

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Correlation of Individual Oil-Shale Beds in the Upper Part of the
Green River Formation, Piceance Creek Basin, Colorado, and Uinta Basin, Utah

by

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INTRODUCTION

Detailed geologic mapping of 7 ½ minute quadrangles and associated stratigraphic studies in most of the Piceance Creek Basin and the eastern part of the Uinta Basin from the mid 1970's until the early 1990's revealed a complex intertonguing of the upper beds of the Eocene Green River Formation with the lower beds of the Eocene Uinta Formation (Duncan and others, 1974; O'Sullivan, 1974, 1975, 1986; Hail, 1977; 1987, 1992; Donnell, 1982). The general stratigraphic positioning of the sandstone and siltstone tongues of the Uinta Formation in the Green River oil-shale sequence has been fairly well determined through detailed 7 ½ minute quadrangle mapping supplemented by numerous stratigraphic surface sections and equally numerous drill cores. A detailed knowledge of the number, characteristics and lateral extent of the many rich oil-shale beds in the upper part of the Green River Formation will aid in the precise location of the Uinta tongues in the stratigraphic sequence.

The upper part of the Green River Formation was formed in a lacustrine environment and consists mainly of organic rich limestone and dolomite beds termed oil shale, and lesser amounts of limestone and dolomite deficient in organic matter termed barren marlstone. For the purposes of this report rich oil-shale beds are those that will yield more than 10 gallons of oil per ton. The lower part of the Uinta Formation consists dominantly of siltstone and fine grained to coarse grained sandstone beds derived from streams that fed Eocene Lake Uinta.

Lateral persistence of individual rich oil-shale beds or groups of beds in the Green River Formation was not recognized by many early investigators including Peale, 1878; Woodruff and Day, 1915; and Winchester, 1917, 1923. However, George (1921) found that two rich oil-shale units persisted throughout a large area in the southern part of the Piceance Creek Basin. Bradley (1931) extended the correlation of the lowermost of the two, the Mahogany Ledge, into the eastern part of the Uinta Basin. Detailed stratigraphic studies and geologic mapping on Naval Oil-Shale Reserve Number 1, a few miles north and west of Rifle, Colorado (Duncan and Denson, 1949), revealed that a number of rich oil-shale beds above the Mahogany Ledge also persisted over wide areas. The persistence of organic rich and lean laminae and thin beds of oil shale in the southern part of the Piceance Creek Basin and the eastern part of the Uinta Basin was also noted by Curry (1964). Neither Duncan and Denson nor Curry identified these beds or groups of beds by name, number or letter. Later Cashion and Donnell (1972) formally named several groups of the beds previously identified by Duncan and Denson.

In this report 37 even numbered oil-shale beds, were correlated in a 380 foot thick section above the Mahogany zone in Corehole 1 with an equivalent section 447 feet thick in corehole 2 (figs. 1 and 2). Bed 2 is the lowermost rich oil-shale bed above A groove, a low grade oil-shale bed in the upper part of the Parachute Creek Member of the Green River Formation. Several correlation lines on figure 2 lack a numerical designation, however, these and other beds not thus far correlated may be labeled with an odd number such as 21, 25, 37, 39, 67. The numbered beds corresponding to the named units on U.S. Geological Survey Chart OC 65 (Cashion and Donnell, 1972) are as follows: 4 senators (beds 26 through 32), Stillwater Zone (unnumbered bed 37 and 38), Big 3 (beds 40 through 44). The Wavy Bed, an analcimized tuff named on the chart, is at the approximate position of bed 14, and another analcimized tuff, the Porcupine Creek Tuff, not labeled on the chart, is between beds 70 and 72. The Porcupine Creek Tuff is probably the equivalent of the Horse Bench Sandstone in the western part of the Uinta Basin.

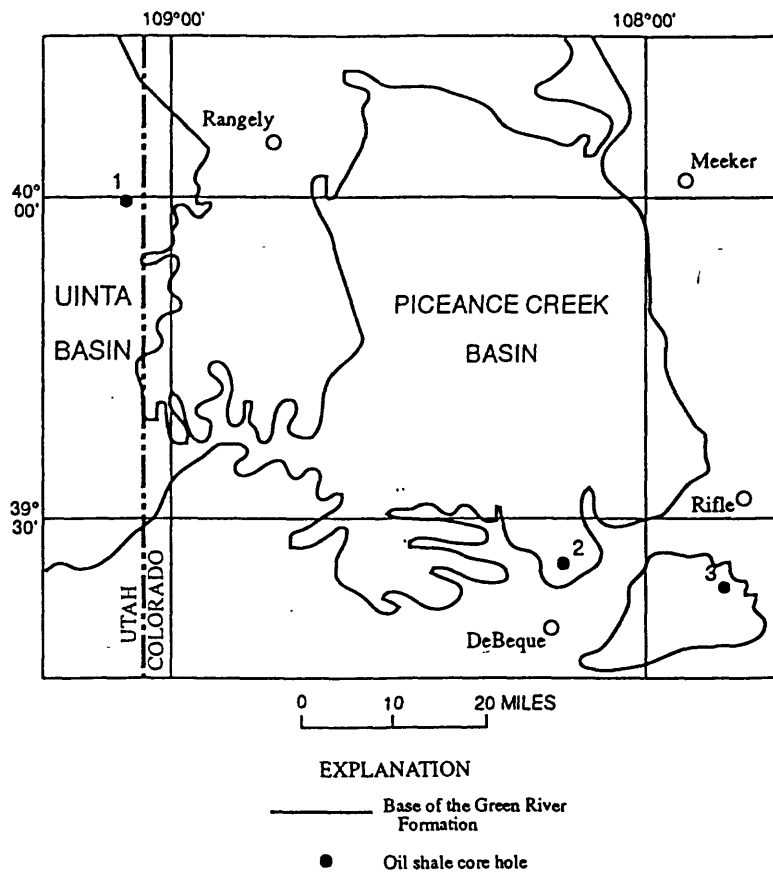
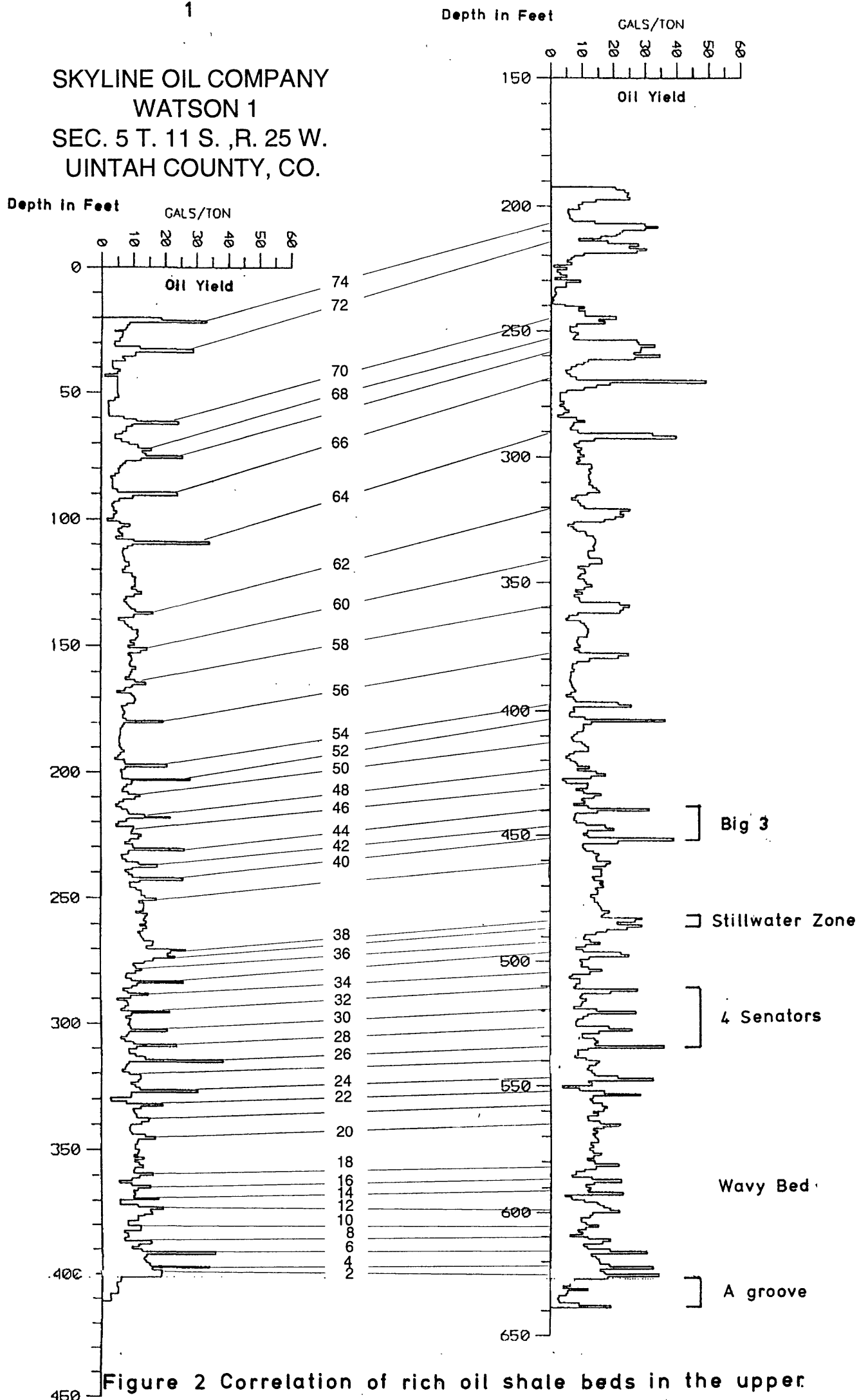


FIGURE 1. Map showing the location of core holes used in this report: (1-Skyline, 2-U.S.B.L.M., 3-Pure)

The numbered oil-shale beds of this report were also identified on computer plots of oil-shale assays from 285 cores in the Piceance Creek Basin and 31 cores in the Uinta Basin. Generally, the beds are easily recognized in cores assayed at one or two foot intervals but with difficulty where assayed at three foot intervals. A sample interval greater than three feet, mixed core and cores with thick missing intervals make identification of individual beds virtually impossible. Many of the cores examined were not assayed completely through the interval between 2 and bed 74. The location of three cores that were assayed through the interval are shown on figure 1. Corehole 1 (Skyline Oil Company Watson) is in Uintah County, Utah, Corehole 2 (U.S. Bureau of Land Management Triangulation Station Shale 2), and 3 (Pure Oil Company Battlement Mesa) are in Garfield County, Colorado. Coreholes 1, 2 and 3 are listed in the U.S. Geological Survey oil shale data base as U31, C37 and C183 respectively. Corehole 1 and corehole 3 are about 75 miles apart. Coreholes 1 and 2 best show the correlation of individual oil-shale beds in the upper part of the Parachute Creek Member and therefore are shown on figure 2.

SKYLINE OIL COMPANY
WATSON 1
SEC. 5 T. 11 S., R. 25 W.
UINTAH COUNTY, CO.



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