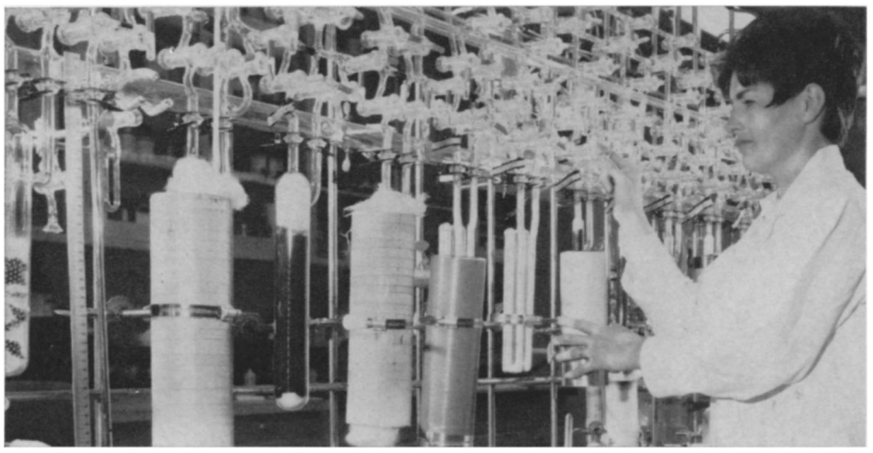
Once more for the money



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Checking for radioisotopes in samples of gas from a Plowshare program test.

The proven natural gas reserves of the continental United States are estimated at 287 trillion cubic feet. At a production rate of 19.4 trillion cubic feet yearly, if no new reserves were discovered, the United States would exhaust its supply in about 15 years.

However, there is a tremendous amount of natural gas—estimates range as high as 24 quadrillion cubic feet—locked away from conventional gas producing methods. The hope, therefore, lies in the unconventional.

For that reason, and as part of its long effort to demonstrate peaceful uses of nuclear energy, the U.S. Atomic Energy Commission has tentatively scheduled for the latter part of May the second U.S. experiment to produce natural gas by a nuclear explosion. This time, rather than feasibility, the key word will be economics. The gas the AEC is after is unassociated gas, that is, gas not tied up with oil as is most natural gas produced today. Conventional production methods make it economically unfeasible to get this unassociated gas out of the ground.

The May blast, Project Rulison, is part of the AEC Plowshare program. Present plans call for a 40-kiloton nuclear device to be detonated in the Mesa Verde formation in northwestern Colorado, about 150 miles west of Denver. The formation contains an estimated 100 billion cubic feet of natural gas.

The device will be detonated about 8,400 feet below ground. The blast should create a roughly cylindrical chimney filled with loose rock into which the natural gas from surrounding rock will flow. A well will be drilled later to tap the chimney.

Rulison is an experiment; it is not designed to be converted into a gas-producing well hooked up to commercial pipelines. But the commercial possibilities are not being overlooked. "We're trying to determine if we can establish a commercial production rate through the detonation of this device," says C. Wardell Leisk, chairman of Austral Oil Company of Houston, Tex., industrial sponsor of the project. "We hope to get rates of 3 million to 20 million cubic feet a day. We think rates of 2 million or more a day in the Rulison field would be in the commercial range.

"We're also trying to establish if the gas will be free of harmful radioactivity so that it can be sold commercially to industry. The main thing, though, is to see if we can produce large amounts of gas."

Project Rulison, named after the Rulison fields between Denver and Grand Junction, follows on the heels of the conclusion of three short-term tests of the output of Project Gasbuggy (SN: 12/23/67, p. 610), the world's first industry-government experiment to test the feasibility of producing an underground natural gas reservoir. Gasbuggy began on Dec. 10, 1967, and six more months of long-term production testing remain. Latest results show that the total production from the emplacement hole since the blast amounts to 167 million cubic feet. A nearby conventional well has produced only 85 million cubic feet over a nine-year period.

"Gasbuggy does not indicate how nuclear production will work on a large scale or commercial basis," comments Dr. Klaus P. Heiss, research economist at Mathematica, a Princeton, N.J., consulting firm. "Rulison will be the test that determines whether nuclear technology is applicable to gas production. If Rulison doesn't work out positively, it would indicate that there are unknowns connected with the method that do not make it feasible. If it is successful, as is expected, then it will be a tremendous boost to applying nuclear explosives to natural gas production."

Dr. Heiss specifically points out the Rocky Mountain area—"the largest single known fossil fuel source in the world"—as one region holding enormous promise for employing the method. But certain questions will have to be settled first. One concern is how close to built-up areas can such nuclear explosions be set off without property damage. A related but less likely problem is that radioactivity could leak out into the air through interconnecting fractures.

The radioactivity does contaminate some of the gas too. Most of the radioactivity is contained in a molten rock melt that collects in the bottom of the chimney, where it is trapped when the rock hardens. The fresh gas coming into the reservoir would tend to purge original gas that was contaminated. One of the purposes of Gasbuggy is to determine how best to remove the contaminated gas. Present methods include filtering, scrubbing, venting and burning.

As for the composition of the natural gas, the Gasbuggy tests show that some of the radiation does mix with it, and tritium, a long-lived hydrogen isotope, can become bound up with the gas. Scientists hope to learn what percentage of the gas can be purged by burning and how troublesome isotopes can be avoided in the future. Essentially, Gasbuggy and Rulison are complementary tests measuring the same things: gas production, contamination and ground shock.

The big difference will be in size. Gasbuggy uses a 26-kiloton device 4,240 feet below ground compared to Rulison's 40 kilotons at 8,400 feet.

Meanwhile, in a related development, the AEC apparently is now readying its Amchitka test site in Alaska's Aleutian Island chain (SN: 11/9, p. 479) to test the Spartan anti-ballistic missile warhead. Three tests will be conducted next fall, culminating in a full-scale detonation of a two-megaton warhead—the largest underground explosion in history.

Although the AEC feels that it can safely conduct tests of several megatons at its Nevada test site without danger to people or buildings, the Amchitka site means less trouble from conservationist groups and influential citizens, including billionaire Howard Hughes, who owns property close to the Nevada site and has been seeking to block the tests.

The Amchitka two-megaton test will be almost twice as powerful as the biggest previous U.S. underground test.