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## Field Trip Guide (for the Nebraska Well Drillers Association) Northeastern Nebraska Geology

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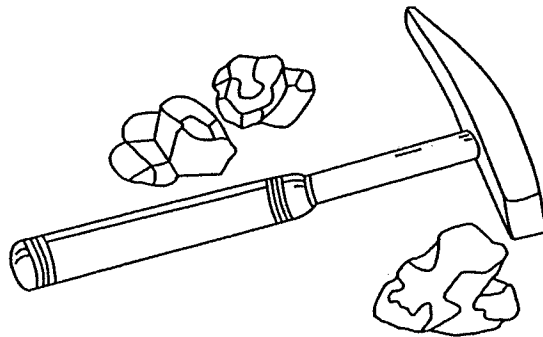
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# FIELD TRIP GUIDE

(for the Nebraska Well Drillers Association)

## *NORTHEASTERN NEBRASKA GEOLOGY*

**Sue Olafsen Lackey and Duane A. Eversoll**  
(*Nebraska Geological Survey*)



**NEBRASKA GEOLOGICAL SURVEY**

Conservation and Survey Division  
Institute of Agriculture and Natural Resources  
University of Nebraska-Lincoln

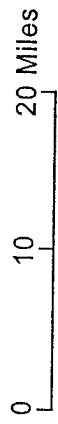
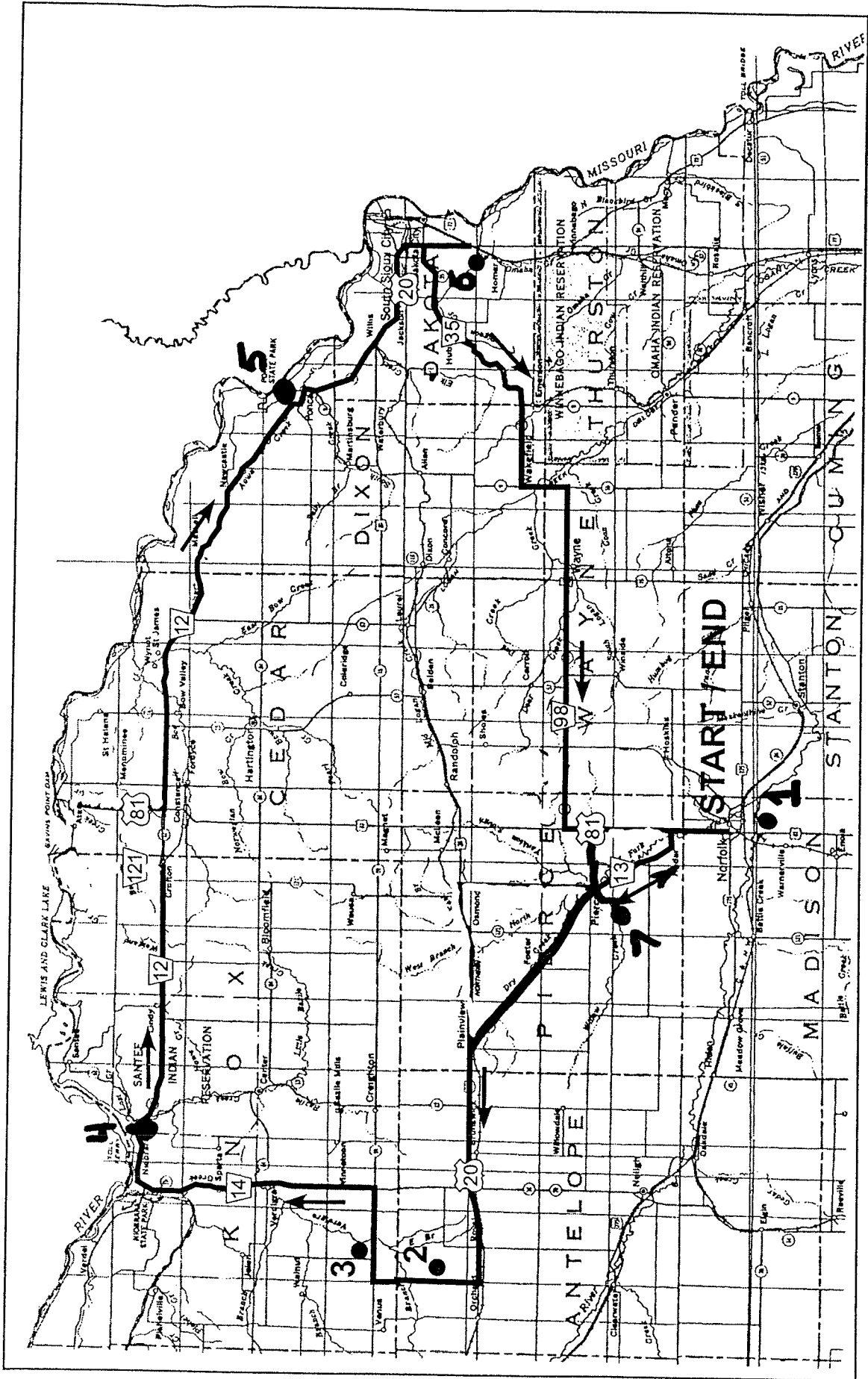
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**Nebraska**  
Lincoln

May 1, 2003

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**NORTHEAST NEBRASKA GEOLOGY FIELD TRIP  
ITINERARY -- MAY 1, 2003**

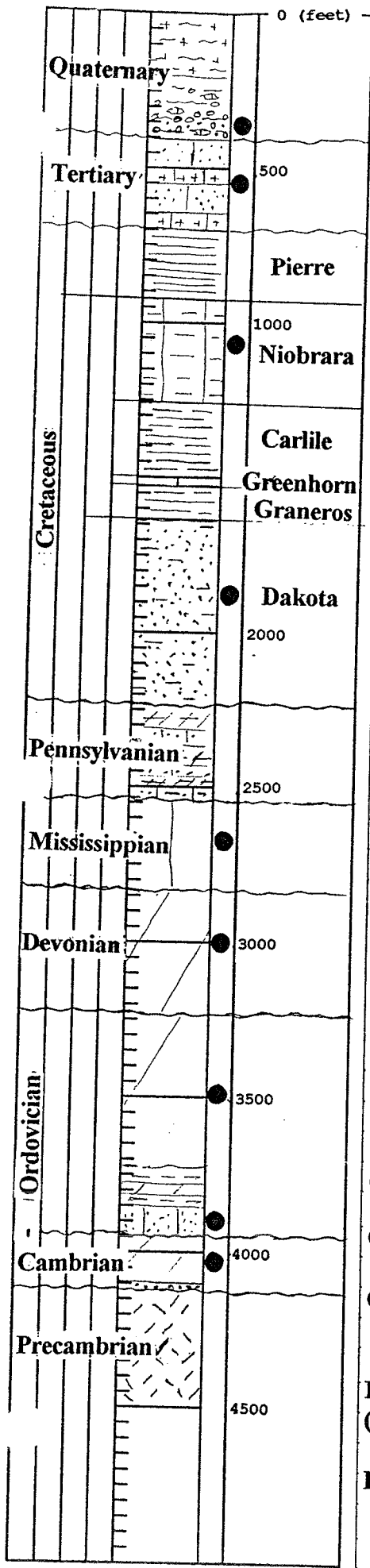
Arrive--Depart	Location
---- 8:00	<b>Lifelong Learning Center, NECC, Norfolk</b>
8:10 8:25	<b>Active Sand &amp; Gravel Pit, South of Norfolk</b> Observe Pleistocene sand & gravel which contains glacial material from the north and east of Nebraska, as well as local bedrock and western source material. On the bus we will discuss the mechanics of glacial deposition and groundwater quality and quality issues related to these deposits.
9:50 10:05	<b>Mitteis Gravel Pit, South of Ashfalls</b> Observe and discuss western source gravel of Pliocene age. Gravel mineralogy and depositional history will be discussed. An introduction to the Ogallala Group will be presented on the bus.
10:10 10:40	<b>Ashfall Fossil Beds State Park</b> While touring the park, the Ash Hollow and Valentine Formations of the Ogallala Group will be examined. Displays will detail the paleontology of the park. Coffee will be provided and restrooms are available. A summation of the Ogallala Group and an introduction to the Cretaceous will be presented on the bus.
11:30 11:45	<b>Old Quarry East of Niobrara</b> View relatively unweathered Niobrara Chalk. Discuss fractures and groundwater development potential as well as water quality issues. Summarization of Pierre Shale and Niobrara Chalk will be presented on the bus. Landslide potential and mechanics will also be discussed. An overview of the hydrogeology of Holt County will be presented. Lunch will be served on the bus.
1:15 1:35	<b>Ponca State Park</b> Examine the Graneros Shale and the Greenhorn Limestone. Discuss the lithology and fossils of these formations. An introduction to the Dakota Group will be presented en route.
2:05 2:20	<b>Homer</b> Examine and discuss Dakota Group lithology and water quality issues. Legislative issues relating to groundwater will be discussed on the bus. Presentation on groundwater quality and quantity from CSD and NRD projects will also be made en route.
3:50 4:40	<b>Willow Creek Recreation Area</b> The Upper and Lower Elkhorn NRD monitoring well networks will be discussed. Attendees will collect a water sample using the dedicated pump and will view pressure transducer data. Discussion general of groundwater issues will summarize the day.
5:00 ---	<b>Norfolk</b>



# COMPOSITE SECTION OF ROCKS FOR THE SIOUX CITY 1°x2° QUADRANGLE

## NEBRASKA GEOLOGICAL SURVEY

Location : \_\_\_\_\_  
 \_\_\_\_\_ Sec. \_\_\_\_\_ T. \_\_\_\_\_ R. \_\_\_\_\_ Co. \_\_\_\_\_  
 Company : \_\_\_\_\_ Fam. \_\_\_\_\_  
 Elev. : \_\_\_\_\_ TD \_\_\_\_\_  
 Described by : \_\_\_\_\_ Date : \_\_\_\_\_



Bed	Thk. (Thickness)
Quaternary loess & glacial till	0 - 400'+
Tertiary Ogallala sandstone & siltstone	0 - 300'
Cretaceous: Pierre Shale	0 - 225'
Niobrara chalk	0 - 330'
Carlile shale	0 - 245'
Greenhorn limestone	0 - 35'
Graneros shale	0 - 60'
Dakota sandstone & shale	250 - 600+
Jurassic	Absent
Triassic	Absent
Permian	Absent
Pennsylvanian shale & sandstone	0 - 300'
Mississippian limestone	0 - 300'+
Devonian dolomite	0 - 400'+
Silurian	Absent
Ordovician - (Upper) dolomite	0 - 500'
Cambrian - Lower Ordovician dolomite, shale, and sandstone	0 - 400'+
Precambrian quartzite or metamorphic rocks (Depth to Precambrian less than 500' to approx. 3000')	

Potential water producing zones ●

## Conservation and Survey Division Publication Catalog

### Test Hole Reports

Test hole reports (THR) are compilations of the logs of test holes drilled across the state. They have little of no narrative but larger amounts of hydrogeological data. The sediment thicknesses and their grain size are recorded for the full depth of virtually every hole.

About 4,700 test holes have been drilled in Nebraska by the division in cooperation with the U.S. Geological Survey. The purpose of this cooperative program is to determine the types of rock or unconsolidated sediment beneath the land surface, the order of their occurrence, the depth to the water table, and the thickness of water-bearing sediments. This information is given in the following test hole reports and their supplements, which record later information.

Publication dates are given in parentheses. The designation unpublished after a county name means that the logs are available for study at the division. Virtually all counties have test hole reports but some are out of print and not listed. Those not listed are available for study or copying at the division. Some references to additional information may refer to reports that are out of print. Newer reports have been given order numbers. Older reports must be ordered by county name.

- THR-1 Adams County - P. B. Wigley (2001) - 46 pages - \$6.00
- THR-2 Antelope County - S. Olafsen-Lackey, F. A. Smith, and R. R. Burchett (1998) - 105 pages - \$7.00
- THR-3 Arthur County - R. F. Diffendal, Jr. and J. W. Goeke (2000) - 56 pages - \$7.00
- THR-4 Banner County - F. A. Smith (2002) - 97 pages - \$8.00
- Blaine County--unpublished
- THR-6 Boone County - R. R. Burchett and F. A. Smith (1992) - 95 pages - \$11.50
- THR-7 Box Butte County - F. A. Smith (2000) - 84 pages - \$9.00
- THR-8 Boyd County - S. Olafsen-Lackey, F. A. Smith and R. R. Burchett (1995) - 48 pages - \$4.50
- Brown County (1953) - \$6.00
- THR-10 Buffalo County - V. H. Dreeszen (2000) - 251 pages - \$13.00
- THR-11 Burt County - R. R. Burchett and F. A. Smith (1991, revised 1996) - 35 pages - \$4.50
- THR-12 Butler County - S. E. Summerside and R. R. Burchett (1998) - 73 pages - \$9.00
- THR-13 Cass County - R. R. Burchett and F. A. Smith (1989, revised 1999) - 180 pages - \$10.50
- THR-14 Cedar County - R. R. Burchett and F. A. Smith (1993) - 110 pages - \$12.50
- THR-15 Chase County - V. H. Dreeszen (2000) - 75 pages - \$9.00
- Cherry County--see Keya Paha County and Northeastern Cherry County--unpublished
- THR-17 Cheyenne County - R. F. Diffendal, Jr. (1999) - 243 pages - \$12.00
- THR-18 Clay County - R. R. Burchett and F. A. Smith (1994) - 35 pages - \$6.00
- THR-19 Colfax County - F. A. Smith and R. R. Burchett (1990, revised 1998) - 20 pages - \$6.00
- THR-20 Cuming County - R. R. Burchett and F. A. Smith (1993) - 56 pages - \$7.50
- THR-21 Custer County - L. D. Cast (2000) - 201 pages - \$12.00
- THR-22 Dakota County - R. R. Burchett and F. A. Smith (1991, revised 2000) - 9 pages - \$4.50
- THR-24 Dawson County - F. A. Smith (1999) - 119 pages - \$11.00
- THR-25 Deuel County - R. F. Diffendal, Jr. (1999) - 93 pages - \$8.00
- THR-26 Dixon County - R. R. Burchett and F. A. Smith (1992) - 45 pages - \$7.50
- THR-27 Dodge County - F. A. Smith and R. R. Burchett (1990, revised 1998) - 97 pages - \$9.00
- THR-28 Douglas County - R. R. Burchett and F. A. Smith (1989, revised 1999) - 48 pages - \$7.50
- Dundy County--see Frenchman Creek Basin and MP-4
- THR-30 Fillmore County - R. R. Burchett and S. E. Summerside (1995) - 28 pages - \$6.00
- THR-31 Franklin County - R. R. Burchett and S. E. Summerside (1997) - 92 pages - \$10.00
- Frenchman Creek Basin (1957) - \$6.00
- THR-32 Frontier County - D. A. Eversoll - (2000) - 93 pages - \$9.00
- THR-33 Furnas County - F. A. Smith (1998) - 266 pages - \$11.50
- THR-34 Gage County - R. R. Burchett and F. A. Smith (1989) - 57 pages - \$8.50
- THR-35 Garden County - F. A. Smith, J. B. Swinehart and J. W. Goeke (2002) - 109 pages - \$9.00
- Garfield County and Valley County (1953) - \$6.00
- THR-37 Gosper County - L. D. Cast (2000) - 68 pages - \$9.00
- Grant County--unpublished

THR-39 Greeley County - R. R. Burchett and F. A. Smith (1992) - 74 pages - \$10.00  
 THR-40 Hall County - V. H. Dreeszen (1999) - 125 pages - \$10.00  
 THR-41 Hamilton County - P. B. Wigley (1999) - 34 pages - \$7.50  
 THR-42 Harlan County - R. R. Burchett and S. E. Summerside (1998) - 115 pages - \$11.50  
 THR-43 Hayes County - D. A. Eversoll (2000) - 56 pages - \$8.00  
 THR-44 Hitchcock County - D. A. Eversoll (1990, revised 1992) - 64 pages - \$9.00  
 THR-45 Holt County - S. Olafsen-Lackey, F. A. Smith and R. R. Burchett (1998) - 110 pages - \$10.50  
 Hooker County--unpublished  
 THR-47 Howard County - V. H. Dreeszen (1999) - 90 pages - \$9.00  
 THR-48 Jefferson County - R. R. Burchett and F. A. Smith (1990, revised 2000) - 45 pages - \$7.50  
 THR-49 Johnson County - R. R. Burchett and F. A. Smith (1989) - 44 pages - \$7.50  
 THR-50 Kearney County - S. E. Summerside (1999) - 53 pages - \$7.50  
 THR-51 Keith County - R. F. Diffendal, Jr. and J. W. Goeke (2000) - 115 pages - \$10.50  
 Keya Paha County and Northeastern Cherry County (1953) - \$6.00  
 THR-53 Kimball County - F. A. Smith (2000) - 153 pages - \$11.50  
 THR-55 Lancaster County - R. R. Burchett and F. A. Smith (1990, revised 1992) - 138 pages - \$12.50  
 THR-56 Lincoln County - J. W. Goeke (2001) - 185 pages - \$12.00  
 THR-57 Logan County - P. B. Wigley (2001) - 17 pages - \$5.00  
 Loup County--unpublished  
 THR-59 Madison County - R. R. Burchett (1998) - 92 pages - \$10.50  
 THR-60 McPherson County - J. W. Goeke (2000) - 50 pages - \$7.50  
 THR-61 Merrick County - F. A. Smith (1999) - 35 pages - \$6.00  
 THR-62 Morrill County - V. L. Souders, J. B. Swinehart and F. A. Smith (2002) - 135 pages - \$9.00  
 THR-63 Nance County - R. R. Burchett and F. A. Smith (1991, revised 1992) - 28 pages - \$4.50  
 THR-64 Nemaha County - R. R. Burchett and F. A. Smith (1989) - 75 pages - \$10.00  
 THR-65 Nuckolls County - R. R. Burchett and F. A. Smith (1989) - 55 pages - \$8.50  
 THR-66 Otoe County - R. R. Burchett and F. A. Smith (1989) - 147 pages - \$12.50  
 THR-67 Pawnee County - R. R. Burchett and F. A. Smith (1989) - 97 pages - \$11.50  
 THR-68 Perkins County - V. H. Dreeszen (2000) - 112 pages - \$10.50  
 THR-69 Phelps County - S. E. Summerside (1999) - 68 pages - \$7.50  
 THR-70 Pierce County - S. Olafsen-Lackey, F. A. Smith and R. R. Burchett (1993, revised May 2000) - 87 pages - \$8.50  
 THR-71 Platte County - R. R. Burchett and S. E. Summerside (1998) - 117 pages - \$10.50  
 THR-72 Polk County - R. R. Burchett and F. A. Smith (1996) - 44 pages - \$7.50  
 THR-73 Red Willow County - D. A. Eversoll (1998) - 187 pages - \$10.50  
 THR-74 Richardson County - R. R. Burchett and F. A. Smith (1990) - 210 pages - \$12.00  
 THR-75 Rock County - S. Olafsen-Lackey, F. A. Smith, L. R. Boryca (2000) - 44 pages - \$7.50  
 Saline County (1964) - \$6.00  
 THR-77 Sarpy County - R. R. Burchett and F. A. Smith (1989, revised 1999) - 77 pages - \$9.00  
 THR-78 Saunders County - R. R. Burchett and S. E. Summerside (1989, revised 2001) - 63 pages - \$9.00  
 THR-79 Scotts Bluff County - V. H. Dreeszen, S. S. Sibray and F. A. Smith (2002) - 280 pages - \$14.00  
 THR-80 Seward County - R. R. Burchett and F. A. Smith (1989, revised 1994) - 48 pages - \$7.50  
 Sheridan County--unpublished  
 Sherman County (1960) - \$6.00  
 Sioux County--unpublished  
 THR-84 Stanton County - S. Olafsen-Lackey, F. A. Smith and R. R. Burchett (1999) - 62 pages - \$5.00  
 THR-85 Thayer County - R. R. Burchett and F. A. Smith (1990, revised 1995) - 24 pages - \$6.00  
 Thomas County--unpublished  
 THR-87 Thurston County - R. R. Burchett and F. A. Smith (1991) - 37 pages - \$7.00  
 Valley County (1960) - \$6.00  
 Valley County and Garfield County (1953) - \$6.00  
 THR-89 Washington County - R. R. Burchett and F. A. Smith (1989, revised 1998) - 39 pages - \$6.00  
 THR-90 Wayne County - S. Olafsen-Lackey, F. A. Smith and R. R. Burchett (1999) - 38 pages - \$4.50  
 THR-91 Webster County - R. R. Burchett and S. E. Summerside (1997) - 101 pages - \$10.00  
 THR-92 Wheeler County - R. R. Burchett and S. E. Summerside (1992) - 52 pages - \$7.00  
 THR-93 York County - F. A. Smith - 60 pages (2000) - \$9.00

## CSD Expertise Listing

- Agates - Roger Pabian
- Agricultural education (America's Farm) - Rick Perk
- Ancient soils - Matt Joeckel; Mark Kuzila; Joe Mason; Hannan LaGarry
- Arikaree Group - Hannan LaGarry
- Biological diversity - Geoff Henebry; Jim Merchant; Sunil Narumalani
- Center for Advanced Land Management Information Technologies (CALMIT) - Don Rundquist; Jim Merchant
- Clays - Matt Joeckel; Mark Kuzila; Joe Mason; Hannan LaGarry; Bill Zanner
- Consortium for the Application of Space Data to Education (CASDE) - Rick Perk
- Contaminant transport - Jerry Ayers, Xun-Hong Chen; Dave Gosselin; Ed Harvey
- Crop monitoring - Al Peters
- Desertification - Al Peters
- Drilling / Coring - Jim Roberts
- Drought - Mike Jess; Jim Merchant; Al Peters; Joe Szilagyi
- Earth science education - Francis Belohlavy; Dave Gosselin; Duane Mohlman; Rick Perk
- Earth Science Information Center (ESIC) - Judy Otteman; Jolene Foster; Duane Mohlman; Les Howard; Charlie Flowerday
- Educational Outreach/Publications - Charlie Flowerday; Dave Gosselin; Duane Mohlman
- Earth history - Marv Carlson; Dave Gosselin
- Earthquakes - Marv Carlson; Duane Eversoll
- Engineering geology - Duane Eversoll
- Environmental Assessment/Change - Anatoly Gitelson; Geoff Henebry; Amanda Holland; Sunil Narumalani; Al Peters; Milda Vaitkus
- Environmental philosophy/theology and history - Charles Flowerday
- Environmental geology - Marv Carlson; Bob Diffendal; Duane Eversoll; Matt Joeckel; Jim Swinehart; Perry Wigley
- Environmental isotopes - Ed Harvey
- Fossils - Bob Diffendal; Matt Joeckel; Hannan LaGarry; Roger Pabian
- Gems / Gemstone identification - Roger Pabian
- Geochemistry - Dave Gosselin; Ed Harvey
- Geographic information systems (GIS) - Francis Belohlavy; Darcy Boellstorff; Markus Craig; Amanda Holland; Les Howard; Jim Merchant; Sunil Narumalanai; Rick Perk; Don Rundquist
- Geology - Marv Carlson; Bob Diffendal; Duane Eversoll; Matt Joeckel; Hannan LaGarry; Joe Mason; Roger Pabian; Jim Swinehart; Perry Wigley
- Geomorphology - see "Landscape evolution / structure"
- Global Environmental Change - Al Peters
- Groundwater chemistry laboratory - Ed Harvey
- Groundwater geology - Jerry Ayers; Xun-Hong Chen; Jim Goeke (North Platte); Dave Gosselin; Ed Harvey; Susan Olafsen Lackey (Norfolk); Steve Sibray (Scottsbluff); Scott Summerside
- Groundwater computer modeling - Xun-Hong Chen
- Groundwater service calls - Jim Goeke (North Platte); Steve Sibray (Scottsbluff); Sue Lackey (Norfolk); Scott Summerside
- Groundwater-surface water relationships - Jerry Ayers; Xun-Hong Chen; Dave Gosselin; Ed Harvey; Joe Szilagyi
- High Plains aquifer - See "Ogallala Group"
- (CSD) Information Center - Jolene Foster, Judy Otteman
- Isotope hydrology - Ed Harvey
- Land-cover assessment - Jim Merchant
- Land-cover/use - Patti Dappen; Anatoly Gitelson; Geoff Henebry; Jim Merchant; Sunil Narumalani; Milda Vaitkus



Land degradation - Sunil Narumalani; Al Peters

Landscape evolution / structure (geomorphology) - Francis Belohlavy; Bob Diffendal; Steve Hartung; Matt Joeckel; Mark Kuzila; Hannan LaGarry; Jim Swinehart; Bill Zanner

Landslides - Duane Eversoll

Limestones - Matt Joeckel; Roger Pabian

Maps and Publications - Judy Otteman; Jolene Foster (402-472-7523)

Map use - Dave Gosselin, Marv Carlson

Mesozoic geology (240 to 66 million years ago) - Matt Joeckel; Roger Pabian

Mineral identification - Roger Pabian; Jim Swinehart

Mineral resources - Marv Carlson; Duane Eversoll; Matt Joeckel; Steve Sibray (Scottsbluff); Perry Wigley

Natural Resources Management - Markus Craig; Amanda Holland; Geoff Henebry; Jim Merchant

Nebraska Earth Science Education Network (NESEN) - Francis Belohlavy; Dave Gosselin; Duane Mohlman

Newsletter (Resource Notes) - Charles Flowerday

News and Editorial - Charlie Flowerday

Nonpoint-source pollution - Jim Merchant; Mark Kuzila; Sunil Narumalani

Ogallala Group sediments - Bob Diffendal; Jim Goeke (North Platte); Hannan LaGarry; Jim Swinehart

Oil and gas - Marv Carlson; Steve Sibray (Scottsbluff); Perry Wigley

Quaternary geology - Bob Diffendal; Ed Harvey; Mark Kuzila; Joe Mason; Jim Swinehart

Paleosols see "Ancient soils"

Paleozoic geology (570-240 million years ago) - Bob Diffendal; Mark Kuzila; Hannan LaGarry; Joe Mason; Jim Swinehart

Plate Tectonics - Marv Carlson, Bob Diffendal

Publication and map sales - Judy Otteman; Jolene Foster (402-472-7523)

Quaternary geology (1.6 million years ago to present) - Bob Diffendal; Mark Kuzila; Hannan LaGarry; Joe Mason; Jim Swinehart

Remote sensing - Darcy Boellstorff; Patti Dappen; Anatoly Gitelson; Geoff Henebry; Jim Merchant; Sunil Narumalani; Rick Perk; Don Rundquist

Rock identification - Marv Carlson, Roger Pabian

Samples (cores/cuttings) - Marv Carlson

Sand Hills/sand dunes - Jim Goeke; Jim Swinehart

Soils - Francis Belohlavy (southeast Nebr.); Darcy Boellstorff (GIS and updates); Steve Hartung(southeast Nebr.); Mark Kuzila(head soil scientist);Phil Young (Panhandle)

Surface water - Ed Harvey; Mike Jess; Joe Szilagyi

Teacher Resources - Charlie Flowerday; Jolene Foster; Dave Gosselin; Duane Mohlman; Judy Otteman

Test holes - Duane Eversoll; Scott Summerside

Vegetation - see "Land cover / use"

Vertebrate paleontology - Matt Joeckel; Hannan LaGarry

Waste management (septic tanks / lagoons, landfill and disposal sites) - Francis Belohlavy; Marv Carlson; Duane Eversoll; Mark Kuzila

Water development - Jim Goeke; Mike Jess; Sue Lackey (Norfolk); Steve Sibray (Scottsbluff); Scott Summerside; Joe Szilagyi

Water-earth materials interaction/geochemistry - Dave Gosselin; Ed Harvey

Water quality/water chemistry - Jerry Ayers; Dave Gosselin; Ed Harvey; Sue Lackey (Norfolk); Steve Sibray (Scottsbluff)

Water policy - Mike Jess

Web site administration - Duane Mohlman

Wetlands - Dave Gosselin; Ed Harvey; Geoff Henebry; Mark Kuzila; Sunil Narumalani; Don Rundquist; Jim Swinehart; Milda Vaitkus

White River Group - Hannan LaGarry