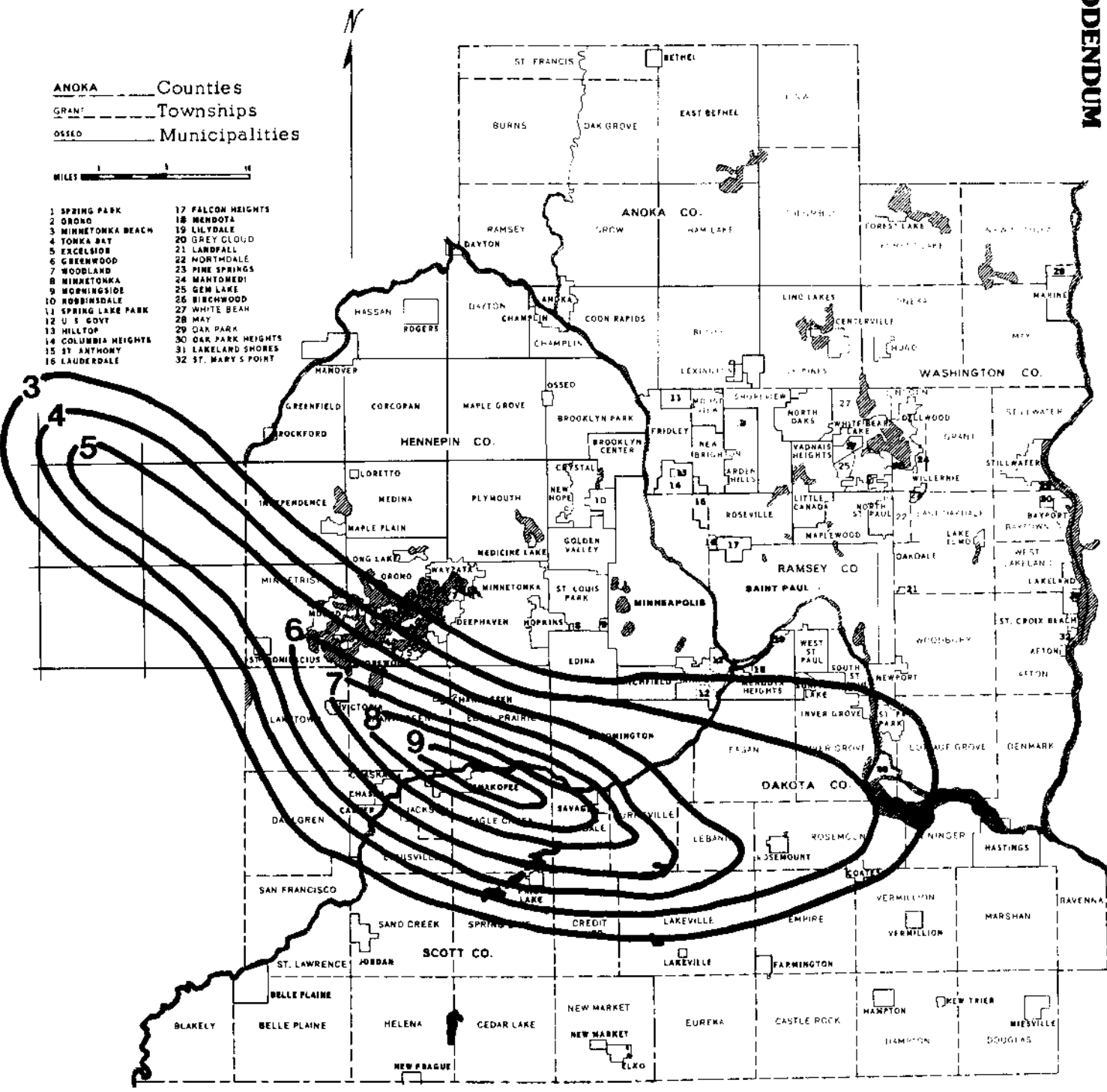


ANOKA \_\_\_\_\_ Counties  
 GRANT \_\_\_\_\_ Townships  
 OSSEO \_\_\_\_\_ Municipalities



- |                     |                     |
|---------------------|---------------------|
| 1 SPRING PARK       | 17 FALCON HEIGHTS   |
| 2 ORONO             | 18 BERDOTZ          |
| 3 MINNETONKA BEACH  | 19 LILYDALE         |
| 4 TONKA BAY         | 20 GREY CLOUD       |
| 5 EXCELSIOR         | 21 LANDFALL         |
| 6 GREENWOOD         | 22 NORTHDALE        |
| 7 WOODLAND          | 23 PINE SPRINGS     |
| 8 MINNETONKA        | 24 WATONEDI         |
| 9 MORNINGSIDE       | 25 GEM LAKE         |
| 10 ROBBINSDALE      | 26 BIRCHWOOD        |
| 11 SPRING LAKE PARK | 27 WHITE BEAN       |
| 12 U S GOVT         | 28 MAY              |
| 13 HILLTOP          | 29 OAK PARK         |
| 14 COLUMBIA HEIGHTS | 30 OAK PARK HEIGHTS |
| 15 ST ANTHONY       | 31 LAKELAND SHORES  |
| 16 LAUDERDALE       | 32 ST. MARY'S POINT |



SHAKOPEE/CANTERBURY DOWNS, MINNESOTA FLASH FLOOD -- JULY 20-21, 1987

A flash flood occurred during the evening of July 20 into the early morning hours of July 21, 1987. The path began northwest of Lake Minnetonka in Wright county extending southeast through Shakopee to about the Rosemount area. The greatest amount reported was 9.00" from a recording 'Sierra Tipping bucket' gage at the Canterbury Downs race track near Shakopee. The area covered by 6 inches or more was 140 square miles while the area of 4 inches or more was 470 square miles. Prepared by Earl L. Kuehnast.

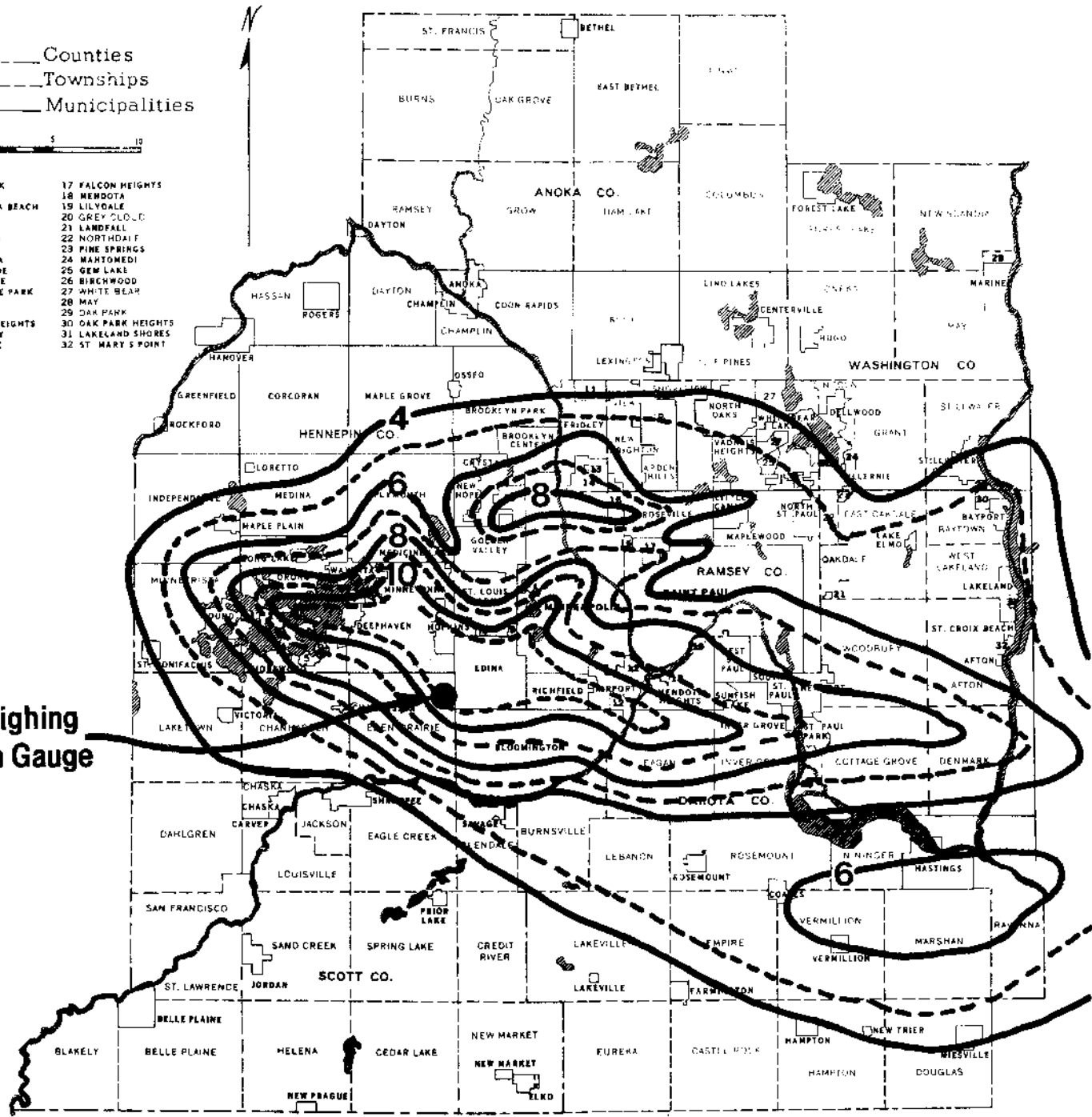
James A. Zandio  
 Minnesota Department of Natural Resources  
 State Climatology Office

ANOKA \_\_\_\_\_ Counties  
 WYMAN \_\_\_\_\_ Townships  
 OSSEO \_\_\_\_\_ Municipalities



- 1 SPRING PARK
- 2 ORONO
- 3 MINNETONKA BEACH
- 4 TONKA BAY
- 5 EXCELSIOR
- 6 GREENWOOD
- 7 WOODLAND
- 8 MINNETONKA
- 9 MORNINGSIDE
- 10 ROBBINSDALE
- 11 SPRING LAKE PARK
- 12 U. S. GOVT.
- 13 HILLTOP
- 14 COLUMBIA HEIGHTS
- 15 ST. ANTHONY
- 16 LAUDERDALE
- 17 FALCON HEIGHTS
- 18 MENDOTA
- 19 LILYDALE
- 20 GREY DOLLE
- 21 LANDFALL
- 22 NORTHDALF
- 23 PINE SPRINGS
- 24 MAHTOMEDI
- 25 GEM LAKE
- 26 BIRCHWOOD
- 27 WHITE BEAR
- 28 MAY
- 29 OAK PARK
- 30 OAK PARK HEIGHTS
- 31 LAKELAND SHORES
- 32 ST. MARY'S POINT

Weighing  
Rain Gauge



WESTERN AND SOUTH CENTRAL TWIN CITIES FLASH FLOOD - JULY 23-24, 1987

The flash flood occurred generally between 7PM 23 July to 1AM 24 July, 1987. It's path was on a line from Lake Minnetonka east-southeast through Edina, Inver Grove Heights and into Wisconsin; with rain fall amounts from 6 inches to more than 11 inches. The greatest amount was 11.32 inches documented on a standard weighing rain gage. There were some greater unofficial amounts. Some 335 rainfall reports were used to draw the isohyet map. The area covered by 10 inches or more of rainfall was 93 square miles; 6 inches or more was 574 square miles and by 4 inches or more was 1460 square miles. Much of the 6 inch and greater rainfalls occurred over residential parts of the Twin Cities. To date an estimated 7000 homes have reported water damage. At this time the known costs of damages are approximately 25 million dollars.

This storm was preceded by 72 hours by a similarly oriented storm with totals exceeding 9 inches. The earlier storm fell mostly in adjacent areas to the south and west. However, two storm totals exceeded 16 inches in some areas.

The greatest official 24-hour rainfall amounts for the Twin Cities are as follows: 10.00" on July 23-24, 1987 ranks first, 7.80" in June 1892 ranks second, and 7.36" on August 30, 1977 ranks third. Prepared by Earl L. Kuehnast.

James A. Zandlo  
 Minnesota Department of Natural Resources  
 State Climatology Office

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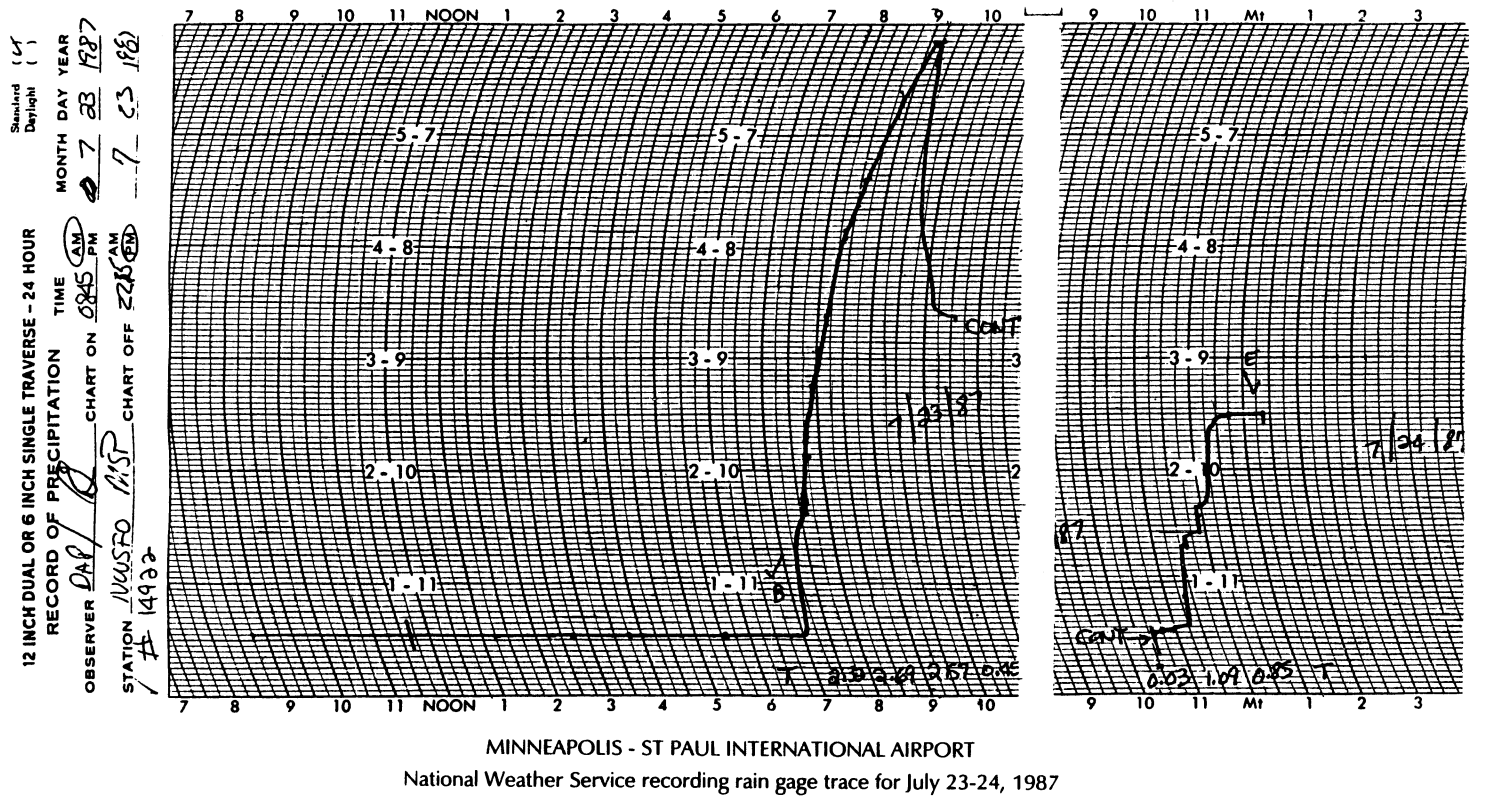
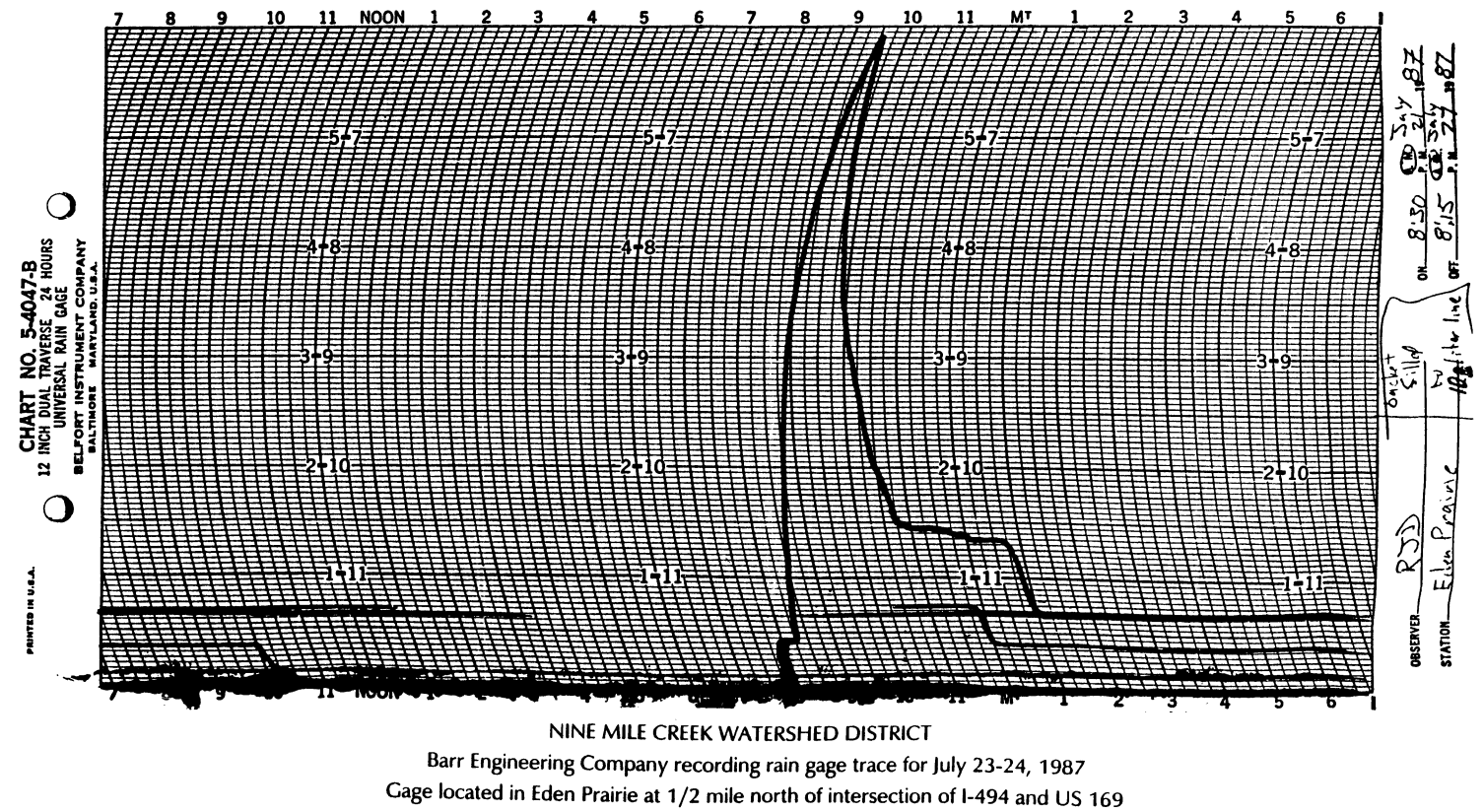
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The total amount of water that fell of the Twin Cities from the storm on the nights of the 20th and the 23rd was calculated to be three to four hundred billion gallons; enough to fill Lake Calhoun eighty times!

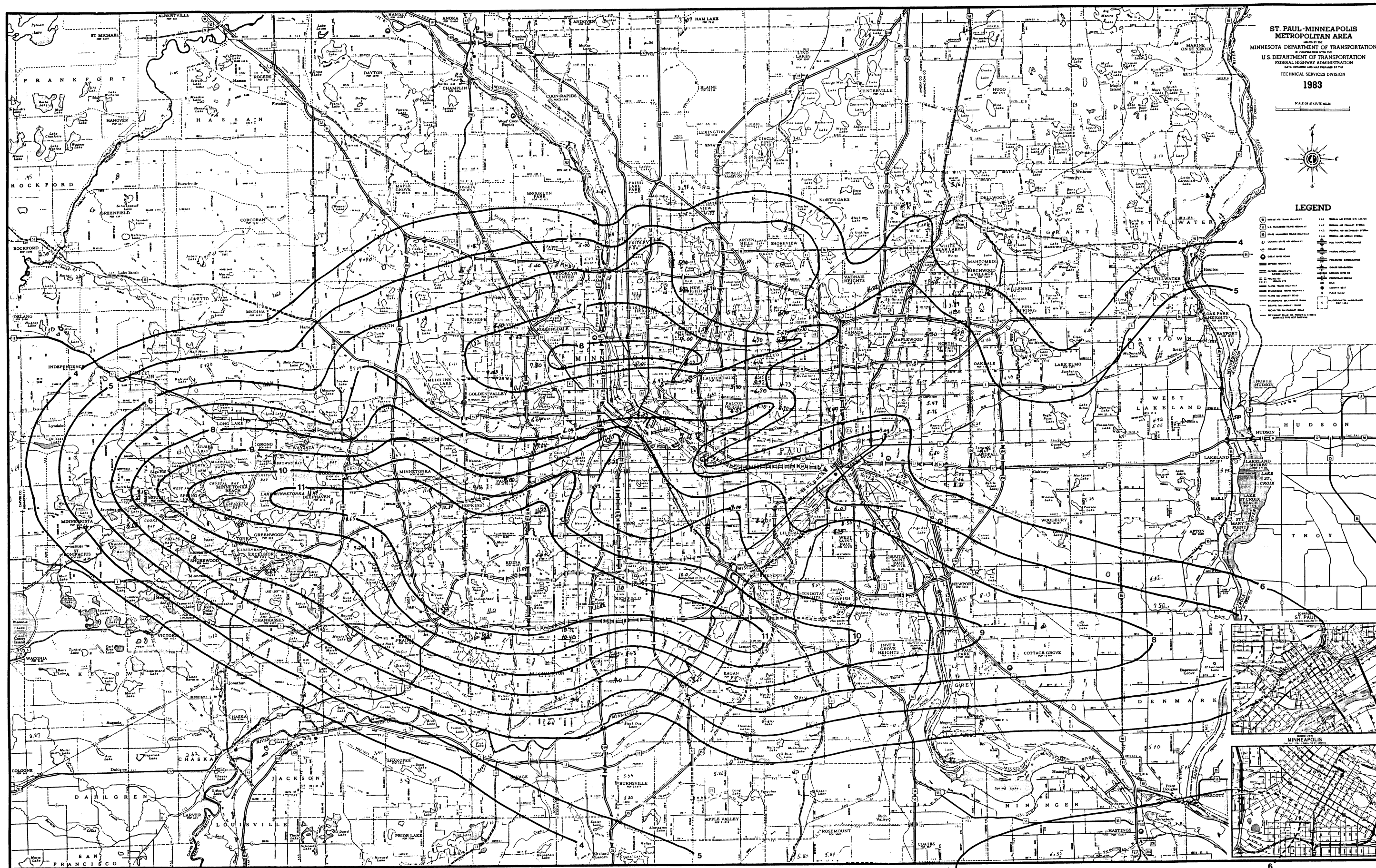
The rarity of such an event may be judged by noting that the Weather Bureau publication 'Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 hours and Return Periods from 1 to 100 Years' or 'TP 40' indicates that a 100 year 24 hour storm total is about 6 inches. By using the same techniques as used in that publication, it can be shown that a 10 inch total in 24 hours has a '1000 to 2000 year return period'. The terminology, 'return period', however, can be somewhat misleading. A '1000 year return period' might be better interpreted as 'a one-in-1000 chance per year' of the stated amount occurring (10 inches in 24 hours). That is, every year a small but not zero chance exists that a large rainfall will be caught at a given point. By looking at many other points, namely the entire State of Minnesota, such large daily totals appear relatively common; about every two or three years a 10 inch amount is caught somewhere in Minnesota. The original concept of 'one-in-1000' can be seen on a statewide basis by measuring the area of each such 10 inch event. From rough examinations of this information, it appears that a 10 inch rainfall ('a 1000 year return period' event at a point) covers about 1/1000th of the total area of the state per year. Prepared by Earl L. Kuehnast and James A. Zandlo.

James A. Zandlo  
Minnesota Department of Natural Resources  
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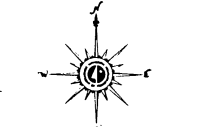
# WESTERN & SOUTH CENTRAL TWIN CITIES FLASH FLOOD

JULY 23-24, 1987



ST. PAUL-MINNEAPOLIS  
METROPOLITAN AREA  
MINNESOTA DEPARTMENT OF TRANSPORTATION  
IN COOPERATION WITH THE  
U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION  
DATA OBTAINED AND MAP PREPARED BY THE  
TECHNICAL SERVICES DIVISION  
1983

SCALE OF STATUTE MILES  
1:25,000



### LEGEND

- 1. Contour lines
- 2. Major roads
- 3. Minor roads
- 4. County roads
- 5. Interstate highways
- 6. State highways
- 7. Water bodies
- 8. Lakes
- 9. Rivers
- 10. Creeks
- 11. Swamps
- 12. Marshes
- 13. Wetlands
- 14. Forests
- 15. Parks
- 16. Cemeteries
- 17. Schools
- 18. Churches
- 19. Public buildings
- 20. Residential areas
- 21. Commercial areas
- 22. Industrial areas
- 23. Airports
- 24. Railroads
- 25. Ferry routes
- 26. Public utilities
- 27. Telephone lines
- 28. Gas lines
- 29. Sewer lines
- 30. Water lines
- 31. Electric lines
- 32. Cable lines
- 33. Other lines

