

Valleys, Channels and Deltas in the Cretaceous Seaway: Analogues to the subsurface

*University of Houston Quantitative Sedimentology Research Consortium Field Trip,
Sunday August 12th – Friday August 17th.*

Dr. Janok P. Bhattacharya

Robert E. Sheriff Professor of Sequence Stratigraphy

Geosciences Department

SR1 Rm 312, University of Houston

4800 Calhoun Rd., Houston, Texas 77204-5007

E-MAIL: jpbhattacharya@uh.edu

Wk: 713/743-4720; Fax: 713/748-7906

Purpose of Trip

This trip will provide an overview of fluvial deltaic systems in the superb Cretaceous outcrops in Central Utah. The trip will show examples of fluvial, storm and wave-influenced deltaic and shoreline systems and the associated feeding fluvial deposits. We will show examples of incised valleys and discuss how they differ from distributary channels as well as examining changes in fluvial style across sequence boundaries. The trip will also examine the interaction of sedimentary processes and the generation of growth faults as well as discuss some aspects of fault-seal quality across extensional normal faults.

This trip will showcase recent results from our ongoing research program on the Ferron “Notom” Delta near Capitol Reef, Utah.



Example of an incised valley in the Ferron Sandstone, Neilson Wash, Factory Butte, Utah.

Getting There

You should plan to arrive in Salt Lake City Sunday afternoon or evening. Each participant is responsible for transportation to Shaheen's Best Western in Salina, Utah. I recommend that you vehicle pool, 4WD vehicles are recommended. The fastest way to

get to Salina is to take Highway 15 south to Highway 50. It will take about 2.5 hours (see instructions at the back of this document).

The field trip will officially leave at 8am Monday Morning from the Best Western parking lot. The field trip will end at about 5pm, Thursday August 16th near Hanksville. The plan is to overnight in Torrey and then drive to Salt Lake City the next day (Friday, August 17th). It is about a 4.5 hour drive to Salt Lake City from Torrey (see directions at end).

Hotels

Book Your Rooms Before July 12th!

To book your rooms call the numbers below and advise them that you are with the University of Houston Group. The rooms are being held until July 12th so please book by the 12th.

Best Western Shaheen's Hotel (August 12th-13th)

1225 S State Street
Salina, Utah, 84654-1616,
Phone: 435-529-7455 by 12-Jul-2007
to guarantee rooms with a valid credit
card or the rooms will be released.
You must mention the group name,
University of Houston, to receive the
group rate. Nonsmoking rooms
guaranteed by June Phillips at the
hotel. Complimentary Continental Breakfast included.



Rimrock Hotel (August 14th – 16th) Torrey, Utah

Toll free reservations: 1-888-447-4676
Email:
reservations@TheRimRock.net



What To Bring/Safety

Here is a list of suggested equipment and supplies that will be needed for the field trip. Note that we will be working in a desert. Expect temperatures to be 85-110°F during the day and 50 - 80°F at night. Clothing worn during the day should be light-colored, loose fitting, and cover as much of your body as is comfortable to reduce exposure

RECOMMENDED FIELD EQUIPMENT

Clothing

- Shirts –T-shirts or long sleeve shirts
- Pants – We recommend wearing pants rather than shorts, because the desert environment is replete with a variety of thorny plants, cacti, and trees, not to mention ticks and chiggers.
- Hiking boots (essential)
- Hat – Wide-brimmed (e.g. Army booney hat) to shade neck and face.
- Socks
- Sweatshirt or fleece
- Light weight rain jacket (\pm pants) or poncho

Gear

- Backpack or waistpack for carrying raingear, water bottle, field guide
- Sunglasses –The desert sun is intense and can potentially lead to sun-blindness over long periods of exposure.
- Sunscreen – high SPF (e.g. 30) is recommended
- Lip balm with sunscreen
- Insect repellent
- Canteen or hydration pack (e.g. Camelback[®])
- Camera
- Rock Hammer
- Hand Lens

SAFETY AND FIRST AID

You may wish to carry a small first aid kit, although we will have them available, and BP HSC personnel will also have safety gear. Some safety information is provided at the end of this document. The main safety considerations are:

- Road safety (practice safe driving)
- Road field stops (take care crossing roads and keep off pavement)
- Dehydration and Heat Exhaustion and Heat Stroke (keep hydrated!)
- Sunburn (wear hat, lipbalm, and sunscreen)
- Loose Rocks, Steep Cliffs and Overhangs (watch for falling rocks, wear appropriate safety gear near cliffs, good boots help)

Itinerary

Day 1. Sunday, August 12th Day 1. Arrive Salt Lake City, Drive to Salina Utah

Check into Shaheen's Best Western Hotel.
Supper on your own. Recommended Restaurant—Mom's Café (no liquor license) or El Mexicano Restaurant II (beer served).



Day 2. Monday, August 13th Day 2. Salina Utah,

Fluvial Sequence Stratigraphy and Facies Architecture Blackhawk/Castlegate Formations

Stop 1. Castlegate/Blackhawk at Water Hollow Tunnel

- Stratigraphy Overview
- Castlegate Lithology
- Normal Faults

Stop 2. Rock Canyon

- Blackhawk Channel Facies
- Meandering versus Braided channels
- Paleohydraulics
- Changes in Fluvial Style across a sequence boundary (Blackhawk-Castlegate sandstone near Salina Utah: Implications for Sequence Stratigraphy



- Implications for reservoir Architecture of fluvial deposits

Ferron Sandstone

Stop 3. Ferron overview and stratigraphy, Willow Springs Wash Road

- 3a. PS1-PS2 overlap
- 3b. Shoreface Lapout
- 3c. County Line and Kokopelli Channel

Return to **Shaheen's Best Western, Salina, Utah**

Day 3. Tuesday, August 14th
Ferron Sandstone (cntd.)

Stop 4. Ivie Creek. I-70

- Channels versus Valleys in the Ferron sandstone
- Westward prograding fluvial dominated delta front

Stop 4b.
 Sedimentology
 and Ichnology of
 fluvial-storm , and
 wave-influenced
 delta fronts (Ivie
 Creek Section).

- Prodelta shales
- Tempestites
- Trace fossils
- Fluvial-dominated lower delta
- Shoreface
- Distributary Channels



Stop 5. Muddy Creek, Growth Faults in fluvial-dominated delta fronts of the Ferron sandstone.

- Fluvial-storm dominated prodelta
- Terminal distributary channels and mouth bars
- Upstream accreting bars
- Growth fault initiation and evolution
- Fault zones

Drive to Torrey, Utah: Stay at **Rimrock Inn.**

Supper at Rimrock Restaurant or Café Diablo.



Day 4. Wednesday, August 15th

Ferron Sandstone, Notom Delta

Stop 1. Introduction to Ferron, Notom delta, Caineville, Utah.

- Prodelta shales
- Distributary-channel to fluvial transition
- Fluvial section



Stop 2. Steamboat/Highway 24

- Prodelta shales and bentonites
- Storm-flood-dominated delta front
- Distributary-channels
- Shorefaces
- Transgressive lag facies



Evening at the **Rimrock Hotel**, Torrey, Utah.

Day 5. Thursday, August 16th

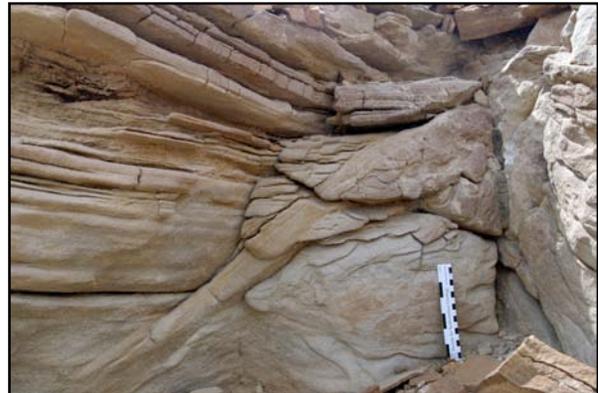
Stop 1. Coalmine Wash,

- Distributary Channels and Mouth Bars in fluvial dominated deltas
- Possible incised valley
- Estuary-lagoonal facies
- Transgressive Surface of Erosion



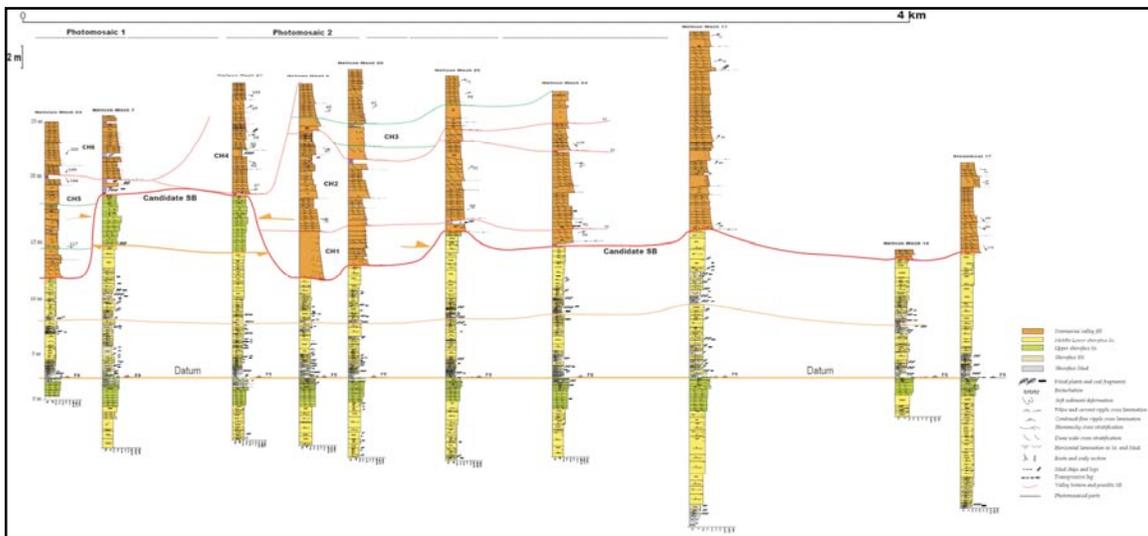
Stop 2. 3D delta front growth faults

- Sharp-based mouth bars
- Super-critical flow regimes
- Shale-ridge diapirs



Stop 3. Incised valleys, Neilson Wash, Factory Butte Road

- Various stops along canyon
- Top of marine parasequences



Evening at the **Rimrock Hotel**, Torrey, Utah.

Day 6. Friday, August 17th.

Drive to Salt Lake City, Fly Home.



Safety Considerations

The matter of safety in the field deals with both personal safety and safety associated with the larger group. The most dangerous implement is the rock hammer. Bruised toes and fingers as well as lacerations that result from rock and steel chips produced on impact are common. Of serious concern is the impact of one of these chips in an individual's eye. These problems can be minimized by wearing protective goggles and practicing good common sense while recovering a fresh rock sample.

Be certain that no one else is within 10-15 feet of the point where rock chips may be produced. It is also worth making sure that people are not facing toward the impact site. Care should always be exercised when freeing a sample. You may place your boot over the sample site to catch any rock and flying chips. Do not use your fingers. A single well-placed blow should be sufficient. Particularly hard and brittle rocks like quartzite make difficult specimens from which to extract samples. A single, well-placed blow on a fractured corner is more likely to produce an adequate specimen than pounding upon on a large rounded surface.

A second area of concern dealing with safety in the field pertains to steep canyon walls, road cuts, and other natural exposures. Canyon walls are can be very steep with precarious overhanging projections. Use caution around such over hangs. On steep climbable slopes care should be exercised while attempting to reach the Rosetta stone. Dislodged rocks pose a serious threat to persons at the base of the slope below the climber. Observation is far more a powerful tool than climbing to solve problems. Injury is more likely going down than going up to the site. We have all had structural geology, so be sure and remember your Mohr's circle and Coulomb's fracture criteria for maintaining solid footing on slopes.

When you are at the top of a steep slope, the obvious problem of falling should not be ignored. Eroded cliff faces may be unstable or changes of wind speed and direction pose problems. It is simply best to stay away from such hazards. Some individuals have the urge to throw rocks. This is a potential hazard for people at the bottom of the slope. In wilderness areas where there are not likely to be people, there is always the real danger of striking wildlife or livestock.

Wet lichen or moss covered rocks provide precarious footing. Fences should be avoided. Where possible, gates should be used. Gates are always left in the exact manner they were found. Barbed wire fences are best crossed in groups with one or more persons spreading the wires apart, and others passing through the opening provided. Never step on the wire. Look for an opening that will allow you to crawl under. Streams and irrigation ditches should be treated with caution. A bad landing after a broad jump may result in a broken or twisted ankle. Instead, look for natural bridges or shallow fords.

Livestock, snakes, bears and other forms of wildlife should be avoided. When wildlife is encountered in the field, keep in mind that geologists do geologist things, snakes do snake things, that badgers do badger things and so on. Teasing or catching potentially dangerous animals, particularly in a group, is foolhardy. Animals will usually evacuate the area and pose no threat. Do not reach into any crevasse or place your hand on an overhanging ledge without looking and checking for danger first. If someone were

to be bitten by a snake, remain calm and treat the victim for shock. In most cases, the individual is not at risk from the bite; although, medical attention is required.

Perhaps the most serious threat to field participants is the danger associated with traffic along roadways. When crossing a road, it is important, especially in large groups that all participants cross together. Needless shifting from one side to the other should be avoided in all circumstances. Observations or discussions should never be attempted from any part of the roadway. It is probable that more persons are injured on highways than in any other manner associated with geological field trips.

Fair-skinned participants should use sun-screen and wide brimmed hat. At five to six thousand feet above sea-level the atmosphere is not as effective at blocking out the Sun's harmful rays. SPF 30 or more is recommended. Plenty of drinking water should be carried. Each participant should be aware of his or her fluid requirements. Insect repellent should be used when needed. Although we do not anticipate rain, afternoon thunderstorms can develop. Each participant should bring wet weather gear.