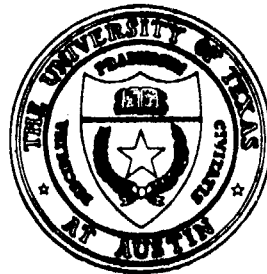


PETROLEUM ENGINEERING  
DEPARTMENT

*The Horizontal Penetration of a  
Buoyant Jet Stream in Brine*

*SMRI Project*

Report No. 76-2



THE UNIVERSITY OF TEXAS AT AUSTIN  
COLLEGE OF ENGINEERING

## INTRODUCTION

Two wells, M-1 and M-2, located on Diamond Crystal Salt Company property, were drilled approximately 2140 feet into the "B" salt of the Michigan basin, salina group formation. The salt in each well was notched at approximately 2100 feet and open-hole hydrofraced successfully with inflatable packers set approximately 5 feet above the notched zones. In conjunction with the hydrofracing project, the Solution Mining Research Institute under contract with M. D. Wood, Inc. was given the opportunity by Diamond Crystal Salt Company to conduct an experiment for the purpose of determining the type of fracture (horizontal or vertical) and to map the area and azimuth of the hydrofracing fluid by earth movement using tiltmeter sensing devices.

The results of the hydrofracing operation are presented in this report. The results of the M. D. Wood, Inc. project are to be reported separately.

## SUMMARY

The M-1 and M-2 wells were successfully communicated and completed with a low pressure connection by the hydrofracing process.

The formation breakdown pressure of M-1 injection well, situated in a Northwesterly direction, and 180 feet from M-2 well, was approximately 1950 p.s.i. at the well head. Communication was reached with M-2 following the injection of 115 barrels of brine during a 25-minute period at a propogating pressure of 1550 to 1650 p.s.i. Following the communication fresh water was introduced into the M-1 well and an additional 1455 barrels

SUMMARY (Continued)

were used to enlarge the fracture for approximately five hours. The wells were then reversed and 2250 barrels of water were injected into M-2 well during approximately seven hours.

At the end of the washing period, the differential pressure between the wells was 250 p.s.i. of which 168 p.s.i. was attributable to hydrostatic pressure and the remainder 82 p.s.i. due to frictional pressure in the aboveground frac lines, well tubing, packer mandrels, etc., and fracture path through the salt.