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AN EXAMINATION OF LONG-TERM PRECIPITATION TRENDS AT NEWARK, NEW JERSEY

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INTRODUCTION

Numerous media inquiries about the wet summer of 1989 led to this analysis of long-term precipitation amounts at Newark, New Jersey. The media raised several questions. Was this the wettest summer on record? Had this been the wettest year to date for the 9-month (3/4-year) period from January through September of 1989? Would the heavy rains continue for the rest of the year?

Reliable monthly and yearly precipitation records for Newark were available since the summer of 1843. There was one break in the records from 1924 to 1930. For this period, data from Elizabeth, New Jersey, 4 miles southwest of Newark, were used. This provided 147 years of precipitation observations for analysis. Although the 3/4-year segment is an unusual period for meteorological analysis, it was used to respond to the media questions, since this was the original impetus for the study. The results are now available, both for comparison with other years, and to respond to future user requests.

ANALYSIS OF RAINFALL RECORDS

A 30-year running mean was computed, beginning with the period 1844-1873, and ending with 1960-1989. Figure 1 shows a plot of the annual precipitation with the running mean (ending year used) superimposed. The 30-year running mean on an enlarged scale in Figure 2 shows that Newark experienced a decline in precipitation beginning about 1925 and ending about 1970. Newark's current annual normal rainfall, based on the 30-year period 1951-1980 is 42.34 inches. The previous World Meteorological Organization standardized 30-year annual normals were 41.45 inches for 1941-70, 42.38 inches for 1931-60, and 42.98 inches for 1921-50.

The most recent standardized normals are near the lowest portion of the 3/4-year running mean curve. The average annual precipitation for the 81-year period 1844-1924 was 47.52 inches. Figure 1 also shows the 11 wettest 3/4-year records, as indicated by an asterisk (*), and the 12 wettest full calendar years, as indicated by the "#" symbol. These records were all set during an upward trend in the 30-year running mean curve.

CONCLUSIONS

Another upward trend in the 30-year running mean precipitation amounts at Newark began in the early 1980's. If this was to continue and eventually match the previous peak of 50.28 inches set in 1915, the additional rainfall and resultant runoff could cause serious flooding. Of course, this is pure speculation. However, considerable population growth, urbanization, and blacktopping of the highways has occurred since the 1950's, along with the construction of housing along many inland river basins. Hence, heavy precipitation now has fewer places to be dispersed without causing serious problems. In addition, as the long-term running mean values

in Figure 2 indicate, the 1951-80, 30-year annual precipitation mean for Newark could be deceivingly low. This value also could be misleading if used for planning purposes without consideration of the long-term record.

Now, how about those media questions? The period in 1989 was not the wettest summer, nor the wettest 3/4-year period (January to September). It was only the 11th wettest 3/4-year period at Newark dating back to 1844. Newark received 17.67 inches of rain during the summer of 1989, far short of the 1897 total of 31.70 inches (almost double the 1989 figure). Also, as these results indicate, a very wet 3/4-year period does not guarantee the entire year will end up excessively wet (see Figure 1). Finally, for planning purposes, public officials might want to consider the possibility of a deluge in the future similar to August, 1843, when 22.48 inches of rain fell at Newark, with 15 inches occurring on August 5th alone!

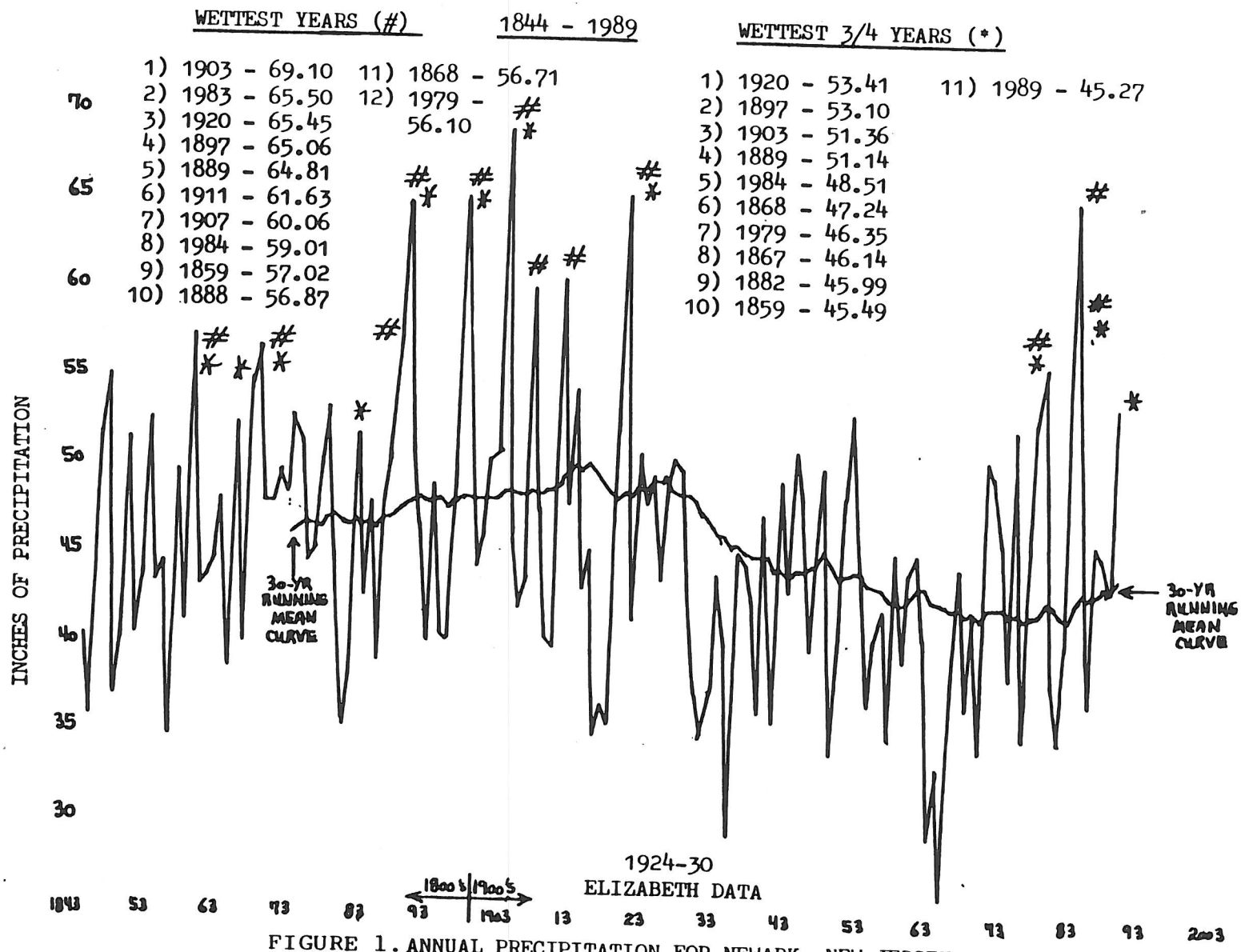

FIGURE 1. ANNUAL PRECIPITATION FOR NEWARK, NEW JERSEY

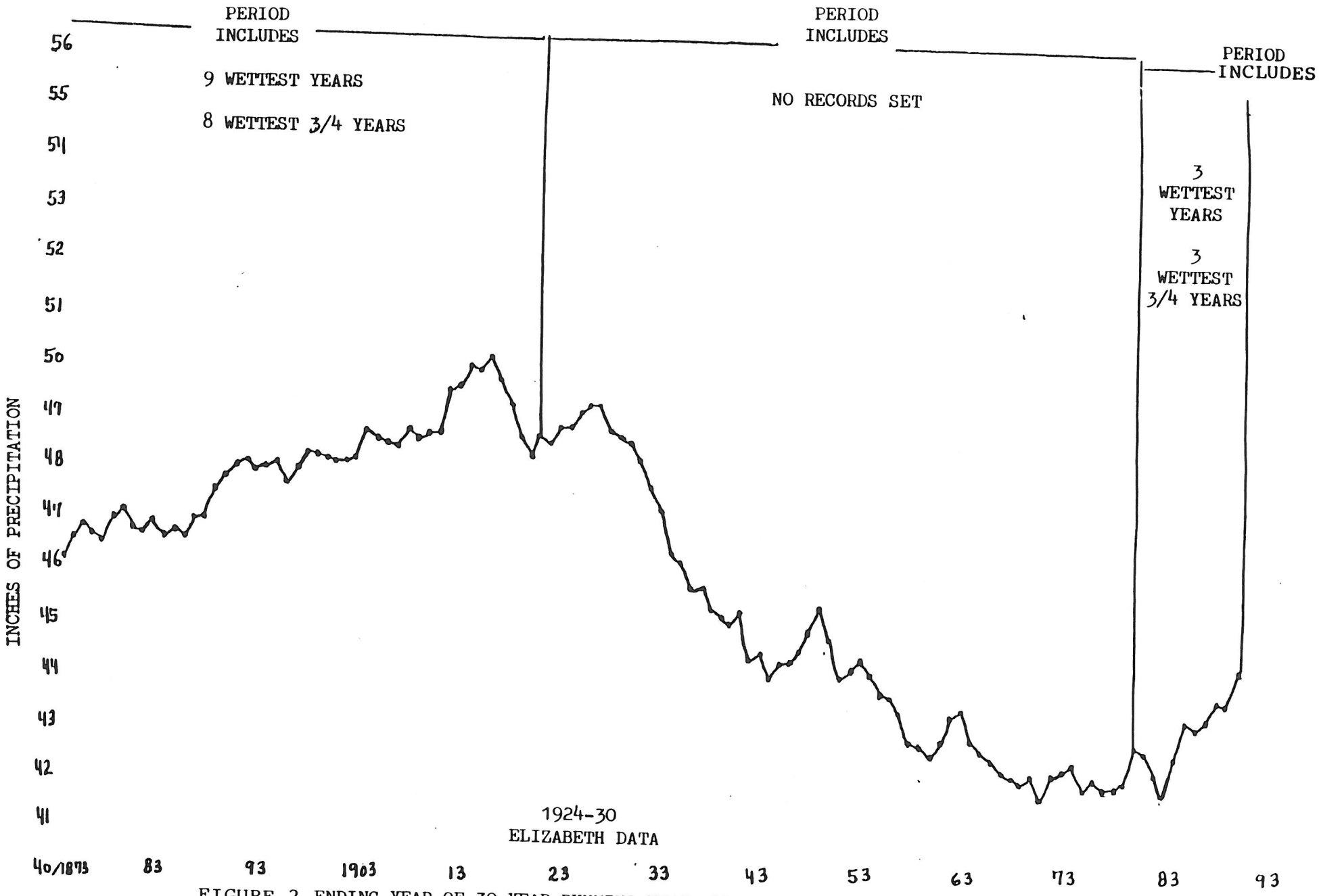

FIGURE 2. ENDING YEAR OF 30-YEAR RUNNING MEAN: PRECIPITATION-NWSO, NEWARK, NJ