Haliburton Company-Union Carbide Corporation's unique new method for disposing of dangerous radioactive waste such as strontium 90 is shown in diagram. Waste originates at nuclear site (upper), is mixed with cement slurry (center) and is then pumped down a drilled hole (bottom) to fracture and enter an impermeable formation. Hallibburton engineer Mack Stogner, left, reviews the project with Harry P. Conroy, senior vice president and general manager of the oil field service firm, and W. D. Owsley, senior vice president.

Oil Industry Helps Solve Radioactive Waste Problem

Two techniques originated by the petroleum industry for its own uses are expected to solve a major problem in the development of nuclear energy for peaceful purposes. The problem is the disposal of dangerous, sometimes deadly, radioactive waste by - products.

Researchers at Halliburton Company's Technical Center here, working with Oak Ridge National Laboratory scientists, have combined the oil well cementing technique with the hydraulic fracturing production stimulation technique to en - tomb radioactive wastes in an impermeable shale formation a thousand feet underground.

Final test series of the new disposal method is being completed this month at Oak Ridge National Laboratory, Oak Ridge, Tenn.

The method used at Oak Ridge begins by mixing the waste with a cement slurry, pumping the mixture down a hole drilled into the Conasuaga shale and then fracturing the shale to create a horizontal crack. The crack fills with the mixture to form a thin, horizontal sheet several hundred feet across. The mix sets to permanently hold the radio - active waste in the formation.

Subsequent injections form parallel sheets 10 to 20 feet above the preceding injection. Extensive experimental runs and test borings using radio - active tracers have confirmed location and extent of the sheets.

This approach combines conventional oil well cementing, which places a sheath of cement between pipe and the hole itself as a protective measure, and formation fracturing, which fractures or cracks open a productive formation to permit more oil to be produced.

Union Carbide Corporation, which operates facilities at Oak Ridge for the U.S. Atomic Energy Commision, and Halliburton, which provides specialized oil field services such as cementing and fracturing worldwide, have collaborated on the project since 1960.

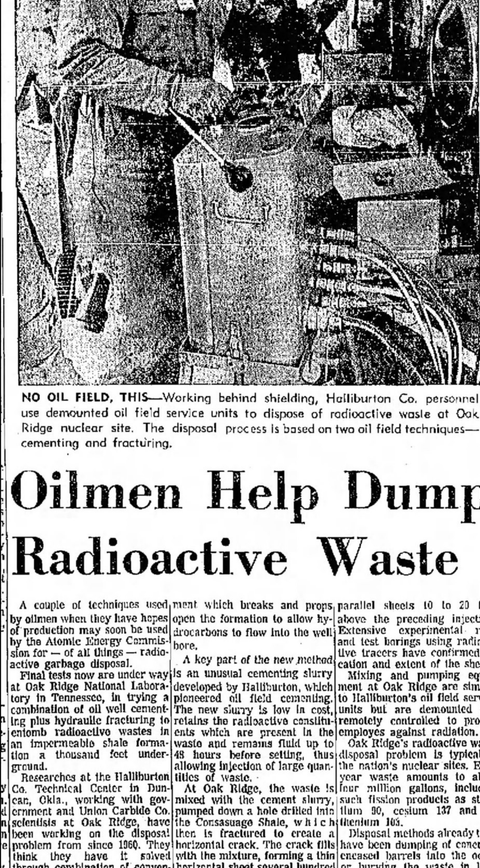
Oak Ridge has a radioactive waste disposal problem typical of the nation's nuclear sites. Each year about four million gallons of waste, including the fission products as strontium 90, cesium 137 and ruthenium 103, are generated at Oak Ridge.

Among the disposal methods already tried have been dumping concrete - encased barrels of waste in the ocean or burying the waste in lead - lined containers. These are considered either too dangerous or too expensive or both.

A key part of the new method is an unusual cementing slurry developed by Hallibur - ton. It is low in cost, it retains the radioactive constituents present in the waste and remains fluid for as long as 48 hours before setting to thus permit injection of large quantities of waste.

The mixing and pumping equipment used at Oak Ridge are similar to Halliburton's oil field service units except that they have been demounted and are remotely controlled for protection against radiation.

"If this process is successful for disposal of Oak Ridge National Laboratory inter - mediate - level wastes, it has potential application at other atomic energy sites where suitable geological conditions exist," the Atomic Energy Commission says.



NO OIL FIELD, THIS—Working behind shielding, Halliburton Co. personnel use demounted oil field service units to dispose of radioactive waste at Oak Ridge nuclear site. The disposal process is based on two oil field techniques—cementing and fracturing.

Oilmen Help Dump Radioactive Waste

A couple of techniques used by oilmen when they have hopes of production may soon be used by the Atomic Energy Commission for — of all things — radioactive garbage disposal.

Final tests now are under way at Oak Ridge National Laboratory in Tennessee, in trying a combination of oil well cementing plus hydraulic fracturing to entomb radioactive wastes in an impermeable shale formation a thousand feet underground.

Researches at the Halliburton Co. Technical Center in Duncan, Okla., working with government and Union Carbide Co. scientists at Oak Ridge, have been working on the disposal problem from since 1960. They think they have it solved through combination of conventional oil well cementing which provides a protective sheath of cement between the casing and the hole, and the fracture treatment which breaks and props open the formation to allow hydrocarbons to flow into the well bore.

A key part of the new method is an unusual cementing slurry developed by Halliburton, which pioneered oil field cementing. The new slurry is low in cost, retains the radioactive constituents which are present in the waste and remains fluid up to 48 hours before setting, thus allowing injection of large quantities of waste.

At Oak Ridge, the waste is mixed with the cement slurry, pumped down a hole drilled into the Conasauga Shale, which then is fractured to create a horizontal crack. The crack fills with the mixture, forming a thin horizontal sheet several hundred feet across. When the mix is set the radioactive waste is permanently held in the formation.

Subsequent injections form parallel sheets 10 to 20 feet above the preceding injection. Extensive experimental runs and test borings using radioactive tracers have confirmed location and extent of the sheets.

Mixing and pumping equipment at Oak Ridge are similar to Halliburton's oil field service units but are demounted and remotely controlled to protect employes against radiation.

Oak Ridge's radioactive waste disposal problem is typical of the nation's nuclear sites. Each year waste amounts to about four million gallons, including such fission products as strontium 90, cesium 137 and ruthenium 103.

Disposal methods already tried have been dumping of concrete-encased barrels into the ocean or burying the waste in lead-lined containers. These are considered either too dangerous or too expensive or both, the AEC said.