

## NATURAL RESOURCES

# Gasoline From Oil Shale

**Oil shale is promising source of liquid fuels for years to come. Better means of recovering crude oil from this abundant mineral may soon make it competitive with natural petroleum.**

By A. C. MONAHAN

► **DRILLING** A mile or two down into the crust of the earth to get petroleum is a costly undertaking, and the cost is certain, sooner or later, to be reflected in the retail price to consumers.

Drilling in inaccessible places, such as in northern Alaska or out in the ocean, is also costly. The protection against extreme retail prices is liquid fuels from oil shale or coal.

Improved methods of getting liquid fuels from these abundant natural materials are reducing the cost of production. Using them for synthetic liquid fuels is not new, but economical production is. In Scotland oil shale has been a source of liquid fuels for over 100 years. In Germany during World War II, gasoline and heating oil from shale and coal provided the Nazi war equipment with a large part of its power.

The methods used in both countries might be called crude, however, and better processes must be developed before synthetic fuels from these sources can compete in the market with products from natural petroleum.

Long steps have been taken in the United States, and probably elsewhere, since the war to develop better processes. Both the government and private industry are taking part here, and their efforts are bringing promising results. The cost of producing liquid fuels from oil shale and coal may soon be down to the rising cost of production from natural petroleum.

## New Type of Retort

Very important in this progress is a new type of retort, called a gas-combustion retort, which gives promise of recovering high-grade liquid fuels from America's abundant oil shale at a cost in the competitive range. A development of the U. S. Bureau of Mines, the retort has been thoroughly tested in laboratory models and soon will be in operation in a large-size pilot plant now under construction.

It is a continuous-action retort, consisting of a vertical cylinder into the top of which broken oil shale is fed. After passing through a hot zone near the retort's center, where the shale's oil contents are removed, the "spent" shale is discharged automatically at the bottom, to be carried by conveyors to a dump pile.

Heat in the hot zone, provided by gas burners, vaporizes the oil products, which are carried off as gases generated in the form of mist. These are withdrawn near

the top of the retort. Part of the gases discharged are combustible. With the oil removed, some of them are recycled back into the retort to burn and provide the necessary heat. The use of this fuel for heating is in large part responsible for the economy of the process.

Shale is a clay-like rock with an appearance much like slate. Oil shale is the same rock but one within which is a bituminous matter called kerogen. This material yields crude oil resembling petroleum when the oil shale is properly heated. Recovery of oil from oil shale is basically a simple operation. Heating it drives off oil in vapor form, and this is easily condensed to a liquid. When refined, the liquid yields about the same products as are obtained from petroleum.

There are complications, however, in producing oil suitable for refining from oil shale by a commercially economical process. These are being solved one by one by the U. S. Bureau of Mines, particularly at its pilot plant at Rifle, Colo.

Liquid fuels are now being produced there at a low enough cost so that products

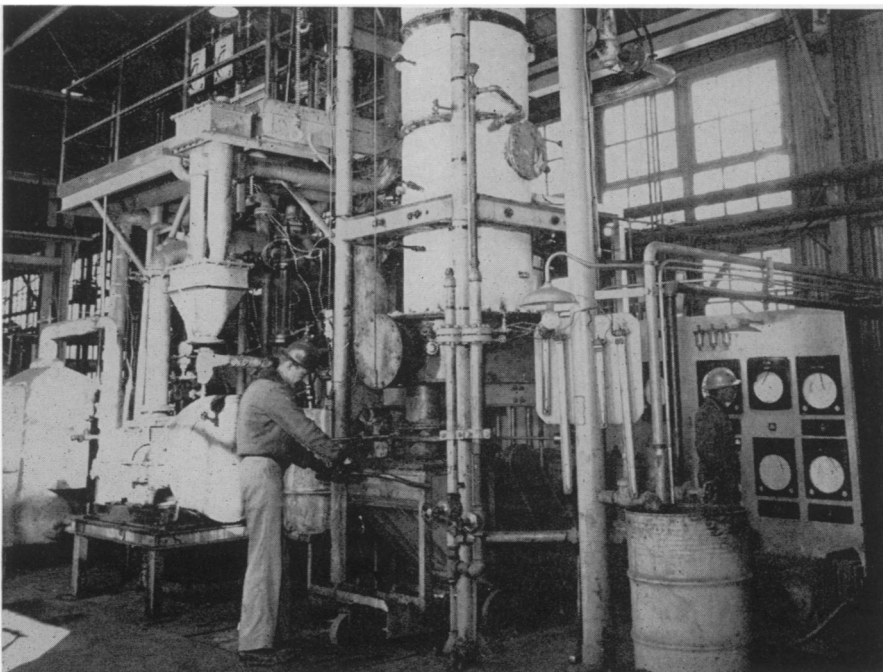
are obtained at prices nearly competitive with petroleum products. With the new plant at Rifle, which should be ready to operate later this year, it is expected that production costs will be decreased and the products put fully into the competitive range.

Scotland is the country which has had the longest experience in producing fuel oils from oil shale. The centennial of the industry was celebrated about two years ago. Methods employed might be called crude, although better processes are now in use. They are not satisfactory for the United States, however, where natural petroleum is still plentiful. Scotland supplies a nation which relies almost wholly on imports. A strong enemy in time of war could cut the supply line completely.

## Estonia Is Large Producer

Estonia is probably the world's largest producer of oils from shale. Its products now go into the Soviet Union, but during World War II they were largely responsible for power to operate German war equipment. Whatever progress has been made in improving methods of oil recovery in this country is unknown outside the Iron Curtain.

Russia itself has large deposits of oil shale, and in prewar years produced more



**GAS-COMBUSTION RETORT**—Developed by U. S. Bureau of Mines, this retort is a new and efficient device to recover oil from oil-shale. A large-size type will be the heart of a demonstration plant at Rifle, Colo., now under construction.

oil from it than any other nation except Estonia. France has produced oil from shale for some 70 years.

Oil shale, suitable for oil production, is found in many countries. It is already being used to a small degree in Brazil, and may in the future become important in fuel production in Australia, which now imports its liquid fuels for automobiles, diesels and other power.

Within the United States there is considerable disagreement on the question whether experimental work in making synthetic liquid fuels from coal, shale or natural gas are justified at this time. Congress, however, has provided funds for experimental work.

### Utilization of Wastes

The U. S. Bureau of Mines is working on production from coal, shale and natural gas, while the Department of Agriculture is concerned with alcohol from farm wastes as a substitute for gasoline.

America has plenty of natural petroleum to meet all present needs and those of the next few decades. Some say there is enough for 75 years. But, sooner or later, with decreasing production and increasing use of liquid fuels, petroleum alone will not meet the demand. Then synthetic liquid fuels will become essential.

How long the known petroleum reserves will last can be easily estimated. What new deposits will be discovered is uncertain. The oil industry seems to be firm in the belief that there are many not yet discovered, but they are deep down in the earth or are in inaccessible places. This means that cost of production will be greater and that synthetic fuels may be needed to supplement the petroleum products.

Science News Letter, January 17, 1953

### METEOROLOGY

## Strato Cold Fronts Jar High-Flying Jets

► THE ANSWER to plane-jarring turbulence high in the air may be found in studies which show that cold fronts sometimes extend up into the stratosphere.

These studies also show that the high reaching cold fronts may be a cause of the extremely fast jet streams, narrow bands of high wind which travel from west to east between 15,000 and 40,000 feet.

Pilots who have reported the turbulence, suddenly hitting the plane in a clear blue sky, tend to find it near a cold front such as this and a jet stream beside it. A study, carried on in Washington by Conrad P. Mook of the U. S. Weather Bureau, has covered 241 of these cases. Based on the theory that the jet stream and a cold front may jointly be responsible for many cases of meeting turbulence, further questionnaires to pilots will ask whether the pilot met a big temperature change during the bumping around.

If the answers are "yes," this will tend to confirm research, carried on by Roy Berg-

ren, showing that the cold fronts do extend high into the stratosphere and indicating that the jet streams might be caused by the extreme temperature contrasts found along the fronts. Theoretical research by Jerome Namias and Philip Clapp of the U. S.

Weather Bureau advanced this hypothesis about two years ago.

Such turbulence has sometimes been strong enough to break up planes. Plane design must take it into account.

Science News Letter, January 17, 1953

# Where Do You Want To Go?

## France? Brazil? West Indies? Hawaii? Mexico?

Read what the *Christian Science Monitor* says about a new way to travel that sometimes costs 1/3 to 1/2 less.

**B**Y THE travel editor of *The Christian Science Monitor*: Many fascinating travel booklets pass over this desk in the course of a year but the one that arrived the other day so interested this department that it cost the office several hours of work in order that we might absorb its content. The booklet is entitled "Travel Routes Around the World" and is the traveler's directory to passenger-carrying freighters and liners. In no time at all you find yourself far out to sea cruising along under tropical skies without a care in the world. You find yourself docking at strange ports and taking land tours to those places you long have read about. Most interesting of the vast listings of ships are the freighters which carry a limited number of passengers in quarters comparable to the luxury offered in the so-called big cruise ships which devote most of their space for passengers.

The booklet first of all answers the question: What is a freighter? The modern freighter, says the booklet, ranks with the de luxe passenger vessels so far as comfort and accommodations are concerned.

### LARGE ROOMS WITH BEDS

It is important to realize that in most cases today, freighter passengers are considered first-class passengers, although the rates charged are generally on a par with either cabin or tourist class fare. Most passenger-carrying freighters, to quote the booklet, have their private bath and shower, and these cabins offer beds, not bunks. The rooms are generally larger than equivalent accommodations aboard passenger ships, and the cabin of a modern freighter is sometimes even twice as large as first-class cabins on some of the older passenger ships. It goes without saying that your room is on the outside, and amidships, the most expensive of all locations, for which you are usually charged a premium over the advertised minimum fares on passenger ships.

This booklet points out that it is frequently astonishing how low freighter fares are as compared with passenger ship fares: for example, less than one-half of the passenger ship fare to California is the amount asked on freighters. On most of the longer runs, the difference in favor of the freighters is regularly from a third to half of the passenger ship fare.

### SERVICE AND MEALS RATED EXCELLENT

Service and meals on a freighter leave little to be desired. You will be treated with consideration. Stewards will go out of their way to make your voyage pleasant. On ships with East Indian stewards you will be waited on almost hand and foot, in a manner that is completely unknown to Americans and most Europeans.

Foreign ships offer their own specialties, says the booklet. Thus vessels in the East Indian trade serve Rijkstafel (or King's Table), the East Indian dish which can run to as many as 50 different courses. Scandinavian ships serve Smorgasbord every day, and some of their desserts (like strawberries smothered in a huge bowl of whipped cream) are never forgotten. Another feature of freighter travel is in its informality. No formal clothes are needed. Sport clothes are enough.

Other valuable information such as how to tip, shipboard activities and costs are covered in the booklet, "Travel Routes Around the World."

Some of the trips listed include a trip to England for \$160, a 12-day Caribbean cruise for \$240, or a leisurely three-month Mediterranean voyage.

The booklet is published by Harian Publications, Greenlawn, New York, and may be obtained by sending to the publisher.

So, when it arrives all you need to do is sit down and take your choice. The booklet lists literally hundreds of ocean trips.

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