**FIELD TRIP MEMORANDUM:** Clarence Babcock
Name

Dec. 11-14, 1967
Dates (inclusive)

**Where** Thayer-Davis, No. 2 Hill well (T.D. 6,209 feet)

**For Whom** Hernando County

**Why** To witness plugging operations

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**SERVICE REPORT RE:**

1. The casing program in this well was:

Information on the conductor pipe will be included on Form 9, to be submitted later.

8 5/8-inch set at 1220 feet

7-inch set at 3150 feet, with 350 sacks

There was 510 feet of open hole below the 7-inch casing seat at the time this string was set. Cement filled much of this open hole; the operator states there was 200 feet of cement below the casing seat. The Halliburton representative calculated that if cement filled 200 feet of open hole, the total injected (350 sacks) was still enough to entirely cement the anulus behind the 7-inch casing, and flow excess cement at the surface. And even if the cement filled all 510 feet of open hole below the 7-inch casing seat, there would be enough additional cement (of the 350-sack total) to rise to a point within 50 feet of the ground surface. The stretch test and associated information (point 3, below) indicate cement actually rose to within about 1,850 feet of the ground surface.

2. The fresh water-salt water contact is believed to have occurred between 3250-3550 feet. Reason for this conclusion are:

a) The induction and conductivity curves on the IES log (included with this presentation; please refer to the 2-inch scale for penciled notations) indicate a gradational contact at the subject interval.

b) Mr. Fred Newman, Schlumberger Engineer, calculated the salinity for two high-resistivity, good-porosity zones in the interval of the gradational contact. His results were:

| Zone | Salinity |
|---|---|
| 3215-35 | 950 ppm |
| 3360-70 | 1200 ppm |

c) Upon drilling through the cement plug left after setting the 7-inch casing, fresh water began flowing at the surface, according to the operators, and also Mr. Floyd Temple, Baroid Engineer. The operators thought this indicated a break in the 7-inch casing string. They therefore applied a stretch tension of 120,000 pounds to the string, to test its integrity. Since the casing did not part it was concluded that it had not leaked; and subsequent developments indicate that the fresh water came from below the casing seat.

d) The presence of many lost circulation zones through an extensive interval in the upper part of this well is indicated by the drilling history, by the drilling time log, and by the fact that the operator set an unusually long string of 7-inch casing (to a depth of 3150 feet). It is inferred that these lost circulations zones are attributable to solution by fresh water.

3. Stretch test

As stated above, a tension of 120,000 pounds was applied to the 7-inch casing to test its integrity when a fresh water flow commenced after drilling the 7-inch casing plug. This tension stretched the casing a maximum of 10 inches.

Neither the Halliburton nor Fortenberry representatives had tables or other information relating stretch to free casing. Therefore, the Fortenberry tool pusher, Mr. George Sims, made a long distance telephone call to Mr. Red Stewart, of Stewart Oil Well Fishing Tool Company, Brookhaven, Mississippi, to request this information; I was present when this call was made. Mr. Stewart stated that this information is not

available in a table. However, he has found from experience that a tension of twice the weight of the casing string will result in a stretch of 6 inches per 1000 feet of free casing, plus or minus about 200 feet. The weight of the casing string in question was about 60,000 pounds (20 pounds per foot x 3150 feet); twice this would be the 120,000 pounds mentioned by Mr. Stewart in his empirical relationship. Therefore,

if 6 inch of stretch indicates 1,000 feet of free casing
then 10 inches of stretch indicates 1,666 feet of free casing

The drilling history of the well indicates that a lost circulation zone occurred at about 1,850 feet (see companion memo relative to conversion of this test to use as a fresh water well). It appears that the stretch test indicates that the anulus is cemented up to this zone of lost circulation.

4. Plugging of the well

In view of the above circumstances, this well was plugged on December 13, 1967, as follows:

Set 95 sacks of cement over the 390-foot interval from 3,000-3,390 feet (see E. log). This emplaced 150 feet above the 7-inch casing seat, and 240 feet below the seat. It also emplaced about 150 feet of cement below the point at which formation water with a salinity of 950 ppm occurred, as determined by the Schlumberger Engineer. The top of the plug at 3,000 feet was verified by "tagging".

The upper part of this hole was converted to use as a fresh water well (see companion memo in connection with this operation).

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**SERVICE REPORT RE:**

Subject:

Conversion of the subject oil test to use as a fresh water well.

Discussion:

Mr. Sherman A. Hill, owner of the property on which this well was drilled, has submitted a letter (attached) in which he states that he wants this hole to be converted to use as a fresh water well, and that he accepts responsibility for re-plugging the well should the State deem this to be necessary in the future. The purpose of this memorandum is to describe the circumstances connected with this conversion. These circumstances are:

1. This well was plugged and abandoned as an oil test on December 13, 1967, as described in an accompanying memo, which presents reasons for considering the fresh water - salt water contact to occur from 3,240-3,550 feet. Accordingly, the operators set a cement plug from 3,000-3,390 feet; the upper 150 feet of the plug was emplaced in the 7-inch casing (set at 3,150 feet).

On the basis of regional correlations it appears that the Lawson Limestone, and the Taylor "kick", are encountered at about 3,074 feet and 4,125 feet, respectively. Thus, the fresh water - salt water contact, at 3,240-3,550 feet, probably occurs in the upper part of the Upper Cretaceous section.

2. Fresh water under sufficient artesian pressure to fill a 2-inch pipe will flow from the anulus between the 7-inch and 8 5/8-inch casing strings.

3. I ran an analysis of a sample of this water and determined chlorides to be 50 ppm, and total dissolved solids (as computed from a conductivity of 2,000 mmhos, using a conversion factor of 0.6) to be 1,200 ppm. The chloride determination is roughly substantiated by an analysis by Mr. Mike Dover, Baroid Logger, who arrived at a figure of 100 ppm chlorides.

4. It is believed that this flow emanates from a cavity encountered during drilling at a depth of about 1,850 feet. The stretch test referred to in the plugging memo indicates, very roughly, that the anulus between the 7-inch casing and the borehole is filled with cement to this approximate depth. Also, a letter dated August 28, 1967, in our file on this well from Mr. D. A. Sommers, Geologist with the U. S. Geological Survey, states that a conductivity of 2,400 mmhos was determined for a sample taken from the bailer when the open hole was being drilled at 1,860 feet. This corresponds fairly closely with the conductivity of 2,000 mmhos which I determined for the sample taken from the flow line (see point 3 above).

Mr. Sommers stated that it is likely that his high conductivity reading was caused by the sulfate ion in the gypsum and anhydrite occurring in the Lake City Limestone and the Oldsmar Limestone.

To effect the conversion of this hole to use as a fresh water well, the operators left the braden head at the surface. A valve in this braden head controls the flow of the fresh water coming from the anulus behind the 7-inch casing.