

Petroleum Source Rock Data for the Brushy Canyon Formation, Delaware Basin, Southeastern New Mexico

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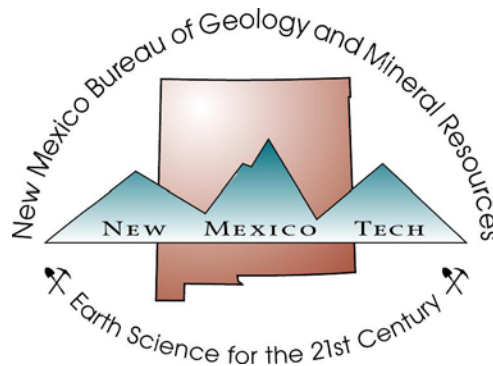
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The Brushy Canyon Petroleum Source Rock Database

This database (*Brushy Canyon source rocks.xls*) presented in this open file report has its origins in a large multidisciplinary research project at New Mexico Tech that was funded by the U.S. Department of Energy (DOE Contract No. DE-AC-26-99BC15218: Risk Reduction with a Fuzzy Expert Exploration Tool). The purpose of the project was to apply modern artificial intelligence and fuzzy logic techniques to develop a computerized tool that reduces risk in oil and gas prospecting. As part of the project, data from several petroleum systems were generated and gathered and input into the fuzzy logic system. One petroleum system was the Lower to Middle Permian system of the lower Brushy Canyon Formation (reservoir and source) and upper Bone Spring Formation (source) in the Delaware Basin of southeastern New Mexico. Results of the geological analysis of this system are available in Justman (2001), Justman and Broadhead (2000) and Broadhead and Justman (2000). The data presented in this open file report were generated by Heidi Justman as part of her graduate studies in geology at New Mexico Tech from 1998 through 2001 under the direction of the junior author. The data constitute petroleum source rock analyses made on well cuttings and core samples from the Brushy Canyon Formation (Permian: Guadalupian). Most of the samples are from the lower part of the Brushy Canyon Formation as defined stratigraphically by resistivity and gamma ray log markers (Figure 1), but a few samples were from the upper part of the Brushy Canyon. Most oil and gas obtained from the Brushy Canyon in the New Mexico part of the Delaware Basin has been produced from turbidite and submarine fan reservoirs in the lower part of the Brushy Canyon. Analyzed samples are composites of cuttings from several 10 ft drilled intervals. In most cases, there is one sample per well. Cuttings were carefully selected (“picked”) to exclude non- Brushy Canyon lithologies and cavings from shallower strata within the Brushy Canyon. Only the dark, kerogen-rich source facies from the Brushy Canyon were analyzed. Once the samples were selected, they were sent to Geoffrey S. Bayliss of Geochem Laboratories, Inc. in Houston, Texas for analysis.

In the database, several attributes are given for each sample, including:

API number of the well

Operator

Lease name

Well number

County

Location Township
Range
Section

Footage from section boundaries

Longitude

Latitude

Top of sampled interval (recorded as depth in well, in feet)

Bottom of sampled interval (recorded as depth in well, in feet)

Geologic system (Permian for Brushy Canyon)

Geologic series (Guadalupian for Brushy Canyon)

Lithostratigraphic Group (Delaware Mountain Group)

Lithostratigraphic formation (Brushy Canyon Formation, indicating lower or upper part)

TOC - total organic carbon (weight percent)

TAI - the Thermal Alteration Index as provided on analyses performed by Geochem Laboratories, Inc. A measure of thermal maturity.

Algal - percentage of kerogen that is algal material, by visual petrographic estimate

Amorphous - percentage of kerogen that is amorphous material, by visual petrographic estimate

Herbaceous - percentage of kerogen that is herbaceous material, by visual petrographic estimate

Woody - percentage of kerogen that is woody material, by visual petrographic estimate

Inertinite - percentage of kerogen that is inertinite, by visual petrographic estimate

S₁ – Rock Eval S₁ peak, measured in milligrams evolved hydrocarbons per gram of rock.

S₂ – Rock Eval S₂ peak, measured in milligrams evolved hydrocarbons per gram of rock.

S₁ – Rock Eval S₁ peak, measured in milligrams evolved carbon dioxide per gram of rock.

PI – Rock Eval Productivity Index

TMAX - the temperature, in degrees centigrade, of the S₂ peak derived from Rock-Eval pyrolysis in degrees Celsius. A measure of thermal maturity.

HI – Rock Eval Hydrogen Index, measured in milligrams evolved hydrocarbons per gram of organic carbon.

OI – Rock Eval Oxygen Index, measured in milligrams evolved carbon dioxide per gram of organic carbon.

Sample type – cuttings or core.

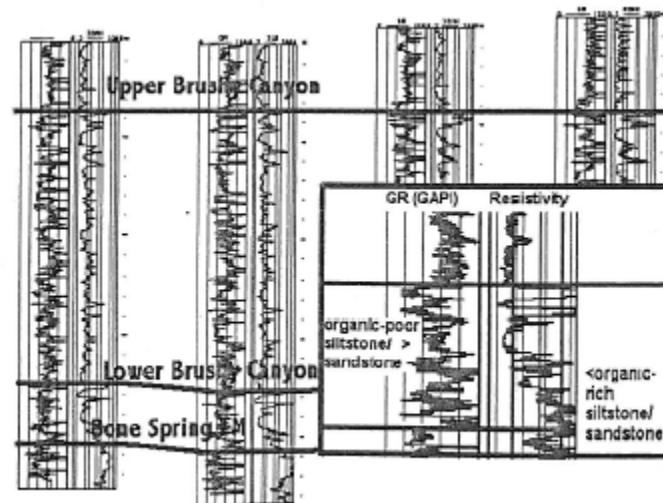


Figure 1. Gamma-ray and resistivity log cross section through Brushy Canyon Formation in Delaware Basin, southeastern New Mexico, indicating log markers used to correlate the top of the Brushy Canyon, the top of the lower Brushy Canyon, and the base of the lower Brushy Canyon (Bone Spring Formation). Inset indicates log response for organic-rich strata versus organic-poor strata within the lower Brushy Canyon. From Justman and Broadhead (2000).

References

Broadhead, R.F., and Justman, H.A., 2000, Regional controls on oil accumulations, lower Brushy Canyon Formation, southeast New Mexico, *in* DeMis, W.D., Nelis, M.K., and Trentham, R.C., eds., *The Permian Basin: Proving ground for tomorrow's technologies*: West Texas Geological Society, Publication 00-109, p. 9-18.

Justman, H.A., 2001, Petroleum source rocks in the Brushy Canyon Formation (Permian), Delaware Basin, southeastern New Mexico: M.S. thesis, Earth and Environmental Sciences Department, New Mexico Institute of Mining and Technology, 106 p.

Justman, H.A., and Broadhead, R.F., 2000, Source rock analysis for the Brushy Canyon Formation, Delaware Basin, southeastern New Mexico, *in* DeMis, W.D., Nelis, M.K., and Trentham, R.C., eds., *The Permian Basin: Proving ground for tomorrow's technologies*: West Texas Geological Society, Publication 00-109, p. 211-220.