



United States Department of the Interior

GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
325 JOHN KNOX ROAD
SUITE F-240
TALLAHASSEE, FLORIDA 32303

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Tootle
File
p# 785
IN REPLY REFER TO:

August 14, 1975

RECEIVED

AUG 15 1975

BUREAU OF GEOLOGY

Mr. C. W. Hendry, Jr., Chief
Bureau of Geology
Florida Department of Natural Resources
903 West Tennessee Street
Tallahassee, Florida 32302

Re: Amoco USA 6-4 No. 1
Ocala National Forest

Dear Bud:

In response to a telephoned request from Charles Tootle of your staff to Joel Kimrey, Chief of our Winter Park Subdistrict office, we are pleased to transmit a copy of Mr. Kimrey's memorandum to the Record of August 8, 1975, regarding the depth to the fresh-salt water interface in the Amoco USA 6-4 No. 1 wildcat well in the Ocala National Forest. As you will note, the memorandum is concerned primarily with documenting criteria on which provisional field judgments were made as to the depth of the fresh-salt water interface.

Personnel from the U.S. Geological Survey's Water Resources Division were present at the well site to provide technical assistance to representatives of the Survey's Conservation Division, the agency responsible for administering the Federal oil and gas rules and regulations on Federal lands. You will note that by copy of Mr. Kimrey's memorandum, he has requested that Mr. Godfrey of the Conservation Division identify any possible errors in the memorandum regarding the well construction process, depths, etc. Any final formal documentation from the U.S. Geological Survey that your agency may need for its files regarding the position of the fresh-salt water interface in the subject well will be prepared by the Conservation Division.

In regard to your request for copies of laboratory analyses not yet available of water samples collected at the well and run by the Water Resources Division, we are requesting by copy of this memorandum that Mr. Kimrey arrange to have them transmitted to you when available. If by oversight you fail to receive them in due time, please contact Mr. Kimrey directly.

Hopefully, the attached information will fill your current needs.

Sincerely yours,



Clyde S. Conover
District Chief

Attachment

cc: Tom Godfrey, District Engineer, Cons. Div., Jackson, Miss.
Joel Kimrey, Subdistrict Chief, WRD, Winter Park, Fla.
Charles Tootle, Department of Natural Resources, Tallahassee, Fla.

UNITED STATES GOVERNMENT

Memorandum

RECEIVED

AUG 11 1975

DATE: August 8, 1975

TO : THE RECORD

FROM : J. O. Kimrey, WRD, Winter Park

DISTRICT OFFICE
U.S. GEOLOGICAL SURVEY
TALLAHASSEE, FLORIDA

SUBJECT: PROGRAM AND PLANS: Amoco USA 6-4 #1 wildcat, Ocala National Forest

Drilling operations on subject wildcat well began during the week of July 14. I visited the site on July 17 and met Messrs. Clifford and Godfrey of the Conservation Division. By July 22, casing had been set to a depth of 260 feet and the hole had been drilled to 1450 feet. Circulation had been lost at 413 feet, and was not regained by 1450 feet. The makeup water used in drilling was from two wells (120 and 160 feet deep), in the upper part of the Floridan aquifer that yield water with a chloride content of 6-9 mg/l.

On July 21-22, the initial 1450 feet of hole were logged by the Schlumberger Company and the SE Regional logging unit. Hayes Grubb and I observed the logging and examined the logs. The logs indicated a sequence of several dense dolomitic zones separated by very permeable limestone zones. Down the hole flow of fresh water from the uppermost permeable zone precluded any interpretation of formation water quality in the lower permeable zones. The temperature log indicated a bottom hole temperature of only 2°F higher than top hole (75°F vs 73°F). The current meter survey indicated a maximum downward flow of about 800 gpm from the upper permeable zones; lesser amounts were being interchanged downward by the lower permeable zones.

Downhole flow of this general magnitude during drilling operations should have resulted in massive invasion of the lower permeable zones by very fresh water; so the SP and resistivity logs were useless for determination of the fresh-salt water interface. During logging, a bottom hole water sample was collected with the Regional logger and analyzed by the Ocala WRD lab. The resulting chloride analysis of 12 mg/l is considered a result of down the hole movement of fresh water.

Depth to the fresh-salt water interface at the site is not known, but has been conservatively estimated by Glen Faulkner to be about 1600 feet below LSD. The nearest usable information on the interface in a comparable hydrogeologic setting is about 32 miles away in Volusia County. By this admittedly rough correlation, Hayes and I felt that the dense zone in which the hole was bottomed might be the confining bed at the interface. Following logging operations, a string of 13 3/8 inch casing was set to 1450 feet.



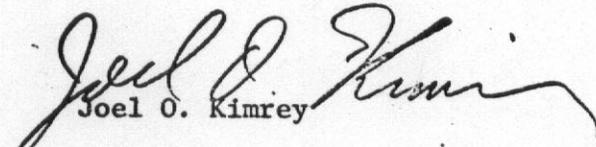
Drilling resumed after casing was set to 1450 feet. Return was achieved to 1463 feet when circulation was again lost. However, two samples of return fluid were collected for the 1450-1463 depth interval; chlorides of 700 and 550 mg/l were titrated for these samples. These chloride values should also be considered suspect of dilution by the freshwater drilling fluid. Circulation was partially regained at a depth of 1556 feet, and lost again at 1590. This section of hole was bottomed at 2700 feet without full circulation being regained.

On August 1-2, geophysical logs were obtained by Schlumberger and the WRD logger for the 1450-2700 feet interval. Jerry Idler and I were at the site. The SP curves were again largely useless to interpretation of formation water quality; this was not unexpected considering the limestone section and the continued introduction of very fresh water into the borehole during drilling. Interpretation of formation water quality was largely made by comparison of the long normal resistivity and neutron density logs, with reference to the caliper and drilling-time logs. The sequence of alternating dense and softer zones continued in the 1450-2700 feet interval. The resistivity curve showed decay or dampening in the dense zones below 1540 feet, but the other logs indicated no appreciable difference in the character of these zones. Decay of the resistivity curve was thus interpreted to be caused by down-the-hole increase in formation water salinity. Considering that the borehole fluid samples from the 1450-1463 feet were likely mixed with fresher water, I feel that the 13 3/8 string of casing grouted in at 1450 feet is seated at or below the 1000 mg/l isoclor. Granted, experience with the Floridan aquifer indicates that the more permeable zones that occur from the lost circulation depth (1463 ft) to about 1480 feet) may contain less mineralized water due to differential flushing; but for practical purposes, I would consider the 13 3/8 inch string of casing to be seated at or below the interface.

The spinner survey showed no detectable movement of fluid between zones in the 1450-2700 feet interval. The fluid resistivity log indicated the highest conductance in the borehole to occur from about 1740 to 1840 feet; the neutron and caliper logs indicate this interval to be of probably very high porosity. A borehole fluid sample was thus collected at 1800 feet and is being analyzed in the Ocala lab. A preliminary titration indicates the chloride content to be about 3000 mg/l.

At present, casing is being seated to the 2700 feet depth and drilling will continue to basement rock at estimated depth of 4200-4500 feet. Further WRD observation of this wildcat is not anticipated to be needed. We will assist the Conservation Division, as needed, with the

next planned test hole. By copy of this memo, Tom Godfrey is asked to comment on any errors I may have made in describing drilling procedures, depths, etc..


Joel O. Kimrey

cc: Don Brown, WRD, Raleigh, NC
C. S. Conover, WRD, Tallahassee
Jim Daniel, WRD, Atlanta
Glen Faulkner, WRD, Tallahassee
Tom Godfrey, Cons. Div., Jackson, Miss
Leonard Wood, WRD, Reston, VA