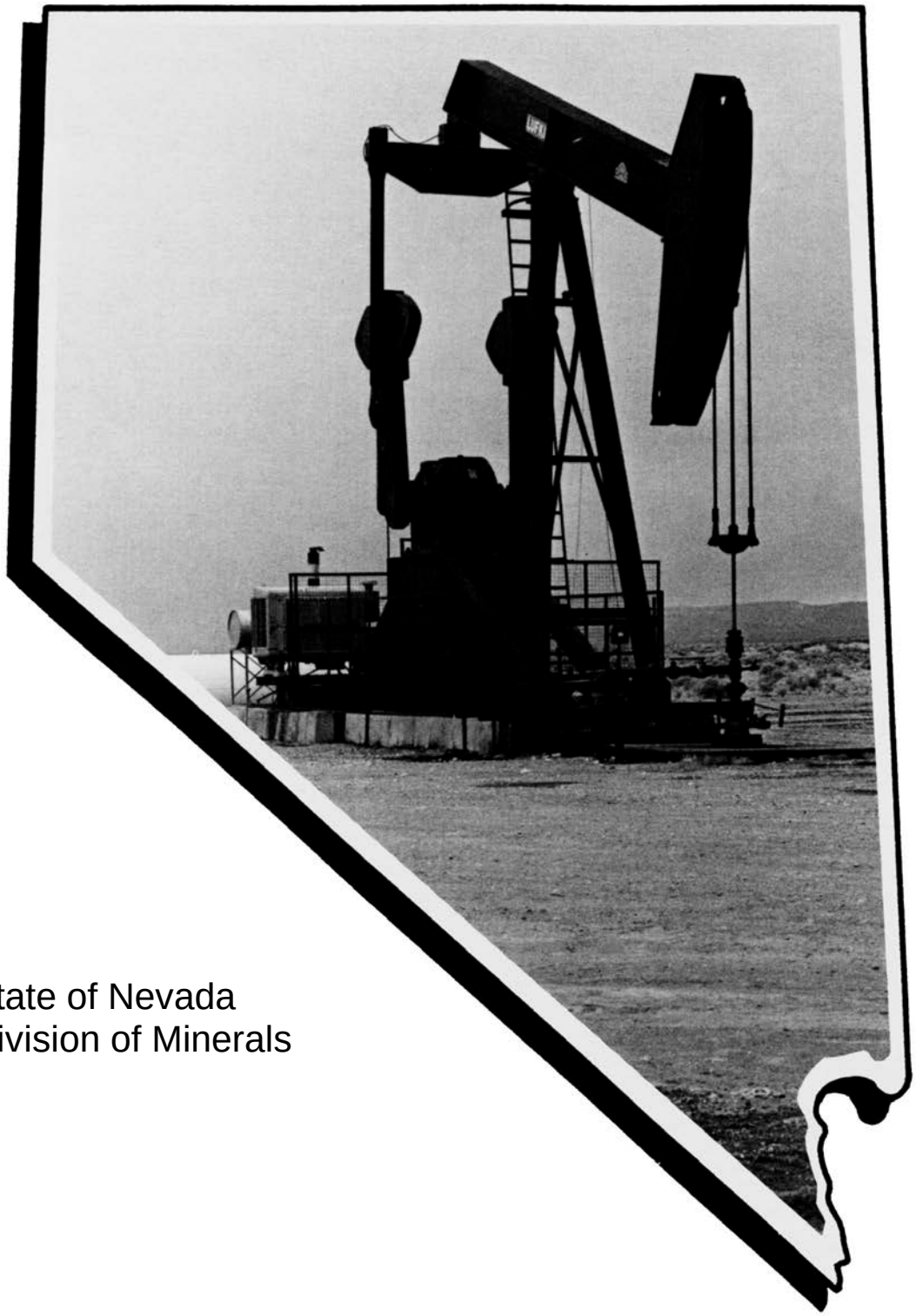
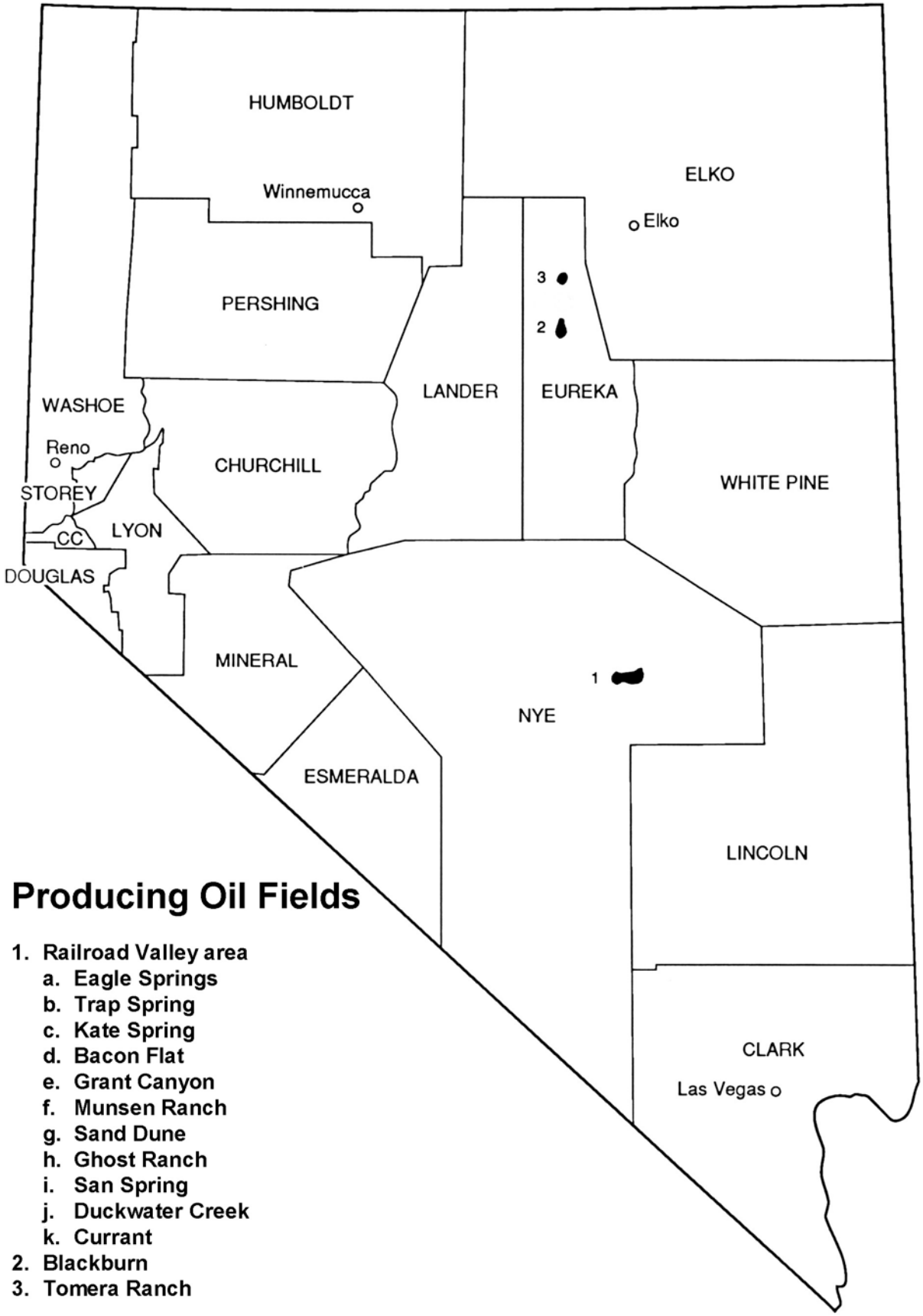
Oil and Gas in Nevada Activity Book 2016



State of Nevada
Division of Minerals



Producing Oil Fields

1. Railroad Valley area
   a. Eagle Springs
   b. Trap Spring
   c. Kate Spring
   d. Bacon Flat
   e. Grant Canyon
   f. Munsen Ranch
   g. Sand Dune
   h. Ghost Ranch
   i. San Spring
   j. Duckwater Creek
   k. Currant
2. Blackburn
3. Tomera Ranch

Oil and Gas in Nevada Activity Book 2016

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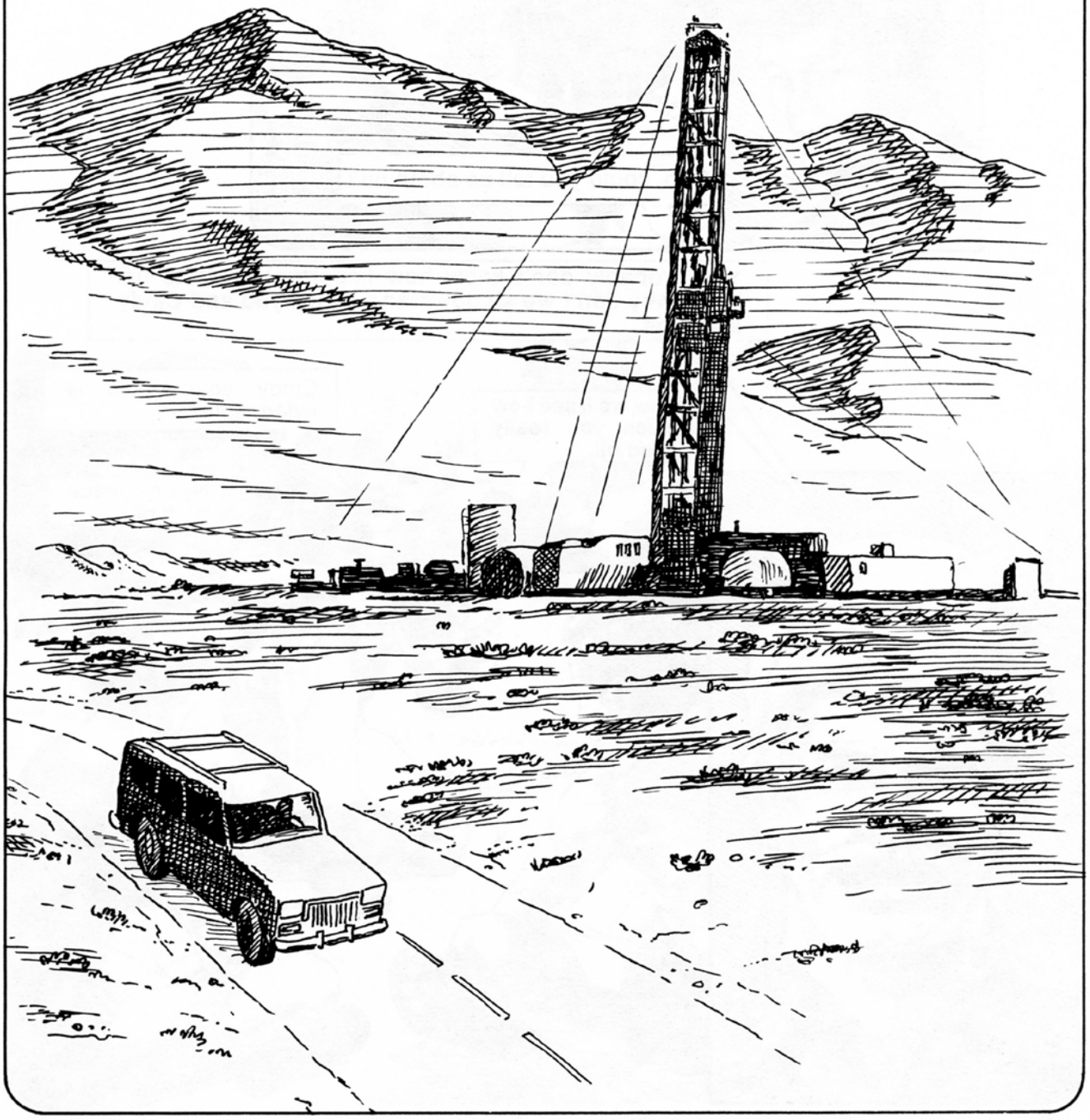
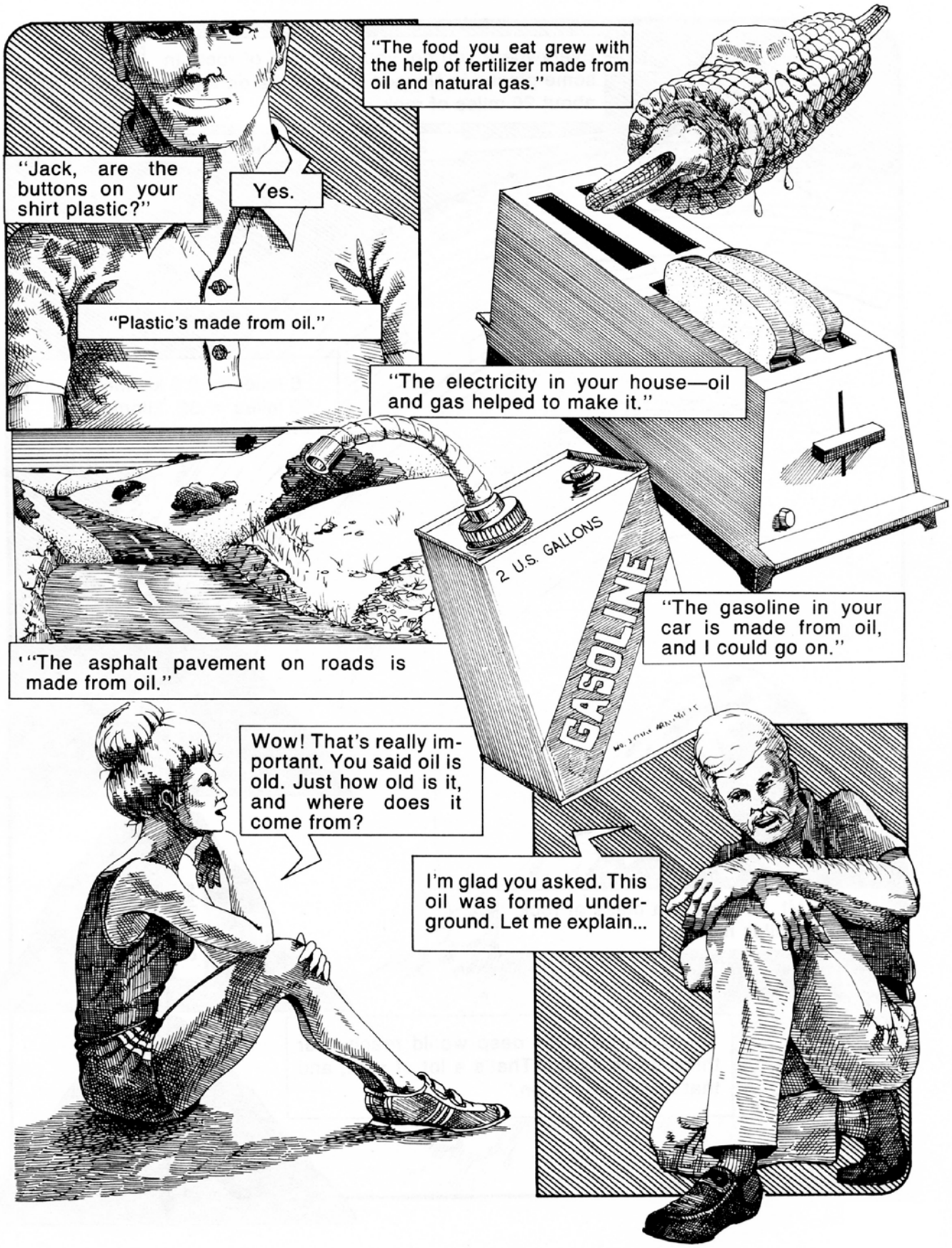
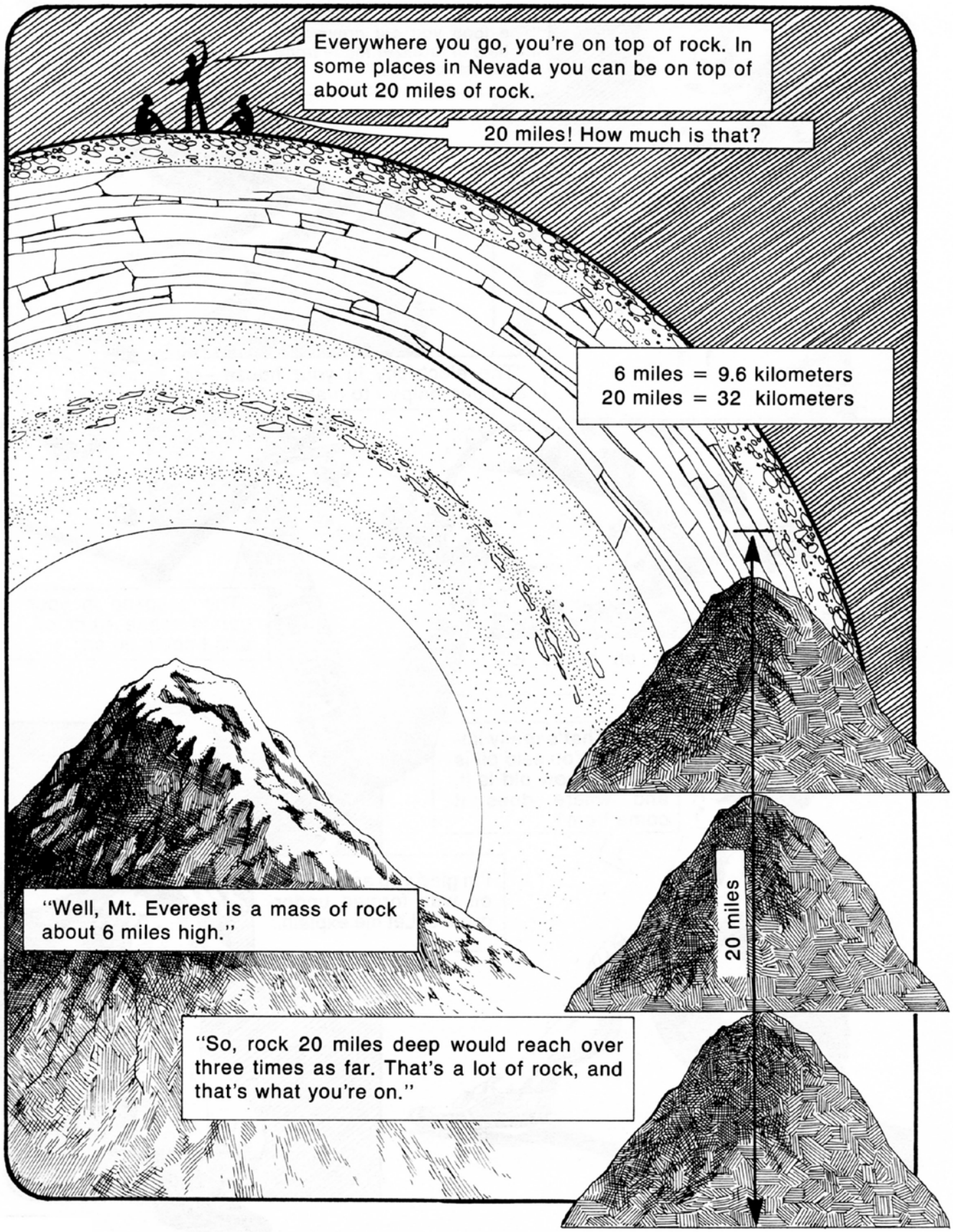
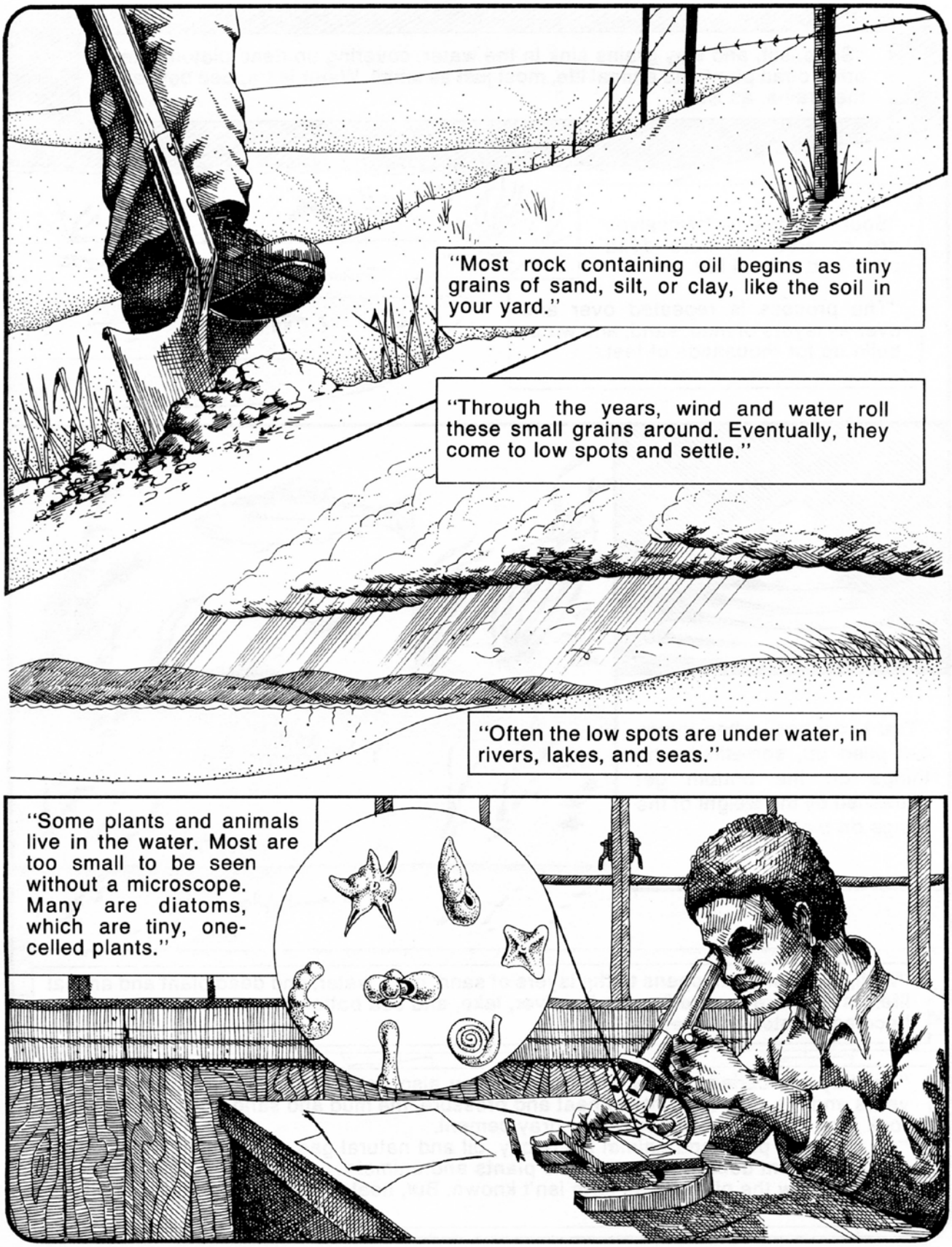
One day Bob, a geologist, and his young friends, Cindy and Jack, were driving through Railroad Valley, Nevada. As they passed a drilling rig off the road Bob asked them if they knew what it was and what it was doing? Neither Cindy nor Jack was sure and asked Bob to tell them. Bob stopped the car, they got out and Bob started to explain.

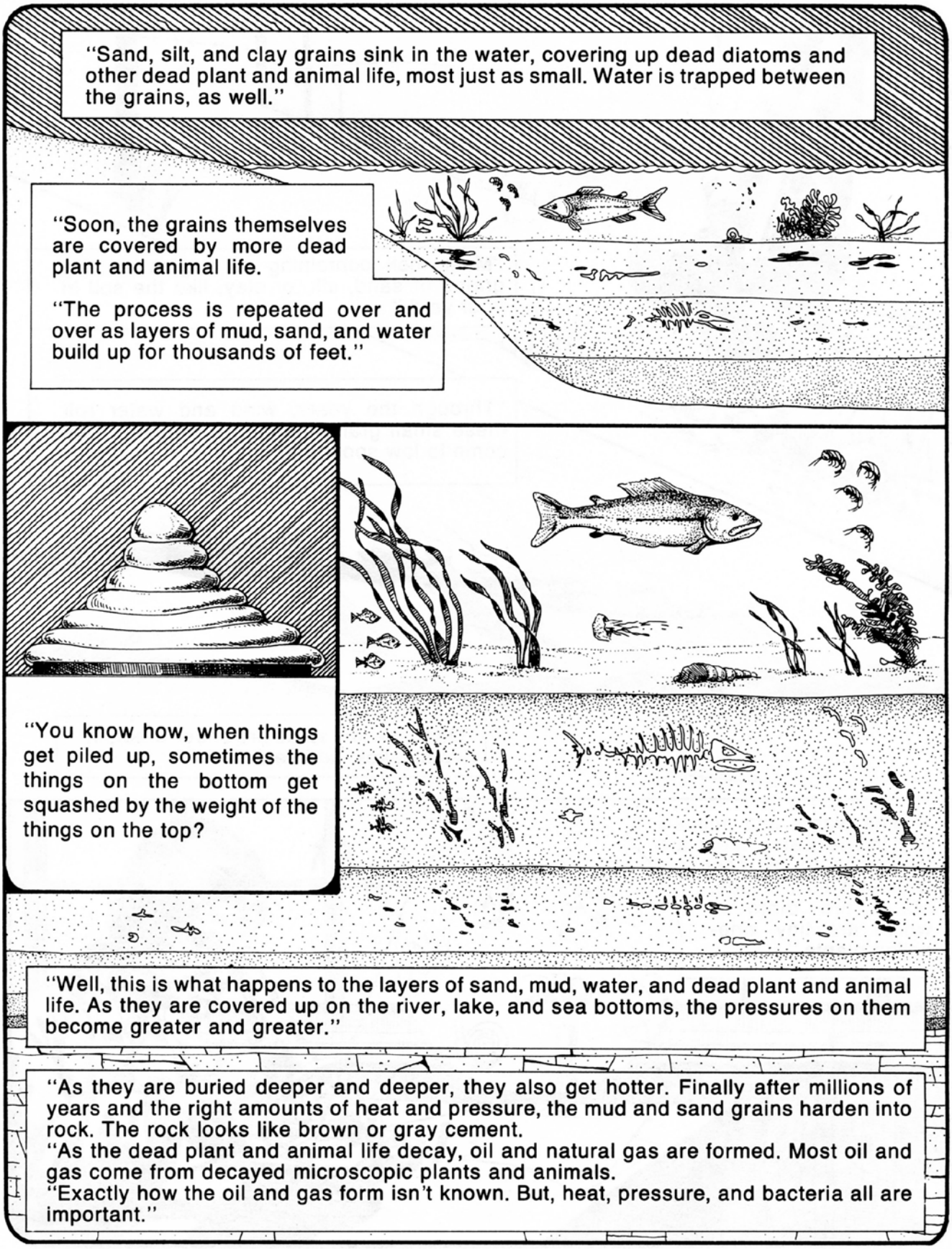


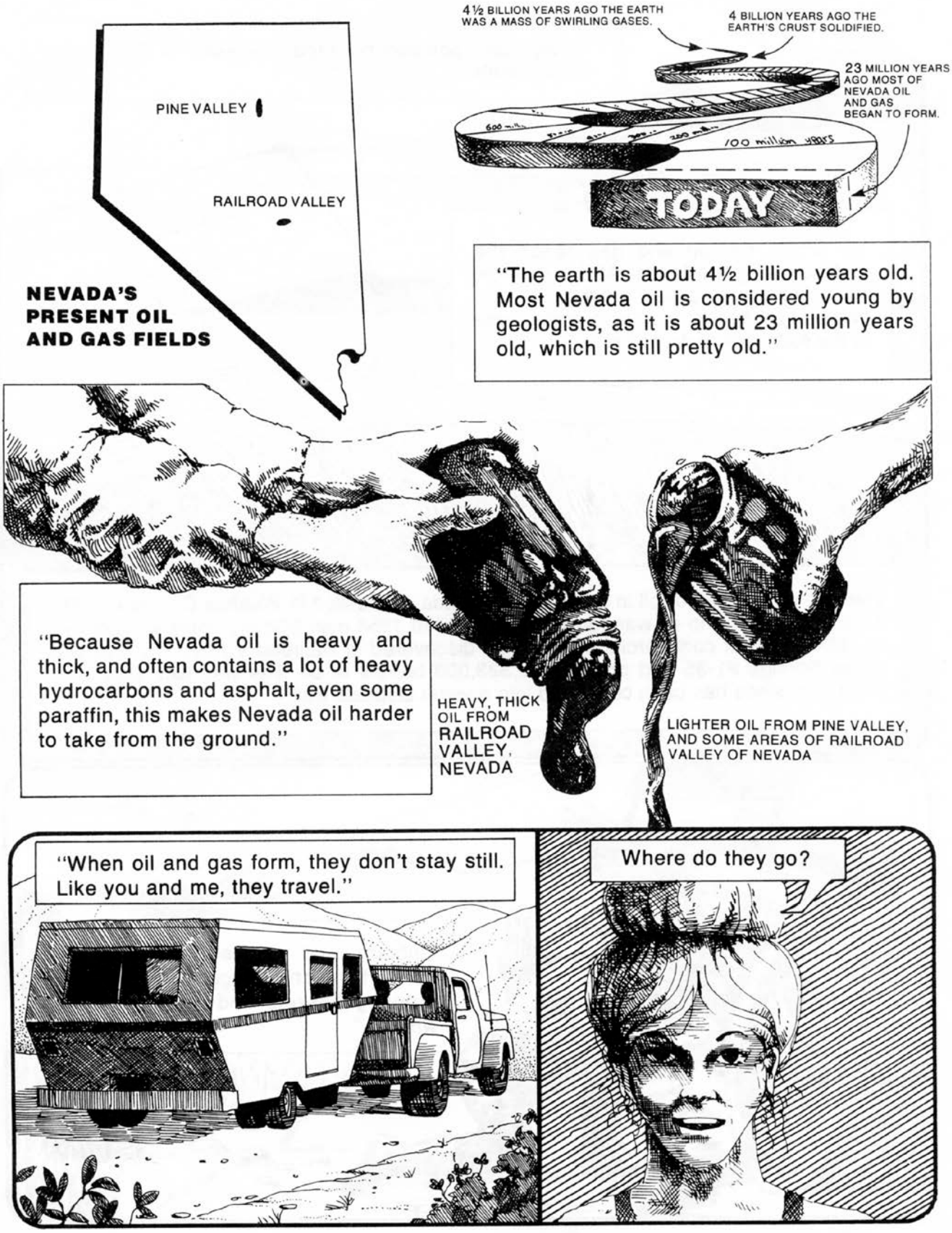
That is a drilling rig, drilling for oil.
Bob, could you tell us about oil?
You probably don't know how important oil is to us. Here, why don't we sit down and I'll tell you and Cindy about oil.
Now we'll see how much you really need oil.
Cindy, your blouse is nylon, right?
Yes.
Nylon's made from oil.

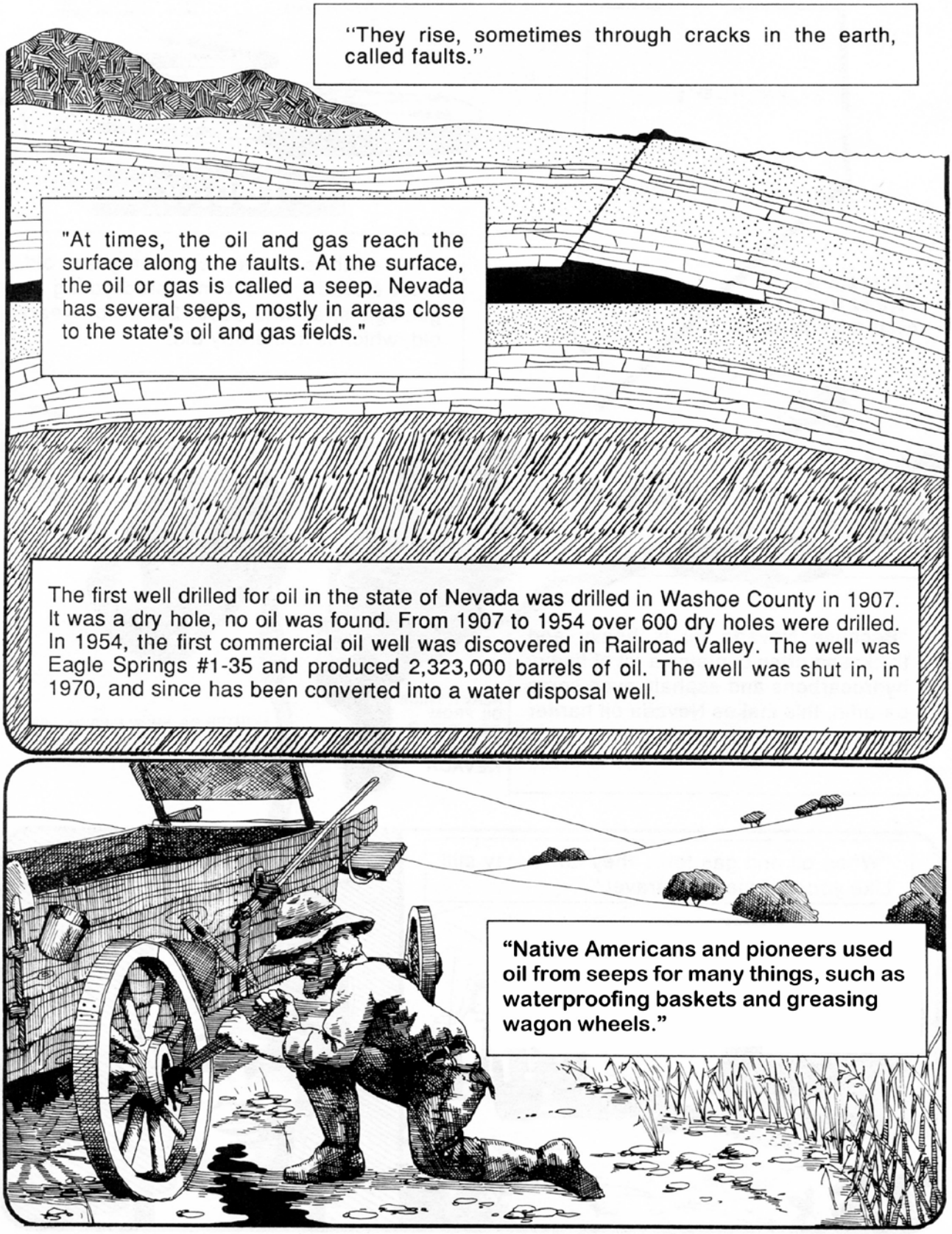

"The food you eat grew with the help of fertilizer made from oil and natural gas."
"Jack, are the buttons on your shirt plastic?"
Yes.
"Plastic's made from oil."
"The electricity in your house—oil and gas helped to make it."
2 U.S. GALLONS
GASOLINE
"The gasoline in your car is made from oil, and I could go on."
'"The asphalt pavement on roads is made from oil."
Wow! That's really important. You said oil is old. Just how old is it, and where does it come from?
I'm glad you asked. This oil was formed underground. Let me explain...

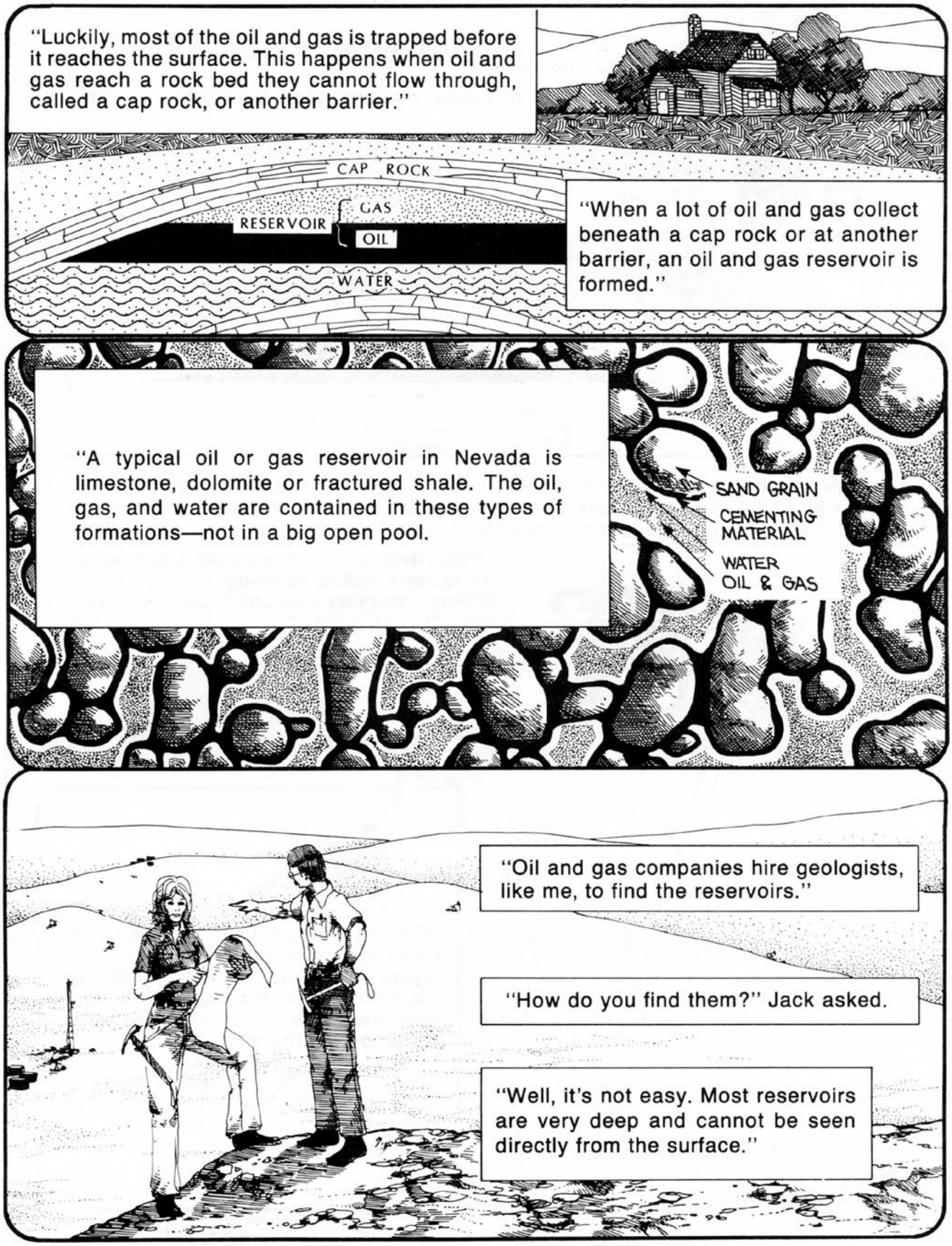

Everywhere you go, you're on top of rock. In some places in Nevada you can be on top of about 20 miles of rock.
20 miles! How much is that?
6 miles = 9.6 kilometers
20 miles = 32 kilometers
"Well, Mt. Everest is a mass of rock about 6 miles high."
20 miles
"So, rock 20 miles deep would reach over three times as far. That's a lot of rock, and that's what you're on."

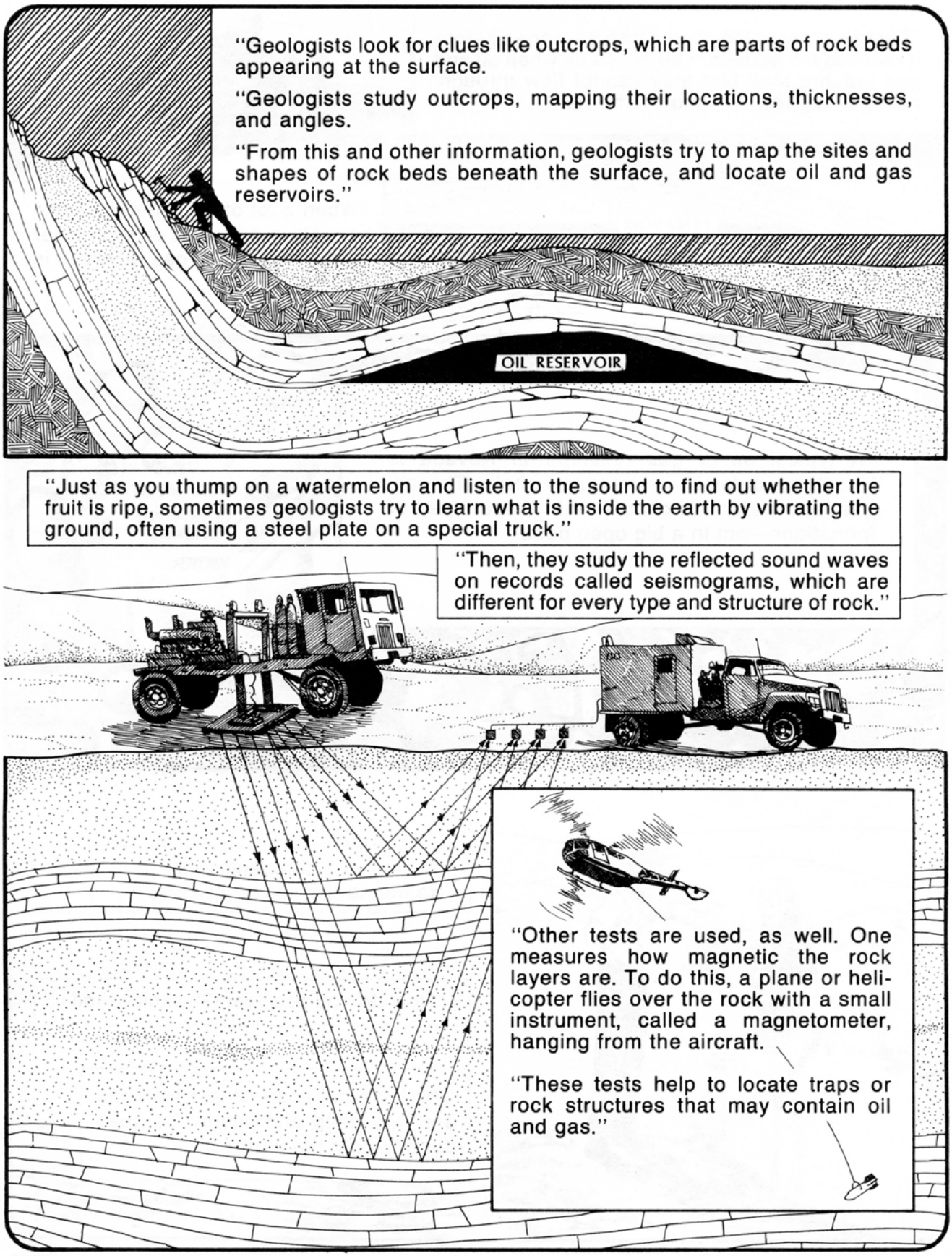

"Most rock containing oil begins as tiny grains of sand, silt, or clay, like the soil in your yard."
"Through the years, wind and water roll these small grains around. Eventually, they come to low spots and settle."
"Often the low spots are under water, in rivers, lakes, and seas."
"Some plants and animals live in the water. Most are too small to be seen without a microscope. Many are diatoms, which are tiny, one-celled plants."

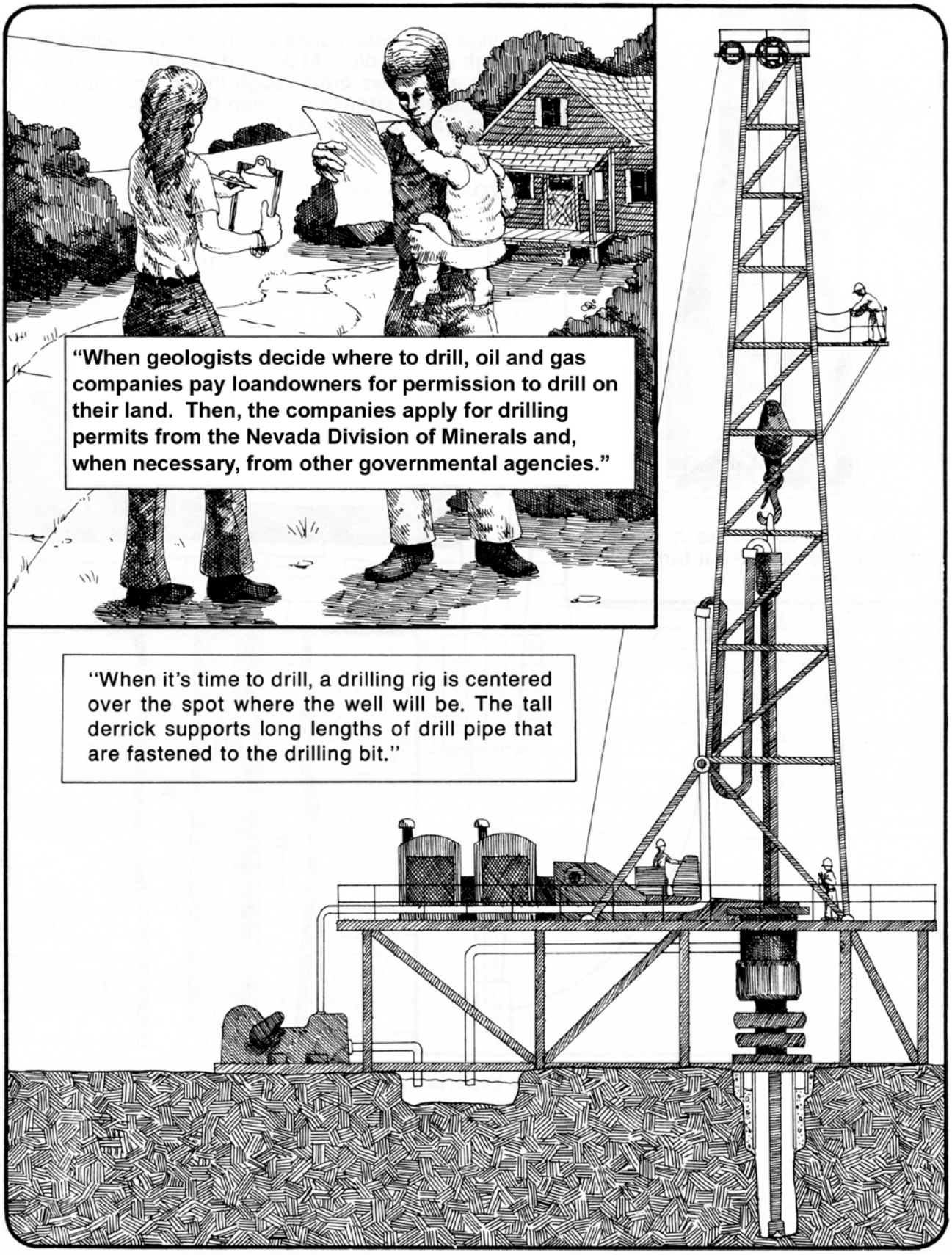

"Sand, silt, and clay grains sink in the water, covering up dead diatoms and other dead plant and animal life, most just as small. Water is trapped between the grains, as well."
"Soon, the grains themselves are covered by more dead plant and animal life.
"The process is repeated over and over as layers of mud, sand, and water build up for thousands of feet."
"You know how, when things get piled up, sometimes the things on the bottom get squashed by the weight of the things on the top?
"Well, this is what happens to the layers of sand, mud, water, and dead plant and animal life. As they are covered up on the river, lake, and sea bottoms, the pressures on them become greater and greater."
"As they are buried deeper and deeper, they also get hotter. Finally after millions of years and the right amounts of heat and pressure, the mud and sand grains harden into rock. The rock looks like brown or gray cement.
"As the dead plant and animal life decay, oil and natural gas are formed. Most oil and gas come from decayed microscopic plants and animals.
"Exactly how the oil and gas form isn't known. But, heat, pressure, and bacteria all are important."

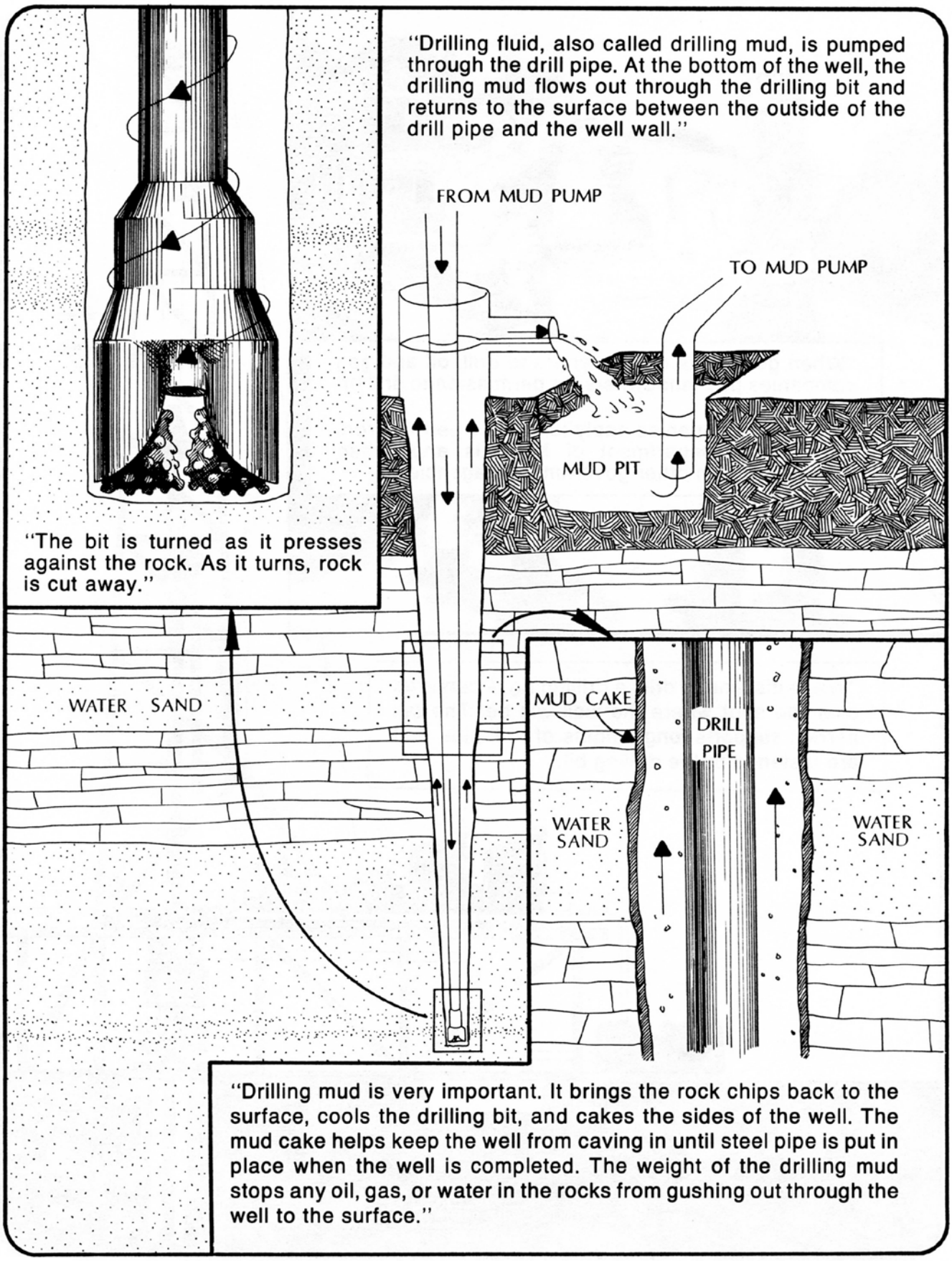

PINE VALLEY
RAILROAD VALLEY
NEVADA'S PRESENT OIL AND GAS FIELDS
4½ BILLION YEARS AGO THE EARTH WAS A MASS OF SWIRLING GASES.
4 BILLION YEARS AGO THE EARTH'S CRUST SOLIDIFIED.
23 MILLION YEARS AGO MOST OF NEVADA OIL AND GAS BEGAN TO FORM.
100 million years
TODAY
"The earth is about 4½ billion years old. Most Nevada oil is considered young by geologists, as it is about 23 million years old, which is still pretty old."
"Because Nevada oil is heavy and thick, and often contains a lot of heavy hydrocarbons and asphalt, even some paraffin, this makes Nevada oil harder to take from the ground."
HEAVY, THICK OIL FROM RAILROAD VALLEY, NEVADA
LIGHTER OIL FROM PINE VALLEY, AND SOME AREAS OF RAILROAD VALLEY OF NEVADA
"When oil and gas form, they don't stay still. Like you and me, they travel."
Where do they go?

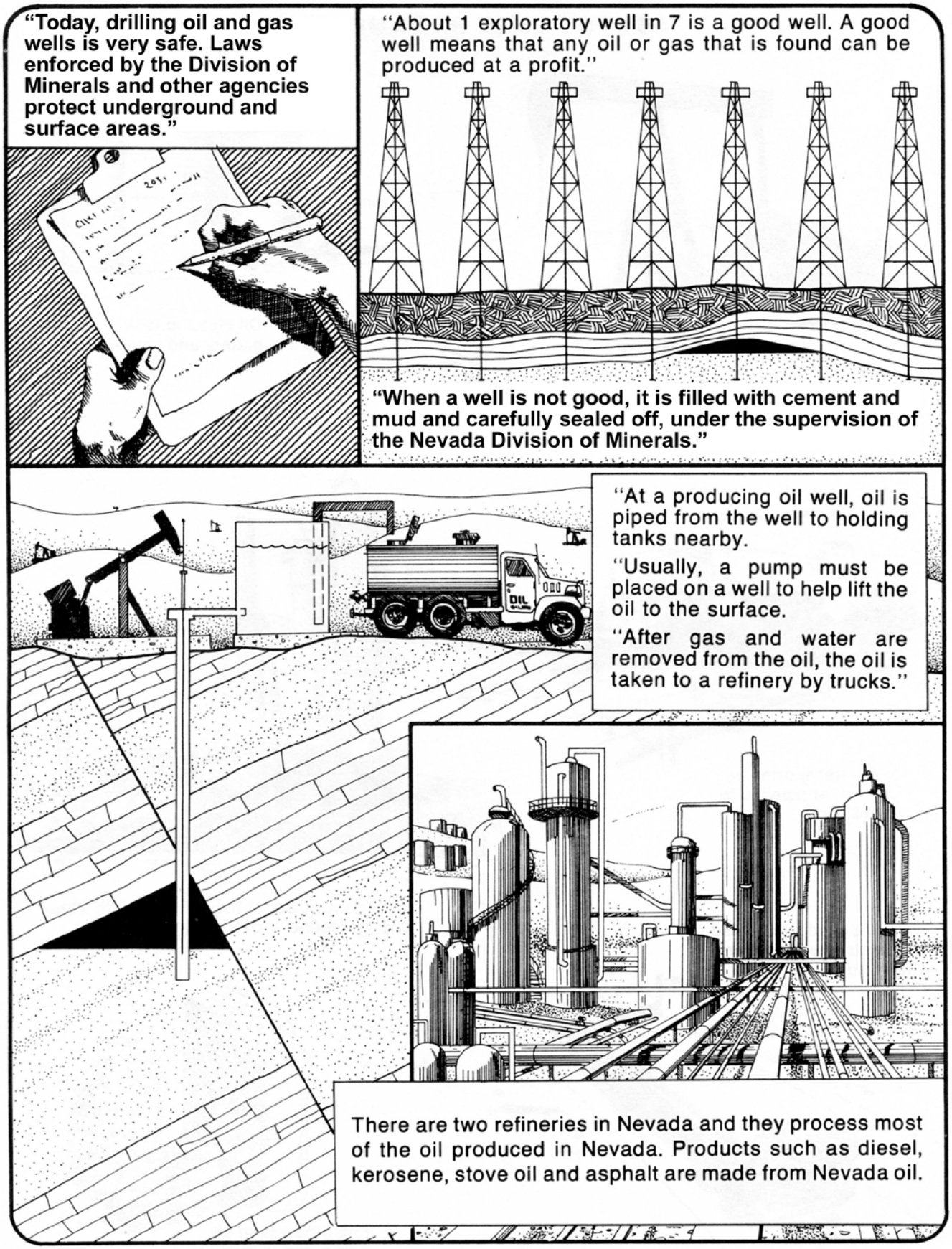

"They rise, sometimes through cracks in the earth, called faults."
"At times, the oil and gas reach the surface along the faults. At the surface, the oil or gas is called a seep. Nevada has several seeps, mostly in areas close to the state's oil and gas fields."
The first well drilled for oil in the state of Nevada was drilled in Washoe County in 1907. It was a dry hole, no oil was found. From 1907 to 1954 over 600 dry holes were drilled. In 1954, the first commercial oil well was discovered in Railroad Valley. The well was Eagle Springs #1-35 and produced 2,323,000 barrels of oil. The well was shut in, in 1970, and since has been converted into a water disposal well.
"Native Americans and pioneers used oil from seeps for many things, such as waterproofing baskets and greasing wagon wheels."


"Luckily, most of the oil and gas is trapped before it reaches the surface. This happens when oil and gas reach a rock bed they cannot flow through, called a cap rock, or another barrier."
CAP ROCK
GAS
RESERVOIR
OIL
WATER
"When a lot of oil and gas collect beneath a cap rock or at another barrier, an oil and gas reservoir is formed."
"A typical oil or gas reservoir in Nevada is limestone, dolomite or fractured shale. The oil, gas, and water are contained in these types of formations—not in a big open pool.
SAND GRAIN
CEMENTING MATERIAL
WATER
OIL & GAS
"Oil and gas companies hire geologists, like me, to find the reservoirs."
"How do you find them?" Jack asked.
"Well, it's not easy. Most reservoirs are very deep and cannot be seen directly from the surface."

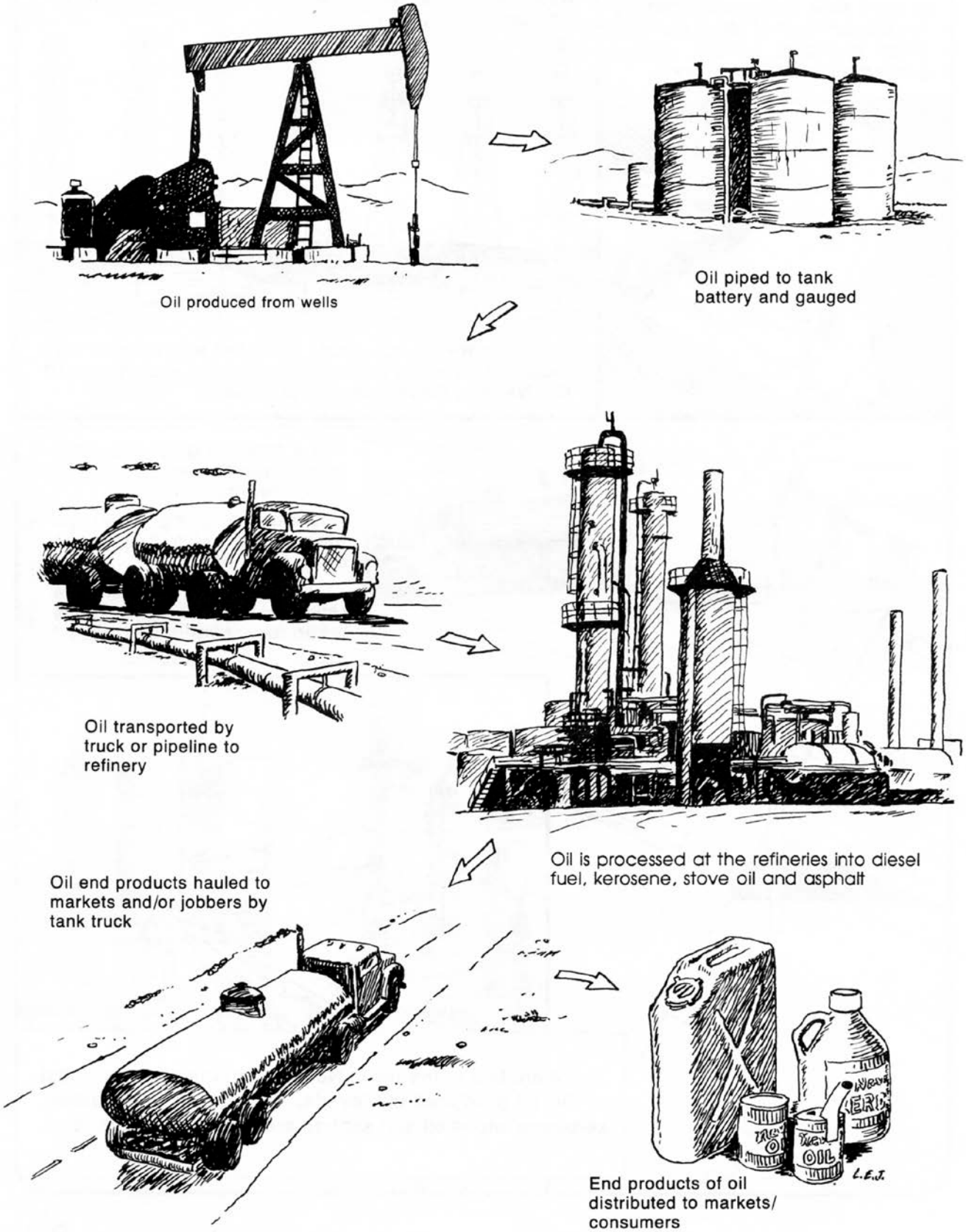

"Geologists look for clues like outcrops, which are parts of rock beds appearing at the surface.
"Geologists study outcrops, mapping their locations, thicknesses, and angles.
"From this and other information, geologists try to map the sites and shapes of rock beds beneath the surface, and locate oil and gas reservoirs."
OIL RESERVOIR
"Just as you thump on a watermelon and listen to the sound to find out whether the fruit is ripe, sometimes geologists try to learn what is inside the earth by vibrating the ground, often using a steel plate on a special truck."
"Then, they study the reflected sound waves on records called seismograms, which are different for every type and structure of rock."
"Other tests are used, as well. One measures how magnetic the rock layers are. To do this, a plane or helicopter flies over the rock with a small instrument, called a magnetometer, hanging from the aircraft.
"These tests help to locate traps or rock structures that may contain oil and gas."


"When geologists decide where to drill, oil and gas companies pay loandowners for permission to drill on their land. Then, the companies apply for drilling permits from the Nevada Division of Minerals and, when necessary, from other governmental agencies."
"When it's time to drill, a drilling rig is centered over the spot where the well will be. The tall derrick supports long lengths of drill pipe that are fastened to the drilling bit."

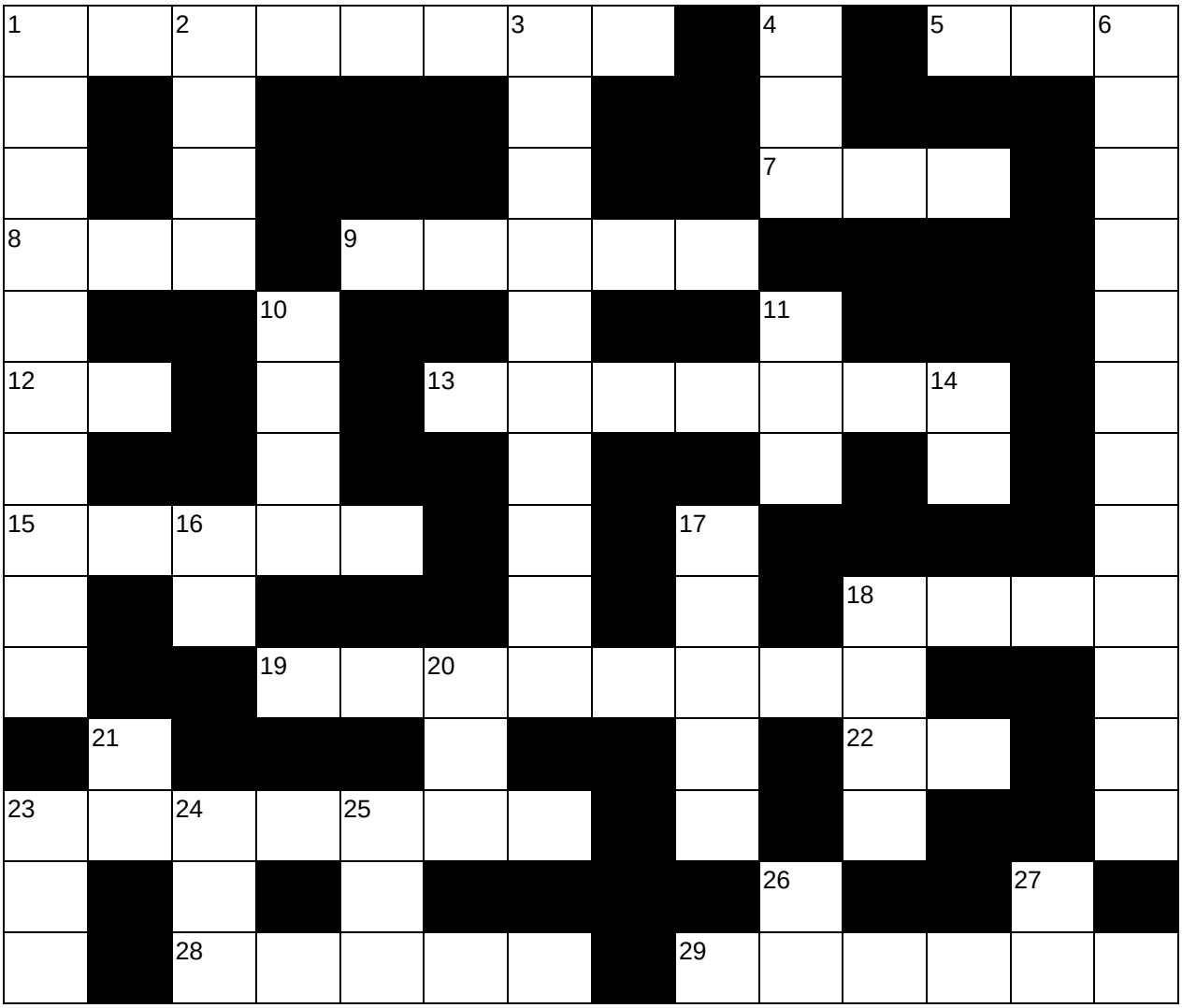

"Drilling fluid, also called drilling mud, is pumped through the drill pipe. At the bottom of the well, the drilling mud flows out through the drilling bit and returns to the surface between the outside of the drill pipe and the well wall."
FROM MUD PUMP
TO MUD PUMP
MUD PIT
"The bit is turned as it presses against the rock. As it turns, rock is cut away."
WATER SAND
MUD CAKE
DRILL PIPE
WATER SAND
WATER SAND
"Drilling mud is very important. It brings the rock chips back to the surface, cools the drilling bit, and cakes the sides of the well. The mud cake helps keep the well from caving in until steel pipe is put in place when the well is completed. The weight of the drilling mud stops any oil, gas, or water in the rocks from gushing out through the well to the surface."


"Today, drilling oil and gas wells is very safe. Laws enforced by the Division of Minerals and other agencies protect underground and surface areas."
"About 1 exploratory well in 7 is a good well. A good well means that any oil or gas that is found can be produced at a profit."
"When a well is not good, it is filled with cement and mud and carefully sealed off, under the supervision of the Nevada Division of Minerals."
"At a producing oil well, oil is piped from the well to holding tanks nearby.
"Usually, a pump must be placed on a well to help lift the oil to the surface.
"After gas and water are removed from the oil, the oil is taken to a refinery by trucks."
OIL
There are two refineries in Nevada and they process most of the oil produced in Nevada. Products such as diesel, kerosene, stove oil and asphalt are made from Nevada oil.

STEPS IN OIL PRODUCTION



Oil and Gas Crossword



ACROSS

1. What a car need to run on
5. Drilling fluid
7. A hot or cold drink
8. A young boy
9. Another name for oil
12. It is time to __ __
13. What is drilled through to get to oil and gas?
15. Oil leaks at the surface
18. To mix up
19. Oil needed heat and __ __ __ __ __ __ __ __ to form
22. Before noon time
23. Paving for roads
28. The __ __ __ __ __ is about 4½ billion years old
29. To find something

DOWN

1. People that look for outcrops
2. It is found on the beach
3. Used to heat your house
4. What cuts rock?
6. They are used to make oil wells
10. A mouse __ __ __ __
11. A call for help
14. A knock out (abrv.)
16. Extraterrestrial (abrv.)
17. A crack in the earth
18. Oceans are also called __ __ __ __
20. A long skinny fish
21. Do __ __ I say!
23. A small poisonous snake
24. Something good to eat
25. What we breathe
26. Company (abrv.)
27. It is __ __ my house

Seek and Find

N	G	N	I	R	P	S	P	A	R	T	O	M	E	R	A	R	A	H
A	O	O	C	S	E	R	C	W	O	L	L	I	W	H	T	R	O	N
B	A	R	R	A	N	C	H	S	T	O	M	E	R	A	R	E	S	O
A	C	G	I	N	G	X	N	A	O	U	I	N	A	A	U	A	N	R
C	T	H	P	S	U	N	O	Y	N	A	C	T	N	A	R	G	A	U
O	S	O	O	S	M	U	N	S	O	N	R	C	N	C	H	L	W	H
N	Z	S	V	P	G	H	O	S	T	R	A	N	C	H	G	E	O	C
F	S	T	I	B	O	N	O	R	O	A	D	R	D	N	A	S	L	N
L	P	R	A	L	R	O	I	B	M	H	P	E	I	G	B	P	L	A
A	M	A	N	A	U	D	O	R	E	S	U	R	H	O	B	R	I	R
T	C	N	N	C	B	U	A	S	P	O	P	O	P	Y	A	I	W	A
Y	P	C	W	K	K	N	Z	A	N	S	S	I	M	H	C	N	A	R
E	H	H	S	B	C	E	R	L	E	T	S	P	R	I	O	G	K	E
K	R	E	L	U	A	T	O	T	R	C	A	N	Y	O	N	S	D	M
R	O	E	M	R	L	O	A	A	Q	U	A	D	A	E	A	E	P	O
O	S	K	L	N	B	K	E	N	U	D	D	N	A	S	W	M	E	T
Y	K	A	T	E	S	P	R	R	I	N	G	S	D	F	T	A	T	E

1. Bacon Flat
2. Blackburn
3. Eagle Springs
4. Ghost Ranch
5. Grant Canyon
6. Kate Spring
7. Munson Ranch
8. Ghost Ranch
9. Sand Dune
10. Sans Spring
11. Tomera Ranch
12. Trap Springs

Oil and Gas Questions

1. Of the 17 counties in Nevada, which two are the oil producing counties?
2. Name three products made from crude oil.
3. What type of drilling rig is used in the oil industry?
4. What year was the first oil produced in Nevada?
5. What is drilling fluid called?
6. List two things drilling fluids do while drilling a well?
7. What created our oil reservoirs?
8. What year was the first well drilled in Nevada for oil?
9. Where did the Native Americans and pioneers get oil?
10. What did Native Americans and pioneers use the oil for?
11. Who are the professional people hired by oil companies to find oil and gas reservoirs?
12. Which Nevada state agency approves, permits, and regulates oil and gas drilling?

What is the piece of equipment called that is found on the bottom of the drill pipe?

Oil and Gas Crossword Answers

G	A	S	O	L	I	N	E		B		M	U	D
E		A				A			I				R
O		N				T			T	E	A		I
L	A	D		C	R	U	D	E					L
O			T			R			S				L
G	O		R		C	A	P	R	O	C	K		I
I			A			L			S		O		N
S	E	E	P	S		G		F					G
T		T				A		A		S	T	I	R
S			P	R	E	S	S	U	R	E			I
	A				E			L		A	M		G
A	S	P	H	A	L	T		T		S			S
S		I		I					C			A	
P		E	A	R	T	H		L	O	C	A	T	E

Seek and Find Answers

N	G	N	I	R	P	S	P	A	R	T	O	M	E	R	A	R	A	H
A	O	O	C	S	E	R	C	W	O	L	L	I	W	H	T	R	O	N
B	A	R	R	A	N	C	H	S	T	O	M	E	R	A	R	E	S	O
A	C	G	I	N	G	X	N	A	O	U	I	N	A	A	U	A	N	R
C	T	H	P	S	U	N	O	Y	N	A	C	T	N	A	R	G	A	U
O	S	O	O	S	M	U	N	S	O	N	R	C	N	C	H	L	W	H
N	Z	S	V	P	G	H	O	S	T	R	A	N	C	H	G	E	O	C
F	S	T	I	B	O	N	O	R	O	A	D	R	D	N	A	S	L	N
L	P	R	A	L	R	O	I	B	M	H	P	E	I	G	B	P	L	A
A	M	A	N	A	U	D	O	R	E	S	U	R	H	O	B	R	I	R
T	C	N	N	C	B	U	A	S	P	O	P	O	P	Y	A	I	W	A
Y	P	C	W	K	K	N	Z	A	N	S	S	I	M	H	C	N	A	R
E	H	H	S	B	C	E	R	L	E	I	S	P	R	I	O	G	K	E
K	R	E	L	U	A	T	O	T	R	C	A	N	Y	O	N	S	D	M
R	O	E	M	R	L	O	A	A	Q	U	A	D	A	E	A	E	P	O
O	S	K	L	N	B	K	E	N	U	D	D	N	A	S	W	M	E	T
Y	K	A	T	E	S	P	R	R	I	N	G	S	D	F	T	A	T	E

Answers to Oil and Gas Questions

1. **Nye and Eureka**
2. **Diesel, asphalt and kerosene (stove oil)**
3. **Rotary rigs**
4. **1954**
5. **Mud**
6. **Bring cuttings to the surface, keep bit cool, cake the side of the hole**
7. **Dead sea life and plants**
8. **1907**
9. **From oil seeps**
10. **Waterproofing baskets, greasing wagon wheels**
11. **Geologists**
12. **Division of Minerals**
13. **The bit**