

E. S. BAKER #1

LOGGING PROGRAM

Before casing was set, the well was logged to 856 feet, 10 inches. Logging was done by Piper Well Surveys, Inc., Box 261, Bradford, Pennsylvania. Piper ran Electric, Nuclear - Gamma Neutron, and Density-Caliper logs. This work was completed on September 25, 1968.

After the well reached total depth, additional logs were run by Schlumberger. A Dual Induction - Laterolog was run from 912 to 3,490 feet; a Sidewall Neutron Porosity log from 912 to 3,490 feet; and a Compensated Formation Density Log (Gamma-Gamma) from 100 feet to 3,490 feet. In addition, Schlumberger provided a Log Analysis from 1,104 feet to 3,478 feet. This analysis furnished data on those logged intervals which showed porosity. The Schlumberger logs were run during the period September 14, 1969 to September 16, 1969.

GEOLOGY

The E. S. Baker No. 1 was drilled on a surface

closure called the Grand Isle anticline (Figure 2). The anomaly was mapped in detail by surface geology and photogeology. It was checked and re-checked in the field by at least four competent geologists. Best estimates are that closure on the land portion of the anticline totals at least 3,200 acres. Sedimentary rocks are well exposed and the presence of this relatively large structural feature was definitely substantiated well in advance of location of a test well site.

The Baker No. 1 spudded in Chazy sediments, near the top of this formation. Fossiliferous carbonates are exposed on the surface, a short distance from the well site. In the beginning, this well was located to test the presence and characteristics of the Beekmantown and Potsdam formations at relatively shallow depths. Although we could not hope to find commercial hydrocarbons in the Chazy formation which is exposed on the surface, the well could reveal the lithology of a major part of this formation as well.

Prior to the drilling of the Baker well, three relatively deep tests had penetrated a thick section

of Middle Ordovician black shales totalling from 3,000 to 5,000 feet. The two Gregoire wells drilled east of Lake Champlain actually spudded in basal Cambrian Dunham dolomite, which forms the sole of the overthrust sheet, and penetrated several hundred feet of this formation before entering the Ordovician shale. It was our intent to drill the lower portion of the sedimentary sequence in this basin at a site where these rocks could be studied without the necessity of drilling some 6,000 to 8,000 feet of younger beds. The Grand Isle anticline offered such an opportunity, plus the chance to test a closed feature. Although the entire section to Basement was not drilled, the presence of Chazy, Beekmantown and some hundreds of feet of Potsdam sandstone was verified in the Baker well.

As drilled, the well penetrated Chazy limestone with some interbeds of clastics and dolomite from surface to about 1,050 feet. From 1,050 to 1,104 feet the beds are mostly sandstone. The Chazy limestone and dolomite has a number of oolitic and sandy zones which may have porosity. The actual base of

TAYLOR AND ASSOCIATES, INCORPORATED

- 7 -

the Chazy and/or top of the Beekmantown was not definitely determined from the well samples. The Manager of Exploration for Quebec Natural Gas Company tentatively picked the contact at 1,126 feet, but it is difficult at best to select such a point in a predominantly carbonate sequence. In all probability, the base of the Chazy lies somewhere between 1,050 and 1,126 feet.

On the basis of such a pick, the Chazy here is at least 1,050 to 1,100 feet thick. This is a greater thickness than has been mapped for this formation anywhere in the basin to date. Some "thickening" may result from penetration of dipping beds, although on the surface the location appears to be situated on relatively flat Chazy carbonates. Even taking into account a relatively steep dip, however, it would not add the several hundred feet of thickening indicated for the Chazy in this well, as compared to surface measurements to the west. It must be assumed that either the Chazy thickens to the east from the outcrop, or surface measurements have been underestimated -- or both.

The Beekmantown, likewise, was not definitely defined in the E. S. Baker No. 1. As noted above, the top was not precisely picked, occurring between 1,050 and 1,126 feet. It is primarily a carbonate-magnesium sequence, but there are considerable thicknesses of interbedded clastics. Sandstones and calcarenites are prominent. One calcarenite zone attains a thickness of more than 200 feet.

As in the case of the Chazy, the Beekmantown appears to have thickened to the east in the subsurface. Geologists who have studied the outcrops, as well as subsurface lithology to the north and northwest, note a change in the Beekmantown and in the upper Potsdam lithology in this well. As a result, it is difficult to select the exact contact between the two. From the Schlumberger Electric Log, the contact was picked at 2,806 feet; on the basis of the sample study, however, it was picked at 2,950 feet.

Depending upon where the top and base of the Beekmantown is selected, the thickness in this well is 1,756 to 1,824 feet. This is substantially thicker than the surface measurements in the outcrop to the

west have indicated. If the Theresa and/or Ticonderoga formations are present and included in the Beekmantown, it could account for some of the thickness increase. Even if this were done, however, it is almost certain that the Beekmantown has increased in thickness down dip to the east from the outcrop.

The Potsdam was one of the principal objectives in the E. S. Baker No. 1 test. The intent was to ascertain the presence of this formation and also to study its lithology. We had hoped to drill a considerable thickness of the Potsdam, but because of increased costs, coupled with mechanical drilling problems, it was decided to terminate the operation at a depth of 3,500 feet. Depending on the accepted top of the Potsdam (base of the Beekmantown), the E. S. Baker No. 1 penetrated from 550 to 694 feet of the Potsdam formation and terminated at 3,500 feet still in this unit.

Lithologically, the Potsdam is a clastic sediment containing much siliceous sandstone. The sandstone is fine to coarse grained, angular to subround, brown to gray in color, and loosely consolidated to well-

- 10 -

cemented. In this well, there are numerous beds of calcarenite, as well as interbedded dolomites within the Potsdam, especially near the top of the formation. Also, starting at about 2,976 feet, small black sticky masses of asphaltic material (dead oil ?) which gave a yellow cut in carbon tetrachloride (CCl_4) were noted. These continued sporadically to a depth of about 3,070 feet. The black asphaltic masses were also noted in the interval 3,320 to 3,354 feet.

Geologists who have studied the samples in the E. S. Baker No. 1 note that there is more calcareous material in the Potsdam than is the rule in outcrops to the west and north and in wells drilled to the northwest in Quebec, Canada. Although less than 700 feet of Potsdam sandstone was drilled in the Baker test, measurements to the north suggest that from 1,500 to 2,000 feet of the formation may be present in the Lake Champlain area. The Potsdam would appear to be suitable as a reservoir rock for the commercial accumulation of hydrocarbons, as well as a reservoir for the storage of gas.