

PROPOSED ITINERARY AND EMERGENCY CONTACT INFORMATION
Donald P. Schwert

My cell phone number is **(701) 361-1348**. Please note that we will often be outside of cell tower range. Also, due to the camping situation of this field course, there may not be opportunities for me to keep the phone on or charged 24 hours per day.

We are traveling on a charter bus operated by the Schuck Bus Company of Moorhead, Minnesota. The driver is Kevin Krogen, and he can be reached at **(701) 371-2551** during the trip.

Please use these phone numbers on an emergency basis, only.

Below is a road log for the course. Weather, road conditions, bus problems, etc., might force a change in these plans.

2003 ROAD LOG

**Approximate
miles from
previous stop:**

SATURDAY, SEPTEMBER 13:

Meet at Stevens Hall parking lot at **5:40 a.m.** Bus departs promptly at 6 a.m. Bring a bag lunch and supplies for dinner that evening and breakfast tomorrow. Bring water, as none is available at tonight's campsite.

I-94 west.

STOP: Exit 290 (Valley City). Landslide along College Street SE, east of the Valley City State University campus. Post-glacial history of the Sheyenne River. Outcrop of Gregory Member of the Pierre Fm (Upper Cretaceous).

52

I-94 west.

STOP: 6.1 mi. south of Exit 230, Medina, I-94. Ice-walled lake plain (NE3, Sec. 5, T.138N., R.68W., Medina SE 7.5' quadrangle).

178

I-94 west to Exit 182 (Sterling). Turn north onto ND Hwy. 14, and drive north 8.0 mi. Turn left (west) onto 136 Ave. NE, and drive 2.6 mi to the McPeak farm.

OPTIONAL STOP: North of Exit 182, I-94. Sibley Butte. 60
Glacially-thrust Fox Hills Sandstone. Private property. Access by
owner's prior permission, only. (SW3, Sec. 11, T.140N., R.77W.,
Sibley Butte 7.5' quadrangle).

Return to I-94, and continue westward through Bismarck.

MOUNTAIN TIME ZONE. All times given from now through the night
of Day 6 will be in Mountain Time. Set watches back one hour.

OPTIONAL STOP: White Butte, west of South Heart, North Dakota. 150
Plant fossils in Golden Valley Fm (Eocene). Return to I-94, and
continue westward to Exit 27, Medora.

STOP: Painted Canyon Overlook, Theodore Roosevelt National Park, 40
South Unit. Bullion Creek Fm (Paleocene).

Return to I-94, and continue westward to first Glendive, Montana, exit.

STOPS: Makoshika State Park. Stratigraphy of the Hell Creek (U.
Cretaceous) and Tullock (= Ludlow) (Paleocene) Formations.

OVERNIGHT STOP: Makoshika State Park, Glendive, Montana. Camp 75
at "Pine on the Rocks" overlook. Primitive camping. Special
permit required for this site. No water. Pit toilets.

SUNDAY, SEPTEMBER 14:

Wake-up at 7:00 a.m. (Mountain Time)

GROCERY STOP in Glendive to purchase lunch, dinner?, and tomorrow's 5
breakfast supplies. Tomorrow's lunch may be late, so you may
wish to pick up some extra food supplies.

Co. Rt. 335 to 1.5 miles south of city limits.

STOP: Colgate Member of the Fox Hills Formation. Plant fossil 4
collecting.

Co. Rt. 335 south.

STOP: Overview of the Cedar Creek Valley and Cedar Creek Anticline. 8

Fossil collecting within region. Stay within assigned public property lines.
WATCH OUT FOR RATTLESNAKES, SCORPIONS, AND
BLACK WIDOW SPIDERS!

Pending good weather, we will take gravel roads southeast to Baker. MT
Hwy 7 south to Medicine Rocks State Park.

STOP: Tertiary dune? sands as a positive landform feature. “Honeycomb”
weathering. Restroom facilities. 100

MT Hwy 7 south to Ekalaka. MT Hwy 323 south to Alzada. WY Hwy 112
south to Hulett. WY Hwy 24 to Devils Tower.

OVERNIGHT STOP: Devils Tower National Monument group 90
campground. No reservations are allowed for the group sites, and
so we take our best chances here. Running water and flush toilets.
No showers. Other campers present. Super-quiet rules apply, as
always.

MONDAY, SEPTEMBER 15:

Wake-up call at 7:00 a.m. (Mountain Time). We depart at 8:15 a.m.

STOP: Devils Tower National Monument. 3

WY Hwy 24 north.

OPTIONAL STOP: Roadcut on WY Hwy 24, 1.0 mi southwest of Hulett. 8
Spearfish Fm (Triassic), Gypsum Spring Fm (Jurassic), and
Sundance Fm (Jurassic). Field analysis project. Answer questions
from handout provided.

WY Hwy 24 south to U.S. Hwy 14. Turn east.

OPTIONAL STOP: Outcrops of the Redwater Member of the Sundance 12
Formation (Jurassic) along U.S. Hwy 14, 1 mile east of WY Hwy
24 intersection. Belemnite collecting.

U.S. Hwy 14 southeast until it merges with I-90. I-90 east to Exit 10 at
Spearfish, SD. **GROCERY STOP** (lunch, supper?, and breakfast?
supplies) at Safeway in Spearfish.

U.S. Hwy 14 east to U.S. Hwy 14A. U.S. Hwy 14A (Spearfish Canyon)
south.

OPTIONAL STOP: U.S. Hwy 14A in vicinity of hydro station. Pull-off area for vehicles is available 500' up road from this outcrop. Englewood (Dev.-Miss., marine) and Pahasapa Formations. Limited marine fossil collecting. WATCH OUT FOR TRAFFIC! 75

U.S. Hwy 14A south.

STOP: Bridal Veil Falls. Field analysis project. Answer questions from handout provided. WATCH OUT FOR POISON IVY. 3

U.S. Hwy 14A south to Savoy. Roughlock Falls Road southeast 2-3 miles.

OPTIONAL STOP: Exposures of Pahasapa Fm (Mississippian, Madison Group), with massive example of rock fall. 10

Return to U.S. Hwy 14A. Follow Hwy 14A southeast to Cheyenne Crossing, SD.

OPTIONAL STOP: 0.6 mi east of Cheyenne Crossing on U.S. Hwy 14A-85. Deadwood Fm (Cambrian). 11

U.S. Hwy 85 northeast to Lead, SD.

STOP: Lead, SD. Open cut (now inactive) of the Homestake Mining Co. at junction of U.S. Hwy 85 and Mill Street. 8

U.S. Hwy 14A through Deadwood to Sturgis. I-90 southeast to Exit 34 to south side (same side as Black Hills National Cemetery). Follow the service road ("Pleasant Valley Drive") 0.4 miles southeast to first major driveway.

OVERNIGHT STOP: No Name RV Park, I-90, Exit 34, Sturgis. Private campground Quiet rules enforced. Group camping. Showers, flush toilets, and running water. Jacuzzi's (and possibly swimming pool) open. Charcoal grill available in the "Corral" area. Game room. 12

OPTIONAL STOP: Bear Butte State Park. Eocene intrusive.

TUESDAY, SEPTEMBER 16:

Wake-up at 6:30 a.m. Please clean the campsite. We depart at 7:30 a.m.

- I-90 east (see road log in **DAY 4**). I-90 southeast to Rapid City (Exit 57) at I-190 until it merges with “West Blvd.” Follow West Blvd. south to St. Joseph St. (Hwy 79). St. Joseph St. east to campus of South Dakota School of Mines.
- STOP:** Museum of Geology, South Dakota School of Mines (2nd Floor of Administration Bldg.). Open 8 a.m. to 5 p.m. “*Follow the dinosaur tracks!*” 45
- Return on Hwy 79 (Main Street) westward until its intersection with U.S. Hwy 16. Turn left (south). Turn right (west) onto Quincy Street.
- STOP:** Dinosaur Park. Overview of Dakota Hogback. 6
- Follow Skyline Drive along the Dakota Hogback to Mt. Rushmore Rd (U.S. Hwy 16). Turn left (north), and proceed down the hill. Safeway is on right. **GROCERY STOP.** Purchase supplies for lunch and dinner? today AND for breakfast tomorrow. (Please note that the bus might drive into Custer tonight for restaurants). Sandwiches available at deli. You are welcome to eat lunch *en route* to the next stop.
- U.S. Hwy 16 southwest to U.S. Hwy 16A. Hwy 16A southwest to tunnel about 1 mile north of Keystone. Bus will pull off onto short loop on left just before tunnel.
- STOP:** Metamorphic facies in schists: contact region of garnet and staurolite zones. Park to left (west) of tunnel. **WATCH OUT FOR POISON IVY** 26
- U.S. Hwy 16A through downtown Keystone.
- OPTIONAL STOP:** Etta Mine, 1 mi south of Keystone. Private property, permission required. Zoned pegmatite. Hard hats and extreme caution are required. 3
- U.S. Hwy 16A south (west) to 0.3 mi west of Keystone village limits.
- OPTIONAL STOP:** Small folds in schistose rocks. Relationship of bedding to cleavage. 2
- U.S. Hwy 16A south to SD Hwy 244. SD Hwy 244 west to Mt. Rushmore.
- STOP:** Mt. Rushmore Natl. Memorial. Fee area. Harney Peak Granite intruded into Archean metasediments. If time allows, we’ll do a long hike along road cuts to view structures. 3

SD Hwy 244 west to U.S. Hwy 16-385. U.S. Hwy 16-385 south to Custer, SD. This route takes us past the Crazy Horse Monument - visible to the left as we approach Custer. The bus will pull off to the roadside to allow viewing.

OVERNIGHT STOP - Big Pine Campground (Bob and Shirley Garbisch, owners), U.S. Hwy 16, 2 mi west of Custer, SD. Showers and game room available. 25

We will camp here for two nights. Please be certain to be courteous and quiet while in this campground. Other guests will probably be registered here. Wake-up time will be announced that evening.

If our bus driver is still in good humor, he/she might be willing to drive a group of us into Custer tonight for restaurants.

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WEDNESDAY, SEPTEMBER 17:

An early wake-up today, for we must arrive at Jewel Cave National Monument by 8:00 a.m.

Bring along with you today a sweatshirt or other warm clothing for the cave tour. You will also find it useful bring a flashlight. Tall people may wish to wear a cap or some other head protection.

Also be sure to bring with you a swimsuit, towel, and easy change of clothes. Late this afternoon, we will visit the Evans Plunge hot springs complex for a long swim.

U.S. Hwy. 16 west to Jewel Cave National Monument. 16

STOP: Jewel Cave National Monument. Tour of cave at 9:00 a.m. (we are to arrive by 8:00 a.m. to register).

U.S. Hwy 16 east, back through Custer, to intersection with SD Hwy 89.

OPTIONAL STOP: Roadcut into Precambrian schists. Example of creep. Exposure of gold-bearing channel gravels. 19

U.S. Hwy 16 west to downtown Custer. Depending on time, we may make our grocery stop for today at this time. Dinner?, and breakfast supplies.

U.S. Hwy 385 south to roadcut in pegmatites. Bus will pull off along side of highway.

STOP: Tourmaline-rich pegmatites. Small crystals of beryl and garnet also present. Extreme care required (an NDSU student was injured here on our last trip, requiring a trip to the hospital). Stay off of private property (demarcated by fence). Watch out for traffic. 4.9

U.S. Hwy 385 through Pringle. 5.1 miles south of Pringle, turn left onto "Rifle Pit Road."

OPTIONAL STOP: Dot Mine. Mineral collecting in a pegmatite mine. Private property, with entry only by permission. Dangerous mine wall conditions. Use great care. 13

U.S. Hwy 385 south to Wind Cave National Park.

OPTIONAL STOP: Wind Cave National Park. If time allows, we'll make a brief stop along the highway to describe both the geological and ecological setting of this national park. 7

U.S. Hwy 385 through Hot Springs to U.S. Hwy 18.

U.S. Hwy 18 to the Mammoth Site.

STOP: Mammoth Site. Tour at 3:00 p.m. Late Pleistocene mammoth and other vertebrate remains. 10

U.S. Hwy 18 to U.S. Hwy 385.

U.S. Hwy 385 to north side of Hot Springs. Evans Plunge.

STOP: Evans Plunge. Swim in indoor hot springs. Changing rooms and a snack shop are available. For those who choose not to swim, there is a free observation deck. Facility closes at 8 p.m. 4

Return to Custer and Big Pine Campground via U.S. Hwy 385 and Hwy 16.

OVERNIGHT STOP: Big Pine Campground, Custer. 24

THURSDAY, SEPTEMBER 18:

A 6:30 a.m. wake-up today. Please help clean up the campground. The bus departs at 7:45 a.m.

U.S. Hwy 16A east to SD Hwy 36. SD Hwy 36 east to SD Hwy 79. SD Hwy 79 north to SD Hwy 44 (Rapid City). **GROCERY STOP** at Family Thrift Center (corner of Hwy 79 and St. Patrick). Purchase groceries for lunch today **and** for breakfast tomorrow.

SD Hwy 44 southeast (see geologic description in text for DAY 6).

STOP: Badlands overlook turnoff on north side of SD Hwy 44, 2.3 mi west of Scenic (turnoff is now closed and barricaded). Overview of Chadron Formation (Eocene), Brule Formation (Oligocene), Sharps Formation (Oligocene), and Interior Formation geosol (Eocene) developed on the Pierre Shale (Cretaceous). 98

Watch out for RATTLESNAKES here and throughout Badlands National Park.

SD Hwy 44 southeast to Scenic, SD, turnoff. Pennington Co. Hwy C589 to 2.1 miles south of railroad crossing.

STOP: Type section of the Scenic Member of the Brule Formation (Oligocene). Buffalo Gap National Grasslands. Leave rock picks on the bus. No vertebrate fossil collecting is allowed on federal lands without prior permit. 7

Before re-boarding the bus, get your lunches ready to eat en route to next stop.

Return to Scenic. SD Hwy 44 east to U.S. Hwy 16A at Cedar Pass, SD. Enter Badlands National Park, and head northeast on Hwy 16A to Park Headquarters.

STOP: Badlands National Park Headquarters. Restroom facilities, natural history displays, and bookstore. 34

U.S. Hwy 16A northwest.

STOP: “Homesteads and Ranches” overlook near mile marker 21, Badlands National Park. Clastic dikes. 16

U.S. Hwy 16A northwest.

STOP: “Seabed Jungle” overlook, Badlands National Park. Interior Formation geosol and Dillon Pass Fault. 3

U.S. Hwy 16A northwest.

STOP: “The Pinnacles” overlook, Badlands National Park. Rockyford
Ash and Sharps Formation. 3

U.S. Hwy 16A northwest to I-90. Follow I-90 eastward 2 miles to U.S.
Hwy 14. U.S. Hwy 14 north and east to U.S. Hwy 83 at Pierre, SD.

CENTRAL TIME ZONE. Set watches ahead one hour.

U.S. Hwy 14/83 north to SD Hwy 34. SD Hwy 34 east to Farm Island State
Recreation Area.

OVERNIGHT STOP: Farm Island State Recreation Area group 118
campground. Mosquito-rich area; use repellent. Showers available
at regular campground.

Final night’s group pizza party at Gator’s Pizza, Pierre Mall. All of the
pizza and pop that you want, provided to us in a buffet format.
Please, however, leave a \$1 tip on the table as you leave.

STOP: “The Flaming Fountain,” State Capitol grounds, Pierre. Artesian 5
well of Dakota Aquifer.

Wake-up and departure times will be given this evening.

FRIDAY, SEPTEMBER 19:

U.S. Hwy 83 north to U.S. Hwy 212. Turn west onto U.S. Hwy 212,
crossing Oahe Reservoir and entering Cheyenne River Reservation.

Continue west on U.S. Hwy 212 until SD Hwy 63. Turn north, and
continue until intersection with SD Hwy 20. Turn east, and
continue to village of Timber Lake. Turn south into Timber Lake
at sign pointing to “Business District.” Pick up lunch/snack
supplies at “Kelly’s Grocery, Dry Goods, and Boots” or the Super
Value (1 block northwest). Be sure to supply yourself with enough
food to get to Fargo.

Turn left (east) off Main Street at post office, and continue eastward for 5.4
miles. At that point, the road will bend slightly around a cluster of
three buttes, the easternmost of which is Dog Butte.

STOP: Dog Butte. Fox Hills Fm (U. Cretaceous, marine). Fossils of 152
marine bivalves (abundant) and fossil wood. Private property.
Access by prior permission, only. WATCH OUT FOR
RATTLESNAKES AND POISON IVY!

Continue east on gravel road, which will bend to the north. Keep north until intersection with SD Hwy 20. Drive east on SD Hwy 20 until its junction with U.S. Hwy 12. Turn east onto U.S. Hwy 12, and continue until descent down to bridge on west side of Oahe Reservoir.

OPTIONAL STOP: Virgin Creek Member of Pierre Fm (U. Cretaceous) 37
exposed on west bank of Oahe Reservoir. Fossil collecting.
Private property. Access by prior permission, only.

U.S. Hwy 12 across the Oahe Reservoir bridge to Mobridge (Get it?: “*Mo*” + “*bridge*”?).

U.S. Hwy 12 to U.S. Hwy 83. U.S. Hwy 83 north to I-94. I-94 east to Fargo.

STOP: Stevens Hall parking lot, NDSU. Early evening arrival anticipated. 286

PLEASE: Plan on staying a few minutes to help unpack and clean up the bus.