

Changes in visibility restrictions over a 20 year period

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It is well known that there is more air pollution today than many years ago. This is a serious problem for many reasons but it also raises the question as to how this has affected ground visibility in connection with aircraft operations. A brief study of several airport stations that have had ground visibility problems in the past indicates that the incidence of low visibilities at the ground has decreased markedly over the past 20 years.

Climatological data show that visibility restrictions due to smoke and/or haze occur most frequently during the months of December, January and February at most airport stations affected by smoke or haze. To facilitate the compilation of data on smoke and haze only with visibilities of 6 miles or less, the month of January 1945 was compared with January 1965. Eight Weather Bureau Airport Stations whose location and point of observation had not been changed during these 20 years were used. The stations used were Atlanta, Newark, Cleveland (observation point was changed 200 ft), Chicago, St. Louis, Kansas City, Omaha and Oakland. There may be some bias towards areas of greater smoke, pollution, station policy or observers. To at least partially eliminate station policy or observer bias, only the totals are shown here and represent 5952 hourly observations since specials were not included. Those cases involving precipitation, fog, etc., were not included in this tabulation.

Table 1 shows that the visibility restrictions due to smoke (K) and smoke with haze (KH) have decreased 82% between 1945 and 1965. These results are similar but show even more pronounced visibility improvement than those of Holzworth (1962) in his earlier study of 28 cities over a 15 to 20-yr period of record that were located mostly in the midwestern and western states. Restrictions due to haze (H) and haze with smoke (HK), remain the same. However it is difficult for an observer to distinguish the predominate visibility restriction

when both smoke and haze are present so a conclusion that there has been no change is not necessarily a valid one. These data on haze may be biased towards too few reports as compared with smoke since there was so much heavy smoke in 1945.

TABLE 1. Summary of 5,952 January hourly observations for eight stations.

Restrictions	Number of observations		% Change
	1945	1965	
K	1,742	227	-87
KH	32	99	+68
K plus KH	1,774	326	-82
H	167	88	-47
HK	45	123	+63
H plus HK	212	211	0

The amount and character of smoke has changed appreciably between 1945 and 1965. For the area near the stations used in this study, locomotives, industries, many homes, etc., were burning coal in 1945 which produced much black smoke. In 1965, even though there is much more pollution in the air, the smoke is of a different character and color. Smoke from a factory or other source today loses its color within a few blocks or miles and thus it is often difficult for the ground observer to distinguish between smoke and haze. Areas that are completely free of local smoke sources may have visibility restrictions due to pollutants that were produced many miles away.

Reference

- Holzworth, G. C., 1962: Some effects of air pollution on visibility in and near cities. Symposium, Air over Cities, SEC Technical Report A62-5, Public Health Service, R. A. Taft Sanitary Engineering Center, Cincinnati, Ohio.