AFS Policy Statement #7:
POLICIES ON TWO ISSUES OF ENVIRONMENTAL CONCERN

"Acid Rain" is defined as precipitation that has a pH lower than 5.61 which is the pH expected in distilled water exposed to the atmosphere. The pH of precipitation undoubtedly is affected by a variety of natural sources of acidic and alkaline materials (e.g., volcanic gases, gases from decomposing organic matter, and soil dust). However, it has recently become apparent that rain and snow in certain regions of the earth are consistently more acidic than expected. The European Atmospheric Chemistry Network first recognized that the pH of precipitation was declining in Scandinavia during the late 1960's. Current data indicate that the mean annual pH in this region declined from 5.0 -5.5 in the late 1950's to *4.2 -4.4* in the mid- 1970's. In eastern North America, precipitation is now more acidic than in Scandinavia. The median pH for 1978 -79 ranged from *4.0* to *4.4* in northeastern U.S. and southeastern Canada.

Although there is disagreement over the source and nature of acidic precipitation, the most widely accepted view is that the increased acidity is a result of the presence of increased quantities of sulfuric and nitric acids. These acids are believed to result from oxidation of sulfur and nitrogen oxide gases. Sulfur oxides and nitrogen oxides are produced from combustion of fossil fuels, metal smelting, and various industrial processes. Although natural sources of these gases may be greater than anthropogenic sources on a global scale, anthropogenic sources are concentrated in the northern hemisphere and far outweigh natural sources in populated areas.

Transportation of these gases to distant locations is facilitated by the trend toward increasing height of smokestacks, and increasing use of particle precipitators. Tall stacks increase dispersion of gases, and particle precipitators reduce the quantity of particles that absorb and neutralize gases. The end result is long-range transport of gases, which are transformed to strong acids and deposited with precipitation at distant locations.
In addition to strong acids, other pollutants are transported atmospherically and deposited in areas distant from any known source. Heavy metals, such as mercury and selenium, and complex organic compounds, such as polychlorinated biphenyls and polynuclear aromatic hydrocarbons, are emitted to the atmosphere by fossil fuel combustion and industrial processes and have been detected in acidic precipitation. It is believed that sources and transport mechanisms are similar for acids, metals, and organic compounds, and that these pollutants may interact with each other in the environment.
There is growing evidence that acidic precipitation is adversely affecting water quality in certain regions of the world and, as a result, sensitive aquatic species are declining or disappearing in these regions. In lakes and streams in affected areas, pH levels are reduced and concentrations of metals and complex organic compounds are increased. Aquatic organisms such as algae, macrophytes, invertebrates, fish, and amphibians have been reduced as a result of these changes. If acidic precipitation remains at present levels of control, these effects will probably spread over larger geographic areas