

# **Delaware Basin Petrophysical Database**

**A Relational Database of Petrophysical Properties  
from the Delaware Basin of West Texas**

**GEO**MARK** RESEARCH, LTD.**

**GEO**MARK****

# Delaware Basin

## Petrophysical Database

### INTRODUCTION

GeoMark is initiating a Petrophysical Database for the Delaware Basin of West Texas and Southeast New Mexico. This new database holds both organic and inorganic laboratory measurements (Figure 1), allowing subscribers to calibrate evaluations and calculations derived from a modern suite of wireline logs. The wells selected for analysis (Figure 2) were chosen because they are deep wells, with samples collected over the entire drilled interval (Figure 3).

The Delaware Basin Database is a new module in GeoMark's RFDbase Database. It is constructed using the Microsoft SQL Server data platform and displayed via the ArcView™ Geographic Information System (GIS). This online database allows full mapping, graphing, and on-screen interpretation of all the available data. Participants can integrate these modules with other types of data [source-rock total organic carbon (TOC), programmed pyrolysis, gas isotopes, produced oil properties, formation water composition, and pressure-volume-temperature (PVT) results]. Users may also combine in-house proprietary data with the GeoMark-supplied data.

Measured Results in the Petrophysical Database	
Organic Analyses	Inorganic Analyses
Total Organic Carbon (TOC)	Elemental Analyses (XRF)
Programmed Pyrolysis (S1, S2, HI)	Mineralogical Analyses (FTIR)
Thermal Maturity (Tmax, VRE)	Mineralogical Analyses (XRD)
Water Chemistry	Density Analyses (RHOB & PHI)

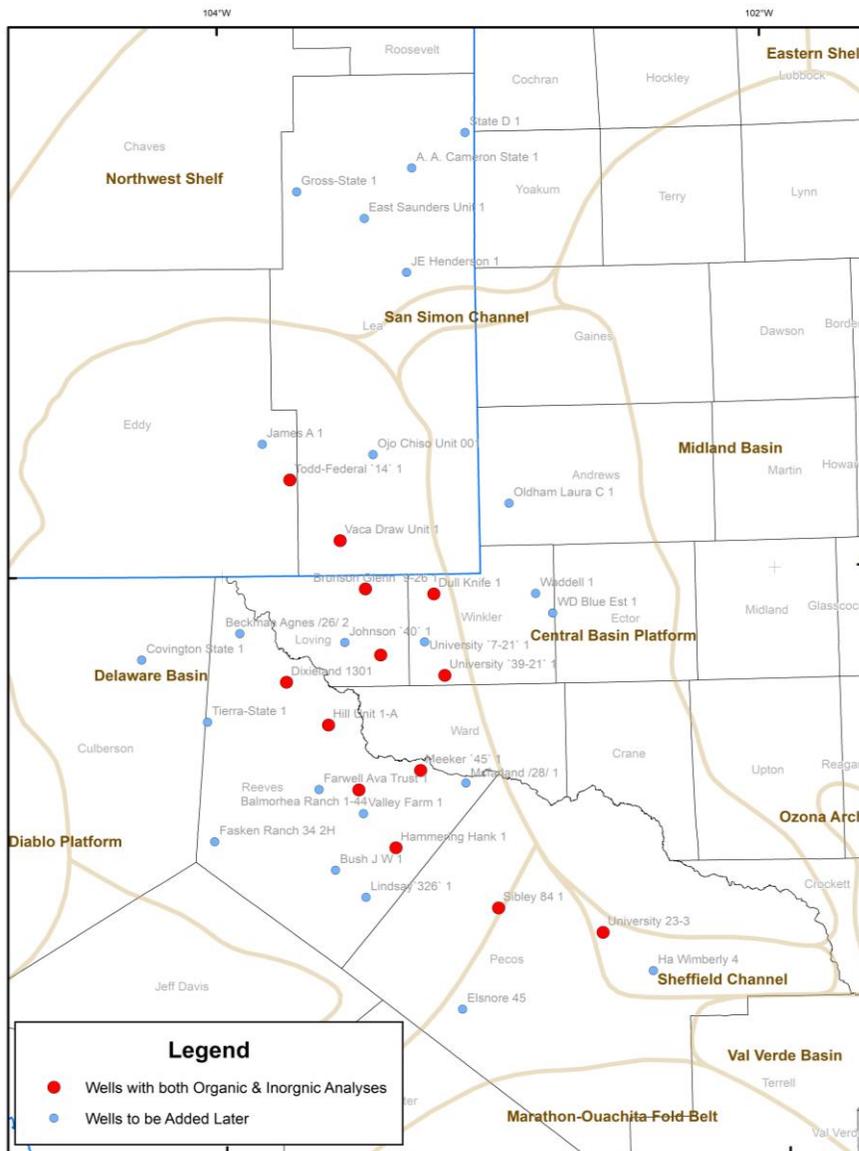
**Figure 1.** Data included in GeoMark's Delaware Basin Petrophysical Database.

The initial price of the Delaware Basin Petrophysical Database is \$45,000 per year, with a three-year minimum commitment. Companies may elect to remain in the database after year three, but this is not an obligation.

More pricing information is explained in the Terms and Conditions section. A more detailed description of the Delaware Basin Geochemical Database is contained in Appendix A of this proposal.

### DATABASE CONTENTS

The Delaware Basin Database currently holds the results for source rock, oil, gas, and PVT analyses. To these data, we now are adding XRF, XRD, FTIR, and density (RHOB & Phi) measurements (Figure 2). This unique database allows log analysts to calibrate interval-by-interval log responses and wireline algorithms.



**Figure 2.** Wells currently in the Delaware Petrophysical Database (red circles). Data from the wells in blue will be available in future years.

During the second year and beyond, GeoMark will add new wells and measurements to the database [(e.g. crushed rock and plug-based laboratory measurements, including total porosity, grain densities, oil and water saturations, permeability, mercury injection capillary pressure (MICP), and nuclear magnetic resonance (NMR)]. The number of new wells added will depend on the popularity of the database.

What makes this database unique is the large collection of organic and inorganic rock measurements collected in every section of very deep wells distributed throughout the Delaware Basin. Since all the data are housed in a single database, it will be easy to compare and contrast multiple exploration opportunities. Additionally, since most of the organic and inorganic measurements were performed on identical samples, this extends the benefits of integrated, log-based interpretations.

Well Name	County	Bell Canyon	Cherry Canyon	Brushy Canyon	1st Bone Spring Carbonate	Avalon Shale	1BS Sand and Shale	2BS Carbonate	2BS Sand	3BS Carbonate	3BS Shale	3BS Sand	Wolfcamp A	Wolfcamp B	Wolfcamp C	Wolfcamp D	Strawn	Atoka	Morrow	Upper Barnett Shale	Lower Barnett Shale	Miss Lime	Woodford	Devonian	Silurian	Fusselman	Simpson	Ellenburger	Total Depth
Todd-Federal 144 1	Eddy																											16,550	
Vaca Draw Unit 1	Lea																											17,609	
Brunson Glenn 9-26 1	Loving																											16,271	
Avant Forest Ecol 39 1	Loving																											22,800	
Sibley 84 1	Pecos																											22,800	
University 23-3	Pecos																											28,600	
Meeker 45 1	Reeves																											20,250	
Balmorhea Ranch 1-44	Reeves																											18,871	
Hill Unit 1-A	Reeves																											16,780	
Dixieland 1301	Reeves																											16,990	
Hammering Hank 1	Reeves																											21,628	
University 39-21 1	Winkler																											20,400	
Dull Knife 1	Winkler																											21,950	

Figure 3. Stratigraphic chart showing zones analyzed in each of the wells included in the year-one release of the Delaware Basin Petrophysical Database.

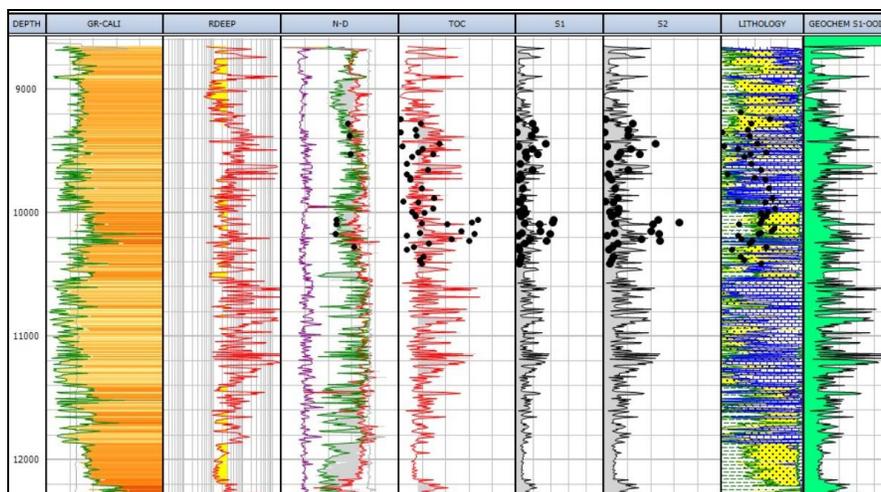


Figure 4. Example log showing how data from the Delaware Basin Petrophysical Database can be integrated with wireline log analysis.

## TERMS AND CONDITIONS

### Pricing Schedule

The cost of joining the consortium varies depending on the time of entry. The price of the database increases over time as more subscribers (and data) are added.

As more companies join, and the database increases, the subscription price will escalate according to the table below.

Number of Subscribers	Study Price
1 - 3	\$45,000.00 / yr
4 - 6	\$55,000.00 / yr
6+	\$65,000.00 / yr

Companies may elect to remain in the database after the third year.

### For additional information, contact:

GEOMARK RESEARCH, LTD.  
9748 Whithorn Drive  
Houston, Texas 77095

Tel: 281/856-9333  
Fax: 281/856-2987  
e-mail: [info@geomarkresearch.com](mailto:info@geomarkresearch.com)

## APPENDIX A

---

### Overview

The Delaware River Basin Petrophysical Database is an Internet-enabled database for the storage, review, and manipulation of key petrophysical calibration measurements. This integrated database consists of key organic and inorganic geochemical analyses selected to support exploration and exploitation functions. Additionally, all modules within the database structure are fully exportable to databases holding other types of data (including geochemistry, rock properties, production data, etc.).

### Database Features

The Delaware Basin Database has a number of functions in addition to the ability to store and maintain all geochemical reports. The mapping interface can be used to search for specific studies or to locate similar samples (based on petrophysical and bulk characteristic classifications) in different geographic regions. These “similar” samples may be further utilized in estimating fluid properties or parameters, and in linking to commercial or in-house simulation programs.

Some of the specific functions of the Delaware Basin Database are listed below.

- Electronic or hardcopy reports generated directly from the database, and can be exported into standard Excel or Access file formats
- Extensive data search function by rock properties, field information, etc.
- Web enabled Geographical Information System (GIS) mapping for data searching and comparative analyses of multiple rocks or fluids in a more visual environment
- Real-time plotting of selected data or data sets
- Data easily exported to Excel for development of rock or fluid property correlations and mathematical relationships

### Database Design

The Delaware Basin Database has been developed as an interactive, web interface overlaying a Microsoft SQL Server database populated with rock data. The database applications are hosted off-site, offering electronic and physical security, as well as broadband access for member companies.

### Database Security

All data/reports are protected with cascading levels of user access, based on established permissions. Levels include Open access, Corporate access, and Proprietary access for tight-holes wells.

Not only are proprietary data protected from other participants, but the existence of such data is not available, or even indicated, during GIS mapping or numerical searches. If a company wishes to “share” data with another participating company, a password adjustment allows only the specific data to be exchanged, while maintaining overall confidentiality.

### Downloading Data

Users have a number of options for printing and/or downloading data. GeoMark’s standard Geochemical Summary Sheet (GSS) may be viewed on screen or printed. Data tables can be downloaded in several format types, including Microsoft Excel and Microsoft Access. Graphical data can be viewed on screen, or downloaded in report format. Raw GC and GC/MS data are also downloadable from the website.