

TECHNICAL NOTE ON TRANSIENT PRESSURE ANALYSIS
FOR FLOW SYSTEMS WITH CONSTANT PRESSURE OUTER BOUNDARY
FOR THE OIL PRODUCING FRACTURED SHALE RESERVOIR OF THE NIOBRARA
MEMBER OF THE MANCOS FORMATION
WEST PUERTO CHIQUITO POOL
CANADA OJITOS UNIT
RIO ARriba COUNTY, NEW MEXICO

PRESENTED IN CASE NOS. 7980, 8946, 8950 AND 9111
BEFORE THE OIL CONSERVATION COMMISSION OF THE
NEW MEXICO DEPARTMENT OF ENERGY AND MINERALS

JUNE 13, 1988

INTRODUCTION

Pressure tests and analyses of wells producing early in the life of the West Puerto Chiquito pool, during the 1960's, showed flow systems to be those of individual small reservoirs producing with "constant" pressure at the boundary; but with the individual reservoirs linked by a high capacity fracture system.

A well given a sand fracture treatment performed as if it had a large "effective wellbore radius" with respect to the size of the small reservoir ("tight block") in which it was completed.

Approximate analyses made by utilizing flow relationships for that of a "large internal boundary" permitted an estimate of size of the tight blocks - or at least a radial dimension of distance to the high capacity fracture system - a distance which later was termed in the industry "frac extension" following frac treatments. These were filed with the Oil Conservation Commission initially in Case 3455 in December 1969.

When type curve analyses became available (1978, Reference Section V herein) for wells with induced fracture in a constant boundary flow system it was possible to estimate the fracture length and at least one dimension of a well's tight block size.

~~the duplicate exercise of developing the curves.~~

These analyses confirmed the size of these tight blocks as earlier calculated from the flow systems for a large internal boundary. This corroborating information was filed with the United States Geological Survey (USGS) in 1980 in conjunction with an expansion of the Canada Ojitos Unit.

Although the analysis for a flow system of induced fracture with a constant pressure boundary was brought into the technical literature in 1978, we have seen no large scale type curves that were made publicly available (constant pressure boundary flow systems are not common). Accordingly B-M-G calculated from the information in this reference the necessary values and from this constructed type curves (herein under Sections W and X; Section W being type curves for infinite conductivity vertical fractures and Section X being type curves for uniform flux vertical fractures). From these calculated values, type curves were prepared for both pressure on log scale and pressure on semilog scale (Sections Y and Z). They are included here, not only for use in examples discussed herein, but to be made available to others so they need not go through the duplicate exercise of developing the curves.