

Recent Developments in Underground Gas Storage Fields in Indiana

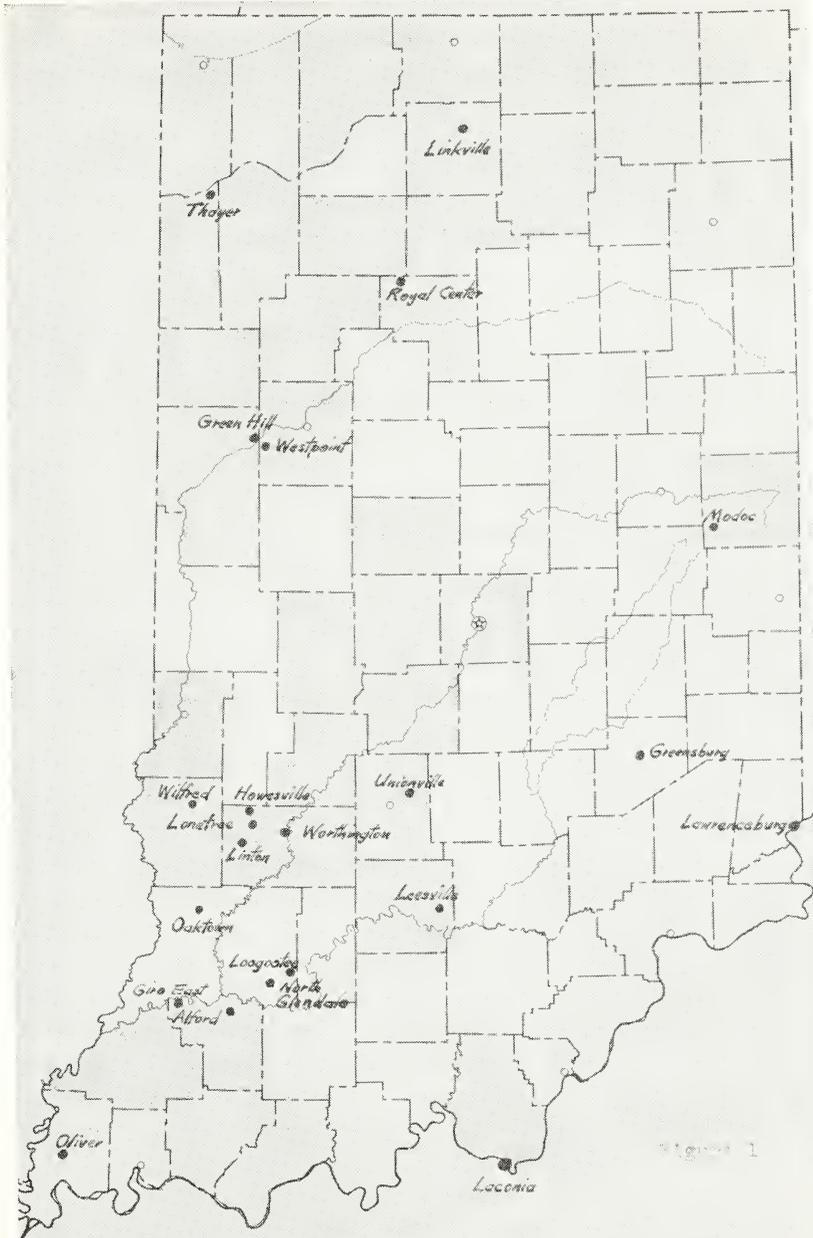
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Reflecting the great demand for natural gas as a heating fuel, the number of underground gas storage fields in Indiana has doubled within the last three years. Since underground reservoirs provide the most effective and economical method to obtain additional amounts of gas to satisfy this demand, Indiana's gas utilities have continued their efforts to locate suitable geological formations capable of holding substantial volumes of natural gas. The gas is injected into the reservoir during the warmer months and is withdrawn from storage throughout the winter months when there is a shortage in the supply of gas. The extent of exploration efforts to discover underground storage sites is indicated on the map of Indiana. (Fig. 1). Some drilling activity for this purpose has occurred in the counties which have been shaded—one or more test holes have been drilled in each of these thirty-six counties during the past three years. The map also shows the location of all storage reservoirs, both experimental and operational, in the state of Indiana. Presently, there are twenty-two such projects.

Northern Indiana Public Service Company which supplies gas to the northern third of the state and Citizens Gas and Coke Utility with its Indianapolis-Marion County service territory are responsible for most of the recent attempts to utilize subterranean rock formations as storage reservoirs. Together they have seven storage fields. Northern Indiana Public Service Company has three projects in various stages of exploration and development in the vicinity of the towns of Royal Center in Cass County, Thayer in Newton County, and Linkville in Marshall County. The most advanced project is the Royal Center reservoir. All of these projects involve the use of non-gas bearing geological structures, that is, formations which have not previously held natural gas. Storage facilities of this kind are known as "aquifers" in that they originally contained only water. Such fields represent a somewhat new development in underground storage—the feasibility of storing gas in these formations has now been amply demonstrated. In the past, the majority of reservoirs were constructed from structures which had at one time held natural gas. These abandoned and depleted gas fields offered a much greater likelihood or assurance that the formations could be reconditioned to again hold natural gas.

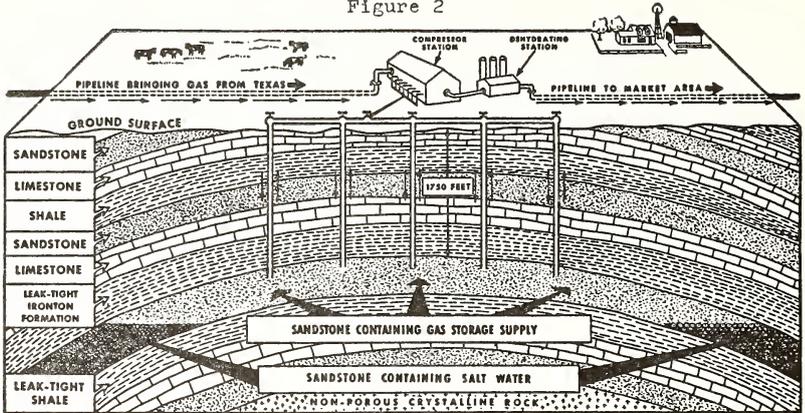
In both gas bearing and non-gas bearing structures, however, the basic geological requirements are the same. The gas is stored under pressure in porous and permeable rock strata, usually sandstone or limestone, which rises and falls to form a domical shape or "hump." The storage formation must be bracketed by impervious strata to prevent the gas from escaping. The necessary gastight seal is completed by the back pressure which develops when the gas injected into the storage formation displaces and pushes the water, normally present in both types of structures, to the sides of the dome. The cross section diagram of an underground storage reservoir (Fig. 2) illustrates the essential requirements.

By drilling through the first reservoir a few gas utilities in this country have discovered a second storage field. Currently, the Indiana



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Figure 2



Cross Section Diagram of an Underground Storage Reservoir.

Gas and Water Company is experimenting with the possibility of "double storage" at their Unionville field in Monroe County. It is hoped that geological formations about one hundred feet below the original reservoir will have the general characteristics for storing gas.

The four storage facilities of the Citizens Gas and Coke Utility became operational in 1961. These large reservoirs, constructed from gas bearing structures, are located in Greene County near the towns of Linton, Worthington, Lonetree, and Howesville. Including the connecting pipe line between Greene County and Marion County, the total cost of these underground reservoirs is twelve million dollars. The estimated storage capacity of these fields is fourteen billion cubic feet.

Recognizing that the development and use of all the storage fields, proposed and operational, in this state still will not meet the market demand for natural gas, it is safe to say that additional underground storage reservoirs will be constructed in the near future by gas utilities operating in Indiana. Explorations are currently underway for more suitable storage sites for this premium heating fuel.