

DIGITAL THIN SECTION AND CORE PHOTO PROJECT

Final Report
to the
North Dakota Oil and Gas Research Council

North Dakota Department of Mineral Resources

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Purpose of the Project

The purpose of the project is to increase the likelihood that oil wells will be drilled in North Dakota by placing photographs of oil core and thin sections on the Oil and Gas subscription site. These photographs will not only encourage oil company geologists to study North Dakota oil well cores and cuttings, it will also provide color photographs that can be incorporated into internal company presentations that are used to convince upper management to drill a given project. Williston Basin prospects compete with other prospects throughout North America. In some cases the addition of color photographs and photomicrographs to a report, may enable approval of a North Dakota prospect that would not otherwise have been approved.

Work Accomplished

An Olympus, camera-mounted-petrographic microscope was purchased to enable detailed photomicrographs to be taken and then placed on the Oil and Gas Division's subscription website. In addition, the Geological Survey purchased with general funds a new digital camera to take photographs of oil and gas rock core to be placed on the subscription site.

As of August, 2006, 15,433 feet of core has been photographed resulting in 25,901 photographs. These photos have been posted on the Oil and Gas Division's subscription website. The core photographs generally encompass eight-inch segments of core. The core library contains 300,000 feet of core. Essentially all of the core from the three major oil plays currently ongoing in the Williston Basin (Bakken, Birdbear, and Ratcliffe) have been photographed.

A total of 57,852 photomicrographs have been taken of 7,546 thin sections. Each thin section is divided into four quadrants and two photographs are taken of each quadrant, one under plain light and one under polarized light. Thin sections are typically photographed through 4x or 10x oculars. We have approximately 15,000 thin sections in our collection. As with the core, the priority has been to photograph all of the Bakken, Birdbear, and Ratcliffe thin sections.

Project Results

We have received numerous positive comments throughout the oil and gas industry on the addition of these photographs to the Oil and Gas Division's subscription site. Our core photographs and photomicrographs are not only being used internally by companies to sell CEOs on drilling projects, but are also being used in presentations at national meetings such as the Rocky Mountain Sectional Meeting of the American Association of Petroleum Geologists which was recently held in Billings, Montana. One company geologist studied the core photographs and photomicrographs and then evaluated core at the core and sample library to determine potential infield drilling locations in several fields along the east flank of the Nesson Anticline. Another geologist was so impressed with the quality of the photomicrographs that he brought his own thin sections in for evaluation with this microscope. The state retained a copy of his photomicrographs.

Potential Applications

These high resolution core photos and photomicrographs will be a permanent record of cores and thin sections and will generate interest in the Williston Basin for decades to come. Company geologists and engineers can evaluate the core photographs from the comforts of their office to determine whether it would be beneficial to either travel to Grand Forks or to have the core shipped to a facility near them. Valuable information on grain structure, fabric, grain size, pore volume, cementation, etc can be determined by examining the photomicrographs that are posted on the website.

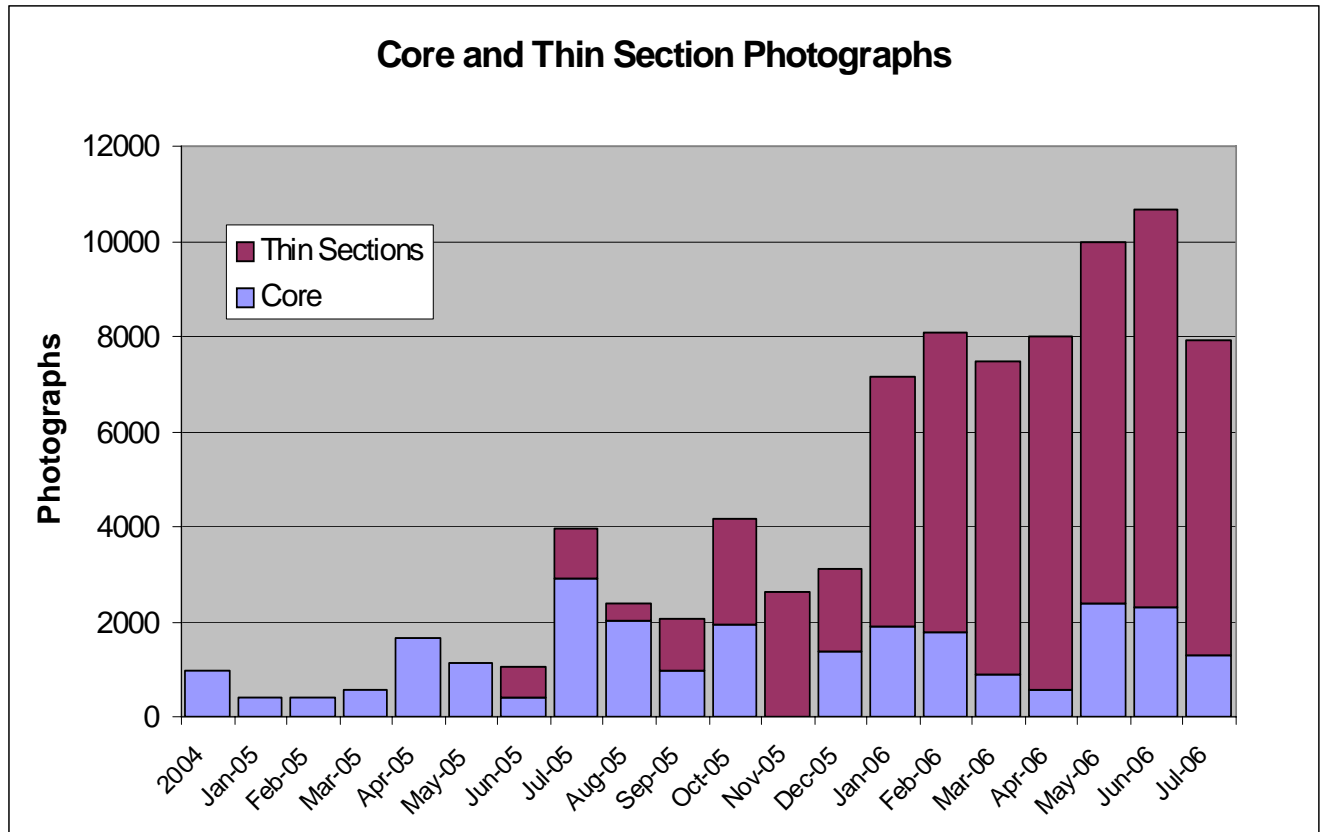


Figure 1. Photographs (cores and thin sections) submitted to the ND Oil and Gas Division's subscription site on a monthly basis from the fall of 2004 to August 1, 2006.



Figure 2. A photograph of a core of limestone in the Birdbear Formation (Devonian) at a depth of 11,012 feet from a well in the Pierre Creek Field, McKenzie County. This screen print was obtained from ND Oil and Gas Division's subscription site.

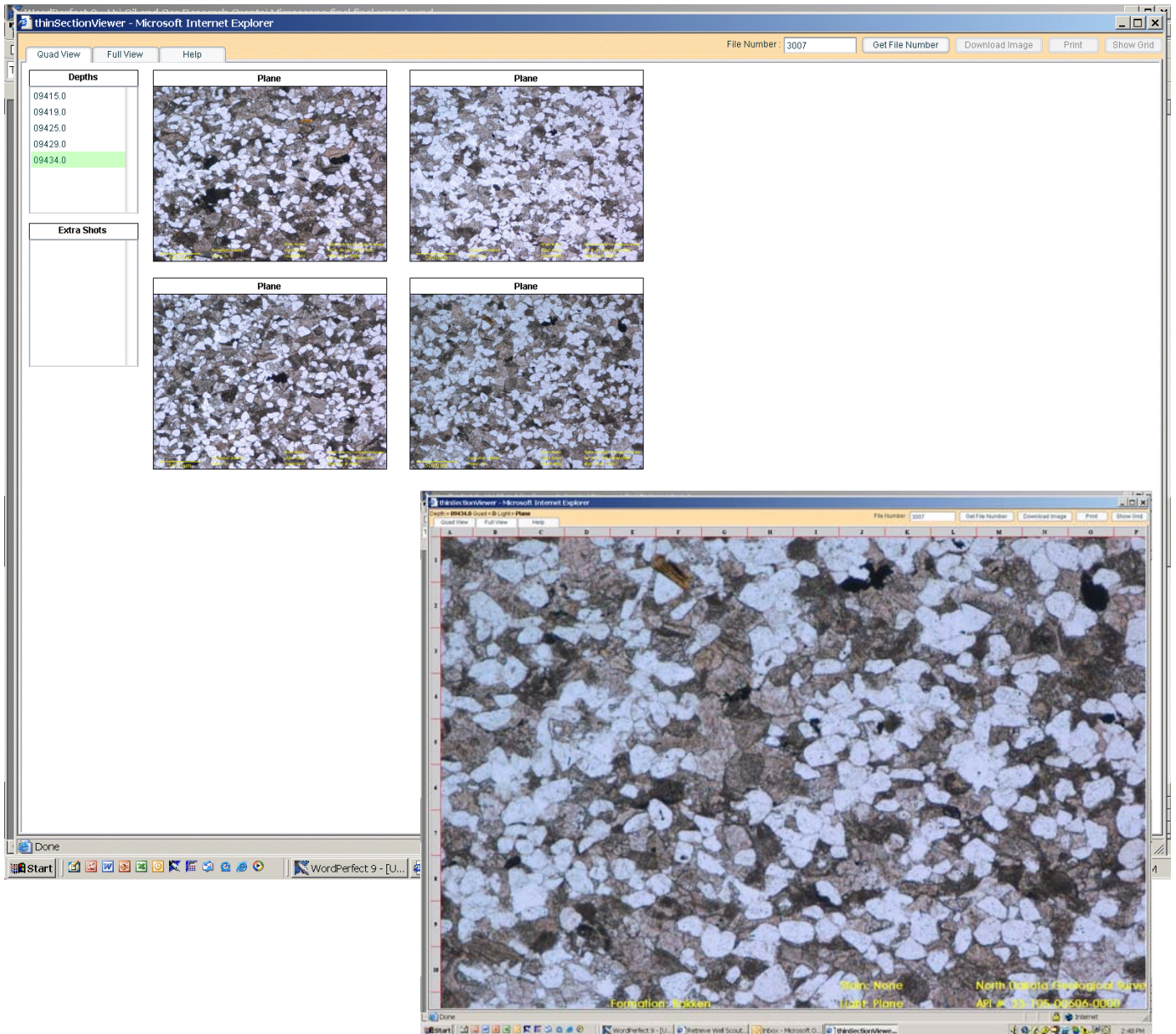


Figure 3. Screen capture of the photomicrograph viewer in the ND Oil and Gas Division's subscription website. The photo includes the four quadrants of the thin section. The lower-right quadrant is in polarized light, the other three in plain light. The view can be changed from plain to polarized and back again by scrolling over the quadrant with the mouse. Inset: clicking on any of the four quadrants will fill expand the photomicrograph to fill the screen. This is a closeup of the lower-right quadrant, a limestone in the Duperow Formation (Devonian) from core obtained at a depth of 9,434 feet in the Hamlet Unit #2 in the Northwest McGregor Field, Williams County.

North Dakota Oil and Gas Research Council Grant Total **\$10,000.00**

Match for Grant

Microscope purchase price = \$14,840		
State share of microscope purchase		\$ 4,840.00
ND Oil and Gas Division share	\$3,427.00	
ND Geological Survey share	\$1,413.00	
Flat panel monitor for microscope		\$ 329.99
Keyboard and mouse (wireless) for microscope computer		\$ 44.99
Olympus digital camera for taking core photographs		\$ 782.90
Survey Hours (November, 2004 - August 1, 2006)		
Julie LeFever		
84 hours microscope/photomicrographs		\$ 2,492.28
Kent Hollands		
553 hours photographing cores		\$ 9,495.01
Temporary Survey employees in the core library		
March - June, 2005, Survey temp budget:		
Blackstone, Davis, Lenarz, and Wilson	535 hrs =	\$ 5,354.84
July, 2005 -August 1, 2006, Reservoir Data Fund:		
Blackstone, Buckingham, Dub, Kringstad, Davis, Lenarz,		
and Wilson	2,896 hours =	\$28,960.00
Oil and Gas Division Hours		
Jim Martel (microscope/computer setup) 62 hrs		\$ 1,476.22
Per diem (two trips to the core library)		\$ 145.00
1,096 mi x .62 mile (two trips to the core library)		\$ 679.52
Jim Lindholm		
2 hours		\$ 74.74
Nathan Kirby		
16 hours		\$ 346.40
Total Match		\$55,021.89