Washakie Museum and Cultural Center
Field Trip Summary

Meet: May 18th at Washakie Museum and Cultural Center before leaving in caravan to head to the RGDT turn-off along U.S. 14 (10.5 miles east of Greybull) where we will meet Erik Kvale.
Note: Transportation is not provided, but carpooling is encouraged
Time: 8am at Washakie Museum
9am at Red Gulch Dinosaur Tracksite turn-off
Guidebook: Provided at the rendezvous point.
Summary: This fieldtrip will visit outcrops east of Greybull that span 67 million years of time stretching from the Middle Jurassic through the Early Cretaceous. We will discuss how climates and geographies changed over that time and what sorts of life lived in the seas, along the shores, and inland. Our primary stops will be at the extremes of that interval, namely the Middle Jurassic Sundance Formation Red Gulch Dinosaur Tracksite and the Early Cretaceous Cloverly Formation exposed in the badlands of Devil's Kitchen. Most of the hiking will be near the vehicles over easy terrane.

Stop 1 – A chance stop on a rippled bedrock surface exposed in the Sundance Formation east of Greybull, Wyoming by geologists Erik Kvale (Indiana University) and Allen Archer (Kansas State University) and local naturalists Row Manuel, Cliff Manuel, and Fran Paton in May of 1997 led to the discovery of one of the most extensive dinosaur megatracksites in North America. The dinosaur tracks were made by small- to medium-sized two-legged (bipedal) dinosaurs that walked along an ancient white sand beach 167 million years ago during the middle part of the Jurassic Period. At that time a vast inland sea extended from Alaska right through eastern Idaho, Montana and into Wyoming with the deepest part of the seaway along the western margin of Wyoming. The nearby town of Shell would have been a beach resort town if it had existed then and would have had a climate much like the Bahamas do today. They were the first middle Jurassic dinosaur tracks discovered in the Wyoming and Montana region.

Until the late 20th century, dinosaur track-bearing horizons were largely unknown in Wyoming, but since the 1990s they have been found in every Jurassic-age formation in the Greybull/Shell area. Some of these horizons extend to the Montana-Wyoming border and as far south as Tensleep. The most exceptional of these are now part of the Red Gulch Dinosaur Tracksite, a 40-acre Bureau of Land Management educational site which preserves thousands of dinosaur tracks and constitute the most concentrated accumulation of publicly accessible dinosaur tracks in Wyoming.

Besides the tracks, we will examine other features that give geologists an indication of what type of dinosaurs these animals were, what the area looked like 167 million years ago, and what sort of climate and environment these dinosaurs experienced.

Stop 2 – From the gravel road north of RGDT, we will view outcrops of Sundance and the younger Morrison Formation and talk briefly about their geology and paleontology.

Stop 3 – Lunch at Old Shell Store, Shell, Wyoming

Stop 4 – A few miles north of Highway 14 between Greybull and Shell, lies Devil's Kitchen. This feature covers roughly 128 acres. While some might view it as a desolate place, to geologists it is a heavenly paradise. Hundreds of students studying geology, enrolled in some of the nation's best universities and colleges, have walked over and mapped this area for decades. Devil's Kitchen exhibits classic "badlands" topography.

Most of Devil's Kitchen is made up of the Cloverly Formation with a little bit of Greybull Interval and Sykes Mountain Formation at the very top of the rim. These are all units that were deposited in the early part of the Cretaceous Period. The sediments that make up the core of Devil's Kitchen constitute most of the Cloverly Formation. It was deposited near the beginning of the Cretaceous Period about 110 to 120 million years ago. This was millions of years after the Jurassic dinosaurs *Allosaurus*, *Diplodocus*, *Stegosaurus*, and *Camarasaurus* were dead and gone. In their places were the plant-eating ornithopod *Tenontosaurus*, armored tank-like herbivores like *Sauropelta* and *Tatankacephalis* (buffalo head) and the fierce little (about 3 feet tall) predators called *Deinonychus* aka "wolf of the Cretaceous". Within the uppermost part of the Cloverly Formation, researcher Dr. Nathan Jud has discovered some of the oldest flowering plant fossils found in North America (angiosperms). Prior to this the landscape was the exclusive domain of conifers, cycads (palmlike plants), ginkgoes, ferns and large horsetails. Most of the Cloverly appears to have been deposited in extremely arid environments and not in the lush forests many people think of when they imagine dinosaur habitats.

From this one stop at Devil's Kitchen, we will be able to view and unravel the startling tectonic history of the Early Cretaceous and how the trends of the ancient Cretaceous rivers completely reversed over the geologic equivalent to a "blink of the eye".