As such, it became an outlaw's country and also became a den of gambling and prostitution. Liquor was being sold to Indians on the Strip, which was forbidden under the federal laws. As a result, the area, until 1906, was practically a small Las Vegas establishment. We drove a well just outside of Gusher here about ten years ago. While we were ... test had some time to walk around. Around the base of the cliff I found some remains of an old cabin. Around the cabin were thousands of broken bottles where the federal troops had come in and found bootleggers selling liquor in the early 1900s, 1894-6, to the Indians and had broken all of the bottles. There was very beautiful bottles, pieces you could piece together. They were all hand-blown bottles with hand-pressed necks, but I never found one crooked bottle among all this big mess of broken glass.

As I was walking away, I looked over the sagebrush and just happened to notice sitting in sagebrush was a perfect bottle that somebody had probably either thrown over his shoulder and landed in the sagebrush and was still perfect and I still have it. That bottle dates back to the time when this land out in the Gusher area was known as The Strip and was a direct result of Gilsonite mining operation out there. There was a carbon vein, a ... vein.

So where did Gilsonite get its name? Its name came from Sam Gilson. Sam Gilson was a man who rounded up wild horses. He promoted various mining ventures and when he came into the Uinta Basin and saw the Gilsonite, he was smart enough to start amassing claims and forming a company. At the formation of his company, he jokingly said, "I'd give anyone a silver dollar if they named the company after me." So they did, and the product became known as Gilsonite for

Sam Gilson, and the company was Gilson Asphaltum Company, which later became American Gilsonite Company

Another curious thing happened which backs up, again, this point of political pressure and economics. When the Castle Peak/Pariette areas south of Myton were found, another very extensive Gilsonite vein, called the Castle Peak/Pariette vein, just about the time this was discovered, the surveyors were trekking their way westward on a survey. Of course, compared to the locators, the potential locators, of this property, that if the lands were located within the reservation boundary, they would not be locatable and could not be opened for exploitations. So what did they do? They jogged up ahead of the surveyors and stopped them before they got to the area and a few dollars under the table and a few bottles of whiskey and probably an Indian blanket or two that they had gotten from the Indians, the surveyors jogged the line a mile north and as a result of that, the lands were left within the federal lands and out of the reservation. So that's how the Pariette/Castle Peak Gilsonite Mine got started.

In 1896, St. Louis mining in the Gusher area blew up. It blew so hard that even the windows in the town of Vernal rattled. In 1902 another thing happened in Congress, from political pressure from the whites, that affected the Indians on the reservation. The Raven Mining Company, which wasn't very far from the St. Louis group, petitioned Congress for permits to record claims on Indian lands. They got a special dispensation to record one hundred claims on Indian lands. Sixty-two were finally approved by Congress. This was within the reservation boundary. They just got a special deal that says, "You can have sixty-two mining claims within the reservation."

In 1905 the entire reservation was opened up for location. In the Vintiquin Canyon area over in Indian Canyon there were laterite veins. Laterite is similar to Gilsonite but it's a little different, it has a little different properties. Everybody rushed to the land. Here's the strange thing backing up the same point I'm hammering home on the basis of economics. In 1905 when they opened up these lands for recording, two years prior, Congress passed a law that the outnumbered sections which had been located prior to 1903 could be valid claims, or prior to 1891, could be valid claims. But in 1891 it wasn't legal to locate the claims, so how could they have a valid claim in 1891 if it wasn't legal to have them in 1891? So that shows you that politicians never make sense.

Okay, the first development of Gilsonite took place in the Dragon area south of Rainbow. The Gilson Asphaltum Company decided that the reserves in the Black Dragon Mine were sufficient to justify the building of a railroad. A railroad today costs about 1 million to 1.25 million dollars per mile. The railroad was built from Mack, Colorado, from the tracks of the Denver Rio Grande over Baxter Pass to the town of Dragon, down Dragon Canyon. The total cost of that railroad up over those high passes and Baxter Pass was $230,000.

With the advent of the railroad, the Gilsonite mining at Black Dragon commenced. It would have been a strange sight if we'd go out there today to see the miners, because there's very little water in that area, so they were forbidden to take baths or use water for anything except for culinary use. To protect themselves from the Gilsonite, they'd coat themselves with mutton tallow. Then they would put powder on top of mutton tallow. Then the next day just apply a little more mutton tallow. After two to three to four weeks, they'd have a big crust of mutton tallow over them all and looked like people from outer space. I don't imagine they smelled too good, either.

The Gilsonite mining operations were really underway in the early 1900s in the Black

Dragon. Later on, because of economics, the Rainbow area became more favorable and they moved the railroad tracks further on to end at Watson, where they finally ended. From Watson to the White River stage, they built toll roads. From the White River up to Bonanza and Bonanza to Vernal they built toll roads. These roads were built all by the Gilson Asphaltum Company, and, of course, they charged a fee for the use of the roads for the stage and for the freighters to carry the merchandise to Vernal and to Ft. Duchesne and to Myton from the railroad terminal at Watson. The narrow gauge railroad at Watson, of course, was very unique in the fact that it was the steepest railroad on the North American continent. It had grades of 7.5 percent. The railroad locomotives were specially built by Baldwin Locomotive Company They were built so that all of the weight in the engine, 82 percent of the weight of the engine, was under the twelve wheels of the engine to give it maximum traction on steep grades. It had hairpin curves such as they'd never even seen in the South American mining operations. As a result, when the railroad was abandoned in 1939, two of the engines went to Oregon and were then later shipped to South America. The other engines went to Guatemala where they're still in use on mining ventures. So the development of Gilsonite has progressed slowly, but thoroughly, over a period of many years, and is still with us and is still a major factor in the economic make-up of the entire Uinta Basin.

Tar sand development was slow. Oil never came into real use until the early 1900s when the automobile became more popular and the gasoline engine came into effect. The advent of the discovery of oil in Rangely from the shallow wells in Rangely... Charlie Neal, who many of you know, was an early prospector for many of the ores including copper, gold, silver, oil and gas, oil shale, and even owned a refinery in Rangely.

I wanted to tell you one thing about the mining. You know, these miners with mutton tallow all over them were bringing down the tremendous wage at that time of $3 a day, less 75 cents a day for their meals. They had to bring their own tent. These miners actually slept right out in the country out there. If you go out there today to the old area of Dragon, some of them were a little more astute than others and they had built themselves little rock shelters in which they would crawl at night, put rocks over the top of them, maybe a few boards to hold the rocks up. Some of those are still out there. You look at them, and you say, "Well, what do you suppose was stored in there?" They didn't store anything except themselves at night. f they didn't have a tent, they'd build a rock shelter and slept there. These were hardy people—they had to be to survive those times in those days. I thought that would be kind of an interesting side-note.

Unidentified man: How come we didn't have further development in this vein around the Gusher area?

BC: That's a good question. In the Gusher area, the development started out pretty good. The vein was fairly wide, the walls were good. As they went down the vein, they began getting to soft, tarry-type stuff which, in the morning they'd come in and it was just like rolling up a carpet. They could just roll the soft, tarry Gilsonite up and throw it out. That wasn't the problem. As they went down a little further, they started getting quite a bit of water. The next thing they got was bad wall-rot. It started caving, heaving on them. So the economics at that time were not good, because they could go over to the Rainbow/Dragon area, and you've got no water at all, no wall-rot. So the water problems and the bad wall conditions as they went down in the vein were the reasons, economic considerations.

That's what we're trying to do today. American Gilsonite tried to work with them.

American Gilsonite Company drilled two or three holes trying to see if they could establish a portion of that, and in future years, as the price of Gilsonite maybe moves up a little more, you probably will see some more development over there. But it's not the most favorable area to develop, and it was much farther from the railroad.

I'd like to tell you a little about the oil and gas development. I have some photographs of Charlie Neal with his rig out here on Asphalt Ridge, the other side of Asphalt Ridge, out on the Twist. I also have another picture which he gave me which shows them. You know, today, the big trucks of R.W. Bob Jones and Utah Power and everybody go out there, and they have big wood trucks and move those rigs around. In those days, the moving of the rig with cable-tool rig, a small-type operation, pounding it into the ground, putting water under it, pounding it and bailing it out and pounding, the moving of the rig was done by a cowboy sitting on a horse with a line tied to the rig, wrapped around his horn. I have a picture of them actually moving a rig with the horses. Of course, the rig itself was put on a wagon, on skids, and the wagon and hauled that way.

But at any rate, many changes have taken place in the oil and gas from the early days of cable-tool to the advent of the rotary drilling, in which you put a bit on the end of it and you drill a hole and fill the hole full of mud and keep the cuttings from coming up to the surface. In the old days, you know, you always saw pictures in movies of them going out there, everyone standing there saying, "Hooray, my brand new $50 hat is covered with oil!" You know, those days are gone forever because of the dangers of the blowouts killing people. So they control the wells by weighting where you don't see that happening anymore.

Unidentified woman: There's a picture.

BC: Oh yeah, pass it around, you can take a look at it there. The development of oil took place starting in 1911-1915, then the first development in the Uinta Basin with oil was at Ashley Valley. Ashley Valley was 1925. [In] 1925, right outside of town here between here and Jensen, the Utah Oil Company drilled a well 1773 feet, formation which tested at a rate of fifteen million cubic feet of gas a day, which even today is a very large, good size gas well. Although our wells in Texas are likely to get 200-300 million cubic feet a day. But the average well out there in the Uinta Basin today is probably a half a million to a million cubic feet a day. Right out here, just outside of town in the Ashley Valley, the first well tested fifteen million cubic feet a day.

A line was laid after the early initial wells to Vernal, and Vernal had gas from that field until sometime after the start of WW II, I believe. At that time they depleted the gas and the line was abandoned. Then in 1948, after the development of the first deep test... By deep test [I mean] a well was drilled to 4200 feet into the Weber sand and discovered the Weber Pool at Ashley Valley. In 1945 this area was affected by the Rangely Pool, 1944 and early '43 because people who lived here, Rusty Thacker, could tell you that for sure, in 1944 and '45 when all the people who had moved into the Rangely area from the drilling of the Rangely field, there was no place to stay in Vernal, everything was crowded; it was a real boom at that time.

When I came to Vernal was right after the boom started to subside a little bit. But at one time there were 100 rigs drilling in the Rangely area, the Rangely field. That field is one of the fifteen largest oil fields in the United States. It has reserves that have already been drilled in excess of 750 million barrels of oil, three-quarters of a billion barrels of oil. So that field and the Ashley Valley field affected the economic growth in the history of this area because it brought new people in and brought new industry in and movement took place, advancing little by little.

Then we had development of the true drilling, the first real drilling outside of the Ashley Valley field in the Uinta Basin itself. Carter Wellcome, which was the exploration order for Standard Oil Company of New Jersey, Exxon, the present Exxon Company, came in here in about 1944 and started an exploration program along Asphalt Ridge. So they drilled a series of seven wells along the ridge, found good shale, but nothing commercial. Then they drilled out in the Uinta Basin and the Roosevelt area and discovered the Roosevelt field and drilled in the Duchesne area and discovered production in the Duchesne field.

At that time that production for fractured shale was in this section right here. Fractures within the shale wells came in with 2500-3000 barrels a day, but dropped off very rapidly because the formation hadn't gotten much frosty and permeability. Frosty is like the number of rooms in a house. Permeability would be like the doors in those rooms. If you don't have those two factors, you can get some oil initially, a lot of oil, flush oil initially from the fràctures, but you deplete it rapidly. So the movement here died off for a while, then came back in with the discovery and advent of Bluebell/Altamont by drilling deeper and in better zones than the general sands.

Today we are affected in our economic development and in the growth of this area by all of these minerals which are still being mined, still being produced, and which are still affecting us today. So the minerals of yesterday, one hundred years ago, 120 years ago, are still affecting us from the same economic broad basis that they were 120 years ago today. Thank you.

C.J. Neal
Letter

1912 - 59 y

Vernal, Utah. March 10, 1913.

Mr. H. M. Coke,

Honolulu, T.H.

Dear Sir:-

Relative to your request for a brief history of The Uintah Development Company's well number three, which is located at the North east corner of the North east quarter of Section 17, Township 5 South, Range 21 East of the Salt Lake Meridian - I will submit the following report:

February 11, 1912, we commenced hauling machinery to the ground, and "spudded in" on February 22nd.; the drilling work being in charge of Mr. W. L. Showalter, with driller Matt Wynn on opposite tower.

March 12, Between 410 and 420 feet, we encountered a stratum of sand carrying a good trace of oil showing Peacock colors. Up to this point we had been drilling an open hole, but having some caving troubles, we put in, on March 13th, a string of 435 feet of 10 inch casing. Work prgressed favorably until March 20th when, at a point between 720 and 725 feet, we ran into a crevice, apparently, that was filled with a loose wash carrying a black sulphur water that made ten barrels in the well per hour. Immediatly below came a 30 foot stratum of hard, flinty conglomerate, and at this point the hole became crooked. We endeavored to straighten the hole by the usual methods but failed in all our efforts. We drilled ahead until April 11th and had reached a depth of 855 feet, when Mr. Showalter was called back to Pennsylvania.

On April 18th work was resumed on the hole by the California drillers, who, by May 2nd, using a "Double" Underreamer, succeeded in straightening the hole, and putting it in perfect condition. May 6th, in a grey sand at 830 feet, we had an excellent showing of gas. May 7th, between 870 and 883 we drilled through 13 feet of fine grey sand that carried a fair showing of oil. May 11th, between 965 and 970, in a blue shale overlying 5 feet of brown sand, we encountered a flow of gas so strong that it ignited from a torch held four or five feet from the mouth of the well. A damaging fire would have resulted but for the presence of mind of the driller, who, at some risk to himself, succeeded in running in the bailer and extinguishing the flames. The 5 feet of brown sand showed good oil colors - lots of gas and some water. The water rose 75 feet in the hole so it became necessary to underream and carry down the $8\frac{1}{4}$ inch casing. This work proceeded until May 17th, when the cable broke and left the tools in the hole. Tools were fished out on afternoon of May 18th. May 21st. had trouble with boulders at 640 feet while putting in $8\frac{1}{4}$ casing, which was so badly dented we could not run tools through. Pulled string of 909 feet and found 6 joints damaged. May 27th, landed $8\frac{1}{4}$ casing at 973'6". Boulders made it difficult to carry the casing down further without damage. May 28th, encountered 2 feet of water sand between 1028 and 1030. Owing to the hole caving it became necessary to put in a string of 6 5/8 casing. On June 4th the 6 5/8 was landed at 1081'8" and the water shut off.

On June 10th we struck a sand at 1160 that carried an excellent showing of light oil accompanied by lots of gas. At 1165 we had a water sand which it became necessary to case off. June 17th, shut off water at 1200 feet, stuck it again at 1206, where we had lots of gas. From 1208 to 1218 we had a yellow sandy shale that also carried lots of gas. June 19th Underreamer got caught below stratum of hard sand, and could not be gotten out until 21st. June 23rd shut water off at 1220, and on 24th again struck water in a hard grey sand between 1255 and 1276. June 25th were down 1345 feet with hole caving so badly that we could not go further without carrying down casing. June 30th lost an underreamer cutter in hole, which we recovered by fishing on July 2nd.

On July 6th had casing down 1314 feet. Water stood 800feet in the hole. On July 8th had casing on bottom at 1350 with 900 feet of water in the hole which we could not shut off. Concluded somthing must be wrong with casing at bottom, we pulled it out and had it back in hole July 17th. There was nothing wrong, apparently, with casing, and on July 19th had hole bailed dry. July 20th depth of hole was 1365 feet with 500 feet of water, which was shut off July 21st when casing was set on bottom. July 22nd had a great deal of gas all day, and it became so bad during night that we had to suspend work until daylight. July 25th commenced running daylight shift only. On 28th had water in hole again at 1405 feet.

August 5th between 1465 and 1480 passed through a tar sand, which seemed to carry considerable gas. On August 9th we were down 1525 feet with a very nice showing of oil in 4 feet of sand. August 12th we were at 1540 feet and 160 feet below bottom of the casing. Hole caving so badly that we could no longer drill with saf$\overset{e}{}$ty,so began underreaming and carrying down 6 5/8 casing. August 14th,lost 2 Reamer Cutters in hole which we fished for unsuccessfully. On the 19th,in pulling on casing, we broke the casing line. On the 20th again broke casing line. August 29th-Resumed double shift. From 12th of month to 31st we underreamed and carried down 6 5/8 casing from 1396'10" to 1442'2". Made during month new hole from 1445 to 1540 feet. Hole in bad condition and very crooked near bottom.

September 2nd,while underreaming,lost off shoe joint and had to pull the entire string of 1444 feet 6 5/8 casing in order to put on another shoe. On September 6th,with 1424 feet casing in,we filled in bottom of well with hard rock,hoping to straighten the hole while drilling up the lost shoe joint,on the 14th we lost an underreamer cutter,for which we fished unsuccessfully until the 16th ,when we resumed drilling. On the 18th,while drilling on the lost cutter,a bit that was not sufficiently tempered became so battered that it would not enter the shoe joint,and we did not suceed in working it back into the pipe until the 20th. We were drilling on iron from the 16th until the end of the month,at which time the log showed a depth of 1505 feet,with 1468'3" of 6 5/8 casing in the hole.

Work had not been progressing at all favorably,so a change in the drilling crew was made,and we run single shift until October 4th when H. E. Walsh began work and was placed in charge of the well,which was in very bad condition. The shoe had been knocked of the bottom joint of casing which was so badly out of shape that the tools could not be run through it at all. Pulled the casing and found four joints damaged.

On the 7th, while putting back casing, had trouble in getting the pipe back past a crook in the hole at 1035 feet and from this time Driller Walsh has carried on the work alone. He commenced straightening the hole at 1035, and on the 20th was drilling an entirely new hole at 1490, with casing working free and carried dow to 1480. October 27th, with hole down 1530 feet and 1512 ft of casing in, the shoe joint was so badly damaged by a boulder that the tools could not be run through. Casing had to be pulled and damaged joint replaced. On October 31st we had 1480 ft 6 5/8 casing back in the hole.

Work progressed without incident and as well as conditions would permit until November 14th, when the casing was damaged at the third joint from the bottom so that bailer would not go through. This trouble was overcome by swedging, and drilling resumed on 15th. At this point, in red shale at 1538, we encountered a fine showing of oil, with more gas than usual, Oil showing improving, and on 19th, in a sand from 1556 to 1574, we had much the best showing to date. Tools were covered by cavings on 21st at 1590 but were gotten out with but little work. We had trouble with our 6 5/8 casing at this time so put in a sting of 5 3/16, and on 23rd had in 1590 feet to bottom with w water shut off. November 26th had hole down to 1630 feet, with a good showing of oil in the bailings all the way from 1590. At 1616 we had 5 feet of water sand. Water rose to 700 feet in hole so we started to carry down our casing. On the 29th we lost an underreamer lug in the hole which we could not recover.

On December 7th, in a brownish sand encountered betwaen 1649 and 1666 we had an excellent showing of oil and gas.

On the morning of December 12th when we went to work we had 50 feet of sand in the casing that had evidently been forced in by the gas pressure. The hole was 1676 feet deep and we had in 1673 feet of casing. The running in of the sand hampered our work of reaming. December 18th had the hole down to 1685, with casing on bottom, and water shut off. Oil showing good. December 19th at 1688 stuck one foot of water sand. Water rose 1200 feet in hole. December 23rd had casing again on bottom and water shut off. December 24th in a sand from 1693 to 1697 we struck a strong flow of gas that ignited readily. At the end of the month the well was 1726 feet deep, with 1716 feet of 5 3/16 casing in. The caving of the hole had made our progress slow, and we had used considerable effort to carry the casing down with our drilling.

Cold weather in January, 1913, hindered our work somewhat. On the 4th the mercury was down to 20° below, with a heavy wind blowing that prevented our raising steam sufficient to run our tools. Water pipes were frozen for the first time. January 7th, well was down 1750 feet, with 1732 feet of casing in. Cavings bothered considerably and in reaming five feet it was necessary to bail out five times. On the 9th we landed the casing on bottom and bailed the hole dry. January 12th, with casing on bottom at 1763, the water broke in accompanied by considerable gas pressure. The gas ignited easily. January 14th we bailed out 1500 feet of water and had a dry hole. Gas very strong and it burned freely. On the 16th we had a good showing of oil. While trying to underream the mud was forced up into the casing so that we were compelled to fill the hole with water to hold it back. January 23rd, at 1775, in mixed shales, we had fine showing of oil and lots of gas. Bailed hole dry on the 25th, and on the 26th the water broke in again.

February 1st we landed our 5 3/16 casing on bottom and bailed well dry. Up to the 5th we had drilled 14 feet of hole and had underreamed to bottom. Water broke in and stood 1200 feet in hole. Carried our casing down to bottom and bailed hole dry. On the morning of the 6th we drilled ahead 10 feet, but at noon the water again broke in. Bailed hole dry during night of February 7th. Morning of 8th drilled 4 feet of hole and carried down our casing same distance. Water again broke in, but we drove our casing 28 inches and shut water off. February 9th, water came in hole again and on the morning of the 10th we had 1700 feet of it in the well. February 13th our depth was 1816 with 1814'7" casing in. We couldn't shut off water so we started to take out our 5 3/16 with the intention of carrying down our 6 5/8 casing, of which there was 1540' 7" in hole. February 18th we had underreamed so that we could get in a 22 ft, joint of pipe which went in easily. February 20th put in another joint of casing making 1584'3" in all. Worked with the casing until the 27th when the pipe became damaged at a point about 100 feet from bottom, so that the entire string had to be taken out. By March 8th we had in1582'5" of 6 5/8, but could get it no further on account of trouble with iron that had come in from the old well and followed us down to 1585. The tools and bailer went past without trouble, so we again put in the 5 3/16 casing. At this date, March 10th, we have in 1699'6" of the 5 3/16 and have had no bother in putting it down other than the usual caving troubles.

Log of Well #2 Uintah Development Company.

Feet.	Kind of Material.	Remarks.
	Clay	
4	Red Sand Rock	
25	Sand Rock	
45	Red Shale	
80	Pink Shale	
120	Sand	Little Water
140	White Shale	
165	Pink "	
195	White Shale	
200	Red Shale	210' Enough water for boiler and drilling.
225	Conglomerate	
250	Red Shale	
255	Sand	
275	Red Shale	
285	White Sandy Conglomerate	
305	Red Shale	
310	2hite Sand Stone	
320	Red Shale	
340	Sand	
385	Red Shale	
415	Sand	
425	Red Shale	
435	Blue Shale	
500	Sand	
505	Red Shale	
530	Sand	
560	White and Sandy (Conglomerate?)	
600	Grey Shale	
625	Red Shale	
650	Lime and Sand (Conglomerate?)	
665q	White Sand	
680	Red Rock	
700	Pink Shale	
725	Lime	

Feet.	Kind of Material.	Remarks.
740	Sand	
755	Red Shale	
765	Sand	
775	Very Dark Red Shale	
855	Red Sand	
880	Sand	
900	Conglomerate	
930	Pure White Sand	
935	Pink Shale	
980	Red Shale	4 bailers water in 14 hours.
1000	White Soapy Shale	
1050	Grey Lime	
1115	Red Shale	
1125	Conglomerate	
1135	Red Shale	
1150	Conglomerate	
1175	Lime and Conglomerate	
11[illegible]	Red and Conglomerate	
1190	Brown Lime	
1205	Conglomerate	Set the 8" Casing.
1210	Conglomerate and Red	
1225	Conglomerate	
1240	Yellow Clay	
1275	Red Clay and Conglomerate	

VE June 1, 1901

Locate Oil

CAPITALISTS EXCITED

Better Indications than in California Oil Fields.

WILL BORE THREE WELLS!

Vernal on the Verge of a Big Oil Excitement--McWhorter Oil Refining Company are locating 32,000 acres within a few miles of Vernal--Will Absorb the Bock Sand Asphalt property

The main topic of interest to the mining and speculative fraternity of this section at present is oil and all the indications point to a veritable boom in that line during the summer. From Deep Creek southeast for over a hundred miles along the hydro carbon belt which extends over into Colorado are found indications of oil and the favorable locations along the entire distance are being gobbled up.

Many thousands of acres are being located on both sides of the state line and if one-twentieth part of the ground staked off proves of any value, eastern Utah and western Colorado are on the ragged edge of a boom that will astonish the natives.

As has often been the case in mining excitements of the past, the interest taken is not confined to local parties, several big syndicates being largely interested, all of whom profess the greatest confidence in the outcome.

The outside companies interested are so far as heard from, Colorado and California concerns, the latter apparently being the most active and confident.

About two weeks ago, Milton McWhorter, president of the McWhorter Oil Refining Company of the Kern River district, California, and one of the company's agents named Rober, landed in Vernal, having been attracted along the hydro carbon belt by the representatives of the Bakersfield, California, crowd who are interested in western Colorado in the vicinity of Rangley and the Dewey oil springs in which County Attorney Pope is interested, the latter gentleman being instrumental in first attracting the California people to that section, having ...

... fornia, ten thousand men are employed, which will give a fair idea of what the discovery of oil will mean to this section, which is pronounced far more extensive by the same men who are interested in the California fields.

While the outside companies have been hustling, local parties have not been idle and some choice ground is held by them and if the predictions of those who lay claim to knowledge concerning oil proves true, there will be some local men with a fat bank account in the future.

mental in first attracting the California people to that section, having sent samples of the oil to different points in the golden state

Mr. McWhorter had, however, had some previous correspondence with John Beck concerning the sand asphalt deposits on the west and south of the valley in which Beck and others are associated. To this correspondence was due the fact that Mr. McWhorter came by way of Vernal enroute for the oil fields of western Colorado.

On arriving in town McWhorter at once looked up County Surveyor John Glenn who has for years had charge of the engineering work of the Beck Hyde interests and who is familiar with every detail of the company's interests in this section

Accompanied by Mr Glenn, the California man inspected the company's ground with the result that Mr McWhorter was struck with the possibilities of this section as an oil field and at once concluded to begin operations in this vicinity instead of going on into Colorado. Mr Glenn was at once employed to go into the field with a force of men and locate lands for the McWhorter Company, extending from Powder Springs across Green River, which had also been visited, along the slopes of the sand asphalt reef, to the Uintah gap west of the valley. Mr Glenn has been in the field several days and has located two hundred claims of 160 acres each, 32,000 acres, all of which it is claimed furnishes indications of oil

It is the expressed intention of the company to bore three wells, in the near future to test these lands. These wells will be driven under the instructions of Mr McWhorter who is one of the noted experts of the California fields and was the pioneer of the Kern River district, which now represents a cash valuation of over a hundred million dollars

Mr McWhorter gives it as his opinion that this section presents a far greater field than Kern river and that the indications are much more pronounced

The scheme of the McWhorter Company is to consolidate all of the principal interests along the belt, which will include the absorption of the Beck Hyde Cunningham holdings. The scheme also contemplates the construction of transportation facilities in the shape of a branch railroad from some convenient point, all of which if carried out, means a big industrial awakening for eastern Utah, for with her hydro carbon deposits, coal measures and other mineral resources, together with a demonstration that oil exists in paying quantities and quality, there would come a boom that would be lasting and permanent.

In the Kern River district, Cali-

e Vernal Express

acres of land in Uintah Basin. Uintah County includes 2,748,00 0acres.

Vernal, Uintah County, Utah, Thursday, August 21, 1947

Price Seven Cents

W AMBASSADOR . . . James ...e, shown taking the oath of ...e, is the new U. S. ambassador ... the Argentina, succeeding ...erge Messersmith.

Carter and Stanolind Lease Vast Acreage As Oil Is Struck At Vernal

...ycees Will ...onsor Traffic ...fety Campaign

...embers of the Vernal Jun... Chamber of Commerce turn...out enmasse Sunday to re...e the centennial and rodeo ...s which have been suspend...above Main Street. The Jay... also installed these ban... several months ago. Stev... Stringham was chairman in ...ge of the project.

...he Vernal club, according ...tewart Ashton, president, in ...aboration with the Utah ...e Highway Department, and local representative, Patrol... Sammy Hatch, is laying ...s for an annual safety cam...n, the first of which will ...in locally within the near ...re.

...eatured during this drive ... be newspaper stories and ...orials together with a radio ...ma pointing out the neces... for careful driving and in...asing vigilance to reduce ...tah County's frightfully high ...ident rate.

...r. and Mrs. J. W. Bastian re...ned Sunday after making a ...r of the Northwest and Yel...stone. They visited their ...s Weldon and June at Spok...e and Derrill at Jackson, ...oming. They were accom...ied on the trip by Mr. and ...s. Darrell E. Bishop of Sandy.

...rs. Edgar Calder returned ...ne Sunday after spending the ...t seven weeks in Salt Lake ...y receiving medical atten...n at the LDS Hospital.

APPLY FOR DOE PERMITS AT CITY OFFICE BETWEEN AUGUST 25 AND SEPTEMBER 3

Curb and Gutter To be Installed On Main Street

Action to install curb and gutter on both sides of Main Street from First West Street to Sixth West, and from Second East to Fifth East streets was taken by the Vernal City Council at their regular meeting Wednesday evening when they held a public hearing on the proposition at the city office. Although a few protests were registered, the majority of the property owners involved appeared to favor the measure. The city will now advertise for bids covering the construction of the improvement.

Henry Schaefermeyer, city fire chief, appeared before the council and stated that several places of business within the downtown fire zone are not observing fire prevention regulations and are consequently creating a fire hazard.

Council members authorized Chief Schaefermeyer to inspect all property embraced in the fire zone, which is included within First South to First North Streets and from First East to Third West Streets, and inform the council which property owners are delinquent in the observance of fire safety regulations. The council will then inform these delinquents that they must either comply with the city ordinances or be declared public nuisance.

Byron P. Fisher requested that the city limits be extended to include the area from Second South Street one-half block deep on the West side of Fifth West Street over to what will be known as Seventh South Street, and including the same area on the east side of Fifth West and Fifth West to Seventh South Streets. The council tabled the matter for further consideration.

Local VFW Post To Hold Charter Night Meeting

Charter night will be held by the local Ashley Valley Veterans of Foreign Wars Post No. 9278 Friday September 5, Clyde S. Johnson, post commander, announced at the organization's regular meeting held Friday evening.

Glen Thompson, state V.F.W. commander and other officials will probably attend the affair. Jerry T. Hatch, club adjutant, is in charge of arrangments.

The post membership at last week's meeting voted to begin a membership drive within the near future. Also projected is a youth movement to be sponsored by the Ashley Valley Post to combat the wave of juvenile delinquency which is apparently sweeping Uintah County.

Commander Johnson announced that he had received information from Bliss Bignall, that at the district meet held near Heber recently the following district officers were elected: Bliss O. Bignall, Heber commander; Dr. John R. Boren, Roosevelt, Sr. vice commander; Clyde S. Johnson, Vernal, Jr. vice-commander; Barney Murdock, Heber, district quartermaster; George Stewart, Roosevelt, judge advocate; Dr. G. Horner, Heber, district surgeon; Donald E. Wardle, Vernal, district chaplain; Neil Fisher, Heber, district adjutant; Francis J. Lennox, Vernal, district assistant chief of staff; Chalmer Workman, Roosevelt, district inspector; Ferrell Reynolds, Heber, district historian; George Stewart, Roosevelt, patriotic instructor; Earl Roberts, Heber, district service officer; Clyde S. Johnson, Vernal, district legislative officer; Loren Mitchell, Duchesne, district chief of staff; Max Nunnally, Heber, sgt. at guard; Jerry T. Hatch and Shirley Rodeback, Vernal, color guards; deputy inspectors of each post are - Herman Bingham, Ashley Valley Post No. 9278, Vernal; Chalmer Workman, Uintah Reservation Post No. 9277, Roosevelt; Loren Mitchell, Kings Post 7267, Duchesne; Alvin Berg, Wasatch Post No. 8865, Heber.

The next district meeting will be held at Roosevelt in September.

Drawing Will be Held Sept. 6. Record Number Of Applications Expected

Local sportsmen were reminded this week by Fred Reynolds, game warden, that applications for the special deer hunts to be held in Daggett and Uintah Counties this fall should be submitted to the Vernal City Office between 9 a.m., August 25, and 5 p.m., September 3, if presented in person, and postmarked not later than midnight, September 3, if mailed.

If more applications for permits are received than the numbers of permits allotted to a given area, and it appears certain that many more applications will be received than there are permits available, a public drawing will be held at 9 a.m., September 6 at the City Office, and permits issued to applicants whose names are drawn from a receptacle containing names of all applicants for permits for such areas. Unsuccessful applicants will have their money refunded.

Description of this region's special hunting areas are as follows:

Daggett-Greendale (300 does during regular season. Oct. 18 to 28). That portion of Daggett County lying west of the following described line; beginning at the junction of the Vernal-Manila Highway and the Daggett-Uintah County line; thence north along said road to the Cart Creek Bridge; thence down Cart Creek to the Green River; thence up the Green River to the Wyoming State Line.

(Continued on page 4)

Good Showing Of Oil Found In Carter Well

Company Will Continue Drilling to Contract Depth of 6,000 feet

Bidding an annual lease rental of $1.25 per acre plus a $4.00 per acre bonus, Carter Oil Company and Stanolind Oil Company were high bidders this week on 15,124 acres of Indian tribal and allotted lands which were offered for lease by the U. S. Indian Service. The award was made to the two companies, who submitted a joint bid, by Forrest R. Stone, superintendent of the Uintah-Ouray Indian Agency, Tuesday at 2 p.m. The California Company, which also bid on the tract, was low bidder.

Coincidentally with the leasing of these lands, the Carter Oil Co. announced that their Knudson No. 1 wildcat well, located 6 1-2 miles west of Vernal in the Twists section of Highway 40, had encountered a good showing of oil during a test made Monday night.

According to Phillip Williams, senior geologist of the Carter Co., a four-foot oil sand was encountered in Uintah type sediments between 3737 and 3741 feet. A drill stem test of the sand was taken, the packer was set at 3714 ft. and the testing tool opened for two hours. In an hour and a half a small amount of gas came to the surface and there was recovered on the test 240 feet of fluid; of which 40 ft. was oil and 200 ft. [illegible] dicated a good showing of oil.

Although Carter Oil Company officials declined to comment, other local reliable oil authorities stated that the test proved the well could be classified as a potential producer.

Company officials stated that drilling would continue to the 6,000 ft. level in accordance with their drilling contract with the Kerr McGee Drilling Company.

The Indian Lands which the Carter and Stanolind Oil Companies jointly leased with their high bid Tuesday, is within the Uintah-Ouray Indian Reservation in Townships 1 and 2 S, Ranges 1 and 2 E, Uintah Special Meridian. These lands adjoin on the southwest the Carter Oil Company unit block on which the company is now drill-

(Continued on Page 8)

School Officials Enjoy Uintah Fishing on Visit

E. Allen Bateman, state superintendent of public instruction; H. B. Gunderson, director of vocational education; and Fred Fowler, director of guidance services for the state of Utah, were Vernal visitors Tuesday and Wednesday.

Conferring with local school officials on various matters, they found time, however, to do a bit of fishing at the Buck Pasture Reservoir and absorb some of the Uintah Mountain scenery. However, it wasn't all scenery, because, according to H. Grant Vest, district superintendent, someone reported as having seen them wrapping up what appeared to be some choice Uintah trout.

...SCHOOL DISTRICT WILL HOLD ...NNUAL INSTITUTE NEXT WEEK

Many Problems Will be Discussed by Visiting And Local Educators

An institute for school teachers and other school employees will be conducted at the Uintah high school Monday to Thursday.

The institute program, according to H. Grant Vest, district school superintendent, will be divided into five major topics, each of which will be discussed on separate days.

Monday, the sessions will deal with recording and reporting student progress. Dr. Fred Fowler, state director of guidance services, will act as educational consultant for this program. Avard Rigby, director of ...

...orest Service ...ngineers Inspect ...ry Fork Road

...Verne L. Despain and Webb ...ennedy, engineers from the ...gional Forest Service office ...Ogden, this week inspected ...e road which the Forest Ser...ce is constructing up Dry Fork ...anyon.

Officially, ...ignated the ...Red Cloud-D... Fork Road," ...e 18-mile stretch of new high...ay will be constructed from ...e forest boundary in Dry Fork ...anyon to Trout Creek Park ...ear the Trout Creek Ranger ...tation where it will connect ...ith the Iron Springs road.

New Dress Shop Opens On Vernal Avenue

Opening this week at 24 South Vernal Avenue is a dry-goods and ladies ready-to-wear shop formerly operated by C. E. Searle and Company.

Mrs. Zina B. Howard will manage the new establishment. Mrs. Howard states that the store will open with a special clearance sale Friday and Saturday.

C. E. Searle and Co. will han...

1947 INDIAN DAYS FETE IS ROOSEVELT'S BIG SHOW

Governor Maw Will Attend Event to be Held August 28 and 28

Sparked by the personal appearance of Governor Herbert B. Maw, the Indian Days Celebration to be held at Roosevelt ...

Expedition Makes Sound Movies of Uinta Mountains

Carter Oil

(Continued from page 1)

ing its Knudson No. 1 well.

Lease terms call for the drilling of a 7,000 ft. well within one year and continued diligent test drilling thereafter.

Observers point out that Carter and Stanolind, are subsidiaries of two of the largest oil companies in the country. Carter Oil is a subsidiary of the Standard Oil of New Jersey, generally acknowledged to be the world's largest oil company and Stanolind is a subsidiary of Standard Oil of Indiana.

The unsuccessful bidder, the California Company is also one of the giants of the oil industry. The Stanolind and California Compsnies are also the two largest Rangely field operators.

The showing of oil in the Carter well is the second oil strike in Uintah Basin within the past two weeks.

Last week Edward S. Rich, president of the Pleasant Valley Oil Corporation, announced that the well which his company is drilling 10 miles west of Myton, encountered a small oil sand at 2,629 ft. Quite a bit of the oil, which was of a high petroleum base, was bailed out. However, as the company is hopeful of striking a richer oil sand at a lower depth, drilling was continued and no steps were taken to determine the possibilities of producing from that particular sand.

The Vernal Oil and Gas Company Hullinger No. 1 well located in Dry Fork Canyon five miles northwest of Vernal has now reached a depth of 435 ft. in the redbeds. Drilling has been hampered because of the difficulty in securing pipe with which to case the hole and shut off an artesian water flow. Company officials state that they expect to secure the needed pipe within the near future following which drilling operatiins will be considerably accelerated.

Legion Officers Leave for National Meet

Leaving for the National American Legion convention at New York City within the next few days are several Vernal officials of the organization.

Mrs. Rae Ashton, national vice-chairman of the national child welfare committee of the Legion Auxiliary organization, will leave Salt Lake City by plane Sunday or Monday. Mrs. Ashton will attend a special meeting for her committee Tuesday prior to the opening of the convention.

Leaving Salt Lake City Saturday evening by train with the other officers of the Utah Department of the Legion will be Stewart Ashton, vice-commander of District 5, which includes the Uintah Basin posts, and Mrs. W. R. Hazelbush, president of the District 5 auxiliary organization.

Shale Deposits

The United States has vast shale deposits, containing an oil reserve estimated at 100 billion barrels.

"Bootlegging Ring" Rounded Up This Week

Spearheaded by three inspectors from the Utah State Liquor Control Commission a roundup of liquor "bootleggers" Tuesday netted eight violators, seven of whom pleaded guilty in Justice Court to a misdemeanor charge of illegally selling whiskey. Those pleading guilty were fined $75 each.

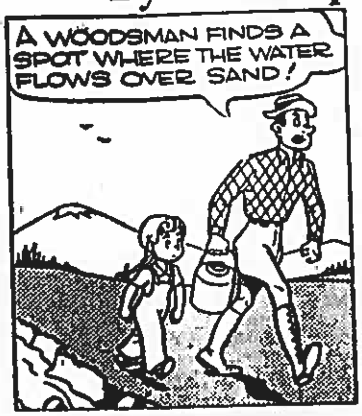
The State Liquor Commission inspectors who uncovered the violations were: Perry Holt, Clifford Seeley, Arno Steinicker. Clifford Seeley, Arno Steinicke. Arresting officers were Sheriff Herbert M. Snyder, Deputy Sheriff Vet Carroll and Probation Officer Clarence Palmer.

Because of the youth of several of the offenders and the fact that this is their first misdemeanbr offense, the Express is not publishing the names of those arrested. However, these names are a matter of public record in Justice of the Peace William Henderson's court, and are open to public inspection.

Love Birds

Love birds are really parrots. They are members of a small short-tailed parrot family.

By Bob Karp



July 18, 1946

Carter Oil Co. Ready for Drilling Operations 10 Miles from Vernal

Standard Subsidiary Marks Site Near Vernal-Lapoint Road

Stakes were driven Wednesday by geologists of the Carter Oil Company to mark the site for drilling operations 10 miles northwest of Vernal near the Vernal-Lapoint highway.

Materials were scheduled to be set down on the site today and operations will commence immediately, an official of the company reported The Carter Oil company is a subsidiary of the Standard Oil company of New Jersey.

Commencement of operations by the Carter company marks the first time that a major oil company has drilled in Ashley valley, and the announcement was hailed here as an important step in assuring the development of the valley's oil resources.

Only other deep well drilled in the Vernal area was taken to the 6800 foot level by the Utah-Mayo company on the Asher Merkley place one mile west of Vernal, then temporarily abandoned in January Officials of the Utah-Mayo company declared that results of the test well were "satisfactory"

Exact location of the new Carter Oil company site was defined by the company engineer as NW, NW 33, 4 S, 20E, Salt Lake Meridian It lies approximately one mile north of the Vernal-Lapoint road at a point about 10 miles northwest of Vernal.

Announcement that the site had been named and that drilling operations would proceed climaxed a year of making applications and litigations by the company with the General Land office of the Department of Interior for permission to drill.

Contract to drill the initial well for the Carter company has been given to the Kerr-McGee company, prominent drillers in the Rangely field Kerr-McGee operates a camp for employes at Wiley's Resort near Artesia

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691	#7	$a Neal, C.J. (Charles, Charlie)
691	#7	$a Uintah Development Company--History--Vernal,Utah--Mar 10, 1913
691	#7	$a Covington, Bud (Robert E.) 1921-
691	#4	$a Uintah County Historical Society Meeting--April 9th, 1984 $x Bud Covington--Minerals--Uinta Basin--History
691	#7	$a Oil shale industry -- Uintah Basin (Utah)--History
650	#0	$a Hydrocarbons--Uinta Basin
691	#7	$a Tar Sands--Uinta Basin (Utah)--History
691	#7	$a Coal mines and mining--Uinta Basin
691	#7	$a Copper mines and mining--Uinta Basin
691	#7	$a Gilsonite Mines and Mining--Uintah Basin (Utah)--History
691	#4	$a First Fifty Years In the Rangely Oil Patch $x Hazel Johns
691	#4	$a Raven Park Oil Co.
691	#4	$a California Oil Co.
691	#4	$a Union Oil Co.
691	#7	$a Emerald Oil Company
691	#4	$a Requenta Co.
691	#4	$a Colorado Pacific Co.
691	#4	$a Texas Oil Co.
691	#4	$a Thermal Recovery in Utah $x Journal of Petrolium Technology
691	#4	$a Utah Oil Makes Good Wagon Grease
691	#4	$a Bituminous Sands and Viscous Crude Oils $x Covington, Robert E.
691	#4	$a Historical Development fo Oil and Gas Production From Utah's Bluebell and Uinta Basin
691	#4	$a First Intermountain Symposium on Fossil Hydrocarbons
691	#4	$a The Gusher Oil Field--Uintah County, Utah $x Covington, Robert E.
691	#4	$a Minerals Consolidated Co.
691	#4	$a Uintah Investment Company
691	#4	$a Asphalt Ridge Area
691	#4	$a Rim Rock
691	#4	$a Duchesne River Formation

691 #4 $a Bituminous Sandstone
691 #4 $a Whiterocks Area Bituminous Sandstones
691 #4 $a Peor Springs Bituminous Sandstones
691 #4 $a Chapita Wells Bituminous Sandstones
691 #4 $a Dragon Asphalt Wash
691 #4 $a Deep Creek Nose Asphaltic Sandstones and Conglomerates
691 #4 $a South Whiterocks Tertiary Bituminous Sandstones
691 #4 $a John Starr Flat Area
691 #4 $a North Tabiona Bituminous Sandstones
691 #4 $a Lake Fork-Yellowstone River Bituminous Sandstones
691 #4 $a South Myton Bench Area Bituminous Sandstones
691 #4 $a Indian Canyon-Lake Canyon Bituminous Limestone Deposit
691 #4 $a Raven Ridge Asphaltic Sandstone
691 #4 $a Maps and Graphs--Oil Industry
691 #4 $a Utah Petroleum Association Data Book--Dec. 1981
691 #4 $a Utah Energy News
691 #4 $a Western Energy Update--Aug. 3, 1984
999 ## $a 39956
979 ## $a 277517

July 2, 1915 VE

CLAIMS FINDLEY BLUFFED MEN OUT

John T. Pope Sues James Findley For Damages Resulting From Same

John T. Pope filed suit this week in the district court against James Findley for $522 which he alleges Findley prevented him from securing as a result of a contract which he had He alleges that Findley by the use of "intimidation" prevented his men from completing the contract

Shipping Problems

Mr. Pope had twenty-one barrels of oil on Whiskey creek, Colorado, valued at about $20 a barrel He was to deliver this to Dragon, Utah He hired two men to do it and alleges that Findley unlawfully by the use of intimidation prevented them from fulfilling his contract thus losing him the $522 and the suit is an effort to secure the $522 The alleged act occured on June 7, 1915

April 3, 1925

DEVELOPMENT OF UINTAH BASIN OIL INTEREST SET FAR AHEAD BY DECISION WHICH WILL GIVE FULL TEST ON AT LEAST FOUR STRUCTURES.

Probably the most momentous event in the history of the Uintah Basin oil development was when the Humphreys-Boyd interests with $9,000,000 in cash and liquid assets decided to drill for oil in Uintah county.

A. E. Humphreys has already taken a great interest in other development in the county and last year secured oil leases to about 7000 acres of land in the Ashley valley, besides other large holdings.

It is when such men as Mr. Humphreys and his associates decide on a venture that real work of pioneering along any line is done. Mr. Humphreys has a vision of future development of any country he invades and has been very fortunate in his estimates of those sections.

The following taken from The Rocky Mountain News published in Denver, on March 26, will give a most comprehensive idea of Mr. Humphrey's plans for Utah invasion with the wealth at his command.

Following the sale of its Wortham properties in Texas March 25 for $7,000,000, the Humphreys-Boyd Oil company will prepare immediately for a drilling campaign in northeastern Utah, 100 miles west of Craig, Colo., and at the same time will intensify its production drilling in Nacona and Richland, and its wildcat drilling in Navarro, Henderson, Regan, Webb and McMillan counties, Texas; Pawnee county Oklahoma, and the Fredonia field of Wilson county, Kan.

Humphreys-Boyd will quit the Wortham field with over $9,000,000 in cash, accounts receivable and liquid assets; an established production of between 1,000 and 1,200 barrels daily, which will be increased rapidly, and numerous geological structures regarded by the most eminent geologists of the United States as highly promising for oil.

The entrance of Humphreys-Boyd on a drilling campaign in Uintah county, Utah, less than thirty miles from the Colorado boundary, is probably the second most important project it has, ranking in possibilities next to the Bazette wildcat field in Navarro county, Texas.

The possibilities for oil in Henderson county, Texas, are superior to this, and possibly even superior to Bazette, but the Humphreys-Boyd acreage there is not extensive.

20,000 Shares in Utah.

In the Utah field the Humphreys

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tions.

interests have 20,000 acres, after selling 10,000 acres of the original 30,000 that they hold there. This acreage is located on four important geological structures.

The Humphreys-Boyd company yesterday completed the sale of its Wortham properties to the Pure Oil company for $7,000,000. This is to be paid with 178,000 shares of Pure Oil stock, which figures up to over $4 700,000 and $2,500,000 in cash.

The entire consideration, it is understood, will be placed in the treasury of the Humphreys-Boyd company, which already has $1,325,000

(Continued on page 4.)
(Column Two)

Humphreys-Boyd Will Enter Utah

(Continued from Page 1)

cash acquired by the sale of treasury stock together with close to $600,000 other cash and accounts receivable. This will give Humphreys-Boyd liquid assets approximately as follows

Cash and receivable on hand	$ 600,000
Cash from stock sale	1,326,000
Cash from Pure Oil	2,600,000
Total cash	$4,326,000
178,000 shares Pure at $26.50	4,717,000
Grand total	$9,043,000

In taking over the Wortham field, the Pure Oil will also take over the obligation of Humphreys-Boyd to deliver about 2,800,000 barrels of crude oil to the Sinclair company at $1 25 per barrel and will also acquire the big tank farm there and take over the obligations against it The entire transaction contains a great many technicalities, but the Humphreys-Boyd retains its Richland and Nacona production and its Henderson county, Webb county, Pawnee and other wildcat properties. It will be free at once to sell its retained production at $2 per barrel, amounting to about 1,100 barrels daily.

Just what financial policy will be pursued by Humphreys-Boyd, following the closing of the deal in which its Wortham acreage is sold to Pure Oil, and its treasury comes into possession of more than $9,000,000 in liquid assets, is a matter of speculation. Three courses are suggested by Denver interests close to the Humphreys interests. One is the possibility of a dividend in which all or part of the 178,000 shares of Pure Oil may be distributed; another is the possibility of a large cash dividend; and the third is the establishing of a regular quarterly dividend on a reasonable percentage basis that could be regularly maintained

C. F. Clay of Clay & Benton, attorneys for the Humphreys-Boyd Oil company in Denver, left last evening for Dallas, where he will meet J A. Elkins, chief counsel for the company, to draft the legal papers in connection with the sale of the Worthm acreage. The terms are all completed, and no modifications are expected in the legal part of the work.

Colonel Humphreys leaves Mexia today for St. Louis, where he will meet Mrs. Humphreys and Dr. Bayless, going thence to Ripley, Ohio, Mrs. Boyd's old home, Colonel Humphreys will then go to Columbus, Ohio, the home office of the Pure Oil company, of which he is a director, and the final papers will be signed. The Dawes family, including Vice President Charles G. Dawes, is the largest interest in Pure Oil and the Humphreys family ranks next, it is understood.

In determining the sale price of the Wortham acreage, Colonel Humphreys states that full value of the oil remaining underground as of April 1, has been received, determined by the engineers after careful survey.

He calculates that the properties the company is retaining are worth more than those which are being sold; which therefore may be taken to mean that the total valuation of the entire Humphreys-Boyd properties before the sale was placed at probably upward of $15,000,000, or better than $81 per share on the 185,000 shares outstanding.

The sale of the Wortham property should not change this share valuation, unless to enhance it by putting the liquid assets in the treasury, in place of the property assets, which have been sold. All stored oil is sold to Pure Oil, in the deal.

Geologist Goes to Utah.

In the Utah acreage of Humphreys-Boyd where drilling is to start very soon, there are four important structures Midwest Refining is drilling one of these now, and has had oil and gas showings at 800 and 1500 feet The Dakota sand is expected in a short time at 2000 feet

The Humphreys interests have been assembling the properties there during the last two years, and two of their geologists have already checked and mapped the areas A third geologist left for Utah Wednesday last to make the final checking, preparatory to starting work

VE Mar 27, 1911

DEVELOPMENT WORK ON ASPHALT RIDGE

Oil Encountered in Two of the Tunnels in Liquid Form

John T. Pope went to Salt Lake the latter part of last week, and took along several gallons of the oil from one of the sand asphalt claims south west of Vernal.

Last October a force of men were put to work on these claims, and work has been pushed continuously all winter, not only assessment work, but the required amount of development work to patent It is the intention to patent all of this groupe of sand asphalt claims which extend for several miles along the ridge. Tunnels were run on the strata of sand, and in two of the tunnels, that were put in over 60 feet, they encountered oil. The oil is thick, almost stringy, very dark in color and seeps in through the crevices in the walls of the tunnel

This is something entirely unexpected especially at this depth, and goes to strengthen the theory that has been advanced many times, that underneath this formation is a vast reservoir of asphalt oil which seeps up through the strata of sand, congealing as it nears the surface and forming what is known as sand asphalt.

And in this state let it be said that it is an ideal paving material, as is evidenced by the Vernal sidewalks, which do not crack in the winter as do the city walks made from the pure gilsonite.