# 1. INTRODUCTION

The focus of highway runoff monitoring programs is on the identification of highway contributions to nonpoint source degradation of surface and groundwater quality. The results of such studies will assist the Iowa Department of Transportation (DOT) in the development of maintenance practices that will minimize the impact of highway transportation networks on water quality while at the same time maintaining public safety.

Highway runoff monitoring research will be useful in developing a basis to address issues in environmental impact statements for future highway network expansions. Further, it will lead to optimization of cost effectiveness/environmental factors related to de-icing, weed and dust control, highway drainage, construction methods, etc.

In this report, the authors present the data accumulated to date with a preliminary interpretation of the significance of the data. The report will discuss the site setup, operational aspects of data collection, and problems encountered. In addition, recommendations are included to optimize information gained from the study.

# 5. SUMMARY

The highway runoff project results to date indicate that highway activities do contribute significant amounts of chloride, oil and grease, metals, and oxygen demand to runoff waters and groundwater. The runoff volume from the flat (0.24 percent) median frequently exceeds that of the steep (2 percent) median when soil conditions are not saturated. However, the peak flows for the flat area are generally 52 percent to 69 percent of the steep area peak flows for most storm events. The flat area peak flow to steep area peak flow ratio approached 0.9 for the June 13, 1984, precipitation event with an approximate intensity of 1.0 inch per hour for a two-hour duration.

When saturated soil conditions exist, the total runoff nearly equalled and in some cases slightly exceeded total precipitation for medium to heavy precipitation events. This is because of both lateral precipitation variation and highway traffic effects. For unsaturated soil conditions, the runoff was generally 50 percent to 70 percent of the precipitation.

Basin lag times were observed to be highly dependent on the basin slope, the degree of soil saturation, and on rainfall intensity. However, for the worst observed conditions, i.e., saturated soils and 1.0 inch per hour to 1.6 inches per hour rainfall intensity, basin lag times for both the flat and the steep slopes were observed to be on the order of 13 minutes to 35 minutes.

The reduction of highway runoff environmental impacts depends to a large extent on suspended solids reduction. Recommendations are

contained in the report text regarding methods for suspended solids control. Chloride, another contaminant in highway runoff, is highly soluble and not strongly adsorbed in soil matrices. Therefore, the control of chloride reverts to stringent application control. It is probable that some of the suspended solids control recommendations would redistribute the final impacts of soluble contaminants. The recommendations would increase basin lag times for most storm events and encourage infiltration over larger land surfaces. Thus, runoff volumes to streams would be reduced, infiltration in small isolated ponding areas would be reduced, and the soil bulk available for adsorption of contaminants would be maximized.