WATER FLOODING THE BRADFORD FIELD—1949

By JOHN F. BUCKWALTER

Introduction

The Bradford oil pool is unique in many respects. It ranks second in area and sixth in total oil production of the pools in the United States. The oil production rate of the Bradford field in May, 1949, is only 29,000 barrels per day. The drilling rate for the year 1948 averaged 189 wells per month. The high quality of the Pennsylvania Grade Crude Oil produced, of course, is responsible for the apparent contradiction between the high drilling rate and the relatively low oil production rate.

Many “firsts” can be credited to the Bradford operators. Since water flooding was legalized in Pennsylvania in 1921, Bradford has been the center of water-flooding activity in the world. It can still rightfully claim to be the center of water-flooding technological activity. The Pennsylvania Grade Crude Oil Association research laboratory, the Pennsylvania State College research projects, the large number of reservoir engineers employed by the operators give sufficient evidence to Bradford’s leadership in technical advances in water flooding. Bradford seems to be the school for the industry in this respect, for a large number of the water-flood engineers throughout the country received their basic field training in Bradford.

Some persons have stated that the Bradford sand is so uniform and so suited to water flooding that it is impossible to experience failures in the Bradford area. It is true that the Bradford sand is suited for water flooding, but the sand is not uniform, and failures are possible. Without the universally accepted technical methods of flooding used today, the failures would be many and serious.

An attempt will be made to show that the Bradford sand is not uniform, and that failures in water flooding have been experienced in the past. The type of engineering practices used today to prevent failures and inefficient flooding will be pointed out.

History of the Field

Fettke and others have related the pertinent facts about Bradford’s history and the development of water-flooding projects. The evolutionary process of developing better methods of recovering oil from the reservoir continues. Early in the 1920’s, water flooding was carried on in a haphazard manner. Wells which seemed to be poor in oil production were used as dump-flood intakes in an attempt to push oil to adjacent oil wells. The circle flood followed in which the more systematic procedure was used of drilling wells in concentric and gradually larger circles, injecting water in the central part of the pattern and pumping oil and water on the periphery. This method gave way to the line flood which soon was followed by experiments in the use of flood patterns in which the pumping wells were surrounded by several water-intake wells, each intake in turn serving several pumping wells, thereby covering the area to be flooded by a continuous pattern. The familiar 5-spot proved to be the most practical of these patterns and it is in general use today.