An Attempt to Convert an Abandoned Oil Well to a Water Well in the Joffre Field, Alberta
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In June, 1967, an attempt was made by the Research Council of Alberta to convert an abandoned oil well to a water well by gun-perforating the surface casing opposite water-producing sands. It was felt that due to the depth at which fresh water-bearing aquifers occurred in the area, gun-perforation of abandoned oil wells might prove to be the most economical method by which landowners in the area could obtain adequate supplies of fresh water.

The following discussion describes the technique used in the conversion and offers some comments as to why we were unsuccessful.

The Joffre oil field is located in south-central Alberta, approximately 10 miles northeast of the city of Red Deer. Most wells completed in the field produce oil and gas from both the Lower Cretaceous Viking Formation and the underlying Devonian reef complex. With the depletion of reserves from these two horizons, the number of wells abandoned for economic reasons increases with time.

The Alberta Oil and Gas Conservation Board regulations regarding the abandonment of oil and gas wells in the Joffre field require that a 200-foot cement plug be set at the bottom of the surface casing, which in the Joffre field is approximately 600 feet. Since there are some prolific aquifers in this area at depths of 200 to 400 feet, it was felt that the conversion of these abandoned wells for water supply purposes would be economically feasible.
The well used in this study was drilled by Imperial Oil Limited in Lsd. 5, Sec. 5, Tp. 39, R. 26, W. 4th Mer. on the southwestern limits of the Joffre field. The well was abandoned in the spring of 1967 and at the request of the landowner the 13-inch surface casing was capped and left exposed at the surface.

The first step in the conversion procedure was to determine exactly at what intervals the well penetrated water-bearing sands. This was accomplished by running a Schlumberger gamma-ray log in the well (Fig. 1) and correlating with a log run in a well 1 1/2 miles south (Fig. 2) in which water sands had been encountered in the depth intervals 275-308 and 464-545 feet. Analysis of the gamma-ray log for the northern well indicated a potential water-bearing sand between 280-308 feet.

Using a Schlumberger "Hyper Jet" perforating tool, the casing was perforated with 20 shots (9" spacing) between 288 and 303 feet.

The technique proved unsuccessful in that water did not enter the well after perforating. Examination of the well two days later indicated that no water had entered the well and it was decided that the technique was not appropriate.

Based on an analysis of the operation, the following conclusions can be drawn:

The well failed to produce water because:

1. The "sands" were not saturated, or

2. The perforations did not penetrate the formation to a point at which water could flow into the well.

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