

# Vital Importance Of Water Supply Recognized Early

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*Water supplies, their sound development and use, have been the keystone of Arizona agriculture. For nearly sixty years the program of the Irrigation Department, now known as Agricultural Engineering Department, has been focused on this target.*

Recognizing the importance of continuing records of surface water supply, the Agricultural Experiment Station engineers established stream gauging stations on Sabino Canyon in 1904, Santa Cruz River in 1905, and Rillito Creek in 1909. These stations are still in operation and now constitute a part of the much more complete system of stream gauging activities in the state under the direction of the U.S. Geological Survey.

Gauging stations were also established in the principal canyons in the Chiricahua Mountains in southern Arizona. The records from these stations supplied the first information of runoff from mountain areas in the southern part of the state. Without quantitative records of stream-flow, realistic plans for the development and use of water were impossible.

## Early Water Study Important

In 1905 the experiment station engineers, under the leadership of Dr. G. E. P. Smith, were first to realize the importance of underground water supplies to the potential agricultural and industrial economy of the state. They pioneered early ground water developments in the state and were the first to caution against overpumping in ground water areas and the ultimate disaster inherent in mining ground water. This prediction has proved only too true. Continued removal of ground water at rates in excess of natural replenishment is the most serious problem facing Arizona today.

Their experience and judgment in the vital fields of water resources and use have been utilized by governors and legislators of the state in the development of water law. The surface water code of 1919 was to a large extent the result of work in this department.

## Better Pump Engines

Ground water development brought many practical mechanical problems to the farmers and ranchers of Arizona. The early internal combustion engines and their fuels were often undependable. Engine characteristics in relation to pumping requirements were not known and engine fuels were not standardized. The agricultural engineers filled this breach by conducting an engine and fuel testing program which enabled the pumper to select the correct engine for his application and obtain proper fuel for that engine.

With a basic program under way for evaluation and development of water supplies, the importance of efficient utilization of water became increasingly apparent.

In 1917, Dr. Smith designed the first extensive concrete pipe line system in the state. This installation was made at Continental, Arizona, for the irrigation of Guayule, a rubber plant from Mexico, and consisted of over 25 miles of 12 to 20-inch diameter pipe. It remains to this day the largest single installation of concrete pipe in the state. The published report of this work was an important contribution in the efficient use of our limited water supplies.

## Study of Thirsty Plants

The Agricultural Experiment Station engineers early recognized the importance of phreatophyte control in water conservation. In 1917 to 1920 they studied water consumption by Mesquite, Cottonwood, Sacaton and Salt Grasses. The techniques for determination of consumptive use developed in this study were later used by other agencies as the importance of phreatophytes in their use of ground water was more widely recognized.

As ground waters became more and more intensively utilized, continuing ground water surveys have been carried out in major irrigated areas. These studies have embraced the Lower Gila, Queen Creek, Casa Grande, Eloy, San Simon, Sulphur Spring Valley areas and the entire Santa Cruz Valley. They have provided a comprehensive history of the utilization of a ground water supply and served as a guide, often ignored, of the safe yield of the water sources involved.

A valuable by-product of the ground water program has been the collection of well logs. This collection is probably the largest in the state and includes thousands of logs of irrigation, domestic, stock, and industrial wells. In some cases the logs are accompanied by actual samples of cuttings from the holes, which have served as valuable source materials for geologists engaged in sub-surface mapping.

## Sprinkler Irrigation Has Value

The water resources program has been continued and a program of sprinkler irrigation investigations has been initiated and is continuing in progress. Sprinkling offers opportunities for decreasing water losses due to non-uniform application and seepage from field distribution systems.

**BELOW is shown an early Arizona irrigation pumping plant with a single cylinder, slow-speed tractor engine with one-quarter turn flat belt drive on a deep-well turbine pump. Note the radiator has been removed and cooling water is taken directly from the pump discharge. In contrast, at right (on facing page) is a present day natural gas installation with 250 horsepower 6-cylinder engine direct-connected to a deep-well turbine pump with right angle gear head.**

