

INCREASED OIL PRODUCTION AND RESERVES FROM IMPROVED COMPLETION
TECHNIQUES IN THE BLUEBELL FIELD, UIN

Quarterly Technical Report

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Objectives

The objective of this project is to increase oil production and reserves in the Uinta Basin by demonstrating improved completion techniques. Low productivity of Uinta Basin wells is caused by gross production intervals of several thousand feet that contain perforated thief zones, water-bearing zones, and unperforated oil-bearing intervals. Geologic and engineering characterization and computer simulation of the Green River and Wasatch formations in the Bluebell field will determine reservoir heterogeneities related to fractures and depositional trends. This will be followed by drilling and recompletion of several wells to demonstrate improved completion techniques based on the reservoir characterization. Transfer of the project results will be an ongoing component of the project.

SUMMARY OF TECHNICAL PROGRESS

Recompletion of the Michelle Ute 7-1 Well

Introduction

The recompletion of the Michelle Ute 7-1 well (section 7, T. 1 S., R. 1 E., USM) commenced and is the first step in the three-well demonstration. As part of the recompletion, the gross productive interval (12,900 to 14,450 ft [3934.5-4407.3 m] was logged, additional beds were perforated, and the entire interval was stimulated with a three-stage acid treatment.

The operator attempted to stimulate the well at high pressure (about 10,000 pounds per square inch (psi) [68,950 kPa]) at three separate packer locations. But at each location the pressure would not hold. As a result, all three stages were pumped at a lower pressure (6500 psi maximum [44,820 kPa]) from one packer location. As of December 31, 1996, the operator was tripping in the hole with the production packer and tubing to begin swab testing the well.

Logging

Dipole sonic and dual burst thermal decay time logs were run over the productive interval in the Michelle Ute 7-1 well. The dipole sonic log indicated several fractured beds and the dual burst thermal decay log showed numerous beds containing hydrocarbons. These logs, along with the detailed bed evaluation completed during the reservoir characterization phase of the project and correlation of original drilling shows, were used to select additional beds that were perforated. The dipole sonic log will be run again after the well has been treated with acid to determine if the stimulation has increased the number of beds with open fractures. A radioactive-tracer log will be run after the treatment to determine which beds actually had acid diverted into them and if any beds were bypassed. If possible, a spinner and temperature log will be run to determine which of the beds responded to the treatment and are producing hydrocarbons.

Acid Treatment

The packer and tubing were set at 13,720 ft (4184.6 m) (planned first stage 13,720 to 14,450 ft [4184.6-4407.3 m]) and then at 13,200 ft (4026.0 m) (planned second stage 13,200 to 13,720 ft [4026.0-4184.6 m]). At both locations leakage occurred when the well was pressure tested at 10,000 psi (68,950 kPa). As a result, acid was not pumped at either depth. The packer was then set at 12,899 ft (3934.2 m) (planned third stage 12,899 to 13,200 ft [3934.2-4026.0 m]). At 10,000 psi (68,950 kPa) leakage occurred at this depth as well but appeared stable at lower pressures. Therefore, all three stages were pumped over the entire interval (12,899 to 14,450 ft [3934.2-4407.3 m]) from this depth. The treatment (all three stages) consisted of 770 bbl (122,000 L) of total fluid containing 17,500 gallons (66,240 L) of 15% hydrochloric acid, with the following additives:

DP104 L),	solvent for solids suspension	- 155 gallons (585
FI L),	scale inhibitor	- 225 gallons (850
M275	Biocide bacteria control	- 60 pounds (27.2 kg),
L55	clay stabilizer	- 35 gallons (132.5 L),
L10	borate cross linking agent	- 12 pounds (5.4 kg),
J66	rock salt, diverting agent	- 3,250 pounds (1,475.5 kg),
J227	benzoic acid flakes, diverting agent	- 3,250 pounds (1,475.5 kg),
J429	friction reducer	- 33 gallons (125 L),
J424 L),	powdered guar gum polymer	- 350 gallons (1,325
A261	corrosion inhibitor	- 88 gallons (330 L),
W54	non-emulsifier	- 55 gallons (210 L),
M2	base for pH control	- 10 pounds (4.5 kg),
L62	iron stabilizer	- 253 pounds (114.9 kg),
L401	iron stabilizer	- 175 gallons (660 L) and,
	two radioactive isotopes.	

The physical parameters of the treatment are:

maximum pump pressure	6500 psi (44,820 kPa),
average pump pressure	5500 psi (37,920 kPa),
maximum pump rate	12.8 bbl/min (2000 L/min),
average pump rate	11.1 bbl/min (1800 L/min),
initial shut-in pressure	4500 psi (31,030 kPa) and,
5 minute shut-in pressure	2125 psi (14,650 kPa).

The well was opened and about 30 bbl (5,000 L) of fluid flowed back. The high-pressure tubing needed for the treatment was taken out of the hole and replaced with the production packer and tubing for additional swab testing.

Future Activity

The operator will continue to swab test the well until the treatment fluids are completely out of the well bore. Once swabbing is completed the well will be logged using dipole sonic, radioactive tracer, temperature, and spinner logs. The well will then be placed

back on production and carefully monitored. A post-recompletion appraisal of the treatment, logs, and characterization, will be conducted by the project team. The knowledge gained from this first well will be used to select beds for treatment in the second demonstration (Malnar Pike 17-1). In the second demonstration three or more beds will be horizontally drilled (about 10 ft [3 m]) with a hydrojet tool. Each bed will be stimulated separately allowing a comparison of the effectiveness and economics of treating large gross intervals and individual beds.

Technology Transfer

The Utah Geological Survey maintains a Bluebell home page on its web site containing the following data: (1) a description of the project, (2) a list of project participants, (3) each of the Quarterly Technical Progress Reports, (4) a description of planned field demonstration work, (5) portions of the First and Second Annual Technical Reports with information on where to obtain complete reports, (6) a reference list of all publications that are a direct result of the project, (7) an extensive selected reference list for the Uinta Basin and lacustrine deposits worldwide, and (8) daily activity reports of the Michelle Ute 7-1 demonstration work. The home page address is
<http://utstdpwww.state.ut.us/~ugs/bluebell.htm>