PROPOSAL FOR MEASUREMENT AND ANALYSIS OF WELLHEAD PRESSURE TRANSIENTS FOR EVALUATION OF HYDRAULIC-FRACTURE DIMENSIONS

TERA Corporation

1.0 INTRODUCTION

The determination of dimensions, strike, and dip of hydraulically induced fractures is of economic importance to solution miners for a variety of reasons:

- If a reliable relationship among fracture dimensions, hydraulic horsepower, and pumped volume is established from measurements in a given field, it becomes possible to optimally specify hydraulic horsepower and volume to achieve the design fractures.
- Accurate knowledge of fracture dimensions enables optimization of spacings between injection and target wells, when fracturing is used to link the two.
- With increased understanding of fracture behavior, the ability to link more than two wells in a single fracturing treatment is improved.
- An optimized fracturing program, in which fracture growth mechanics is understood and taken advantage of, reduces the number of wells needed for field development (Ref. 1).
- Monitoring fracture growth in real time permits adjustment of treatment parameters to achieve optimal results.
- Summarily, the ability to reliably determine fracture dimensions, strike and dip will lead to cost savings by reducing the number of fractures and/or wells necessary for a given level of brine recovery.

In this proposal we describe a simple technique for estimating dimensions of hydraulic fractures by measuring and analyzing wellbore pressure oscillations routinely produced during fracturing treatments. The necessary measurements are inexpensively made using wellhead sensors, and the theory for interpretation of the measurements is well established (Ref. 2). The technique is not new, having first been used in a series of experiments in New York State in the 1960s with encouraging results (Ref. 2). We propose that the method be tested and calibrated in fracturing treatments in salt, for which it appears optimally suited because of the shallow treatment depths and low fluid viscosities.