



## *A Big View in Big Country*



*The health of the eye demands a horizon. We are never tired – so long as we can see far enough.* – Ralph Waldo Emerson

### **Forever Is Becoming Finite**

The song *On a Clear Day You Can See Forever* could have been written here at Badlands National Park. When the South Dakota skies are bright and clear, you can often see well over 100 miles. Visitors have come to expect these big views when visiting Badlands. Unfortunately, in recent years, many have been disappointed when their view is hazy and somehow “less crisp.” It is at these moments that we realize air quality is the park resource most often taken for granted, but so critical to the perception of the health of our national parks.

### **The Science of the Sky**

Since the passage of the initial Clean Air Act in 1963, Americans have been aware of the importance of the atmosphere. Awareness of air quality came into focus during the 1960s with the coining of the term “smog” (a combination of “smoke” and “fog”) and “killer smog” instances occurred worldwide. International efforts have greatly reduced the severe health issues relating to air pollution; however, we continue to find the general air quality degrading.

Small particles of sulfate, nitrate, and other pollutants can scatter light and reduce visibility. Visibility is not only how far you can see but also how clearly. Park air quality technicians track changes in visibility and monitor variations in pollution such as ozone, sulfur dioxide, and acid rain. Air pollution does not remain sky-bound. It impacts soils, plants, and wildlife. Acid rain intermingles with surface and groundwater to change chemically and become inhospitable to native life. Badlands consistently has some of the lowest ozone levels in the National Park Service.

## Remoteness Factor

Badlands National Park is fortunate to be located in a remote section of a sparsely populated state. The closest industrial community is Rapid City about 80 miles west of the park boundary. Initially, researchers found most of our air pollution was the result of wind and surrounding agriculture. Today, this is still a major factor in the quality of our air. We find that many of our “dirty air” days are “dirtier.” Additionally, the sources of this grit and grime are now proving to stem from industrial pollution. As a result, the Badlands National Park “community” has become much larger. We, as managers of this international treasure, must look well beyond park boundaries and pay attention to trends in vehicle use, road construction, industrial development, and other distant activities that impact the sky. In fact, our “neighborhood” expands to neighboring states, not just counties. Wyoming coal production ends up in South Dakota skies.

## At the Top of Our “Class”

The goal of the National Park Service Air Resource Management program is the preservation, protection, and enhancement of the air quality in our National Parks. Under the revised Clean Air Act of 1970, sky clarity was divided into “classes.” Badlands National Park has a Class I airshed, the highest level of protection, because of the presence of 64,144 acres of federally designated wilderness. Federal lands with Class I airsheds are required to conduct a rigorous visibility monitoring program. Badlands has participated in the air quality monitoring program since 1987 with visibility monitoring beginning a year later. Aerosol sampling for particulate particles ( the size of particles we breathe in) occurs automatically every three days, testing for hydrogen, sodium, lead, nitrates, organic and elemental carbon, and total mass. Every hour a light beam is sent across the prairie from a transmitting telescope to a receiving telescope approximately 2.5 miles away. The amount of the light scattered, or basically, how clean the air is, can then be measured. Together, the results of the data gathered by filters and “transmissometers” can determine trends in the air quality at Badlands National Park.

## A View Without Boundaries

More than any other natural resource, air and sky do not acknowledge boundaries. Wyoming, a big oil and gas producing state, contains numerous oil wells and strip mines and is home to some of the nation’s largest coal-fired power plants. Montana, to our northwest, is also home to coal-fired power plants. Our southern border finds Nebraska harboring the largest train-switching station for diesel engines in the nation and massive ethanol-producing plants. In recent years, industrial air waste from Denver and the Front Range has begun to seep into our boundaries. With westerly or northwesterly weather patterns, our neighbors are infringing on our skies.

## Facing the Challenge

Badlands National Park has been collecting visibility monitoring data for over ten years. In early 2000, the park joined State of South Dakota in a cooperative monitoring program to increase visibility monitoring within our park boundaries, as well as in areas surrounding Badlands in an effort to narrow down the sources contributing to “dirtying” our air. Although trends show our “dirty” days getting “dirtier,” our clean days are increasingly cleaner. Visitors to Badlands National Park are still rewarded with outstanding vistas under near perfect visibility conditions – just like we promised.

## Into the Night: Could It Cost Us the Stars?

Remember that without clear skies, clean air, and low light pollution, we lose something magical – we lose our night skies. Stars are scientific wonderlights and romantic embers. They light something in the eyes of everyone who can see them. Even the blind have the dream of stars. *The moon belongs to everyone, The best things in life are free. The stars belong to everyone, They gleam there for you and me.* – Buddy De Sylva and Lew Brown