

Petroleum Geochemistry from Wireline Data

TERRASCIENCES provides a unique approach to computing organic geochemistry values from a suite of standard logs. Combined with the multi well mapping and cross section capabilities of the TerraStation suite of software, detailed field studies of potential source rock distribution can be undertaken.

Log Analysis Concepts

Density and sonic logs reflect variations in sediments from organic lean to rocks rich in organic matter. Resistivity curves reflect changes in quantities and maturation of kerogen and hydrocarbon contained in the interstices of source rocks, allowing for computation of other properties.

The quantity, kerogen type, and thermal maturation of source rocks are computed to assist in the exploration effort by answering the question, “Is there a sufficient volume of mature oil or gas prone source rock present?”.

Required Input Data

The required data for the geochemical evaluation is a complete suite of traditional wireline logs. This includes gamma ray, acoustic, density, caliper, and shallow, medium and deep reading resistivity curves. Information on mud weight, bit size, and fluid density are also needed. The paleodepth of the shale being analyzed should also be known. This is used to compute the temperature gradient, and hence the paleotemperature.

Calculations

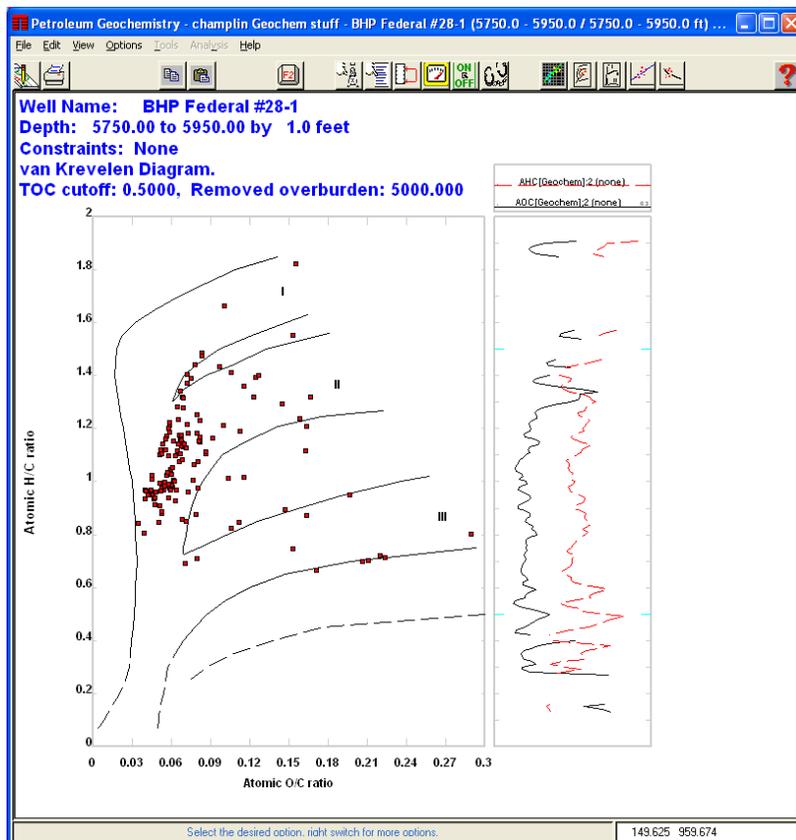
Four primary values are computed: Total Organic Carbon Weight % (TOC), S1 as a measure of the volume of hydrocarbon previously generated, S2 as the remaining hydrocarbon potential in the rock, and S3 as the amount of CO₂ otherwise generated during pyrolysis. Thermal maturation is determined using the ratio of generated hydrocarbon (S1) to the genetic potential (S1+S2). This value is converted to several other maturation values including vitrinite reflectance, Tmax, Time-Temperature Index (TTI), and Level of Organic metamorphism (LOM). Several other parameters are also computed and used on organic facies and kerogen type cross plots.

Display capabilities

Several geochemical crossplotting options are provided. These include the van Krevelen and modified van Krevelen plots for predicting organic facies and kerogen type, and a TOC vs. S2 plot. A hydrocarbon potential report may also be generated.

Support and Training

TERRASCIENCES provides immediate telephone and email support by trained earth science professionals. A regularly updated web site, electronic newsletter, and training courses are also available. All product upgrades are included in the maintenance and support fee.



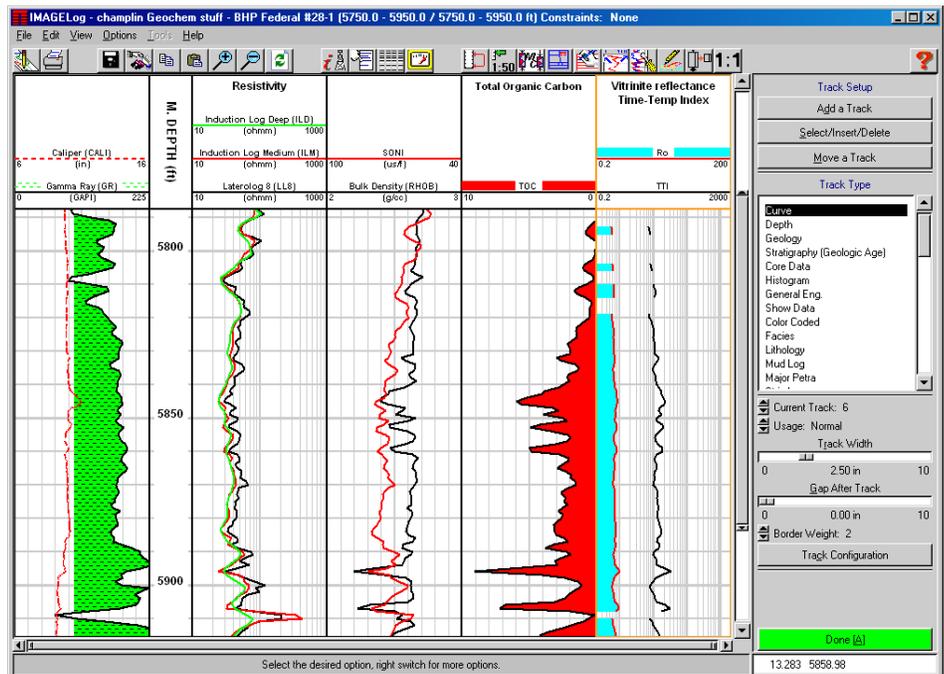
Product Specifications



- ✓ Data loading from all common formats including LIS, DLIS, LAS, and other ASCII files.
- ✓ Unlimited depth intervals, up to 10,000 wells per project.
- ✓ Crossplots – General, van Krevelen, modified van Krevelen, TOC vs. S2.
- ✓ Composite log design and display.
- ✓ Computes over 20 geochemical values, including S1, S2, S3, TOC, Hydrogen and Oxygen Indices and more.
- ✓ Computes several thermal maturation indicators including vitrinite reflectance, time temperature index, and many more.
- ✓ Optional Delta-logR (Passey) interactive method for computing TOC.
- ✓ Generates a report on hydrocarbon potential.
- ✓ Full suite of directional survey computations to generate TVD, TVT, and TST.
- ✓ Load, display and compare laboratory data against computed values.

Benefits of the Analysis

- ✓ Provides a quick look at the entire well bore over which a complete suite of logs is available.
- ✓ Provides a geochemical log on a foot by foot basis compared to laboratory sampling rates of 10 or more feet per sample.
- ✓ Provides a means of analysis on wells with log data, but where no cuttings or core samples are available.
- ✓ Provides a means of analysis on wells where high bit rotation speeds may cause “bit metamorphism” of cuttings and other potential samples.
- ✓ Provides a quick and uniform analysis of a discrete black shale interval over many wells within a basin.
- ✓ Provides evaluation of black shales with filtrate invasion as the only drilling mud contaminant.
- ✓ S1/(S1+S2), and conversion to other thermal maturation indicators, provides an inexpensive and quick answer to the question of whether a mature source rock is present in an area.



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