



## Capulin Volcano National Monument

# Air Quality

Air quality doesn't just affect the air we breathe, it affects many air quality related values, such as visibility and natural and cultural resources. Air quality in national parks, which includes Capulin Volcano National Monument, is protected by the Clean Air Act and by the National Park Service (NPS) Organic Act. Understanding how directly linked air quality is to the health of the monument's resources can help with interpreting changes that occur in vegetation resulting from elevated levels of ozone or elevated levels of nitrogen or sulfur. High levels of these compounds can result in vegetation damage through acidification or nutrient loading to ecosystems or through disrupting metabolic processes, creating an extra stress to resources. Air quality can also impact visibility, which is significant to many national park visitors. In 2003, a visitor study was conducted at the monument and 94% of visitors stated that sightseeing was their main activity while visiting the monument. If visibility is impacted by poor air quality in the form of haze, visitor experiences will be greatly impacted and the sweeping views afforded from the top of the monument's volcano will be obscured.

### Status and Trends

There are different facets to air quality including ozone levels, visibility conditions, and atmospheric wet deposition levels. Currently, the monument staff monitor atmospheric wet deposition levels directly on site, and the ozone and visibility conditions are assessed by the NPS Air Resources Division scientists by interpolating data collected throughout the United States.

Atmospheric wet deposition monitoring began at the monument in 1984 as part of the National Atmospheric Deposition Program/National Trends Network atmospheric deposition monitoring program. Weekly samples are collected and sent to a chemical lab where analyses are performed to determine the levels of nitrogen, sulfur, and ammonium at the monument. These levels are annually averaged, providing results in kilograms per year per hectare. To date, nitrogen, sulfur, and ammonium levels have been high enough to be of a moderate concern. Currently, the condition for ozone and visibility at the monument is also of moderate concern.

### Discussion

The monument's air quality is largely influenced by activities and operations that occur outside its boundary. As a result, monitoring for damages related to higher levels of ozone or nitrogen, sulfur, or ammonium may provide insight into resource impact. For example, the monument contains four



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Cloudy skies at Capulin Volcano National Monument.

known ozone bioindicators, which are plants that are more susceptible to injury from higher ozone levels. Increased uptake of ozone can result in leaf stippling (browning), weakening a plant's resistance to other stressors. But as with many living systems, it is not just the presence of high ozone levels that induce injury. Other conditions, such as degree of moisture, length of ozone exposure, and existing stressors to the plants, such as competition from non-native plants, also play critical roles in the possibility of damage when higher levels of ozone are present. Ultimately, the current and future condition of the monument's air quality condition is primarily dependent on local, regional, and even national planning.