

VISIBILITY TRENDS AT GRAND CANYON

Visibility trends in the southwest has been investigated using airport visibility data from the period 1948 to 1976 (Trijonis and Yuan, 1978). The southwest is a region containing several Class I areas, which require visibility protection, such as Grand Canyon National Park.

The study results indicate that from late 1940 to the early/mid '50s, visibility trends were mixed with some sites showing a slight improvement and a lesser number showing a slight deterioration. From early/mid '50s to the early '70s, 11 of 12 sites showed a drop in visibility of approximately 10 to 30 percent. Additional information on historical visibility trends is contained in attachment one taken from the "EPA Report to Congress", 1979.

The NPS and EPA have been cooperatively monitoring visibility in the Grand Canyon since the summer of 1978. During the summer, the peak visitor season, the visibility averages about 160 km (100 mi) as compared to the best visibility of about 400 km (250 mi). Slides showing these conditions are being sent to you from the Visibility Research Center.

An initial look at best and worst days at Grand Canyon indicates that fine sulfur and fine soil particles are in part responsible for visibility degradation (Pitchford, et al. 1980). The path of air masses on days before the days of best and worst visibility at Grand Canyon was determined. The analysis showed that during best visibility days air masses approached Grand Canyon from the north and northwest. This suggests the existence of a "clean corridor", by the predominance of best visibility days, over central and northern Nevada and Utah.

In contrast, the worst case air masses associated with visual range of 80 km or less never initiate from the northwest. Instead, these masses approach Grand Canyon from the southwest, west, and southeast, passing over central and southern Arizona, southern California, and southern New Mexico. Potentially they are associated with copper smelter emissions and the southern California urban plume. Attachment two is the paper by Pitchford et al., which discusses this analysis.

If one only considers the contribution of sulfates to visibility impairment there is the potential for significant improvement in visibility at the Grand Canyon since sulfates compose approximately 30% of the fine particulates.

References:

Trijonis, J., and K. Yuan (1978) Visibility in the Southwest: An Exploration of the Historical Data Base, EPA-600-3-78-039, U.S. EPA, Research Triangle Park, N.C.

Protecting Visibility, An EPA Report to Congress, (October, 1979), Office of Air Quality Planning and Standards, EPA-450/5-79-008, U.S. EPA, Research Triangle Park, N.C.

Pitchford, Ann, and Mark Pitchford, Regional Analysis of Factors Affecting Visual Air Quality, submitted to "Atmospheric Environment," expected publication - summer 1981.