

GEOLOGICAL AND ENGINEERING REPORT
BONE SPRINGS FORMATION
GREENWOOD PRE-GRAYBURG UNIT NO. 3
EDDY COUNTY, NEW MEXICO

The Pan American operated Greenwood Pre-Grayburg Unit No. 3 located 1985' FNL and 660' FEL, Section 27, T-18-S, R-31-E, Eddy County, New Mexico, was completed on July 29, 1958, as a Devonian gas well. The well was later recompleted to the Bone Springs and Wolfcamp Formations on April 6, 1961, and March 6, 1961, respectively. The Wolfcamp Formation in Greenwood Unit Well No. 3 has been designated as non-commercial. The Bone Springs Formation is capable of producing unitized substances in paying quantities and, therefore, requires establishment of an Initial Participating Area for the Bone Springs Formation.

Prior to the Bone Springs recompletion, Greenwood Unit No. 3 was drilled to a total depth of 12,858'. The well was completed in the Devonian Formation in the interval 12,728-48' for an initial potential of 1200 MCF and 79 barrels of 59° condensate in 24 hours.

The Devonian Formation in Greenwood Unit No. 3 was shut-in in January, 1961 and the well was recompleted as a dual producer in the Bone Springs and Wolfcamp Formations. A bridge plug is set at 9989' between the Devonian and Wolfcamp Formations. The Wolfcamp was then perforated in the interval 9785-95', acidized, and completed for an initial flowing potential of 167 barrels of oil and 17 barrels of load water in 20 hours through a 14/64" choke on March 6, 1961. The Wolfcamp has since declined to a present producing rate of 4 BOPD during October, 1962.

The Bone Springs was perforated in the interval 8135-85' and stimulated with 500 gallons of acid. The Bone Springs Formation flowed 238 BOPD with no water through a 12/64" choke on the initial potential test on April 6, 1961. The Bone Springs Formation flowed at top allowable rates (approximately 105 BOPD) until November, 1961 at which time the flowing producing rate decreased. Pumping equipment was installed during January, 1962. The latest official gas-oil ratio test submitted to the New Mexico Oil and Gas Conservation Commission showed the Bone Springs Formation to be producing 100 BOPD and 22 BOPD with a gas-oil ratio of 757 cubic feet per barrel on September 12, 1962. The Bone Springs Formation average 82 BOPD during November, 1962 with a cumulative oil production of 54,550 barrels as of December 1, 1962.

The Bone Springs Formation within the Greenwood Unit consists of beds that are dipping gently to the southeast at approximately 150 feet per mile. Very slight folding has occurred along a northwest-southeast axis and has resulted in a minor structural nose dipping to the southeast. The pay zone consists of tan to light-brown medium crystalline dolomite, characterized by good vuggy and inter-crystalline porosities, and is encountered approximately 150 feet below the base of the First Bone Springs Sand.

Although the Bone Springs Formation is perforated over a 50 foot interval, the net producing interval is actually approximately 4 feet in thickness, as indicated by the microlaterolog. The Bone Springs Formation was not cored. Log analysis indicates an average porosity of 11% and an average water saturation of 25%. The performance of the Bone Springs Formation indicates that the well is draining more than 40 acres. Attachment "A", a structural contour map of the Bone Springs, shows the proposed 360-acre Initial Participating Area consisting of the NE/4 and the N/2 SE/4, Section 27, and the W/2 NW/4 and NW/4 SW/4, Section 26, T-18-S, R-31-E. The proposed Initial Participating Area for the Bone Springs is located entirely within the established Siluro-Devonian Participating Area. Attachment "B" is a log cross section through the Greenwood Pre-Grayburg Unit.

The nearest Bone Springs oil production to the proposed Initial Participating Area is in Greenwood Unit No. 7, SE NE Section 12, T-19-S, R-31-E. A non-commercial designation has been requested for the Bone Springs Formation in Greenwood Unit No. 7. The Bone Springs Formation was not tested in Gulf Oil Corporation's Littlefield "AB" No. 1, SW SW Section 22, T-18-S, R-31-E, or in Greenwood Unit No. 6, NW SE Section 26, T-18-S, R-31-E, the closest north and east offsets to the proposed Initial Participating Area. A drillstem test of the Bone Springs Formation in Greenwood Unit No. 1, SE SE Section 27, T-18-S, R-31-E, the nearest south offset to the proposed Initial Participating Area, recovered 75' of slightly gas cut mud with no show of oil or water from the interval 7891-7921'. This interval, however, is approximately 200' higher than the correlated interval from which Greenwood Unit No. 3 is producing.

On the basis of past performance of Greenwood Unit No. 3, it can be concluded that the entire 360 acres within the proposed Initial Bone Springs Participating Area has been reasonably proven to be capable of oil production in commercial quantities.

CFH/dp