CHAPTER 8 - EVAPORATION

FIGURES

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The need for evaporation data is very important when studying water yields. Several daily evaporation data stations are located in North Dakota. Location of these stations and evaporation values are published monthly in the "Climatological Data" of the National Oceanic and Atmospheric Administration, Environmental Data Service. Average annual class A pan and lake evaporation values are given in Technical Paper No. 37 of the U. S. Department of Commerce, Weather Bureau, dated 1959. These data are reproduced on Figures 8-2 and 8-3. This is the most recent average annual evaporation map published by the National Weather Service.

Mean monthly evaporation values are normally used for watershed yield or reservoir operation studies. Figure 8-3 gives the mean monthly evaporation values for January through December in percent of mean annual. The mean monthly evaporation percentages were obtained from Standard Drawing Number ES-1016 which was compiled by Adolph F. Meyer, Works Progress Administration, National Resources Planning Board, Minnesota Resources Commission.

The monthly percentage variation was considered uniform across the state even though minor variances occur.

The following examples are used for purposes of illustration:

Example 1:

Find the inches of evaporation for the month of August for a pond located in Burleigh County, North Dakota.

From Figure 8-3, the August percentage is 20.16
20.16 x 34 inches (from Figure 8-3 - mean annual evaporation) = 6.85" of evaporation.

Example 2:

Find the May through October evaporation for a pond located in Barnes County, North Dakota.

From Figure 8-3, the percent evaporation rates are:

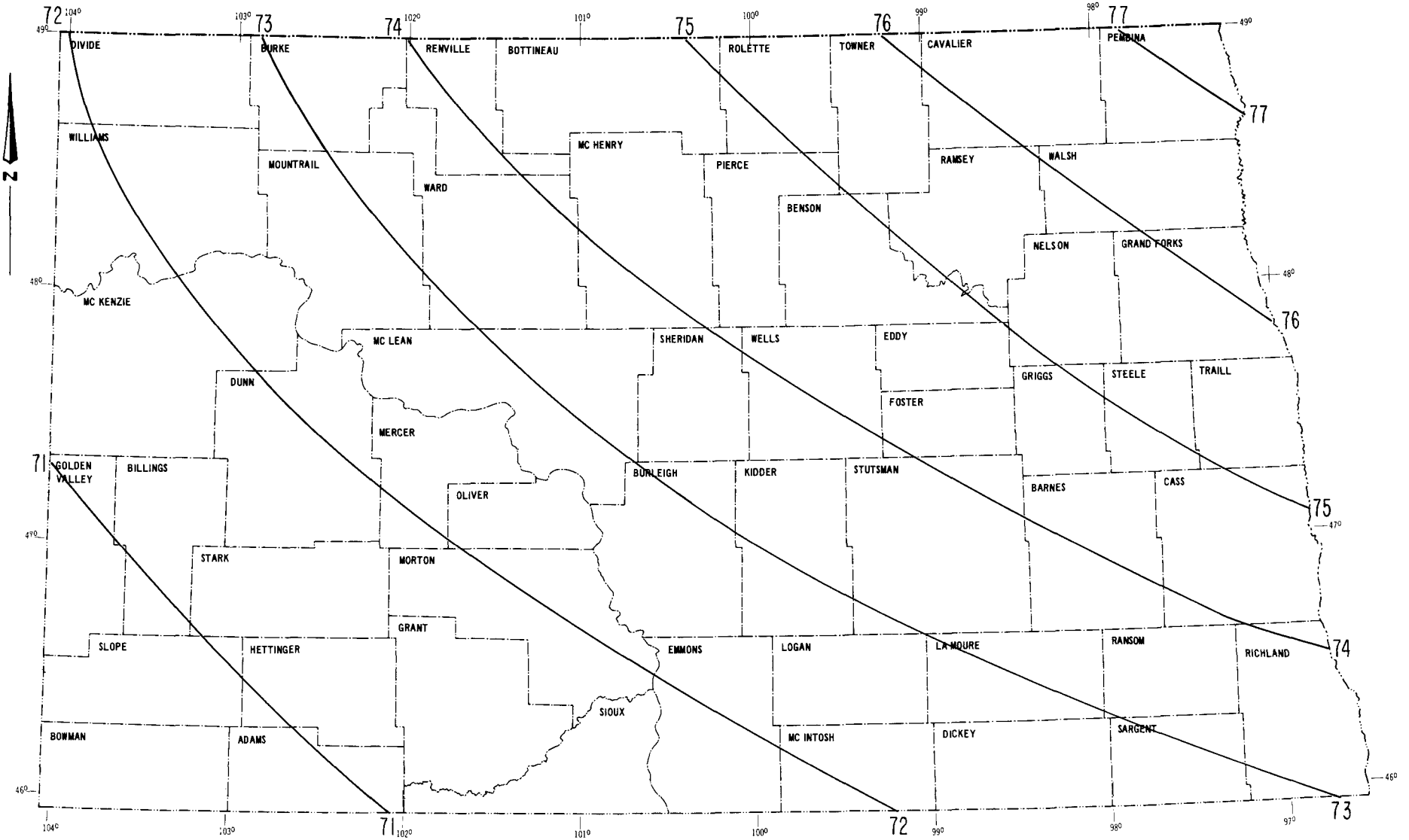
May	10.33
June	13.57
July	18.59
August	20.16
September	14.95
October	8.53
Total	86.13%

86.13% x 31 inches (from Figure 8-3 - mean annual evaporation) = 26.7" of evaporation.

Example 3:

Find the equivalent average annual lake or pond evaporation using the average annual class A pan evaporation.

Location: Barnes County
class A pan evaporation = 42 inches (from Figure 8-2)
class A pan coefficient = 74% (from Figure 8-1)
42 inches (class A pan evap.) x .74 (class A pan coef.) = 31 inches



AVERAGE ANNUAL CLASS A PAN COEFFICIENT IN PERCENT

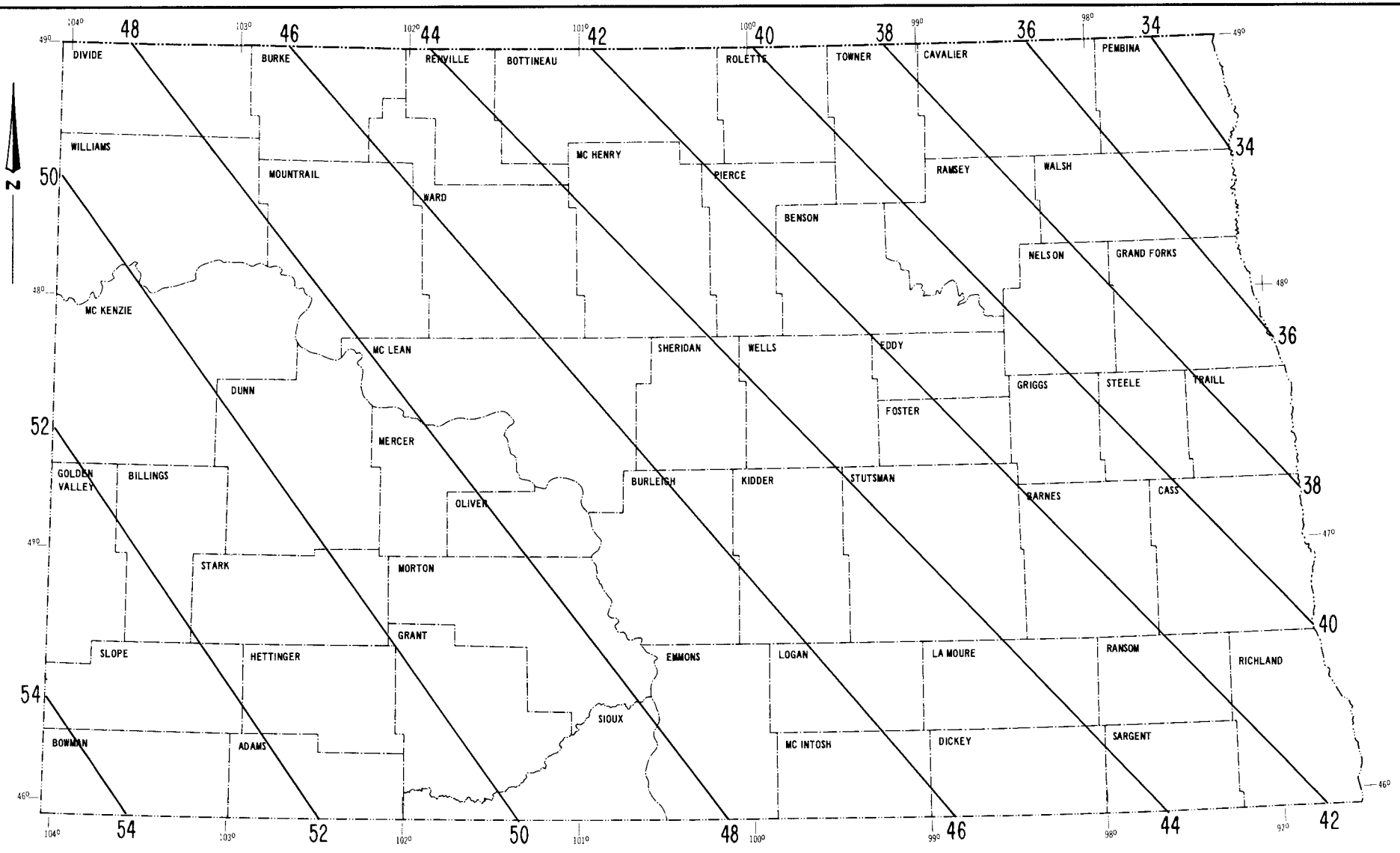
SOURCE:
WEATHER BUREAU
T.P. NO. 37

BASE MAP SOURCE:
FAMILY OF MAPS 5,S-32,814 (9-74)
ALBERS EQUAL AREA PROJECTION

NORTH DAKOTA

SCALE 0 10 20 30 40 50 MILES
0 20 40 60 80 KILOMETERS
1/2,492,800

FIGURE 8-1



AVERAGE ANNUAL CLASS A PAN EVAPORATION IN INCHES
(PERIOD 1946 – 1955)

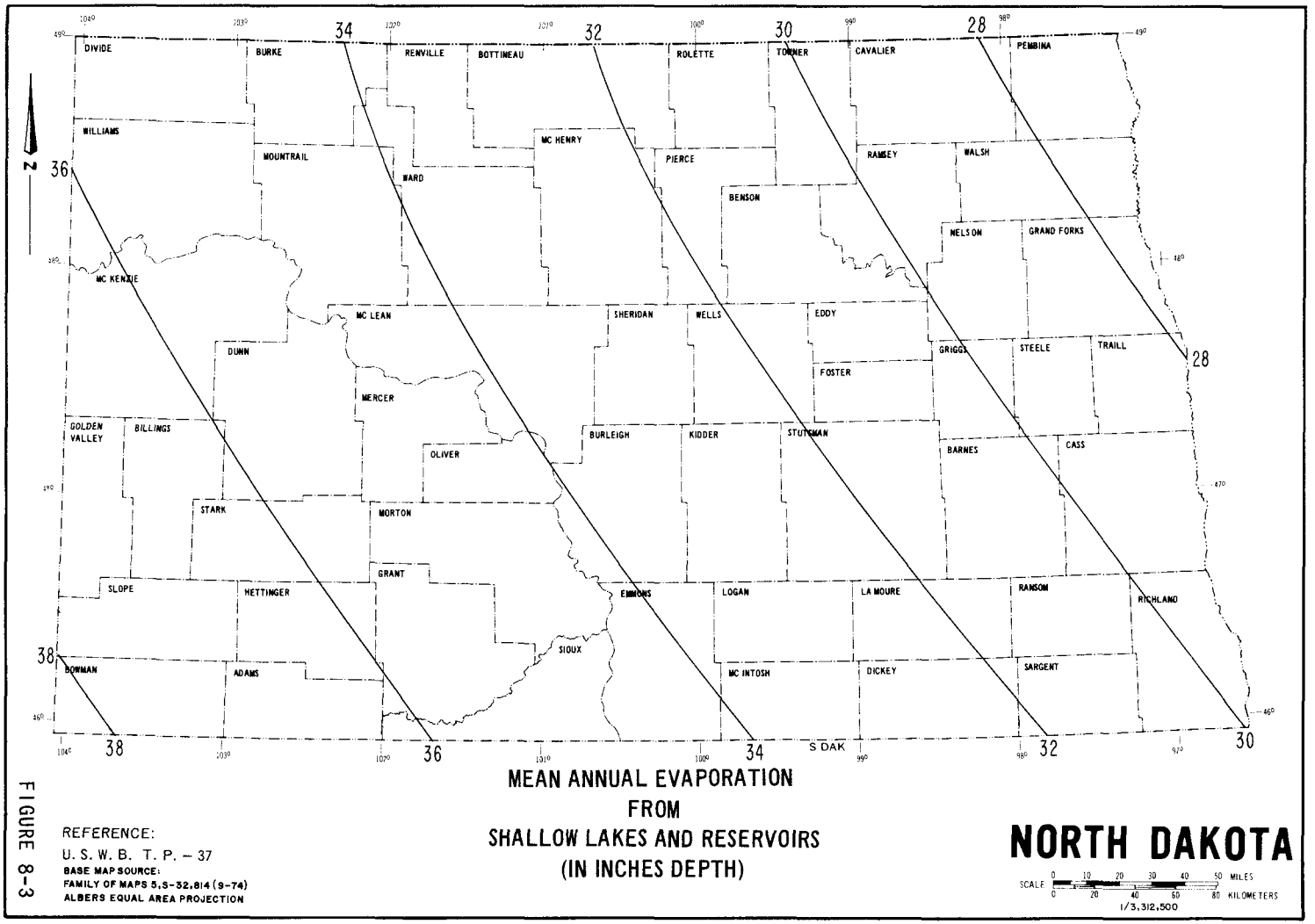
NORTH DAKOTA

SOURCE. WEATHER BUREAU T. P. NO. 37

BASE MAP SOURCE:
FAMILY OF MAPS 5,S-32,814 (9-74)
ALBERS EQUAL AREA PROJECTION

SCALE 0 10 20 30 40 50 MILES
0 20 40 60 80 KILOMETERS
1/2,492,800

FIGURE 8-2



MEAN ANNUAL EVAPORATION
FROM
SHALLOW LAKES AND RESERVOIRS
(IN INCHES DEPTH)

REFERENCE:
U. S. W. B. T. P. – 37
BASE MAP SOURCE:
FAMILY OF MAPS 5,S-32,814 (9-74)
ALBERS EQUAL AREA PROJECTION

NORTH DAKOTA

SCALE 0 10 20 30 40 50 MILES
0 20 40 60 80 KILOMETERS
1/3,312,500

FIGURE 8-3

Month	Monthly Evaporation Rate (% of mean annual)
January	0.75
February	0.95
March	2.30
April	5.85
May	10.33
June	13.57
July	18.59
August	20.16
September	14.95
October	8.53
November	3.00
December	1.02
TOTAL	100.00%