



## NDGS Scientists Receive the 2001 John C. Frye Environmental Geology Award

Julie LeFever, John Bluemle, and Ryan Waldkirch are recipients of the 2001 John C. Frye Environmental Geology Award for their 1999 report titled "Flooding in the Grand Forks—East Grand Forks North Dakota and Minnesota Area" (NDGS Educational Series 25, 63 p., 2 plates). The John C. Frye Environmental Geology Award is given annually for the best paper in environmental geology, published by the Geological Society of America or one of the state geological surveys.

John C. Frye was the State Geologist of Illinois (1954-1974) and was renowned for his work in the field of environmental geology. The 2001 award is the twelfth one given out and the first received by scientists from the North Dakota Geological Survey. Ironically, this outstanding report, which has received national attention and acclaim for its outstanding science and clear writing, has gone largely unnoticed by the city planners and developers in Grand Forks and East Grand Forks, the communities that stand to benefit the most from the recommendations and findings of the report. Such disregard for the geologic advice of this report is unfortunate considering the economic hardships suffered by residents and businesses of Grand Forks. The current post-flood response in the Grand Cities exposes many residents and businesses to harms way and future losses.

The award was formally conferred at an award ceremony during the annual meeting of the Geological Society of America in Boston during the first week in November. An excerpt of John Bluemle's acceptance speech is provided below.

"We greatly appreciate receiving this award. Julie LeFever did a great job of pulling together a massive amount of pertinent geologic information. She deserves nearly all the credit for crafting our report.

"It's not really possible to prepare or plan for a flood like the one in Grand Forks in 1997. Simply building ever-higher levees won't do the job. We laid out, in our publication, what needs to be done before the next flood. We have stressed, as strongly as we could, that, among other things, the river must be allowed room to flow through the two cities.

"The information that geologists can provide to average citizens, and to decision makers, can go a long way toward helping communities everywhere understand and deal with a variety of environmental problems. Such information has to be presented in a way that is comprehensible to lay persons. I am pleased that the Frye Award Committee felt that our effort deserves recognition.

"Thank you for this prestigious award...."



The John C. Frye Environmental Geology Award for 2001 went to geologists from the North Dakota Geological Survey for their publication on the flooding in the Grand Forks—East Grand Forks area of North Dakota and Minnesota. Bob Marvinney (far left), State Geologist of Maine and member of the Frye Award selection committee, and Vicki Cowart (far right), State Geologist of Colorado and President of the Association of American State Geologists, presented the Award to John P. Bluemle (center left) and Julie LeFever (center right) during the annual meeting of the Geological Society of America in Boston in November. Ryan Waldkirch, formerly of the North Dakota Geological Survey, also received the Award, but was not present at the award ceremony.

## New Faces and Positions

During the past six months, the NDGS experienced a particularly active period of personnel changes. Ryan Waldkirch, GIS Specialist, who was stationed in Grand Forks while completing his Master's degree in Geography, accepted a new position in Iowa. Shawna Zelinsky, Publications Clerk, accepted a position with American Legal Services in Bismarck, a position where she could better apply her college training. We wish them both good fortunes in their new careers.

After completing a search, Elroy Kadrmas, formerly a Digital Conversion Technician, was promoted to GIS Specialist II to fill Waldkirch's vacancy. Elroy has been with the NDGS for four years and his new role as GIS Specialist gives him an opportunity to expand his professional training and skills.



In July, Beverly Zwing became the Administrative Officer for both the NDGS and the Oil and Gas Division. Bev is a North Dakota native, hailing from the Devils Lake area. Bev is a member of that elite group of Dakotans who attended a one-room school. She completed grades 1-8 with seven other children in her school—not enough to field a baseball team! Later she attended college at UND and worked for a bank in Grand Forks. Struck with wanderlust, she enlisted in the Army, serving in both Texas (for one-half year) and Germany (for three years). Bev enjoys baking and spends much time doing artwork and graphics with her home computer.

In September, Linda Hagen was hired to fill our vacancy in the Publications Office. Linda is a North Dakota native, too, and is one of an ever-decreasing number of Dakotans who can claim to have attended a one-room school and to have lived her early years in a “soddie”. The soddie, or sod house, was once the most ubiquitous symbol of the resilient Dakota pioneers. Linda and her family grew up and farmed land in the Gladstone/Lefor area of Stark County. She now lives in a modern house with her husband, Pat, in Dickinson.



Much of Linda's earlier work experience comes from the legal profession. In 1983 she obtained a degree in Certification of Legal Assistants from NDSCS-Wahpeton. Before joining the NDGS, she worked in the legal field for 19 years and with the Southwest Water Project for the past 4 years. She is the Region 4 Director of the Western Dakota Association for Legal Assistants. Linda's favorite pastimes include reading, gardening, and canning, the latter being proof of her pioneer roots.



Also in September, NDGS hired Dr. Lorraine Manz to fill a long-time vacancy in Surfacial Geology. Lorraine clearly took the scenic route to Bismarck. She was born and raised in England, obtaining a Bachelors degree and Ph.D. degree in Chemistry at the University of London. She used her doctorate in chemistry to pursue her insatiable interest in explosions and worked with mining companies in northern England and then in South Africa to design and manufacture explosives used in the mining industry.

In 1993, Lorraine and her husband, Brad, moved to the United States. Despite attaining a Ph.D. in Chemistry, Lorraine returned to graduate school to obtain a Master's degree in Geology at Ohio University so that she could pursue her long-time interests in geology. For her M.S. degree, she undertook a study of Pleistocene deposits on Mount Olympus, Greece. In this study, she undertook the dating of glacial deposits using the cosmogenic isotope, chlorine-36. This is a relatively new isotopic dating method that provides a means of dating Pleistocene deposits older than 40,000 years, the age-limit for dating materials by the radiocarbon age-dating method.

Lorraine is interested in applying cosmogenic dating techniques to some of the old, poorly-dated glacial deposits in western and central North Dakota, such as those that were deposited during the Napoleon, Verone, and Dunn glaciations. She also has taken an immediate interest in developing educational materials to supplement and to enhance our outreach programs.

Lorraine is the Assistant Editor of *Gaea*, the newsletter of the Association of Women Geoscientists. I'm sure she'll apply those writing skills to future stories in the *NDGS Newsletter* soon. When Lorraine is not working, she devotes much time to

reading voraciously, walking, and collecting rocks and minerals. With interests such as these, it is clear she is well suited to her new career as a geologist.

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## **NDGS Gets a New Home**

In August 2001, the NDGS and the Oil and Gas Division moved to a newly constructed office building (Figure 1) in north Bismarck. Our current address is 1016 E. Calgary Ave, Bismarck, ND 58503. Calgary Avenue currently ends one block west of our building; therefore, to visit us, take Highway 83 (also known as State Street) north of I-94 and turn west onto Calgary Avenue. Our office building is one block west of Highway 83.

Our new quarters have a formal reception and entry area, featuring a cast of a reconstructed triceratops skull (Figure 2). John Hoganson and Johnathan Campbell have created a display of North Dakota fossils in the entry way. Another display case contains the early geologic field instruments used by Arthur Gray Leonard, first State Geologist of the NDGS. Other display cases contain a mineral collection and a collection of lignite, clinker, Knife River flint, concretions, and other geologic specimens that Ed Murphy has found in his numerous explorations of North Dakota.

Please plan to spend an additional 10 or 15 minutes to peruse our displays when you next visit our office.



**Figure 1.** New office building at 1016 E. Calgary Avenue houses the NDGS (lower floor) and the Oil and Gas Division (upper floor).



**Figure 2.** A triceratops skull graces the entryway. Display cases, filled with rocks, minerals, and fossils line the walls of the entry way.

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## **Global Positioning Satellite (GPS) Base Station** **by Tom Heck**

In October, the ND Geological Survey, together with the other members of the State's GPS Steering Committee, Trimble Navigation, Inc., and Frontier Precision converted the Bismarck community base station to a free site. The base station is located atop Schafer Hall on the Bismarck State College campus. It records data from the constellation of 24 GPS satellites that continuously circle the earth. The base station hardware consists of a Trimble 5700 receiver and a Zephyr antenna. Data are recorded and archived using Trimble Reference Station software and are made available via the internet. The site can be found at [geo101.state.bsc.nodak.edu](http://geo101.state.bsc.nodak.edu). The base-station data will also be available through links on the web pages of Trimble Navigation, Frontier Precision, the NDGS, and various other state agencies. The data can be downloaded using either a web browser or ftp (file transfer protocol) software. Base-station data are used by surveyors and researchers to perform differential correction of field readings and improve the accuracy of GPS readings.

The position of the base station has been precisely calculated by the National Geodetic Survey (NGS). The base station will be listed by the NGS as a CORS (continuously operating reference station) site.

## **Weyburn CO<sub>2</sub> Project**

### **by Tom Heck**

The ND Geological Survey has joined an international group of geologists and geophysicists studying Pan Canadian Petroleum's CO<sub>2</sub> flood of the Weyburn Field. Weyburn Field is a giant oil field that produces oil from the Midale beds. Some goals of the project include:

- Evaluating the effectiveness of injecting CO<sub>2</sub> for enhanced oil recovery,
- Evaluating seismic technology to monitor the CO<sub>2</sub> as it moves through the reservoir's rocks,
- Modeling the chemical changes that occur over the short- and long-term in the reservoir as CO<sub>2</sub> chemically reacts with the reservoir's rocks and fluids,
- Evaluating the likelihood that CO<sub>2</sub> will migrate from the reservoir rocks into other formations,
- Modeling groundwater flow to determine where any migrating CO<sub>2</sub> might flow, and
- Determining how effective the injection of CO<sub>2</sub> is at sequestering CO<sub>2</sub>.

Although the primary focus of the project is to recover additional oil from the reservoir, there are also long-range environmental implications to the project. Some scientists and environmentalists are concerned that man-made greenhouse gases, especially CO<sub>2</sub>, are a cause of global warming. One potential method of reducing CO<sub>2</sub> is to inject it into the ground and store or sequester it. The Weyburn Project is one of the first attempts in the world to scientifically evaluate the viability of sequestering CO<sub>2</sub> in underground strata.

One of the main tasks of the NDGS is a "3-D" study of the strata surrounding Weyburn Field. Our goal is to map all the formations within a 100-kilometer (60 miles) radius around the field, to identify the formations that are present, and to determine which formations are aquicludes (strata through which fluids flow very slowly or not at all) and which are aquifers (strata through which fluids flow easily). All four of the subsurface geologists at the NDGS (Burke, Diehl, Heck, and LeFever) will be involved in the project by mapping a 40- by 100-mile block of northwestern North Dakota.

The pipeline that supplies the CO<sub>2</sub> runs from Dakota Gasification's plant near Beulah, North Dakota, to the Weyburn Field. The pipeline route is parallel to the Nesson Anticline, a structural feature containing many of North Dakota's largest oil fields. Our involvement in the Weyburn CO<sub>2</sub> Project will help us to evaluate the potential for future CO<sub>2</sub> projects in North Dakota, to obtain a first-hand look at new technologies used to evaluate a CO<sub>2</sub> flood, and to gain an understanding of the process of CO<sub>2</sub> sequestration.



## **Ice Age Exhibit Unveiled at the Heritage Center**

On June 15, 2001, a new exhibit was unveiled in the main gallery of the Heritage Center. The exhibit includes bones from Ice Age horses, camels, and a giant ground sloth. One of the most spectacular fossils in this collection is the skull of the ancient *Bison latifrons*. This bison was approximately 25% larger than the modern-day bison and had enormous horns with a span of 6 and ½ feet (200 cm). Bone from this fossil was radiocarbon dated indicating that it is over 47,500 years old. This specimen is the only *Bison latifrons* skull ever found in North Dakota.

The skull was found in Pleistocene alluvium of the Missouri River near New Town, North Dakota, by Kent Pelton, a high school teacher from Watford City. The discovery site is on land administered by the Army Corps of Engineers within the Fort Berthold Indian Reservation. The U. S. Army Corps of Engineers, Omaha District, provided funding for restoration of the skull. Three copies of the skull are being made and will be displayed in a museum in New Town, in the Army Corps of Engineers office in Riverdale, and in the Watford City high school.

Other fossils on display in this exhibit were discovered by Doug Vannurden and David Johnson. The NDGS, Heritage Center, and citizens of North Dakota are fortunate to have these discoveries shared with the public and available for scientific studies.