News In Brief

Compiled by Mark A. Gonzalez, Editor

STATEMAP Update

The NDGS has received grants of $29,000 from the U.S. Geological Survey and $10,000 from the National Park Service to support new digital, geologic mapping and database construction in North Dakota. The mapping will be conducted at a scale of 1:24,000, adding much greater detail to areas mapped decades ago by the Survey at a scale of 1:125,000. The projects will also generate digital data for use in Geographic Information Systems (GIS), which permit three-dimensional, computer-assisted, spatial analysis of mapped areas.

The grants will support three mapping projects that begin in July 2003 (Fig. 1). Ed Murphy will study and map a four-quadrangle area around Glen Ullin and Hebron (the Indian Butte, Hebron, Glen Ullin NW and Glen Ullin NE quadrangles). This project is of particular interest to Hebron Brick Company, which is in the process of locating new, nearby sources of clay for their operations. Murphy's work demonstrates how fundamental geologic mapping is key to the economic vitality of the state and to the development and management of our state's mineral resources.

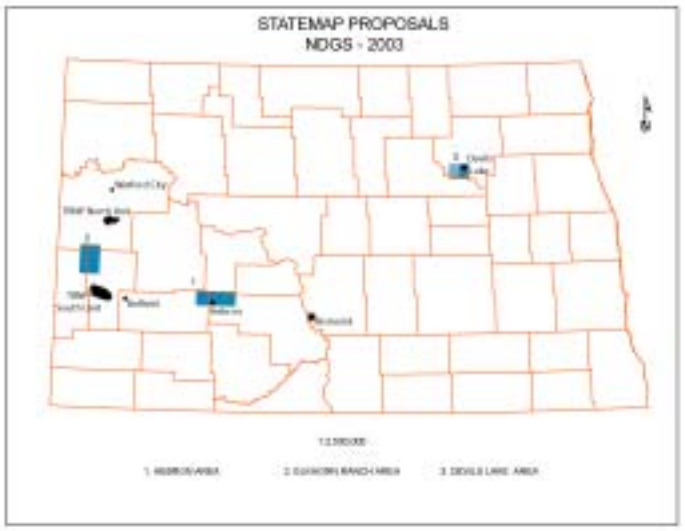

Fig. 1 Project areas supported by STATEMAP in 2003-2004.

Mark Gonzalez will study a four-quadrangle (Eagle Draw, Hanks Gully, Roosevelt Creek West, and Roosevelt Creek East) area in the Little Missouri Badlands. This area is half-way between the North and South units of Theodore Roosevelt National Park, areas mapped in 1995-1996 and 2002-2003. The Elkhorn Ranch unit of the Park is located in this map area; and the National Park Service is contributing $10,000 for this study. The study is three-fold in nature. First it provides digital geologic information for use by county agencies and two federal agencies (National Park Service and U.S. Forest Service) for management of federal, state, and private lands. Second, the area has been among the most productive oil-producing areas in the state, and three-dimensional geologic mapping is useful in the exploration and development of oil and gas resources. Third, the region has numerous landslides, and surface mapping can identify those areas and strata which are most susceptible to landslides. Fundamental geologic mapping is cost effective because it can save the state, counties, and private industry much money when they properly locate and build new roads in landslide prone areas.

Lorraine Manz will initiate a study of two quadrangles (Camp Grafton and Devils Lake) around Devils Lake. This is an area of complex glacial history. Manz' study will help characterize the geologic materials in the Devils Lake Region. Findings will be relevant to state and federal agencies that are evaluating the area for construction of flood control projects and possible drainage outlets for Devils Lake.

Murphy and Gonzalez have recently completed the mapping of 12 quadrangle maps in western North Dakota. The maps include one map at 1:100,000-scale (the Killdeer sheet, a 30' X 60' area) in Dunn County, and eleven quadrangles at 1:24,000-scale: Sperati Point, Long X Divide, Lone Butte (McKenzie County); Medora, Fryburg NW, Fryburg NE (Billings County); and Marshall SE, Marshall SW, Hirshville, Hirshville SW, and Manning (Dunn County). Pre-publication drafts of these maps are available upon request. Print-on-demand copies and digital data sets are expected to be available by the end of 2003.

NDGS Web Site Continues its Overhaul and Updates

NDGS Webmasters, Jim Martel and Julie LeFever, continue all aspects of redesigning our web sites to ensure compliance with federal disability-access requirements and to increase user information. Kent Hollands, Linda Johnson, and Linda Hagen have been busy scanning out-of-print publications. Readers will find these out-of-print publications on our web site. They are available for free in PDF format for download. The well circulars section now has all circulars available for download. We are busy completing the maps to allow easy selection of wells located in each county.

Another section has been completed on rules and regulations of the Survey's regulatory programs (core and drilling samples, coal exploration, geothermal resources, paleontological resources, subsurface minerals). All forms are available in PDF format for download. The *NDGS Newsletter* is available on-line too. Unlike the printed *Newsletter*, the web site supports color photography and illustrations, and in some cases hyperlinks are embedded for use by interested readers. We have also added new sections to our site: Ask a Geologist, Teaching Tools, and an enhanced New Information section. Please stop back often, check out the new additions to our site, and leave comments and suggestions for our webmasters.

The results of these updates are evident. The NDGS web site has quickly grown from an average visitation of 1000 hits per month in 2000 to more than 50,000 hits per month in the first three months of 2003. In fact, in April 2003, the last month for which statistics are available, the NDGS web site registered more than 77,000 hits, making our web site one of the most visited in the 13-state mid-America ESIC Network.

Centennial Guide to the Glacial Geology of North-Central North Dakota

Mark Gonzalez has received an $8000 cost-share grant from the U.S. Fish and Wildlife Service to create a roadside guide to the glacial geology found within and between four large refuges in north-central North Dakota: J. Clark Salyer, Des Lacs, Upper Souris, and Lostwood National Wildlife refuges. The guidebook will describe the glacial features, the geologic processes, and the geologic history of the region. Some of the features readily observed in this region include: glacial Lake Souris, the Missouri Escarpment and Missouri Coteau, dead-ice (or stagnant-ice) moraine, washboard moraine, prairie potholes, glacial outwash channels, eskers, drumlin fields (e.g., the Hogback Ridge), and dune fields (Denbigh dunes).

This year marks the centennial of the national wildlife refuge system. The guidebook will be published as part of the Fish and Wildlife Service's Centennial guide series. *[Incidentally, North Dakota has two great reasons to celebrate the centennial. First, the national wildlife refuge system was created by former Dakota resident, Theodore Roosevelt, during his first term as President of the United States. Second, North Dakota has more national wildlife refuges than any other state. Map information on page 23]* The NDGS will issue the guidebook as part of its Educational Series. In addition, photographs, illustrations, and factual materials from the guidebook will be made available on the Survey's web site for use by earth-science educators and the general public.

Tom Heck Headed for New Pastures

Tom Heck joined the NDGS as a petroleum geologist in 1989. Previously, Tom worked for Conoco and was involved on projects in the Gulf Coast of Texas and Louisiana, as well as the Powder River and Williston basin of the Northern Great Plains. Tom also worked as a mudlogger with Tooke Engineering and as a consulting geologist with Sunburst Consulting.

Since coming to NDGS, Tom has amassed a vast knowledge of the geology of the oil-producing rocks of the Williston Basin. He is an encyclopedia of which fields produce from what pools. He will be a tremendous asset to any oil company undertaking work in the Basin.

Tom was central to many Survey projects. Among numerous other projects, he served as the NDGS representative on the Potential Gas Committee for many years. He chaired the North Dakota GPS Steering Committee and coordinated the operation of the NDS GPS Base Station at Bismarck State College since its inception. And, he coordinated the NDGS involvement with the Weyburn CO_2 project.

Colleagues at the Geological Survey had a suspicion that Tom's recent marriage to Joanne Lerud, who lives in Golden, Colorado, might number his days in North Dakota. Our suspicions were confirmed when he announced his resignation from the Survey. Colleagues will remember a gifted man, who was the resident wiz with computers before we ever had a dedicated computer specialist. In a few keystrokes, he could fix problems that derailed the rest of us for hours. He mastered new computer programs that have been key to undertaking modern explorations of the Williston Basin's oil and gas potential.

Tom loves to travel; and with travel comes a love of history, foreign cultures, religions, and sights from around the world. After each of his trips, we would congregate in his office to ogle at his impressive photo collection. His wife, Joanne, is a perfect travel companion for him. We wish both of them Godspeed in their travels through green pastures.

Eleventh Williston Basin Horizontal Well & Petroleum Conference
by Paul Diehl

The eleventh annual Williston Basin Horizontal Well & Petroleum Conference was held Sunday, April 27 through Tuesday, April 29, 2003, at the Delta Regina Trade and Convention Centre, Regina, Saskatchewan. The conference again was a success judging from most comments.

A pre-meeting core workshop directed toward the characterization of horizontal well reservoirs was held Sunday afternoon at the Saskatchewan Industry and Resources Subsurface Geological Laboratory. Unfortunately, the day-long Complex Well Technology for Earth Scientists/Engineers 2003 short course had to be cancelled because the instructor was caught in a snow storm in Calgary. This was the first event scheduled for any of the conferences that had to be cancelled.

The customary Sunday evening Ice Breaker "kicked off" the meeting. On Monday morning, the Honorable Eric Cline, Minister of Saskatchewan Industry and Resources, opened the technical presentation sessions. He welcomed the conference participants and recognized the international cooperation past workshops and conferences have generated in the oil and gas industries of Saskatchewan and North Dakota. Later, at the Monday luncheon, Minister Cline addressed the conference attendees and assured them that the oil industry is vitally important to Saskatchewan.

As it has been since inception in 1993, the conference was jointly organized and hosted by the North Dakota Geological Survey and the Saskatchewan Industry and Resources (formerly Saskatchewan Energy and Mines). Twenty-nine energy-industry and associated companies helped sponsor the workshop with their generous contributions. We thank them for their continued support, which allows us to minimize participants' expenses.

The 308 conference registrants (Fig. 1) this year represented the spectrum of petroleum-industry occupations. Registrants came from 10 states and four Canadian provinces (Fig. 2) as well as one person from Australia. Forty-two displays and posters representing energy-industry service companies, government agencies, and consultants were set up for participants' inspection and discussion. Oral presentations included the updates of horizontal well activity as well as significant non-horizontal drilling activities in the states and provinces within the Williston Basin. Technical papers included topics such as:

- New "polybore" casing liner and patch technology
- Newly devised reverse circulation center discharge drilling technology
- Recently developed stimulation technique for open-hole horizontal well completions in low- to medium-permeability reservoirs
- New technology for improving well production by reducing line pressure using Vortex VX surface tools
- "Fingerprinting" formation waters of the Williston Basin using stable isotopes of hydrogen, oxygen, and strontium
- Progress on the Weyburn CO_2 miscible flood Enhanced Oil Recovery project
- Products thus far produced from Weyburn CO_2 monitoring and sequestration project
- CO_2 sequestration and coalbed methane potential of Mannville coal
- Considerations relating to exploration for "shallow gas" underlying previously glaciated areas
- Case histories of horizontal wells in Alida Field
- Development of the Arcola Pool.

A total of twenty-two presentations were given during the two-day conference. As always, ample time was allotted for conference participants to engage in individual discussions.

In his remarks given Monday evening at the open house and barbeque celebrating the Grand Re-opening Ceremony of the Subsurface Geological Laboratory, Minister Cline noted that the Subsurface Geological Laboratory lends essential support to Saskatchewan's petroleum and mining industries. The lab continues to be vital to the mining and oil and gas industries as well as to government and universities. Minister Cline emphasized that research done at the lab helps the petroleum and mining industries continue to be key economic drivers creating prosperity for Saskatchewan and creating jobs for its people. An equivalent facility, the Wilson M. Laird Core and Sample Library in Grand Forks, serves as a similar catalyst for the petroleum and mining industries in North Dakota.

Tuesday morning, after welcoming and opening remarks from Deputy Minister of Saskatchewan Industry and Resources, Larry Spanier, petroleum activity updates were given by representatives of the provinces and states within the Williston Basin. The technical program continued following these updates.

On Wednesday, April 30, conference registrants had the opportunity to take part in one of two scheduled field trips. There was no additional fee for these field trips. Participants could choose either a trip to EnCana Corporation's CO_2 miscible flood Enhanced Oil Recovery project site in the Weyburn Pool or to the Saskatchewan Potash Corporation's Rocanville Potash mine. We thank these corporations for allowing conference participants to tour their operations.

A 280-page conference volume, including the conference agenda, and an outline, abstract, or short paper of the oral presentations, was provided to all registrants. This volume can be purchased from the Saskatchewan Industry and Resources for $20 US ($25 Canadian). Please make checks payable to "Horizontal Workshop" and mail to: Horizontal Workshop, c/o Vivian Barkman, 2nd Floor, 2103 – 11th Avenue, Regina, SK, S4P 3V7 Canada. Vivian can be reached at (306) 787-7662, fax (306) 787-2198, or e-mail: vbarkman@ir.gov.sk.ca. Past conference volumes may also be purchased from Vivian.

Current plans are to hold the Twelfth Horizontal Well & Petroleum Conference in Minot, North Dakota, the 1993 birthplace of the International Williston Basin Horizontal Well Workshop. The 2004 conference will be held on May 2 – 4, 2004. Please note the change in conference location and mark your calendar to join us in Minot in 2004.

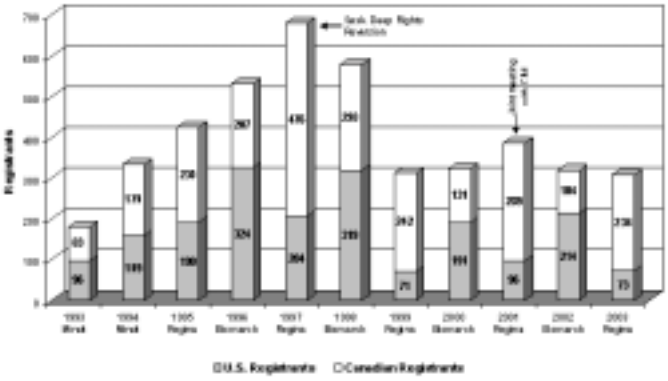

Figure 1. Annual Canadian and U.S. registration for each of the eleven horizontal well workshops/conferences to date.

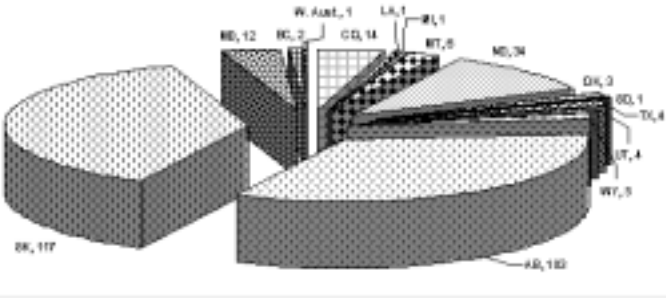

Figure 2. Number of registrants by states and provinces for the 11th Williston Basin Horizontal Well & Petroleum Conference.

Geochemical Mapping Survey of North Dakota

by Lorraine Manz

The North Dakota Geological Survey (NDGS), Natural Resources Conservation Service (NRCS), and North Dakota State University (NDSU) have entered into a cooperative effort with the US Geological Survey (USGS) to conduct a statewide solid-phase geochemical study of North Dakota. This study is part of a nationwide project to create a geochemical database for the United States that will provide a valuable source of statistically valid, unbiased, background information on a suite of more than 20 trace elements such as arsenic and selenium. The nationwide study is approximately 70% complete, with the Midwestern states constituting the bulk of the area left to survey.

The standard reference maps for the surface geochemistry of the United States were constructed by Shacklette and others (Boerngen and Shacklette, 1981; Shacklette and Boerngen, 1984) and republished in 2001 by Gustavson and others. These maps were based on the analyses of 1,323 soil samples (equivalent to a sample density of 1 per 6,000 km^2 or 1 per 2,300 mi^2) collected across the conterminous United States. They remain the most accurate and often-cited geochemical works of their kind. The current study will increase the sample density of the Shacklette data for North Dakota by a factor of at least 23 (1 sample point per 100 mi^2).

In North Dakota the geochemical study involves the collection of approximately 2000 soil and stream sediment samples according to a statewide grid consisting of more than 700 10 x 10 mile cells. Surface soil and subsoil samples will be collected at the majority of sites. At selected sites, an additional set of subsoil and surface sub-samples will be collected.

To facilitate sample collection, the NDGS has enlisted the help of several state and federal agencies that own or manage land throughout the state. These agencies, which include the State Land Department, the North Dakota Game and Fish Department, U.S. Fish and Wildlife Service, the U.S. Forest Service, the U.S. Army Corps of Engineers, and Bureau of Land Management, have obligingly granted permission to collect samples from their lands in North Dakota. This measure reduces considerably the number of permissions required to access privately owned land.

The NDGS is responsible for the coordination of this project among participating agencies. Most of the field work is being undertaken by NRCS and NDSU personnel. Sample collection began in April 2003 and is expected to continue as late into the fall as weather permits. It is expected to be completed by early summer 2004 with the full analytical data set available shortly thereafter.

All data obtained from this study will ultimately be made available to the public, although no site specific information will be released. The geochemical maps and other products derived from this enormous information base will enable each state, and the nation as a whole, to assess more accurately its energy and mineral resources. It will also aid in the better understanding of the relations between geochemistry, geologic processes, human health, and other environmental issues. For example, understanding the distribution of trace elements in soils is of vital importance if North Dakota's agricultural land is to be utilized to its best possible advantage. Premium prices have been paid for selected crops with high levels of specific elements like selenium, and the demand for these commodities, particularly in Asian markets, continues to grow. Evaluation of the state's mineral resources is another area in which North Dakota stands to benefit from this study. In Mississippi, which has already completed its geochemical survey, mineral exploration has significantly increased as a direct consequence of its findings.

The data collected and the validation of ancillary information from the project have an estimated replacement value between $300,000 and $500,000. The information obtained will provide a geochemical profile of the state in unprecedented detail. It will also substantially enlarge and diversify the amount of soils data currently available through resources such as NRCS's soil survey program.

References

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Gustavson, N., Bølviken, B., Smith, D.B., and Severson, R.C., 2001. Geochemical landscapes of the conterminous United States – new map presentations for 22 elements: U.S. Geological Survey Professional Paper 1648, 38p.

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