# Lewis & Mancos,

In 1998, Burlington Resources (BR) initiated a study to characterize the Lewis Shale (Lewis) gas potential in the San Juan Basin (SJB) and optimize exploitation. Historically, most SJB production has been from naturally fractured, low permeability, Cretaceous sandstones (Dakota, Mesaverde, and Pictured Cliffs)or from the prolific Fruitland Coal. In the past, the Lewis, which lies between the Mesaverde and Pictured Cliffs Formations, was completed in only the few wells where large Lewis flow rates were encountered while air-drilling for deeper targets. However, the Lewis lies behind pipe in thousands of existing wells across the SJB. In a large number of these wells and in new Mesaverde/Dakota wells, the Lewis can be completed. The BR program includes performing geological, petrophysical, reservoir, stimulation, and production data analysis. From this data, reservoir characterization, completion optimization, and forecasting models were developed that indicate commercial Lewis potential through much of the SJB in both new and existing wells. Furthermore, the Lewis is more accurately characterized as a sandy siltstone, rather than a true shale such as the Devonian or Antrim Shale. Introduction

The San Juan Basin (SJB), in northwestern New Mexico and southwestern Colorado, is the largest producer of natural gas in the Rocky Mountain province of the United States.[1] As the basin matures, “unconventional”horizons, such as the Lewis Shale, have drawn more interest and such reservoirs may significantly increase ultimate recovery from the basin. Since 1998, the Lewis Shale (Lewis) has been the focus of an extensive evaluation by Burlington Resources (BR). Stratigraphically, the Lewis is composed of shale, siltstone, and a smaller percentage of sandstone. Most of the Lewis can be classified as sandy siltstone. The Lewis lies above the Mesaverde Formation and below the Pictured Cliffs Formation, both prolific gas producers. The study area and most Lewis completion activity trends along the northwest-southeast Mesaverde production fairway at an average depth of 4,500 ft  Current Status of the San Juan Basin

Since the mid-1980's, development of the prolific Fruitland Coal (FTC)has dominated activity within the SJB.[2] Production from the FTC reached a plateau at approximately 2.8 Bscf/D (65% of the total 4.[3] Bscf/D produced from the SJB) and has begun to decline.3 Conventional gas (non-coal) presently accounts for another 1.5 Bscf/D (35%) produced from the basin. The focus of SJB activity is returning to reservoirs such as Dakota (DK), Mesaverde (MV), and Pictured Cliffs (PC)sandstones, as well as to the Mancos and Lewis shale intervals which lie between these more conventional reservoirs. is a geologic cross section of the SJB and shows the stratigraphic relationships of these formations.
Overview

BR is a dominant player in the SJB, operating over 6,500 of the total 18,255 active wells. The Lewis is behind pipe in 3,500 BR operated wells. The Lewis was rarely completed in the SJB from 1950-1990, when the only documented production was from 16 wells that encountered extensive Lewis natural fracture systems while drilling for deeper MV and DK objectives.[4] In 1991, BR began adding the Lewis to existing MV completions in specific areas of the basin. Through 1997, approximately 101 Lewis completions had been made in existing and new wells. However, the Lewis was always commingled with MV and/or DK. As such, it was difficult to quantify the incremental production rates, reserves, and corresponding value of the Lewis.

In an abstract presented to the Utah Geological surey recently by Michael D. Laine, Thomas C. Chidsey, Jr and Craig D. Morgan it was proposed that there is tremendous untapped potential in the shales Utah. The Mississippian, Manning Canyon shale, Pennsylvanian

Hermosa group (Paradox formation), and Cretaceous Mancos shale, which included the Prairie Canyon, Tununk and Lower Blue Gate members. These shales which stretch from north-central to southeastern Utah are beginning to see some drilling activity. These shale beds have all the elements needed to be highly productive. They are thick, deep enough to produce dry gas and contain high concentrations of organic matter along with high fracturing to make gas recoverable.

"The Manning Canyon Shale is mainly claystone with interbeds of limestone, sandstone, siltstone, and mudstone, and has a maximum thickness of 2000 ft. Total organic carbon (TOC) varies from 1% to greater than 8% with type III (?) kerogen. In north-central Utah, the Manning Canyon was deeply buried by sediments in the Pennsylvanian-Permian-aged Oquirrh basin and is therefore likely very thermally mature.

Cyclic shale units in the Paradox Formation consist of thinly interbedded, black, organic-rich marine shale; dolomitic siltstone; dolomite; and anhydrite. They generally range in thickness between 25 and 50 ft. These units contain TOC as high as 15% with type III and mixed type II-III kerogen, are naturally fractured (usually on the crest of anticlinal closures), and are typically often overpressured."