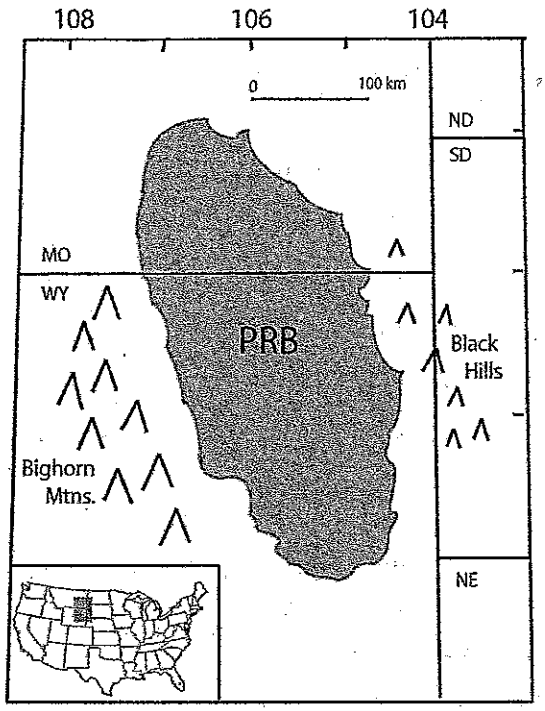
Copeland Fund Proposal

I am focusing my senior Independent Study in geology on an area in northeastern Wyoming and southeastern Montana called the Powder River Basin, which comprises about a 24,000 square mile expanse between the Black Hills to the east and the Bighorn Mountains to the west. The Powder River Basin is famous for its large coal deposits, as it is one of the biggest coal-producing locations in the United States. However, the condition of the coal in the basin is not perfectly stable. Underground fires have burned through billions of tons of the coal. These fires have been, for the most part, natural, started by lightning and spontaneous combustion.



Location of the Powder River Basin, Wyoming and Montana, USA

When coal burns, it reaches extremely high temperatures, and that heat escapes through the ground by filtering upward through cracks and weaknesses in the overlying rocks. This tremendous addition of heat ultimately causes those layers of rock to metamorphose (physically and chemically change) into an entirely different rock type. This new rock is called *clinker*. It is extremely hard and also very porous since it has undergone intense heating and fracturing, making it resistant to both erosion and runoff. It has shaped the overall geology of the basin, and has even required mining companies to reformat their mining practices in order to safely extract coal from the area.

As the overlying sedimentary rocks are metamorphosed, their composition changes. A number of chemicals and new minerals form. Some of this new material is hazardous to the water supply and the surrounding environment. Currently, there are not very many specific sites where extensive mineralogical and chemical mapping and research have been conducted. In my project, I hope to gain a better understanding of the geology of the Powder River Basin and try to focus in on a few specific sites in order to start creating a more detailed and complete profile of the nature of both the coal and clinker.

In order to conduct the field research needed to complete my I. S., I am hoping to travel to Wyoming and Montana early this summer. I am expecting this trip to last about one week. The College of Wooster Geology Department will be able to cover the cost of renting a car to use while we are there, but I will still need to pay for airfare. Upon returning to Wooster, I am planning on making thin sections of some of my best samples. A thin section is an extremely thin slice of rock that is mounted on a slide to be viewed using a microscope. This will make the characteristics of the mineralogy of the clinker much easier to analyze. I am also planning on sending in six to ten of my samples to be tested using X-ray fluorescence (XRF). XRF analysis measures the abundances of the different elements present in a sample. These analyses will be performed at Washington State University.

Being able to actually gather samples myself from the Powder River Basin and then test them with XRF and make thin sections out of them will greatly aid in my research project. I hope that my research will be something that either I or someone else can continue into the future, as it is both a naturally and economically dynamic setting.

	Quantity	Cost Per	Total Cost
Polished Thin Sections	10 thin sections	$28.00	$280.00
X-Ray Fluorescence Analyses	10 samples	$40.00	$400.00
Airfare from Cleveland to Rapid City	1 ticket	$352.00 per ticket	$352.00
Total Cost			$1032.00