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16. Abstract

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# OIL, GREASE, AND OTHER POLLUTANTS IN HIGHWAY RUNOFF

by

Bruce Wiland
Joseph F. Malina, Jr.

Research Report Number 16-1F

Determination of Quantities of Certain Fuels, Oils, and Tars in Storm Runoff Waters from Highways

Research Project 3-8-76-16

conducted for

Texas
State Department of Highways and Public Transportation

in cooperation with the
U. S. Department of Transportation
Federal Highway Administration

by the

CENTER FOR HIGHWAY RESEARCH
THE UNIVERSITY OF TEXAS AT AUSTIN

September 1976

ABSTRACT

The pollutional effects of runoff from streets and highways have usually been expressed in terms of parameters commonly used to characterize municipal wastewater. This study represents an initial attempt at determining the presence or absence of certain categories of fuels, oils and tars in storm effluents. Oil, grease and heavy metals are washed from asphalt and concrete pavements under simulated rainfall conditions.

KEY WORDS: oil and grease, heavy metals, highway runoff, non-point source.

SUMMARY

Highways and streets contribute to the pollutional loading of stormwater runoff by increasing the amount of impervious surface area and thus increasing the quantity of runoff. One pollution source is the automobile and other motor vehicles. In addition to depositing quantities of oil and gas on the roadways, automobiles deposit zinc from oils and tires, lead from leaded gas and tires, and suspended solids from wearing tires and brakes.

Past studies on urban runoff have not always isolated the contribution of highway runoff. In addition, these studies have concentrated on suspended solids, nutrients, heavy metals, and COD. Little mention has been made of oil and grease. The purpose of this study was to identify the quantity of oil and grease in highway runoff. The scope of the project involved the determination of the presence or absence of certain categories of fuels, oils, and tars in storm effluents. The sporadic occurrence of rainfall events led to simulation of rainfall by applying water to the pavement from storage tanks on a truck and manual sampling collection.

The data reported herein indicate that oil, grease and heavy metals are washed from asphalt and concrete pavements under simulated rainfall conditions. This study provides a basis for more detailed analysis of the various factors which may affect the accumulation of possible pollutants on highway surfaces.

## IMPLEMENTATION STATEMENT

Samples should be taken during actual rainfall and rainfall should be recorded on site. Simulated rainfall is artificial, local, and limited and cannot fully represent actual conditions of evenly distributed rainfall. Moreover, simulated rainfall cannot give the frequency-intensity-duration relationship that is essential in tying the results together.

The non-predictable frequency and time occurrence of rainfall events make it mandatory that the use of automatic samplers triggered by rainfall or run-off be used in future studies.

Counting traffic between testing periods will enhance the meaningfulness of the results by possibly establishing a relation between vehicular traffic counts and pollutant levels.

Implementation of the first three recommendations will require a larger budget than was available for this initial exploratory project. Long-term data obtained on a monthly basis over several years could provide comprehensive information about the extent of the pollutional problems resulting from highway runoff.

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# CHAPTER 1. INTRODUCTION

Until recently, relatively little attention has been given to the environmental effects of non-point sources of pollution. Point source discharges of pollutants were easily identified and control at the source was feasible. Therefore, attention from the regulatory agencies, resulted in a trend to provide secondary treatment. The pollutant contribution of non-point sources such as stormwater runoff became evident.

The impact of non-point sources on receiving waters is not well understood. Indications are that for short poriods of time when storms are in progress, the pollutional loadings of stormwater may greatly exceed those of raw sewage to the domestic wastewater treatment plants. These stormwater flows may represent shock loadings on marginal receiving waters. Most cities presently channel stormwater directly to the receiving waters with little or no treatment. Storage of stormwater runoff until it can be treated is one alternative that has been discussed by the City of Chicago.

Because of the growing evidence that stormwater caused a tremendous load on receiving waters, environmental impact statements must now include the effects of highway projects which may increase the effects of stormwater runoff. Highways and streets contribute much of the pollutional loading of stormwater runoff by increasing the amount of impervious surface area and thus increasing the quantity of runoff. One pollution source is the automobile and other motor vehicles. In addition to depositing quantities of oil and gas on the roadways, automobiles deposit zinc from oils and tires, lead from leaded gas and tires, and suspended solids from wearing tires and brakes.

Past studies on urban runoff have not always isolated the contribution of highway runoff. In addition, these studies have concentrated on suspended solids, nutrients, heavy metals, and COD. Little mention has been made of oil and grease. The purpose of this study was to identify the quantity of oil and grease in highway funoff. The scope of the project involved the determination of the presence or absence of certain categories of fuels, oils, and tars in storm effluents. The budget available for the implementation of this project was relatively small ($12,000 for one year), therefore, the scope of work and the sampling program were proportionately limited. This constraint resulted in manual sample collection. The sporadic occurrence of rainfall events led to simulation of rainfall by applying water to the pavement from storage tanks on a truck. This procedure required that a crew from the State Department of Highways and Public Transportation direct traffic and the cost of this service was charged to the project. The most current traffic counts available in the District Office of the DHT were used in an attempt to correlate the analytical data with highway utilization.

In spite of the limitations of this study, the data reported herein, indicate that oil and grease as well as heavy metals are washed from asphalt and concrete pavements under simulated rainfall conditions. This study provides a basis for more detailed analysis of the various factors which may affect the accumulation of possible pollutants on highway surfaces.

## CHAPTER 2. LITERATURE REVIEW

The effects of urban and highway runoff on water quality have been studied by various investigators. Therefore this review attempts to concisely summarize the more significant results of previous and ongoing investigating.

### A. Urban Runoff

Urban runoff includes stormwater runoff from surfaces such as rooftops, lawns, alleys, sidewalks, parking lots, streets, and highways. Such runoff might either flow over the surfaces or in gutters, ditches, culverts, catch basins, and storm sewers. A comprehensive summary of early and recent studies on urban runoff is presented in Table 1[(1)]. The results of these studies indicate that urban runoff could result in severe shock loadings of both organic and inorganic, to receiving waters. The organic components included pathogenic bacteria, oxygen demanding substances, organic nutrients, oil and grease, and pesticides and herbicides; while the inorganic constituents were toxic substances, trace elements and heavy metals, inorganic salts, and particulates such as sand and grit. The concentrations of pollutants in stormwater runoff were directly proportional to the length of the antecedent dry weather period. High pollutant concentrations are observed during the early first flush and usually such concentrations decrease with time. Times of peaking and subsidence were a function of the size, topography and permeability of the drainage basin, and the rainfall intensity, frequency, and duration. The impact of shock stormwater runoff loadings on receiving waters could be several fold that of the effluent loadings from a municipal secondary (biological) treatment facility. In some cases the annual pollutant contributions of stormwater were compared to effluents from municipal treatment facilities.

TABLE 1. COMPARISON OF STORMWATER QUALITY FROM AN URBAN DRAINAGE BASIN IN DURHAM, NORTH CAROLINA, WITH RESULTS REPORTED BY OTHERS[1]

| Parameter / Location | | BOD, mg/l | COD, mg/l | Total Solids, mg/l | Volatile Solids, mg/l | Suspended Solids, mg/l | Total Phosphate, mg/l | Fecal Coliforms, per 100ml | Chloride as NaCl, mg/l |
|---|---|---|---|---|---|---|---|---|---|
| Durham, N. C. (urban stormwater) | Mean | 14.5 | 179 | 2730 | 298 | - | 0.58 | 30,000 | 12.6 |
| | Range | 2- 232 | 40-600 | 274-13,800 | 20-1110 | - | 0.15-2.50 | 7000 - 86,000* | 3.0-390 |
| Cincinnati, Ohio (urban stormwater) | Mean | 17 | 111 | - | - | 227 | 1.1 | - | 19.8 |
| | Range | 1-173 | 20-610 | - | - | 5-1200 | 0.02-7.3 | 500 - 76,000 | 5.0-705 |
| Cincinnati, Ohio (rainfall) | Mean | - | 16 | - | - | 13 | 0.24 | - | - |
| Coshocton, Ohio (rural stormwater) | Mean | 7 | 79 | - | - | 313 | 1.7 | - | - |
| | Range | 0.5-23 | 30-159 | - | - | 5-2074 | 0.25-3.3 | 2 - 56,000 | - |
| Coshocton, Ohio (rainfall) | Mean | - | 9.0 | - | - | 11.7 | 0.08 | - | - |
| Detroit, Mich. (1949) (urban stormwater) | Range | 96-234 | - | 310-914 | - | - | - | Total Coliforms MPN/100 ml 25,000 - 930,000 | |
| Seattle, Washington (urban stormwater) | | 10 | - | - | - | - | 4.3 max | 16,100 max | |
| Stockholm, Sweden (urban stormwater) | Median | 17 | 188 | 300 | 90 | - | - | 4,000 | |
| | Maximum | 80 | 3100 | 3000 | 580 | - | - | 200,000 | |
| Pretoria, S. Africa (residential/park/school) | | 30 | 29 | - | - | - | - | 240,000 | |
| (business and flat area) | | 34 | 28 | - | - | - | - | 230,000 | |
| Oxney, England | Maximum | 100 | - | - | - | 2045 | - | - | |
| Leningrad, USSR | | 36 | - | - | - | 14,541 | - | - | |
| Moscow, USSR | Range | 18-285 | - | - | - | 1000-3500 | - | - | |

*Range of Means for 17-storm series for Durham, North Carolina

B. Street and Highway Runoff

Attempts have been made at isolating street and highway runoff from urban runoff so that means of pollution control might be made a little easier. Components of street and highway runoff result from erosion during the construction stages; chemicals, oils and materials used during construction; operation and maintenance of highways including addition of chemicals to melt ice, herbicides to control roadside vegetations, and re-asphalting; spills of chemicals and oils; litter and debris; and engine exhausts, oils and greases, and other substances deposited on the road surface during the normal use of the highway.

A comprehensive study of the pollutional loadings from highway runoff in eight cities was conducted by URS Research Company[2]. Streets were sprayed with water fram a rainwater simulator and samples of the water were analyzed. Results of the study are summarized in Table 2[2]. These data indicate that asphalt survaces resulted in 80% heavier loadings than did concrete surfaces, streets in poor-to-fair conditions contributed 2.5 times as much load as did good-to=excellent roadways, and heavy metal concentrations were 10 to 100 times greater than in domestic sewage. On a slug load basis (lb/hr) the loading was 100 to 1000 times greater.

The results of a one-year investigation of runoff from the Aston Expressway in the city of Birmingham, Alabama, for one year are shown in Table 3. The highest loadings occurred during the winter months possibly as a result of the inefficiency of automobile engines during the cold weather months.

A more detailed literature review is included in a report titled "Water Pollution Effects of Highway Runoff on the Environment". The report was submitted to the Federal Highway Administration in July 1975 by Envirex, Inc.[4] This report was reviewed by these authors who felt a repeat of those results at this time would only be redundant.

TABLE 2. QUANTITIES OF POLLUTANTS FOUND ON STREETS ($lb/1000\ ft^2$)[2]

| POLLUTANT | RANGE | MEAN |
|---|---|---|
| $BOD_5$ | 0.021 - 0.67 | 0.20 |
| COD | 0.14 - 3.8 | 0.98 |
| $PO_4^{\equiv}$ | 0.0029 - 0.042 | 0.012 |
| $NO_3^-$ | 0.00017 - 0.031 | 0.0042 |
| N | 0.0053 - 0.10 | 0.026 |
| SOLIDS | 4.6 - 56 | 16 |
| Pb | 0.0042 - 0.018 | 0.0074 |
| Zn | 0.00087 - 0.052 | 0.012 |

TABLE 3. QUALITY OF RUNOFF FROM ASTON EXPRESSWAY EXPRESSED AS TOTAL LOADING PER MONTH

| MONTHS | RAINFALL AT SPRING LANE (mm) | VOLUME FROM STUDY AREA ($m^3$) | TOTAL SS (mg/L) | BOD (mg/L) | TOTAL METALS (mg/L) | TOTAL Zn (mg/L) | TOTAL Pb (mg/L) |
|---|---|---|---|---|---|---|---|
| JULY | 81.1 | 2923 | 160 | 10.3 | 1.39 | 0.65 | 0.56 |
| AUGUST | 23.0 | 829 | 134 | 11.2 | 1.40 | 0.68 | 0.45 |
| SEPTEMBER | 38.8 | 1398 | 510 | 17.0 | 4.18 | 1.91 | 1.52 |
| OCTOBER | 38.7 | 1395 | 754 | 27.4 | 5.63 | 2.70 | 2.21 |
| NOVEMBER | 48.9 | 1762 | 547 | 4.0 | 8.03 | 5.43 | 1.83 |
| DECEMBER | 29.0 | 1045 | 2238 | 64 | 15.01 | 8.01 | 4.84 |
| JANUARY | 102.0 | 3676 | 2599 | 64.5 | 13.4 | 6.59 | 4.94 |
| FEBRUARY | 64.2 | 2315 | 1646 | 49 | 6.8 | 3.22 | 2.51 |
| MARCH | 26.9 | 969 | ---- | ---- | ---- | ---- | ---- |
| APRIL | 9.1 | 328 | 570 | 33.0 | 3.4 | 1.45 | 0.8 |
| MAY | 32.5 | 1171 | 1204 | 38 | 4.29 | 2.1 | 1.40 |
| JUNE | 39.2 | 1413 | 632.7 | 6.2 | 5.14 | 2.37 | 1.87 |

*BOD figures based on relations between BOD/SS.

## CHAPTER 3. RUNOFF SITES AND TRAFFIC COUNTS

The two sites selected for this study are located on limited access freeways (55 mph speed limit) running north-south through Austin and were chosen with the help of the Texas State Department of Highways and Public Transportation District 14 Office.

The first site was located on the upper deck of IH35. The actual sampling area was the right southbound lane at 41st Street on drainage section R-13 as shown on the drainage area map for IH35 (Fig 1). The upper deck of IH35 consists of concrete pavement. IH35 is part of the Interstate highway system and as such is a major artery for through traffic much of which consists of heavy truck traffic. It is also a major route for local traffic as it provides major access to The University of Texas campus, the Capitol Complex and downtown Austin. From October 1975 to February 1976, the Texas Highway Department collected traffic counts on the two-lane southbound upper deck which showed a daily average of 31,610 vehicle/24 hours. This section of IH35 was opened in October 1976.

The second site is located on the Loop 1 (MoPac Freeway). The actual sampling area was the second from the right southbound lane between the Westover and Windsor exits on drainage section DA-256 as shown on the drainage area map for MoPac (Fig 2). MoPac was chosen because it was an asphalt base pavement. MoPac consists almost entirely of local traffic with little through traffic. It is also a major artery for access to downtown Austin from Northwest Austin. The most current available Texas Highway Department traffic count data were used. In January 1976 to February 1976 between Westover and Windsor, the daily average traffic count was 18,250 vehicles per 24 hours. This count included the traffic flow across all four lanes although the right lane probably contributed very little since it was an entrance and exit lane only. MoPac was opened in November 1975.

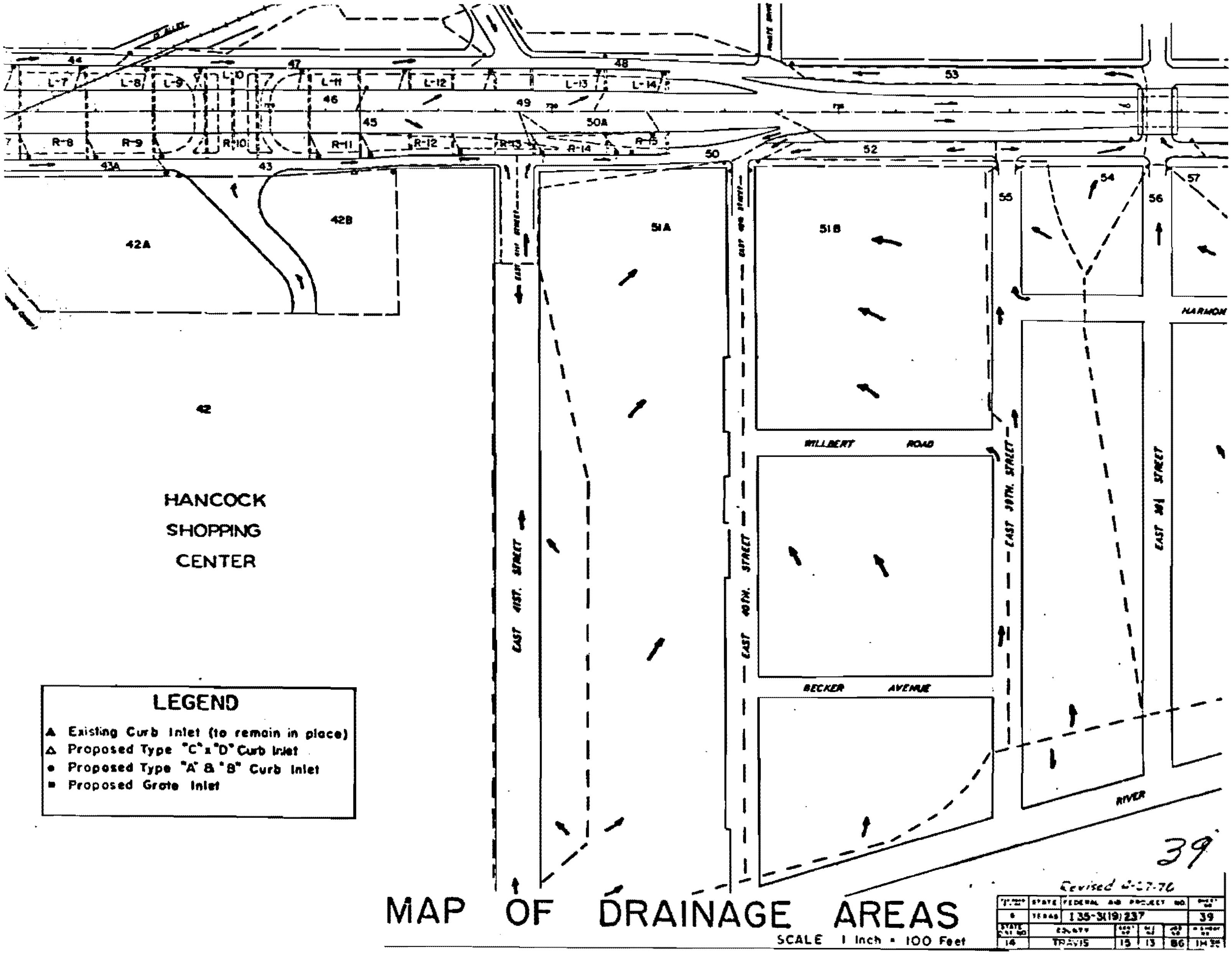


Fig 1. Drainage area map for IH 35.

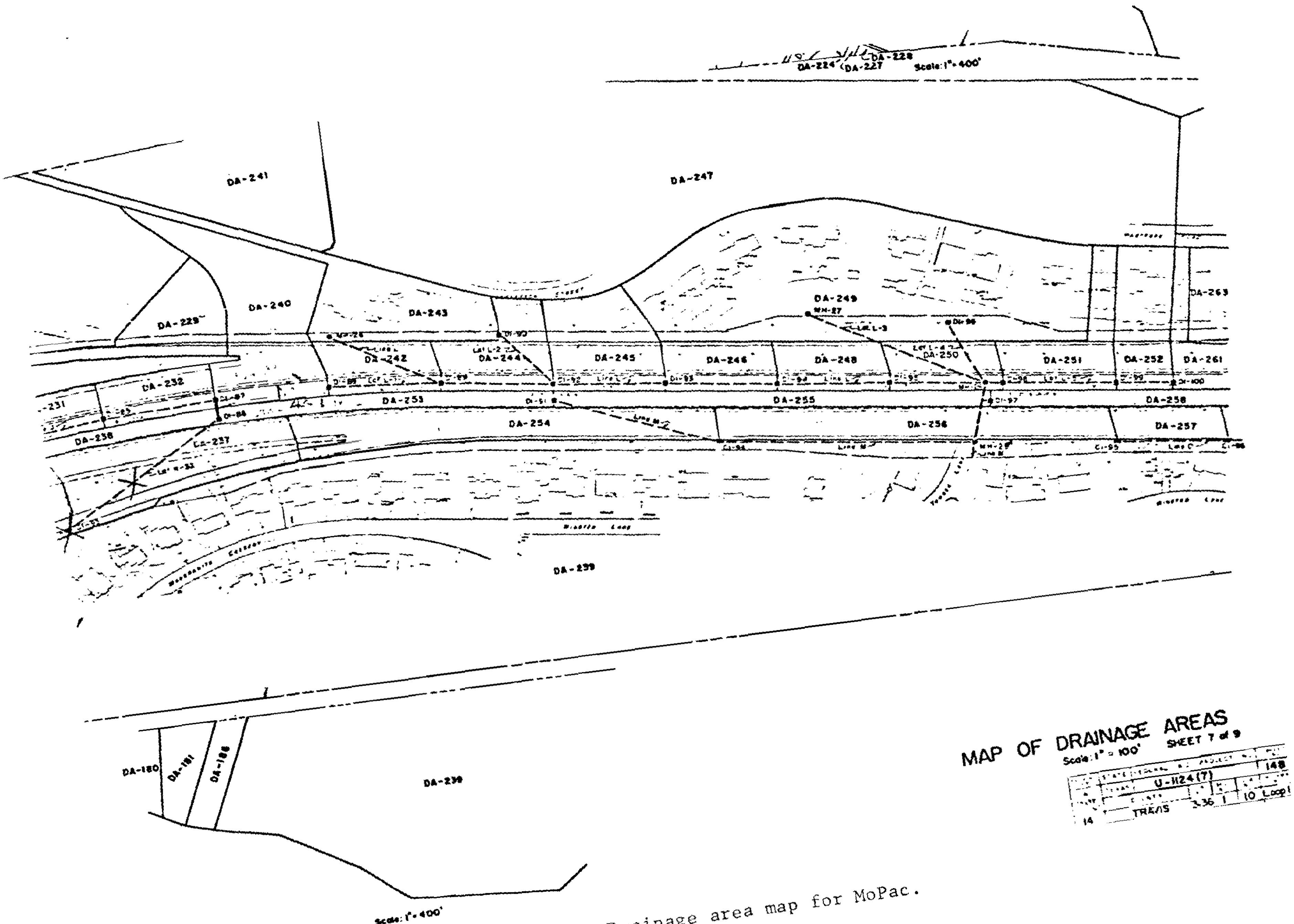


Fig 2. Drainage area map for MoPac.

# CHAPTER 4. EXPERIMENTAL PROCEDURES

## A. Collection of Samples

The lack of rainfall during the early stages of the project required the development of a method to provide simulated runoff. After discussion with the Highway Department, a decision was made to simulate rainfall by spraying water on the surface of the highway. A similar method had been used in a study for the EPA prepared by URS Research Company.[2]

A pickup truck was equipped with a self-priming centrifugal pump and two Nalgene containers with a combined capacity of 200 gallons. The Nalgene containers were filled with tap water from the Austin water supply. The water was pumped from the Nalgene containers through polyvinyl chloride piping and onto the highway through a polyvinyl chloride header. Flow was controlled by means of a valve on the discharge side of the pump.

The truck was driven back and forth over the designated area to give uniform distribution of the water. The time required to empty the 200-gallon containers was measured in order to compute a simulated average rainfall intensity.

To prevent any oil that might leak from the truck from interfering with the results, a sheet of plastic was suspended beneath the truck to catch any oil drippings.

Samples were collected in 3 ½-liter bottles once every one to two minutes for ten to twenty minutes depending on the duration of runoff. On IH35, the samples were collected as the runoff flowed from the downspout on the lower level. On MoPac, the samples were collected as the runoff flowed into a catch basin.

## B. Analysis of Samples

The highway runoff samples were analyzed for oil and grease, chemical oxygen demand, total organic carbon, suspended solids, and the heavy metals, lead and zinc. The samples collected in the 3 ½-liter bottles were stored at $4^{o}C$ until analysis.

1. Oil and Grease

Oil and grease concentration of the highway runoff was determined using the infrared Freon-extraction technique outlined by the Environmental Protection Agency.[5] After most of the solids settled in the sample bottles, one liter of the sample was transferred into a 2000 ml separatory funnel. Failure to allow the solids to settle created a condition in which the Freon and water layers could not be separated but remained in an emulsion. This emulsion was not broken easily even using the soidum sulfate technique.

Ten milliliters of concentrated hydrochloric acid were added to the sample to acidify to pH = 2. After adding thirty milliliters of Freon TF to the separatory funnel, extraction was accomplished by shaking the contents vigorously for two minutes. Care must be exercised during this procedure. Pressure builds up within the separatory funnel because of the volatile nature of the Freon. If the stopper is not held firmly in place while shaking and if the pressure is not released periodically, the pressure may cause the stopper to blow off and the sample to be lost.

After shaking, the layers were allowed to separate. The lower Freon layer was filtered through a glass funnel lined with solvent-moistened Whatman 42 filter paper into a 100 milliliter volumetric flask. An emulsion which fails to separate can be broken by pouring a small amount of anhydrous sodium sulfate into the filter.

The extraction process was repeated with two additional 30 milliliter portions of Freon. The volumetric flask was filled to 100 milliliters and stoppered until analysis by infrared spectrophotometric technique.

Standards were prepared from an "unknown oil" reference standard as outlined by the EPA. The reference standard consists of 15 milliliters n-hexadecane, 15 milliliters isooctane, and 10 milliliters benzene. The mixture was assumed to have a specific gravity of 0.769 so that 10 microliters equals 7.69 milligrams of oil. Suitable dilutions of the unknown oil were prepared for determining the sample concentrations.

Samples and standards were analyzed on a Beckman Acculab 4 Double Beam Infrared Spectrophotometer with auxillary recorder for ordinate expansion.

A cell pathlength of one centimeter was used. Each sample was scanned from 3200 $cm^{-1}$ to 2700 $cm^{-1}$. The peak height at 2930 $cm^{-1}$ was used to calculate the quantity of oil and grease present. Further details of infrared spectrophotometric analysis of oil were presented by Gruenfeld.(6)

2. Chemical Oxygen Demand

The Chemical Oxygen Demand (COD) was determined using the dichromate reflux method described in Standard Methods.(7) Blanks were collected from the water truck before spraying the water on the highway. These blanks were used to correct for any COD that might be in the simulated rainwater. COD concentrations were determined on mixed unfiltered samples.

3. Biochemical Oxygen Demand

Biochemical Oxygen Demand (BOD) determinations were attempted but discontinued. The large variations in concentration necessitated large numbers of dilutions and more sample than was collected. The results were very erratic and the BOD concentrations were low probably because of the presence of heavy metal toxicity which also was observed by Bryan.(1)

4. Total Organic Carbon

Total Organic Carbon (TOC) was determined on a Beckman Total Carbon Analyzer using the procedures outlined in Standard Methods. TOC was determined after acidifying the sample to pH=2 with two drops of hydrochloric acid and stripping the samples with nitrogen for ten minutes to remove the inorganic carbon. TOC concentrations were determined on unfiltered samples of the solids which had been allowed to settle.

5. Suspended Solids

Suspended solids determinations were made by filtering the sample through Reeve-Angel 934AH Glass Fiber Filters using the method outlined in Standard Methods.(7) Total Suspended Solids (TSS) concentrations were calculated after drying the filters for 30 minutes at 104°C. Volatile Suspended Solids (VSS) concentrations were calculated after igniting the filters for 15 minutes at

600$^{o}$C.

6. Heavy Metals

The concentrations of heavy metals, zinc and lead, were determined by atomic absorption on a Perkin-Elmer 303 Atomic Absorption Spectrophotometer in the ultraviolet range. A triple slot burner was used with an air-acetylene flame. Each metal had a separate cathode source lamp specific for that element. Lead concentrations were measured at a wavelength of 2833A. Zinc concentrations were measured at a wavelength of 2138A. Heavy metal concentrations were determined on samples the solids of which had been allowed to settle.

# CHAPTER 5. RESULTS

Sampling runs were conducted February 11, March 15, April 22, June 16, July 21, and August 6, 1976. The simulated rainfall conditions for these runs are given in Table 4. Climatological data for January 1976 through August 1976 are shown in the Appendix. Runoff characteristics as a function of time for each sampling period also are presented in the Appendix. The average concentrations observed for the runoff periods along with mass loadings are summarized in Tables 5-7.

The simulated rainfall intensities ranged from 1.8 to 4.2 in/hr. These high intensities resulted from the need to quickly apply the water to the highway surface so as to not restrict traffic flow any more than was necessary. The amounts of simulated rainfall ranged from 0.30 inches to 0.97 inches with durations of 10-22 minutes.

On IH35, the average mass loadings were 7.2 mg oil and grease per square foot of pavement, 222 mg/sq ft of COD, 40 mg/sq ft of TOC, 438 μg/sq ft lead, 220 μg/sq ft zinc, and 185 mg/sq ft suspended solids. The average mass loadings for MoPac were 4.2 mg/sq ft oil and grease, 400 mg/sq ft COD, 97 mg/sq ft TOC, 698 μg/sq ft lead, 542 μg/sq ft zinc, and 83 mg/sq ft suspended solids. These loadings should be considered conservative estimates on the low side for two reasons. The expected exponential decrease of concentration during runoff often did not occur. If rainfalls continued for longer than the simulated runoff period of 10-22 minutes, higher loadings may be expected. Also, the first seven months of 1976 were unusually wet and probably did not allow for the normal build up of pollutants.

Comparison of the data observed for IH35 to that for MoPac indicates that oil and grease loading was 75% higher and suspended solids were 123% higher on IH35 than on MoPac. However, the COD was 80% higher, the TOC 142% higher, lead 59% higher, and zinc 146% higher on MoPac than on IH35. The higher oil and grease concentrations on IH35 can be explained by noting that the average traffic flow for the lanes sampled is 160% higher on IH35 than on MoPac. The higher suspended solids loading may result in part from

TABLE 4. SIMULATED RAINFALL

| | Date | Area, sq ft | Duration, minutes | Amount, inches | Intensity, in./hr |
|---|---|---|---|---|---|
| IH 35 | February 11 | 960 | 10 | 0.33 | 2.0 |
| | March 15 | 330 | 22 | 0.97 | 2.7 |
| | April 22 | 330 | 15 | 0.97 | 3.9 |
| | June 16 | 330 | 14 | 0.97 | 4.2 |
| | July 21 | 350 | 20 | 0.60 | 1.8 |
| | August 6 | 350 | 16 | 0.92 | 3.5 |
| MoPac | February 11 | 1080 | 10 | 0.30 | 1.8 |
| | March 15 | 600 | 17 | 0.53 | 1.8 |
| | April 22 | 600 | 15 | 0.53 | 2.1 |
| | June 16 | 600 | 12 | 0.53 | 2.7 |
| | July 21 | 350 | 16 | 0.92 | 3.4 |
| | August 6 | 350 | 19 | 0.92 | 2.9 |

TABLE 5. AVERAGE CONCENTRATIONS

| | Date | Oil and Grease, mg/l | COD, mg/l | TOC, mg/l | Lead, mg/l | Zinc, mg/l | TSS, mg/l |
|---|---|---|---|---|---|---|---|
| IH 35 | February 11 | 6.8 | 117 | 18 | 229 | 75 | - |
| | March 15 | 3.2 | 169 | 9 | 98 | 60 | - |
| | April 22 | 2.1 | 76 | 17 | 137 | 95 | - |
| | June 16 | 3.3 | 128 | 28 | 366 | 165 | 79 |
| | July 21 | 4.3 | 92 | 23 | 308 | 75 | 80 |
| | August 6 | 7.8 | 167 | 47 | 423 | 278 | 171 |
| | Average | 4.6 | 125 | 24 | 259 | 125 | 110 |
| MoPac | February 11 | 3.4 | 266 | 66 | 581 | 406 | - |
| | March 15 | 2.3 | 205 | 22 | 113 | 62 | - |
| | April 22 | 1.4 | 116 | 30 | 101 | 83 | - |
| | June 16 | 2.2 | 280 | 70 | 527 | 362 | 44 |
| | July 21 | 2.1 | 104 | 35 | 219 | 104 | 40 |
| | August 6 | 4.6 | 568 | 141 | 1098 | 970 | 50 |
| | Average | 2.7 | 257 | 61 | 440 | 331 | 45 |

TABLE 6. MASS LOADINGS

| | Date | Oil and Grease, mg/sq ft | COD, mg/sq ft | TOC, mg/sq ft | Lead, mg/sq ft | Zinc, mg/sq ft | TSS, mg/sq ft |
|---|---|---|---|---|---|---|---|
| IH 35 | February 11 | 5.4 | 92 | 14 | 181 | 59 | - |
| | March 15 | 7.3 | 387 | 20 | 224 | 137 | - |
| | April 22 | 4.8 | 175 | 39 | 303 | 218 | - |
| | June 16 | 7.6 | 295 | 64 | 839 | 378 | 181 |
| | July 21 | 6.0 | 130 | 33 | 436 | 106 | 113 |
| | August 6 | 11.9 | 255 | 72 | 646 | 424 | 261 |
| | Average | 7.2 | 222 | 40 | 438 | 220 | 185 |
| MoPac | February 11 | 2.4 | 187 | 47 | 407 | 285 | - |
| | March 15 | 2.9 | 259 | 27 | 142 | 79 | - |
| | April 22 | 1.7 | 147 | 38 | 127 | 105 | - |
| | June 16 | 2.8 | 353 | 89 | 664 | 457 | 56 |
| | July 21 | 4.5 | 225 | 76 | 475 | 226 | 86 |
| | August 6 | 10.0 | 1229 | 304 | 2374 | 2098 | 108 |
| | Average | 4.1 | 400 | 97 | 698 | 542 | 83 |

TABLE 7. MASS LOADINGS

| | Date | Oil and Grease, lb/1000 sq ft | COD, lb/1000 sq ft | TOC, lb/1000 sq ft | Lead, lb/1000 sq ft | Zinc, lb/1000 sq ft | TSS, lb/1000 sq ft |
|---|---|---|---|---|---|---|---|
| IH 35 | February 11 | 0.012 | 0.20 | 0.030 | 0.00040 | 0.00013 | - |
| | March 15 | 0.016 | 0.85 | 0.044 | 0.00049 | 0.00030 | - |
| | April 22 | 0.010 | 0.39 | 0.086 | 0.00067 | 0.00048 | - |
| | June 16 | 0.017 | 0.65 | 0.141 | 0.00185 | 0.00083 | 0.40 |
| | July 21 | 0.013 | 0.29 | 0.072 | 0.00096 | 0.00023 | 0.25 |
| | August 6 | 0.026 | 0.56 | 0.159 | 0.00142 | 0.00094 | 0.58 |
| | Average | 0.016 | 0.49 | 0.089 | 0.00097 | 0.00049 | 0.41 |
| MoPac | February 11 | 0.005 | 0.41 | 0.103 | 0.00090 | 0.00063 | - |
| | March 15 | 0.006 | 0.57 | 0.060 | 0.00031 | 0.00017 | - |
| | April 22 | 0.004 | 0.32 | 0.083 | 0.00028 | 0.00023 | - |
| | June 16 | 0.006 | 0.78 | 0.196 | 0.00146 | 0.00101 | 0.12 |
| | July 21 | 0.010 | 0.50 | 0.167 | 0.00105 | 0.00050 | 0.19 |
| | August 6 | 0.022 | 2.71 | 0.671 | 0.00523 | 0.00463 | 0.24 |
| | Average | 0.009 | 0.88 | 0.213 | 0.00154 | 0.00120 | 0.18 |

the fact that the concrete surface is more abrasive on tires than is asphalt. Also, the guard walls on Ih35 prevent many of the solids from being blown off the pavement surface.

The higher loadings on MoPac correspond with the results of the URS study which indicated asphalt surfaces to have higher loadings. These loadings may result from impurities and binders used in the asphalt. They may also be caused by leaching from asphalt which has been borken down by oil and gasoline from automobiles. However, the leachate does not consist of oil or grease as indicated by the relatively low oil and grease concentration for MoPac.

The impact of antecedant dry period is difficult to determine because of the large amount of rainfall during the testing period. The trends indicate, however, that the longer the antecedant dry period, the higher the pollutional loading as would be expected. The sixteen-day dry spell preceding the August sampling run showed a dramatic effect in increasing concentrations and loadings. The effect on MoPac was much more pronounced than that on IH35 indicating that asphalt surfaces may be more affected by antecedant weather conditions.

Comparison of the mass loadings calculated from the data observed for MoPac and IH35 with those found by URS Research Company[2], shows that the loadings from IH35 and MoPac and lower especially with respect to heavy metals and solids. The URS study reported mean values of 0.98 lb/1000 sq ft COD, 0.0074 lb/1000 sq ft lead, 0.012 lb/1000 sq ft zinc, and 16 lb/1000 sq ft solids. The average values on IH35 were 0.49 lb/1000 sq ft COD, 0.00097 lb/1000 sq ft lead, 0.00049 lb/1000 sq ft zinc, and 0.41 lb/1000 sq ft solids. The average values for MoPac were 0.88 lb/1000 sq ft COD, 0.00154 lb/1000 sq ft lead, 0.00120 lb/1000 sq ft zinc, and 0.18 lb/1000 sq ft solids.

# CHAPTER 6. CONCLUSIONS

Based on simulated rainfall intensities ranging from 1.8-4.2 in./hr corresponding to durations of 10-22 minutes the following conclusions can be drawn.

1. The average mass loadings found on IH35 (a concrete surface) were 0.49 lb/1000 sq ft COD, 0.016 lb/1000 sq ft oil and grease, 0.089 lb/1000 sq ft TOC, and 0.00097 lb/1000 sq ft lead, 0.00049 lb/1000 sq ft zinc, and 0.41 lb/1000 sq ft TSS.

2. The average mass loadings found on MoPac (an asphalt surface) were 0.88 lb/1000 sq ft COD, 0.009 lb/1000 sq ft oil and grease, 0.213 lb/1000 sq ft TOC, 0.00154 lb/1000 sq ft lead, 0.0012 lb/1000 sq ft zinc, and 0.18 lb/1000 sq ft TSS.

3. Loadings of COD, TOC, lead, and zinc were much higher from the MoPac aspahlt surface than from the IH35 concrete surface even though the traffic flow was 160% higher on IH35. Asphalt contributes higher COD, TOC, lead, and zinc loadings than does concrete. Oil, grease, and TSS loadings were lower on asphalt than on concrete.

4. Mass loading of lead, zinc, and suspended solids were lower than those reported in the literature. The use of less leaded gasoline since the 1975 model cars were introduced might have some influence on lowering lead levels.

# REFERENCES

1. Bryan, E. H., "Quality of Stormwater Drainage from Urban Land Areas in North Carolina," Report No. 37, Water Resources Research Institute of the University of North Carolina, Raleigh, N. C., 1970.

2. "Water Pollution Aspects of Street Surface Contaminants," URS Research Co., prepared for Office of Research and Monitoring, EPA-R2-72-081, November 1972, and paper by Sarter, J. D., and Boyd, G. B., JWPCF, Vol. 46, No. 3, p. 458, March 1974.

3. Hedley, George, and J. C. Lockley, "Quality of Water Discharged from an Urban Motorway," Water Pollution Control, 1975.

4. Agnew, R. W., M. K. Gupta, and A. J. Veteri, "Water Pollution Effects of Highway Runoff on the Environment: State-of-the-Art," Iterim Report to Federal Highway Administration by Envirex, Inc., July 1975.

5. U. S. Environmental Protection Agnecy, "Methods for Chemical Analysis of Water and Wastes," Methods Development and Quality Assurance Research Laboratory, National Environmental Research Center, Cincinnati, Ohio, 1974.

6. Gruenfeld, M., "Extraction of Dispersed Oils from Water for Quantitative Analysis by Infrared Spectroscopy," Environmental Science Technology, 7,646, 1973.

7. Standard Methods for the Examination of Water and Wastewater, 13th Edition, 1971.

# APPENDIX

TABLE A.1

(February 11, 1976)

| | Minutes Since Runoff Began | Oil and Grease mg/l | COD mg/l | TOC mg/l | Lead mg/l | Zinc mg/l |
|---|---|---|---|---|---|---|
| IH 35 | 0 | 9.6 | 273 | 33 | 340 | 130 |
| | 1 | 6.3 | 189 | 18 | 240 | 68 |
| | 2 | 6.1 | 84 | 21 | 370 | 130 |
| | 3 | 4.5 | 87 | 19 | 240 | 83 |
| | 4 | 5.0 | 76 | 19 | 250 | 172 |
| | 5 | 5.4 | 70 | 16 | 240 | 50 |
| | 6 | 9.2 | 82 | 14 | 220 | 47 |
| | 7 | 5.6 | 169 | 14 | 80 | 23 |
| | 8 | 8.8 | 77 | 11 | 150 | 17 |
| | 9 | 7.7 | 63 | 10 | 160 | 26 |
| MoPac | 0 | 5.9 | 340 | 52 | 610 | 225 |
| | 1 | 2.0 | 140 | 39 | 420 | 175 |
| | 2 | 3.4 | 226 | 57 | 390 | 212 |
| | 3 | 2.6 | 196 | 52 | 460 | 218 |
| | 4 | 6.6 | 610 | 153 | 1110 | 1130 |
| | 5 | 2.6 | 411 | 109 | 970 | 930 |
| | 6 | 2.2 | 250 | 58 | 500 | 392 |
| | 7 | 2.9 | 186 | 54 | 460 | 325 |
| | 8 | 2.3 | 158 | 48 | 490 | 253 |
| | 9 | 3.5 | 147 | 42 | 400 | 200 |

TABLE A.2

(March 15, 1976)

| | Minutes Since Runoff Began | Oil and Grease mg/1 | COD mg/1 | TOC mg/1 | Lead mg/1 | Zinc mg/1 |
|---|---|---|---|---|---|---|
| IH 35 | 0 | 2.9 | 655 | 25 | 270 | 185 |
| | 2 | 2.5 | 198 | 16 | 90 | 90 |
| | 4 | 2.3 | 234 | 10 | 130 | 32 |
| | 6 | 2.4 | 155 | 7 | 80 | 83 |
| | 8 | 3.5 | 122 | 6 | 90 | 35 |
| | 10 | 2.7 | 58 | 5 | 90 | 30 |
| | 12 | 5.7 | 58 | 4 | 50 | 42 |
| | 14 | 4.8 | 18 | 4 | 40 | 29 |
| | 16 | * | * | * | * | * |
| | 18 | 1.9 | 22 | 1 | 40 | 12 |
| MoPac | 0 | 2.6 | 745 | 27 | 190 | 135 |
| | 2 | 1.6 | 248 | 32 | 170 | 100 |
| | 4 | * | * | * | * | * |
| | 6 | 1.8 | 117 | 29 | 130 | 87 |
| | 8 | 2.7 | 117 | 28 | 120 | 60 |
| | 10 | 4.5 | 129 | 21 | 120 | 58 |
| | 12 | 1.6 | 126 | 18 | 120 | 80 |
| | 14 | 2.2 | 126 | 15 | 55 | 13 |
| | 16 | 2.3 | 115 | 11 | 40 | 15 |
| | 18 | 1.2 | 122 | 14 | 70 | 14 |

*No sample

TABLE A.3

(April 22, 1976)

| | Minutes Since Runoff Began | Oil and Grease mg/l | COD mg/l | TOC mg/l | Lead mg/l | Zinc mg/l |
|---|---|---|---|---|---|---|
| IH 35 | 0 | 3.0 | 301 | 52 | 480 | 450 |
| | 2 | 1.6 | 119 | 24 | 140 | 45 |
| | 4 | 1.5 | 65 | 17 | 115 | 37 |
| | 6 | 1.9 | 60 | 16 | 70 | 55 |
| | 8 | 4.0 | 60 | 10 | 110 | 25 |
| | 10 | 2.8 | 46 | 5 | 45 | 25 |
| | 12 | 0.8 | 15 | 8 | 65 | 15 |
| | 14 | 1.3 | 27 | 11 | 40 | 35 |
| | 16 | 2.0 | 35 | 12 | 135 | 200 |
| | 18 | 1.8 | 36 | 15 | 120 | 64 |
| MoPac | 0 | 1.5 | 333 | 70 | 375 | 225 |
| | 2 | 2.2 | 184 | 50 | 140 | 115 |
| | 4 | 1.6 | 88 | 25 | 95 | 40 |
| | 6 | 1.0 | 54 | 18 | 48 | 28 |
| | 8 | 0.8 | 58 | 14 | 57 | 95 |
| | 10 | 0.9 | 58 | 16 | 30 | 37 |
| | 12 | 1.5 | 73 | 25 | 35 | 35 |
| | 14 | 1.5 | 84 | 21 | 25 | 88 |

TABLE A.4

(June 16, 1976)

| | Minutes Since Runoff Began | Oil and Grease mg/1 | COD mg/1 | TOC mg/1 | Lead mg/1 | Zinc mg/1 | TSS mg/1 | VSS mg/1 |
|---|---|---|---|---|---|---|---|---|
| IH 35 | 0 | 3.3 | 505 | 88 | 910 | 720 | 352 | 106 |
| | 2 | 3.6 | 111 | 20 | 280 | 45 | 84 | 35 |
| | 4 | 4.0 | 44 | 13 | 130 | 25 | 25 | 13 |
| | 6 | 3.6 | 44 | 11 | 80 | 200 | 29 | 17 |
| | 8 | 3.1 | 53 | 16 | 90 | 25 | 20 | 12 |
| | 10 | 3.4 | 76 | 24 | 510 | 55 | 22 | 13 |
| | 12 | 2.3 | 63 | 23 | 560 | 85 | 20 | 11 |
| MoPac | 0 | 5.3 | 744 | 94 | 1110 | 1300 | 210 | 188 |
| | 2 | 2.5 | 206 | 71 | 570 | 345 | 29 | 20 |
| | 4 | 1.8 | 131 | 45 | 430 | 155 | 12 | 9 |
| | 6 | 0.6 | 107 | 41 | 200 | 70 | 9 | 6 |
| | 8 | 1.3 | 206 | 72 | 300 | 130 | 3 | 1 |
| | 10 | 1.6 | 285 | 100 | 550 | 175 | 3 | 1 |

TABLE A.5

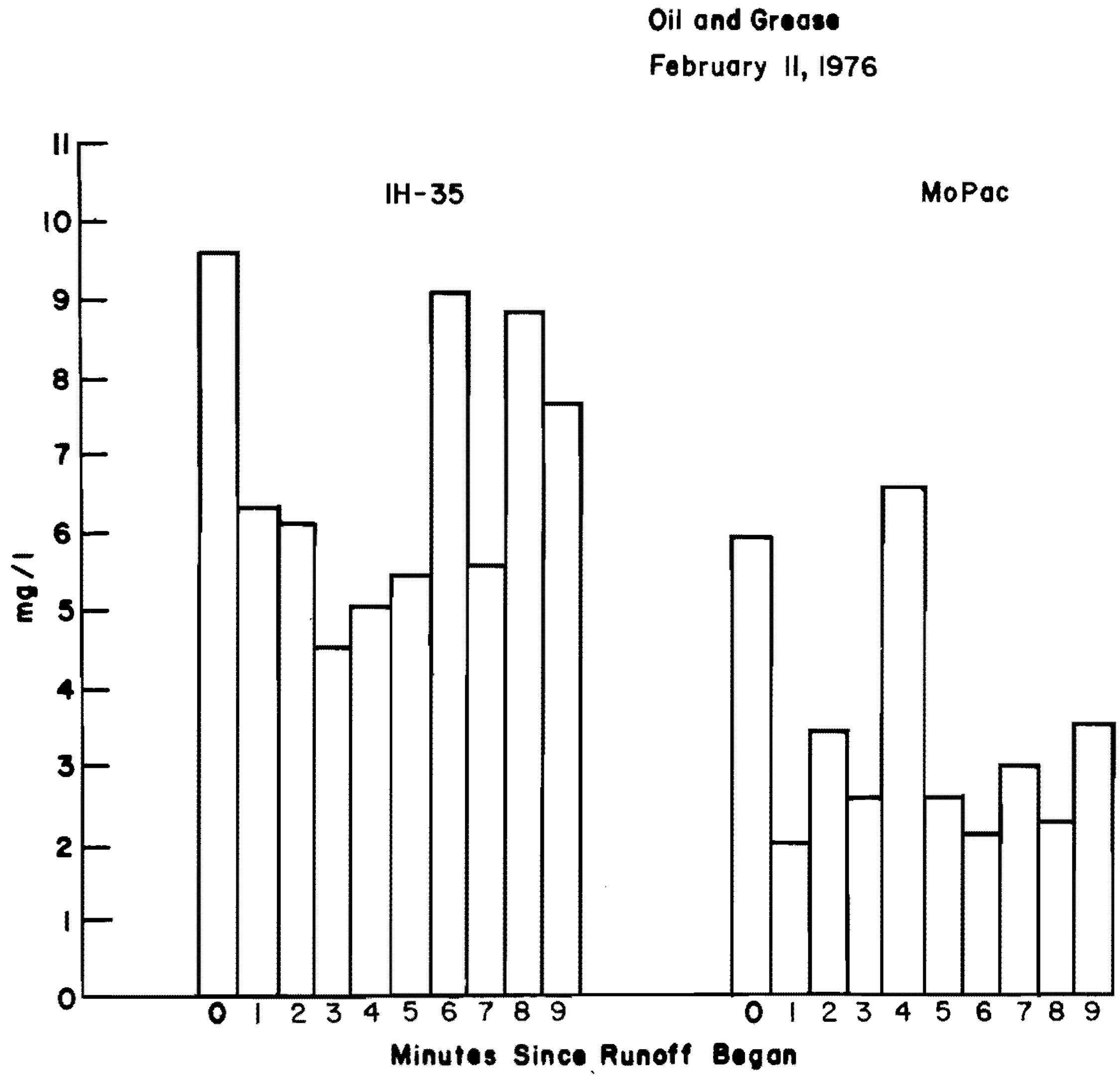
(July 21, 1976)

| | Minutes Since Runoff Began | Oil and Grease mg/l | COD mg/l | TOC mg/l | Lead mg/l | Zinc mg/l | TSS mg/l | VSS mg/l |
|---|---|---|---|---|---|---|---|---|
| IH 35 | 0 | 5.1 | 244 | 56 | 690 | 285 | 334 | 48 |
| | 2 | 5.8 | 167 | 37 | 530 | 155 | 141 | 42 |
| | 4 | 6.3 | 114 | 27 | 300 | 60 | 84 | 33 |
| | 6 | 4.8 | 85 | 23 | 300 | 55 | 56 | 12 |
| | 8 | 3.1 | 68 | 20 | 170 | 35 | 40 | 23 |
| | 10 | 1.6 | 60 | 17 | 170 | 25 | 44 | 17 |
| | 12 | 3.7 | 50 | 14 | 220 | 25 | 32 | 18 |
| | 14 | 3.5 | 49 | 12 | 380 | 40 | 23 | 7 |
| | 16 | 4.3 | 39 | 12 | 140 | 45 | 23 | 10 |
| | 18 | 4.6 | 41 | 13 | 180 | 25 | 19 | 9 |
| MoPac | 0 | 5.3 | 319 | 127 | 770 | 600 | 297 | 100 |
| | 2 | 2.2 | 167 | 51 | 250 | 130 | 12 | 9 |
| | 4 | 2.0 | 85 | 28 | 170 | 40 | 11 | 10 |
| | 6 | 2.0 | 78 | 21 | 155 | 25 | 12 | 11 |
| | 8 | 1.4 | 66 | 20 | 130 | 50 | 8 | 7 |
| | 10 | 1.3 | 56 | 17 | 170 | 35 | 5 | 4 |
| | 12 | 1.0 | 47 | 15 | 130 | 20 | 5 | 4 |
| | 14 | 0.8 | 45 | 17 | 100 | 20 | 6 | 5 |
| | 16 | 2.5 | 72 | 19 | 100 | 20 | 2 | 1 |

TABLE A.6

(August 6, 1976)

| | Minutes Since Runoff Began | Oil and Grease mg/l | COD mg/l | TOC mg/l | Lead mg/l | Zinc mg/l | TSS mg/l | VSS mg/l |
|---|---|---|---|---|---|---|---|---|
| IH 35 | 0 | 6.9 | 622 | 142 | 1300 | 1000 | 1397 | 271 |
| | 2 | 8.4 | 232 | 72 | 670 | 730 | 93 | 31 |
| | 4 | 8.1 | 185 | 50 | 540 | 420 | 41 | 14 |
| | 6 | 9.3 | 124 | 38 | 410 | 270 | 32 | 13 |
| | 8 | 8.0 | 97 | 32 | 260 | 175 | 40 | 12 |
| | 10 | 8.7 | 81 | 26 | 80 | 45 | 23 | 9 |
| | 12 | 7.8 | 77 | 22 | 150 | 60 | 24 | 8 |
| | 14 | 6.1 | 73 | 24 | 210 | 350 | 21 | 7 |
| | 16 | 6.8 | 77 | 30 | 230 | 280 | 17 | 6 |
| | 18 | 7.8 | 104 | 36 | 380 | 350 | 21 | 9 |
| MoPac | 0 | 5.9 | 2747 | 460 | 3550 | 2420 | 278 | 107 |
| | 2 | 5.5 | 710 | 224 | 1680 | 1600 | 55 | 29 |
| | 4 | 5.0 | 371 | 125 | 900 | 950 | 24 | 11 |
| | 6 | 4.1 | 266 | 89 | 740 | 1100 | 25 | 14 |
| | 8 | 2.9 | 208 | 73 | 700 | 470 | 15 | 8 |
| | 10 | 3.0 | 189 | 66 | 550 | 340 | 12 | 7 |
| | 12 | 5.9 | 193 | 69 | 470 | 320 | 12 | 7 |
| | 14 | 4.7 | 201 | 76 | 590 | 380 | 15 | 9 |
| | 16 | 4.4 | 228 | 85 | 700 | 1150 | 15 | 8 |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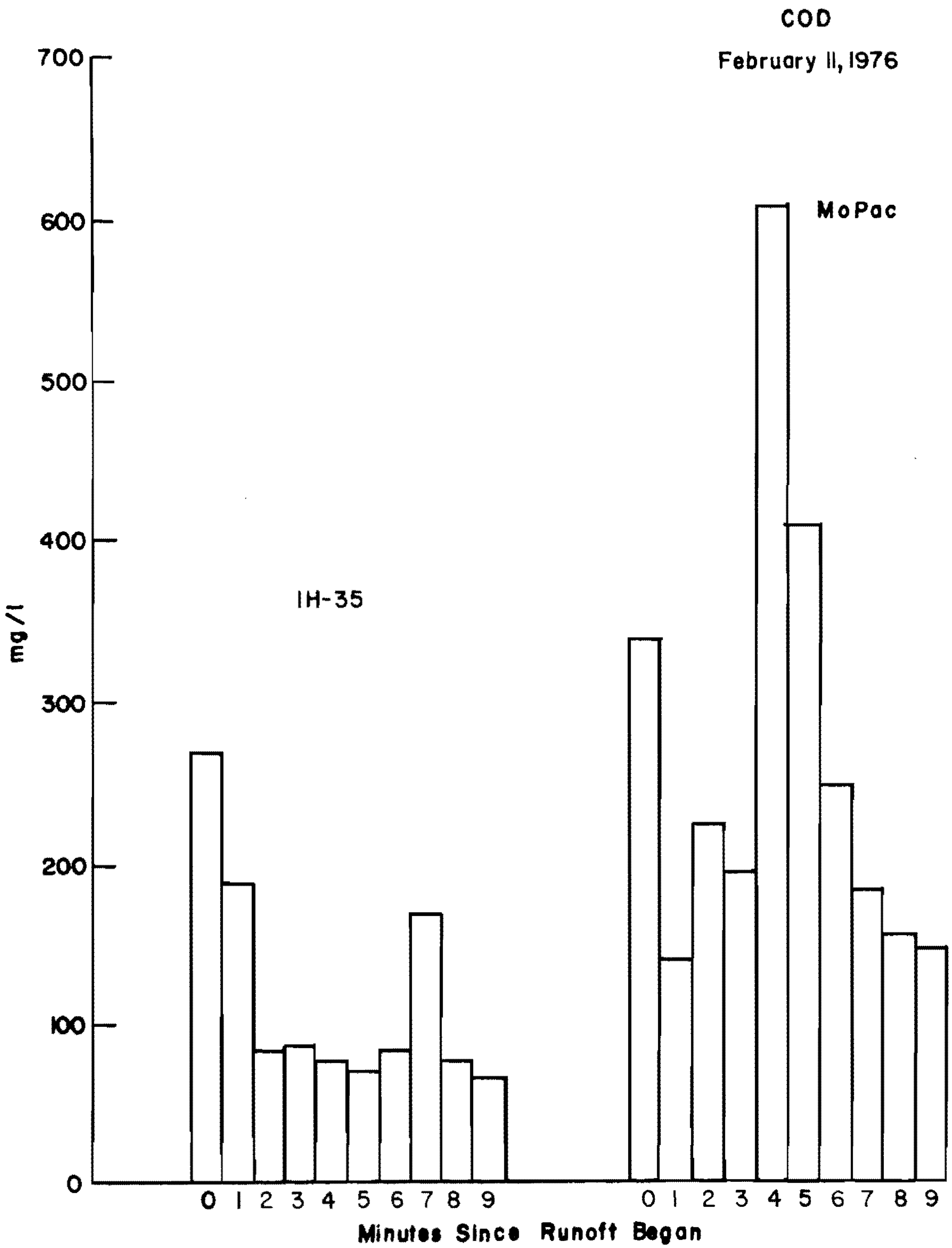
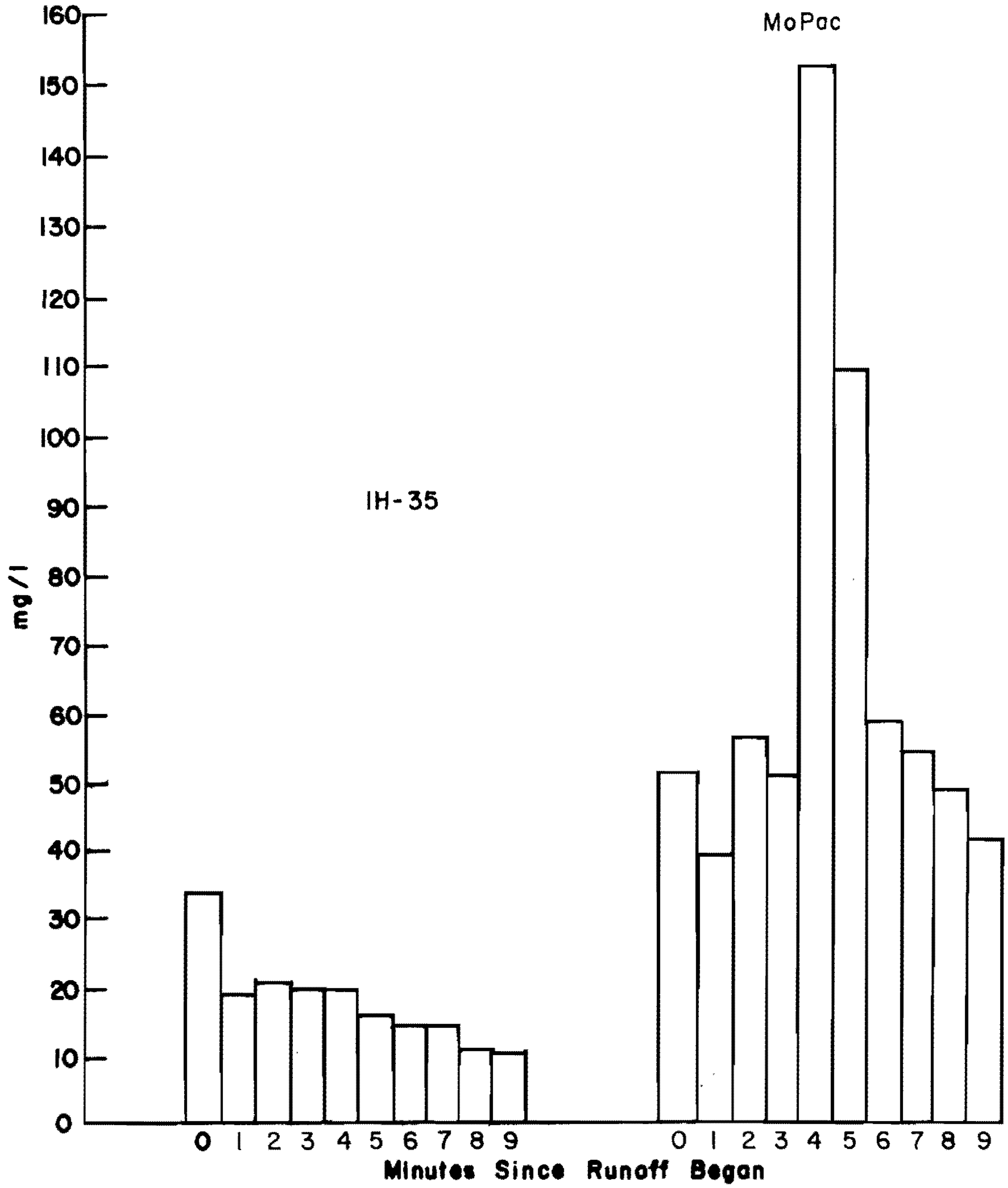
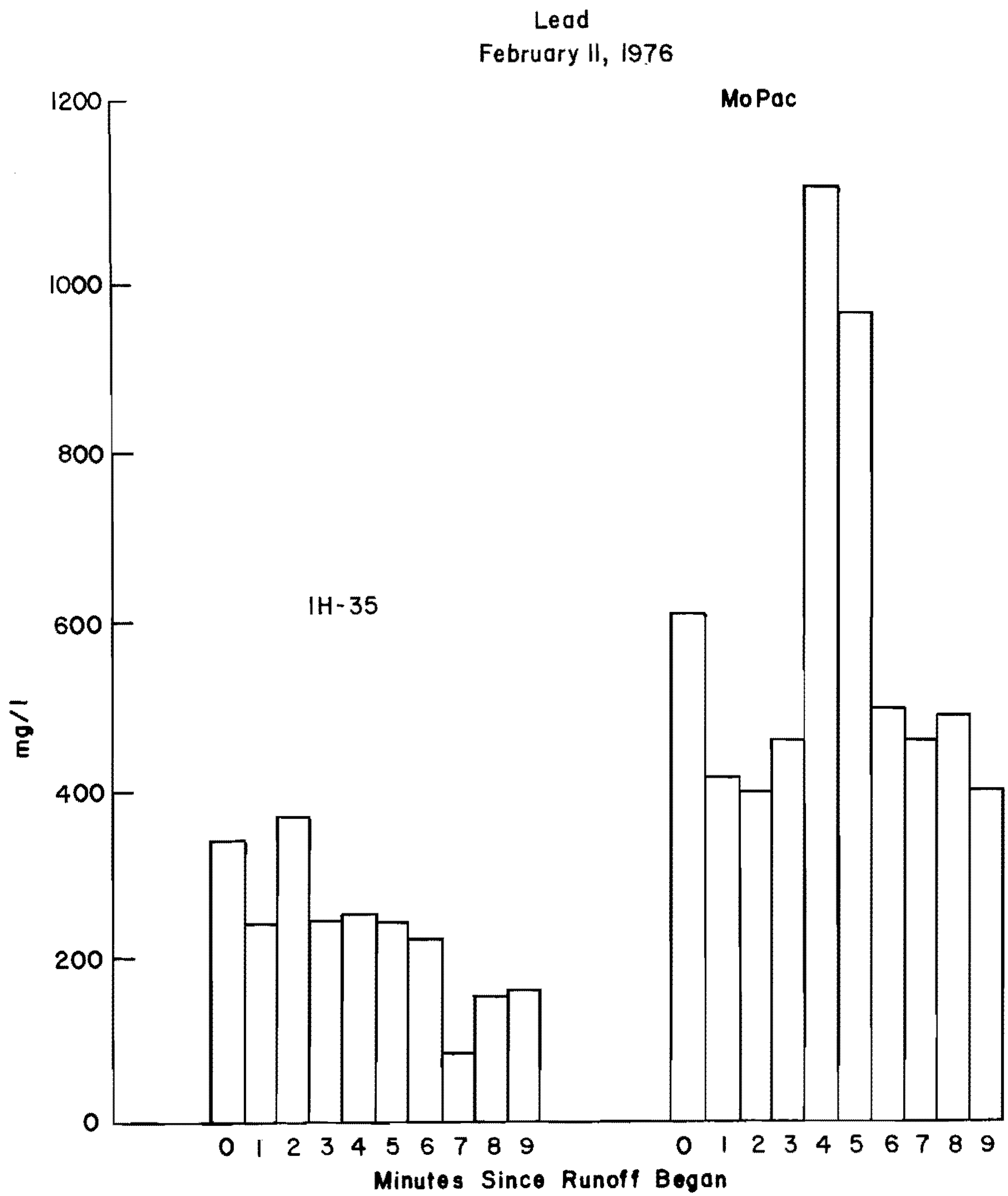
February 11, 1976
IH-35
MoPac
mg/l
0
1
2
3
4
5
6
7
8
9
10
11
0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
Minutes Since Runoff Began


COD
February 11, 1976
MoPac
IH-35
mg/l
700
600
500
400
300
200
100
0
0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
Minutes Since Runoff Began

TOC
February 11, 1976

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February 11, 1976
MoPac
IH-35
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1000
800
600
400
200
0
mg/l
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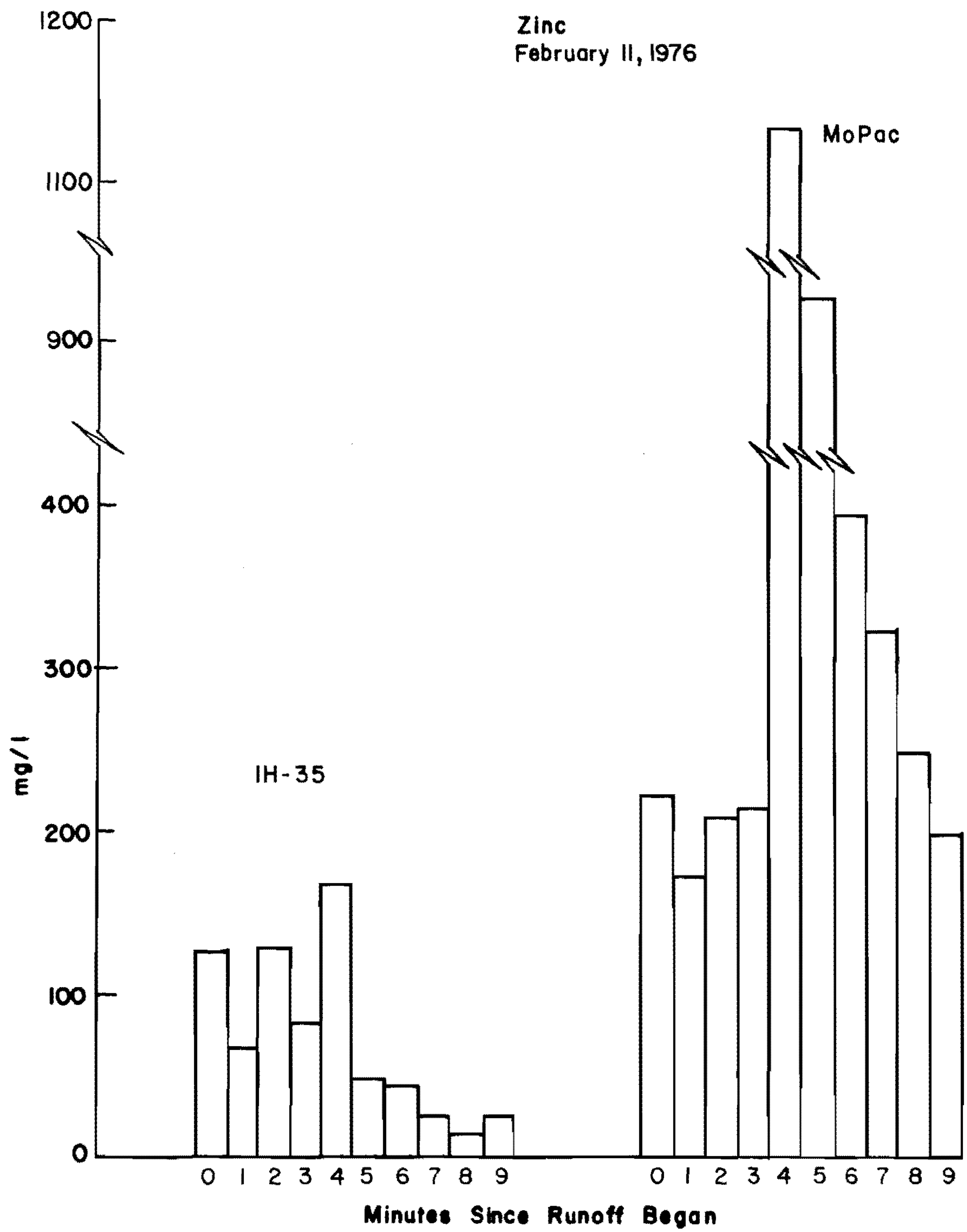
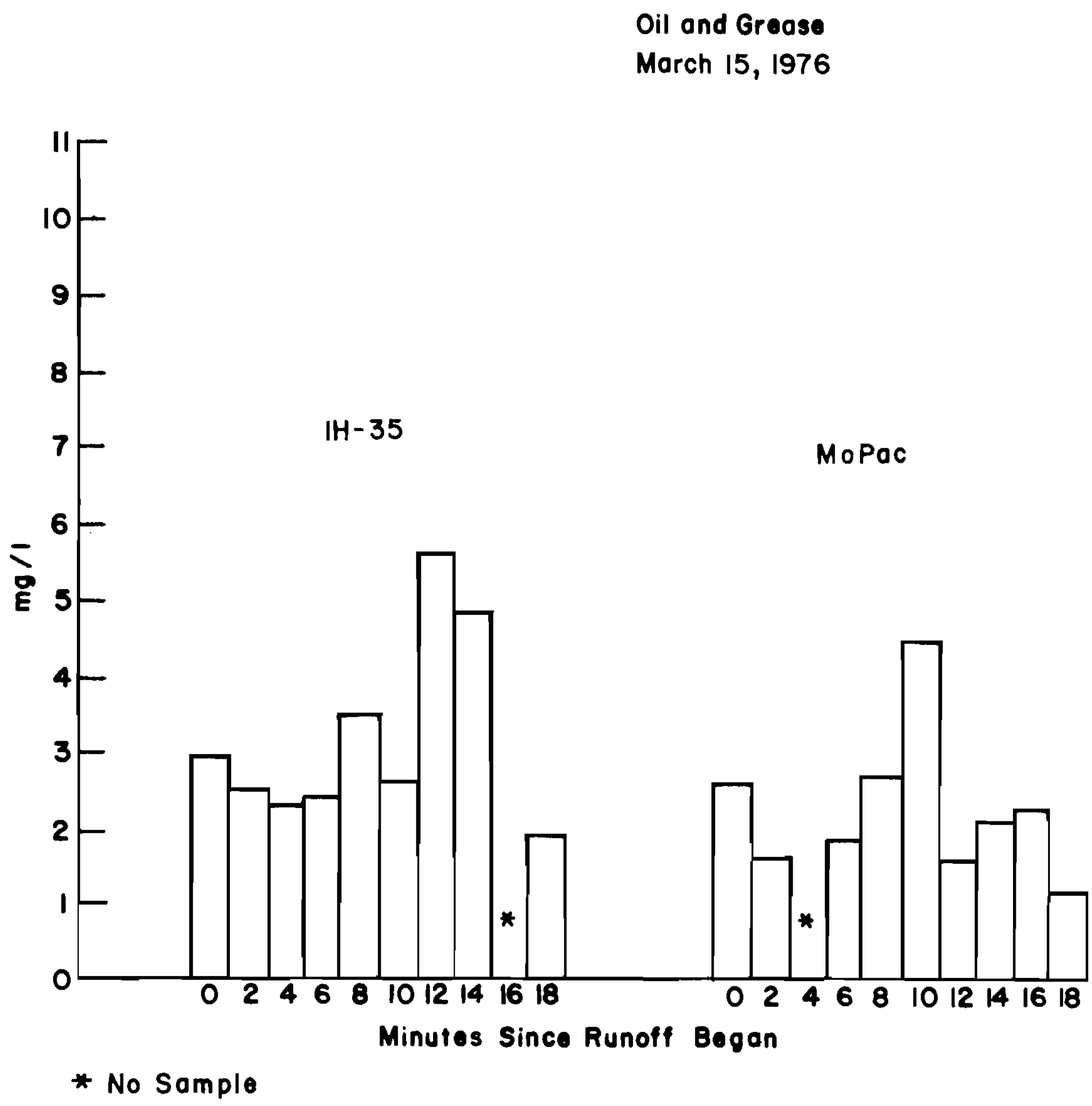
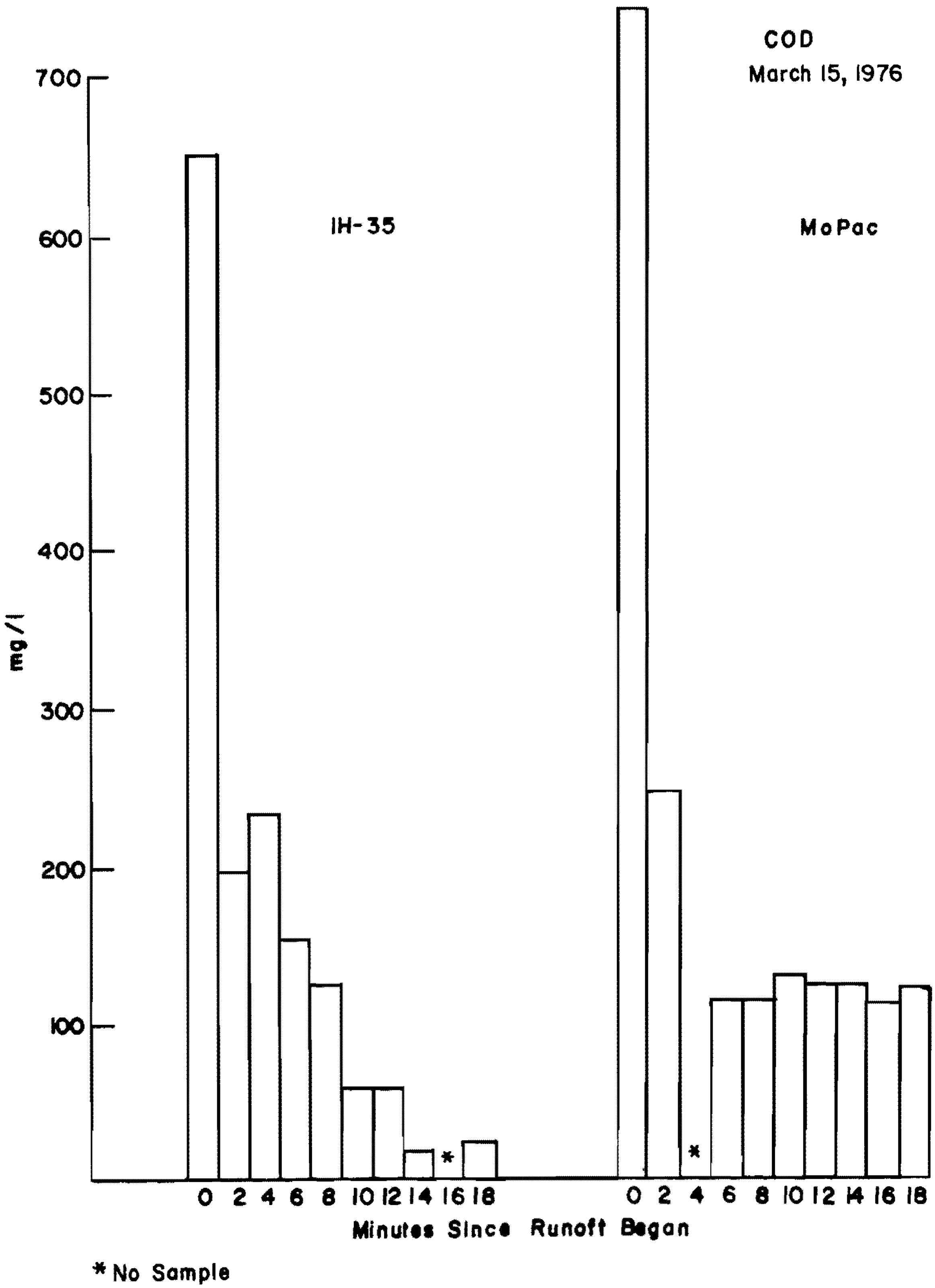
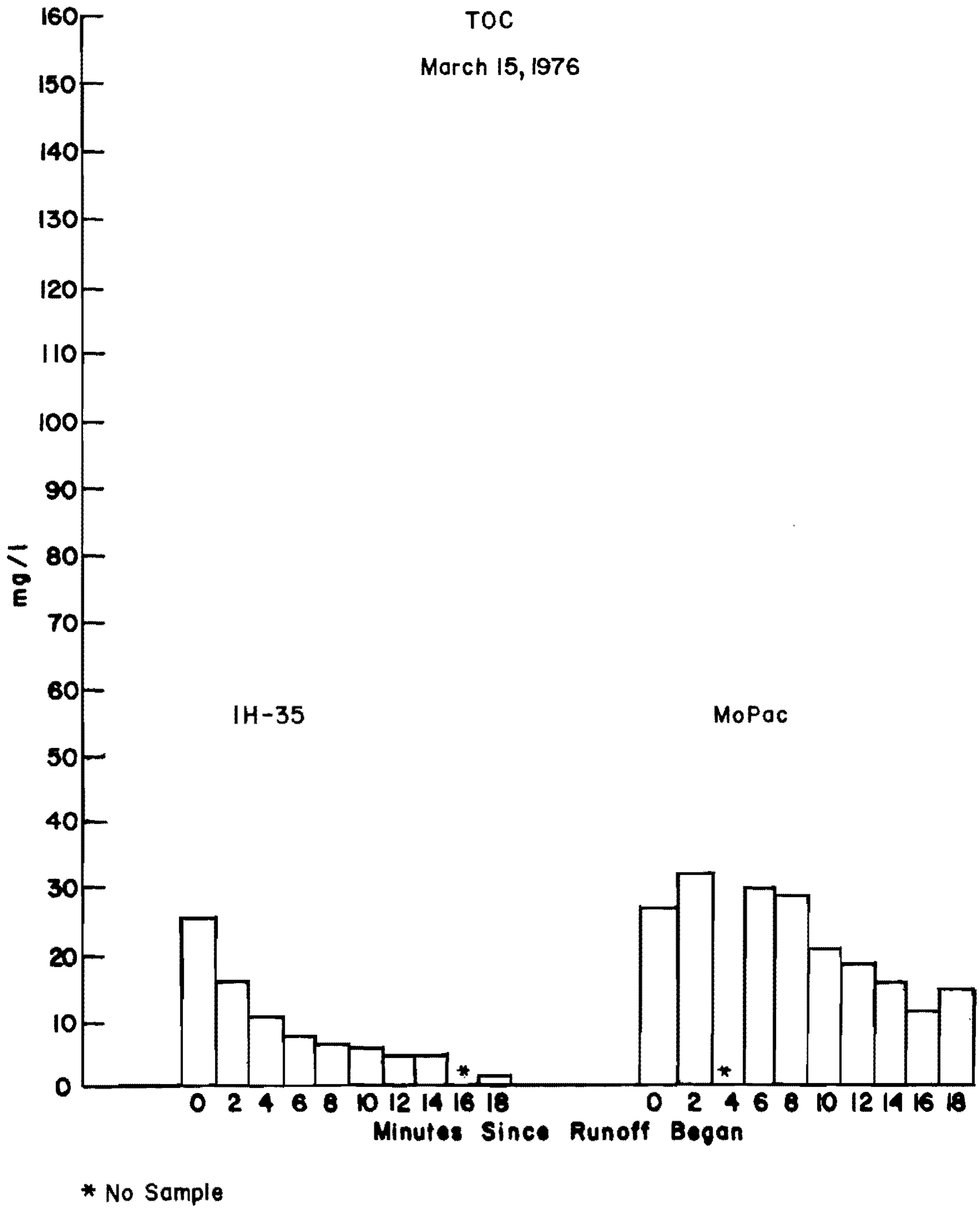
0 1 2 3 4 5 6 7 8 9
Minutes Since Runoff Began


Zinc
February 11, 1976
MoPac
IH-35
mg/l
1200
1100
900
400
300
200
100
0
0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
Minutes Since Runoff Began


Oil and Grease
March 15, 1976
IH-35
MoPac
mg/l
0
1
2
3
4
5
6
7
8
9
10
11
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16 18
Minutes Since Runoff Began
* No Sample


COD
March 15, 1976
IH-35
MoPac
700
600
500
400
300
200
100
mg/l
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16 18
Minutes Since Runoff Began
* No Sample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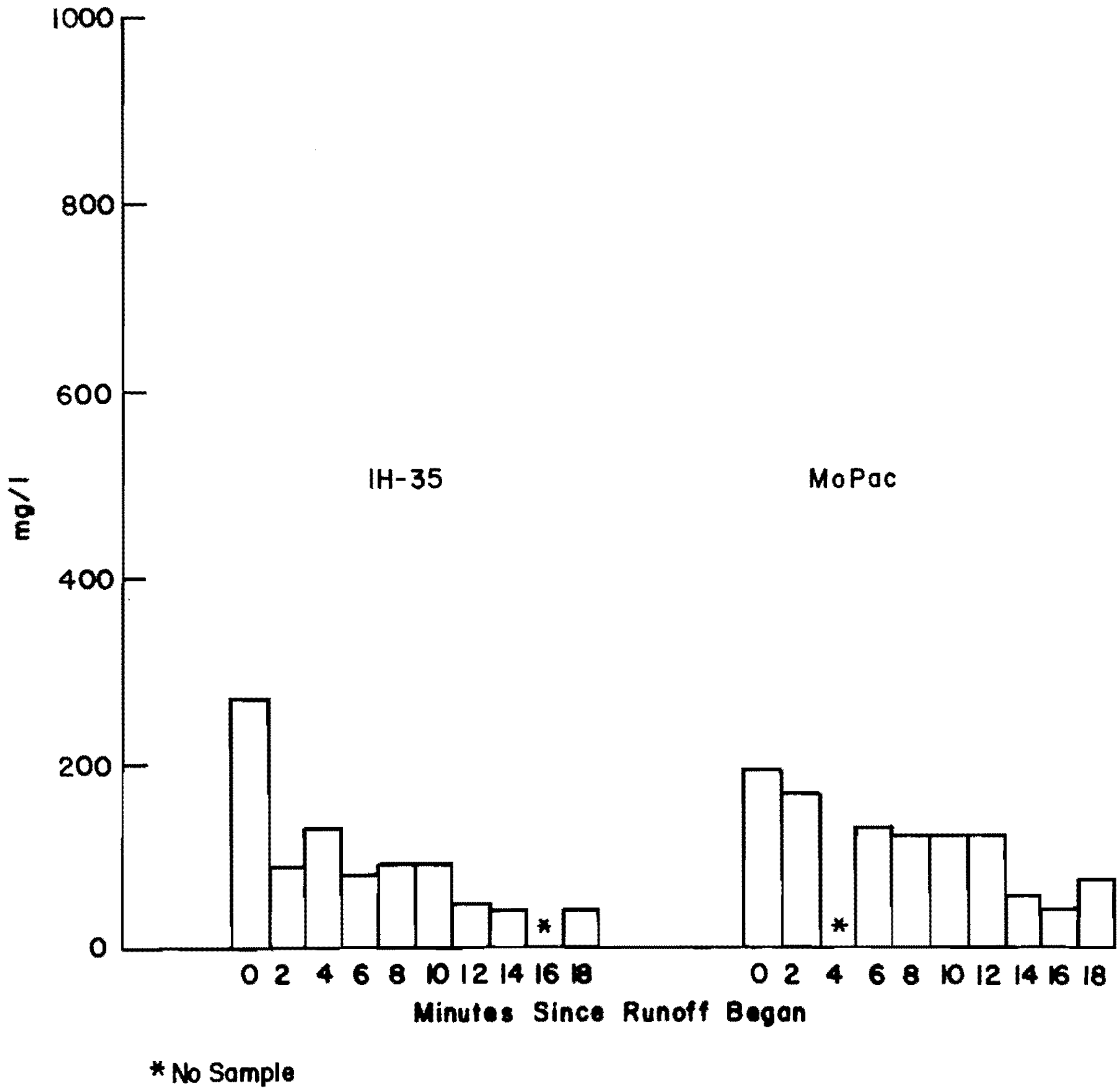
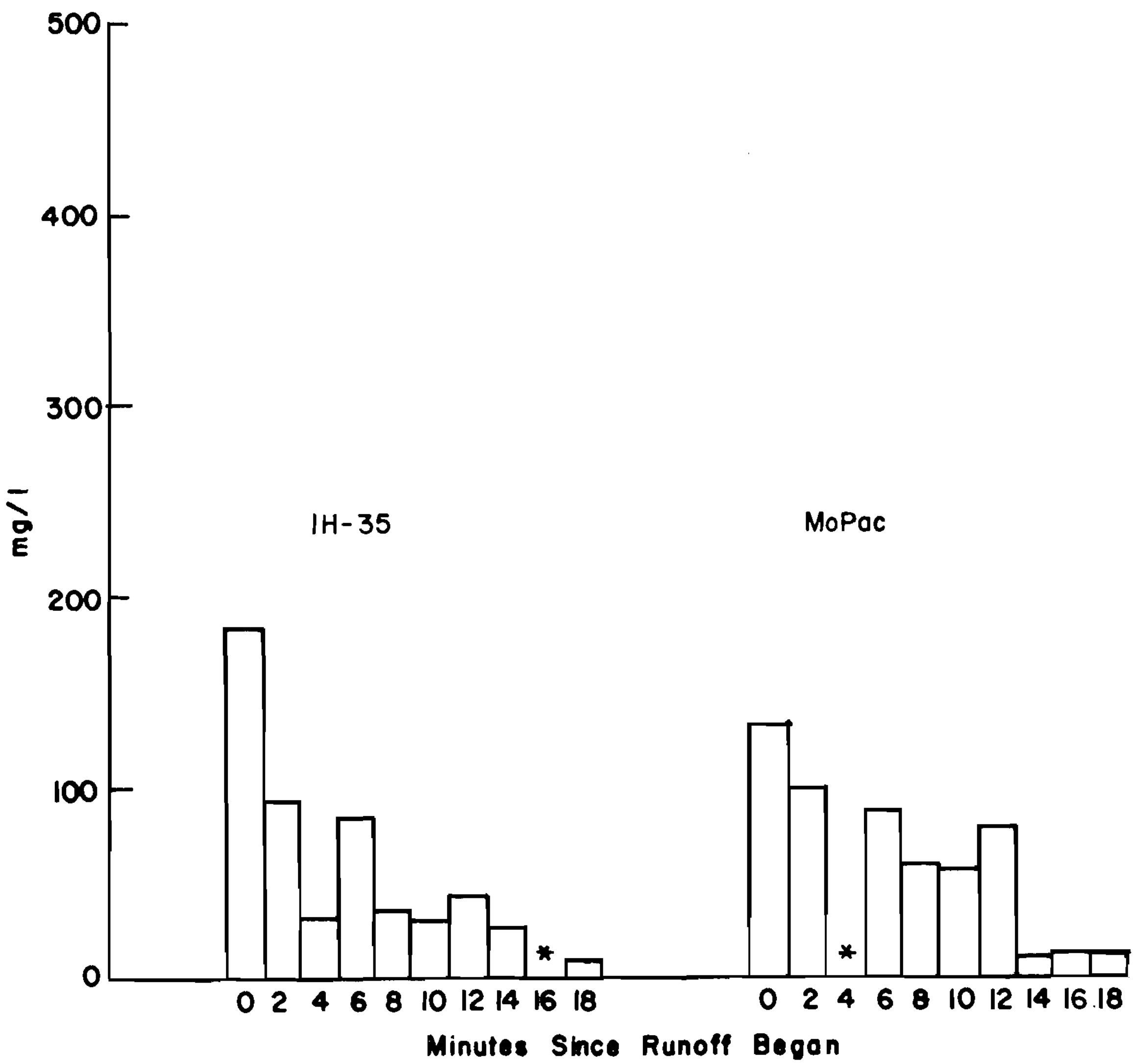
March 15, 1976
mg/l
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
IH-35
MoPac
*
*
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16 18
Minutes Since Runoff Began
* No Sample

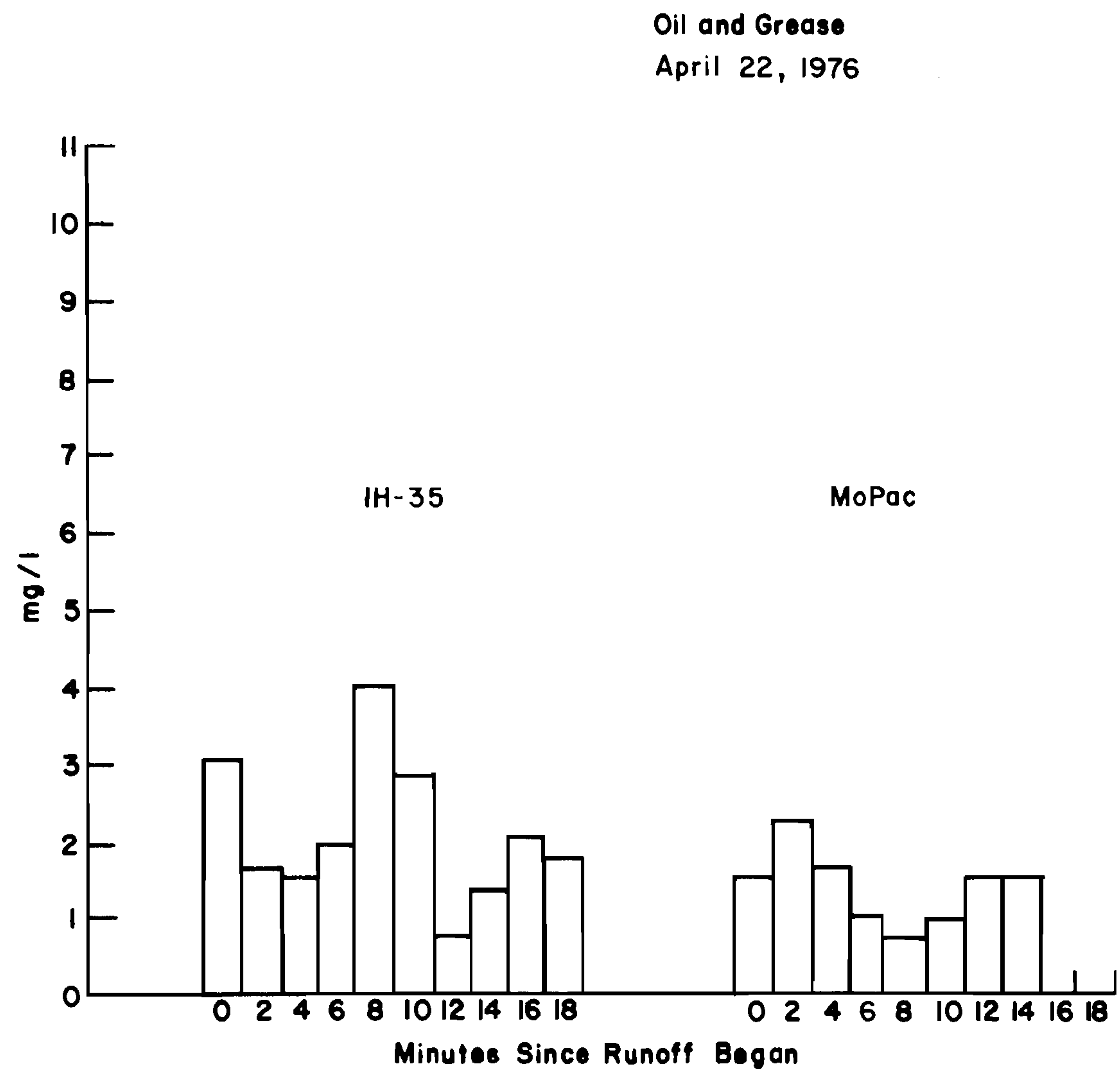
Lead
March 15, 1976

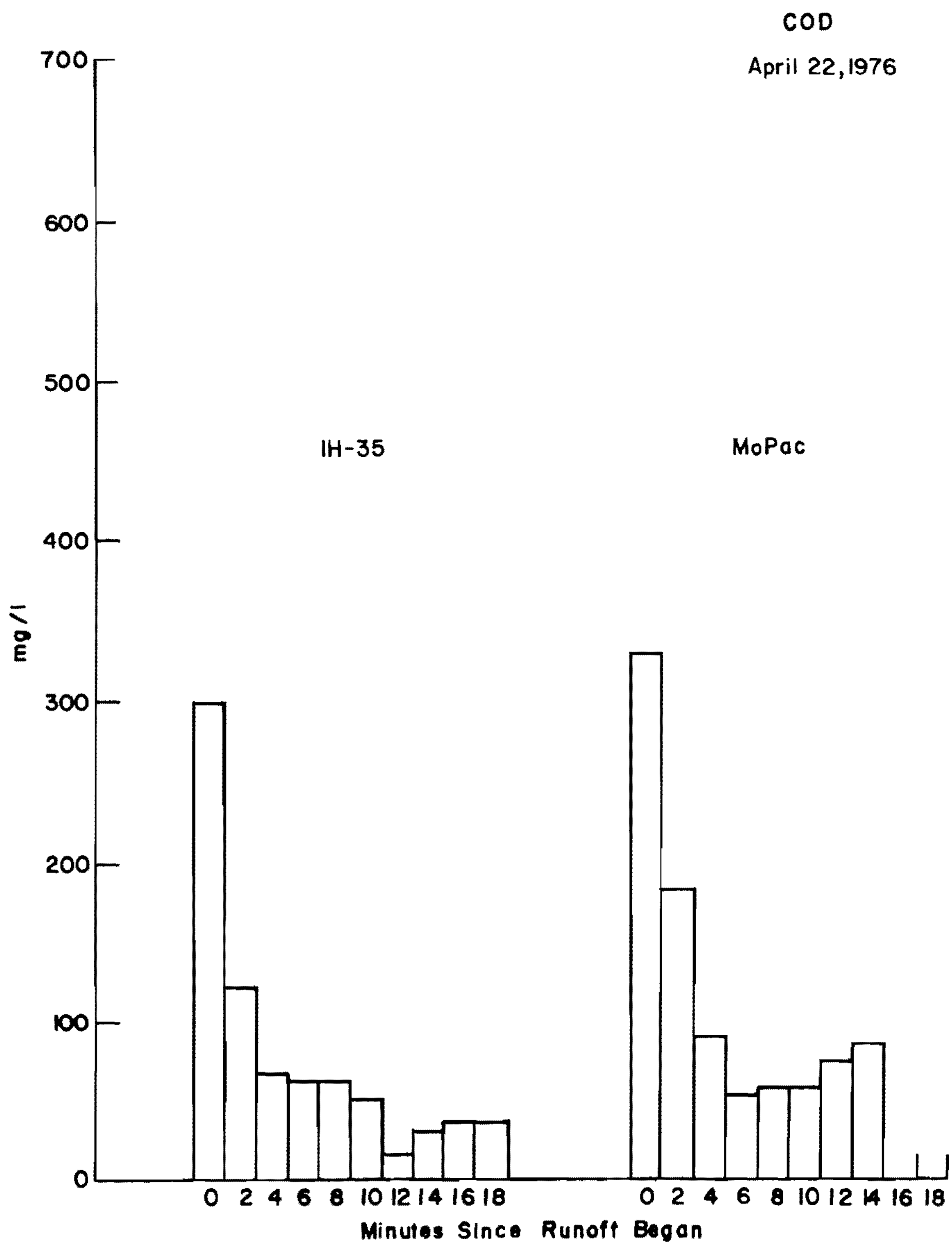


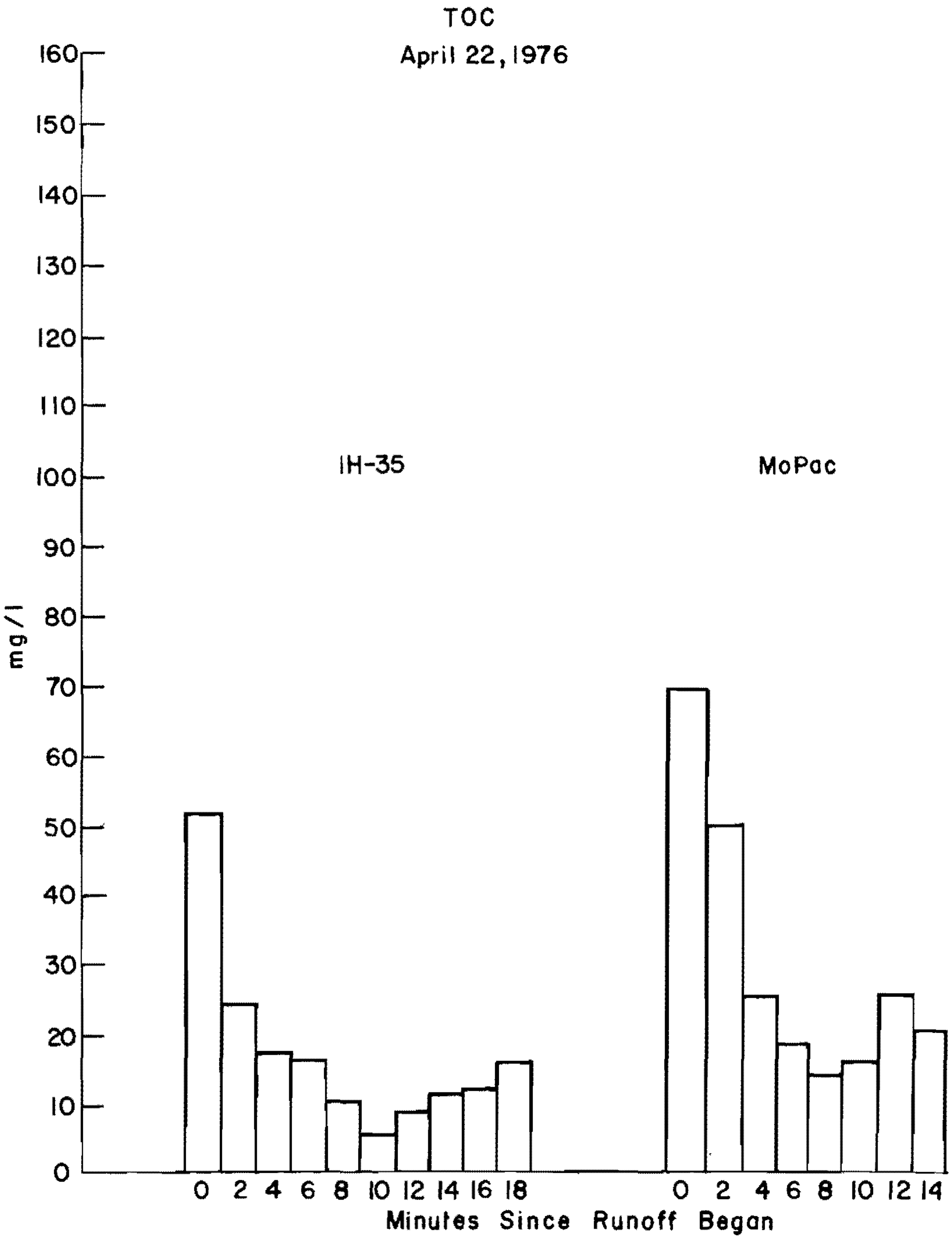
Zinc
March 15, 1976



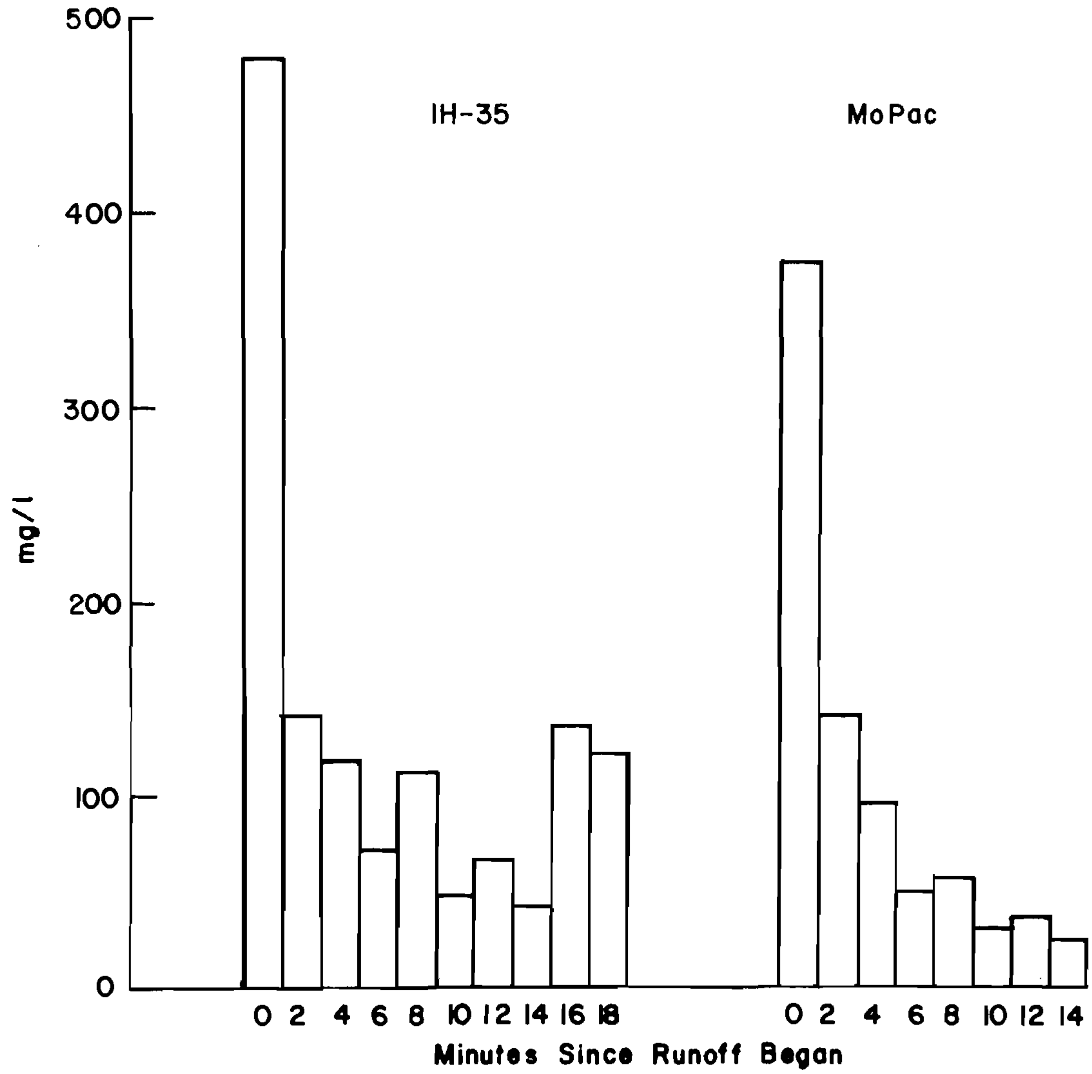
* No Sample


Oil and Grease
April 22, 1976
mg/l
0
1
2
3
4
5
6
7
8
9
10
11
IH-35
MoPac
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16 18
Minutes Since Runoff Began

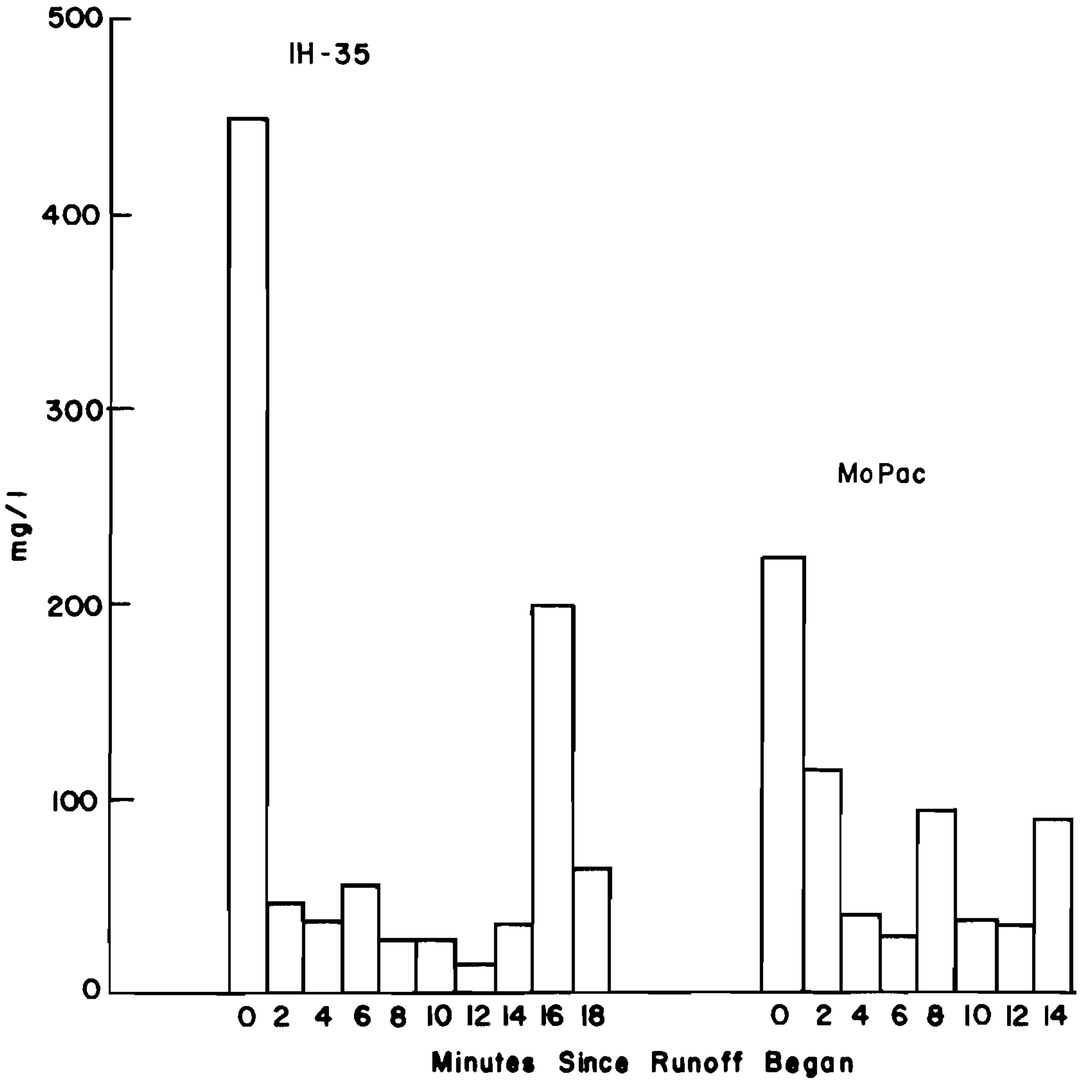

COD
April 22, 1976
700
600
500
400
300
200
100
0
mg/l
IH-35
MoPac
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16 18
Minutes Since Runoff Began

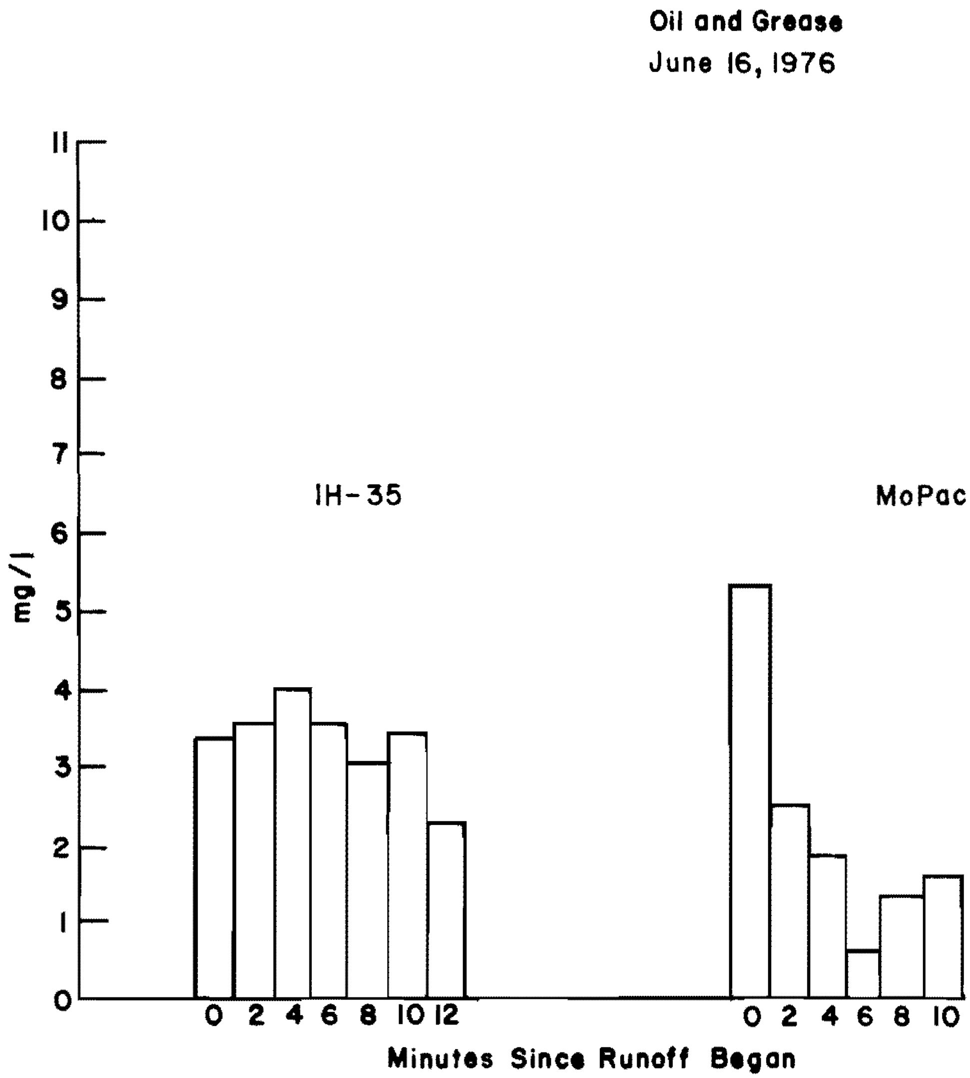

TOC
April 22, 1976
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
mg/l
IH-35
MoPac
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14
Minutes Since Runoff Began

Lead
April 22, 1976



Zinc
April 22, 1976

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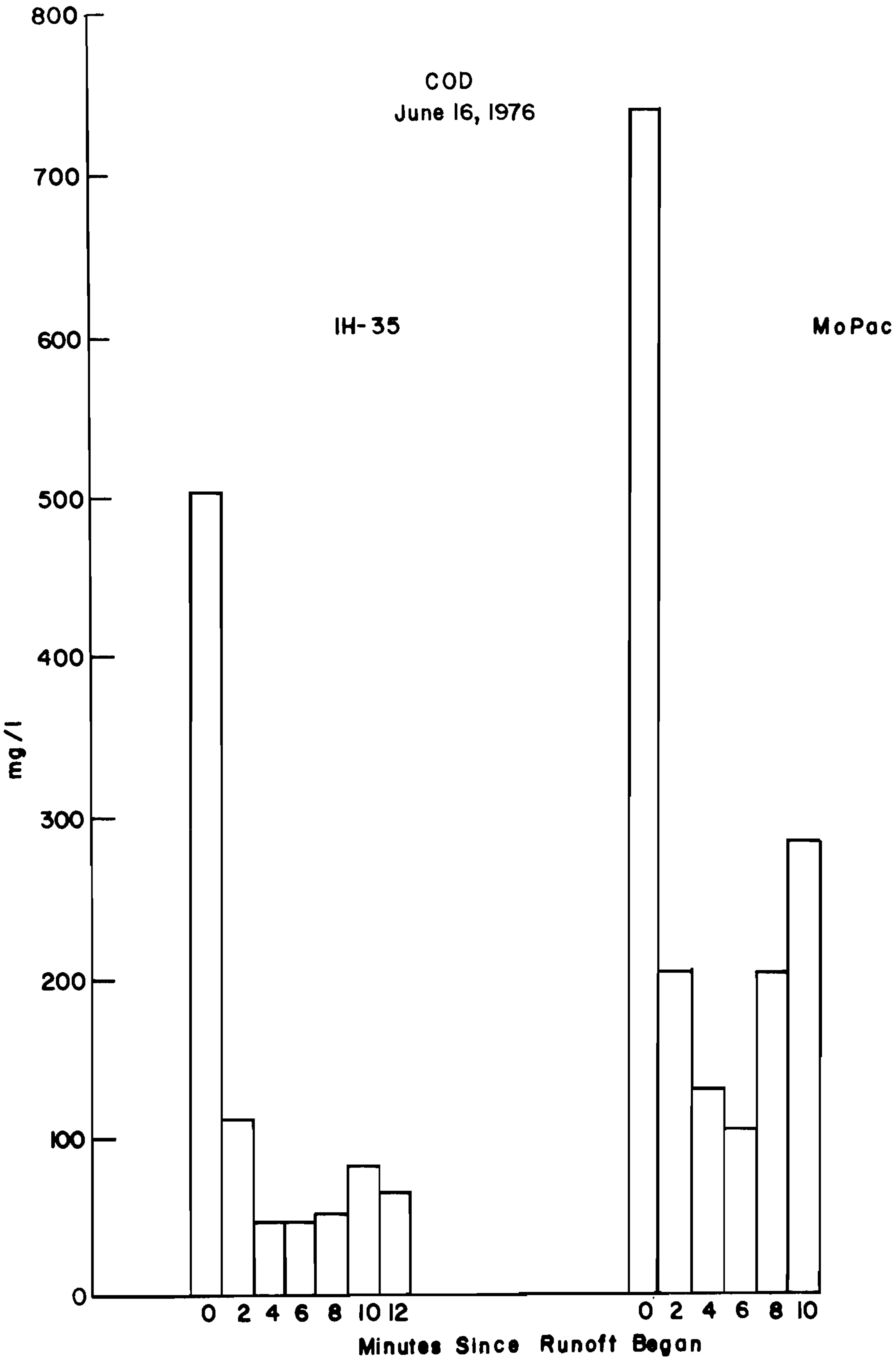
June 16, 1976
IH-35
MoPac
mg/l
0
1
2
3
4
5
6
7
8
9
10
11
0 2 4 6 8 10 12
0 2 4 6 8 10
Minutes Since Runoff Began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June 16, 1976
IH-35
MoPac
mg/l
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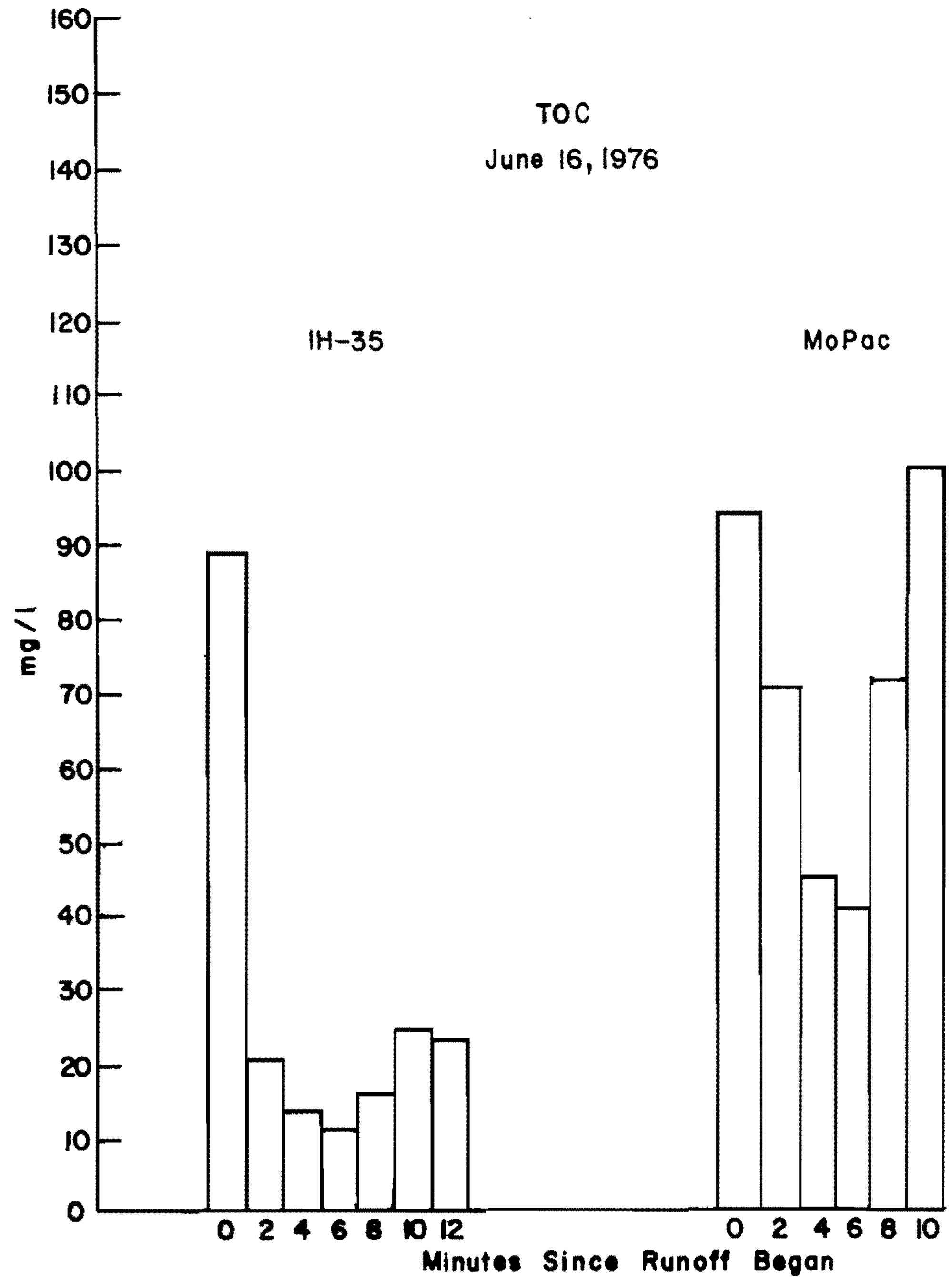
700
600
500
400
300
200
100
0
0 2 4 6 8 10 12
0 2 4 6 8 10
Minutes Since Runoff Began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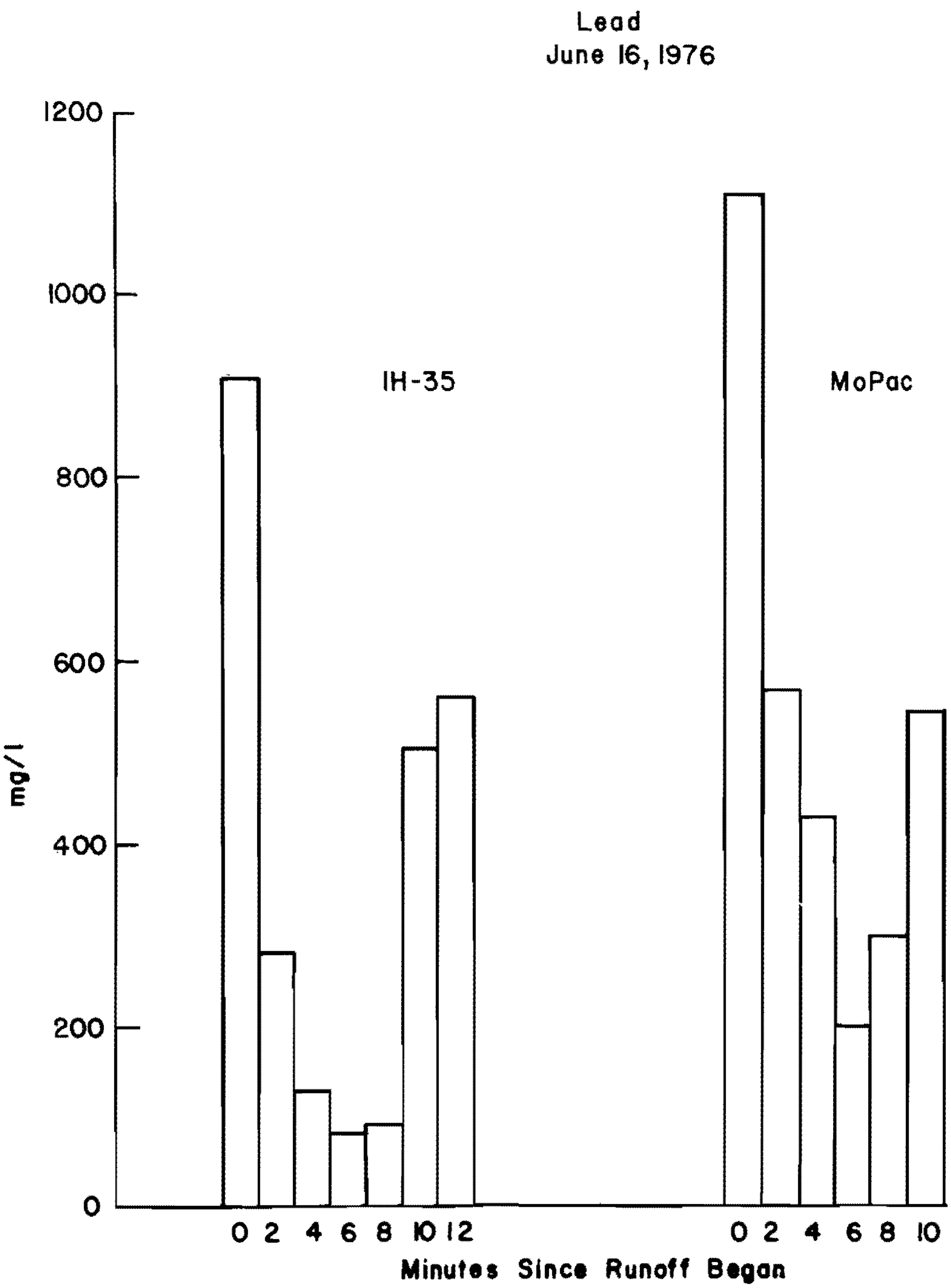
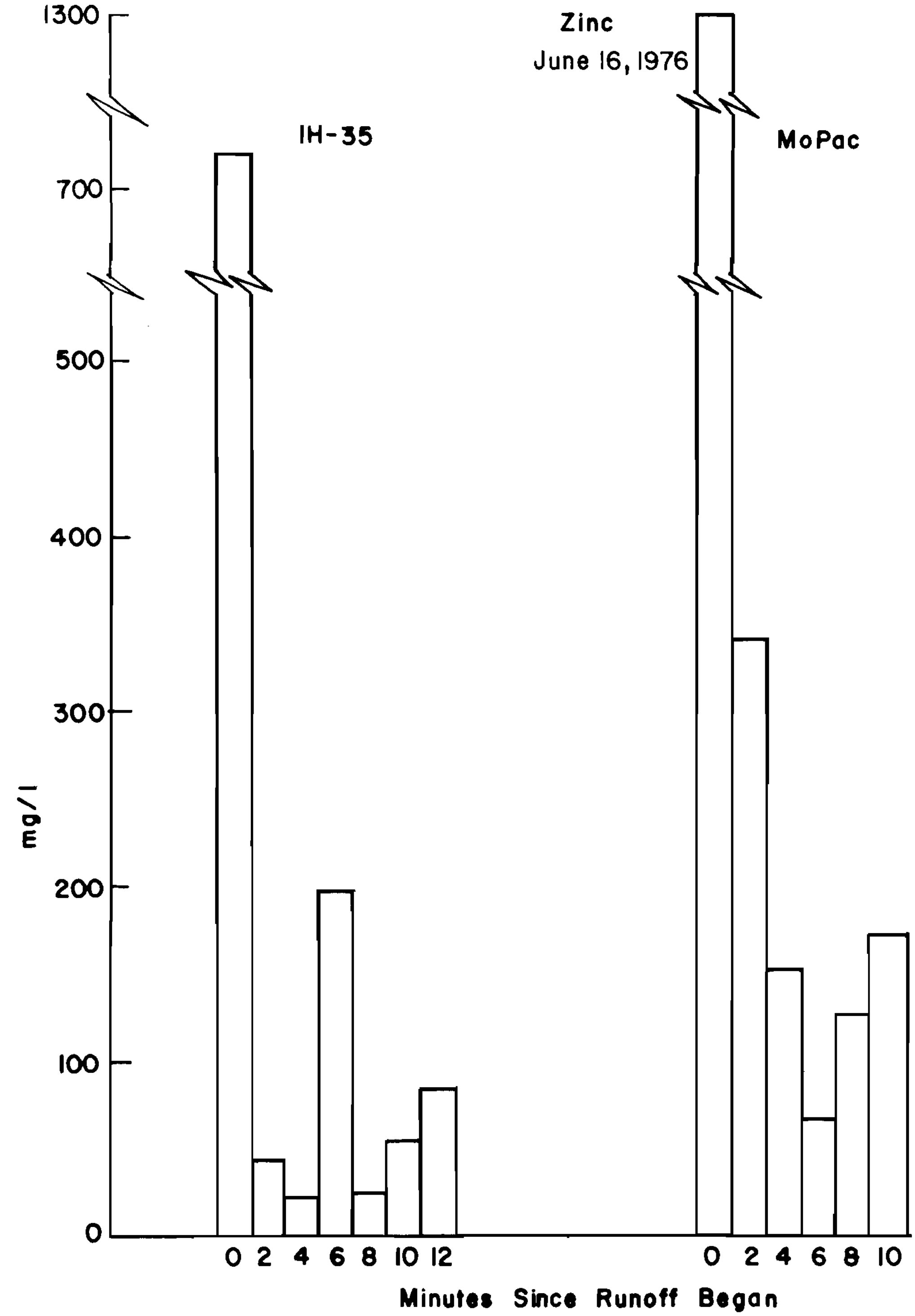
June 16, 1976
IH-35
MoPac
mg/l
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0 2 4 6 8 10 12
0 2 4 6 8 10
Minutes Since Runoff Began


Lead
June 16, 1976
1200
1000
800
600
400
200
0
mg/l
IH-35
MoPac
0 2 4 6 8 10 12
0 2 4 6 8 10
Minutes Since Runoff Began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June 16, 1976
IH-35
MoPac
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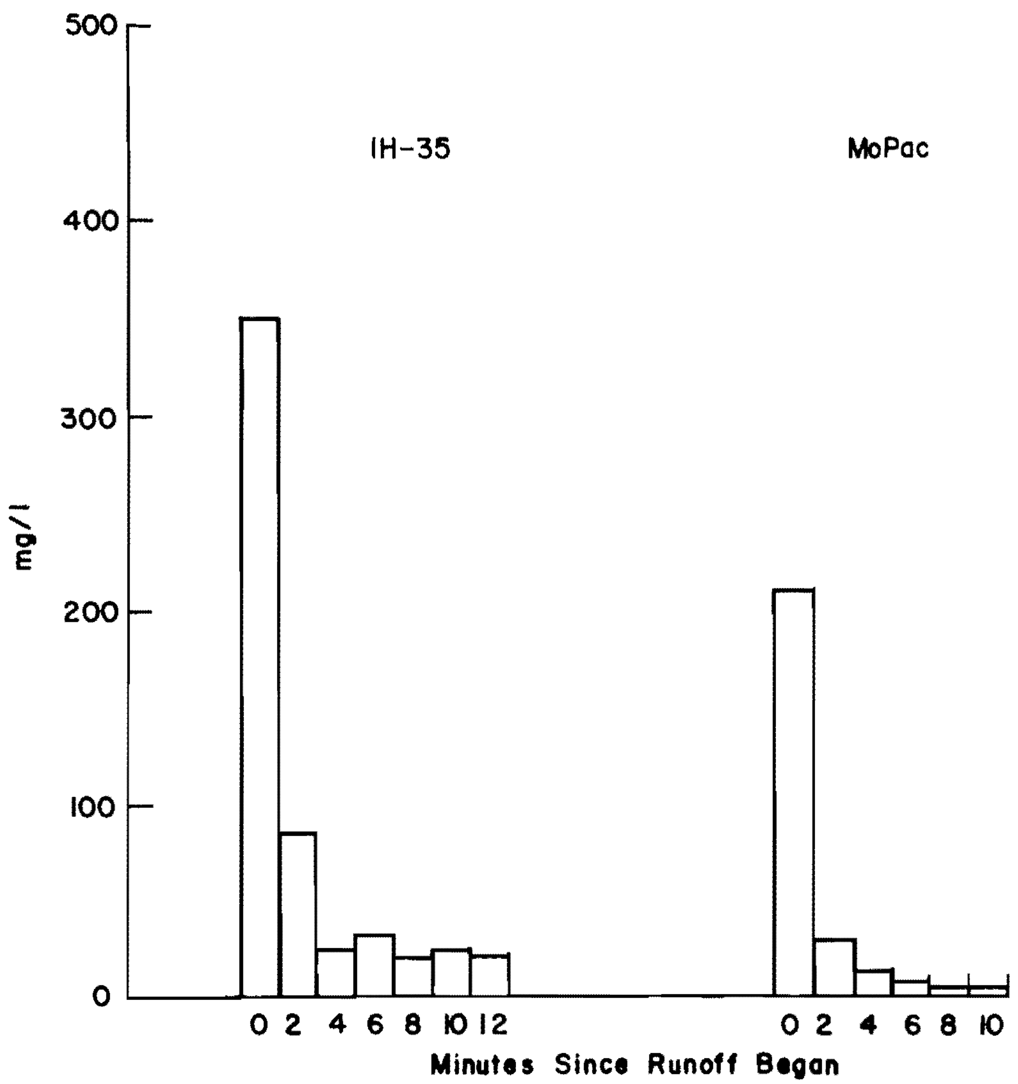
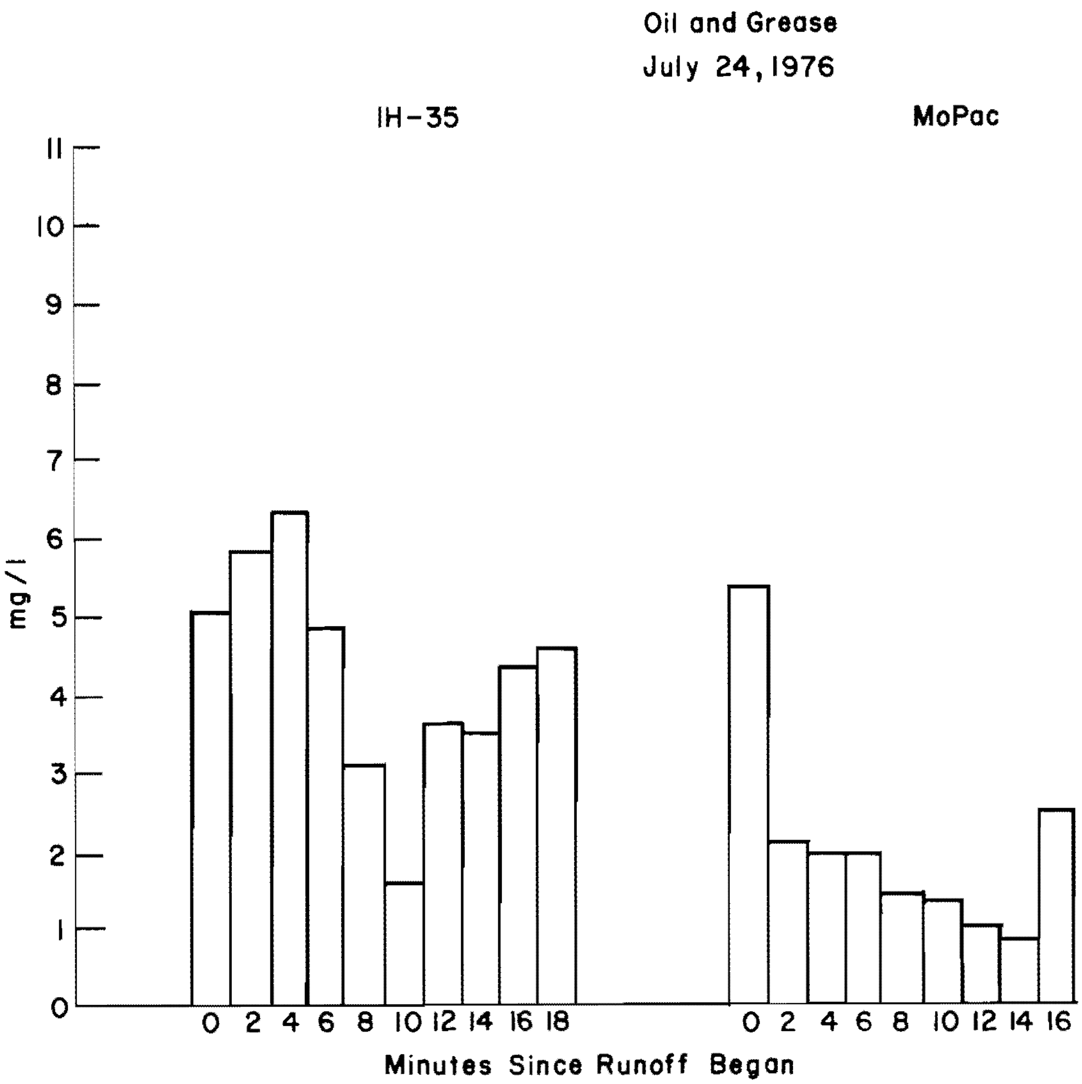
700
500
400
300
200
100
0
mg/l
0 2 4 6 8 10 12
0 2 4 6 8 10
Minutes Since Runoff Began

TSS

June 16, 1976




Oil and Grease
July 24, 1976
IH-35
MoPac
mg/l
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2
3
4
5
6
7
8
9
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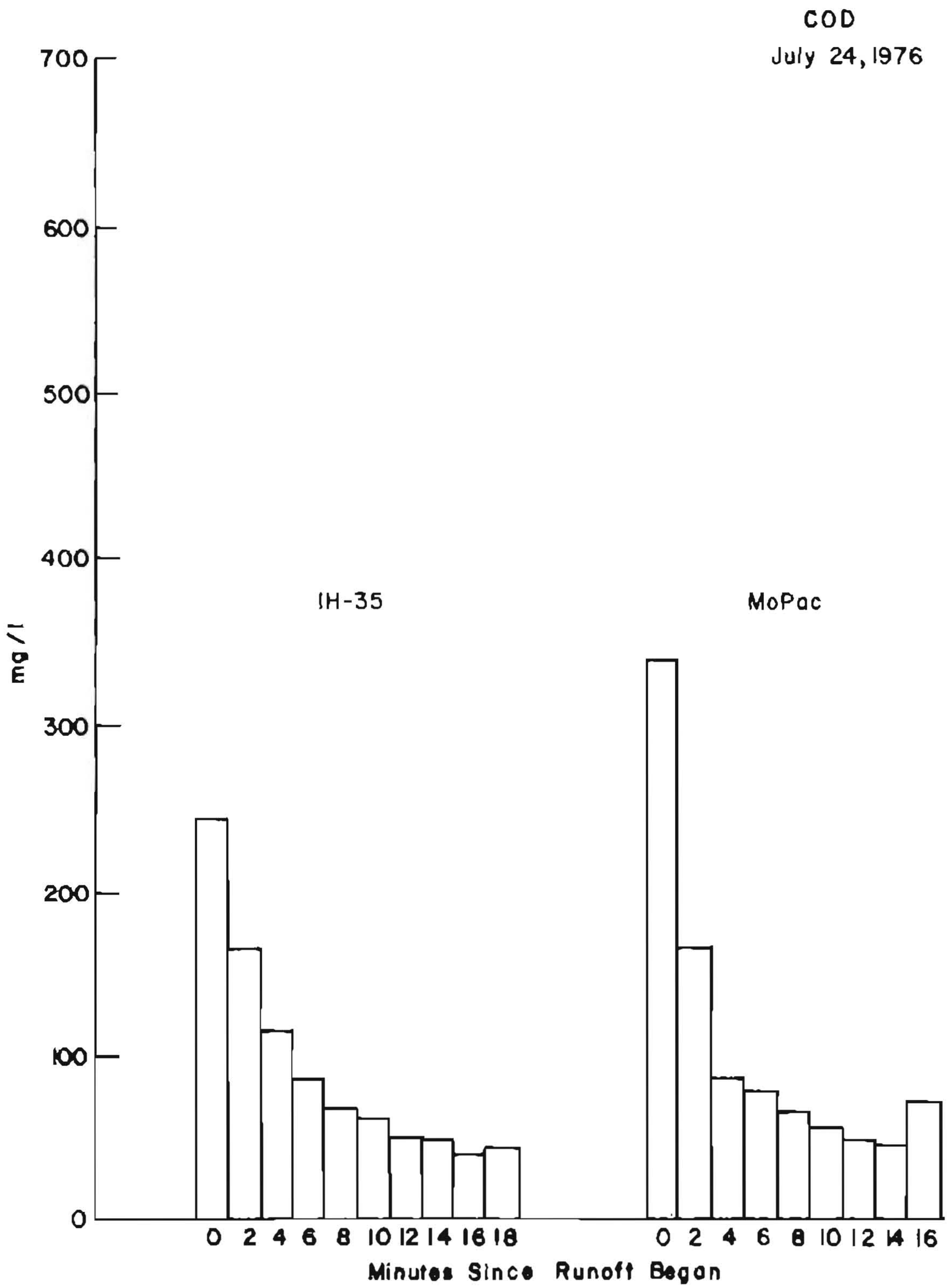
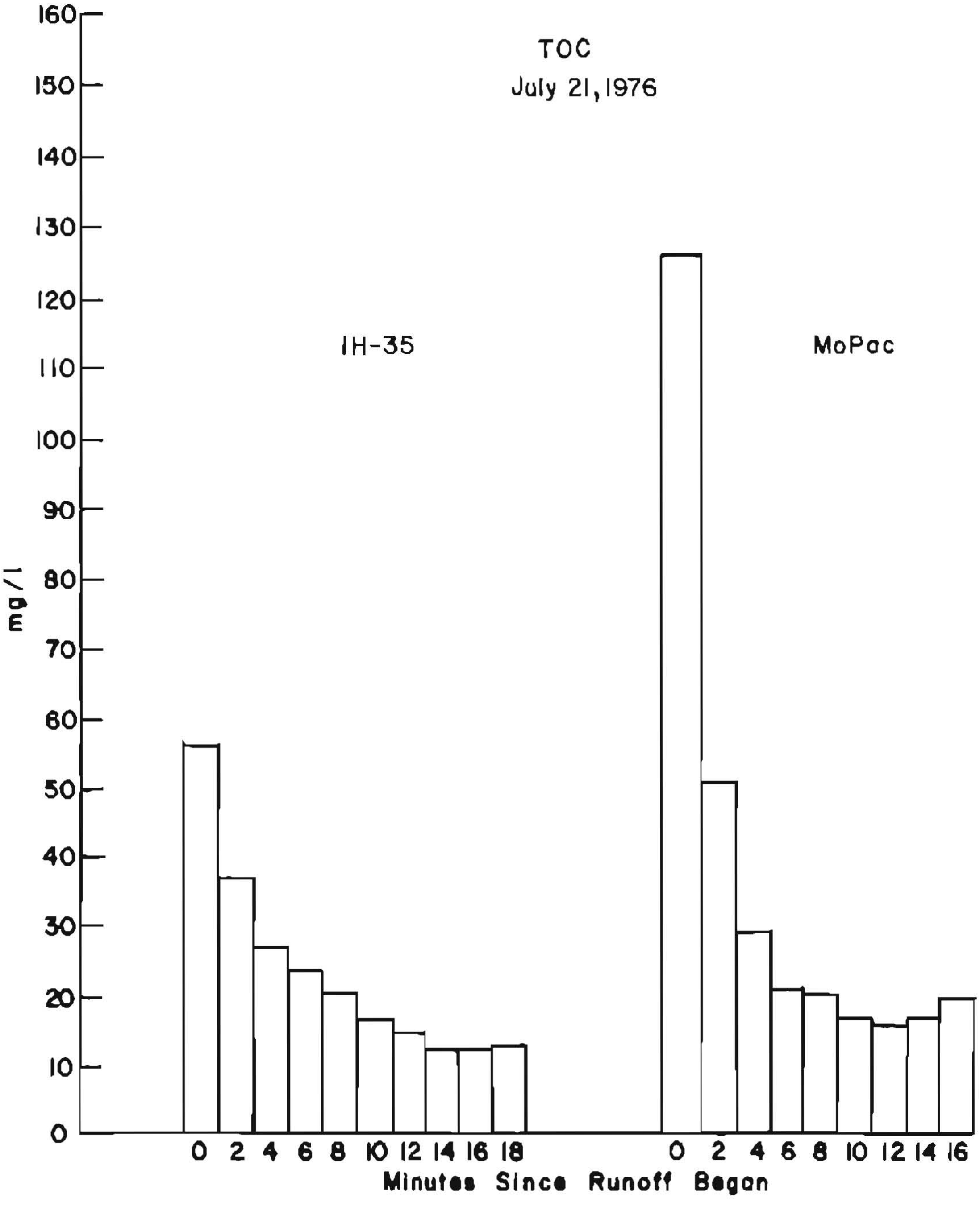
11
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16
Minutes Since Runoff Began

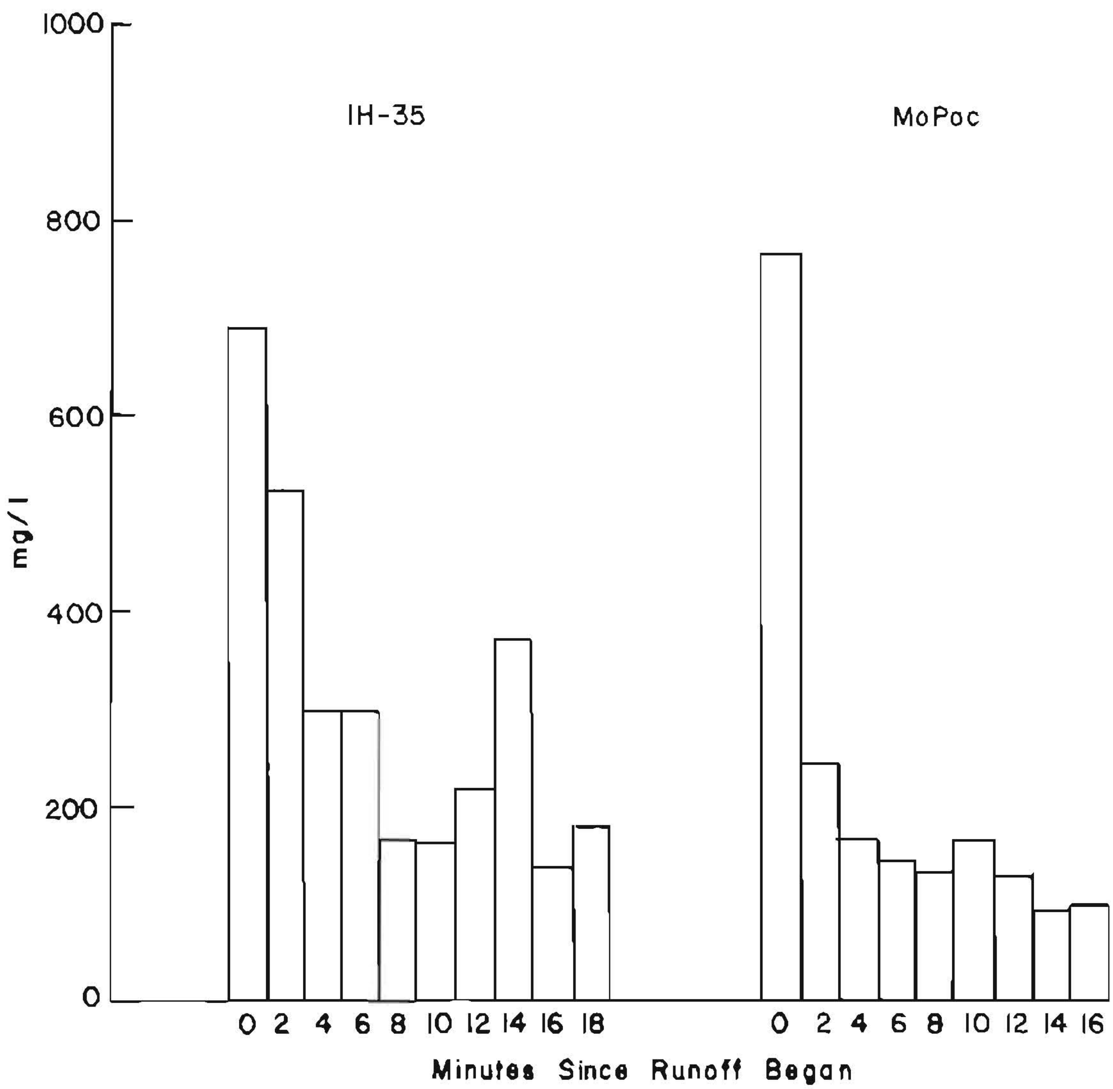


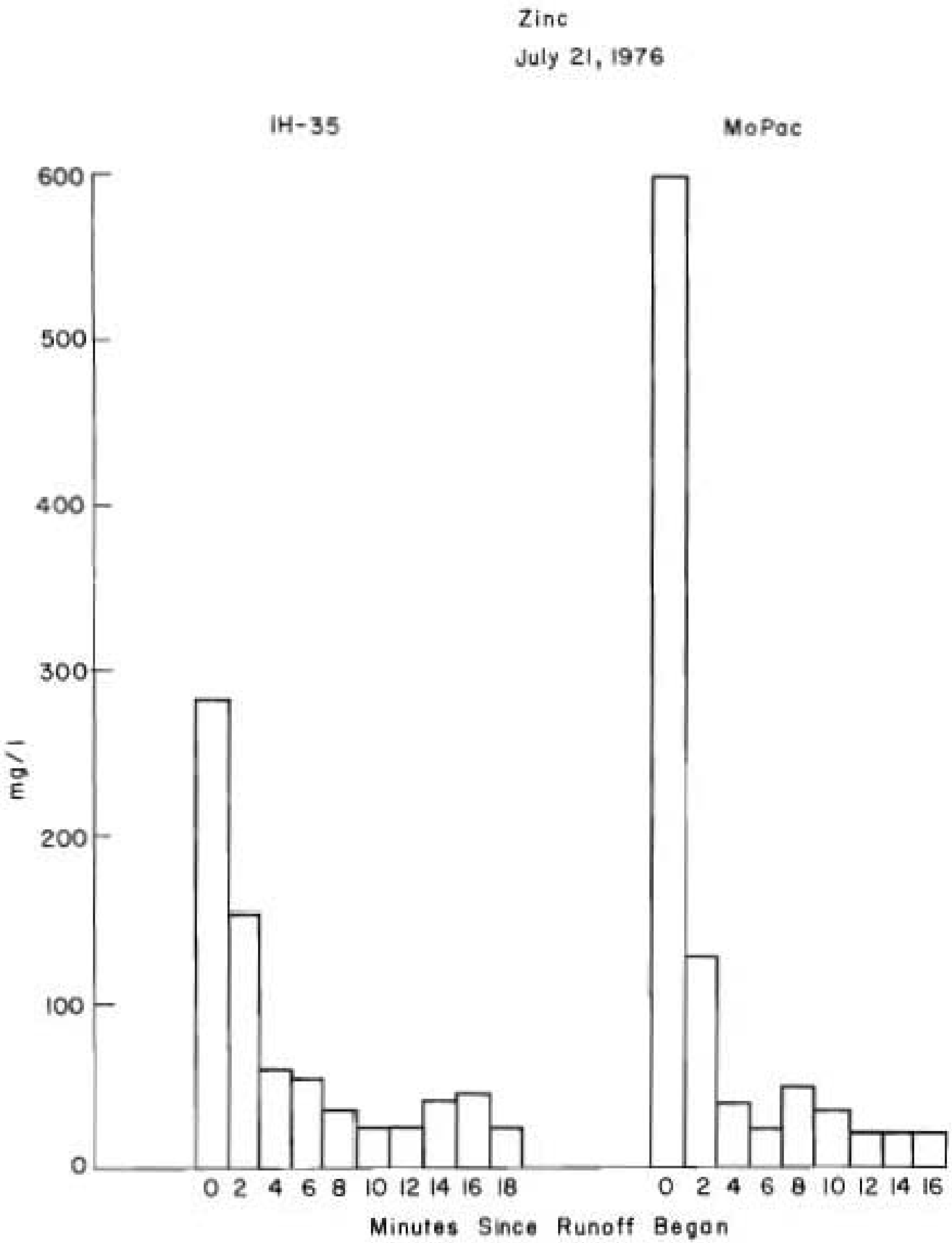
COD
July 24, 1976
700
600
500
400
300
200
100
0
mg/l
IH-35
MoPac
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16
Minutes Since Runoff Began


TOC
July 21, 1976
IH-35
MoPac
mg/l
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16
Minutes Since Runoff Began

Lead

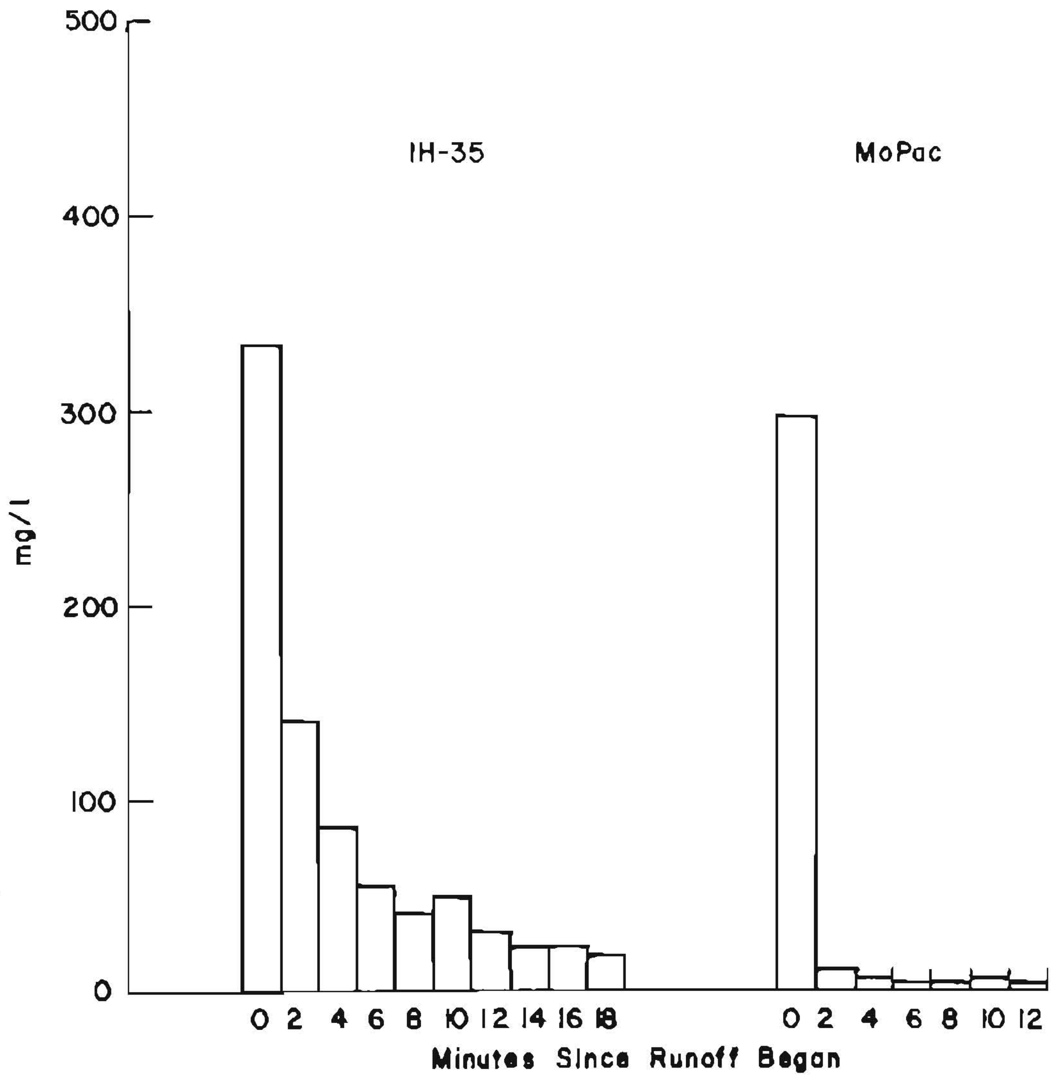
July 21, 1976

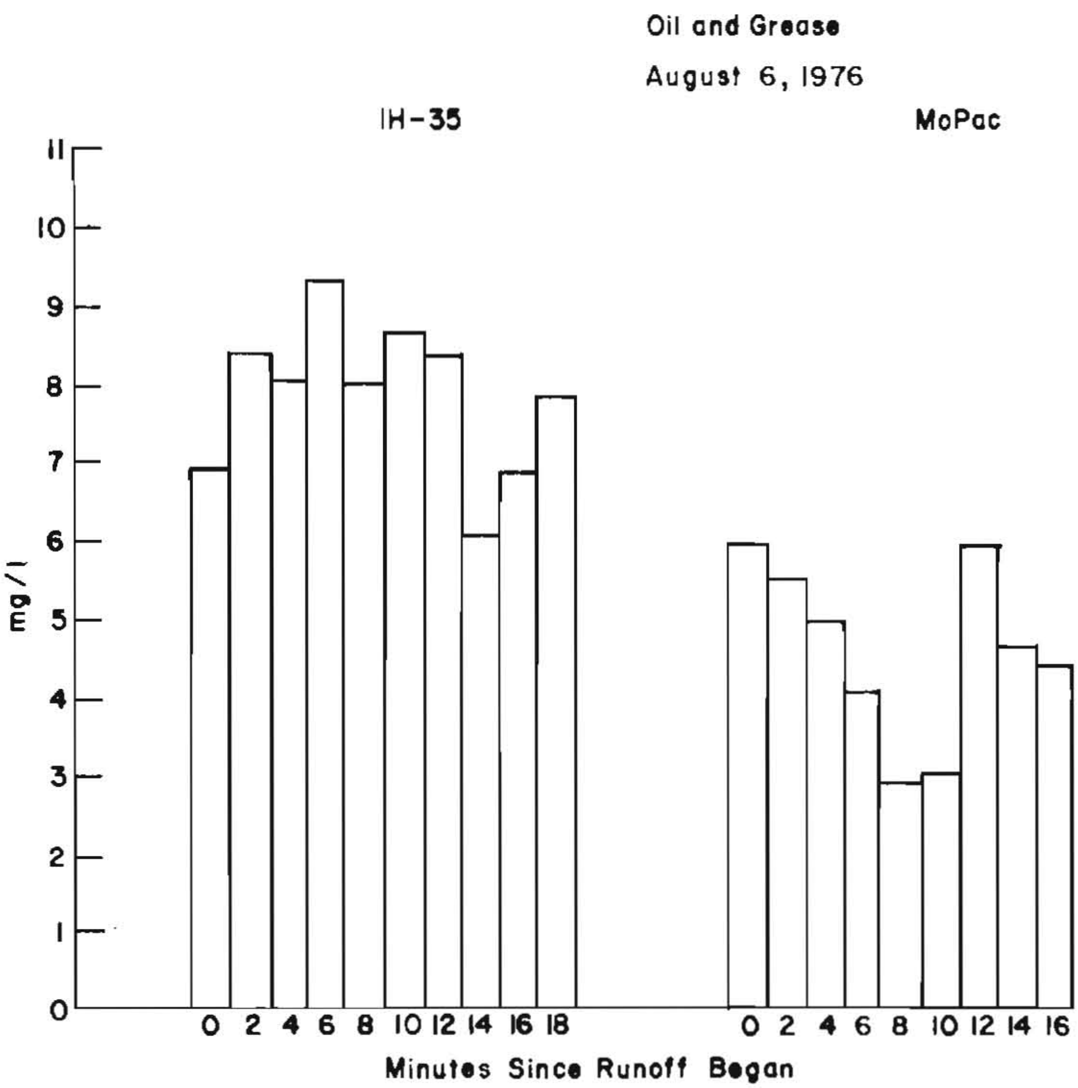


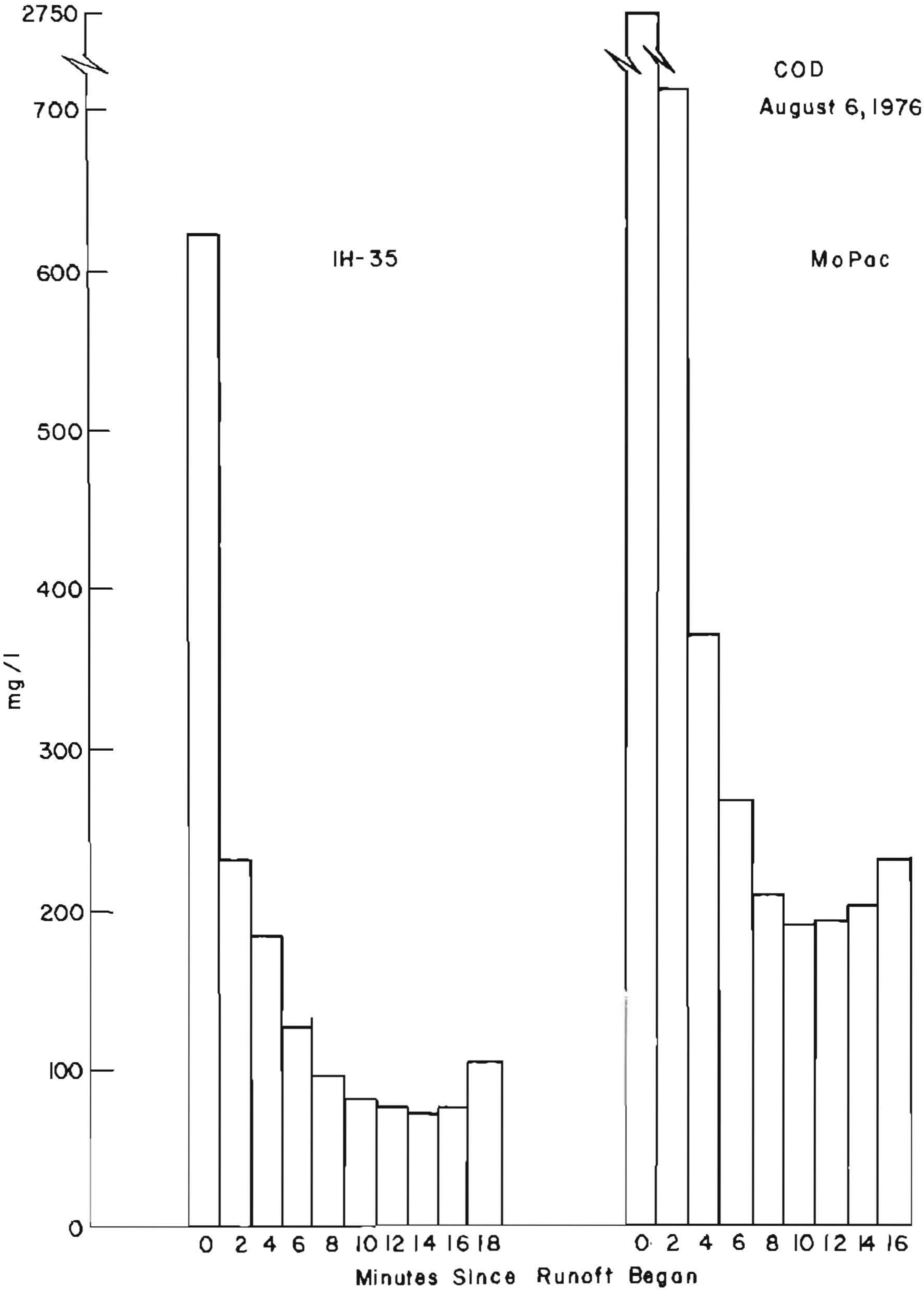

Zinc
July 21, 1976
IH-35
MoPac
600
500
400
300
200
100
0
mg/l
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16
Minutes Since Runoff Began

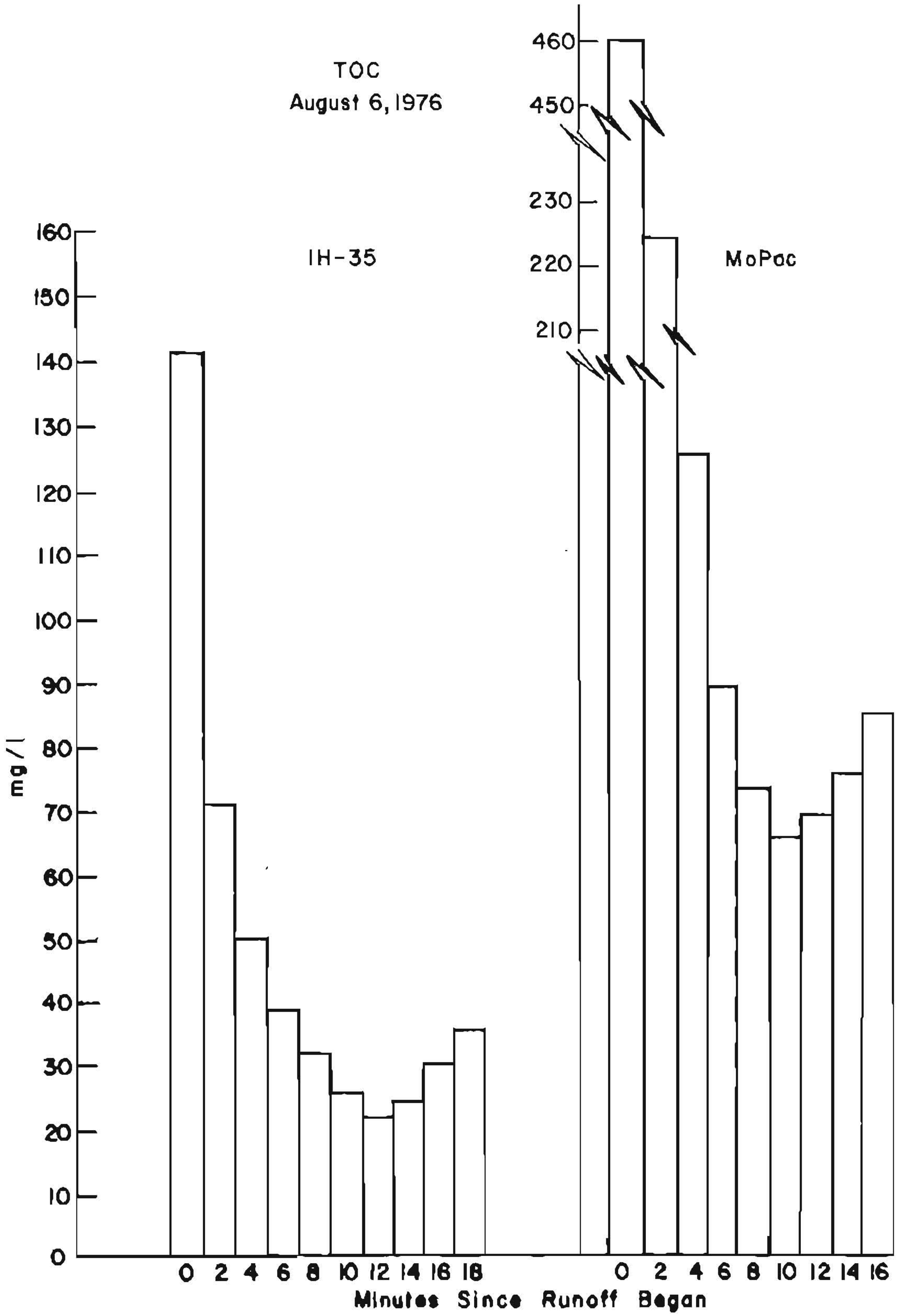
TSS

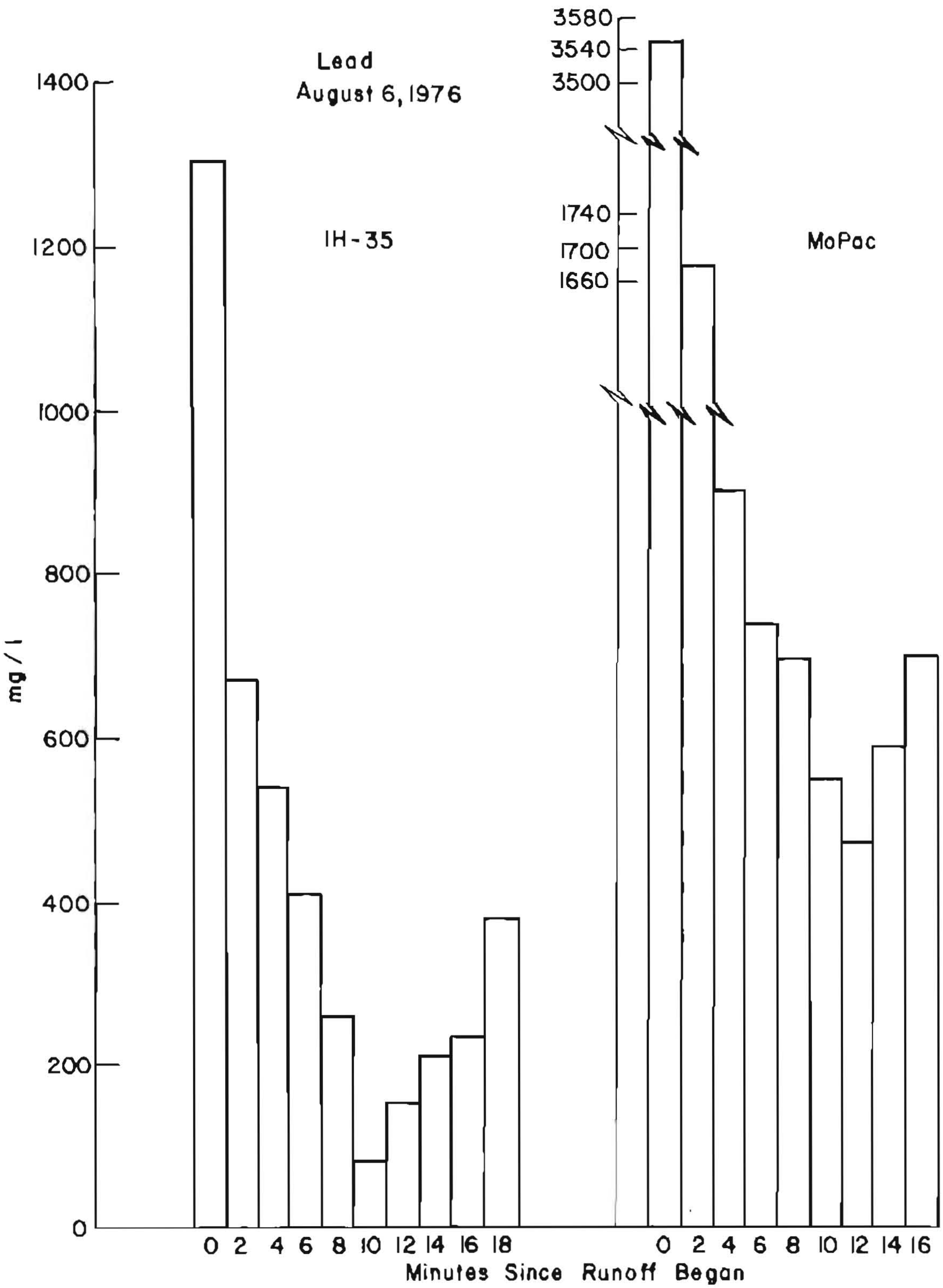
July 21, 1976



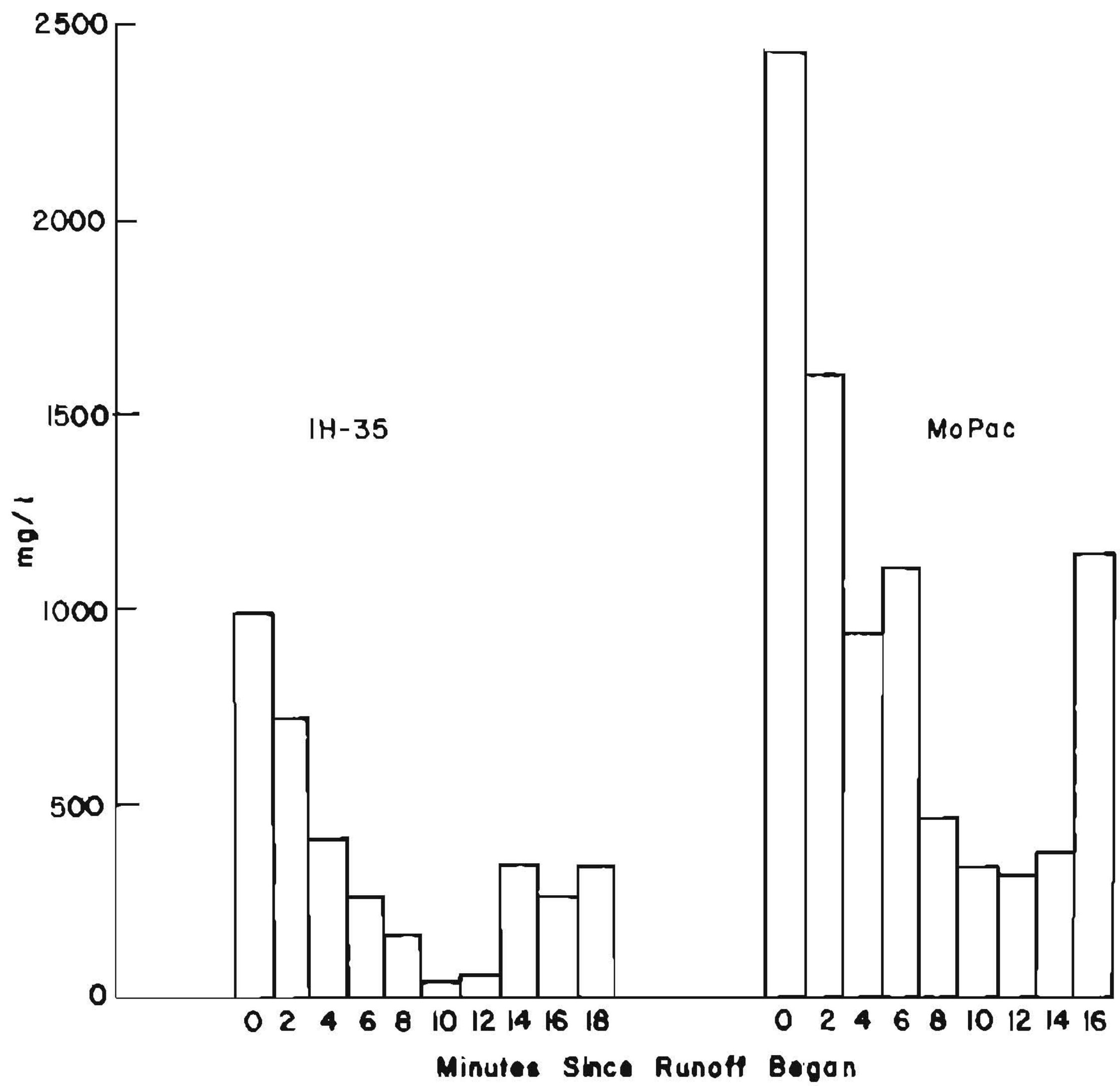

Oil and Grease
August 6, 1976
IH-35
MoPac
mg/l
0
1
2
3
4
5
6
7
8
9
10
11
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16
Minutes Since Runoff Began

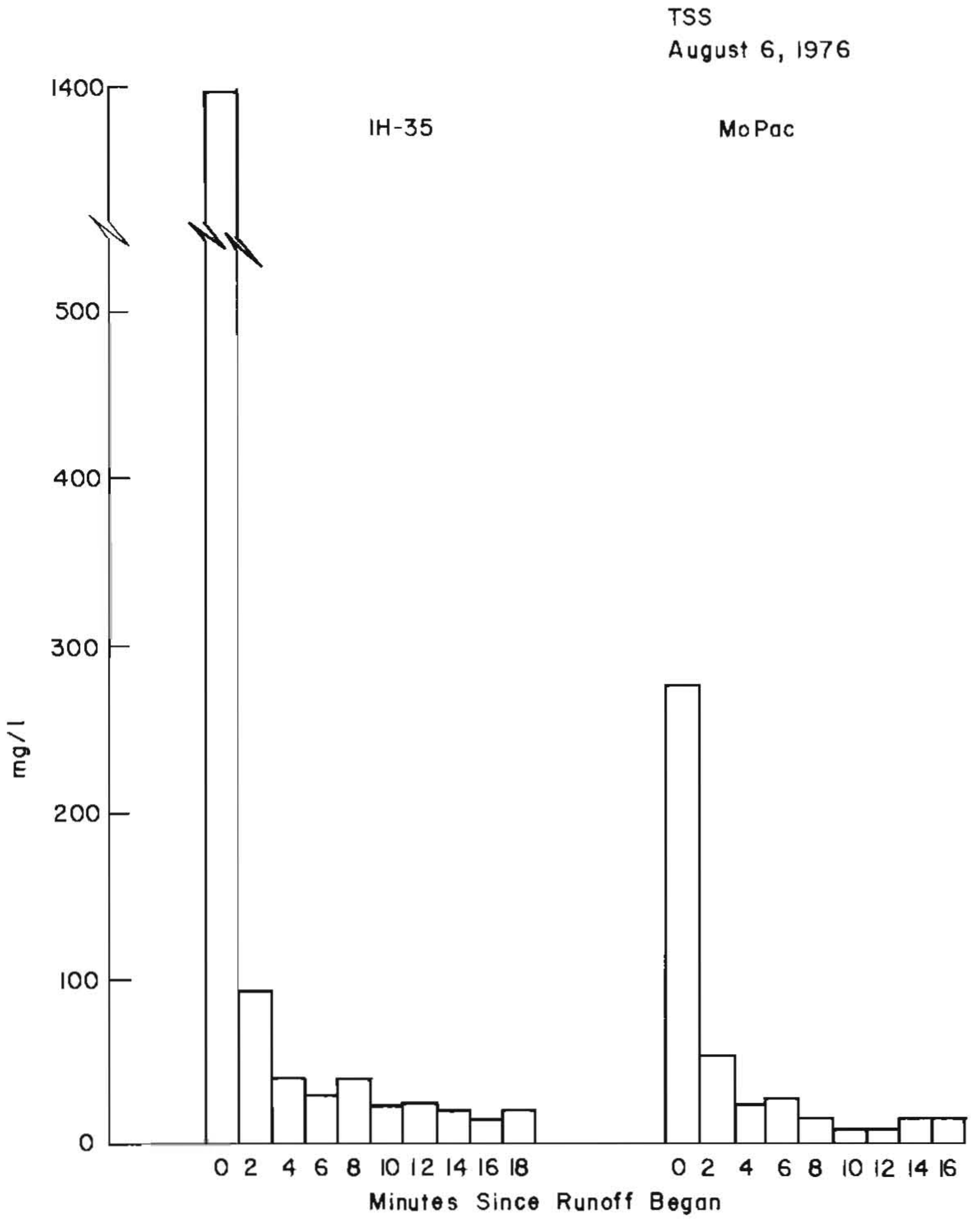

2750
700
600
500
400
300
200
100
0
mg/l
COD
August 6, 1976
IH-35
MoPac
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16
Minutes Since Runoff Began


TOC
August 6, 1976
IH-35
MoPac
mg/l
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
210
220
230
450
460
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16
Minutes Since Runoff Began


Lead
August 6, 1976
IH-35
MoPac
mg / l
1400
1200
1000
800
600
400
200
0
3580
3540
3500
1740
1700
1660
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16
Minutes Since Runoff Began

Zinc
August 6, 1976




TSS
August 6, 1976
IH-35
MoPac
mg/l
1400
500
400
300
200
100
0
0 2 4 6 8 10 12 14 16 18
0 2 4 6 8 10 12 14 16
Minutes Since Runoff Began

JANUARY 1976
AUSTIN, TEXAS
NATIONAL WEATHER SERVICE OFC
MUNICIPAL AIRPORT

# Local Climatological Data

## MONTHLY SUMMARY

LATITUDE 30° 18' N  LONGITUDE 97° 42' W  ELEVATION (GROUND) 597 FT.  STANDARD TIME USED: CENTRAL  WBAN #13958

AUSTIN, TEXAS

| Date | Temperature °F Maximum | Minimum | Average | Departure from normal | Average dew point | Degree days base 65° Heating | Cooling | Weather types on dates of occurrence | Snow, ice pellets or ice on ground at 06AM in. | Precipitation Water equivalent in. | Snow, ice pellets in. | Avg. station pressure in. | Wind Resultant direction | Resultant speed m.p.h. | Average speed m.p.h. | Fastest mile Speed m.p.h. | Fastest mile Direction | Sunshine Minutes | Percent of possible | Sky cover Sunrise to sunset | Midnight to midnight | Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7A | 7B | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 1 | 73 | 55 | 64 | 14 | 55 | 1 | 0 | 1 | 0 | 0 | 0 | 30.16 | 10 | 4.0 | 8.6 | 17 | S | 218 | 38 | 8 | 7 | 1 |
| 2 | 62 | 40 | 51 | 1 | 34 | 14 | 0 | 1 | 0 | 0 | 0 | 29.55 | 01 | 14.1 | 15.7 | 35 | NW | 0 | 0 | 10 | 9 | 2 |
| 3 | 46 | 32 | 39 | -11 | 16 | 26 | 0 | | 0 | 0 | 0 | 29.73 | 01 | 14.3 | 14.8 | 23 | N | 447 | 73 | 3 | 3 | 3 |
| 4 | 47 | 27 | 37 | -13 | 14 | 28 | 0 | | 0 | 0 | 0 | 29.81 | 04 | 6.9 | 8.0 | 13 | N | 433 | 68 | 5 | 4 | 4 |
| 5 | 45 | 35 | 40 | -10 | 22 | 25 | 0 | | 0 | 0 | 0 | 29.54 | 17 | 5.4 | 6.7 | 8 | SE | 0 | 0 | 10 | 10 | 5 |
| 6 | 63 | 43 | 53 | 3 | 44 | 12 | 0 | 1 | 0 | T | 0 | 29.30 | 10 | 8.7 | 9.0 | 18 | S | 63 | 10 | 9 | 10 | 6 |
| 7 | 56 | 24 | 40 | -10 | 23 | 25 | 0 | 1 | 0 | 0 | 0 | 29.55 | 35 | 17.2 | 18.0 | 31 | NW | 610 | 100 | 0 | 2 | 7 |
| 8 | 40 | 16* | 28* | -20 | 0 | 36 | 0 | | 0 | 0 | 0 | 29.84 | 02 | 10.0 | 11.0 | 16 | N | 610 | 100 | 0 | 0 | 8 |
| 9 | 57 | 23 | 40 | -8 | 21 | 25 | 0 | | 0 | 0 | 0 | 29.74 | 18 | 7.2 | 7.5 | 19 | S | 613 | 99 | 0 | 0 | 9 |
| 10 | 70 | 42 | 56 | 7 | 48 | 8 | 0 | | 0 | 0 | 0 | 29.48 | 18 | 13.0 | 13.2 | 28 | S | 34 | 5 | 10 | 10 | 10 |
| 11 | 64 | 46 | 55 | 6 | 45 | 10 | 0 | 2 | 0 | 0 | 0 | 29.40 | 34 | 6.4 | 11.8 | 24 | NW | 560 | 91 | 1 | 2 | 11 |
| 12 | 71 | 34 | 53 | 4 | 38 | 12 | 0 | | 0 | 0 | 0 | 29.60 | 25 | 4.7 | 10.2 | 20 | S | 515 | 82 | 1 | 1 | 12 |
| 13 | 77* | 53 | 65* | 16 | 52 | 0 | 0 | | 0 | 0 | 0 | 29.32 | 27 | 1.2 | 12.0 | 23 | N | 261 | 42 | 6 | 6 | 13 |
| 14 | 58 | 42 | 50 | 1 | 29 | 15 | 0 | | 0 | 0 | 0 | 29.74 | 03 | 14.0 | 14.4 | 30 | N | 481 | 78 | 8 | 4 | 14 |
| 15 | 67 | 34 | 51 | 2 | 27 | 14 | 0 | | 0 | 0 | 0 | 29.61 | 23 | 5.0 | 8.8 | 20 | S | 609 | 67 | 1 | 1 | 15 |
| 16 | 68 | 38 | 54 | 5 | 30 | 11 | 0 | | 0 | 0 | 0 | 29.55 | 01 | 8.3 | 11.7 | 23 | N | 625 | 100 | 2 | 1 | 16 |
| 17 | 68 | 34 | 51 | 2 | 26 | 14 | 0 | | 0 | 0 | 0 | 29.64 | 25 | 5.5 | 8.0 | 15 | S | 627 | 100 | 0 | 0 | 17 |
| 18 | 72 | 38 | 56 | 7 | 38 | 8 | 0 | | 0 | 0 | 0 | 29.54 | 18 | 9.9 | 10.6 | 29 | SE | 627 | 100 | 0 | 0 | 18 |
| 19 | 72 | 46 | 59 | 10 | 50 | 6 | 0 | 2 | 0 | .64 | 0 | 29.56 | 18 | 5.9 | 10.4 | 26 | S | 109 | 17 | 6 | 6 | 19 |
| 20 | 66 | 38 | 47 | -3 | 29 | 18 | 0 | | 0 | .08 | 0 | 29.81 | 02 | 15.5 | 15.7 | 28 | N | 108 | 30 | 6 | 6 | 20 |
| 21 | 65 | 30 | 48 | -2 | 24 | 17 | 0 | | 0 | 0 | 0 | 29.78 | 31 | 7.6 | 8.2 | 13 | W | 614 | 97 | 5 | 3 | 21 |
| 22 | 66 | 34 | 51 | 1 | 27 | 14 | 0 | | 0 | 0 | 0 | 29.65 | 26 | 3.4 | 7.6 | 12 | S | 597 | 94 | 4 | 3 | 22 |
| 23 | 73 | 43 | 58 | 8 | 44 | 7 | 0 | | 0 | 0 | 0 | 29.32 | 20 | 6.7 | 8.8 | 21 | S | 466 | 74 | 7 | 6 | 23 |
| 24 | 67 | 53 | 60 | 10 | 57 | 5 | 0 | 23 8 | 0 | .64 | 0 | 29.12 | 18 | 6.0 | 9.1 | 22 | NW | 8 | 1 | 10 | 8 | 24 |
| 25 | 70 | 40 | 55 | 5 | 46 | 10 | 0 | | 0 | 0 | 0 | 29.13 | 33 | 7.7 | 10.8 | 28 | N | 636 | 100 | 0 | 1 | 25 |
| 26 | 45 | 33 | 39 | -11 | 23 | 26 | 0 | | 0 | 0 | 0 | 29.60 | 36 | 16.7 | 17.0 | 24 | N | 98 | 15 | 8 | 4 | 26 |
| 27 | 52 | 24 | 38 | -12 | 14 | 27 | 0 | | 0 | 0 | 0 | 29.87 | 36 | 4.8 | 6.5 | 8 | NW | 638 | 100 | 0 | 0 | 27 |
| 28 | 60 | 25 | 43 | -7 | 22 | 22 | 0 | | 0 | 0 | 0 | 29.60 | 22 | 4.8 | 9.8 | 16 | S | 640 | 100 | 0 | 0 | 28 |
| 29 | 70 | 34 | 52 | 1 | 28 | 13 | 0 | | 0 | 0 | 0 | 29.59 | 31 | .9 | 4.0 | 12 | W | 611 | 94 | 1 | 1 | 29 |
| 30 | 73 | 36 | 55 | 4 | 36 | 10 | 0 | | 0 | 0 | 0 | 29.40 | 23 | 6.3 | 8.8 | 17 | S | 630 | 96 | 0 | 0 | 30 |
| 31 | 56 | 44 | 50 | -1 | 26 | 15 | 0 | | 0 | 0 | 0 | 29.34 | 34 | 14.2 | 17.1 | 37 | NW | 410 | 64 | 4 | 2 | 31 |
| | Sum 1932 | Sum 1134 | | | | Total 476 | Total 0 | | | Total 1.16 | Total 0 | For the month: 29.54 | 24 | 2.0 | 10.7 | 37 | NW | Total 13009 | % for month | Sum 127 | Sum 112 | |
| | Avg. 62.3 | Avg. 36.6 | Avg. 49.5 | Dep. -0.2 | Avg. 32 | Dep. -7 | Dep. -8 | | | Dep. -0.72 | | | | | | Date: 31 | | Possible 19430 | 67 | Avg. 4.1 | Avg. 3.6 | |

| Number of days | | | | Season to date | | | | |
|---|---|---|---|---|---|---|---|---|
| Maximum temp. ≥ 90° | Maximum temp. ≤ 32° | Minimum temp. ≤ 32° | Minimum temp. ≤ 0° | Heating Total 1112 | Cooling Total 0 | Number of days: Precipitation ≥ .01 inch | 3 | |
| 0 | 0 | 9 | 0 | Dep. -14 | Dep. -8 | Snow, ice pellets ≥ 1.0 inch | 0 | |
| | | | | | | Thunderstorms | 1 | |
| | | | | | | Heavy fog | 3 | |
| | | | | | | Clear 15 | Partly cloudy 7 | Cloudy 9 |

Greatest in 24 hours and dates: Precipitation .64, 24; Snow, ice pellets 0. Greatest depth on ground of snow, ice pellets or ice and date: 0.

* Extreme for the month - last occurrence if more than one.
T Trace amount.
+ Also on an earlier date, or dates.
Heavy fog: visibility 1/4 mile or less.
Figures for wind directions are tens of degrees clockwise from true north. 00 = calm.
Data in cols. 6 and 12-15 are based on 8 observations per day at 3-hour intervals.
Fastest mile wind speeds are fastest observed one-minute values when directions are in tens of degrees. The / with the direction indicates peak gust speed.
Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

### SUMMARY BY HOURS

| Hour local time | Sky cover tenths | Station pressure in. | Air °F | Wet bulb °F | Dew pt. °F | Relative humidity % | Wind speed m.p.h. | Resultant wind Direction | Resultant wind Speed m.p.h. |
|---|---|---|---|---|---|---|---|---|---|
| 00 | 3 | 29.54 | 46 | 41 | 35 | 62 | 8.5 | 30 | .8 |
| 03 | 3 | 29.53 | 43 | 39 | 35 | 68 | 7.0 | 32 | 1.0 |
| 06 | 3 | 29.54 | 41 | 37 | 31 | 71 | 8.7 | 33 | 3.3 |
| 09 | 4 | 29.56 | 44 | 38 | 32 | 64 | 11.0 | 34 | 3.3 |
| 12 | 4 | 29.50 | 55 | 45 | 32 | 44 | 14.5 | 33 | 1.7 |
| 15 | 4 | 29.50 | 60 | 47 | 32 | 38 | 13.8 | 30 | 1.1 |
| 18 | 4 | 29.50 | 54 | 45 | 31 | 43 | 11.3 | 06 | 1.0 |
| 21 | 3 | 29.54 | 49 | 42 | 33 | 54 | 9.9 | 02 | 2.5 |

### HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

| Date | A.M. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | P.M. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | 4 |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | 5 |
| 6 | | | | | | | | | | | | T | T | | | | | | | | | | | | 6 |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | 7 |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | 9 |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | 10 |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | 11 |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | 12 |
| 13 | | | | | | | | | | | | | | | | | | | | | | | | | 13 |
| 14 | | | | | | | | | | | | | | | | | | | | | | | | | 14 |
| 15 | | | | | | | | | | | | | | | | | | | | | | | | | 15 |
| 16 | | | | | | | | | | | | | | | | | | | | | | | | | 16 |
| 17 | | | | | | | | | | | | | | | | | | | | | | | | | 17 |
| 18 | | | | | | | | | | | | | | | | | | | | | | | | | 18 |
| 19 | | | | | | | | | | | | | | | | .02 | .11 | .01 | .22 | .04 | T | .03 | T | T | 19 |
| 20 | .04 | .03 | .01 | | | | | | T | | | | | | | | | | | | | | | | 20 |
| 21 | | | | | | | | | | | | | | | | | | | | | | | | | 21 |
| 22 | | | | | | | | | | | | | | | | | | | | | | | | | 22 |
| 23 | | | | | | | | | | | | | | | | | | | | | | | | | 23 |
| 24 | | | | | | | | | | | | | | T | T | | | | | | T | .08 | .55 | | 24 |
| 25 | | | | | | | | | | | | | | | | | | | | | | | | | 25 |
| 26 | | | | | | | | | | | | | | | | | | | | | | | | | 26 |
| 27 | | | | | | | | | | | | | | | | | | | | | | | | | 27 |
| 28 | | | | | | | | | | | | | | | | | | | | | | | | | 28 |
| 29 | | | | | | | | | | | | | | | | | | | | | | | | | 29 |
| 30 | | | | | | | | | | | | | | | | | | | | | | | | | 30 |
| 31 | | | | | | | | | | | | | | | | | | | | | | | | | 31 |

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Thomas D. Potter
DIRECTOR, NATIONAL CLIMATIC CENTER

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USCOMM--NOAA--ASHEVILLE 500

FEBRUARY 1976
AUSTIN, TEXAS
NATIONAL WEATHER SERVICE OFC
MUNICIPAL AIRPORT

# Local Climatological Data

## MONTHLY SUMMARY

LATITUDE 30° 18' N LONGITUDE 97° 42' W ELEVATION (GROUND) 597 FT STANDARD TIME USED: CENTRAL WBAN 13958

AUSTIN, TEXAS

| Date | Temp. Maximum | Temp. Minimum | Temp. Average | Departure from normal | Average dew point | Degree days Heating | Degree days Cooling | Weather types | Snow, ice pellets or ice on ground at 06AM In. | Precip. Water equivalent In. | Snow, ice pellets In. | Avg. station pressure In. Elev. 621 feet m.s.l. | Wind Resultant direction | Resultant speed m.p.h. | Average speed m.p.h. | Fastest mile Speed m.p.h. | Fastest mile Direction | Sunshine Minutes | Percent of possible | Sky cover Sunrise to sunset | Sky cover Midnight to midnight | Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7A | 7B | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 1 | 72 | 43 | 58 | 7 | 23 | 7 | 0 | | 0 | 0 | 0 | 29.40 | 32 | 13.0 | 14.2 | 22 | NW | 646 | 100 | 2 | 1 | 1 |
| 2 | 81 | 34 | 58 | 7 | 26 | 7 | 0 | | 0 | 0 | 0 | 29.32 | 24 | 4.5 | 8.2 | 19 | SW | 647 | 100 | 0 | 0 | 2 |
| 3 | 76 | 38 | 58 | 8 | 31 | 6 | 0 | | 0 | 0 | 0 | 29.26 | 17 | 6.1 | 11.5 | 23 | S | 648 | 100 | 1 | 0 | 3 |
| 4 | 77 | 54 | 66 | 15 | 57 | 0 | 1 | 1 | 0 | T | 0 | 29.30 | 18 | 11.4 | 11.8 | 20 | S | 78 | 12 | 9 | 8 | 4 |
| 5 | 65 | 45 | 55 | 3 | 50 | 10 | 0 | 1 8 | 0 | .02 | 0 | 29.44 | 04 | 0.0 | 11.5 | 17 | N | 0 | 0 | 10 | 10 | 5 |
| 6 | 45 | 35 | 40* | -12 | 29 | 25 | 0 | | 0 | T | 0 | 29.70 | 01 | 16.5 | 16.7 | 22 | N | 0 | 0 | 10 | 10 | 6 |
| 7 | 51 | 30* | 41 | -11 | 20 | 24 | 0 | | 0 | 0 | 0 | 29.75 | 01 | 8.0 | 11.1 | 20 | N | 340 | 57 | 5 | 5 | 7 |
| 8 | 73 | 33 | 53 | 1 | 35 | 12 | 0 | | 0 | 0 | 0 | 29.47 | 19 | 6.0 | 7.2 | 14 | S | 658 | 100 | 5 | 2 | 8 |
| 9 | 76 | 42 | 59 | 7 | 48 | 6 | 0 | 8 | 0 | 0 | 0 | 29.41 | 18 | 6.4 | 8.8 | 17 | S | 517 | 79 | 9 | 6 | 9 |
| 10 | 78 | 64 | 71 | 18 | 60 | 0 | 6 | | 0 | 0 | 0 | 29.38 | 18 | 14.5 | 14.8 | 22 | S | 341 | 52 | 8 | 7 | 10 |
| 11 | 83 | 63 | 73 | 20 | 58 | 0 | 8 | | 0 | 0 | 0 | 29.47 | 18 | 4.0 | 8.8 | 18 | SE | 487 | 74 | 7 | 7 | 11 |
| 12 | 77 | 61 | 69 | 16 | 57 | 0 | 4 | | 0 | 0 | 0 | 29.47 | 19 | 8.6 | 10.1 | 18 | S | 276 | 42 | 8 | 8 | 12 |
| 13 | 78 | 60 | 69 | 16 | 57 | 0 | 4 | 8 | 0 | 0 | 0 | 29.48 | 18 | 10.7 | 10.9 | 17 | S | 330 | 50 | 8 | 7 | 13 |
| 14 | 76 | 60 | 68 | 15 | 60 | 0 | 3 | 1 8 | 0 | T | 0 | 29.50 | 18 | 11.6 | 11.8 | 22 | SE | 76 | 11 | 9 | 9 | 14 |
| 15 | 79 | 64 | 72 | 19 | 61 | 0 | 7 | 1 | 0 | T | 0 | 29.43 | 18 | 12.0 | 12.1 | 21 | SE | 21 | 3 | 10 | 9 | 15 |
| 16 | 70 | 65 | 71 | 17 | 64 | 0 | 6 | | 0 | .03 | 0 | 29.31 | 19 | 8.9 | 9.5 | 14 | S | 1 | 0 | 9 | 9 | 16 |
| 17 | 80 | 63 | 72 | 18 | 59 | 0 | 7 | 3 5 8 | 0 | .83 | 0 | 29.13 | 21 | 6.2 | 8.5 | 25 | W | 204 | 30 | 8 | 8 | 17 |
| 18 | 75 | 47 | 61 | 7 | 29 | 4 | 0 | | 0 | 0 | 0 | 29.50 | 32 | 8.4 | 13.1 | 20 | NW | 672 | 100 | 0 | 0 | 18 |
| 19 | 83* | 46 | 65 | 11 | 40 | 0 | 0 | | 0 | 0 | 0 | 29.28 | 19 | 6.0 | 6.6 | 17 | SE | 670 | 98 | 0 | 1 | 19 |
| 20 | 75 | 63 | 69 | 15 | 63 | 0 | 4 | 3 | 0 | .13 | 0 | 29.11 | 18 | 13.6 | 13.8 | 20 | SE | 40 | 6 | 9 | 9 | 20 |
| 21 | 63 | 46 | 55 | 1 | 30 | 10 | 0 | 3 | 0 | .10 | 0 | 29.41 | 34 | 17.7 | 18.1 | 33 | NW | 617 | 91 | 1 | 3 | 21 |
| 22 | 60 | 38 | 49 | -6 | 17 | 16 | 0 | | 0 | 0 | 0 | 29.80 | 35 | 11.9 | 13.1 | 24 | N | 579 | 100 | 0 | 0 | 22 |
| 23 | 73 | 38 | 55 | 0 | 21 | 10 | 0 | | 0 | 0 | 0 | 29.78 | 25 | 6.2 | 8.3 | 14 | SE | 681 | 100 | 0 | 0 | 23 |
| 24 | 73 | 39 | 56 | 1 | 30 | 9 | 0 | | 0 | 0 | 0 | 29.64 | 20 | 13.9 | 13.2 | 21 | S | 614 | 80 | 6 | 4 | 24 |
| 25 | 80 | 47 | 58 | 3 | 48 | 7 | 0 | | 0 | 0 | 0 | 29.50 | 20 | 6.4 | 9.8 | 23 | S | 202 | 29 | 9 | 5 | 25 |
| 26 | 76 | 45 | 61 | 6 | 49 | 4 | 0 | | 0 | 0 | 0 | 29.56 | 20 | 2.7 | 5.8 | 10 | S | 686 | 100 | 0 | 0 | 26 |
| 27 | 75 | 52 | 64 | 8 | 52 | 1 | 0 | 1 | 0 | 0 | 0 | 29.52 | 19 | 7.8 | 9.2 | 15 | S | 523 | 76 | 3 | 3 | 27 |
| 28 | 78 | 54 | 66 | 10 | 53 | 0 | 1 | | 0 | T | 0 | 29.33 | 18 | 10.1 | 10.2 | 16 | S | 300 | 43 | 9 | 8 | 28 |
| 29 | 81 | 61 | 71 | 15 | 58 | 0 | 6 | | 0 | 0 | 0 | 29.20 | 19 | 14.5 | 14.7 | 22 | S | 310 | 44 | 7 | 6 | 29 |
| | Sum 2120 | Sum 1427 | | | | Total 158 | Total 57 | Number of days | | Total 1.11 | Total 0 | For the month: 29.44 | 20 | 4.2 | 11.1 | 33 | NW | Total 11261 | % for month | Sum 159 | Sum 141 | |
| | Avg. 73.1 | Avg. 49.2 | Avg. 61.3 | Dep. 6.0 | Avg. 44 | Dep. -106 | Dep. 40 | Precipitation ≥ .01 inch | 5 | Dep. -1.98 | | | | | | Date: 21 | | Possible 19372 | 58 | Avg. 5.4 | Avg. 4.8 | |

| Number of days: Max temp. ≥ 90° | Max temp. ≤ 32° | Min temp. ≤ 32° | Min temp. ≤ 0° | Season to date: Heating total | Cooling total | Snow, ice pellets ≥ 1.0 inch | Thunderstorms | Heavy fog | Clear | Partly cloudy | Cloudy |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 1270 | 57 | 0 | 3 | 0 | 10 | 7 | 12 |
| | | | | Dep. -210 | Dep. 22 | | | | | | |

| Greatest in 24 hours and dates: Precipitation | Date | Snow, ice pellets | Date | Greatest depth of ground of snow, ice pellets or ice and date |
|---|---|---|---|---|
| .83 | 17 | 0 | | 0 |

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
T TRACE AMOUNT.
\+ ALSO ON AN EARLIER DATE, OR DATES.
HEAVY FOG: VISIBILITY 1/4 MILE OR LESS.
FIGURES FOR WIND DIRECTIONS ARE TENS OF DEGREES CLOCKWISE FROM TRUE NORTH. 00 - CALM.
DATA IN COLS. 6 AND 12-15 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
FASTEST MILE WIND SPEEDS ARE FASTEST OBSERVED ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN TENS OF DEGREES. THE / WITH THE DIRECTION INDICATES PEAK GUST SPEED.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

NOTE: PUBLIC REPORTED GOLF BALL SIZE HAIL OVER SOUTH AND NORTH AUSTIN. ALSO, ONE HOUSE DESTROYED AND TREES BROKEN BY TORNADO AT 0525CST ON 17TH.

### SUMMARY BY HOURS

| Hour local time | Sky cover tenths | Station pressure In. | Air °F | Wet bulb °F | Dew pt. °F | Relative humidity % | Wind speed m.p.h. | Resultant wind Direction | Resultant wind Speed m.p.h. |
|---|---|---|---|---|---|---|---|---|---|
| 00 | 5 | 29.45 | 56 | 53 | 44 | 69 | 10.3 | 20 | 3.3 |
| 03 | 6 | 29.43 | 54 | 50 | 44 | 73 | 9.4 | 21 | 3.4 |
| 06 | 6 | 29.44 | 52 | 49 | 44 | 77 | 8.8 | 22 | 3.5 |
| 09 | 6 | 29.49 | 55 | 51 | 45 | 71 | 11.0 | 23 | 3.7 |
| 12 | 6 | 29.46 | 65 | 55 | 45 | 53 | 13.8 | 21 | 5.7 |
| 15 | 5 | 29.39 | 71 | 57 | 44 | 41 | 13.9 | 20 | 6.6 |
| 18 | 3 | 29.30 | 69 | 56 | 45 | 45 | 11.7 | 18 | 5.5 |
| 21 | 3 | 29.42 | 61 | 53 | 44 | 58 | 10.0 | 18 | 5.0 |

### HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

| Date | A.M. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | P.M. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| 4 | | | | | | | | | | | | | | | | | | | | | | T | T | | 4 |
| 5 | | | | .02 | T | | | | | | T | | | | | | | | | | T | T | | | 5 |
| 6 | | | | | | T | T | T | | | | | | | | | | | | | | | | | 6 |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | 7 |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | 9 |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | 10 |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | 11 |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | 12 |
| 13 | | | | | | | | | | | | | | | | | | | | | | | | | 13 |
| 14 | | | | | | | | T | | | | | | | | | | | | | | | | | 14 |
| 15 | | | | | | | | T | T | T | | | | | | | | | | | | | | | 15 |
| 16 | | | | T | | T | | | T | .03 | T | T | | | | | | | | | | | | | 16 |
| 17 | | | | | | T | | | | .02 | T | .81 | | | | | | | | | | | | | 17 |
| 18 | | | | | | | | | | | | | | | | | | | | | | | | | 18 |
| 19 | | | | | | | | | | | | | | | | | | | | | | | | | 19 |
| 20 | | | T | T | | | | | | | | | | | | | | | | | | | .08 | .04 | 20 |
| 21 | .04 | .06 | | | | | | | | | | | | | | | | | | | | | | | 21 |
| 22 | | | | | | | | | | | | | | | | | | | | | | | | | 22 |
| 23 | | | | | | | | | | | | | | | | | | | | | | | | | 23 |
| 24 | | | | | | | | | | | | | | | | | | | | | | | | | 24 |
| 25 | | | | | | | | | | | | | | | | | | | | | | | | | 25 |
| 26 | | | | | | | | | | | | | | | | | | | | | | | | | 26 |
| 27 | | | | | | | | | | | | | | | | | | | | | | | | | 27 |
| 28 | | | | | | | T | T | | | | | | | | | | | | | | | | | 28 |
| 29 | | | | | | | | | | | | | | | | | | | | | | | | | 29 |

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Thomas D. Potter
DIRECTOR, NATIONAL CLIMATIC CENTER

USCOMM--NOAA--ASHEVILLE 03/15/76 300

MARCH 1976
AUSTIN, TEXAS
NATIONAL WEATHER SERVICE OFC
MUNICIPAL AIRPORT

# Local Climatological Data

## MONTHLY SUMMARY

MARCH 1976 AUSTIN, TEXAS

LATITUDE 30° 18' N LONGITUDE 97° 42' W ELEVATION (GROUND) 597 FT. STANDARD TIME USED: CENTRAL WBAN #13958

| Date | Temperature °F Maximum | Minimum | Average | Departure from normal | Average dew point | Degree days base 65° Heating (season begins with Jul) | Cooling (season begins with Jan) | Weather types on dates of occurrence<br>1 Fog<br>2 Heavy fog<br>3 Thunderstorm<br>4 Ice pellets<br>5 Hail<br>6 Glaze<br>7 Duststorm<br>8 Smoke, haze<br>9 Blowing snow | Snow, ice pellets or ice on ground at 06AM In. | Precipitation Water equivalent In. | Snow, ice pellets In. | Avg. station pressure In. Elev. 621 feet m.s.l. | Wind Resultant direction | Resultant speed m.p.h. | Average speed m.p.h. | Fastest mile Speed m.p.h. | Fastest mile Direction | Sunshine Minutes | Percent of possible | Sky cover tenths Sunrise to sunset | Midnight to midnight | Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7A | 7B | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 1 | 82 | 66 | 74 | 18 | 61 | 0 | 9 | | 0 | 0 | 0 | 29.22 | 18 | 14.6 | 14.7 | 21 | S | 264 | 38 | 7 | 8 | 1 |
| 2 | 84 | 68 | 76 | 20 | 63 | 0 | 11 | | 0 | 0 | 0 | 29.25 | 18 | 13.7 | 14.0 | 35 | S | 175 | 25 | 9 | 9 | 2 |
| 3 | 80 | 66 | 73 | 17 | 65 | 0 | 8 | | 0 | 0 | 0 | 29.32 | 17 | 15.5 | 15.5 | 27 | S | 39 | 6 | 10 | 10 | 3 |
| 4 | 85 | 57 | 71 | 15 | 63 | 0 | 6 | 3 | 0 | .45 | 0 | 29.11 | 18 | 16.3 | 16.7 | 29 | S | 344 | 45 | 9 | 7 | 4 |
| 5 | 63 | 45 | 54 | -3 | 38 | 11 | 0 | 3 | 0 | .38 | 0 | 29.43 | 04 | 16.7 | 16.8 | 26 | N | 0 | 0 | 10 | 10 | 5 |
| 6 | 51 | 43 | 47 | -10 | 40 | 18 | 0 | 1 3 8 | 0 | .17 | 0 | 29.57 | 03 | 13.8 | 14.1 | 18 | N | 0 | 0 | 10 | 10 | 6 |
| 7 | 53 | 47 | 50 | -7 | 46 | 15 | 0 | 1 | 0 | .19 | 0 | 29.42 | 04 | 8.9 | 9.1 | 12 | NE | 0 | 0 | 10 | 10 | 7 |
| 8 | 63 | 48 | 56 | -1 | 49 | 9 | 0 | 1 | 0 | .35 | 0 | 29.17 | 34 | 10.7 | 12.4 | 25 | NW | 422 | 60 | 8 | 5 | 8 |
| 9 | 64 | 43 | 54 | -4 | 41 | 11 | 0 | | 0 | 0 | 0 | 29.33 | 35 | 9.9 | 11.1 | 19 | NW | 639 | 90 | 3 | 3 | 9 |
| 10 | 71 | 43 | 57 | -1 | 46 | 8 | 0 | 8 | 0 | 0 | 0 | 29.37 | 18 | 5.2 | 6.5 | 13 | S | 400 | 56 | 9 | 8 | 10 |
| 11 | 71 | 58 | 65 | 7 | 60 | 0 | 0 | 1 | 0 | 0 | 0 | 29.25 | 18 | 10.7 | 10.8 | 22 | S | 0 | 0 | 10 | 10 | 11 |
| 12 | 78 | 53 | 65 | 7 | 50 | 0 | 0 | 3 | 0 | .04 | 0 | 29.28 | 01 | 9.9 | 13.1 | 30 | N | 409 | 57 | 6 | 6 | 12 |
| 13 | 52 | 40 | 46* | -12 | 33 | 19 | 0 | 1 3 | 0 | .13 | 0 | 29.56 | 02 | 16.2 | 16.4 | 29 | N | 0 | 0 | 10 | 9 | 13 |
| 14 | 56 | 42 | 49 | -10 | 41 | 16 | 0 | 8 | 0 | 0 | 0 | 29.45 | 06 | 4.9 | 6.3 | 11 | N | 45 | 6 | 9 | 10 | 14 |
| 15 | 71 | 51 | 61 | 2 | 52 | 4 | 0 | 1 8 | 0 | T | 0 | 29.24 | 20 | 7.5 | 10.2 | 29 | NW | 70 | 10 | 9 | 8 | 15 |
| 16 | 65 | 42 | 53 | -5 | 31 | 12 | 0 | | 0 | 0 | 0 | 29.55 | 01 | 15.1 | 16.5 | 28 | NW | 633 | 88 | 1 | 1 | 16 |
| 17 | 69 | 35* | 52 | -8 | 31 | 13 | 0 | | 0 | 0 | 0 | 29.51 | 17 | 6.1 | 8.3 | 12 | SE | 223 | 31 | 8 | 5 | 17 |
| 18 | 78 | 48 | 63 | 3 | 52 | 2 | 0 | 1 8 | 0 | 0 | 0 | 29.34 | 18 | 11.5 | 11.4 | 23 | S | 134 | 19 | 8 | 8 | 18 |
| 19 | 81 | 63 | 72 | 12 | 63 | 0 | 7 | 1 | 0 | T | 0 | 29.16 | 18 | 12.4 | 13.5 | 30 | SE | 7 | 1 | 10 | 9 | 19 |
| 20 | 91* | 61 | 76 | 16 | 54 | 0 | 11 | 1 | 0 | T | 0 | 29.12 | 21 | 1.1 | 12.2 | 26 | NW | 322 | 44 | 8 | 6 | 20 |
| 21 | 72 | 51 | 62 | 1 | 28 | 3 | 0 | | 0 | .01 | 0 | 29.50 | 06 | 9.8 | 10.5 | 35 | NE | 261 | 38 | 6 | 7 | 21 |
| 22 | 73 | 47 | 60 | -1 | 46 | 5 | 0 | | 0 | .02 | 0 | 29.58 | 16 | 1.8 | 5.3 | 13 | NW | 343 | 47 | 7 | 6 | 22 |
| 23 | 72 | 45 | 59 | -2 | 40 | 6 | 0 | 3 8 | 0 | .14 | 0 | 29.57 | 15 | 3.8 | 8.5 | 20 | E | 106 | 14 | 8 | 7 | 23 |
| 24 | 80 | 55 | 68 | 8 | 60 | 0 | 3 | 2 | 0 | .05 | 0 | 29.35 | 17 | 4.6 | 8.1 | 16 | E | 0 | 0 | 8 | 9 | 24 |
| 25 | 81 | 68 | 75 | 13 | 67 | 0 | 10 | 1 | 0 | T | 0 | 29.20 | 18 | 10.7 | 13.4 | 18 | S | 90 | 12 | 8 | 9 | 25 |
| 26 | 83 | 60 | 72 | 10 | 59 | 0 | 7 | 1 | 0 | T | 0 | 29.15 | 20 | 5.1 | 14.7 | 28 | NW | 176 | 17 | 8 | 7 | 26 |
| 27 | 72 | 45 | 59 | -4 | 35 | 6 | 0 | | 0 | 0 | 0 | 29.40 | 05 | 7.0 | 9.4 | 19 | NE | 519 | 45 | 6 | 6 | 27 |
| 28 | 73 | 51 | 62 | 1 | 55 | 3 | 0 | | 0 | T | 0 | 29.14 | 17 | 6.3 | 6.8 | 14 | S | 0 | 0 | 10 | 10 | 28 |
| 29 | 89 | 67 | 78* | 15 | 54 | 0 | 13 | 1 | 0 | T | 0 | 29.04 | 34 | 3.5 | 11.5 | 23 | W | 458 | 75 | 2 | 4 | 29 |
| 30 | 70 | 47 | 59 | -5 | 43 | 6 | 0 | 3 | 0 | .40 | 0 | 29.30 | 36 | 14.4 | 15.7 | 34 | N | 201 | 26 | 9 | 8 | 30 |
| 31 | 72 | 42 | 57 | -7 | 35 | 8 | 0 | | 0 | 0 | 0 | 29.47 | 29 | 4.4 | 8.1 | 11 | W | 747 | 100 | 3 | 1 | 31 |
| | SUM | SUM | | | | TOTAL | TOTAL | | | TOTAL | TOTAL | FOR THE MONTH: | | | | | | TOTAL | % | SUM | SUM | |
| | 2243 | 1601 | | | | 173 | 85 | NUMBER OF DAYS | | 2.11 | 0 | 29.33 | 15 | 1.6 | 11.4 | 34 | N | 6904 | FOR MONTH | 235 | 226 | |
| | AVG. | AVG. | AVG. | DEP. | AVG. | DEP. | DEP. | PRECIPITATION | | DEP. | | | | | | DATE: 30 | | POSSIBLE | | AVG. | AVG. | |
| | 72.4 | 51.6 | 62.0 | 2.5 | 49 | -50 | 33 | ≥ .01 INCH 12 | | 0.22 | | | | | | | | 22309 | 31 | 7.6 | 7.3 | |

| NUMBER OF DAYS | | | | SEASON TO DATE | | |
|---|---|---|---|---|---|---|
| MAXIMUM TEMP. | | MINIMUM TEMP. | | TOTAL | TOTAL | SNOW, ICE PELLETS ≥ 1.0 INCH 0 |
| ≥ 90° | ≤ 32° | ≤ 32° | ≤ 0° | 1443 | 142 | THUNDERSTORMS 7 |
| | | | | DEP. | DEP. | HEAVY FOG 1 |
| 1 | 0 | 0 | 0 | -250 | 66 | CLEAR 3 PARTLY CLOUDY 8 CLOUDY 20 |

| GREATEST IN 24 HOURS AND DATES | | | GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE |
|---|---|---|---|
| PRECIPITATION | | SNOW, ICE PELLETS | |
| .81 | 4- 5 | 0 | 0 |

- * EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
- T TRACE AMOUNT.
- \+ ALSO ON AN EARLIER DATE, OR DATES.
- HEAVY FOG: VISIBILITY 1/4 MILE OR LESS.
- FIGURES FOR WIND DIRECTIONS ARE TENS OF DEGREES CLOCKWISE FROM TRUE NORTH. 00 - CALM.
- DATA IN COLS. 6 AND 12-15 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
- FASTEST MILE WIND SPEEDS ARE FASTEST OBSERVED ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN TENS OF DEGREES. THE / WITH THE DIRECTION INDICATES PEAK GUST SPEED.
- ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

### SUMMARY BY HOURS

| Hour local time | Averages: Sky cover tenths | Station pressure in. | Temperature °F Air | Wet bulb | Dew pt. | Relative humidity % | Wind speed m.p.h. | Resultant wind Direction | Speed m.p.h. |
|---|---|---|---|---|---|---|---|---|---|
| 00 | 7 | 29.34 | 58 | 54 | 50 | 76 | 10.8 | 10 | 2.3 |
| 03 | 7 | 29.32 | 56 | 53 | 50 | 82 | 10.2 | 06 | .6 |
| 06 | 8 | 29.33 | 55 | 52 | 49 | 87 | 9.7 | 07 | 1.5 |
| 09 | 8 | 29.38 | 58 | 54 | 48 | 76 | 11.1 | 08 | .8 |
| 12 | 8 | 29.36 | 65 | 56 | 49 | 60 | 13.8 | 17 | 2.4 |
| 15 | 7 | 29.28 | 70 | 58 | 47 | 50 | 13.8 | 18 | 2.3 |
| 18 | 7 | 29.28 | 66 | 57 | 47 | 52 | 12.2 | 14 | 2.4 |
| 21 | 8 | 29.32 | 61 | 54 | 48 | 68 | 9.6 | 13 | 2.9 |

### HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

| Date | A.M. hour ending at 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | P.M. hour ending at 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| 4 | | | | | | | | | | | | | | | | | | | | | | | .45 | | 4 |
| 5 | .20 | .07 | T | T | | | | | | | T | T | | | | | | T | T | .01 | T | | T | T | 5 |
| 6 | | | | | T | T | T | T | T | T | T | T | .06 | T | .01 | T | T | .02 | .02 | .03 | .01 | .01 | .01 | T | 6 |
| 7 | T | .01 | T | | T | T | T | .02 | .01 | .04 | .02 | .02 | T | T | T | .01 | .02 | .03 | T | .02 | T | T | .01 | T | 7 |
| 8 | T | .03 | T | .01 | T | .04 | .01 | .01 | .05 | .02 | T | | | | | | | | | | | | | | 8 |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | 9 |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | 10 |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | 11 |
| 12 | | | T | T | | .03 | .01 | | | | | | | | | | | | | | | | | | 12 |
| 13 | | | | | | | | | | | .02 | T | | T | .06 | .03 | .02 | | T | T | T | T | | | 13 |
| 14 | | | | | | | | | | | | | | | | | | | | | | | | | 14 |
| 15 | | | | | T | T | | | | | | | | | | | | | | | | | | | 15 |
| 16 | | | | | | | | | | | | | | | | | | | | | | | | | 16 |
| 17 | | | | | | | | | | | | | | | | | | | | | | | | | 17 |
| 18 | | | | | | | | | | | | | | | | | | | | | | | | | 18 |
| 19 | | | | | | | T | T | T | T | | | | | | | | | | | | | | T | 19 |
| 20 | T | T | | | | | | | T | T | | | | | | | | | | | | | | | 20 |
| 21 | | | | | | | | | | | | | | | | | | | T | .01 | T | T | T | T | 21 |
| 22 | .02 | | | | | | | | | | | | | | | | | | | | | | | | 22 |
| 23 | | | | | | | | | | | | | | T | | | T | .09 | .01 | | T | T | .03 | .01 | 23 |
| 24 | T | T | T | T | T | T | .01 | .03 | .01 | T | T | T | | | | | | T | | T | | | | | 24 |
| 25 | T | T | T | T | | T | T | T | | | | | | | | | | | | | | | | | 25 |
| 26 | | | | | | | T | T | | | T | T | T | | | | | | | | | | | | 26 |
| 27 | | | | | | | | | | | | | | | | | | | | | | | | | 27 |
| 28 | | | | | | | | | | | T | | | | | | | | | | | | | T | 28 |
| 29 | T | T | T | | | | | | | | | | | | | | | | | | | | | | 29 |
| 30 | | | .28 | .04 | T | | T | .07 | T | | | | | | T | T | | | | | | | | | 30 |
| 31 | | | | | | | | | | | | | | | | | | | | | | | | | 31 |

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Thomas D. Potter
DIRECTOR, NATIONAL CLIMATIC CENTER

USCOMM--NOAA--ASHEVILLE [illegible] 300

APRIL 1976
AUSTIN, TEXAS
NATIONAL WEATHER SERVICE OFC
MUNICIPAL AIRPORT

# Local Climatological Data

MONTHLY SUMMARY

APRIL 1976 AUSTIN, TEXAS

LATITUDE 30° 18' N LONGITUDE 97° 42' W ELEVATION (GROUND) 597 FT. STANDARD TIME USED: CENTRAL WBAN #13958

| DATE | TEMPERATURE °F MAXIMUM | MINIMUM | AVERAGE | DEPARTURE FROM NORMAL | AVERAGE DEW POINT | DEGREE DAYS BASE 65° HEATING (SEASON BEGINS WITH JUL.) | COOLING (SEASON BEGINS WITH JAN.) | WEATHER TYPES ON DATES OF OCCURRENCE (1 FOG, 2 HEAVY FOG, 3 THUNDERSTORM, 4 ICE PELLETS, 5 HAIL, 6 GLAZE, 7 DUSTSTORM, 8 SMOKE, HAZE, 9 BLOWING SNOW) | SNOW, ICE PELLETS OR ICE ON GROUND AT 06AM IN. | PRECIPITATION WATER EQUIVALENT IN. | SNOW, ICE PELLETS IN. | AVG. STATION PRESSURE IN. ELEV. 621 FEET M.S.L. | WIND RESULTANT DIR. | RESULTANT SPEED M.P.H. | AVERAGE SPEED M.P.H. | FASTEST MILE SPEED M.P.H. | FASTEST MILE DIRECTION | SUNSHINE MINUTES | PERCENT OF POSSIBLE | SKY COVER TENTHS SUNRISE TO SUNSET | MIDNIGHT TO MIDNIGHT | DATE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7A | 7B | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 1 | 80 | 45* | 63 | -1 | 37 | 2 | 0 | | 0 | 0 | 0 | 29.47 | 31 | 5.5 | 6.3 | 13 | S | 750 | 100 | 0 | 0 | 1 |
| 2 | 77 | 40 | 63 | -3 | 40 | 2 | 0 | | 0 | 0 | 0 | 29.45 | 17 | 8.2 | 9.6 | 17 | SE | 620 | 70 | 8 | 6 | 2 |
| 3 | 77 | 57 | 67 | 2 | 60 | 0 | 2 | | 0 | T | 0 | 29.38 | 17 | 5.4 | 6.3 | 14 | E | 177 | 17 | 9 | 9 | 3 |
| 4 | 74 | 61 | 68 | 3 | 62 | 0 | 3 | 1 | 0 | .47 | 0 | 29.33 | 11 | 4.0 | 8.2 | 20 | NE | 62 | 8 | 10 | 10 | 4 |
| 5 | 63 | 57 | 60* | -6 | 58 | 5 | 0 | 1 | 0 | 1.76 | 0 | 29.32 | 04 | 7.5 | 8.1 | 14 | N | 0 | 0 | 10 | 10 | 5 |
| 6 | 73 | 58 | 66 | 0 | 58 | 0 | 1 | 2 8 | 0 | 0 | 0 | 29.28 | 11 | 2.0 | 4.5 | 8 | E | 347 | 46 | 9 | 9 | 6 |
| 7 | 75 | 56 | 66 | 0 | 56 | 0 | 1 | 1 3 | 0 | .53 | 0 | 29.21 | 16 | 3.6 | 7.5 | 28 | N | 274 | 36 | 8 | 9 | 7 |
| 8 | 73 | 50 | 62 | -5 | 55 | 3 | 0 | | 0 | 0 | 0 | 29.31 | 03 | 5.5 | 7.0 | 12 | N | 652 | 83 | 4 | 3 | 8 |
| 9 | 76 | 58 | 67 | 0 | 54 | 0 | 2 | | 0 | 0 | 0 | 29.43 | 09 | 5.7 | 8.5 | 11 | E | 642 | 84 | 8 | 8 | 9 |
| 10 | 71 | 59 | 65 | -2 | 59 | 0 | 0 | 1 8 | 0 | T | 0 | 29.46 | 14 | 4.5 | 5.0 | 8 | SE | 21 | 3 | 10 | 10 | 10 |
| 11 | 80 | 64 | 72 | 4 | 62 | 0 | 7 | 1 8 | 0 | 0 | 0 | 29.47 | 18 | 7.8 | 8.2 | 12 | S | 396 | 52 | 8 | 9 | 11 |
| 12 | 81 | 64 | 73 | 5 | 63 | 0 | 8 | 1 8 | 0 | 0 | 0 | 29.40 | 17 | 7.1 | 7.5 | 17 | SE | 197 | 26 | 9 | 9 | 12 |
| 13 | 78 | 65 | 72 | 4 | 65 | 0 | 7 | | 0 | T | 0 | 29.37 | 17 | 9.3 | 9.0 | 17 | S | 120 | 16 | 10 | 9 | 13 |
| 14 | 79 | 68 | 74 | 6 | 68 | 0 | 9 | 1 8 | 0 | T | 0 | 29.33 | 17 | 12.3 | 12.5 | 18 | SE | 1 | 0 | 10 | 10 | 14 |
| 15 | 79 | 56 | 68 | -1 | 64 | 0 | 3 | 3 | 0 | .43 | 0 | 29.16 | 17 | 15.6 | 15.8 | 28 | SE | 43 | 6 | 10 | 10 | 15 |
| 16 | 76 | 55 | 67 | -2 | 61 | 0 | 2 | 1 3 | 0 | .17 | 0 | 29.16 | 14 | 4.7 | 7.9 | 24 | SE | 114 | 15 | 9 | 9 | 16 |
| 17 | 78 | 69 | 74 | 5 | 61 | 0 | 9 | 3 | 0 | T | 0 | 29.14 | 17 | 14.6 | 14.7 | 27 | SE | 41 | 5 | 10 | 10 | 17 |
| 18 | 70 | 53 | 62 | -8 | 60 | 3 | 0 | 1 3 | 0 | 3.56 | 0 | 29.35 | 03 | 6.8 | 10.4 | 22 | W | 0 | 0 | 10 | 10 | 18 |
| 19 | 74 | 69 | 72 | 2 | 67 | 0 | 7 | 1 | 0 | .07 | 0 | 29.25 | 17 | 11.9 | 12.1 | 16 | SE | 0 | 0 | 10 | 10 | 19 |
| 20 | 80 | 58 | 69 | -1 | 54 | 0 | 4 | 3 | 0 | .66 | 0 | 29.18 | 29 | 7.3 | 11.1 | 31 | NW | 731 | 93 | 0 | 2 | 20 |
| 21 | 78 | 51 | 65 | -5 | 53 | 0 | 0 | | 0 | 0 | 0 | 29.28 | 13 | 1.0 | 7.3 | 10 | SE | 784 | 100 | 0 | 0 | 21 |
| 22 | 83 | 63 | 73 | 3 | 64 | 0 | 8 | 1 | 0 | 0 | 0 | 29.27 | 17 | 6.5 | 8.8 | 17 | SE | 388 | 51 | 8 | 7 | 22 |
| 23 | 80 | 68 | 74 | 3 | 67 | 0 | 9 | 1 3 | 0 | .01 | 0 | 29.24 | 17 | 11.1 | 11.4 | 18 | SE | 51 | 6 | 10 | 10 | 23 |
| 24 | 86* | 68 | 77* | 6 | 66 | 0 | 12 | 1 3 8 | 0 | T | 0 | 29.21 | 18 | 7.1 | 8.4 | 19 | N | 283 | 37 | 9 | 9 | 24 |
| 25 | 83 | 53 | 68 | -3 | 47 | 0 | 3 | | 0 | 0 | 0 | 29.31 | 05 | 3.9 | 6.6 | 11 | N | 703 | 100 | 2 | 3 | 25 |
| 26 | 80 | 56 | 68 | -3 | 51 | 0 | 3 | | 0 | 0 | 0 | 29.28 | 12 | 9.6 | 10.6 | 17 | E | 643 | 81 | 6 | 5 | 26 |
| 27 | 80 | 65 | 73 | 2 | 64 | 0 | 8 | 1 | 0 | T | 0 | 29.33 | 15 | 9.7 | 9.9 | 18 | SE | 139 | 17 | 10 | 10 | 27 |
| 28 | 81 | 63 | 72 | 0 | 67 | 0 | 7 | 1 3 8 | 0 | .77 | 0 | 29.35 | 15 | 8.7 | 8.9 | 17 | NW | 85 | 11 | 10 | 10 | 28 |
| 29 | 64 | 58 | 61 | -11 | 58 | 4 | 0 | 1 3 8 | 0 | .29 | 0 | 29.36 | 02 | 12.1 | 12.7 | 25 | NE | 0 | 0 | 10 | 10 | 29 |
| 30 | 73 | 57 | 65 | -7 | 56 | 0 | 0 | 1 8 | 0 | T | 0 | 29.37 | 01 | 8.0 | 9.2 | 13 | N | 65 | 8 | 10 | 9 | 30 |
| | SUM 2304 | SUM 1773 | | | | TOTAL 19 | TOTAL 115 | | | TOTAL 8.13 | TOTAL 0 | FOR THE MONTH: 29.32 | 15 | 4.6 | 9.3 | 31 | NW | TOTAL 8276 | % FOR MONTH | SUM 235 | SUM 235 | |
| | AVG. 76.8 | AVG. 59.1 | AVG. 68.0 | DEP. -0.6 | AVG. 59 | DEP. -25 | DEP. -37 | | | DEP. 4.64 | | | | | | DATE: 20 | | POSSIBLE 23242 | 36 | AVG. 7.8 | AVG. 7.8 | |

| NUMBER OF DAYS | | | | SEASON TO DATE | |
|---|---|---|---|---|---|
| MAXIMUM TEMP. | | MINIMUM TEMP. | | TOTAL | TOTAL |
| ≥ 90° [1] | ≤ 32° [2] | ≤ 32° [3] | ≤ 0° [4] | 1462 | 257 |
| 0 | 0 | 0 | 0 | DEP. -275 | DEP. 26 |

NUMBER OF DAYS: PRECIPITATION ≥ .01 INCH 11; SNOW, ICE PELLETS ≥ 1.0 INCH 0; THUNDERSTORMS 10; HEAVY FOG 1; CLEAR 4 PARTLY CLOUDY 3 CLOUDY 23

GREATEST IN 24 HOURS AND DATES: PRECIPITATION 3.57 18-19; SNOW, ICE PELLETS 0

GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE: 0

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
T TRACE AMOUNT.
+ ALSO ON AN EARLIER DATE, OR DATES.
HEAVY FOG: VISIBILITY 1/4 MILE OR LESS.
FIGURES FOR WIND DIRECTIONS ARE TENS OF DEGREES CLOCKWISE FROM TRUE NORTH. 00 = CALM.
DATA IN COLS 8 AND 12-15 ARE BASED ON 8 OR MORE OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
FASTEST MILE WIND SPEEDS ARE FASTEST OBSERVED ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN TENS OF DEGREES. THE / WITH THE DIRECTION INDICATES PEAK GUST SPEED.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

## SUMMARY BY HOURS

| HOUR (LST) | AVERAGES SKY COVER TENTHS | STATION PRESSURE IN. | TEMPERATURE AIR °F | WET BULB °F | DEW PT. °F | RELATIVE HUMIDITY % | WIND SPEED M.P.H. | RESULTANT WIND DIRECTION | SPEED M.P.H. |
|---|---|---|---|---|---|---|---|---|---|
| 00 | 8 | 29.33 | 64 | 61 | 58 | 83 | 8.6 | 16 | 4.0 |
| 03 | 8 | 29.31 | 62 | 60 | 58 | 88 | 8.0 | 15 | 2.9 |
| 06 | 7 | 29.32 | 61 | 59 | 58 | 91 | 6.9 | 12 | 1.5 |
| 09 | 8 | 29.36 | 65 | 62 | 59 | 81 | 9.6 | 16 | 3.9 |
| 12 | 8 | 29.35 | 72 | 64 | 59 | 68 | 10.3 | 16 | 5.6 |
| 15 | 8 | 29.29 | 75 | 66 | 60 | 63 | 11.6 | 15 | 6.5 |
| 18 | 8 | 29.28 | 73 | 65 | 60 | 67 | 10.4 | 14 | 6.9 |
| 21 | 8 | 29.31 | 68 | 63 | 60 | 77 | 9.0 | 15 | 5.6 |

## HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

| DATE | A.M. HOUR ENDING AT 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | P.M. HOUR ENDING AT 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | DATE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| 3 | | | T | | | T | T | | | | | | | | | | | | | | | | | | 3 |
| 4 | | | | | | | T | T | | | | | | | | | | .13 | .01 | .03 | .04 | .09 | .17 | .06 | 4 |
| 5 | .03 | .02 | .22 | .25 | .11 | .06 | .07 | .03 | .01 | .09 | .12 | .20 | .04 | .01 | T | T | T | T | T | | | | | | 5 |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | 6 |
| 7 | | | | | | .03 | T | .04 | .01 | .01 | | | | | | T | T | T | .02 | .25 | .17 | | | | 7 |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | 9 |
| 10 | | | | | | | T | | | | | | T | T | | | T | | | | | | | | 10 |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | 11 |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | 12 |
| 13 | | | | | | | | | | | | | T | T | T | | | | | | | | | | 13 |
| 14 | | | T | T | T | | | T | T | T | | | | | | | | | | | | | | | 14 |
| 15 | | | | | | | | | | | | | | | | | | | | | | .13 | .24 | .04 | 15 |
| 16 | .03 | .02 | .03 | .01 | | | | | T | .03 | .01 | .01 | T | T | | | | | | | | T | T | | 16 |
| 17 | | | | | | | | | | T | T | T | | | | | | | | | | | T | | 17 |
| 18 | .01 | .60 | .68 | .50 | .56 | .66 | .64 | .03 | T | .01 | .01 | T | .01 | .05 | .07 | .02 | .01 | .04 | .07 | T | T | T | | T | 18 |
| 19 | .07 | T | T | T | T | .01 | T | T | T | | | | T | T | | | | | T | T | | | | | 19 |
| 20 | | .50 | .05 | .11 | | | | | | | | | | | | | | | | | | | | | 20 |
| 21 | | | | | | | | | | | | | | | | | | | | | | | | | 21 |
| 22 | | | | | | | | | | | | | | | | | | | | | | | | | 22 |
| 23 | | | | | .01 | T | T | | | | | | | | | | | | | | | | | | 23 |
| 24 | | T | T | T | T | T | T | | | | | | | | | | | T | T | | | | | | 24 |
| 25 | | | | | | | | | | | | | | | | | | | | | | | | | 25 |
| 26 | | | | | | | | | | | | | | | | | | | | | | | | | 26 |
| 27 | | | | | | | T | T | T | T | | | | | | | | | | | | | | | 27 |
| 28 | | | | | | | | | | | | T | T | | T | T | .02 | .02 | | | | | | .73 | 28 |
| 29 | .15 | .14 | T | T | T | T | | | T | T | T | | | | | | | | | | | T | T | T | 29 |
| 30 | T | T | T | | | | T | T | T | | | | | | | | | | T | | | | | | 30 |

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Thomas D. Potter
DIRECTOR, NATIONAL CLIMATIC CENTER

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / ENVIRONMENTAL DATA SERVICE

MAY 1976
AUSTIN, TEXAS
NATIONAL WEATHER SERVICE OFC
MUNICIPAL AIRPORT

# Local Climatological Data

MONTHLY SUMMARY

MAY 1976 AUSTIN, TEXAS

SUMMARY BY HOURS

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

**noaa** NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / ENVIRONMENTAL DATA SERVICE

Thomas D. Potter
DIRECTOR, NATIONAL CLIMATIC CENTER

JUNE 1976
AUSTIN, TEXAS
NATIONAL WEATHER SERVICE OFC
MUNICIPAL AIRPORT

# Local Climatological Data

## MONTHLY SUMMARY

JUNE 1976 AUSTIN, TEXAS

LATITUDE 30° 18' N LONGITUDE 97° 42' W ELEVATION (GROUND) 597 FT. STANDARD TIME USED: CENTRAL WBAN #13958

| Date | Temperature °F: Maximum | Minimum | Average | Departure from normal | Average dew point | Degree days base 65°: Heating (season begins with July) | Cooling (season begins with Jan.) | Weather types on dates of occurrence (1 Fog, 2 Heavy fog, 3 Thunderstorm, 4 Ice pellets, 5 Hail, 6 Glaze, 7 Duststorm, 8 Smoke, haze, 9 Blowing snow) | Snow, ice pellets or ice on ground at 06AM in. | Precipitation: Water equivalent in. | Snow, ice pellets in. | Avg. station pressure in. elev. 621 feet m.s.l. | Wind: Resultant dir. | Resultant speed m.p.h. | Average speed m.p.h. | Fastest mile: Speed m.p.h. | Direction | Sunshine: Minutes | Percent of possible | Sky cover tenths: Sunrise to sunset | Midnight to midnight | Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7A | 7B | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 1 | 82 | 66 | 74* | -5 | 67 | 0 | 9 | 3 | 0 | .23 | 0 | 29.21 | 21 | 3.3 | 7.6 | 17 | E | 283 | 34 | 7 | 1 | 1 |
| 2 | 87 | 66 | 77 | -2 | 66 | 0 | 12 | 3 | 0 | .17 | 0 | 29.27 | 33 | 1.8 | 6.3 | 12 | W | 650 | 77 | 4 | 3 | 2 |
| 3 | 87 | 66 | 77 | -2 | 63 | 0 | 12 | | 0 | 0 | 0 | 29.28 | 04 | 2.1 | 5.6 | 17 | NE | 712 | 85 | 4 | 3 | 3 |
| 4 | 87 | 67 | 77 | -3 | 65 | 0 | 12 | 8 | 0 | 0 | 0 | 29.32 | 11 | 3.8 | 4.0 | 13 | E | 549 | 65 | 5 | 6 | 4 |
| 5 | 88 | 68 | 78 | -2 | 64 | 0 | 13 | 1 8 | 0 | 0 | 0 | 29.37 | 08 | 3.0 | 4.2 | 11 | E | 796 | 95 | 2 | 1 | 5 |
| 6 | 88 | 67 | 78 | -2 | 64 | 0 | 13 | 8 | 0 | .04 | 0 | 29.38 | 06 | 6.3 | 7.6 | 18 | N | 558 | 66 | 3 | 3 | 6 |
| 7 | 83 | 68 | 76 | -4 | 66 | 0 | 11 | | 0 | 0 | 0 | 29.38 | 07 | 6.6 | 8.1 | 14 | E | 442 | 52 | 5 | 5 | 7 |
| 8 | 86 | 68 | 77 | -3 | 66 | 0 | 12 | 1 | 0 | 0 | 0 | 29.37 | 10 | 4.5 | 5.2 | 11 | E | 477 | 57 | 6 | 4 | 8 |
| 9 | 87 | 67 | 77 | -4 | 64 | 0 | 12 | 8 | 0 | 0 | 0 | 29.37 | 16 | 4.5 | 4.8 | 12 | E | 733 | 87 | 2 | 1 | 9 |
| 10 | 87 | 65 | 76 | -5 | 63 | 0 | 11 | 1 8 | 0 | 0 | 0 | 29.31 | 18 | 7.4 | 7.9 | 12 | S | 840 | 100 | 0 | 0 | 10 |
| 11 | 91 | 70 | 81 | 0 | 68 | 0 | 16 | 1 | 0 | 0 | 0 | 29.21 | 17 | 10.3 | 10.6 | 16 | SE | 497 | 59 | 5 | 6 | 11 |
| 12 | 91 | 74 | 83 | 2 | 70 | 0 | 18 | | 0 | 0 | 0 | 29.22 | 17 | 12.4 | 12.5 | 18 | S | 570 | 67 | 6 | 8 | 12 |
| 13 | 89 | 72 | 81 | 0 | 67 | 0 | 16 | | 0 | 0 | 0 | 29.27 | 18 | 10.2 | 10.5 | 17 | S | 389 | 46 | 6 | 5 | 13 |
| 14 | 89 | 70 | 80 | -2 | 67 | 0 | 15 | 1 | 0 | 0 | 0 | 29.24 | 18 | 10.0 | 10.4 | 21 | S | 605 | 72 | 4 | 4 | 14 |
| 15 | 92 | 73 | 83 | 3 | 72 | 0 | 18 | | 0 | T | 0 | 29.21 | 18 | 8.2 | 8.6 | 16 | SE | 383 | 45 | 7 | 8 | 15 |
| 16 | 93 | 74 | 83 | 1 | 69 | 0 | 18 | | 0 | 0 | 0 | 29.21 | 04 | 3.3 | 7.8 | 14 | N | 661 | 78 | 6 | 6 | 16 |
| 17 | 93 | 76 | 85 | 3 | 73 | 0 | 20 | | 0 | 0 | 0 | 29.20 | 18 | 10.0 | 10.4 | 17 | S | 480 | 57 | 5 | 7 | 17 |
| 18 | 93 | 76 | 85 | 3 | 72 | 0 | 20 | | 0 | 0 | 0 | 29.22 | 18 | 10.7 | 11.2 | 17 | S | 487 | 58 | 6 | 6 | 18 |
| 19 | 89 | 73 | 81 | -1 | 70 | 0 | 16 | | 0 | .03 | 0 | 29.34 | 04 | 5.1 | 12.1 | 23 | S | 443 | 52 | 7 | 6 | 19 |
| 20 | 87 | 66 | 77 | -6 | 52 | 0 | 12 | | 0 | 0 | 0 | 29.40 | 06 | 7.8 | 8.1 | 17 | NE | 842 | 100 | 1 | 1 | 20 |
| 21 | 90 | 60* | 75 | -8 | 58 | 0 | 10 | | 0 | 0 | 0 | 29.30 | 16 | 5.1 | 8.5 | 13 | SE | 846 | 100 | 1 | 1 | 21 |
| 22 | 92 | 73 | 83 | 0 | 69 | 0 | 18 | 1 | 0 | T | 0 | 29.25 | 18 | 10.4 | 11.1 | 19 | S | 391 | 46 | 6 | 6 | 22 |
| 23 | 93 | 75 | 84 | 1 | 70 | 0 | 19 | | 0 | 0 | 0 | 29.20 | 18 | 15.0 | 15.1 | 25 | S | 507 | 60 | 6 | 5 | 23 |
| 24 | 94* | 75 | 85* | 2 | 71 | 0 | 20 | | 0 | T | 0 | 29.19 | 18 | 11.7 | 11.8 | 23 | S | 576 | 68 | 4 | 5 | 24 |
| 25 | 86 | 67 | 77 | -6 | 68 | 0 | 12 | 1 | 0 | .92 | 0 | 29.26 | 07 | 4.8 | 8.6 | 20 | N | 524 | 62 | 6 | 6 | 25 |
| 26 | 90 | 74 | 82 | -1 | 72 | 0 | 17 | 3 | 0 | 1.80 | 0 | 29.33 | 17 | 4.8 | 6.6 | 18 | E | 318 | 38 | 8 | 8 | 26 |
| 27 | 90 | 72 | 81 | -2 | 71 | 0 | 16 | | 0 | 0 | 0 | 29.46 | 15 | 4.8 | 5.9 | 11 | S | 683 | 81 | 4 | 5 | 27 |
| 28 | 91 | 74 | 83 | 0 | 70 | 0 | 18 | | 0 | 0 | 0 | 29.43 | 18 | 4.9 | 5.9 | 9 | SE | 674 | 80 | 6 | 5 | 28 |
| 29 | 92 | 72 | 82 | -1 | 69 | 0 | 17 | | 0 | 0 | 0 | 29.34 | 21 | 6.4 | 7.5 | 11 | S | 826 | 98 | 3 | 2 | 29 |
| 30 | 93 | 73 | 83 | -1 | 68 | 0 | 18 | | 0 | 0 | 0 | 29.32 | 20 | 7.3 | 7.9 | 17 | S | 780 | 93 | 1 | 0 | 30 |
| | Sum 2676 | Sum 2107 | | | | Total 0 | Total 451 | Number of days | | Total 3.19 | Total 0 | For the month: 29.29 | 16 | 4.8 | 6.4 | 25 | S | Total 17533 | | Sum 138 | Sum 133 | |
| | Avg. 89.2 | Avg. 70.2 | Avg. 78.8 | Dep. -1.8 | Avg. 67 | Dep. 0 | Dep. -47 | Precipitation ≥ .01 inch 6 | | Dep. 0.06 | | | | | | Date: 23 | | Possible 25326 | % for month 69 | Avg. 4.5 | Avg. 4.4 | |

| Number of days: Maximum temp. ≥ 90° | Maximum temp. ≤ 32° | Minimum temp. ≤ 32° | Minimum temp. ≤ 0° | Season to date: Heating total | Cooling total | Snow, ice pellets ≥ 1.0 inch | Thunderstorms | Heavy fog | Greatest in 24 hours and dates: Precipitation | Date | Snow, ice pellets | Greatest depth on ground of snow, ice pellets or ice and date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 0 | 0 | 0 | 1465 | 1494 | 0 | 3 | 0 | 1.80 | 26 | 0 | 0 |
| | | | | Dep. -272 | Dep. -148 | | | | | | | |

Clear 8 Partly cloudy 21 Cloudy 1

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE
T TRACE AMOUNT
+ ALSO ON AN EARLIER DATE, OR DATES.
HEAVY FOG: - VISIBILITY 1/4 MILE OR LESS.
FIGURES FOR WIND DIRECTIONS ARE TENS OF DEGREES CLOCKWISE FROM TRUE NORTH. 00 - CALM
DATA IN COLS. 6 AND 12-15 ARE BASED ON 8 OR MORE OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
FASTEST MILE WIND SPEEDS ARE FASTEST OBSERVED ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN TENS OF DEGREES. THE / WITH THE DIRECTION INDICATES PEAK GUST SPEED.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

## SUMMARY BY HOURS

| Hour local time | Averages: Sky cover (tenths) | Station pressure in. | Temperature: Air °F | Wet bulb °F | Dew pt °F | Relative humidity % | Wind speed m.p.h. | Resultant wind: Direction | Speed m.p.h. |
|---|---|---|---|---|---|---|---|---|---|
| 00 | 3 | 29.29 | 74 | 70 | 68 | 80 | 7.6 | 18 | 4.3 |
| 03 | 6 | 29.30 | 72 | 69 | 68 | 86 | 7.3 | 18 | 3.0 |
| 06 | 6 | 29.32 | 71 | 69 | 68 | 90 | 5.6 | 15 | 2.0 |
| 09 | 5 | 29.34 | 78 | 71 | 68 | 73 | 9.7 | 19 | 4.8 |
| 12 | 5 | 29.32 | 84 | 72 | 67 | 57 | 9.9 | 17 | 6.5 |
| 15 | 5 | 29.27 | 87 | 73 | 66 | 50 | 10.0 | 15 | 7.1 |
| 18 | 3 | 29.24 | 86 | 72 | 65 | 51 | 9.5 | 15 | 6.7 |
| 21 | 2 | 29.27 | 78 | 71 | 67 | 70 | 7.6 | 14 | 5.5 |

## HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

| Date | A.M. hour ending at 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | P.M. hour ending at 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | T | .03 | | .22 | T | | | | | | | | | | | | 1 |
| 2 | | | | | | | | | | | | .01 | .16 | | | | | | | | | | | | 2 |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | 4 |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | 5 |
| 6 | | | | | | | | | | | | | | | | | | | .03 | .01 | | | | | 6 |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | 7 |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | 9 |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | 10 |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | 11 |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | 12 |
| 13 | | | | | | | | | | | | | | | | | | | | | | | | | 13 |
| 14 | | | | | | | | | | | | | | | | | | | | | | | | | 14 |
| 15 | | | | | | | T | T | | | | | | | | | | | | | | | | | 15 |
| 16 | | | | | | | | | | | | | | | | | | | | | | | | | 16 |
| 17 | | | | | | | | | | | | | | | | | | | | | | | | | 17 |
| 18 | | | | | | | | | | | | | | | | | | | | | | | | | 18 |
| 19 | | | | | | | | | | .03 | T | | | | | | | | | | | | | | 19 |
| 20 | | | | | | | | | | | | | | | | | | | | | | | | | 20 |
| 21 | | | | | | | | | | | | | | | | | | | | | | | | | 21 |
| 22 | | | | | T | T | | | | | | | | | | | | | | | | | | | 22 |
| 23 | | | | | | | | | | | | | | | | | | | | | | | | | 23 |
| 24 | | | T | T | T | | | | | | | | | | | | | | | | | | | | 24 |
| 25 | | | T | .48 | .27 | .13 | .03 | T | .01 | | | | | | | | | | | | | | | | 25 |
| 26 | | | | | | | T | | | .09 | | | | | .26 | T | .30 | 1.15 | | | | | | | 26 |
| 27 | | | | | | | | | | | | | | | | | | | | | | | | | 27 |
| 28 | | | | | | | | | | | | | | | | | | | | | | | | | 28 |
| 29 | | | | | | | | | | | | | | | | | | | | | | | | | 29 |
| 30 | | | | | | | | | | | | | | | | | | | | | | | | | 30 |

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# PRELIMINARY LOCAL CLIMATOLOGICAL DATA

[redacted] JULY 76 [redacted]

STATION [redacted] N. | LONGITUDE [redacted] ° [redacted] ' W. | GROUND ELEVATION (ft) [redacted] FT. | STANDARD TIME [redacted]

| MAXI-MUM (2) | MINI-MUM (3) | AVER-AGE (4) | DEPARTURE FROM NORMAL (5) | DEGREE DAYS HEATING (6A) | DEGREE DAYS COOLING (6B) | PRECIP. TOTAL (Water equivalent) (7) | SNOWFALL, ICE PELLETS (8) | SNOW, ICE PELLETS OR ICE ON GROUND [redacted] (9) | WIND AVERAGE SPEED (m.p.h.) (10) | FASTEST MILE SPEED (m.p.h.) (11) | FASTEST MILE DIRECTION (12) | SUNSHINE TOTAL (13) | SUNSHINE PERCENT OF POSSIBLE (14) | SKY COVER SUNRISE TO SUNSET (Tenths) (15) | WEATHER OCCURRENCES (16) | [redacted] (17) | [redacted] (18) | [redacted] (19) | (20) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 91 | 72 | 82 | -2 | 0 | 17 | 0 | 0 | 0 | 9.7 | 17 | S | 549 | 66 | 4 | | S | 24 | DO | [illegible] |
| 93 | 72 | 83 | -1 | 0 | 18 | 0 | 0 | 0 | 11.3 | 18 | S | 682 | 81 | 4 | | S | 26 | DO | [illegible] |
| 93 | 74 | 84 | 0 | 0 | 19 | T | 0 | 0 | 11.2 | 20 | SE | 549 | 65 | 7 | | S | 24 | [illegible] | [illegible] |
| 79 | 74 | 77 | -7 | 0 | 12 | 1.77 | 0 | 0 | 5.6 | 12 | S | 23 | 3 | 10 | 1 | S | 11 | [illegible] | [illegible] |
| 84 | 71 | 78 | -6 | 0 | 13 | .01 | 0 | 0 | 5.9 | 17 | S | 365 | 43 | 8 | 2 | S | 23 | [illegible] | [illegible] |
| 84 | 71 | 78 | -6 | 0 | 13 | .03 | 0 | 0 | 4.0 | 19 | NE | 242 | 29 | 9 | | NE | 29 | [illegible] | [illegible] |
| 87 | 71 | 79 | -5 | 0 | 14 | 0 | 0 | 0 | 6.6 | 20 | E | 216 | 34 | 8 | 1,8 | E | 23 | [illegible] | [illegible] |
| 79 | 71 | 75 | -9 | 0 | 10 | .06 | 0 | 0 | 5.2 | 8 | S | 3 | 0 | 10 | | S | 12 | PL | [illegible] |
| 79 | 71 | 75 | -9 | 0 | 10 | .09 | 0 | 0 | 7.2 | 15 | E | 0 | 0 | 10 | | SE | 20 | PL | DO |
| 82 | 70 | 76 | -8 | 0 | 11 | .66 | 0 | 0 | 9.2 | 18 | E | 68 | 8 | 10 | 1 | SE | 26 | PL | DO |
| 82 | 72 | 77 | -7 | 0 | 12 | .01 | 0 | 0 | 8.2 | 15 | SE | 68 | 8 | 10 | 1,8 | SE | 20 | PL | RA |
| [illegible] | 74 | [illegible] | -3 | 0 | 16 | .01 | 0 | 0 | 6.5 | 12 | S | 57 | 7 | 10 | 1,8 | S | 16 | PL | RA |
| 86 | 73 | 80 | -5 | 0 | 15 | .26 | 0 | 0 | 5.4 | 14 | S | 24 | 8 | 10 | 8 | S | 25 | [illegible] | [illegible] |
| 81 | 71 | 76 | -9 | 0 | 11 | .73 | 0 | 0 | 8.3 | 18 | E | 34 | 4 | 10 | | E | [illegible] | [illegible] | [illegible] |
| 84 | 71 | 78 | -7 | 0 | 13 | .60 | 0 | 0 | 7.4 | 26 | S | 142 | 17 | 10 | 1,3 | S | [illegible] | [illegible] | [illegible] |
| 88 | 73 | 81 | -4 | 0 | 16 | .31 | 0 | 0 | [illegible] | 20 | SE | 316 | 37 | 8 | 1,3 | SE | 24 | [illegible] | PL |
| 88 | 73 | 81 | -4 | 0 | 16 | 0 | 0 | 0 | 6.1 | 13 | S | 555 | 24 | 8 | 1 | S | 30 | [illegible] | [illegible] |
| 90 | 75 | 83 | -2 | 0 | 18 | 0 | 0 | 0 | 9.8 | 15 | SE | 657 | 79 | 5 | 1 | SE | 21 | [illegible] | [illegible] |
| 91 | 72 | 82 | -3 | 0 | 17 | 0 | 0 | 0 | 9.3 | 17 | S | 578 | 69 | 3 | | S | 23 | [illegible] | [illegible] |
| 90 | 73 | 82 | -3 | 0 | 17 | 0 | 0 | 0 | 8.6 | 15 | S | 612 | 74 | 3 | 1 | S | 21 | [illegible] | [illegible] |
| 88 | 70 | 79 | -6 | 0 | 14 | .14 | 0 | 0 | 5.6 | 33 | E | 363 | 44 | 8 | 1,3 | E | 40 | [illegible] | [illegible] |
| 90 | 72 | 81 | -4 | 0 | 16 | 0 | 0 | 0 | 6.9 | 14 | SE | 443 | 56 | 8 | 1 | SE | 18 | [illegible] | [illegible] |
| 91 | 72 | 82 | -3 | 0 | 17 | 0 | 0 | 0 | 4.8 | 15 | E | 398 | 49 | 7 | 1,3 | E | 20 | PL | [illegible] |
| 92 | 72 | 82 | -3 | 0 | 17 | .03 | 0 | 0 | 3.9 | 23 | SE | 680 | 82 | 6 | 3 | SE | 31 | PL | [illegible] |
| 92 | 74 | 83 | -2 | 0 | 18 | 0 | 0 | 0 | 5.4 | 13 | W | 572 | 69 | 3 | | W | 17 | PL | RA |
| 91 | 72 | 82 | -3 | 0 | 17 | 0 | 0 | 0 | 6.1 | 11 | SE | 752 | 91 | 1 | | SE | 18 | PL | RA |
| 92 | 71 | 82 | -3 | 0 | 17 | 0 | 0 | 0 | 7.3 | 13 | S | 690 | 84 | 3 | | S | 22 | PL | RA |
| 93 | 73 | 83 | -2 | 0 | 18 | 0 | 0 | 0 | 9.5 | 15 | S | 811 | 99 | 0 | | S | 27 | [illegible] | RA |
| 93 | 74 | 84 | -1 | 0 | 19 | 0 | 0 | 0 | 9.2 | 15 | S | 749 | 91 | 2 | | S | 21 | [illegible] | RA |
| 94 | 74 | 84 | -1 | 0 | 19 | 0 | 0 | 0 | 8.7 | 14 | S | 665 | 81 | 3 | | S | 20 | [illegible] | DO |
| 93 | 75 | 84 | -1 | 0 | 19 | 0 | 0 | 0 | 8.5 | 13 | S | 754 | 92 | 2 | | SW | 22 | [illegible] | |
| 2727 | 2243 | — | — | 0 | 479 | 4.71 | 0 | — | 229? | — | — | [illegible] | — | 200 | — | | | | |
| 88.0 | 72.4 | — | — | — | — | — | — | — | 7.4 | FASTEST MILE 33 | DIRECTION E | [redacted] | 49 | 6.5 | — | | | | |

[redacted]

## TEMPERATURE DATA

MEAN MONTHLY 80.2
DEPARTURE FROM NORMAL -4.4
HIGHEST 94 ON 30TH
LOWEST 70 ON 10TH, 21ST

NUMBER OF DAYS WITH -
MAX 32° OR BELOW 0
MAX 90° OR ABOVE 16
MIN 32° OR BELOW 0
MIN 0° OR BELOW 0

HEATING DEGREE DAYS (Base 65)
TOTAL THIS MONTH 0
DEPARTURE FROM NORMAL 0
SEASONAL TOTAL 0
DEPARTURE FROM NORMAL 0

COOLING DEGREE DAYS (Base 65)
TOTAL THIS MONTH 479
DEPARTURE FROM NORMAL -129
SEASONAL TOTAL 1373
DEPARTURE FROM NORMAL -277

## PRECIPITATION DATA

TOTAL FOR THE MONTH 4.71 IN.
DEPARTURE FROM NORMAL +2.83 IN.
GREATEST IN 24 HRS 1.77 ON 4

SNOWFALL, ICE PELLETS
TOTAL FOR THE MONTH 0 IN.
GREATEST IN 24 HRS 0 ON —
GREATEST DEPTH ON GROUND 0 ON —

## WEATHER

NUMBER OF DAYS -
CLEAR (Scale 0-3) 9
PARTLY CLOUDY (Scale 4-7) 6
CLOUDY (Scale 8-10) 16
WITH 0.01 INCH OR MORE PRECIP. 14
WITH 0.10 INCH OR MORE PRECIP. 7
WITH 0.50 INCH OR MORE PRECIP. 4
WITH 1.00 INCH OR MORE PRECIP. 1

## SYMBOLS USED IN COLUMN 16

1 = FOG
2 = FOG WITH VISIBILITY 1/4 MILE OR LESS
3 = THUNDER
4 = ICE PELLETS
5 = HAIL
6 = GLAZE OR RIME
7 = DUSTSTORM OR SANDSTORM
8 = SMOKE OR HAZE
9 = BLOWING SNOW
T = TORNADO

## MAXIMUM PRECIPITATION

| Δt (minutes) | 5 | 10 | 15 | 20 | 30 | 45 | 60 | 80 | 100 | 120 | 150 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRECIPITATION (inches) | .22 | .26 | .24 | .37 | .46 | .62 | .65 | .67 | .72 | .86 | 1.02 | 1.18 |
| ENDED: DATE | 16 | 16 | 15 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| TIME | 0924 | 0927 | 1405 | 1032 | 1043 | 1058 | 1107 | 1117 | 1110 | 1112 | 1243 | 1312 |

BAROMETRIC PRESSURE (Climatological station elevation)
HIGHEST SEA-LEVEL 30.20 ON 24
30.27? 27

COOLEST MONTHLY MEAN TEMPERATURE SINCE (78.6) IN 1907

NATIONAL WEATHER SERVICE

WEATHER SERVICE OFFICE
AUSTIN, TEXAS

# PRELIMINARY LOCAL CLIMATOLOGICAL DATA

MONTH: AUGUST YEAR: 1976

LATITUDE: 30 ° 18 ' LONGITUDE: 97 ° 42 ' GROUND ELEVATION: 597 FT STANDARD TIME: CENTRAL

| Day | Temp. Maximum | Temp. Minimum | Temp. Average | Departure from Normal | Degree Days Heating | Degree Days Cooling | Precip. Total (Water equiv.) (in) | Snowfall, Ice Pellets | Snow, Ice Pellets or Ice on Ground at 6am | Wind Average Speed (m.p.h.) | Fastest Mile Speed (m.p.h.) | Fastest Mile Direction | Sunshine Total | Sunshine Percent of Possible | Sky Cover Sunrise to Sunset (Tenths) | Weather Occurrences | PK DIR. | WND SD (mph) | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 96 | 74 | 85 | [illegible] | 0 | 21 | 0 | 0 | 0 | 6.0 | 10 | SW | 815 | 100 | 0 | | S | 16 | | |
| 2 | 97 | 75 | 86 | +1 | 0 | [illegible] | 0 | 0 | 0 | 7.5 | 22 | E | 765 | 94 | 3 | | E | 20 | | |
| 3 | 92 | 76 | 84 | -2 | [illegible] | 19 | 0 | 0 | 0 | 8.4 | 16 | NE | 630 | 77 | 3 | 8 | NE | 22 | | |
| 4 | 92 | 70 | 81 | -5 | 0 | 16 | 0 | 0 | 0 | 6.4 | 9 | NE | 803 | 99 | 0 | 8 | E | 12 | | |
| 5 | 95 | 74 | 85 | -1 | 0 | 20 | 0 | 0 | 0 | 7.8 | 11 | S | 811 | 100 | 0 | 8 | SW | 15 | | |
| 6 | 95 | 73 | 84 | -2 | 0 | 19 | 0 | 0 | 0 | 7.2 | 14 | S | 791 | 98 | 1 | | S | 18 | | |
| 7 | 99 | 75 | 87 | +1 | 0 | 22 | 0 | 0 | 0 | 6.0 | 9 | S | 807 | 100 | 0 | | S | 14 | | |
| 8 | 100 | 75 | 88 | +2 | 0 | 23 | 0 | 0 | 0 | 6.1 | 13 | SE | 663 | 82 | 2 | | SE | 25 | | |
| 9 | 100 | 75 | 88 | +3 | 0 | 23 | 0 | 0 | 0 | 4.8 | 11 | E | 781 | 97 | 1 | | SE | 15 | | |
| 10 | [illegible] | 76 | [illegible] | +3 | 0 | 23 | 0 | 0 | 0 | 6.2 | 14 | SE | 687 | 86 | 3 | | S | 18 | | |
| 11 | 93 | 72 | 83 | -2 | 0 | 18 | 0 | 0 | 0 | 6.8 | 11 | E | 744 | 93 | 0 | 8 | SE | 15 | | |
| 12 | 94 | 70 | 82 | -3 | 0 | 17 | 0 | 0 | 0 | 6.4 | 13 | S | 709 | 89 | 1 | 1,8 | S | 12 | | |
| 13 | 96 | 74 | 85 | 0 | 0 | 20 | 0 | 0 | 0 | 8.3 | 14 | S | 748 | 94 | 2 | | SW | 22 | | |
| 14 | 96 | 74 | 85 | 0 | 0 | 20 | 0 | 0 | 0 | 9.9 | 17 | SE | 742 | 93 | 2 | | S | 23 | | |
| 15 | 96 | 74 | 85 | 0 | 0 | 20 | 0 | 0 | 0 | 8.7 | 17 | SE | 623 | 78 | 4 | | SE | 22 | | |
| 16 | 94 | 73 | 84 | -1 | 0 | 19 | 0 | 0 | 0 | 7.8 | 17 | E | 316 | 40 | 7 | | [illegible] | 22 | | |
| 17 | 91 | 73 | 82 | -3 | 0 | 17 | T | 0 | 0 | 3.2 | 15 | SE | 154 | 19 | 9 | 3 | S | 21 | | |
| 18 | 96 | 74 | 85 | 0 | 0 | 20 | 0 | 0 | 0 | 6.3 | 14 | NE | 586 | 74 | 4 | | NE | 28 | | |
| 19 | 94 | 72 | 83 | -2 | 0 | 18 | 0 | 0 | 0 | 7.0 | 20 | E | 510 | 65 | 4 | 3 | E | 26 | | |
| 20 | 92 | 72 | 82 | -3 | 0 | 17 | 0 | 0 | 0 | 5.8 | 12 | E | 640 | 82 | 3 | | E | 23 | | |
| 21 | 92 | 68 | 80 | [illegible] | 0 | 15 | 0 | 0 | 0 | 5.1 | 9 | SE | 574 | 74 | 3 | | S | 15 | | |
| 22 | 92 | 70 | 81 | [illegible] | 0 | 16 | 0 | 0 | 0 | 5.9 | 11 | E | 517 | 66 | 4 | | S | 16 | | |
| 23 | 94 | 69 | 82 | -2 | 0 | 17 | 0 | 0 | 0 | 5.0 | 12 | SE | 767 | 98 | 1 | | SE | 15 | | |
| 24 | 94 | 69 | 82 | -2 | 0 | 17 | 0 | 0 | 0 | 6.2 | 11 | S | 559 | 72 | 2 | | S | [illegible] | | |
| 25 | 93 | 70 | 82 | -2 | 0 | 17 | 0 | 0 | 0 | 6.2 | 10 | S | 714 | 92 | 3 | | S | 19 | | |
| 26 | | | | | | | | | | | | | | | | | | | | |
| 27 | | | | | | | | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | | | | | | |
| 31 | | | | | | | | | | | | | | | | | | | | |
| SUM | | | | | | | | | | | | | | | | | | | | |
| AVG | | | | | | | | | | | FASTEST | DIRECTION | POSSIBLE 24583 | | | | | | | |

[redacted]

**TEMPERATURE DATA**

AVERAGE MONTHLY
DEPARTURE FROM NORMAL
HIGHEST ON
LOWEST ON
NUMBER OF DAYS WITH -
MAX. 32° OR BELOW
MAX. 90° OR ABOVE
MIN. 32° OR BELOW
MIN. 0° OR BELOW
HEATING DEGREE DAYS (Base 65°)
TOTAL THIS MONTH
DEPARTURE FROM NORMAL
SEASONAL TOTAL
DEPARTURE FROM NORMAL
COOLING DEGREE DAYS (Base 65°)
TOTAL THIS MONTH
DEPARTURE FROM NORMAL
ANNUAL TOTAL

**PRECIPITATION DATA**

TOTAL FOR THE MONTH IN
DEPARTURE FROM NORMAL IN
GREATEST IN 24 HRS ON
SNOW, ICE PELLETS
TOTAL FOR THE MONTH IN
GREATEST IN 24 HRS ON
GREATEST DEPTH ON GROUND ON

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CLEAR (Scale 0-3)
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CLOUDY (Scale 8-10)
WITH 0.01 INCH OR MORE PRECIP
WITH 0.10 INCH OR MORE PRECIP
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X = TORNADO

| MAXIMUM PRECIPITATION | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Δt (Minutes) | 5 | 10 | 15 | 20 | 30 | 45 | 60 | 80 | 100 | 120 | 150 | 180 |
| PRECIPITATION (Inches) | | | | | | | | | | | | |
| ENDED: DATE | | | | | | | | | | | | |
| TIME | | | | | | | | | | | | |

BAROMETRIC PRESSURE (Climatological station elevation)
(Hpc) FT., M.S.L.