

Soil Conservation Service

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# Reserve United States Department of Agriculture So33 Urban Hydrology for **Small Watersheds**

**Technical Release Number 55** 



#### PREFACE

This technical release was prepared by hydraulic engineers from the Engineering and Watershed Planning Unit (E&WP), Upper Darby, Pa., and the Central Technical Unit, Hyattsville, Md. Valuable contributions were received from the Engineering Division, Washington, D.C., E&WP Units at Lincoln, Nebr., Portland, Oreg., and Fort Worth, Tex., and from state hydrologists and engineers.

This technical release is presented as a guide for field personnel in estimating the effects of land use changes and structural measures on hydraulic and hydrologic parameters, runoff volume, and peak rates of discharge. Field engineers should recognize that some of the proposed methods are in the formative stage and thus have not been fully tested. The results should be compared with other available methods, and engineering judgment should be used in arriving at a final estimate. Careful consideration should be given to the scope and importance of the job when deciding on a particular procedure. It is not intended that all procedures fit all situations that arise.

As more data become available procedures described in this technical release will be revised. UNITED STATES DEPARTMENT OF AGRICULTURE

# SOIL CONSERVATION SERVICE

# TECHNICAL RELEASE NO. 55

# URBAN HYDROLOGY FOR SMALL WATERSHEDS

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#### CHAPTER 1

# EFFECTS OF URBANIZATION ON RUNOFF VOLUME AND PEAK RATES OF DISCHARGE

# Introduction

This technical release analyzes the effects of urbanization in a watershed on hydraulic and hydrologic parameters and presents methods of estimating runoff volume and peak rates of discharge. Obtaining basic data on runoff volume and peak rates of discharge is difficult because conditions are constantly changing during the transition from rural to urban land use. At this time only general empirical relationships between the parameters that affect runoff and peak rates of discharge can be developed. Much research is being undertaken to better analyze the effects of urbanization through collection of runoff data and study of watershed models. Reports of progress in this field are being made continually. For additional information see the bibliography in appendix A.

As population density and land values increase, the effects of uncontrolled runoff become an economic burden and a serious threat to the health and well-being of a community and its citizens. Emphasis must be placed on providing solutions to the water problems caused by radical changes in land use. Estimating the magnitude and frequency of future flood events makes possible systematic planning and installation of structural and nonstructural measures to reduce hazards to acceptable levels.

Management of runoff from even minor storms is rapidly becoming an engineering requirement of local and state governments to help reduce flooding and stream erosion. Rapid deterioration of stream channels caused by increased storm runoff has had a detrimental impact on communities. Counties and states are adopting policies which limit the effects that changes in land use may have on the stream regimen within a development or watershed. These policies cover such areas as (1) assisting in the planned management of water resources, including storm drainage, throughout the watershed; (2) promoting and encouraging the inclusion of flood storage in all planned reservoirs; and (3) encouraging and assisting in planning for onsite retention of runoff through the use of temporary storage structures and infiltration devices.

There is a need for thorough understanding of the problems associated with the rapid conversion of land use and for adequate technical procedures to assist local communities, municipalities, and planning groups in assessing the effects of changed land use on streamflow.

# Effects of Urban Development

An urban or urbanizing watershed can be defined as an area in which all or part of the watershed will be covered by impervious structures, such as roads, sidewalks, parking lots, and houses. Urban stream channels may also be supplemented by some form of artificial drainage system, such as paved gutters and storm sewers.

The effect of urbanization on the water regimen has long been recognized. Investigations to evaluate the factors involved have been going on for over 35 years. Ideally, hydrologic studies to determine volume and rates of runoff should be based on long-term stationary streamflow records for the area being investigated. Such records are seldom available for small drainage areas, and because of the time involved in converting a watershed from rural to urban conditions, available records normally are not adequate. It becomes necessary to estimate the magnitude and frequency of peak rates of runoff through modeling of measurable watershed characteristics. An understanding of these characteristics is required for judging how to alter parameters to reflect changing watershed conditions.

Urbanization of a watershed changes its response to precipitation. The most common effects are reduced infiltration and decreased travel time, which result in significantly higher peak rates of runoff. The volume of runoff is determined primarily by the amount of precipitation and by infiltration characteristics related to soil type, antecedent rainfall, type of vegetal cover, impervious surfaces, and surface retention. Travel time is determined primarily by slope, flow length, depth of flow, and roughness of flow surfaces. Peak rates of discharge are based on the relationship of the above parameters as well as the total drainage area of the watershed, the location of the development in relation to the total drainage area, and the effect of any flood control works or other manmade storage. Peak rates of discharge are also influenced by the distribution of rainfall within a given storm event. SCS uses three standard rainfall distributions--types I, IA, and II. Type II-distribution applies to all areas of the United States except for parts of the Pacific Coast states. For rainfall distribution in the Pacific Coast states, refer to the map in appendix D.

#### Volume Parameters

#### Soil type

Since urban areas are seldom completely covered by impervious structures, soil properties are an important factor in estimating the total volume of direct runoff. The infiltration and percolation rates of soils indicate their potential to absorb rainfall and thereby reduce the amount of direct runoff. Soils having a high infiltration rate (sands or gravels) have a low runoff potential, and soils having a low infiltration rate (clays) have a high runoff potential. Urbanization on soils with a high infiltration rate increases the volume of runoff and peak discharge more than urbanization on soils with a low infiltration rate.

#### Cover type

The type of cover and its hydrologic condition affects runoff volume through its influence on the infiltration rate of the soil. Fallow land yields more runoff than forested land for a given soil type. Covering areas with impervious material reduces surface storage and infiltration and increases the volume of runoff. Some rainfall is retained on the surface and by vegetation before runoff begins. Interception is rainfall that is caught by foliage, twigs, branches, leaves, etc. This rainfall is lost to evaporation and thus never reaches the ground surface. Increasing the vegetal cover increases the amount of interception.

Surface depression storage begins when precipitation exceeds infiltration. Overland flow starts when the surface depressions are full. The water in depression storage is not available as direct runoff.

Initial abstraction is the sum of interception, depression storage, and infiltration before runoff begins. It occurs on all types of cover, from pasture in good condition to concrete pavement. However, the amount of initial abstraction is less on concrete pavement than on pasture.

#### Time Parameters

# Slope

Urbanization can change the effective slope of a watershed if flow paths are altered by channelization and by terracing areas for building lots, parking lots, roads, and diversion ditches. The slopes of storm sewers, street gutters, roads, and overland flow areas as well as stream channels are significant in determining travel times through urban watersheds.

#### Flow length

Flow length may be reduced if natural meandering streams are changed to straight channels. It may be increased if overland flows are diverted through diversions, storm sewers, or street gutters to larger collection systems.

#### Surface roughness

Flow velocity normally increases significantly when the flow path is changed from flow over rough surfaces of woodland, grassland, and natural channels to sheet flow over smooth surfaces of parking lots, diversions, storm sewers, gutters, and lined channels.

# Methodology

Procedures outlined in SCS National Engineering Handbook, Section 4, Hydrology (NEH-4), are adequate for determining volumes, peak rates, and hydrographs of runoff from urban areas. The increase in the volume of runoff due to urbanization depends more on the percentage of impervious area than on any of the other watershed constants. Changes in the time-area relationship (lag time) can be estimated by hydraulic analysis of overland velocities and storage. Changes in channel routing can be estimated by hydraulic analysis of channel velocities and storage.

The soil-cover complex and associated runoff curve number procedure outlined in NEH-4 can be used to measure the change in runoff volume caused by urbanization. Runoff curve numbers for land use and treatment practices for hydrologic soil groups were developed from daily rainfall records from small agricultural watersheds. By using land use patterns found in an urban area and accounting for impervious areas, a composite weighted curve number representing runoff potential from the watershed can be determined.

Special attention should be given to the computation of time of concentration and travel time. Once storm drains are installed, the flow pattern may be changed so significantly that flow retardance cannot be represented by factors based on runoff curve numbers or overland flow. Velocities of flow through culverts and channels should be computed using hydraulic procedures that take into consideration the characteristics of the flow paths.

When urbanization is proposed in only part of a watershed and peak discharges are desired downstream of the development, consideration should be given to subdividing the watershed into areas of similar land use. The hydrographs from these areas are combined and routed to the outlet.

Methods of determining peak rates of runoff are outlined in chapter 16 of NEH-4. Examples 1 and 2 in chapter 16 of NEH-4 show the development of the total hydrograph. Hydrographs are used when timing effects of tributaries must be analyzed or hydrographs must be routed. Example 4 in chapter 16 of NEH-4 describes a procedure for computing only the peak rate of discharge. This approach can be used when runoff characteristics within a watershed are homogeneous and routing is not required.

Examples in this technical release illustrate the effects of urbanization on volumes and peak rates of runoff using procedures outlined in chapter 16 of NEH-4. Chapter 2 in this technical release discusses runoff volume from urban areas and presents methods of developing runoff curve numbers for urban areas. Chapter 3 discusses time of concentration and travel time as they are affected by urbanization and presents examples of the computation of these parameters. Chapters 4, 5, and 6 present methods of computing peak rates of discharge using standard charts applicable to small drainage areas, charts for preliminary planning and evaluation, and SCS-TR-20 procedures for dealing with more complicated watershed conditions. Chapter 7 reviews methods of surface and subsurface storage used to reduce peak discharges caused by urbanization.

As more information is gathered and analyzed, better procedures may be developed to analyze the effects of urbanization. Procedures presented in this technical release will be revised periodically to incorporate results of future research.

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#### CHAPTER 2

# ESTIMATING RUNOFF FROM URBAN AREAS

#### Introduction

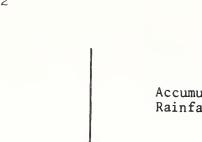
Effective rainfall is that portion of precipitation that produces direct runoff, which is water that enters the stream channels during a storm or soon after and forms a runoff hydrograph. Losses or abstractions are that portion of precipitation that does not contribute to direct runoff. Losses occurring on urban watersheds are similar to those occurring on natural watersheds. The amount of runoff from a storm event largely depends on detention, infiltration, evapotranspiration, etc., and is related to soil type, type of vegetation, and amount of impervious cover.

With proper modifications and assumptions, the soil-cover-complex method described in NEH-4 can be used to estimate runoff from urban areas. The variables used in this method apply to runoff from both agricultural and urban watersheds. A combination of a hydrologic soil group (soil) and a land use and treatment class (cover) is used to determine the hydrologic soil-cover complex. The effect of the hydrologic soil-cover complex on the amount of rainfall that runs off is represented by a runoff curve number, referred to as CN. Chapters 7, 8, 9, and 10 of NEH-4 discuss the development of soil-cover complexes including soils, cover, treatment practices for agricultural areas, and resulting runoff.

In an urban watershed, the cover usually consists of both pervious and impervious surfaces. Impervious surfaces, such as roofs, streets, sidewalks, driveways, and parking lots, have some initial abstraction before runoff occurs. However, during an intense part of a storm event, nearly 100 percent of the rainfall may run off. Both initial abstraction and infiltration should be considered for pervious surfaces such as lawns, parks, and playing fields.

# Runoff Equation

Figure 2-1 shows schematic curves of accumulated storm rainfall P, runoff Q, and infiltration plus initial abstraction  $(F + I_a)$ . For convenience in estimating runoff, initial abstraction includes all the storm rainfall occurring before surface runoff starts.



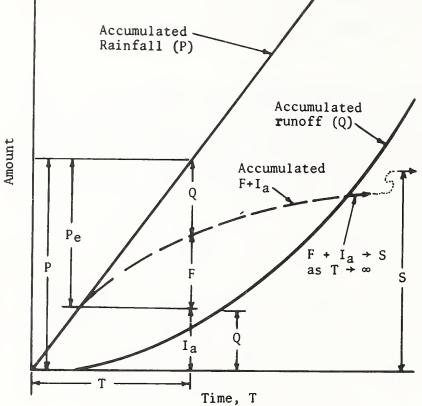


Figure 2-1.--Schematic curves of accumulated rainfall (P), runoff (Q), and infiltration plus initial abstraction (F +  $I_a$ ) showing the relation expressed by equation 2-5.

Assume

 $\frac{F}{S} = \frac{Q}{P_{Q}}$ 

(Eq. 2-1)

where F is the infiltration occurring after runoff begins in inches, S is the potential abstraction in inches, Q is the actual direct runoff in inches, and  $P_e$  is the potential runoff or effective storm runoff (storm rainfall minus the initial abstraction) in inches.

With  $F = P_e - Q$ , equation 2-1 can be written as

$$Q = \frac{P_e^2}{P_e^2 + S}$$
 (Eq. 2-2)

The initial abstraction  $({\rm I}_a)$  in inches, estimated from an empirical relation based on data from small watersheds, is

 $I_a = 0.2S$  (Eq. 2-3)

Thus

$$P_e = P - I_a = P - 0.2S$$
 (Eq. 2-4)

where P is the total storm rainfall in inches. Substituting equation 2-4 in equation 2-2,

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$$
(Eq. 2-5)

Potential abstraction S is related to the soil and cover conditions of a watershed. The runoff curve number, which is also related to soil and cover conditions, is related to potential abstraction S by

$$CN = \frac{1,000}{S+10}$$
(Eq. 2-6)

from which

$$S = \frac{1,000}{CN} - 10$$
 (Eq. 2-7)

The solution to equation 2-5 is shown in table 2-1 for a range of CN's and total rainfall amounts.

Table 2-1. -- Runoff depth in inches for selected CN's and rainfall amounts

Rainfall (inches)									
(Inches)	60	65	70	75	80	85	90	95	98
1.0 1.2 1.4 1.6 1.8	0 0 0.01 0.03	0 0 0.02 0.05 0.09	0 0.03 0.06 0.11 0.17	0.03 0.07 0.13 0.20 0.29	0.08 0.15 0.24 0.34 0.44	0.17 0.28 0.39 0.52 0.65	0.32 0.46 0.61 0.76 0.93	.56 .74 .92 1.11 1.29	.79 .99 1.18 1.38 1.58
2.0	0.06	0.14	0.24	0.38	0.56	0.80	1.09	1.48	1.77
2.5	0.17	0.30	0.46	0.65	0.89	1.18	1.53	1.96	2.27
3.0	0.33	0.51	0.72	0.96	1.25	1.59	1.98	2.45	2.78
4.0	0.76	1.03	1.33	1.67	2.04	2.46	2.92	3.43	3.77
5.0	1.30	1.65	2.04	2.45	2.89	3.37	3.88	4.42	4.76
6.0	1.92	2.35	2.80	3.28	3.78	4.31	4.85	5.41	5.76
7.0	2.60	3.10	3.62	4.15	4.69	5.26	5.82	6.41	6.76
8.0	3.33	3.90	4.47	5.04	5.62	6.22	6.81	7.40	7.76
9.0	4.10	4.72	5.34	5.95	6.57	7.19	7.79	8.40	8.76
10.0	4.90	5.57	6.23	6.88	7.52	8.16	8.78	9.40	9.76
11.0	5.72	6.44	7.13	7.82	8.48	9.14	9.77	10.39	10.76
12.0	6.56	7.32	.8.05	8.76	9.45	10.12	10.76	11.39	11.76

 $\frac{1}{1}$  To obtain runoff depths for CN's and other rainfall amounts not shown in this table, use an arithmetic interpolation.

Initial abstraction consists of interception, infiltration, and depression storage that must be satisfied before runoff begins. Urban initial abstraction has been found to be correlated with slope of the impervious area. However, because of the limited scope of the research data available, no attempt has been made to revise the basic runoff equation to apply exclusively to urban areas.

Investigations have also shown that runoff from small (less than annual) rainfall events comes primarily from the impervious areas. However, both the pervious and impervious areas contribute to runoff for the larger, less frequent events. If the pervious portion of an urban area has a CN of 60 to 65, approximately 2 inches of rainfall is needed before runoff begins. Most 24-hour rainfall values used in computing peak rates of flow are over 2 inches. Therefore, for urban analysis the total watershed area can be assumed to contribute to storm runoff.

# Urban Runoff Curve Numbers

Several factors should be considered when computing the anticipated future CN for urban areas. The amount of runoff can vary depending on whether house gutters connect directly to storm drains, outlet onto impervious driveways, or outlet onto lawns or other pervious areas where infiltration can occur. General building practices or codes within a development may be helpful in determining runoff flow paths. Some areas have zoning ordinances on how storm runoff from individual houses must be handled.

In determining urban CN's, consideration should be given to whether heavy equipment compacted the soil significantly more than natural conditions, whether much of the pervious area is barren with little sod established, and whether grading has mixed the surface and subsurface soils causing a completely different hydrologic condition. Any one of the above could cause 'a soil normally in hydrologic group A or B to be classified in group B or C, respectively. In many areas of the country, lawns are heavily irrigated. This may significantly increase the moisture content in the soil over that under natural rainfall conditions.

Table 2-2 gives CN's for agricultural, suburban, and urban land use classifications. The suburban and urban CN's are based on typical land use relationships that exist in some areas. They should only be used when it has been determined that the area under study meets the criteria for which these CN's were developed.

There will be areas to which the values in table 2-2 do not apply. The percentage of impervious area for the various types of residential areas or the land use condition for the pervious portions may vary from the conditions assumed in table 2-2. A curve for each pervious CN can be developed to determine the composite CN for any density of impervious area. Figure 2-2 has been developed assuming a CN of 98 for the impervious

Table 2-2.--Runoff curve numbers for selected agricultural, suburban, and urban land use. (Antecedent moisture condition II, and  $I_a = 0.2S$ )

	HYDR	OLOGIC	SOIL	GROUP
LAND USE DESCRIPTION	A	В	С	D
Cultivated land1/: without conservation treatment	72	81	88	91
: with conservation treatment	62	71	78	81
Pasture or range land: poor condition	68	79	86	89
good condition	39	61	74	80
Meadow: good condition	30	58	71	78
Wood or Forest land: thin stand, poor cover, no mulch	45	66	77	83
good cover <sup>2</sup> /	25	55	70	77
Open Spaces, lawns, parks, golf courses, cemeteries, etc.				
good condition: grass cover on 75% or more of the area	39	61	74	80
fair condition: grass cover on 50% to 75% of the area	49	69	79	84
Commercial and business areas (85% impervious)	89	92	94	95
Industrial districts (72% impervious).	81	88	91	93
Residential: 3/				
Average lot size Average % Impervious <sup>4/</sup>				
1/8 acre or less 65	77	85	90	92
1/4 acre 38	61	75	83	87
1/3 acre 30	57	72	81	86
1/2 acre 25	54	70	80	85
lacre 20	51	68	79	84
Paved parking lots, roofs, driveways, etc.5/	98	98	98	98
Streets and roads:				
paved with curbs and storm sewers $\frac{5}{2}$	98	98	98	98
gravel	76	85	89	91
dirt	72	82	87	89

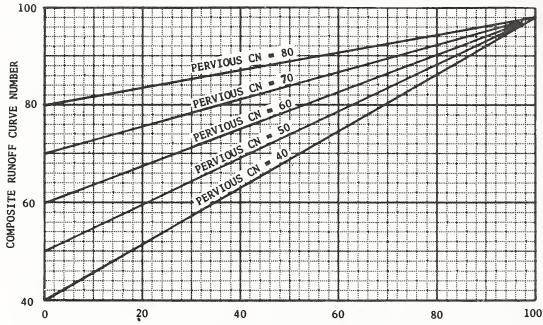
I/ For a more detailed description of agricultural land use curve numbers refer to National Engineering Handbook, Section 4, Hydrology, Chapter 9, Aug. 1972.

 $\frac{2}{2}$  Good cover is protected from grazing and litter and brush cover soil.

2/ Curve numbers are computed assuming the runoff from the house and driveway is directed towards the street with a minimum of roof water directed to lawns where additional infiltration could occur.

4/ The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.

 $\frac{5}{1}$  In some warmer climates of the country a curve number of 95 may be used.



PERCENT IMPERVIOUS

Figure 2-2.--Percentage of impervious areas vs. composite CN's for given pervious area CN's.

area. The curves in figure 2-2 can help in estimating the increase in runoff as more and more land within a given area is covered with impervious material.

There are a number of methods available for computing the percentage of impervious area in a watershed. Some methods include using U.S. Geological Survey topographic maps, land use maps, aerial photographs, and field reconnaissance. Care must be exercised when using methods based on such parameters as population density, street density, and age of the development as a means of determining the percentage of impervious area. The available data on runoff from urban areas are not yet sufficient to validate widespread use of these methods.

#### Example 2-1

Compute the runoff from 5 inches of rainfall for a 1,000-acre watershed to be converted to a suburban development. All the soils are in hydrologic soil group C. The proposed land use is 50 percent detached houses with lot size 1/4 acre; 10 percent townhouses with lot size 1/8 acre; 25 percent streets with curbs and gutters, schools, parking lots, plazas; and 15 percent open space, parks, schoolyards, etc., with good grass cover.

1. Compute the weighted runoff curve number.

		Table 2-2 curve	
Land use	Percent	number	Product
Detached houses with lot size 1/4 acre	50	83	4,150
Townhouses with lot size 1/8 acre	10	90	900
Streets with curbs, plazas, etc.	25	98	2,450
Open space, parks, etc.	15	74	1,110
	100		8,610

Thus

Weighted CN = 
$$\frac{8,610}{100}$$
 = 86

2. From table 2-1 using CN = 86 and P = 5 interpolate to read Q = 3.47 inches.

Example 2-2

Compute the runoff from 6.3 inches of rainfall for a 1,000-acre watershed to be converted to a suburban development. The soils are in hydrologic soil group B. Forty percent of the development is impervious with all impervious areas connected; 60 percent is pervious and considered to be in good grass cover.

- 1. From table 2-2 read pervious CN = 61.
- 2. From figure 2-2 read CN = 76.
- 3. From table 2-1 using CN = 76 and P = 6.3 interpolate to read Q = 3.64 inches.

#### Example 2-3

Compute the runoff curve number for a 1,000-acre watershed. The hydrologic soil group is 50 percent B and 50 percent C interspersed throughout the watershed. The land use is:

- 40 percent residential area that is 30 percent impervious
- 12 percent residential area that is 65 percent impervious
- 8 percent paved roads with open ditches
- 10 percent paved roads with curbs and storm sewers
- 16 percent open land with 50 percent fair cover and 50 percent good cover
- 14 percent parking lots, plazas, schools, etc. (all impervious)

			Hydrologi	c soil	gro	up
Land use		В			С	
Residential (30 pct. impervious)	<u>Pct.</u> 20	$\frac{CN}{72}$	Product 1,440	<u>Pct.</u> 20	<u>CN</u> 81	$\frac{\text{Product}}{1,620}$
Residential (65 pct. impervious)	6	85	510	6	90	540
Roads with open ditches	4	89	356	4	92	368
Roads with curbs and sewers	5	98	490	5	98	490
Open land:						
Fair cover	4	69	276	4	79	316
Good cover	4	61	244	4	74	296
Parking lots, plazas, etc.	7	98	686	7	98	686
	50		4,002	50		4,316

Using table 2-2 and figure 2-2, display the data given and compute the runoff curve number.

Thus

Weighted  $CN = \frac{4,002 + 4,316}{100} = 83.18$  (use 83)

# Example 2-4

A 175-acre watershed is 30 percent agricultural and 70 percent urban land. The agricultural area is 40 percent cultivated land with conservation treatment, 35 percent meadow in good condition, and 25 percent forest land with good cover. The urban area is residential: 60 percent is 1/3-acre lots, 25 percent is 1/4-acre lots, and 15 percent is streets and roads with curbs and storm sewers. The entire watershed is in B hydrologic soil group.

Display the data given and compute the weighted composite runoff curve number using curve numbers for the given land use in table 2-2.

Land use	Acres	Curve Number	Product
Agricultural:	(52)		
Cultivated land (conservation treatment)	21	71	1,491
Meadow (good cover)	18	58	l,044
Forest (good cover)	13	55	715
Urban:	(123)		
1/3-acre lots	74	72	5,328
1/4-acre lots	31	75	2,325
Streets and roads with curbs			·
and storm sewers	_18_	98	1,764
	175		12,667

Thus

Weighted CN = 
$$\frac{12,667}{175}$$
 = 72.4 (use 72)

#### CHAPTER 3

# TIME OF CONCENTRATION, TRAVEL TIME, AND LAG

# Introduction

Urbanization commonly increases the velocity at which water can flow from its point of impact on the watershed to the watershed outlet. Time of concentration, travel time, and watershed lag are three related watershed parameters directly affected by the increased velocity. These parameters are widely used in determining peak rates of runoff.

Time of concentration is the time it takes for runoff to travel from the hydraulically most distant part of the watershed to the point of reference. It is usually computed by determining the water travel time through the watershed. In hydrograph analysis it is the time from the end of excessive rainfall to the point of inflection on the falling limb of the hydrograph. Lag can be considered as a weighted time of concentration and is related to the physical properties of a watershed, such as area, length, and slope. In simple hydrograph analysis, lag is the time from the center of mass of excessive rainfall to the peak rate of runoff. The time of concentration determines the shape of the runoff hydrograph. Thus, changes in the time of concentration cause changes in the resulting hydrograph. The extent of urbanization and stream modification affects the travel time of water through the watershed, which changes the time of concentration.

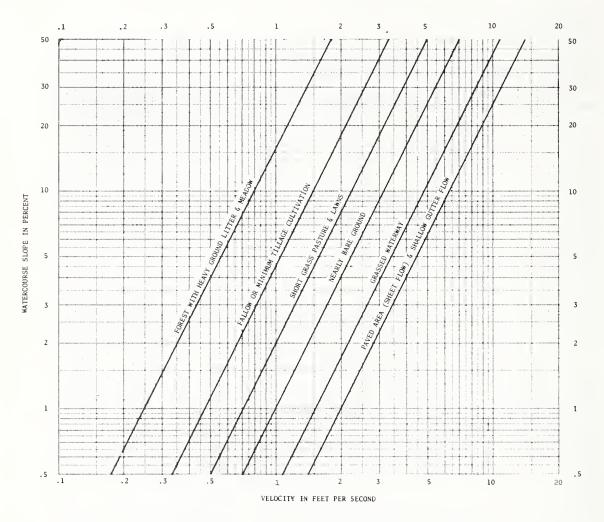
Two factors can contribute to a decrease in travel time. Urbanization generally decreases overland flow travel time by decreasing flow retardance and by reducing the interflow distance because there are more points of interception by gutters and other conveyances. Channelization decreases travel time by increasing velocities in improved channels. The travel path may be on the surface of the ground or below it (as subsurface flow) or in a combination of both. Urban hydrology studies have shown that the response time of subsurface flow is so much longer than that of surface flow that only surface (including sewer) flow travel time is of significance when determining peak discharges.

# Computation of Travel Time

Overland flow, storm sewer or road gutter flow, and channel flow are the three phases of direct flow commonly used in computing travel time.

# Overland flow

The travel time for overland flow in an urban area consists of the time it takes water to travel from the uppermost part of the watershed to a defined channel or inlet of the storm sewer system. This type of flow is significant in very small watersheds because a high proportion of travel time is due to overland flow. The velocity of overland flow can vary greatly with the surface cover and tillage as shown in figure 3-1. If the slope and land use of the overland flow segment are known, the average flow velocity can be read from figure 3-1. The travel time is



then computed by dividing the total overland flow length by the average velocity.

Figure 3-1.--Average velocities for estimating travel time for overland flow.

# Storm sewer or road gutter flow

Travel time through the storm sewer or road gutter system to the main open channel is the sum of travel times in each individual component of the system between the uppermost inlet and the outlet. In most cases average velocities can be used without a significant loss of accuracy. During major storm events, the sewer system may be fully taxed and additional overland flow may occur, generally at a significantly lower velocity than the flow in the storm sewers. By using average conduit sizes and an average slope (excluding any vertical drops in the system), the average velocity can be estimated using Manning's formula.

Since the hydraulic radius of a pipe flowing half full is the same as when flowing full, the respective velocities are equal. Travel time may be based on the pipe flowing full or half full. The travel time through the storm sewers is computed by dividing the length of flow by the average velocity. If flow is principally in shallow road gutters, the curve for overland flow in paved areas shown in figure 3-1 can be used to determine average velocity.

# Channel flow

The travel time for flow in an open channel from the storm sewer outlet to the watershed outlet (or evaluation or design point) can be determined by using Manning's equation to compute average velocities. Bankfull velocities should be used to compute these averages. Channels may be in either natural or improved condition.

#### Example 3-1

An urbanized watershed is shown in figure 3-2. Three types of flow conditions exist from the furthermost point of the watershed to the outlet. Compute the travel time  $(T_t)$  and time of concentration  $(T_c)$  based on the following data:

Reach	Description of flow	Slope	Length
A to B	Overland (forest)	Percent 7	<u>Feet</u> 500
B to C	Overland (shallow gutter)	2	900
C to D	<pre>Storm drain with manhole     covers, inlets, etc.     (n=0.015; diameter 3 feet)</pre>	1.5	2,000
D to E	<pre>Open channel, gunite, trape- zoidal (b = 5; d = 3; z = 1.1; n = 0.019)</pre>	0.5	3,000

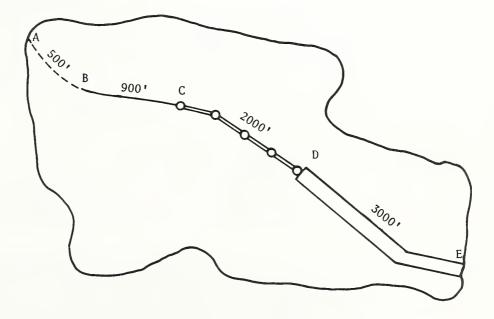


Figure 3-2.--Urban watershed for example 3-1.

1. Compute the overland flow travel time. Reach A to B (forest cover). From figure 3-1 for a slope of 7 percent read v = 0.7 ft/sec.

$$T_t = \frac{\text{length}}{\text{velocity}} = \frac{500 \text{ ft}}{0.7 \text{ ft/sec}} = 714 \text{ sec}$$

Reach B to C (street gutter). From figure 3-1 for a slope of 2 percent read v = 2.8 ft/sec.

$$T_t = \frac{\text{length}}{\text{velocity}} = \frac{900 \text{ ft}}{2.8 \text{ ft/sec}} = 321 \text{ sec}$$

2. Compute the storm drain flow travel time. Reach C to D. Use Manning's equation to compute pipefull velocity.

$$v = \frac{1.49}{n} \left(\frac{D}{4}\right)^{2/3} s^{1/2}$$
$$v = \frac{1.49}{0.015} \left(\frac{3}{4}\right)^{2/3} (0.015)^{1/2} = 10 \text{ ft/sec}$$

$$T_{t} = \frac{\text{length}}{\text{velocity}} = \frac{2,000 \text{ ft}}{10 \text{ ft/sec}} = 200 \text{ sec}$$

3. Compute the open channel flow travel time. Reach D to E. Use Manning's equation to compute bankfull velocity.

$$v = \frac{1.49}{n} r^{2/3} s^{1/2}$$
  
n = 0.019 for gunite channel  
s = 0.005  
$$v = \frac{1.49}{0.019} (1.78)^{2/3} (0.005)^{1/2} = 8.2 \text{ ft/sec}$$
  
$$T_t = \frac{\text{length}}{\text{velocity}} = \frac{3,000 \text{ ft}}{8.2 \text{ ft/sec}} = 366 \text{ sec}$$

3-4

4. Summary

Reach	Description of flow	Length (ft)	Velocity (ft/sec)	Travel time (sec)
A to B	Overland	500	0.7	714
B to C	Overland	900	2.8	321
C to D	Storm drain	2,000	10.0	200
D to E	Open channel	3,000	8.2	366
			Total	1,601

Thus

$$T_c = \frac{1,601 \text{ sec}}{(3,600 \text{ sec/hr})} = 0.44 \text{ hr}$$

# Computation of Lag

The time between a brief heavy rain and the maximum runoff rate is called lag. Lag is a watershed parameter that is often related to time of concentration. It can be estimated from historical hydrographs or it can be estimated from specific watershed characteristics, such as watershed length, slope, and flow retardance. Watershed lag is used to compute peak discharges of the unit hydrograph in equation 4-1 in chapter 4. The same relationship is used in all SCS procedures outlined in chapters 4, 5, and 6.

#### Hydrograph method

In hydrograph analysis, lag is the time from the center of mass of excess rainfall to the peak rate of runoff. The time difference between the center of excess rainfall and the peak runoff can be determined by analyzing hydrographs from historical storm events. Based on studies of many storm events for a range of watershed conditions, the following empirical relationship between lag and time of concentration was derived:

$$L = 0.6 T_{c}$$
 (Eq. 3-1)

This relationship is for average natural conditions and for approximately uniform distribution of runoff over the watershed. A limited study of urban hydrographs shows that this relationship does not differ significantly in urbanized watersheds.

# Modified curve number method

In small urban areas (less than 2,000 acres), the curve number method described in chapter 15 of NEH-4 can be used to estimate the time of concentration from watershed lag. The curve number method, originally developed from agricultural watershed data, was intended to span a broad set

of conditions ranging from steep to flat and from heavily forested to smooth. The equation for watershed lag is:

$$L = \frac{\ell^{0.8} (S + 1)^{0.7}}{1,900 Y^{0.5}}$$
(Eq. 3-2)

where

L = lag in hours

- l = hydraulic length of watershed in feet
- $S = \frac{1,000}{CN'}$  10 (where CN' is the retardance factor and is equivalent to the runoff curve number)

Y = average watershed land slope in percent.

Figure 3-3 shows the solution to equation 3-2 in graph form.

The CN' is a measure of the retardance of surface conditions on the rate at which runoff concentrates at some point in question. Therefore,  $(S + 1)^{0.7}$  is a retardance factor based on the surface condition of the watershed.

Data collected from small urban watersheds indicate that the retardance factor CN' generally does not adequately reflect the increased rate at which water can run off as a result of the installation of impervious areas, roads, gutters, and storm drains. Where an area is completely paved, such as a small parking lot, equation 3-2 adequately represents lag. For composite land use areas where streets, gutters, or sewers provide a more efficient flow pattern than lawns, forests, or other pervious areas, equation 3-2 overestimates lag.

Two factors cause the difference between historical measurements of lag and those computed by equation 3-2. The first is the extent to which a stream (usually the major watercourse in the watershed) has been changed over natural conditions either by straightening or by enlarging stream capacity and providing bank protection to allow higher flow velocities than under natural conditions. The second factor is the increased amount of impervious area, which permits water from overland flow sources and side channels to reach the main channel at a much faster rate than under natural conditions.

The weighted runoff curve number, if used as a retardance factor in equation 3-2, does not provide sufficiently for the decrease in lag caused by changes in the main channel and increases in impervious areas. Since urbanization can take place while the main channel is left in its natural state, separate adjustments to the lag equation were derived to account for the effect of each of the two factors on lag.

3-6

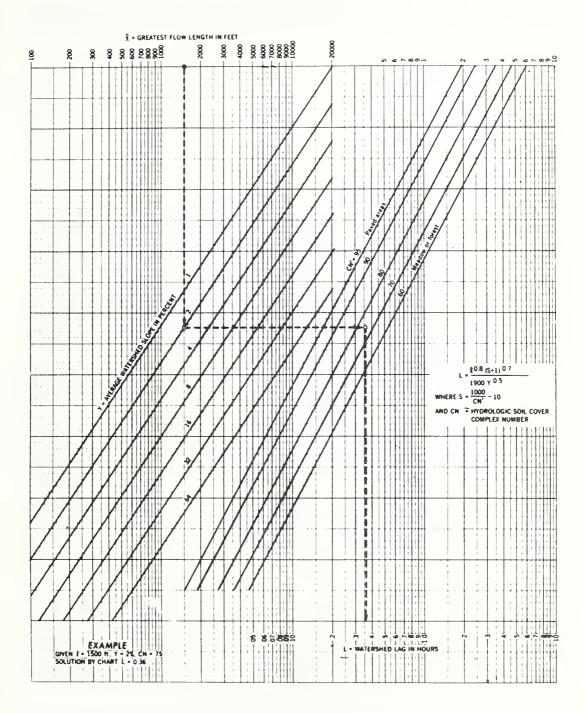


Figure 3-3.--Curve number method for estimating lag (L) for homogeneous watersheds under natural conditions up to 2,000 acres.

Figure 3-4 shows lag factors required to adjust equation 3-2 for watersheds where the natural condition of the main channel has been hydraulically improved. If the main channel has not been modified, the lag computed by equation 3-2 can be used. Not enough data are available, nor is equation 3-2 accurate enough, to distinguish between the types of channel modification made. The adjustment for channel improvement is made as follows. If 50 percent of the channel has been modified from its natural condition and the future-condition curve number is computed to be 80, then the lag computed by equation 3-2 (or read from figure 3-3) is multiplied by 0.7.

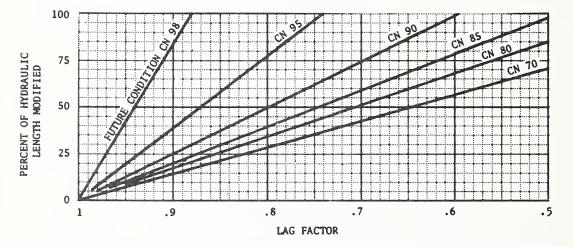


Figure 3-4.--Factors for adjusting lag from equation 3-2 or figure 3-3 when the main channel has been hydraulically improved.

Figure 3-5 shows lag factors for adjusting equation 3-2 if part of the watershed is impervious. If the future-condition curve number is 100 or the impervious area is zero, adjustments are not necessary. When a significant part of the watershed is impervious, time of concentration is decreased because the flow paths to the main channel are more efficient than under natural conditions.

Since figures 3-4 and 3-5 are used only with future-condition curve numbers, the lag factors cannot be used to directly compute the decrease in lag (or time of concentration) from present conditions. To determine the change in lag or time of concentration from present to future conditions, compute the present value and then, using the future-condition curve number, compute the future value.

When only peak discharges from an urban watershed are desired, lag does not have to be computed. Peak factors in figures 4-1 and 4-2, discussed in the next chapter, are used in the same manner as the lag factors when urban modifications to a watershed have occurred. If other procedures are used to compute peaks, but a time of concentration for future conditions is desired without making a detailed survey to determine the individual overland components of flow, figures 3-4 and 3-5 can be used. Figures 3-4 and 3-5 are approximations at best and have the same limitations and uses as equation 3-2 and figure 3-3.

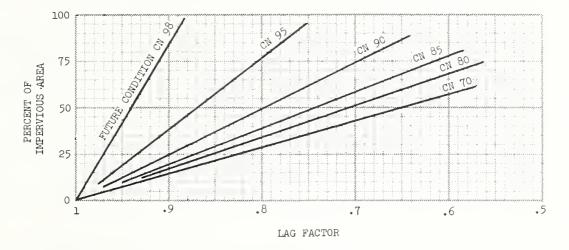


Figure 3-5.--Factors for adjusting lag from equation 3-2 or figure 3-3 when impervious areas occur in the watershed.

#### Example 3-2

A watershed of 1,000 acres has a present-condition curve number of 75, average watershed slope of 4 percent, and hydraulic length of 13,200 feet. Urban development is expected to modify about 70 percent of the hydraulic length, increase the impervious area to 40 percent, and increase the runoff curve number to 80. Compute the present- and futurecondition time of concentration using the curve number method.

1. Present-condition lag from equation 3-2 or figure 3-3 with CN = 75.

$$L = \frac{(13,200)^{0.8}(3.33 + 1)^{0.7}}{1,900(4)^{0.5}} = 1.45 \text{ hr}$$

2. Present-condition time of concentration from equation 3-1.

$$T_{1} = 1.67(1.45) = 2.42 \text{ hr}$$

3. Future-condition lag.

a. Basic future-condition lag with CN = 80:

$$L = \frac{(13,200)^{0.8}(2.5+1)^{0.7}}{1,900(4)^{0.5}} = 1.25 \text{ hr}$$

b. Lag factor for modification of 70 percent of the hydraulic length from figure 3-4: hydraulic-length lag factor = 0.59

- 3-10
  - c. Lag factor for 40 percent impervious area from figure 3-5: impervious-area lag factor = 0.76
  - d. Future-condition lag = 1.25(0.59)(0.76) = 0.56 hr
- 4. Future-condition time of concentration from equation 3-1.

 $T_c = 1.67(.56) = 0.94 \text{ hr}$ 

#### CHAPTER 4

# PEAK DISCHARGES (APPENDIX D CHARTS)

# Introduction

A quick and reliable method of computing peak discharges from agricultural drainage areas 1 to 2,000 acres in size is given in charts in appendix D. The charts were prepared for the solution of the general relationships, are based on type-II rainfall distribution, and are applicable to most agricultural areas of the United States. They do not apply to parts of the Pacific Coast states that do not have type-II rainfall distribution, as shown on the map in appendix D.

This chapter presents a method of adjusting peak discharges obtained from the charts in appendix D to reflect the increase in peak discharge due to urbanization. Additional methods for interpolating or adjusting peak discharges for conditions not found on the charts or not represented by the general equations in this chapter are given in appendix E.

# Modification of Peak Discharge Due to Urbanization

Research in the area of urban hydrology is developing rapidly. Research to date has been sufficient to identify the parameters that are affected by urbanization and to derive limited empirical relationships between those parameters for both agricultural and urban watersheds. The time to peak for urban watersheds is affected by a decrease in lag or time of concentration as described in chapter 3.

Figures 4-1 and 4-2 give factors for adjusting peaks calculated from charts in appendix D based on the same parameters that affect watershed lag and time of concentration. The factors are applied to the peaks using future-condition runoff curve numbers as follows:

$$Q_{MOD} = Q \left[ Factor_{IMP} \right] \left[ Factor_{HIM} \right]$$
 (Eq. 4-1)

where

Q<sub>MOD</sub> = modified discharge due to urbanization

Q = discharge for future CN from appendix D charts

Factor<sub>TMP</sub> = adjustment factor for percent impervious areas

Factor = adjustment factor for percent of hydraulic length HLM modified.

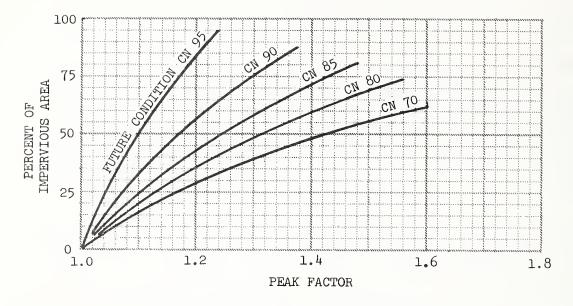


Figure 4-1.--Factors for adjusting peak discharges for a given futurecondition runoff curve number based on the percentage of impervious area in the watershed.

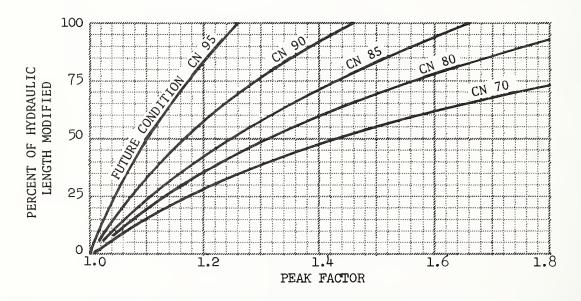


Figure 4-2.—Factors for adjusting peak discharges for a given futurecondition runoff curve number based on the percentage of hydraulic length modified.

# Example 4-1

A 300-acre watershed is to be developed. The runoff curve number for the proposed development is computed to be 80. Approximately 60 percent of the hydraulic length will be modified by the installation of street gutters and storm drains to the watershed outlet. Approximately 30 percent of the watershed will be impervious. The average watershed slope is estimated to be 4 percent. Compute the present-condition and anticipated future-condition peak discharge for a 50-year 24-hour storm event with 5 inches of rainfall. The present-condition runoff curve number is 75.

- 1. From table 2-1, the runoff for present condition is 2.45 inches and for future condition is 2.89 inches.
- 2. From the chart for moderate slope in appendix D (CN = 75), the present condition peak discharge is 120 cfs (cubic feet per second) per inch of runoff. The peak discharge is then 120 x 2.45 or 294 cfs.
- 3. From the chart for moderate slope in appendix D (CN = 80), the futurecondition base discharge for CN = 80 is 133 cfs per inch of runoff. The base discharge is then 133 x 2.89 or 384 cfs.
- 4. From figure 4-1, with 30 percent impervious area and future runoff curve number of 80, read peak factor = 1.16.
- 5. From figure 4-2, with 60 percent of the hydraulic length modified and future-condition curve number of 80, read peak factor = 1.42.
- 6. The future-condition peak discharge is:

389 (1.16)(1.42) = 633 cfs

7. The effect of this proposed development is to increase the peak discharge from 294 to 633 cfs.



#### CHAPTER 5

#### TABULAR AND GRAPHICAL METHODS OF DETERMINING PEAK DISCHARGES

#### Introduction

The tabular method can be used to develop composite hydrographs at any point within a watershed by dividing the watershed into subareas and computing the time of concentration for each subarea and the travel time through each reach. The graphical method uses only the time of concentration and is applicable to a watershed where runoff characteristics are uniform and valley routing is not required. The factors affecting peak discharge calculations discussed in earlier chapters also apply in this chapter: 24-hour rainfall amount, a given rainfall distribution, hydrologic soil-cover complexes (runoff curve numbers), time of concentration, travel time, and drainage area.

The tabular method can be used for watersheds where hydrographs are needed to measure nonhomogeneous runoff, i.e., the watershed is divided into subareas. It is especially applicable for measuring the effects of changed land use in a part of a watershed. It can also be used to determine the effects of structures and combinations of structures, including channel modifications, at different locations in a watershed.

# Tabular Method of Determining Peak Discharge

Table 5-3 shows the tabular discharge values for the type-II rainfall distribution used in this procedure. Tabular discharges, in terms of csm (cubic feet per second per square mile) per inch of runoff, are given for a range of  $T_c$ 's from 0.1 to 2 hours and  $T_t$ 's from 0 to 4 hours. For  $T_c$ 's up to 12 hours and  $T_t$ 's up to 30 hours, refer to TSC Technical Note ENG-UD-20. Values for other distributions are available. Table 5-3 was developed by computing hydrographs for 1 square mile of drainage area for a range of times of concentration and routing them through stream reaches with a range of travel times. A constant runoff curve number of 75 and a rainfall volume sufficient to yield 3 inches of runoff were used.

The tabular method should not be used when large changes in the curve number occur among subareas within a watershed and when runoff volumes are less than about 1.5 inches for curve numbers less than 60. For most watershed conditions, however, this procedure is adequate to determine the effects of urbanization on peak rates of discharge for subareas up to approximately 20 square miles in size. The computed values of time of concentration  $(T_c)$  and travel time  $(T_t)$  can be rounded to the nearest value used in table 5-3 or, if more refinement is warranted, the discharges can be computed using the calculated  $T_c$  and  $T_t$  and interpolating between the  $T_c$  and  $T_t$  shown in the table. The information needed to calculate the peak discharge at a point in the watershed is:

- 1. The drainage area of each subarea
- 2.  $T_c$  for each subarea
- 3. Tt for each routing reach
- 4. The runoff curve number for each subarea
- 5. The 24-hour rainfall for a selected frequency
- 6. The runoff in inches for each subarea

### Example 5-1

A developer plans to develop subareas 5, 6, and 7 shown in figure 5-1. The township planning board, before accepting his proposal, wants to know what effect the development would have on the 100-year discharge at the downstream end of subarea 7.

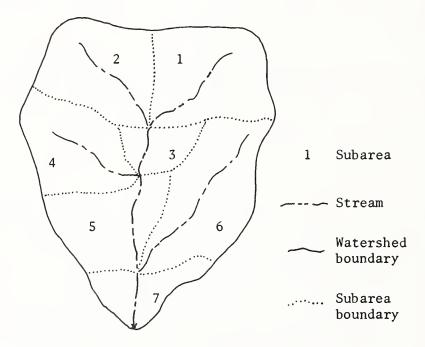


Figure 5-1.--Sample watershed for example 5-1.

1. Develop a table similar to table 5-1, which provides a summary of all the basic data required in the tabular hydrograph method.

Sub- area	Drain- age Area (mi <sup>2</sup> )	Time of Concent (hrs	ration	Runo Curve		Runc (ir	off1/	Travel (hr:	
		Pres.	Fut.	Pres.	Fut.	Pres.	Fut.	Pres.	Fut.
1 2 3 4 5 6 7	0.3 0.2 0.1 0.25 0.2 0.4 0.2	1.50 1.25 0.50 0.75 1.50 1.50 1.25	1.50 1.25 0.50 0.75 1.50 1.00 0.75	65 70 75 70 75 70 75	65 70 75 70 85 75 90	2.35 2.80 3.28 2.80 3.28 2.80 3.28	2.35 2.80 3.28 2.80 4.31 3.28 4.85	- 0.25 - 1.25 - 0.75	- 0.25 - 1.00 - 0.50

Table 5-1.--Basic data used in example 5-1

 $\frac{1}{\text{From Table 2-1 for P}} = 6$  inches.

2/ Travel time through the reach for the corresponding subarea.

- 2. Develop a flood routing summary table similar to table 5-2 for present and future conditions. The Tt for each subarea is the total travel time for that subarea through the watershed to the point of interest (end of subarea 7). The hydrograph coordinates under timehours for each subarea are computed using the appropriate sheets from table 5-3 and equation  $q = q_D (DA)(Q)$  where:

  - DA = drainage area in square miles
    - Q = runoff in inches

Using subarea 4 as an example, for  $T_c = 0.75$  hours use sheet 3 of table 5-3. For  $T_t = 2.00$  hours (the travel time through subareas 5 and 7) the routed peak of subarea 4 appears at the outlet of subarea 7 at 14.0 hours and is 251 csm/in. Therefore, the peak discharge is: q = 251(.25)(2.80) = 176 cfs.

3. In order to develop a composite hydrograph at the end of subarea 7, a method of summing the hydrographs from each subarea is used. This method provides a means of adjusting the timing of each hydrograph to allow for the travel time  $(T_t)$  from the individual watershed to the point in question. Table 5-2 shows how the present and future discharges are estimated. The effect of the urban development is to increase the 100-year peak discharge from 752 to 894 cfs. Methods for preventing an increase in discharge are discussed in chapter 7.

at e at e	Table       ge     Ra       at     end       at     end       at     end
Table       at end       at end       at end	$\begin{tabular}{ c c c c } Table 5-2Discharge summary \\ \hline $T_c$ $T_t$ $Present conditio \\ \hline $T_c$ $Present $
at e at e	Tc         T         Table $T_c$ $T_t$ $T_c$ $T_t$ $Hr$ $Hr$ $Mt^2$ $T$ $Hr$ $Hr$ $Mt^2$ $T$ $1.50$ $2.25$ $0.30$ $0.10$ $1.50$ $2.25$ $0.20$ $0.10$ $0.75$ $2.00$ $0.10$ $0.20$ $1.25$ $0.75$ $0.20$ $0.10$ $0.75$ $2.00$ $0.20$ $0.10$ $0.75$ $0.00$ $0.20$ $0.20$ $1.25$ $0.75$ $0.20$ $0.20$ $1.25$ $0.00$ $0.20$ $0.20$ $T_c$ $T_t$ $T_t$ $T_t$ $T_t$ $T_t$

5-4

# Graphical Method of Determining Peak Discharge

The curve of  $T_c$  vs. peak discharge in csm per inch of runoff shown in figure 5-2 was developed from table 5-3 for zero  $T_t$ . It can be used for a watershed where the runoff can be represented by one curve number, i.e., the land use, soils, and cover are similar and are distributed uniformly throughout the watershed. This procedure is limited to peak discharge determination (hydrograph not required) for a watershed where valley routing is not required. The peak discharge can be calculated from figure 5-2 using  $T_c$  in hours, runoff in inches from a 24-hour rainfall, and drainage area in square miles.

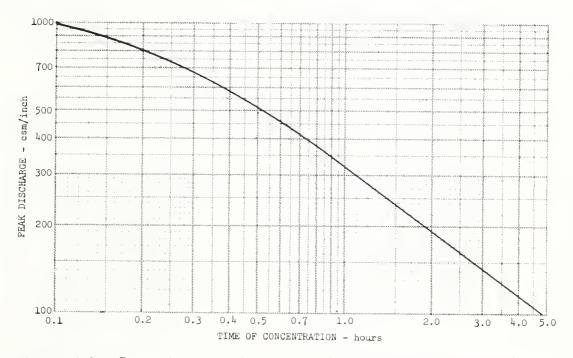


Figure 5-2.--Peak discharge in csm per inch of runoff versus time of concentration  $(T_c)$  for 24-hour, type-II storm distribution.

#### Example 5-2

A developer wishes to install a planned unit development in the uppermost part of a watershed. An ordinance in the township requires that a planned unit development not increase the 100-year-frequency flood flow at the downstream end of the development. The following basic data have been determined for present and future conditions:

Drainage area = 960 acres (l.5 mi<sup>2</sup>) CN (present) = 80 CN (future) = 85  $T_c$  (present) = 0.9 hr  $T_c$  (future) = 0.6 hr  $P_{24}$  (24-hour, 100-year frequency rainfall) = 6.0 in. The land use (present and future) and hydrologic soil groups are evenly distributed, i.e., runoff characteristics are uniform throughout the watershed. What will be the effect of the planned development on runoff and peak discharge at the 100-year frequency?

1. Present condition: Q = 3.78 inches for CN = 80 and P<sub>24</sub> = 6.0 inches (table 2-1). From figure 5-2 for T<sub>c</sub> = 0.9 hours, q<sub>p</sub> = 345 csm per inch of runoff.

$$q = q_D AQ = 345$$
 (1.5) (3.78) = 1,956 cfs

2. Future condition: Q = 4.31 inches for CN = 85 and P<sub>24</sub> = 6.0 inches (table 2-1). From figure 5-2 for T<sub>c</sub> = 0.6 hours, q<sub>p</sub> = 460 csm per inch of runoff.

 $q = q_p AQ = 460 (1.5) 4.31 = 2,974 cfs$ 

3. The proposed project will increase the total volume of runoff by 14 percent and decrease the time of concentration by 33 percent resulting in an increase in peak discharge of 52 percent (from 1,956 cfs to 2,974 cfs).

Methods described in chapter 7 can be used to determine the reservoir storage capacity required to reduce the peak from 2,974 to 1,956 cfs.

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discharges
Tabular
5-3
Table

Sheet 1 of

5

	20.0	14	14	15	15	16	16	17	19	8	21	23
	18.0	18	18	19	19	8	21	23	8	8	33	8
	16.0	24	24	8	27	8	33	38	44	1r	159	500
	15.0	ଝ	R	32	35	38	<b>14</b> 7	68	150	321	301	67
	14.5	33	35	38	42	47	8	142	343	239	59	18
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	13.0	65	75	011	206	389	236	34	<b>1</b> 6	10	9	4
=j	12.9	68	83	134	273	451	154	27	15	6	9	e
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ATION = 0.1 h	12.7	74	711	222	452	1t21	56	ଝ	12	7	4	0
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ME OF Hvd	12.4	121	236	543	392	115	25	14	6	5	e	0
빍	12.3	132	364	580	245	63	22	13	80	2	e	г
	12.2	152	546	482	125	τ <sub>ή</sub>	19	12	7	4	0	г
	12.1	233	686	288	65	R	17	11	7	4	0	Г
	12.0	477	626	133	42	28	16	10	9	4	0	Ч
	9.11	746	327	67	34	24	14	6	2	٣	г	0
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·	ц Н	0	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00

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	18.0 2	18	18	19	19	8	22	24	56	8	34	τη
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	14.0	140	43	<b>1</b> 49	56	69	159	363	200	0†	16	6
	13.5	49	55	67	89	74T	399	192	33	15	6	9
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Time	12.6	104	173	397	161	240	32	16	10	9	4	0
Hydrograph	12.5	121	235	197	40 <del>1</del>	143	8	15	6	9	e	2
Hy dr	12.4	138	341	545	284	79	23	13	80	2	e	Ч
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	12.2	245	627	341	84	35	18	Ц	7	ন	0	٦
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	11.9	796	196	50	8	22	13	80	2	e	г	0
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rges	12.1	535	191	124	ፒቲ	26	15	6	9	ę	N	г		12.1	575	343	92	36	24	77	6	5	m	г	0
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e 5-3.	7.11 2.11	43	31	22	17	13	8	5	m	г	0	0		11.5	39	28	20	16	12	80	5	e	Ч	0	0
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E	Table	5-3		-Tabular		scha	discharges	for	type-II		storm		distribution	ltion	( CS]	(csm/in)Continued	)Co	ntinu	led	Sh	Sheet	4 of	2		)-
									TDE	OF CONCENTY Hydrograph			<pre>1 = 1.0 hours 1n Hours</pre>	ours											10
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	13	24	45	99	107	155	211	258	301	313	316	301	277	247	217	188	146	102	64	<b>1</b> 46	36	27	19	15	
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#### CHAPTER 6

## SCS-TR-20 METHOD OF DETERMINING PEAK FLOW

## Introduction

This chapter presents a general description of the "Computer Program for Project Formulation--Hydrology" distributed by SCS through Technical Release No. 20 (SCS-TR-20). A detailed description of the use of the computer program is beyond the scope of this chapter. However, an awareness of its potential use in urban hydrologic studies is important. The program was developed primarily as an evaluation tool for watershed project planning. It provides a procedure for analyzing alternative systems of structural measures. SCS-TR-20 describes in detail the preparation of input data.

#### Areas of Application

Under most conditions seen in the field the hydrologic effects of urbanizing a watershed can be determined by using methods described in chapters 4 and 5. However, consideration should be given to using the computer program when:

- 1. Watersheds are larger than 2,000 acres
- 2. There are many subareas with different runoff characteristics
- 3. Large swamp areas or reservoirs are present
- 4. Historical storm events need to be analyzed

# General Description

The program was developed with strict adherence to a policy of having it (1) as flexible as possible in the use of input data; (2) provide for the maximum use of engineering judgment; (3) engineer-oriented rather than machine-oriented; and (4) described in the FORTRAN system to provide for ease in future extensions, alterations, and recompilation for other computer models.

The program computes surface runoff resulting from any synthetic or natural rainstorm. It takes into account conditions affecting runoff (CN,  $T_c$ , etc.), develops a hydrograph, and routes the hydrograph through stream channels and reservoirs. The computer can combine the routed hydrograph with those from other tributaries and print out the total composite hydrograph, peak discharges, time of occurrence, and the water surface elevation at each desired cross section or structure. Watersheds are analyzed under present conditions and with various combinations of land treatment, floodwater-retarding structures, and channel improvement.

## Capabilities and Limitations

In general, in any one continuous operation, the computer program can:

1. Route through as many as 60 structures and an unlimited number of variations for each structure, including that of having no structure.

- 2. Route through as many as 120 stream reaches and an unlimited number of channel modifications for each reach.
- 3. Compute up to 300 ordinates of a hydrograph and print out the discharge and elevation for each.
- 4. Make an unlimited number of routings through a watershed, including variations in rainfall amounts, rainfall duration, and antecedent moisture condition.
- 5. Develop and route the runoff for nine different storm distributions and for an unlimited number of depths and durations for any storm distribution.
- 6. Combine hydrographs from an unlimited number of tributaries and reaches.

Hydrologic and hydraulic parameters that are affected by urbanization can be varied and used as input to the computer program and the effects can be analyzed.

If it is desired to use the computer program for urban hydrology studies, a copy of SCS-TR-20 can be obtained from any SCS state office. A copy of the source program can be obtained by SCS personnel through the SCS Management Division, Washington, D.C.; other users can obtain a copy through the National Technical Information Service:

National Technical Information Service U.S. Department of Commerce P.O. Box 1553 Springfield, Virginia 22151

6-2

#### METHODS FOR CONTROLLING PEAK DISCHARGES FROM URBANIZING AREAS

#### Introduction

As rural areas urbanize, the increase in peak discharges due to more efficient conveyance paths and increased impervious areas can have a significant adverse impact on downstream areas. There is a growing interest on the part of planners, developers, and the public in protecting downstream areas from induced flood damages that may accompany increased peaks and stages. Planning authorities are proposing local ordinances that restrict the type of development permitted and the impact development can have on the watershed. One of the primary controls being imposed is that future-condition discharges cannot exceed present-condition discharges at some predetermined frequency of occurrence at specified points on the channel.

Earlier chapters discussed methods of determining changes in peak discharges. This chapter discusses types of measures or construction techniques that can be used to control peak discharges from urbanizing areas through planned runoff delay and increased infiltration and presents a procedure for estimating the amount of storage required to maintain peaks at some predetermined level.

## Methods of Reducing or Delaying Urban Runoff

Methods to control runoff in urbanizing areas reduce either the volume or the rate of runoff. The effectiveness of any control method depends on the available storage, the outflow rate, and the inflow rate. Because a great variety of methods can be used to control peak flows, each method proposed should be evaluated for its effectiveness in the given area.

Table 7-1 lists measures for reducing and delaying urban storm runoff. Table 7-2 lists some advantages and disadvantages of each measure. Both tables were adapted from tables prepared at Pennsylvania State University under the direction of Gert Aron, associate professor of civil engineering. Effective measures for reducing peak rates of runoff are, of course, not limited to those listed in table 7-1.

#### Effects of Reducing or Delaying Urban Runoff

The direct reduction of peak flows and volume of runoff through installation of these measures is very difficult to determine. Measures that increase infiltration also reduce runoff. Therefore the runoff curve number will be lower than it would be without the measures. Measures that delay runoff also increase the time of concentration. The degree of change in curve number or time of concentration over the watershed depends on how extensively each measure is applied.

Area	Reducing runoff	Delaying runoff
Large flat roof	<ol> <li>Cistern storage</li> <li>Rooftop gardens</li> <li>Pool storage or fountain storage</li> <li>Sod roof cover</li> </ol>	<ol> <li>Ponding on roof by constricted down- spouts</li> <li>Increasing roof roughness         <ul> <li>a. Rippled roof</li> <li>b. Gravelled roof</li> </ul> </li> </ol>
Parking lots	<ol> <li>Porous pavement         <ul> <li>a. Gravel parking lots</li> <li>b. Porous or punc- tured asphalt</li> </ul> </li> <li>Concrete vaults and cisterns beneath parking lots in high value areas</li> <li>Vegetated ponding areas around parking lots</li> <li>Gravel trenches</li> </ol>	<ol> <li>Grassy strips on parking lots</li> <li>Grassed waterways draining parking lot</li> <li>Ponding and deten- tion measures for impervious areas         <ul> <li>Rippled pave- ment</li> <li>Depressions</li> <li>Basins</li> </ul> </li> </ol>
Residential	<ol> <li>Cisterns for indi- vidual homes or groups of homes</li> <li>Gravel driveways (porous)</li> <li>Contoured landscape</li> <li>Ground-water recharge         <ul> <li>a. Perforated pipe</li> <li>b. Gravel (sand)</li> <li>c. Trench</li> <li>d. Porous pipe</li> <li>e. Dry wells</li> </ul> </li> <li>Vegetated depressions</li> </ol>	<ol> <li>Reservoir or deten- tion basin</li> <li>Planting a high de- laying grass (high roughness)</li> <li>Gravel driveways</li> <li>Grassy gutters or channels</li> <li>Increased length of travel of runoff by means of gutters, diversions, etc.</li> </ol>
General	<ol> <li>Gravel alleys</li> <li>Porous sidewalks</li> <li>Mulched planters</li> </ol>	1. Gravel alleys

Table 7-1.--Measures for reducing and delaying urban storm runoff

	Measure		Advantages		Disadvantages
Α.	Cisterns and covered ponds	2.	Water may be used for: a. Fire protection b. Watering lawns c. Industrial processes d. Cooling purposes Reduce runoff while only occupying small area Land or space above cistern may be used for other purposes	2. 3. 4.	Expensive to install Cost required may be restrictive if the cistern must accept water from large drainage areas Requires slight maintenance Restricted access Reduced available space in basements for other uses
В.	Rooftop gardens	2. 3.	Esthetically pleasing Runoff reduction Reduce noise levels Wildlife enhancement		Higher structural loadings on roof and building Expensive to install and maintain
C.	Surface pond storage (usually resi- dential areas)	2. 3.	Controls large drainage areas with low release Esthetically pleasing Possible recreation benefits a. Boating b. Ice skating c. Fishing d. Swimming Aquatic life habitat Increases land value of adjoining property	2. 3. 4.	Require large areas Possible pollution from storm water and siltation Possible mosquito breeding areas May have adverse algal blooms as a result of eutro- phication Possible drowning Maintenance prob- lems
D.	Ponding on roof by constricted downspouts	2.	Runoff delay Cooling effect for building a. Water on roof b. Circulation through Roof ponding provides fire protection for building (roof water may be tapped in case of fire)	2. 3. 4.	Higher structural loadings Clogging of con- stricted inlet re- quiring maintenance Freezing during winter (expansion) Waves and wave load- ing Leakage of roof water into building (water damage)

Table 7-2.--Advantages and disadvantages of measures for reducing and delaying runoff

	Measure		Advantages		Disadvantages
E.	Increased roof roughness a. Rippled roof b. Gravel on roof	1.	Runoff delay and some reduction (detention in ripples or gravel)	1.	Somewhat higher struc- tural loadings
F.	Porous pavement (parking lots and alleys) a. Gravel park- ing lot b. Holes in im- pervious pavements (1/4 in. φ) filled with sand	2.	Runoff reduction (a and b) Potential ground- water recharge (a and b) Gravel pavements may be cheaper than asphalt or concrete (a)	2. 3. 4.	Clogging of holes or gravel pores (a and b) Compaction of earth below pavement or gravel decreases perme- ability of soil (a and b) Ground-water pollution from salt in winter (a and b) Frost heaving for im- pervious pavement with holes (b) Difficult to maintain Grass or weeds could grow in porous pave- ment (a and b)
G.	Grassed channels and vegetated strips	2.	Runoff delay Some runoff re- duction (infil- tration re- charge) Esthetically pleasing a. Flowers b. Trees		Sacrifice some land area for vegetated strips Grassed areas must be mowed or cut periodi- cally (maintenance costs)
H.	Ponding and detention measures on impervious pavement a. Rippled pavement b. Basins c. Constricted inlets		Runoff delay (a, b, and c) Runoff reduction (a and b)	2. 3.	Somewhat restricted movement of vehicle (a) Interferes with normal use (b and c) Damage to rippled pave- ment during snow re- moval (a) Depressions collect dirt and debris (a, b, and c)

Table 7-2.--Advantages and disadvantages of measures for reducing and delaying runoff--Continued

	Measure	Advantages	Disadvantages
I.	Reservoir or detention basin	<ol> <li>Runoff delay</li> <li>Recreation bene- fits         <ul> <li>a. Ice skating</li> <li>b. Baseball,</li> <li>football, etc</li> <li>if land is pr</li> <li>vided</li> </ul> </li> <li>Esthetically pleating</li> <li>Could control</li> <li>large drain- age areas with</li> <li>low release</li> </ol>	
J.	Converted septic tank for storage and ground- water re- charge	<ol> <li>Low installation costs</li> <li>Runoff reduction (infiltration and storage)</li> <li>Water may be used for:         <ul> <li>a. Fire protection</li> <li>b. Watering lawns and gardens</li> <li>c. Ground-water m charge</li> </ul> </li> </ol>	on S
К.	Ground-water recharge a. Perforated pipe or hose b. French drain c. Porous pipe d. Dry well	<ol> <li>Runoff reduction (infiltration)</li> <li>Ground-water re- charge with relatively clear water</li> <li>May supply water to garden or dry areas</li> <li>Little evaporation loss</li> </ol>	Ţ
L.	High delay grass (high rough- ness)	<ol> <li>Runoff delay</li> <li>Increased infil- tration</li> </ol>	1. More difficult to mow
Μ.	Routing flow over lawn	<ol> <li>Runoff delay</li> <li>Increased infil- tration</li> </ol>	<ol> <li>Possible erosion or scour</li> <li>Standing water on lawn in depressions</li> </ol>

Table 7-2.--Advantages and disadvantages of measures for reducing and delaying runoff--Continued

Preliminary studies at Pennsylvania State University<sup>1</sup> have shown that for one particular situation analyzed (a 200-acre urban watershed) the potential peak flow was reduced by about 8 percent by gravel minidikes on slightly slanted roofs. Also, installing grass-protected infiltration trenches to control runoff from parking lots reduced the flood peak by about 5 percent. Various possible combinations of methods should be evaluated on their particular merit for the watershed under consideration.

# Methods for Estimating the Effect of Storage

When a structure such as a retarding dam or holding pond is installed, hydraulic routing procedures can be used to determine the effect on peak discharges. The SCS-TR-20 program referred to in chapter 6 provides an accurate method for analyzing this situation. A less accurate method has been developed for quickly analyzing effects of storage reservoirs on peak discharges. The method is based on average storage and routing effects for many structures. The storage indication method of routing was used. Figure 7-1 relates the volume of inflow to volume of required storage for a range of peak release rates. Figure 7-2 relates the peak outflow-inflow ratio to the storage-runoff volume ratio where a singlestage pipe spillway or weir is used. Emergency spillway flow is not considered.

The accuracy of the curves in figures 7-1 and 7-2 depends on the relationship between the storage available, the inflow volume, and the shape of the inflow hydrograph. When only a small volume is available for temporary storage, the shape of the outflow hydrograph is very sensitive to the rate of rise of the inflow hydrograph. Conversely, when a large volume is available for storage, the shape of the inflow hydrograph has little effect on the outflow hydrograph which, in this case, is controlled by the hydraulics of the structural system. Therefore, parameters such as runoff curve number and time of concentration, which affect the rate of rise of a hydrograph, become significant parameters in analyzing the effects of structures when the peak outflow rate approaches the peak inflow rate.

In figure 7-1 the peak inflow rate is not a factor in determining storage requirements. It can be seen that the ratio of volume of storage  $(V_s)$  to volume of runoff  $(V_r)$  is relatively high. Therefore, inflow peak is not a significant parameter. Figure 7-1 is usually accurate within 5 percent for release rates under 100 csm (cubic feet per second per square mile) and within 10 percent for release rates over 100 csm.

Figure 7-2 relates the ratio of peaks to volumes. For this case the parameters affecting the shape of the hydrograph are important. In situations where runoff curve numbers are less than 65 in combination with short  $T_c$  values,  $V_s/V_r$  values read from the curve will be up to 25 percent too high. Runoff curve numbers over 85 with long  $T_c$  values cause  $V_s/V_r$  values to be up to 25 percent too low.

<sup>1</sup>Studies of flood peak abatement in urban storm runoff conducted by Gert Aron, assoc. prof. civil eng., Pennsylvania State Univ.

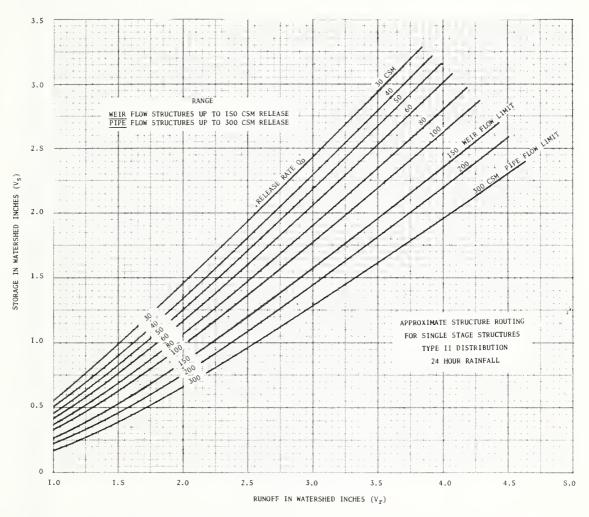


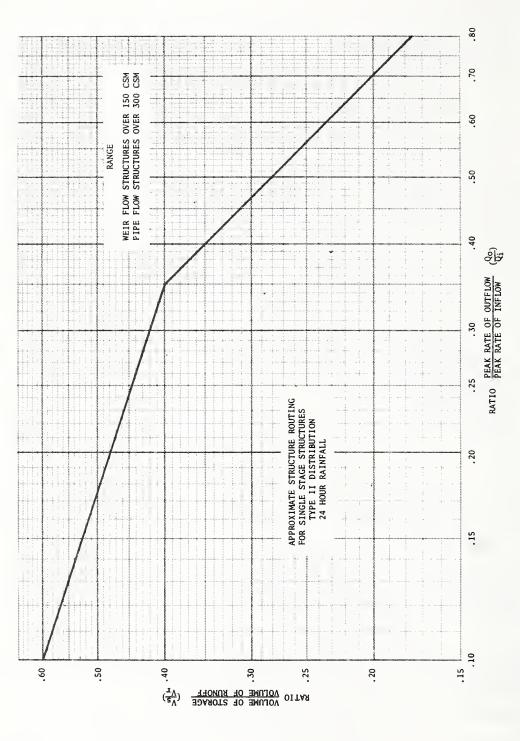
Figure 7-1.--Approximate single-stage structure routing for weir flow structures up to 150 csm release rate and pipe flow structures up to 300 csm release rate.

Figure 7-1 applies to pipe drop inlets of 0 to 300 csm release rate and weir flow structures of 0 to 150 csm release rate. Figure 7-2 applies to pipe drop inlets of over 300 csm release rate and weir flow structures of over 150 csm release rate.

Extrapolation for points falling outside the limits of the curves could introduce a significant error. The steps necessary to use the procedure described in this chapter are:

- 1. Determine the basic watershed parameters (DA, CN, T<sub>c</sub>, etc.).
- 2. Determine the volume of runoff and peak rate of flow from the watershed.





- 3. Set the desired rate of outflow from the structure.
- 4. Determine the required volume of storage from the appropriate figure, 7-1 or 7-2.
- 5. Proportion the storage structure so that the design outflow rate and maximum storage occur at the same stage.

Note that in steps 3 and 4, the storage volume could be set and the resulting rate of outflow determined from figures 7-1 and 7-2. For structures with drainage areas over 2,000 acres and for events of less than 2-year frequency, the SCS-TR-20 program discussed in chapter 6 should be used. The following examples show how figures 7-1 and 7-2 are used.

#### Example 7-1

A developer is attempting to secure a permit to install a 4.2-acre-ft detention reservoir at the outlet of a proposed 75-acre development for storm water management. Based on procedures described in chapter 4, the present peak discharge of the design storm is 180 cfs (cubic feet per second), the future runoff is 3.4 inches, and the future peak discharge is 360 cfs. Using the stage-discharge and stage-storage curves shown in figure 7-3, determine whether the proposed structure will reduce the future-condition peak discharge to 180 cfs.

For this example, 180 cfs is the desired outflow  $\rm Q_O$  and 360 cfs is the future-condition discharge into the reservoir  $\rm Q_i.$  Inflow runoff  $\rm V_r$  is 3.4 inches.

1. Select the proper figure to use in the shortcut routing method.

$$Q_0 = 180 \text{ cfs} (\text{present peak})$$
  
=  $\frac{180 \text{ cfs} (640 \text{ acres/mi}^2)}{75 \text{ acres}} = 1,536 \text{ csm}$ 

Since  $Q_0$  is greater than 300 csm, use figure 7-2.

2. Compute  $\frac{Q_0}{Q_1}$  (must be in same units).

$$\frac{20}{2} = \frac{180 \text{ cfs}}{360 \text{ cfs}} = 0.5$$

3. Determine  $V_S$  (volume storage).

With 
$$\frac{Q_0}{Q_1} = 0.5$$
, enter figure 7-2 and find  $\frac{V_s}{V_r} = 0.28$ .

7-10

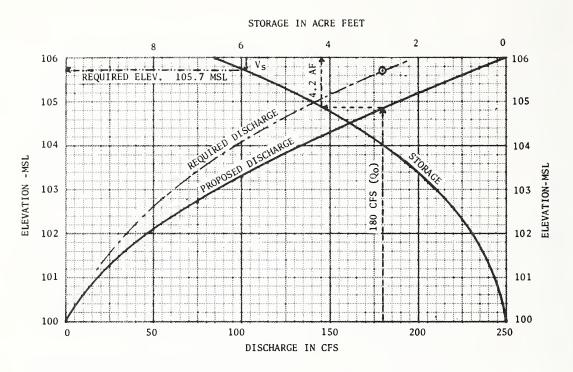


Figure 7-3.--Stage-discharge and stage-storage relationship for structure A in example 7-1.

Since  $V_n = 3.4$  inches, then

$$V_s = 0.28 (3.4) = 0.95 \text{ in}$$
  
=  $\frac{0.95 \text{ in} (75 \text{ acres})}{12 \text{ in/ft}} = 5.9 \text{ acre-ft}$ 

- 4. Determine available storage. From figure 7-3 the elevation of the crest of the emergency spillway must be 104.8 msl (mean sea level) to discharge 180 cfs. At this elevation the available storage is 4.2 acre-ft.
- 5. Evaluate proposed structure.

The required storage of 5.9 acre-ft is greater than the 4.2 acre-ft provided by the proposed structure. The structure should be redesigned to raise the crest of the emergency spillway to 105.7 msl (5.9 acre-ft), and the principal spillway should be modified so that it will discharge 180 cfs at 105.7 msl.

## Example 7-2

Based on the conditions in example 5-1, determine the release rate and the storage required at structure 6A located near the outlet of subarea 6 to maintain the peak discharge at the existing rate at the outlet of the watershed. Refer to figure 5-1 and tables 5-1 and 5-2. Assume a pipe drop inlet spillway for the structure.

1. From table 5-2, subtract the future-condition flow contribution by subarea 6 from the future composite hydrograph as follows:

Hydrograph	Time (hours)								
location	13.0	13.2	13.5	14.0	14.5				
Composite discharge (cfs)	819	858	894	774	603				
Subarea 6 discharge (cfs)	371	333	245	138	85				
Composite discharge minus subarea 6 (cfs)	448	525	649	636	518				

Note that the partial composite hydrograph peak is 649 cfs at the outlet of the watershed.

2. Since the present-condition maximum peak discharge at the outlet is 752 cfs, the release rate of structure 6A cannot exceed 752 cfs minus the peak of the partial composite hydrograph. Therefore,

maximum release rate = 752 - 649 = 103 cfs

3. Determine peak outflow  $(Q_0)$  in csm from proposed structure 6A.

$$Q_0 = \frac{103 \text{ cfs}}{0.4 \text{ mi}^2} = 258 \text{ csm}$$

- 4. A pipe drop inlet with 258 csm maximum release rate will be routed. Use figure 7-1 since the release rate is less than 300 csm.
- 5. Determine required storage  $(V_S)$ . With  $Q_O = 258 \text{ csm}$ ,  $V_r = 3.28 \text{ in}$ . (future-condition runoff for subarea 6). Enter figure 7-1 and find

$$V_{\rm S} = 1.55$$
 in  
=  $\frac{1.55 \text{ in } (640 \text{ acres/mi}^2)(0.4 \text{ mi}^2)}{12 \text{ in/ft}} = 33.1 \text{ acre-ft}$ 

Therefore, the storage required to maintain the peak discharge at the present rate at the watershed outlet is 1.55 inches or 33.1 acre-ft. The pipe spillway must be designed to provide 103 cfs outflow at 33.1-acre-ft storage.

# Example 7-3

Determine the release rates and storage required to maintain present peaks for two structures, one located at the outlet of subarea 4 (site 4A) and one at the outlet of subarea 6 (site 6A) as shown in figure 5-1 and example 5-1. Structure 4A will have a pipe drop inlet spillway and 'structure 6A will have a straight drop spillway. 1. The decision on the amount of reduction to be accomplished at each structure is more or less arbitrary. Several alternatives should be studied to find the optimum design. This example will illustrate one trial calculation to show the procedure used. First subtract futurecondition outflows of subareas 4 and 6 from the future composite hydrograph as follows:

Hydrograph	Time (hours)								
location	13.00	13.20	13.50	14.00	14.50				
Composite discharge (cfs)	819	858	894	774	6 <b>03</b>				
Subarea 4 discharge (cfs)	58	103	188	174	106				
Subarea 6 discharge (cfs)	371	333	245	138	85				
Composite discharge minus subareas 4 and 6 (cfs)	390	422	461	462	412				

Note that the partial composite hydrograph peak discharge is 462 cfs.

- 2. The combined release rates of the two structures can be 752 cfs (desired peak) less 462 cfs (partial composite peak). Therefore structure 4A release and structure 6A release equals 752 minus 462, or 290 cfs.
- 3. It is now necessary to decide the distribution of the 290 cfs release rate between the two structures. For a first trial assume structure 6A release is 200 cfs and structure 4A release is 90 cfs.
- 4. Determine storage required in structure 6A.
  - a.  $Q_0 = 200 \text{ cfs} = \frac{200 \text{ cfs}}{0.4 \text{ mi}^2} = 500 \text{ csm}$ . Since  $Q_0$  is more than 300 csm, use figure 7-2.
  - b. Since figure 7-2 is to be used, the peak inflow  $(Q_i)$  at the outlet of subarea 6 must be determined.

Do not use 371 cfs or 245 cfs, because the discharges in table 5-2 and in step 1 above are subarea contributions at the outlet of subarea 7 and not the peak inflow at subarea 6.

Enter table 5-3 for  $T_{\rm c}$  = 1.00 hr (sheet 4 of 5) and  $T_{\rm t}$  = 0 and find Q\_i = 316 csm per inch of runoff.

$$Q_1 = 316 (V_n) = 316 (3.28) = 1,036 \text{ csm}$$

c. Compute required storage  $(V_S)$ .

With  $Q_0 = 500 \text{ csm}$  and  $Q_1 = 1,036 \text{ csm}$ ,

$$\frac{Q_0}{Q_1} = \frac{500}{1,036} = 0.48$$

From figure 7-2,  $\frac{V_S}{V_r}$  = 0.29 and with  $V_r$  = 3.28 in (future-condition runoff)

$$V_s = 0.29 (V_r) = 0.29 (3.28) = 0.95 in$$

$$= \frac{0.95 \text{ in } (640 \text{ acres/mi}^2) (0.40 \text{ mi}^2)}{12 \text{ in/ft}} = 20 \text{ acre-ft}$$

5. Determine storage required in structure 4A.

Since  $Q_0 = 360$  csm and the outflow structure is a pipe drop inlet, use figure 7-2.

b. Since figure 7-2 is to be used, the peak inflow  $(Q_i)$  at the outlet of subarea 4 must be determined. Enter table 5-3 for  $T_c = 0.75$  and  $T_t = 0$  and find  $Q_i = 388$  csm per inch of runoff.

$$Q_i = 388 (V_r) = 388 (2.80) = 1,086 \text{ csm}$$

c. Compute required storage  $(V_S)$ .

With  $Q_0 = 360 \text{ csm}$  and  $Q_1 = 1,086 \text{ csm}$ ,

$$\frac{Q_0}{Q_1} = \frac{360}{1,086} = 0.33$$

From figure 7-2 read  $\frac{V_S}{V_T}$  = 0.41, and with  $V_T$  = 2.80 in,  $V_S$  = 0.41 (2.80) = 1.1 in

$$= \frac{1.1 \text{ in } (640 \text{ acres/mi}^2)(0.25 \text{ mi}^2)}{12 \text{ in/ft}} = \frac{15 \text{ acre-ft}}{15 \text{ acre-ft}}$$

6. Summary

Structure	Drainage area		<u>Qo</u>	Storage		
4A	2 .25	<u>csm</u> 368	<u>cfs</u> 90	<u>acre - ft</u> 15		
6A	.40	500	200	<u>20</u>		
Total			290	35		

Other trial calculations can be made to determine the most economical allocation of storage between the two structures that still maintains a combined release rate of 290 cfs.



## APPENDIX A

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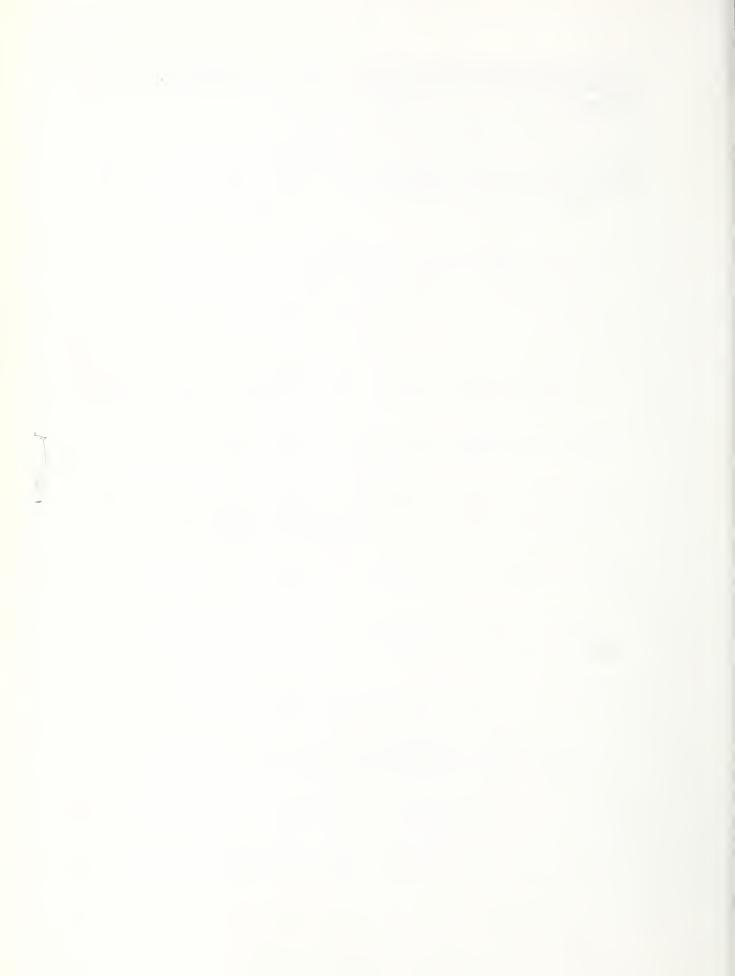
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#### APPENDIX B

# SOIL SERIES AND HYDROLOGIC SOIL GROUPS

This appendix provides soil names and their hydrologic classification used in determining soil-cover complexes in chapter 2 of this technical release. The hydrologic parameter, A, B, C, or D, is an indicator of the minimum rate of infiltration obtained for a bare soil after prolonged wetting. By using the hydrologic classification and the associated land use, runoff curve numbers can be computed as shown in chapter 2.

The hydrologic soil groups, as defined by SCS soil scientists, are:

- A. (Low runoff potential). Soils having a high infiltration rate even when thoroughly wetted and consisting chiefly of deep, well to excessively drained sands or gravels.
- B. Soils having a moderate infiltration rate when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse texture.
- C. Soils having a slow infiltration rate when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water or soils with moderately fine to fine texture.
- D. (High runoff potential). Soils having a very slow infiltration rate when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material.

						40050			
AASTAD	8	AKAKA AKASKA	A B	AMADDR Amagon	D	ARBUCKLE	8 8	ATLEE	C 8/D
ABAJD	ĉ	AKELA	č	AMALU	Ď	AKCATA	8	ATOKA	c
ABBUTT	0	ALADDIN	в	AMALO	8	ARCH	8	ATSION	č
ABBOTTSTOWN	č	ALAE	A	AMARGDSA	Ď	ARCHABAL	8	ATTERBERRY	B
ABEGG	B	ALAELOA	ê	AMARILLC	8	ARCHER	č	ATTEWAN	Ă
ABELA	8	ALAGA	A	AMASA	8	ARCHIN	č	ATTICA	8
ABELL	ŭ	ALAKAI	ĉ	AMBERSON	-	ARCO	ě	ATTLEBORD	
ABERDEEN	D	ALAMA	с	AMBCY	с	ARCOLA	с	ATWATER	8
ABES	D	ALAMANCE	в	AMBRAW	с	ARD	c	ATWELL	c
ABILENE	с	ALAMC	C	AMECEE	A	ARDEN	8	ATWCOD	8
ABINGTON	8	ALAMOSA	C	AMELIA	8	ARUENVUIR	8	AUBBEENAUBBEE	8
ABIQUA	C	ALAPAHA	Û	AMENIA	8	ARDILLA	с	AUBERRY	8
ABU	8	ALAPAI	A	AMERICUS	A	AREDALE	в	AUBURN	С
ABKA	C	ALBAN	8	AMES	С	ARENA	С	AUBURNDALE	D
ABRAHAM	8	ALRAND	C	AMHERST	С	ARENALES	Α	AUDIAN	8
ABSARUKEE	C	ALBANY	С	AMITY	С	ARENDISVILLE	6	AU GRES	с
ABSCUTA	8	ALBATON	D	AMMON	8	ARENOSA	A	AUGSBURG	в
ABSHER	D	ALVEE	С	AMOLE	С	ARENZVILLE	B	AUGUSTA	с
ACACIO	С	ALBEMARLE	8	AMOR	8	ARGONAUT	D	AULD	D
ACADENY	C	ALBERTVILLE	C	AMDS	C	ARGUELLD	8	AURA	B
ACADIA	D	ALBIA	C	AMSTERDAM	8	ARGYLE	в	AURORA	C
ACANA	Ð	ALGION	e	AMTCFT	D	ARIZO	A	AUSTIN	c
ACEITUNAS	8	ALBRIGHTS ALCALDE	C C	ΑΜΥ ΑΝΑζΑΡΑ	D B	ARKABUTLA ARKPORT	С В	AUXVASSE	D B
ACKEP	8	ALCESTER	с 8	ANAHUAC	0	ARLANC	8	AVA	č
ACKMEN	8	ALCUA	5	ANAMITE	D	ARLING	c	AVALANCHE	B
ACME	č	ALCONA	в	ANAPRA	8	ARLINGTON	Ă	AVALON	6
ACO	8	ALCOVA	ë	ANATONE	D	ARLDVAL	ĉ	AVERY	8
ACHLITA	8	ALDA	č	ANAVERDE	8	APMAGH	Ď	AVCN	č
ACOVE	č	ALDAX	Ď	ANCHO	č	ARMINGTUN	Ď	AVONBURG	ŏ
ACTON	8	ALUEN	C	ANCHERAGE	٨	ARMO	8	AVONDALE	в
ACUFF	8	ALDER	ē	ANCHOR BAY	D	ARMOUR	8	AWBREY	õ
ACHURTH	8	ALDERDALE	Ċ	ANCHOR PGINT	8	ARMSTEP	C	AXTELL	D
AOA	в	AL DE RWUOD	c	ANCLUTE	С	ARMSTRENG	D	AYAR	C
ADAIY	D	ALDIND	c	ANCO	С	ARMUCHEE	C	AYCCCK	8
ADAMS	A	ALEKNAGIK	8	ANCERS	C	ARNEGARD	8	AYR	8
ADAMSUN	B	ALEX	8	ANDERSON	в	ARNHART	С	AYRES	D
ADAMSTINWN		ALFXANDRIA	C	ANCES	С	AKNHEIM	С	AYRSHIRE	С
ADAMSVILLE	C	ALEXIS	8	ANCCRINIA	С	ARNŪ	D	AYSEES	8
ADATUN	D	ALFORD	6	ANDDVER	Ð	ARNGLD	8	AZTALAN	8
ACAVEN	0	ALGANSEE	8	ANCRES	в	AKNUT	C/D	AZTEC	8
ADDISON	D	ALGIERS	C/D	ANCREWS	С	AROC STOCK		AZULE	С
ADDY	C	ALGDMA	0 <b>1</b> 6	ANED	D	ARDSA	D	AZWELL	8
ADE	A	ALICE	Α	ANETH	Α	ARP	D		
ADEL	A	ALICEL	B	ANGELICA	Ū 0.10	AKRINGTON	в	BABB	A
ADELATCE	D	ALICIA	C	ANGELINA	B/D	ARRGLIME	C	BABBINGTON	8
ADELANTG	8	ALIDA	9	ANGIE	C A	ARREN	С В	BABCOCK	8 A
ADELPHIA	C	ALIKCHI	8	ANGLE		ARREW		BABYLON	
ADENA ADILLIS	C A	ALKD ALLAGASH	D B	ANGLEN ANGCLA	8 C	AFRÖWSMITH Arta	B C	BACA Bach	C D
ADIRONDACK	~	ALLARD		ANGESTURA	8	ARTOIS	č	BACHUS	8
ACKINS	8	ALLEGHENY	ы В	ANIAK	D	ARVACA	Ď	BACKBONE	Å
ADLEN	c	ALLEMANDS	υ	ANITA	D	ARVANA	č	BADENAUGH	8
ADUL 2H	D	ALLEN	μ	ANKENY	A	ARVESON	c	BADGER	č
ADAIAN	A/D	ALLENDALE	ċ	ANLAUF	ĉ	AKVILLA	ē	BADGERTON	ě
AENEAS	в	ALLENSVILLE	č	ANNABELLA	Ā	AKZELL	č	BADO	D
AETNA	8	ALLENTINE	0	ANNANDALE	c	ASA	8	BADUS	с
AFTON	D	ALLENWOOD	в	ANNISTON	8	ASBURY		BAGCAD	8
AGAR	в	ALLEY	С	ANDKA	Α	ASCALON	8	3AGGOTT	Ð
AGISSIZ	D	ALLIANCE	8	ANCNES	c	ASCHUFF	ы	BAGLEY	8
AGATE	P	ALLIGATOR	E .	ANSELMC	Α	ASCEROFT	8	BAHEM	8
A G A WA M	в	ALLIS	D	ANSON	8	ASHBY	С	BAILE	D
AGENCY	С	ALLISCN	С	ANTELOPE SPRINGS	C	ASHCALE	8	BAINVILLE	С
AGER	D	ALLCUEZ	C	ANTERC	с	ASHE	8	BAIRD HOLLOW	с
AGNER	в	ALLOWAY		ANT FLAT	C	ASHKUM	C	BAJURA	D
AGNEW	8/0	ALMAC	8	ANTHONY	8	ASHLEY	A	BAKEOVEN	D
AGNUS AGUA	8 8	ALMENA	c	ANTIGO	8 8	ASH SPRINGS	C	BAKER DAGE	С В
AGUADILLA	B ▲	ALMONT ALMY	0	ANTILON		ASHTON	8 8	BAKER PASS	A
AGUA CULCE	C	ALCHA	е С	ANTICCH ANTLER	D C	ASHUELOT	ĉ	BALAAM Balch	Ď
AGUA FRIA	c	ALUNSO	в	ANTCINE	č	ASHICOD	ĉ	BALCOM	в
AGUEDA	8	ALLYAR	c	ANTY	8	ASKEN	č	BALD	č
AGUILITA	в	ALPENA	в	ANKAY	в	ASC	ō	BALGER	č
AGUIKES	D	ALPON	в	ANZA	6	ASCTIN	č	BALDOCK	B/C
AGUSTIN	R	ALPCHA	в	APACHE	D	ASPEN	8	BALCHIN	D
AHATONE	D	ALPS		APAKUIE	A	ASPERMENT	8	BALDY	8
AHL	с	ALSEA	۴	APISHAPA	c	ASSINNIBOINE	8	BALE	C
AHLSTEDM	c	ALSTAD	8	APISCN	8	ASSUMPTICN	в	BALLARD	ы
AHMEEK	в	ALSTEWN	P	APPIAN	D	ASTATULA	A	BALLINGER	C
AHUL T	0	ALTAMONT	C	APPL:CATE	L	ASTER	A/D	BALF	B/C
AHTANUM	C	ALTAVISTA	Ċ	APPLETCK	С	ASTONIA	8	BALPAN	8/C
AHWAH OF E	C	ALTOORE	r	APPLING	9	ATASCAUERO	C	BALCN	8
AIGONITO	C	ALTMAR	н	APRCK	в	ATCC	8	BALTIC	D
AIKEN	ь	ALTO	C	APT	C	ATEFIC	C	PALTIMORE	e
AIKMAN	٥ ٥	ALTUGA	С	APTAKISIC	5	ATHELWOLD	в	BAMBER	в
AILEY	<u>р</u>	ALTON	5	AFABY		ATHENA	в	BAMFORTH	в
AINAKEA	6	ALTUS ALTVAN	в		в	ATHENS ATHERTLN	в	BANCAS	B
ALFOTSA	С Н	ALIVAN	ь Н	ARAPIEN	C		E/C	BANCROFT	8 8
ALADICA	в D	ALVIN ALVINA	C C	ΑΚΑΥΕ ΛΚΑΥΕΤΟΝ	D 8	ATHEL ATKINSON	ь В	BANDERA BANGG	C
AITS	3	ALVIXA	U U	ARAVETEN	e L	ATLAS	8 0	BANGUR	с в
	.,		0	HOTCLA	C C	ALLAS	U		U

NOTES A BLACK HYDROLOGIC SOLL CROUP INCLOSES THE SOLL CROUP HAS NOT PEED DETERMINED TWO SOLL GROUPS SUCH AS BYC INCLOSES THE DRAINED/UNDRAINED SITUATION

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BANGSTUN	۵	BEATTY		BERTELSCN	A	BLAKENEY	с	BORDA	D
BANKARD	Â	BEAUCOUP	в	BERTHOUD	8	BLAKEPCRT	8	BORDEAUX	B
HANKS	A	BEAUFORD	D	BERTIE	с	BLAMER	С	BORDEN	8
BANNER	с	BEAUMONT	D	BERTOLOTTI	8	BLANCA	в	BORDER	8
BANNFRVILLE	C/D	BEAUREGARD	с	BERTRANC	8	BLANCHARD	Α	BORNSTEDT	8
BANNOCK	8	BEAUSITE	8	BERVILLE	D	BLANCHESTER	8/D	BORREGO	С
BANQUE LE	Ð	BEAVERTON	8	BERYL	8	BLAND	C	BORUP	8
BARABOI	8	BECK	с	BESSEMER	8	BLANDFURD	с	BORVANT	D
BARAGA	C	BECKER	8	BETHANY	c	BLANDING	8	BORZA	C
BARBARY	D	BECKET	C	BETHEL	D C	BLANEY BLANKET	B C	80 SANKC 80 SCO	D
BARBOUR	8 8	BECKLEY BECKTON	e D	BETTERAVIA BETTS	8	BLANTON	Å	BOSKET	8 8
BAR BOURVILLE BARCLAY	č	BECKWITH	c	BEULAH	8	BLANYON	ĉ	BOSLER	8
BARCO	в	BECKWOURTH	8	BEVENT	8	BLASINGAME	č	BOSQUE	8
BARCUS	8	BECREEK	в	BEVERLY	8	BLENCOE	č	8055	D
BARD	Ď	BEOFCRO	č	BEW	Ď	BLENC	Ď	BOSTON	č
BARDEN	c	BEDINGTON	8	BEWLEYVILLE	8	BLENDON	8	BOSTWICK	8
BARDLEY	ċ	BEDNER	С	BEWLIN	D	BLETHEN	8	BOSWELL	D
BARELA	с	BEEBE	Α	BEXAR	С	BLEVINS	8	BOSWORTH	D
BARFIELD	D	BEECHER	С	BEZZANT	B	BLICHTON	D	BOTELLA	8
BARFUSS	8	BEFCHY		8188	8/0	BLISS	D	BOTHWELL	C
BARKER	C	BEEHIVE	8	BIBON	A	BLOCKTON	c	BOTTINEAU	с
BARKERVILLE	c	BEEZAR	8	BICKELTCN	8 C	BLODGETT	A 8	BOTTLE	A
BARKLEY	8	BEHANIN	8	BICKMORE	c	BLOMFORD	č	BOULDER	8
BARLANE BARLOW	D 8	BEHEMOTUSH Bejucos	8 8	8ICCNDOA BIDDEFORD	D	BLGOM BLOOMFIELD	A	BOULDER LAKE BOULDER POINT	0 8
BARNARD	Ď	BELDEN	Ď	BIDOLEMAN	č	BLUCHING	8	BOULFLAT	D
BAKNES	8	BELDING	в	BIOWELL	8	BLOGR	D	BOURNE	č
BARNESTON	8	BELFAST	8	BIEBER	õ	BLOSSOM	č	BOW	č
BARNEY	A	BELFIELD	в	BIENVILLE	A	BLOUNT	c	BOWBELLS	8
BARNHARDT	8	BELFORE	в	BIG BLUE	D	BLUCHER	С	BOWDOIN	D
BARNSTFAD		BELGRADE	8	BIGEL	A	BLUEBELL	С	BOWDRE	С
BARNUM	8	BEL INDA	D	BIGETTY	С	BLUE EARTH	D	BOWERS	С
BARKADA	Ð	BELKNAP	c	BIGGS	Δ	BLUEJCINT	8	BOWIE	8
BARRINGTON	8	BELLAMY	8	BIGGSVILLE	8	BLUE LAKE	A	BOWPAN	8
BARRON	8	BELLAVISTA	D	BIG HORN	C	BLUEPGINT	8	BOWMANSVILLE	C
BARRONETT	C D	BELLE	8	BIG TIMBER	DA	BLUE STAR	8 8	BOX ELDER	c
BARROWS	D	BELLEFONTAINE BELLICUM	8	BIGWIN BIJCU	Å	BLUEWING BLUFFDALE	č	BOXWELL BOY	C A
BARSTOW	8	BELLINGHAM	č	BILLETT	Å	BLUFFTON	D	BOYCE	8/D
BARTH	č	BELLPINE	č	BILLINGS	ĉ	BLUFORD	Ď	8070	0
BARTLE	õ	BELMONT	в	BINEORD	8	BLY	8	BOYER	Б
BARTON	8	BELMORE	8	BINGHAM	8	BLYTHE	D	BOYNTON	-
BARTONFLAT	в	BELT	D	BINNSVILLE	D	BDARCTREE	č	BOYSAG	D
BARVON	č	BELTED	D	BINS	8	8 OB S	Ď	BOYSEN	8
BASCOM	8	BELTRAMI	8	BIPPUS	8	BOETAIL	8	BOZ AR TH	С
BASEHOR	D	BELTSVILLE	С	BIRCH	Α	BOCK	8	BOZE	B
BASHAW	D	BELUGA	с	BIRCHWOOD	с	BODENBURG	8	BOZEMAN	A
BASHER	R	BELVCIR	c	BIRDS	с	BUDINE	6	BRACEVILLE	c
BASILE	D	BENCLARE	c	BIRCSALL	D	BOEL	A	BRACKEN	D
BASIN	c	BENEVOLA	c	BIRDSBORO	8	BOELUS	A	BRACKETT	c
BASINGER BASKET	с с	BENEWAH BENFIRLD	с с	BIRCSLEY BIRKGECK	D 8	BOETTCHER BOGAN	C C	BRAD BRADDOCK	D C
BASS	Ă	BENGE	e	BISBEE	∆	BOGART	8	BRACENTON	870
BASSEL	8	BEN HUR	в	BISCAY	ĉ	BUGUE	D	BRACER	c
BASSETT	в	BENIN	D	BISHOP	8/C	BUHANNUN	č	BRADFORD	8
BASSLER	D	BENITO	D	BISPING	8	BCHEMIAN	8	BRADSHAW	Ā
BASTIAN	D	BENJAMIN	D	BISSELL	8	BUISTFORT	с	BRADWAY	с
BASTROP	B	BEN LOMOND	8	BIT	D	BOLAR	С	BRACY	8
BATAVIA	8	BENMAN	Δ	BITTERON	Α	BCLD	8	BRACYVILLE	С
BATES	8	BENNCALE	8	BITTERRCOT	с	BOLES	с	BRAHAM	e
BATH	c	BENNETT	c	BITTER SPRING	ç	BGLIVAR	8	BRAINERD	B
BATTLE CREFK	C	BENNINGTON	D	BITTERSPRING	c	BOLIVIA	8	BRALLIER	D
BATZA BAUDETTE	С 8	BENOIT BENSCN	с с/р	BIXBY BJCRK	8 C	BOLTON BOMBAY	8 8	BRAM BRAMARD	8 8
BAUER	č	BENTONVILLE	070	BLACHLY	c	BON	8	BRAMBLE	č
BAUGH	8/C	BENZ	D	BLACK BUTTE	č	EONACCURD	C	BRAMWELL	D
BAXTER	8	BECTIA	в	BLACK CANYON	D	BONAPARTE	A	BRAND	D
BAXTERVILLE	8	BEGWAWE	Ď	BLACKCAP	A	BCND	ĉ	BR ANDE NBURG	A
BAYAMON	8	BERCAIL	С	<b>BLACKETT</b>	8	BGNURANCH	D	BRANDON	в
BAYARD	Α	BERDA	8	BLACKFOUT	8	BENDURANT	8	BRANDYWINE	С
BAYBORD	D	BEREA	С	BLACKHALL	D	BONE	D	BRANFORD	8
BAYSHORE	8/0	BERENICETON	P	BLACKHAWK	D	BONG	8	BRANTFORD	8
BAYSIDE BAYWO(1)	C A	BERENT	Δ	BLACKLEAF	8	BONHAM	C	BRASHEAR	C
BAZETTE	ĉ	BERGLAND	D	BLACKLOCK	D	BONILLA	8	BRASSFIELD	8
BEAD	č	BEKGSTRUM BERINO	8 8	FLACKMAN BLACK MCUNTAIN	C B	BCNITA BCNN	D	BRATTON BRAXTON	8 C
BEADLE	č	BERKELEY	0	BLACKCAR	č	BONNER	8	BRAYMILL	870
BEALES	Ā	BERKS	с	BLACKPIPE	č	BONNET	8	BRAYS	0
BEAR BASIN	8	BERKSHIRE	8	BLACK RIDGE	č	BCNNEVILLE	8	BRAYTON	č
BEAR CREEK	С	BERLIN	С	BLACKRCCK	8	BGNNICK	Α	BRAZITO	A
BEARDALL	С	BERMUDIAN	8	BLACKSTCN	8	BONNIE	C	BRAZOS	А
BEARDEN	с	BERNAL	С	BLACKTAIL	8	BUNG	D	BRECKENRIDGE	D
BEARDSTOWN	с	BERNALOO	в	BLACKWATER	D	BONSALL	D	BRECKNCCK	8
BEAR LAKE	D	BERNARD	υ	BLACKWELL	8/D	BONTA	c	BREECE	8
BEARMOUTH	A	BERNARDINU	C	BLADEN	D	BONTI	c	BREGAR	0
BEARPAW Bear praipie	8 8	BERNARDSTON	C	BLACC	D	BCOKER	D	BREMEN	8
BEAFSKIN	D	BERNHILL BERNICE	B	BLAINE	B	BCOMER	8	BREMER	8
BEASLEY	č	BERNING	ĉ	BLAIR BLAIRTCN	C C	BOUNE BCONESBORG	8	BREMO BREMS	C A
BEASUN	č	REFRENDOS	D	PLAKE	č	BOUTH	ĉ	BRENDA	ĉ
BEATON	č	BERRYLAND	ē	BLAKELAND	A	BURAH	A	BRENNAN	8
	NOTES			SOIL GPOUP INDIG					0
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BRENNER BRENT	C / D C	BUCKLEY	B∕C D	CAID CAIRO	8 D	CAPUTA CARACO	с с	CATLIN CATNIP	8 D
BRENTON	B	BUCKNER	Α	CAJALCO	c	CARALAMPI	B	CATECTIN	С
BRENTWOOD	8	BUCKNEY BUCKS	A B	CAJCN CALABAR	A D	CARBO CARBOL	C D	CATLOSA	B
BRESSER BREVARD	B B	BUCKSKIN	č	CALABASAS	č	CARBONDALE	Ď	CAT SKILL CAT TARAUGUS	ĉ
BREVORT	6	BUC OD A	С	CALAIS	С	CARBURY	в	CAUDLE	в
BREWER	С	BUDD	B	CALAMINE	0	CARDIFF	B	CAVE	D
BREWSTER BREWTON	D C	BUDE BUDE	C C	CALAPOOYA Calawah	С В	CARCINGTON CARDON	C D	CAVE ROCK Cave	A D
BRICKEL	č	BUELL	Ă	CALCO	С	CAREY	8	CAVODE	č
BRICKTON	С	BUENA VISTA	8	CALDER	D	CAREY LAKE	в	CAVCUR	D
BRIDGE	C	BUFFINGTON	B C	CALDWELL	B C	CAREYTOWN	D	CAWKER	8
BRIDGEHAMPTON BRIDGEPORT	B B	BUFF PEAK BUICK	c	CALEAST CALEB	B	CARGILL CARIBE	С В	CAYAGUA CAYLOR	C B
BRIDGER	A	BUKREEK	8	CALERA	č	CARIBEL	8	CAYLGA	č
BRIDGESON	8/C	BULLION	D	CALHI	A	CARIBOU	8	CAZADERC	с
BRIDGEVILLE	B	BULLREY	8 6	CALHOUN	D	CARLIN CARLINTON	D B	CAZADOR CAZENOVIA	B
BRIDGPORT BRIEDWELL	6 6	BULL RUN BULL TRAIL	8	CALIFCN	c	CARLISLE	A/D	CEBOLIA	ĉ
BRIEF	8	BULLY	8	CALIPUS	в	CARLCTTA	8	CEC IL	8
BRIENSBURG		EUMGARD	в	CALITA	B	CARLEW	D	CEDARAN	D
BR IGGS BR IGGSDAL E	A C	EUNCOMBE BUNDO	A B	CALIZA CALKINS	A C	CARL SBAD CARL SBDRG	C A	CEDAR BUTTE CEDAREDGE	C 8
BRIGGSVILLE	č	PUNEJUG	č	CALLAHAN	č	CARLSON	ĉ	CEDAR MT.	ŏ
BRIGHTON	A/D	BUNKER	D	CALLEGUAS	D	CARLTON	в	CEDARVILLE	B
BRIGHTWOUD	C	BUNSELMEIER	C 8/C		с с	CARMI	8	CEDONIA	8
BRILL BRIM	B C	BUNTINGVILLE BUNYAN	8	CALLCWAY CALMAR	в	CARNEGIE CARNERO	с с	CEDRUN CELAYA	C/D B
BRIMFIELD	C/D	BURBANK	Ă	CALNEVA	č	CARNEY	D	CELETON	D
BRIMLEY	B	BURCH	в	CALCUSE	в	CAROLINE	C	CELINA	c
BRINEGAR BRINKERTON	B D	BURCHARD	B B/C		в D	CARR CARRISALITOS	B D	CELIO	A C
BRISCOT	8	BURDETT	c 2	CALVERT CALVERTCN	č	CARRIZE	A	CELLAR CENCOVE	8
BRITE	С	BUREN	С	CALVIN	С	CARSC	D	CENTER	С
BRITTON	c	BURGESS	8	CALVISTA	D	CARSON	D	CENTER CREEK	в
BRIZAM BRUAD	A C	BURGI BURGIN	B D	CAM CAMAGUEY	B D	CARSTAIRS CARSTUMP	B C	CENTERFIELD	8 D
BROADALBIN	č	BURKE	č	CAMARGO	8	CARTAGENA	Ď	CENTRALIA	8
BROADAX	в	BURKHARDT	B	CAPARILLO	B/C	CARTECAY	С	CENTRAL POINT	в
BRDADBROGK BROAD CANYON	С В	BURLEIGH BURLESON	D	CAMAS CAMASCREEK	A 8/D	CARUSC CARUTHEPSVILLE	C B	CERESCO CERRILLOS	A C
BRUADHEAD	č	BURLINGTON	A	CAPBERN	C 870	CARVER	A	CERRO	c
BROADHURST	Ď	BURMA	-	CAMERIDGE	č	CARWILE	ĉ	CHACRA	č
BROCK	D	BURMESTER	D	CAPCEN	B	CARYVILLE	в	CHAFFEE	С
BROCKLISS BPOCKMAN	с с	BURNAC BURNETTE	C B	CAMERON CAMILLUS	D e	CASA GRANDE CASCADE	с с	CHAGRIN	8
BRUCKPURT	D	BURNHAM	D	CAMP	6	CASCAJO	в	CHAIX CHALFONT	в C
BROCKTON	D	BURNSIDE	в	CAMPBELL	B/C	CASCILLA	в	CHALMERS	c
BROCKWAY	8	BURNSVILLE	6	CAMPHDRA	ы В	CASCO	B	CHAMA	8
BRÚDY BROGAN	с С	BURNT LAKE BURRIS	В D	CAMPIA CAMPIC	B C	CASE CASEBIER	8 0	CHAPBER CHAMBERINO	с с
BROGUEN	8	BURT	õ	CAMPONE	B/C	CASEY	č	CHAMISE	B
BRDLLIAR	D	BURTON	8	CAPPSPASS	С	CASHEL	С	CHAPOKANE	8
BROMO	6	BUSE	8	CAMPUS	в	CASHICN	D	CHAPPION	e
BRONAUGH BRONCHO	8 8	BUSHNELL BUSHVALLEV	C D	CAMPCDEN	ι C	CASH#EKE CASH#CNT	8 8	CHANCE CHANDLER	870 8
BRONSON	8	BUSTER	č	CANAAN	C/D	CASINC	Ă	CHANEY	č
BRONTE	С	BUTANO	С	CANADIAN	8	CASITO	С	CHANNAHON	е
BRDDKE BRDDKFIELC	С В	BUTLER BUTLERTOWN	D C	CANACICE CANANDA IGUA	D C	CASPAR CASPIANA	8 8	CHANNING CHANTA	8
BROOKINGS	8	BUTTE	c	CANASERAGA	č	CASS	A	CHANTIER	D
BROCKLYN	D	BUTTERFIELD	С	CANAVERAL	С	CASSACAGA		CHAPIN	с
BROCKSIDE	C	BUXIN	D	CANDELERC	C	CASSIA	c	CHAPMAN	
BROOKSTON BROOKSVILLE	87D D	BUXTEN BYARS	C D	CANE CANEADEA	C D	CASSCLARY CASSVILLE	6	CHAPPELL	8 8
AROSELEY	8	BYRGN	Ă	CANEEK	8	CASTAIC	С	CHARITON	D
BRUSS	в			CANEL	6	CASTALIA	С	CHARITY	D
BROUGHTON BROWARD	D C	CABALLO CABARTON	C C	CANELCX	с с	CASTANA CASTELL	a C	CHARLESTON CHARLEVOIX	C B
BRGANELL	в	CABBA	č	CANEYVILLE	č	CASTILE	в	CHARLOS	A
BRD#NFIELO	A	CASBART	ũ	CANFIELD	č	CASTINE	č	CHARLUTTE	A/D
BROWNLEE	8	CABEZON	D	CANISTED	ç	CASTLE	D	CHARLTON	в
BRUCE	C D	CABINET	с с	CANNINGER CANDE	8 8	CASTLÉ VALLEY CASTNER	0 C	CHA SE CHA SEBURG	с в
BRUIN	c	CABLE	D	CANCICITO	č	CASTG	č	CHASEVILLE	A
BRUNEEL	B	CABO RUJD	С	CANCVA	8/D	CASTRO	С	CHASKA	С
BRUND BRUNT	Α.	CABOT	C	CANTEN	8	CASTROVILLE	в	CHASTAIN	D
BRUSETT	C B	CACAPUN CACHE	б D	CANTRIL CANTUA	6 8	CASUSE CASHELL	C B	CHATBURN	в
BRUSH	-	C AC I QUE	в	CANUTIO	8	CATAL INA	в	LHA THAN	đ
BRUSSFTT	Б	CADDC	D	CANYLN	υ	CATALPA	С	CHATSWCRTH	D
BRYAN BRYCAN	A B	CADEVILLE CADMUS	0 8	CAPAC	в D	CATANO CATARINA	<b>۵</b>	CHAUNCEY	C B
BKYCE	Ŭ	CADGMA	в С	CAPAY CAPE	U D	CATAULA	c	CHAVIES CHAWANAKEE	C
BUCAN	D	CAUOR	č	CAPE FEAR	D	CATANBA	в	CHEADLE	С
BUCHANAN	C	CAGEY	C	CAPERS	D	CATH	D	CHECKETT	C
BUCHENAU BUCHEK	C C	CAGUABO CAHABA	ມ B	CAPILLO	D C	CATHCART CATHEDKAL	8 C	CHEDAHAP CHEEKTCWAGA	B D
BUCKINGHAM	C	CAHILL	8 13	CAPLES	6 8	CATHERINE	6/D	CHEESMAN	8
BUCKLAND	с	CAHUNE	С	CAPSHAW	с	CATHRJ	D	CHEHALEM	с
	8	CAHTC	С	CAPULIN	С	CATLETT	C/D	CHEMALIS	B
BUCKLEBAS	NOTES					THE SOLL GROUP H			

C HE HUL PUM	C	CHUTE	A	CCACHELLA	е	CONALB	в	CDTITO	C
CHCLAN	в	CIALES	0	CCAD	в	CENANT	Ĺ	COTC	C
CHELSEA	Δ	CIALITUS	в	COAL CREEK	С	CONASAUGA	С	COTCPAXI	Α
CHEMAWA	B	CIBEQUE	ß	CCALMONT	С	CONATA	0	COTT	в
CHEMUNG		C18U	D	COAMC	С	CGNBGY	D	COTTER	ы
CHEN	D	CIBOLA	в	COARSEGELD	8	CONCHAS	C	COTTERAL	в
CHENA	Δ	CICERD	0	CGATICOOK	С	CGNCHO	C	COTTIER	В
CHENANGO	Α	CIDERCONE	в	CGATSBURG	D	CONCENULLY	В	COTTGNIDOO	C
CHENEY	в	CIDRAL	C	COBB	в	CONCORU	0	COTTRELL	C
CHENNENY	C	CIENEBA	е	CUBEN	D	CONCREEK	e	COUCH	C
CHENDWATH	в		C C	COBEY CCEURG	B C	CONDA CONDIT	C C	COUGAR COULSTONE	C
CHEQUEST	C A	CIMARRGN CINCINNATI	c	CGCHETDPA	c	CONDON	c	COUNTS	B C
CHEROKEE	õ	CINCO	Ā	COCCA	Ă	CGNE	2	CGUPEVILLE	e
CHERKY	č	CINEBAR	8	COCOLALLA	ĉ	CENEJO	ĉ	COURT	В
CHERRYHILL	c	CIACLE	č	CODCRUS	č	CGNESTUGA	B	COURTHOUSE	D
CHERRY SPHINGS	õ	CIRCLEVILLE	č	CODY	Ā	CGNESUS	в	COURTLAND	8
CHESAW	в	CISNE	D	CCE	A	CENGAREE	8	COURTNEY	D
CHESHIRE	8	CISPUS	Δ.	CCEBURN	C	CONI	D	COURTROCK	в
CHESHNINA	õ	CITICO	в	CCFF	D	CUNLEN	8	COUSE	č
CHESNIMNUS	в	CLACKAMAS	ú	CGGGON	в	CONLEY	С	COUSHATTA	в
CHLSTER	в	C LA I B GR NE	в	COGSWELL	С	CONNEAUT	С	COVE	D
CHESTERTON	С	CLAIRE	Α	COHASSET	в	CONNECTICUT		COVEILG	в
CHETCO	D	CLAIREMONT	в	CONGETAN	D	CONNER	8	COVELANO	C
CHETEK	в	CLALLAM	в	COHCE	в	CONDITION	в	COVENTRY	в
CHEVELON	C	CLAM GULCH	С	C011	C	CONUVER	в	COVEYTOWN	C
CHEWACLA	С	CLAMC	С	CGKEDALE	с	CUNUWINGU	С	CUVINGTON	Ð
CHEWELAH	в	CLANTON	С	CGKEL	С	CONRAD	в	COWAN	Δ
CHEYENNE	в	CLAPPER	в	CGKER	D	CONRLE	в	COWARTS	c
CHIARA	D	CLAREMORE	С	CCKESBURY	D	CGNSER	C/D	CONDEN	D
CHICKASHA	в	CLARENCE	C	CCKEAILLE	В	CONSTABLE	Α	CUWERY	C
CHICOPFE	в	CLARESON	c	CCLEATH	C/D	CONSUMO	в	COWEEMAN	C
CHICOTE	0	CLAREVILLE	C	CCLBERT	0	CONTINENTAL	C	COWERS	в
CHIGLEY	С	CLARINDA	D	CCLBURN	8	CONTRA COSTA	C	COWICHE	9
CHILCOTT	0	CLARIEN	в	CCLBY	8	CONVENT	C	CONGOD	C
CHILDS	в	CLARITA	D	COLCHESTER	в	COOK	0	COX	D
CHILGREN	C	CLARK	В	CCLDEN	~	CCGKPGRT	c	CUXVILLE	D
CHILHOWIE	C	CLARK FORK	A	COLD SPRINGS	C	CCULBRITH	B	COVATA	C
CHILL	В		C	CCLE	e/c	CUULVILLE	C B	COZAD	B
CHILLICDIHE CHILLISQUAQUE	c	CLARKSDALE CLARKSON	С В	CLLEBRCCK COLEMAN	B C	CDOPBS COUNEY	8	CRABTON CRADDOCK	B
CHILLUM	в	CLARKSVILLE	e	CGLEMANTCHN	D	CEGPER	č	CRACLEBAUGH	D
CHILMAPK	8	CLARNO	E E	CCLETU	A	CCGTER	č	CRAFTON	c
CHILU	8/0	CLARY	8	CCLFAX	ĉ	CCPAKE	в	CRAGO	В
CHILUQUIN	8	CLATO	в	CELINAS	8	COPALIS	8	CRAIG	č
CHILSON	õ	CLATSOP	Ď	CCILAMER	č	COPELAND	8/0	CRAIGMENT	č
CHILTON	8	CLAVERACK	č	CCLLARD	в	COPITA	в	CRAFER	Ď
CHIMAY.	č	CLAWSGN	č	CCLLBRAN	č	CCPLAY	2	CRANE	8
CHIMNEY	в	CLAYBURN	6	CCLLEEN	č	CCPPER RIVER	Ð	CRANS TON	в
CHINA CREEK	8	CLAYSPRINGS	D	CCLLEGIATE	č	COPPERTON	в	CRARY	č
CHINCHALLO	B/D	CLAYTON	в	CCLLETT	č	CGPPOCK	e	CRATER LAKE	в
CHINIAK	A	CLEARFIELD	c	CGLLIER	A	CUPSEY	D	CRAVEN	С
CHIND	8 / C	CLEAR LAKE	Ð	CGLLINGTON	в	COOLILLE	C/D	CRAWFORD	D
CHINDUK	в	CLEEK	С	CCLLINS	c	CUKA	D	CREAL	Ð
CHIPETA	D	CLE ELUM	в	CCLLINSTON	c	CORAL	С	CREBBIN	С
CHIPLEY	С	CLEGG	в	CELLINSVILLE	с	CORBETT	С	CREEDMAN	U
CHIPMAN	C	CLEMAN	в	CCLMA	в	CORBIN	в	CR E E D ⊭ D C R	C
CHIPPENY	D	CLEMVILLE	в	CCLMCR	C	CORCEGA	С	CRE 1GHTCN	в
CHIPPEMA	B <b>/</b> 0	CLECRA	в	CGLC	е	CCKL	C	CRELDGN	в
CHIQUITU	C	CLERF	в	CCLCCKUM	в	CURCES	в	CRE SBARD	C
CHIRICAHUA	0	CLERMGNT	C	COLCMA	Δ	CGRUEVA	С	CRESCENT	в
CHITINA	в	CLEVERLY	Α	CCLC#BC	в	CORINTH	C	CRESCG	C
CHITTENDEN	C	CLIFFDGWN	C	CGLGNA	C	CURKINDALE	в	CREST	C
CHITWOW	C	CLIFFHOUSE	C	CCLCNIE	Δ	CURLENA	Δ	CRESTLINE	е
CHIVAT: CHIWAWA	C	CLIFFORD CLIFFWGOD	B C	CELERADG	8	CORLETT	8	CRESTMGRE	Α
CHU	B C	CLIFTERSON	8	CCLCRCCK CCLCSC	C D	CURLEY	C C	CRESTON	C
CHUREE	D	CLIFTON	č	CCLCSSE	A	CURMANT CCRNHILL	в	CRESWELL CRETE	õ
CHOCK	B/D	CLIFTY	в	CCLP	õ	CORNING	D	CREVA	ō
CHECOLOCCO	8	CLIMARA	D	CLERAIN	в	CORNUTT	č	CREVASSE	A
CHUPAKA	č	CLIMAX	č	CCLTCN	۵	CCRNVILLE	в	CREWS	ō
CHOPTANK	Ă	CLIME	č	CLLTS NECK	8	CUKCZAL	č	CRIDER	В
CHUPTIE	D	CLINTON	в	CL'LUMBIA	8	CGPPENING	D	CRIM	в
CHORAL MONT	в	CLODINE	C	CCLUMBINE	Δ	CORKALITOS	A	CRISFIELD	в
CHOTEAU	С	CLCNTARF	8	CCLUSA	c	CCHRECI	С	CRITCHELL	В
CHRISTIAN	С	CLUQUALLUM	C	CCLVILLE	в	CUPRERA	D	CRIVITZ	Α
CHRISTIANA	в	CLIQUATO	З	CCLVIN	С	CERSON	С	CRGCKER	Α
CHRISTIANBURG	0	CLCQUET	в	CCLWGCD	B/O	CURTEZ	D	CRECKETT	D
CHRISTY	Β	CLOUD	D	CCLYER	C/0	CORTINA	Α	CROFTGN	в
CHEDME	C	CLOUDCROFT	С	CCMERIC	в	CCHUNNA	C	CRDGHAN	в
CHUALAF	в	CLOUD PEAK	е	CCMETA	C	CURVALLIS	в	CRECKED	С
CHUBRS	C	CLOUD RIM	в	COMEREY	C	CORWIN	в	CRGCKED CREEK	D
CHUCKAWALLA	8	CLOUGH	D	CGMITAS	Δ	CCKY	C	CROCKSTON	в
CHULITNA	в	CLOVERDALE	C	COPLY	C	CERYCUN	C	CRGCM	В
CHUMMY	C	CLOVER SPRINGS	в	CCMMERCE	C	CUSAC	C	CROPLEY	C
CHUMSTICK	C	CLUVIS	в	CUM0	A	COSH	C	CRUSBY	C
CHUPADERA	в	CLUFF	C	CCMODORE	в	COSHCOTON	0	CRGSS	D
	0		0	CCMCRD	8	COSKI	B	CROSSVILLE	B
CHURCHILL	0	CLURD	C	CCMPTCHE	в	CESSAYUNA	C A	CROSWELL	Δ
CHURN	О В	CLURG CLYDE	C C	CC⊭PTGN CL⊮STCCK	C	CUSTILLA CCTACU	A C	CROT CROTON	0
CHURNUASHER	в	CLYMER	e e	CCMUS	C B	COTATI	c	CROUCH	В
			-		-				U
	NOTES	A BLANE HEDRO		SULL GPPUP IND	TCATES 1	THE SCIL GROUP H	TON 24	BEEN DETERMINED	

A BLANK HYDROLOGIC SOIL GROUP INDICATES THE SOIL GROUP HAS NOT BEEN DETERMINED TWO SOIL CROUPS SUCH AS B/C INDICATES THE DEALMED/UNDRAIMED SITUATION

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	~			0.01 0.04	6	0.1 × 11 0 11 7		004 00004	
CROW CROW CREEK	С В	CANZ DAKGOL	в C	CEL REY CHL RIC	с с	DIXMONT DIXMORE	С В	DRY CREEK DRYDEN	C B
CREWERPT	č	DAKIEN	č	DELTA	č	DIXONVILLE	č	DRY LAKE	c
CRUWHEAKT	В	DARLING	8	DELTEN	в	DIXVILLE	Α	CUANE	в
CRUW HILL	C	DAKNELL	С	CELWIN	A	DCAK	С	DUBAKELLA	С
CROWLEY	О В	DARNEN DARR	B	CELYNDIA DEMAST	8 8	UCBBS DDBY	8 0	DUBAY DUBBS	D
CRUWN CREWSHAW	8	CARRET	ĉ	DEMASTERS	6	CCCAS	ß	CUBCIS	B C
CRUZIER	č	DARRCCH	c	DE MAYA	c	COCKERY	c	CUBUQUE	8
CRUCKTON	B	CART	A	CEMERS	D	DCC T	8	GUC EY	8
CRUICKSHANK	C	CAOVADA	υ	CEMKY	0	DDDGE	6	DUCHESNE	A
CRUME CRUMP	B D	DARWIN DASSEL	D D	DEMONA DEMOPOLIS	с с	DODGEVILLE DUDSCN	8 C	DUCKETT DUCCR	C C
CRUTCH	в	UATEMAN	c	DEMPSTER	в	DUGER	Ă	DUDA	A
CPUTCHER	0	DATINO	С	DENAY	8	CUGUE	С	DUDLEY	D
CRUZE	С	DATWYLER	С	DENISON	С	CCLANC	в	DUEL	8
CRYSTAL LAKE	в	CAULTON	D	DENMARK	D	DCLF DCLLAR	C	DUELM	c
CRYSTAL SPRINGS CRYSTOLA	D B	DAVEY	А	CENNIS CENNY	C D	DCLLARD	ы С	DUFFAU DUFFER	8 0
CUBA	6	DAVIDSON	в	CENROCK	0	DULCRES	в	DUFFIELD	в
CUBERANT	в	CAVIS	6	DENTCN	0	DUL PH	С	CUFFSON	в
CUCHILLAS	D	CAVISON	8	CENVER	c	DDMINGD	С	DUFFY	в
CUDAHY CUDIY:	D B	DAWES DAWHCO	С 6/D	DEPEW CEPCE	C D	DCMINGUEZ DGMINIC	C A	DUFUR DUGCINS	B D
CUERO	8	DAWSCN	0	DERINCA	c	DCMINO	ĉ	DUGCUT	ō
CUEVA	õ	CAY	õ	PESAN	Ă	DCNA ANA	8	CUGWAY	č
CUEVITAS	0	DAYBELL	Α	CESART	С	DCNALD	В	DUKES	A
CULLEN	С	DAYTCN	0	DESCALABRADD	0	CUNEGAL	c	CULAC	С
CULLEDKA CULLD	8 C	DAYVILLE GAZE	B/C D	CESCHUTES CESERET	с с	DDNERAIL DGNICA	C A	DUMAS DUMECQ	B C
CULPERER	č	DEACON	ย	DESHA	õ	DENLENTEN	ĉ	CUPENT	č
CULVERS	č	CEADFALL	в	CESFLER	ĉ	CCNNA	Ď	DUNBAR	õ
CUMBERLAND	8	CEAMA	С	DESCLATION	С	DENNAN	С	DUNBARTON	С
CLIML EY	C	DEAN	в	DESRAIN	B	CUNNYBRDOK	U O	CUNBRIDGE	в
CUMMINGS	E/D C	DEAN LAKE DEARDURFF	С В	DETER DETLÜR	с с	DCNC VAN CDULEY	B ▲	DUNCAN DUNCANNON	0 8
CURPER	в	DEARY	č	DETCUR	č	DCDNE	e	DUNCCM	Ŭ
CURDLI	ĉ	DEARYTON	B	CETHDIT	č	DEUR	6	CUNCAS	č
CURECANTI	6	DEATMAN	С	DEV	8	DORA	D	DUNCAY	A
CURLEW	C	DEAVER	c	CEVILS CIVE	D	CGRAN	C	LUNCEE	C
CURKAN	С J	DEPENGER DECAN	C D	DEVCL	8 8	CURCHESTER DOROSHIN	е С	DUNELLEN CUNE SAND	B
CURTIS CREEK	ŭ	DECATHON	C	CEVCRE	в	DORUTHEA	č	DUNGENESS	ß
CURTIS SIDING	Α	DECATUR	8	DEMART		CCREVAN	D	CUN GLEN	c
CUSHING	ß	DECCA	ß	DEWEY	в	DCKS	6	CUNKINSVILLE	8
CUSHMAN	C	DECKER	C	CENVILLE	6	CORSET	8	DUNKIRK	8
CUSTER	C D	DECKERVILLE	C B	DEXTER	В C	DUS CALEZAS DOSSMAN	С 8	DUNEAP DUNEDRE	6 6
CUTZ	Ũ	DECORRA	ы ы	DIABLC	õ	DUTHAN	ē	DUNNING	C
CUYAMA	R.	DECRESS	Ū	DIAMEND	C	DDTTA	в	DUNPHY	C
CYLINDER	8	DEE	С	DIAMEND SPRINGS	C	DUTY	в	DUNVILLE	B
CYNTHIANA	C/D	DEERWATER	L C	CIAZ	C	CCUBLETDP	8	DU PAGE	e C
CYRREMORT CYRIL	С В	DEER CREEK DEERFIELD	C B	DIBBLE CICK	C A	COUCHERTY	e A	CUREÉ DUPLIN	č
	-	DEERFORD	Ū.	CICKEY	A	COUGHTY	A	DUPC	č
DABCG	8	DEERING	C	CICKINSON	Α	COUGLAS	8	DUPCNT	C
DACENA	С	DEERLODGE	D	CICKSCN	С	DOURC	8	DUPREE	D
ÚADE CAFTEK	A B	DEER RARK DEERTON	А Ю	DIGEY Ligger	с с	COVER	8 D	CURALDE DURAND	С В
CAGGETT	A	CEERTKAIL	č	DIGHTCN	6	LOW	в	DURANT	D
DAGLUM	D	DEFIANCE	ΰ	DILL	в	CCHAGIAC	6	DURELLE	8
DAGOR	В	DEFURD	0	CILLARD	С	CCWDEN	С	DURFAM	8
CAGUAO	C	DEGARMO	ь/С	CILLOCWN		DEWELLTEN	C	CURKEE	C
DAGUEY DAHLUUIST	С 8	DEGNER DE GREY	C D	DILLINGER DILLON	8 0	CCWNEK CCWNEY	е́в В	CURCC CURRSTEIN	6 0
DAIGLE	ĉ	DEJARNET	8	DILLWYN	Å	DEWNS	3	DUTCHESS	ê
CALLEY	A	CEKALB	č	GILMAN	c	CCXIE	c	DUTSGN	C
DAKETA	8	DEKCVEN	C	DILTS	D	CCYCE	С	DUTTEN	D
DALBO	8	CELAKE	B	DILNCRTH	C	CCYLE	A	DUVAL	8 6
DALEY	D B	DELANCU	C A	CIMAL CIMYAW	с с	COYLE COYLESTOWN	A D	DUZEL CWIGHT	ΰ
DALHART	6	DELANU	a	DINGLE	ъ	DLYN	č	UWYER	Ă
DALIAN	в	DELECO	υ	DINCLISHNA	с	CKA	С	CYE	C
DALLAS	8	DELENA	3	DINKELMAN	e	DRACUT	C	UYER	
DALTON DALUPE	C ស	DELFINA DELHI	6 A	CINKEY	A B	CRAGE CRAGODN	2	DYKE DYRENG	e U
JAMASCUS	ñ	DELICIAS	3	CINNEN DINSLALE	8	CRAGSTUN	в С	DIRENG	0
DAME !	D	VELKS	9/0	DINURA	B/C	CRAIN	č	ŁAD	С
CANA	в	DELL	С	LINZER	в	CRAKE	в	EAGAR	e
DANBURY	С	DELLEKER	6	CICXICE	С	CRANYUN	6	EAGLECONE	e
DANEY DANEY	с	CELLC CELLRDSE	A/C E	CIQUE CISAPEL	В С	CRAPER CRESUEN	С В	EAKIN EAMES	B
DANDREDGE	D D	DELEKDSE	E G	DISAPEL	8	DRESSLER	в С	EARLE	c
DANLAEPG	0	CELMAR	D	DISCE	8	LREWS	в	LAKLMONT	B/C
DANIELS	в	DELMITA	C	DISHNER	£	CRIFTON	С	EARR	ы
CANKE	ŋ	DELMONT	H	CISTERHEFF	C	CRIGES	в	LASLEY	Û
DANNEMURA	C D	GELNCRTE DELRHI	С В	CIVERS	С В	CRUMMER Crummer	C B	FAST FORK EAST LAKE	C A
DANSKIN	ö	DELPHILL	B C	CIVERS	6	CRUMMEND	C	EASTLAND	Ĉ
DANT	J	DELPIEDRA	č	EIVICE XIS	A	CKURY	8	EASTEN	č
DANVERS	С	DELRINE	C	XIG	A	<b>ERYAC</b>	С	EASTCNVILLE	Α
DANVILLE	С	CELRAY	A/ D	DIXIE	C	CRYBURG	8	EAST PARK	D
	NOTES	A BLANK HYDE	OLOGIC	SOIL GROUP IMPIC	ATES	THE SOLL COOLD HE	S POT	BEEN OFTERMINED	

A BLANK HYDROLDGIC SOIL GROUP IMPICATES THE SOIL OPDIDE HAS NOT BEEN DETERMINED TWO SOIL GROUPS SUCH AS B/C INDICATES THE DEALMED/IMPRAIMED SITX-

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EASTPORT	۵	ELLISCN	в	FSMCND	ß	FARNUM	в	FLEISCHMANN	D
EATONTUWN	-	ELLOAM	C	ESPARTO	в	FAKRAGUT	С	FLEFING	c
EAUGALLIE	870	ELLSBERRY	с	E SPIL E SPINAL	D A	FARRAR FARRELL	8 8	FLETCHER FLOKE	B
EBA EBHFKT	C D	ELLSWORTH ELMA	8	ESGLATZEL	8	FARKENBURG	ß	FLOP	D C
EBHS	н	FLPDALE	e	ESS	8	FARROT	С	FLOPATION	A
EBENEZ: M FCCLES	С Н	ELMIRA ELMO	A C	EŠSEN ESSEX	с с	FARSCN FARWELL	в С	FLORENCE FLORIDANA	с 8/D
ECHARD	c	ELMONT	e	ESSEXVILLE	D	FATIMA	в	FLURISSANT	c
ECHLEK	8	ELMORE	в	LSTACADO	B	FATTIG	C	FLOWELL	С
ECKLEY ECKMAN	в В	ELMWOOD ELNORA	С В	ESTELLINE ESTEP	8 0	FAUNCE FAUQUIER	A C	FLOWEREE FLOYD	8 8
ECKRANT	ō	ELOIKA	8	ESTERBROOK	8	FAWCETT	č	FLUSHING	U
ECTOR	с	ELPAN	D	ESTHERVILLE	в	FAWN	8	FLUVANNA	С
EDALGO EDDS	С В	EL PFCD EL RANCHU	C B	ESTU	С В	FAXCN FAYAL	C C	FLYGARE FLYNN	B D
EDDY	č	ELRED	ยั/อ	ETHAN	8	FAYETTE	в	FOARO	ŏ
EDEN	c	ELRED	870	ETHETE	8	FAYETTEVILLE	8	FOGELSVILLE	8
EDENTUN EDENVALE	C D	FLS ELSAH	A B	ETHRIDGE E <b>til</b>	C A	FAYWCCD FE	C D	FOLA FOLEY	B D
EDGAR	8	ELSINBORU	8	ETNA	-	FEDORA	8	FONDA	ō
EDGECUMBE	8	ELSMERE	Α	ETCWAH	0	FELDA	B/D	FONCIS	С
EDGELEY EDGEMUNT	С В	ELSO EL SCLYO	DC	ETCWN ETTA	B C	FELIDA FELLOWSHIP	8 0	FONTAL FONTREEN	C B
EDGEWATER	č	ELSTON	в	ETTER	8	FELT	B	FOPIANC	D
EDGEWICK	8	ELTOPIA	۴	ETTERSBURG	в	FELTA	С	FORBES	в
EDGEWUUD	A C	ELTREE	8	ETTRICK	D B	FELTPAM	A	FORC	D A
EDGINGTUN EDINA	b D	ELTSAC ELWHA	0	EUBANKS	8	FELTUNIA	8 8	FORDNEY FORDVILLE	B
EDINBURG	č	ELWOCD	č	EUFAULA	Α	FENCE	8	FORE	D
EDISON	8	ELY	в	LUREKA	D	FENDALL	C	FORELAND	с
EDISTO EDITH	C A	ELYSIAN ELZINGA	8 8	FUSTIS EUTAW	A 0	FENWOOD FERDELFORD	B C	FORELLE FGRESMAN	0 8
EDLOF	ê	EMBDEN	8	EVANGELINE	č	FERDIG	č	FORESTDALE	õ
EDMONDS	С	EMDENT	C	EVANS	B	FERGUS	0	FORESTER	С
EDMURF EDMUNJ	D C	EMERALD	C	EVANSTON	8	FERGUSON FERNANDG	в С	FORGAY FORPAN	A B
EDNA	D	EMERSON	B B	EVARG Evart	ō	FERNDALE	B	FORNEY	0
EDNFYVILLF	8	EMI DA	D	EVENDALE		FERNLEY	С	FORREST	C
EDGM EDSON	c c	EMIGRANT EMIGRATION	8 D	EVERETT EVERGLADES	8 A/D	FERNOW FERNPCINT	B C	FORSEY FORSGREN	C C
EDWARDS	870	EMILY	8	EVERLY	8	FERRELD	B	FORT COLLINS	в
FFL	c	EMLIN	8	EVERMAN	č	FERRIS	õ	FORT DRUM	č
EFFINGTON	0	EMMA	c	EVERSON	c	FERRON	в	FORT LYDN	B
EFWUN EGAM	A C	EMMERT	A B	LVESBORC EWA	А В	FERTALINE	D B	FORT MEADE Fort mott	A
EGAN	в	EMMENS	c	EWAIL	Ă	FETTIC	ō	FORT PIERCE	ĉ
EGBERT	B/C	EMCRY	ß	EWINGSVILLE	в	FIANDER	С	FORT ROCK	С
EGELAND EGGLESTON	6 8	EMPEY	B L	EXCHEQUER EXETER	D C	FIBEA FIDALGO	C C	FORTUNA FORTWINGATE	0 C
EGHAR	č	EMPIRE	č	FXLINE	č	FIDDLETUWN	č	FORWARD	č
EICKS	С	EMRICK	в	EXRAY	D	FIDCYMENT	С	FOSHOME	в
E I FORT Ekah	с	ENCE ENCIFRRC	8 D	EXUM Eyerbcw	C D	FIELDING FIELDCN	8 8	FOSSUM	в в/с
EKALAKA	ě	ENCINA	в	EYRE	8	FIELDSUN	A	FOSTORIA	8
ELAM	Α	ENDERS	С			FIFE	8	FOUNTAIN	D
ELBERT Elburn	0 8	ENDICOTT FNFT	в В	FABIUS FACEVILLE	8 8	FIFER FILLMORE	0	FOURLOG FOURPILE	D B
ELCO	8	ENFIELD	8	FAFFY	8	FINCASTLE	č	FOUR STAR	B/C
ELD	8	ENGLE	н	FAIM	С	FINGAL	С	FOUTS	в
ELDER HULLOW	B D	ENGLESIDE ENGLEWOOD	в с	FAINËS FAIRBANKS	A B	FINLEY FIRESTEEL	B B	FOX FOXCREEK	B C
FLDERON	в	ENGLUND	D	FAIRCALE	8	FIRGRELL	8	FOXPOUNT	c
ELOON	8	ENNIS	8	FAIRFAX	в	FIRMAGE	8	FOXCL	D
EL CORADU EL DRIDGE	c c	ENDCHVILLE	870 8	FAIRFIELD	8	FIRC Firth	С В	FGXPARK Foxton	8
ELFPHANT	D	ENCN	č	FAIRHAVEN FAIRMCUNT	8 0	FISH CREEK	B	FRAILEY	c c
ELEROY	8	ENDS	в	FAIRPORT	č	FISHERS	в	FRAM	B
ELFRIDA ELIJAH	6 C	ENCSAURG	0 0	FAJARDC	C C	FISHECOK	D	FRANCIS	A O
FLIGAK	c	ENSIGN ENSLE¥	C	FALAYA FALCON	c	FISHKILL FITCH	A	FRANKFORT	0
ELK	в	ENSTROM	8	FALFURR IAS	Ă	FITCHVILLE	ĉ	FRANKIKK	č
FLKADER	8	ENTERPRISE	8	FALK	в	FITZGERALD	B	FRANKLIN	B
FLKCRFEK ELK HOLLDW	С В	FNTIAT ENUMCLAW	D €	FALKNER FALL	С В	FITZHUGH FIVE DUT	8 8	FRANKSTCWN FRANKTCWN	8 0
ELKHORN	R	EPHRAIM	ċ	FALLBRCCK	8	FIVEMILE	8	FRANKVILLE	В
ELKINS	D	EPHRATA	B	FALLCN	с	FIVES	8	FRATERNIDAD	D
ELKINSVILLF ELKMDUND	BC	EPOUFETTE EPPING	ย 10	FALLSBURG FALLSINGTON	O	FLAGC FLAGSTAFF	B C	FRAZER	C C
FLK MCUNTAIN	8	EPSIE	C	FANCHER	č	FLAK	8	FREDENSBORG	č
ELKTON	D	FRA	в	FANG	С	FLAMING	ß	FREDERICK	в
ELLABELLE ELLEDGE	B/C D	ERAM Erber	C C	FANNIN FANNC	в С	FLAMINGB FLANAGAN	0	FREDON	c c
ELLERY	õ	ERIC	8	FANU	c	FLANCREAU	8	FREDRICKSDN	c
ELI ETT	D	ERIE	C	FARACAY	c	FLASHER	A	FREEBURG	С
ELLIGEN	Δ	EKIN	R	FARALLONE	8	FLATHEAD	A	FREECE	D
ELLICOTT FLLINGTON	A B	ERNEST ERKAMOUSPE	C	FARAWAY	D	FLAT HORN FLATICP	8 0	FREEHOLD	8 8
FLLINUR	в	ESCAL	в	FARISTA	B	FLAXTON	Ă	FREEMAN	С
FLLIƏTT	C	ESCALANTE	8	FARLAND	8	FLEAK	A	FREEMANVILLE	8
ELLIS ELLISFORDE	D C	E SC AMBIA E SCONDIDO	с с	FARMINGTON FARNUF	C/D B	FLECHADO FLEETWOOD	С	FREEDN FREER	B C
	NOTES				-		HAS HOT	BEEN DETERMINE	
						יב האמויירהעייהאים שי			-

# Table B.1--Continued

FREESTONE	С	GASCENADE	D	GLENFIELD	D	GRANCER	с	GUNN	в
FREEZENER	8	GAS CREEK	č	GLENFORD	С	CRANGEVILLE	B/C	GUNTER	Ă
FREMONT	č	GASKELL	č	GLENHALL	8	GRANILE	8	CUR ABO	õ
FRENCH	С	GASS	D	GLENHAP	8	GRANC	C	GURNEY	с
FRENCHTOWN	D	GASSET	D	GLENMCRA	с	GRANT	8	GUSTAVUS	8
FRENEAU		GATE SBURG	A	GLENNALLEN	с	GRANTSBURG	С	GUSTIN	с
FRESNO	С	GATEVIEW	8	GLENOMA	в	GRANTSUALE	A	GUTHRIE	0
FRIANA	D	GATEWAY	С	GLENRCSE	8	GRANVILLE	8	GUYTON	D
FRIANT	Ď	GATEWOOD	Ď	GLENSTED	Ď	CRAPEVINE	č	GWIN	Ď
					-				
FRIDLO	ç	GAULDY	B	GLENTON	8	GRASMEPE	в	GWINNETT	8
FRIEDMAN	в	GAVINS	с	GLENVIEW	в	GRASSNA	8	GYMER	c
FRIES	D	GAVIOTA	D	GLENVILLE	С	GRASSY BUTTE	A		
FRID	8	GAY	0	GLIDE	8	GRATZ	с	HACCKE	с
FRIZZELL	c	GAYLORO	8	GLIKON	8	GRAVCEN	č	HACIENDA	č
FROBERG	Ď	GAYNOR	č	GLCRIA	č	GRAVE	8	HACK	8
FROHMAN	C	GAYVILLE	B	GLCUCESTER	A	GRAVITY	C	HACKERS	B
FRONHOFER	с	GAZELLE	D	GLOVER	C/D	GRAYCALM	A	HACKETTSTOWN	е
FRONTON	D	GAZOS	8	GLYNDCN	8	GRAYFGRD	в	HADLEY	8
FRGST	D	GEARHART	Α	GLYNN	с	GRAYLING	A	HAOO	8
FRUITA	8	GEARY	8	GCBLE	с	GRAYLOCK	в	HAGEN	8
FRUITLANC	В	GEE	8	GEEEARD	B	GRAYPOINT	В	HAGENBARTH	в
	ŏ	GEEBURG	č	GCDDE	Ď	GRAYS			Ă
FRYE							B	HAGENER	
FUEGO	C	GEER	c	COCECKE	D	GREAT BEND	в	HAGER	с
FUERA	с	GEFO	A	GODFREY	С	GREELEY	8	HAGERMAN	8
FULDA	С	GELKIE	8	GOCWIN	D	GREEN BLUFF	8	HAGERSTGWN	с
FULLERTON	8	GEM	С	GCEGLEIN	с	GREEN CANVUN	8	HAGGA	в
FULMER	8/D	GEMID	с	GOESSEL	D	GREENCREEK	в	HAIG	с
FULSHEAR	c	GEMSGN	č	GCFF	č	GREENCALE	ē	HAIKU	ē
FULTON	D	GENE SEE	в	GCGEBIC	8	GREENFIELD	8	HAILMAN	B
FUQUAY	8	GENEVA	С	GGLBIN	С	GREENHORN	D	HAINES	8/C
FURNIS	8/D	GENOA	D	GULCENDA	D	GREENLEAF	8	HAIRE	с
FURY	87D	GENOLA	8	CCLDENDALE	8	GREENDUGH	с	HALAWA	в
1011		GEORGEVILLE	8	GCLCFIELD	8	GREENPORT	· ·	HALCER	č
	~								
GAASTRA.	C	GEORGIA	8	GULCHILL	в	GREEN RIVER	в	HALE	8
GABALDON	с	GERALD	D	GGLDMAN	С	GREENSBORD		HALEIWA	8
GABICA	D	GERBER	D	GCLDRIDGE	в	GREENSON	с	HALEY	8
GACEY	D	GERIG	8	GULDRUN	Α	GREENTON	с	HALF MOCN	в
GADDES	č	GERING	B	GULDSBCRO	c	GREENVILLE	8	HAL FORD	Ă
GADES	Ğ	GERLAND	č	GOLDSTON	č	GREENWATER	A	HALFWAY	õ
			c						
GADSDEN	D	GERMANIA		GULCSTREAM	D	GREENWICH	в	HALII	8
GAGE		GFRMANY	в	GGLCVALE	с	GREENWOOD	C	HALIIMAILE	8
GAGEBY	8	GESTRIN	8	GCLUVEIN	С	GREER	С	HALIS	в
GAGETOWN	с	GETTA	с	GCLIAD	c	GREGCRY	A	HALL	8
GAHEE	8	GETTYS	č	GOLLAHER	A	GRELL	c	HALLECK	8
GAINES	č	GEYSEN			8	GRENADA	č	HALL RANCH	č
			D	GCMEZ					
GAINESVILLE	A	GHENT	с	GCNVICK	8	GRENVILLE	8	HALLVILLE	в
GALATA	D	GIBBLER	С	EUCCH	D	GRE SHAM	с	HALSEV	D
GALE	8	C LBBGN	8	GGCCALE	с	GREWINGK	с	HAMAKUAPOKO	8
GALEN	8	GINBS	D	GCCDING	с	GREYBACK	в	HAMAN	B
GALENA	с	GIBBSTOWN	A	GUCCINGTON	с	GREYBULL	с	HAMAR	8
GALEPPI	č	GIFFIN	ĉ	GCCDLCW	B	GREVCLIFF	č	HAMBLEN	č
GALESTOWN	A	GIFFCRD	C	COOCMAN	В	GRIFFY	B	HAMBRIGHT	D
GALEY	в	GILA	с	GCGCRICH	8	GRIGSTON	8	HAMBURG	8
GALISTEO -	D	GILBY	B	GCCUSPRINGS	D	GRIPSTAC	8	HAMEL	с
GALLAGHER	в	GILCHRIST	8	GOOSE CREEK	в	GRISWELC	8	HAMERLY	с
GALLATIN	Α	GILCREST	8	GOGSE LAKE	с	GRIVER	с	HAMILTON	A
GALLEGOS	8	GILEAU	č	GGGSMUS	8	GRIZZLY	č	HAMLET	в
GALLINA	С	GILES	8	GCRCO	c	GROGAN	8	HAMLIN	8
GALLION	8	GILFCRD	8/D	GCRE	D	GRGSECLOSE	с	HAMPDEN	
GALVA	в	GILHCULY	8	GCRGCNIC	A	GRGSS	С	HAMPSHIRE	с
GALVESTUN	A	GILISPIE	C	GCRHAM	8	GRUTCN	Α	HAMPTON	с
GALVIN	с	GILLIAM	с	GCRIN	с	GROVE	Α	HAMTAH	с
GAMBLER	Ă	GILLIGAN	8	GURING	č	GREVELAND	8	HANA	A
									ĉ
GANNETT	D	GILLS	c	GCRFAN	в	GROVER	в	HANALEI	
GANSNER	D	GILMORE	D	GCRUS	Α	GREVETEN	в	HANAMAULU	A
GAPO	D	GILPIN	С	GDRZELL	8	GRUBBS	D	HANCEVILLE	в
GAPPMAYER	8	GILRCY	С	GOSHEN	в	GRULLA	D	HAND	8
GAKA	8	GILSON	8	GESHUTE	D	GRUMMIT	C	HANDFGRD	8
GARBER	8	GILT EDGE	C	GCSPCRT	с	GRUNCY	С	HANEY	8
GARBUTT	в	GINAT	D	GCTHAM	Α	CRUVER	с	HANGAARD	с
GARCENO	č	GINGER	č	GCTHARD	Ð	GRYGLA	č	MAA CEN	в
GARDENA	8		в					HANGER	8
		GINI		GOTHIC	c	GUADALUPE	в	HANIPOE	
GARDINER	A	GINSER	с	GGTHC	С	GUAJE	A	HANKINS	С
GARONERS FORK	8	GIKD	A	GCULDING	D	GUALALA	D	HANKS	в
GARDNERVILLE	D	GIVEN	с	GEVAN	с	GUAMANI	8	HANLY	A
GARDONE	Α	GLADCEN	Α	GOVE	8	GUANAJIBO	С	HANNA	e
GAREY	С	GLADSTONE	в	GCWEN	8	GUANICA	D	HANOVER	c
GARFIELD	c	GLADWIN	A	GRABE	8	GUAYABO	8	HANS	č
GARITA	C	GLAMIS	С	GRABLE	8	GUAYABUTA	0	HANSEL	c
GARLAND	В	GLANN	B/C	GRACEPONT	8	GUAYAMA	D	HANSKA	С
GARLET	Α	GLA SGOW	C	GPACEVILLE	в	GUBEN	в	HANSON	Α
GARLGCK	С	GLEAN	в	GRACY	D	GUCKEEN	С	HANTHO	8
GARHUN	č	GLEASON	ĉ	GRAFTGN	B	GUELPH	8	HANTZ	Ŭ
GARMORE	8	GLEN	Â	GRAHAM	D	GUENCC	č	HAP	8
GARNER	D	GLENBERG	в	GRAIL	c	GUERNSEY	C	HAPGOOD	в
GARG	D	GLENBROOK	D	GRAPH	8	GUERRERC	С	HAPNEY	с
GARK	D	GLENCOE	C	GRANATH	8	GUE ST	D	HARBORD	B
GARRARD	8	GLENDALE	8	GRANBY	Ā/D		A	HARBOURTON	
GARRETSON	в	GLENDALE	ä	GRANDE RCNDE	D	GULER	8	HARCO	8
GARRETT	в	GLENDIVE	8				в 8	HARCEMAN	8
				CRANDFIELD	8	GULKANA			
GARRISON	8	GLENOORA	C	GRANCVIEW	с	GUMBCOT	С	HARDESTY	8
GARWIN	C	GLENELG	в	GRANER	с	GUNBARKEL	A	HARGING	D
	NOTES							BEEN DETERMINE	
	14171 63	A DLANK HI	UPPLUGIL				1015 1101		

NOTES A BLANK HYDPOLOGIC SOLL GROUP IPDICATES THE SOLL GROUP HAS NOT REEN DETERMINED TWO SOLL GROUPS SUCH AS B/C INDICATES THE DRAIPED/INDDAINED SITUATION

January 1971

## January 1971

HARR I MAN	в	HEIST	8	HINESBURG	с	HOUTEN	D	HUSE	С
HARKIS	D	HEITT	С	HINKLE	D	HCDVER	8	HUSSA	8/0
HARRISBURG	D	HEITZ	D	HENMAN	с	HDPETCN	С	HUSSMAN	D
HARRISON	c	HEIZER	D	HENSDALE		HCPEWELL		HUTCHENSON	с
HARRISVILLE	č	HELDT	č	HENTZE	D	FDPGCCD	с	HUTSCN	8
HARSTENE	в	HELEMANO	с	HISLE	D	HDPKENS	в	HUXLEY	D
HART	D	HELENA	c	HETT	в	HOPLEY	8	HYAF	D
HART CAMP	č	HELMER	č	HI VISTA	č	HCPPER	B	HYA1	Ă
HARTFORD	Ă	HELVETIA	Ē	HEWASSEE	в	HOQUIAM	8	HYATTVILLE	в
HARTIG	в	HELY	ß	HEWCOD	Ă	HORAT10	D	HYDABURG	D
HARTLAND	в	HEMBRE	8	HEXTON	8	HCRD	в	HYDE	ŏ
HARTLETON	в	HEMMI	č	HCBACKER	в	HGREB	в	HYDRO	č
HARTLINE	в	HEMPFIELD	c	HCBAN	č	HCRNELL	D	HYMAS	õ
HAPTSBURG	в	HEPPSTEAD	с	нсавѕ	в	HORNING	A	HYRUM	ē
HARTSELLS	B	HENCRATT	6	HCBSCN	C	FORNETOS	Ď	HYSHAM	C
HARTSHERN	8	HENDERSON	6	HCCHHEIM	8	HCRRCCKS	в	RIJCAR	L
HARVARD	в	HENDRICKS	В	HOCKING	В	HORSESHDE	8	EAO	с
HARVEL	B	HENEFER	C B	HCCKINSON	c c	HORTEN	8 8	1BERTA ICENE	C
	c	PERKIN	6	HCCKLEY		FCRTCNVILLE	-		C
HASKILL	A	HENLEY	C	HCCCE	В	HOSKIN	C	IDA	B
HASKINS	С	HENLINE	C	FUDGINS	С	HOSLEY	υ	IDABEL	в
HASSELL	D	HENNEKE	3	HCCGSCN	C	HCSMER	c	IDANA	C
HASTINGS	в	HENNEPIN	в	HCEBE	в	HOTAW	c	IDECN	D
HAT	в	HENNINGSEN	С	HCELZLE	С	HCT LAKE	С	IDMCN	8
HATBORC	D	HENRY	D	HCFFMAN	C	HOUDEK	в	IGNACID	в
HATCH	С	HENSEL	B	HCFFMANVILLE	C	HOUGHTON	A/D	160	D
HATCHERY	С	HENSHAW	С	HCGANSBURG	в	HOUK	C	1 GUAL DAD	D
HATFIELD	С	HENSLEY	D	HCCELAND	в	HCULKA	U I	IHLEN	D
HATHAWAY	в	HEPLER	D	HCGG	D	HOULTON	C/D	IJAM	C
HATTIE	с	MERBERT	B	FOGRES	в	HCUNDBY	D	ILDEFCNSD	8
HATTON	С	MEREFORD	в	нсн	B	FCURGLASS	в	ILKA	8
HAUBSTADT	С	MERKIMER	8	HOHPANN	с	HCUSATONEC	D	ILLIDN	8/0
HAVANA	в	HEFLCNG	D	HCKC	с	HOUSE MOUNTAIN	D	EMA	8
HAVEN	в	FERMISTON	в	HELBROCK	8	FCUSEVILLE	С	1MALER	8
HAVERLY	в	HERMON	Α	HOLCOMB	D	HEUSTEN	D	IMLAY	С
HAVERSON	B	HERNDON	в	HCLDAWAY	D	HEUSTEN BLACK	C	IMMCKALEE	8/0
HAVILLAH	в	HERD	в	FELDEN	Ā	HDADE	A/C	IMPERIAL	c
HAVINGDON	с	HEPRERA	A	HELCERNESS	с	POVEN	D	INAVALE	Å
HAVRC	9	HEERICK	C	HCLEREGE	B	HOVENWEEP	Ĉ	INDIAHOMA	D
HAVRELON	в	HEPRON	8	FELLAND	в	HOVENT	D	INDIAN	-
HAW	ษั	HERSH	Ă	HELLINGER	B	HUVEY	č	INDIAN CREEK	D
HAWES	A	HERSHAL	B/D	FOLLIS	C/D	HCWARD	6	INDIANC	č
HAWI	B	HESCH	B	HULLISTER	0	HCWELL	č	INDIANCLA	Ă
HAWKEYE	A	HESPER	c	HELLEMAN	č	HOWLAND	č	INDIO	В
HAWKSELL	Ā	PESPERIA	B	HCLLCHAY	Ă	HCYE	в	INGA	8
HAWKSPRENGS	8	HESPERUS	6	HOLLY	Ď	HCYLETON	č	INGALLS	8
HAXTUN	A	HESSE	C	HELLY SPRINGS	D	ECYPUS	Å	INGARD	B
HAYBUURNE	в	HESSEL	ί	HCLLYWCCD	D		D	INGENID	č
HAYBRO	č	HESSELBERG	č	HCLMDEL	c	HCYTVILLE HUBBARD	Δ	INGRAM	D
HAYDEN	в		B			HUBER	Ď	INKLER	в
HAVESTON	B	HESSELTINE HESSON	C	FCLPES FCLCPUA	B	HUBERT	B	INKS	D
			D D						
HAYESVILLE HAYEIELD	B P	HETTENGER HEXT	в	HCLCPAW	B/D	HUBLERSBURG	C	INMAN	C ▲
			-	HCLRDYD	в	FUCKLEBERKY	С	INPC	
HAYFORD	C	HEZEL	в	HELSINE	в	HUDSON	c	ENSKEP	С
GROMYAH	B	HIALEAH	D	HCLST	в	HUECG	c	INVERNESS	D
HAYNESS	D	HIAWATHA	Α	HELSTEN	в	HUEL	A	INWCDD	С
HAYNIE	8	HIBBARD	с	HELT	8	HUENEME	0/C	10	в
HAYPALSS	A	HIPBING	C	HELTLE	θ	FUERFUERD	D	EOLA	A
HAYSPUR	870	HICKCRY	c	HULTVILLE	С	HUEY	D	IDLEAU	С
HAYTER	8	HICKS	в	HELYCKE	C/D	FUFFINE	A	EONA	в
HAYTI	D	HIDALGO	B	HOPA	с	HUGGINS	С	EONEA	в
HAYWOOD	в	HIDEAWAY	D	HOME CAMP	С	HUGHES	C	ICSCC	в
HAZEL	с	HIDEWOOD	с	HCMELAKE	в	FUGHESVILLE	в	[PAVA	6
HAZELAIR	Ð	HIGHAMS	D	HC#ER	С	PUGC	в	184	C
HAZEN	в	HIGHFIELD	6	HCMESTAKE	D	FUICHICA	c	IREDELL	D
HAZLEHURST	С	HIGH GAP	C	HCHESTEAC	в	HUIKAU	A	IRETEBA	č
HALLETON	ĥ	HIGHLAND	B	HENAUNAU	č	HULETT	8	IRIM	č
HEADLEY	в	HIGHMORE	6	HENCLT	в	HULLS	č	IRCCK	ĕ
HEADQUARTERS	8	HIGH PARK	8	HONCALE	D	HULLT	в	IRCN BLDSSOM	Ď
HEAKE	D	HIHIMANU	A	HENDE	c	HULUA	D	IRCN MOUNTAIN	D
HEATH	c	HIIBNCR	ĉ	HENCCHE	в	HUM	в	IRDN REVER	e
HEATLY	A	HIKO PEAK	d	FCNECVE	8	HUMACAO	6	IRDNTCN	ĉ
NEBBRONVILLE	3	HIKC SPRINGS	-		D				
HEDDAW WILLE			C	FUNEY		HUMATAS	С	IRVINGTON	С
	NOTES	A BLANK HYDR	OLDGIC	SOIL CPOUP INDI	CATES 1	THE SOLL PROUP HA	S POT	BEEN DETERMINED	
		TWD SDIL GRO	UPS SUC	H AS B/C PUDICA	TES THE	DPAINED/UNDPAIN	ED SH	UATION	

D

D

8 8 8

C D 0

С В

B B

Δ

в

B A

c c

8 C/D HONEYGROVE

HONEYVILLE HONN HONCKAA

HONCMANU HONCULTULT

HENCLUA

HONUAULU HCUD

HCCDSPCRT

HODKICN

HOCPAL

HCCPER

HCCT HCUTEN

HOOLEHUA

HEOPESTEN

HDODLE

С

C B A

в

8 D A

B

в

BCBCD

BA

D

D

HUMBARGER

HUMBIRD HUMBDLD1

HUMESTON

HUMPHREYS HUMPTUL1PS

HUNTINGTON

HUNTSVILLE

HUN SAKER

HUNTERS

HUNTING

HUPP

HURLEY

HUR CN HUR ST

HURMAL

HUSE

HUMDUN

HUFE

HILDRETH

HILEA HILES HILGER HILGRAVE

HILLEMANN HILLET HILLFIELD

PILLGATE

HILLIARD

HILLON HILLSBORD

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#### 1971 January

		JULIAETTA	8	KAUFPAN	Ď	KEYPORT	č	KLGNDIKE	Ď
JABU	С	JUMPE	В	KAUPC	A	KEYTESVILLE	D	KLONE	e
JACAGUAS	в	JUNCAL	C	KAVETT	D	KEZAR	6	KLOOCHMAN	8
JACANA	D	JUNCOS	D	KAWAIHAE	c	KIAWAH	C	KLOTEN	8
JACINTO JACK CREEK	8	JUNCTION JUNEAU	8 8	KAWAIHAPAI Kawbawgam	8 C	KIB91E KICKERVILLE	8 8	KLUTINA KNAPPA	8
JACKLIN	8	JUNIATA		KAWICH	Å	KIDC	ĉ	KNEELAND	ĉ
JACKNIFE	č	JUNIUS	с	KAWKAWL IN	ĉ	KICHAN	8	KNIFFIN	č
JACKS	Ď	JUND	8	KEAAU	ŏ	KIEHL	A	KNIGHT	č
JAEKSON	8	JUNQUITOS	C	KEAHUA	8	KIEV	8	KNIK	в
JACKSONVILLE	С	JURA	C	KEALAKEKUA	С	KIKONI	в	KNIPPA	D
5UJAL	D	AVUL	8	KEALIA	D	KILARC	D	KNOB HILL	8
JACOBSEN	D	JUAAN	D	KEANSBURG	0	KILAUEA	В	KNCWLES	8
Y603AL	C		۵	KEARNS	8	KIL BOURNE	A A	KNOX	6 6
JACQUES JACQUITH	C C	KAALUALU KACHEMAK	8	KEATING KEAUKAHA	C	KILBURN KILCHIS	ĉ	KNULL KNUTSEN	A
JACHIN	a	KADASHAN	8	KEAWAKAPU	8	KILDER	c	KOBAR	ĉ
JAFFREY	۵	KADE	č	KEBLER	8	KILGCRE	8/0	KOCh	č
JAGUEYES	8	KADGKA	8	KECH	č	KILKENNY	8	KODAK	č
JAL	8	KAUCKA	8	KECKO	8	KILLBUCK	C/D	KODIAK	8
JAMES CANYON	8/C	KAENA	Ð	KEDRON	C	KILLEY	8	KOEFLER	С
JAMESFCWN	С	KAHALUU	D	KEEFERS	C	KILLINGWURTH		KOELE	8
JANE	C	KAHANA	8	KEEGAN	-	KILLPACK	c	KOEPKĚ	в
JANISE	C	KAHANUI	в	KEEI	0	KILMERQUE	C	KOERLING	в
JANSEN JARHGE	A C	KAHLER	8	KEEKEE	8 C	KILCA KILLHANA	А А	KOGISH Kohala	D
JAKITA	c	KAHOLA Kah Sheets	8	KEENE KFENC	č	KILWINNING	ĉ	KOKEE	8
JARRE	6	KAHUA	Ď	KEG	8	KIM	ĕ	KOKC	8
JARVIS	ê	KAIKLI	D	KEFENA	č	KIMAMA	8	KOKCKAHI	Ď
JASPER	8	KAILUA	A	KEIGLEY	Č	KIMBALL	c	KOKOMO	B/D
JAUCAS	Α	KAIHU	Α	KEISER	8	KIMBERLY	8	KOLBERG	8
JAVAL	в	KAINALIU	Α	KEITH	8	K I MBR CUGH	С	KOLEKGLE	C
YAL	С	KAIPCIOI	8	КЕКАНА	в	KIMMERLING	C	KOLLS	D
JAYEM	8	KAIWIKI	A	KEKAKE	D	KIMO	С	KOLCA	C
JAYSON	D	KALAE	в	KELLER	C	KINA	D	KOLCKOLC	B D
JEAN JEANERFTTF	A C	KALAMA KALAMAZOO	C B	KELLY KELN	D C	KINCC KINGFISHER	A B	KONA Konawa	8
JEAN LAKE	в	KALAPAZOO	8	KELSEY	C	KINGHURST	8	KONNER	č
JE000	ΰ	KAL AL'PAPA	D	KELSC	č	KINGMAN	c	KONCKTI	č
JEFFELSON	8	KALIFONSKY	č	KELTNER	8	KINGS	Č/D	KOCLAU	č
JEKLEY	C	KALIHI	D	KELVIN	С	KINGSBURY	0	KOCSKIA	С
JELM	Ð	KALISPELL	Α	KEMEC	8	KINGSLEY	8	KOOTENAI	Α
JENKINS	ß	KALKASKA	A	<b>KEMDSAIIIF</b>	в	KINGS RIVER	С	KOPIAH	с
JENKINSON	D	KALMIA	в	KEMPTCN	8	KINGSTON	8	KOPP	8
JENNESS JENNINGS	8 C	KALOKO Kaloloch	C	KÉNAI	c	KINGSVILLE	C D	KOPPES KORCHEA	8 8
JENNINGS	υ Ο	KALSIN	E	KENANSVILLF KENCAIA	A C	KINKEAD KINKEI	8	KORNMAN	8
JERAULD	0	KAMACK	8	KENCALL	8	KINKCRA	Ď	KOSPOS	č
JEK ICHO	č	KAMAKUA	A	KENCALLVILLE	B	KINMAN	č	KOSSE	Ď
JEROME	в	KAMADA	в	KENESAW	8	KINNEY	8	KOSTER	C
JERKY	С	KAMACLE	6	KENMOOR	В	KINNICK	С	KOSZTA	в
JESBEL	0	KAMPAR	li	KENNALLY	ы	KINREAD	D	KOUTS	в
JESSE CAMP	C	KANABEC	в.	KENNAN	8	KINRUSS	D	KOVICH	C
JESSUP	c	KANAKA	в.	KENNEBEC	в	KINSTON	C	KOYEN	8
JE035	8 C	KANAPAHA Kandik	6/A	KENNEDY	8	KINTGN	C 8	KOYUKUK	18 18
AIN	C	KANE	8	KENNEWICK	8	KINZEL KIGNA	8	KRANZBURG	8
JINENEZ	č	KANECHE	8	KENNEY LAKE	ĉ	KIPLING	Ď	KRATKA	č
JIMTCWN	č	KANEPUU	8	KENC	Ď	KIPP	č	KRAUSE	Ā
J.03	c	KANLEE	в	KENCHA	Ď	KIPPEN	8	KREAMER	
J0905	C	KANGSH	C	KENSAL	8	KIPSCN	С	<b>KREPLIN</b>	в
JUCITY	в	KANZA	C	KENSPUR	A	KIRK	8/ D	KRENTZ	8
JUEL	6	KAPAA	A	KENT	D	KIRKHAM	C	KRESSON	c
JOES	6	KAPAPALA	8	KENYON	С	KIRKLAND	D	KRUM	D
JOHNS JOHNSBURG	C D	KAPCO	e	KEC	8	KIRKTEN	8	KRUSE	8
	-	KAPGWSIN	в	KECLDAR	8	KIRTLEY	8	KRUZOF	3
JOHNSEN JOHNSTON	∂ 870	KAPUHIKANI Karapin	Е Н	KECMAH Kecta	C C	KIRVIN KISRING	C	KUBE	B C
JOHNSYON	6	KAKDE	C	KECHA	0	KISKING	D	KUBLI	c
JOICE	õ	KARHEEN	c	KEPLER	č	KISTLER	C/D	KUCERA	8
JULIET	č	KARLAN	č	KERBY	в	KITCHELL	8	KUCK	č
JONFSVILLE	Ă	KARLIN	A	KERMEL	8	KITCHEN CREEK	ย	KUHL	ŭ
	NOTES					THE SOIL CPOUP H E DEATHED/UNDPAT			10

IRWIN	o	JONUS	8	KARLG	D	KERMIT :	A	KITSAP
ISAAC	c	JCPLIN	_	KARLUK	č	KERR	8	KITTANNING
ISAAQUAH	6/C	JOPPA	6 6	KARNAK	D	KERRICK	8	KITTITAS
ISABELL	6/L	JCRDAN	0	KARNES	8	KERRTEWN	0	KITTREDGE
ISAN	υ	JCRNADO	b U	KARRO	8	KERSHAW		KITTSON
ISANTI	D	JOKY	č	KARS		KERSICK	ō	KIUP
ISHAM	č	JUKY	c c	KARTA	ĉ	KERSTON	A/D	KIVA
ISHT PISHI	č	JOSEPHINE	8	KARTAR	8	KERT	ĉ	KIWANIS
ISLAND	8	JOSIE	8	KASHWITNA	8	KERWAN	č	KIZHUYAK
ISOM	в	JOY	8	KASILCF	Å	KESSLER	č	KJAR
ISTOKPOGA	D	JUBILEE	C	KASKI	8	KESWICK	D	KLABER
ITSHOOT	8	JUBILEE	D	KASCTA	ĉ	KETCHLY	8	KLAPATH
IUKA	ĉ	JUDITH	8	KASSLER	L L	KETTLE	8	KLAUS
IVA	c	JUDKINS	Ċ	KASSEN	ĉ	KETTLEMAN	6	KLAWASI
IVAN	с 8	JUDICINS	6 8	KATAMA	8	KETTLEMAN	č	KLAWASI
IVES	8	10030N	C	KATEPCY	Č	KEVIN	c	KLICKER
IATE	6	JUGET	D D	KATC	c	KLVIN	č	KLICKITAT
IVINS			3	KATHINE	с 8	KENEENAN	Δ	KLILKIIAI
	C	JUGHANDLE		KATULA		KEYA	8	KLINE
I ZAGURA	С	JULES	8		8		-	
IZEE	C	JULESBURG	A	KATY	C	KEYES	U U	KLINGER
	_	JULIAETTA	8	KAUFPAN	D	KEYPORT	C	KLGNDIKE
JABU	C	JUMPE	B	KAUPC	A	KEYTESVILLE	D	KLONE
JACAGUAS	в	JUNCAL	C	KAVETT	D	KEZAR	8	KLOOCHMAN
JACANA	D	JUNCOS	D	KAWAIHAE	c	KIAWAH	C	KLOTEN
JACINTO	8	JUNCTION	в	KAWAIHAPAI	8	KIB9IE	8	KLUTINA
JACK CREEK	в	JUNEAU	В	KAWBAWGAM	C	KICKERVILLE	8	KNAPPA
JACKL IN	6	JUNIATA		KAWICH	A	KIDC	С	KNEELAND
JACKNIFE	C	JUNIUS	C	KAWKAWL IN	C	KICHAN	в	KNIFFIN
JACKS	D	JUND	8	KEAAU	D.	KIEHL	A	KNIGHT
JACKSON	8	JUNQUITOS	C	KEAHUA	8	KIEV	8	KNIK
JACKSONVILLE	С	JURA	c	KEALAKEKUA	C	KIKONI	в	KNIPPA
5UJAL	D	AVUL	8	KEALIA	D	KILARC	D	KNOB HILL
JACOBSEN	D	JUVAN	D	KEANSBURG	0	KILAUEA	8	KNCWLES
Y603AL	C			KEARNS	8	KIL BOURNE	A	KNOX
JACQUES	C	KAALUALU	Α	KEATING	С	KILBURN	Α	KNULL
JACQUITH	С	KACHEMAK	8	KEAUKAHA	D	KILCHIS	C	KNUTSEN
JACWIN	9	KADA SHAN	в	KEAWAKAPU	8	KILDCR	С	KOBAR
JAFFREY	Α	KADE	c	KEBLER	8	K IL GCRE	8/D	KOCh
JAGUEYES	8	KADGKA	6	KECH	C	KILKENNY	8	KODAK
		NAUCUA	0		•	N 11 1 8 10 10 M	C / O	YOO TAY

# Table B .1--Continued

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KUKATAU	A	LANE	c	LEACVILLE	BD	LICKCALE LICKING	0	LOLAK	D B
KULA	8 8/C	LANEY LANG	8 8/0	LEAF LEAHY	8	LICKSKILLET	C D	LOLALITA LOLEKAA	8
KULLIT	в	LANGFORD	ε	LEAL	8	LIDDELL	ŏ	LOLETA	Č/D
KUMA	8	LANGHEI	8	LEAPS	č	LIEBERMAN	č	LOLC	A
KUNTA	в	LANGLEY	с	LEATPAM	С	LIEN	D	LOLCN	A
KUNUWEIA	С	LANGLOIS	D	LEAVENWERTH	B	LIGGET	8	LOMA	с
KURO	D	LANGELA	в	LEAVITT	8	LIGHTNING	D	LOMALTA	D
KUSKOKWEM	D	LANGRELL	8	LEAVITTVILLE	8	LIGNUM	С	LOMAX	8
KUSLINA	D	LANGSTON	C	LEBANCN	C	LIGON	D	LOMIRA,	8
KUTCH	D	LANIER	8	LEBAR	8	LIHEN	A	LONDE	c
KUTZTOWN KVICHAK	8 8	LANIGER LANKBUSH	8 8	LEBEC LEBO	B C	LIHUE LIKES	B A	LONEPINE LONERIDGE	C B
KYLE	D	LANKIN	č	LEBSACK	č	LILAH	Â	LCNE ROCK	Å
KYLER	Ď	LANKTREE	č	LECK KILL	B	LILLIWAUP	Â	LONETREE	8
		LANDAK	8	LEDBEDER	8	LIMA	8	LONGFORD	č
LA BARGE	8	LANSDALE	B	LEDGEFORK	Α	LIMANI	8	LONGLOIS	8
LABETTE	С	LANSDOWNE		LEDGER	C	LIMBAR	8	LONGMARE	8
LABISH	D	LANSING	8	LEDRU	D	LIMERICK	С	LONGMONT	с
LA BOUNTY	С	LANTIS	8	LECY		LIMON	С	LÖNGRIE	с
LA BRIER	С	LANTON	ε	LEE	D	LIMONES	8	LONGVAL	8
LACAMAS	C/0	LANTCNIA	8	LEEDS	C	LINCCLN	A	LONG VALLEY	8
LA CASA	c	LANTZ	2	LEEFIELD	c	LINCROFT	A	LONGVIEW	c
LACITA	c	LAP	0	LEELANAU	A D	LINDLFY	c	LONCKE	B
	C		C	LEEPER	-	LINDSEY	D C	LONTI	C C
LACONA LACOTA	C D	LAPEER	B	LEESVILLE	B/C C	LINDSIDE LINDSTROM	6 6	LOOKQUT LUON	8
LACY	D	LAPLATTA	A C	LEETCN LEETCNIA	č	LINDY	č	LOPER	8
LADD	8	LAPORTE	č	LEFCR	в	LINEVILLE	č	LOPEZ	D
LAUDER	ō	LA POSTA	Ă	LEGLER	8	LINGANORE	8	LORADALE	č
LADELLE	B	LA PRAIRIE	ê	LEGCRE	8	LINKER	ě	LORAIN	č/D
LADCGA	č	LARABEE	8	LEHEW	č	LINKVILLE	8	LORDSTOWN	c
LADUE	c	LARCHMOUNT	8	LEHIGH	Ċ	LINNE	С	LORELLA	0
LADYSMITH	D	LARDELL	С	LEPMANS	D	LINNET	D	LORENZO	A
LA FARGE	в	LAREDO	8	LEHR	8	LINNEUS	в	LORETTO	в
LAFE	D	LARES	С	LEICESTER	С	LINO	С	LORING	С
LA FONDA	С	LARGENT	D	LEILEHUA	в	LINSLAH	D	LOS ALAMOS	С
LAFONT	8	LARGC	С	LELA	D	LINT	B	LOS BANOS	с
LAGLORIA	B	LARIMER	8	LELAND	D	LINTEN	8	LOSEE	8
LAGONDA	C		6	LEMETA	0	LINVILLE	8	LOS GATOS	B
LA GRANDE LAHAINA	С В	LARKSON LA RCSE	C B	LEMPSTER	C/D C	LINHCOD LIPAN	A/D D	LOS GUINEOS LOS OSOS	c c
LA HOGUE	8	LARRY	D	LEN LENA	A	LIPPINCOTT	6/D	LGS ROBLES	с 8
LAHONTAN	D	LARSEN	D	LENAPAH	Ô	LIRICS	8	LOS TANOS	6
LAIDIG	č	LARUE	Ă	LENAWEE	8/0	LIRRET	ō	LOST CREEK	8
LAIDLAW	8	LARVIE	õ	LENNEP	0	LISADE	8	LOST HILLS	č
LAIRDSVILLE	D	LAS	č	LENCIR	D	LISAM	c	LOS TRANCOS	Ď
LAIREP	D	LAS ANIMAS	c	LENCX	в	LISBEN	в	LOSTWELLS	в
LA JARA	C	LASAUSSES	С	LENZ	в	LISMAS	D	LOTHAIR	С
LAKE	Α	LAS FLORES	D	LEC	в	LISMCRE	в	LOTUS	в
LAKE CHARLES	D	LASHLEY		LEON	A/0	LITCHFIELD	A	LOUDON	С
LAKF CREEK	8	LASIL	0	LECNARD	С	LITHGOW	С	LOUCCNVILLE	с
LAKEHELFN	8	LAS LUCAS	c	LECNARDO	8	LITHIA	C	LOUIE	C
LAKEHURST	A	LAS POSAS	c	LECNARDTCWN	D	LITIMBER	c	LOUISA	8
LAKE JANEE LAKELAND	A		0	LECNIDAS	B C		D	LOUISBURG	B D
LAKEMONT	Ô	LASTANCE	B D	LECTA LEPLEY	D	LITTLEBEAR LITTLEFIELD	Ô	LOUP LOURDES	c
LAKEPORT	в	LAS VEGAS LATAH	č	LERDAL	c	LITTLE PCLE	D	LOUVIERS	D
LAKESHORE	D	LATAHCD	č	LERCY	в	LITTLETON	в	LOVEJOY	č
LAKESUL	8	LATANIER	ŏ	LESHARA	8	LITTLE WOUD	8	LOVELAND	č
LAKETON	8	LATHAM	Ō	LESHC	č	LITZ	č	LOVELL	Ċ
LAKEVIEW	С	LATINA	D	LESLIE	D	LIVERMORE	Α	LOVELOCK	C/C
LAKEWIN	Α	LATOM	D	LESTER	в	LIVINGSTON	D	LOWELL	С
LAKEWOOD	A	LATCNIA	8	LE SUEUR	8	LIVCNA	Α	LOWRY	8
	в	LATTY	C	LETA	C	LIZE	C	LOWVILLE	в
	A	LAUDERDALE	8	LETCHER	D	LIZZANT	8	LOYAL	в
	D A	LAUGENOUR LAUGHLIN	8/D 8	LETHA LETHENT	D C	LOBUELL	с с	LOYALTON	D
LA LANDE	ĉ		в	LETCRT	L	LCBERG	8	LOZAND	B
LALLIE	ŏ	LAUREL	č	LETTERBCX	8	LUBERT	8	LOZIER	D
LAM	8/0	LAURELHURST	č	LEVAN	A	LCBITOS	č	LUALUALEI	Ď
LAMAR	ß	LAURELWOOD	B	LEVASY	C	LOCEY	č	LUBBOCK	č
LAMARTINE	8	LAUREN	8	LEVERETT	С	LOCHSA	в	LUBRECHT	С
LAMBERT	8	LAVALLEE	в	LEVIATHAN	8	LCCKE	8	LUCAS	С
LAMBETH	С	LAVEEN	Û	LEVIS	С	LCCKERBY	С	LUCE	С
LAMINGTON	D	LAVELDO	D	LEWIS	D	LOCKHARD	8	LUCEDALE	ы
LAMO	B	LAVERKIN	C	LEWISBERRY	8	LOCKHART	8	LUCERNE	8
LAMONI	D A		c	LEWISBURG	ç	LCCKPCKT	0	LUCIEN	C
LAMCHT LAMONTA	A D		8	LEWISTON	C	LECKWOGD	8		8
LAMOURE	c	LAWLER LAWRENCE	в С	LEWISVILLE LEX	С 8	LOCUST	C D	LUCILETON LUCKY	8
LAMPHIER	8	LAWRENCEVILLE	c		8	LUCEMA		LUCKY STAR	8 8
LAMPSHIRE	Ď	LAWSENCEVILLE	ь	LEXINGTON	Ď		ĉ	LUCKY STAK	A B
LAMSDN	ŏ	LAWTHER	D	LIBBA	8	LODC	Ď	LUDDEN	ō
LANARK	в	LAWTCN	č	LIBEG	Ă	LOFFTUS	č	LUDLOW	č
LANCASTER	8	LAX	č	LIBERAL	ō	LOFTON	Ď	LUFKIN	ŏ
LANCE	8	LAYCCCK	в	LIBERTY	С	LOGAN	С	LUHCN	в
LAND	υ	LAYTON	A	LIBCRY	A	LCGGERT		LUJANE	с
LANDES	B	LEA	с	LIBRARY	D	LCGY	в	LUKIN	с
LANDISBURG LANDLOw	C	LEADER	8	LIBUTTE	0	LCHLER	ç	LULA	8
	C D	LEADPOINT LEADVALE	B C	LICK LICK CREEK	6 D	LOHMILLER	C	LUMBEE	D 8/C
		LLAUTALE	C	LICK CREEK	U	COMES		COUNT	6/L

NOTES A BLANK HYDPOLOGIC SOLL GPOUP IND4CATES THE SOLL GROUP HAS NOT BEEN DETERMINED THO SOLL GROUPS SUCH AS B/C INDICATES THE DEALNED/UNDRALMED SITUATION

LUN	C	MALABAR	A/D	<b>₽ARKSBCRC</b>		PAYFLOWER	C	PCV ICKERS	C
LUNA	C	MALABON	C	MARLA	Α	MAYHEW	D	MEAD	D
LUNCH	С	MAL ACHY	в	MARLBERE	6	MAYLAND	в	PEACIN	Α
LUNDIMO	C	MALAGA	8	MARLEAN	в	MAYMEN	C	MEADCWVILLE	6
LUNDY	8	PALAMA	A	MARLETTE	8	MAYNARD LAKE	B	MEADVILLE	
LUNI	С	MALAYA	0	MARLEY	B	MAYO	в	MEANDER	0
LUPTON	D	MALCCLM MALEZA	e B	MARLIN MARLCW	D	MAYGDAN Maychorth	B D	₽ECAN MECCA	в
LURA			0		C		в		8
LURAY	C/D	MALIBU	C/0	MARLTCN MARMARTH	С В	MAYSDORF MAYSVILLE	в	MECKESVILLE	C
LUTE LUTH	D C	MALIN MALJAMAR	A 2	MARKAKIN	D	MAYTCHN	c	MEDA	C B
LUTHER	в	MALLCT	Â	MARPA	8	MAYVILLE	в	MEDANO	c
LUTIE	8	MALM	ĉ	MARQUETTE	Å	MAYNGOD	8	MEDARY	č
LUTON	D	MALG	B	MARR	8	MAZEPPA	в	MEDFCRD	ă
LUVERNE	č	MALONE	в	MARRIOTT	в	PAZCN	č	MEDERA	õ
LUXOR	č	MALCTERRE	č	MARSDEN	č	PAZUPA	č	MEDICINE LODGE	8
LUZENA	Ď	MALPAIS	č	MARSELL	8	MCAFEE	č	MEDINA	6
LYCAN	в	MALPCSA	C	MARSHALL	в	MCALLEN	в	MEDWAY	8
LYCOMING	Č	PALVERN	c	MARSHAN	O	MCALLISTER	c	MEEKS	A
LYDICK	в	MAMALA	D	MARSHDALE	C	PCALPIN	C	MEETEETSE	С
LYFORD	С	MAMOU	C	MARSHFIELD	C	MCBEE	в	MEGGETT	D
LYLES	8	MANAHAA	С	<b>⊭ARSING</b>	в	MCBETH	C	MEGCN	C
LYMAN	C/D	MANALAPAN		MART	C	MCBRIDE	в	MEHL	C
LYNCH	D	MANANA	C	MARTELLA	B	MCCABE	B	PEHLHCRN	C
LYNCHBURG	B/D	MANASSA	C	MARTIN	¢	MCCAFFERY	Α	MEIGS	
LYNDEN	A	MANASSAS	в	MARTINA	A	MCCAIN	C	MEIKLE	0
LYNNUYL	A	MANASTASH	C	MARTINECK	0	MCCALEB	8	MEISS	D
LYNN HAVEN	8/0	MANATEE	B/D	MARTINEZ	D	MCCALLY	D	MELBCURNE	B
LANNAILLE	C	MANAWA	c	MARTINI	в в	MCCAPMON	C D	MELBY	C
LYNX	8	MANCELONA	A	MARTINSBURG		MCCARRAN		MELITA	8
L YONMAN L YONS	С D	MANCHESTER MANDAN	А B	MARTINSOALE MARTINSON	B C	MCCARTHY MCCLAVE	B C	MELLENTHIN MELLOR	D C
LYUNSVILLE	в	MANDERFIELD	6	MARTINSVILLE	в	MCCLEARY	c	MELLCTT	6
LYSINE	D	MANDEVILLE	8	MARTINTCN	č	PCCLELLAN	в	MELOLAND	č
LYSTAIR	в	MANFRED	C	MARTY	8	MCCLCUD	c	MELROSE	č
LYTELL	8	MANGUM	D	MARVAN	õ	MCCOIN	ŏ	MEL STONE	Ă
		MANHATTAN	A	MARVIN	č	MCCOLL	ΰ	MELTCN	в
MABEN	C	MANHEIM	c	MARY	č	MCCONNEL	в	MELVILLE	£
MABI	õ	MANI	č	MARYDEL	8	MCCOCK	B	MELVIN	Ď
MABRAY	D	MANILA	c	MARYSLAND	0	MCCCRNICK	C	MEPALOCSE	Ó
MACAY	в	MANISTEE	в	MASADA	c	MCCCY	C	MEMPHIS	8
MAC EDONIA	C	MANITOU	С	MASCAMP	O	MCCREE	в	MENAHGA	Α
MACHETE	C	MANLEY	8	MASCCITE	0	MCCKCRY	C	MENAN	С
MACHIAS	B	MANLIUS	C	MASHEL	6	MCCRCSK IE	D	MENARD	в
MACK	С	MANLCVE	в	MASHULAVILLE	B/D	MCCULLOUGH	C	MENCH	C
MACKEN	D	PANNING	в	MASON	в	MCCULLY	C	MENCEBOURE	C
MACKINAC	в	MANOR	в	MASCHVILLE	C	MCCUNE	D	MENCCCINO	в
MACKSBURG	в	<b>MANSFIELD</b>		MASSACK	в	MCCUTCHEN	C	MENDON	в
MACOMB	в	MANSIC	е	MASSENA	С	MCDOLE	в	MENDLTA	в
MACOMBER	B	MANSKER	в	MASSILLON	в	MCDONALO	в	MENEFEE	D
MACON	B	MANTACHIE	C	PASTERSCN	B	MCDONALDSVILLE	C	MENFRC	8
MACY	B	MANTEO	C/D	MATAMOROS	C	MCEWEN	B	MENLO	D
MADALIN	D	MANTER	ß	MATANUSKA	C	MCFACDEN	B	MENC	C
MADAWASKA	B	MANTON	8	PATANZAS	B	MCFAIN	C	MENCKEN	C
MADDDCK MADDOX	A	MANTZ MANU	в С	ΜΑΤΑΡΕΑΚΕ ΜΑΤΑμΑΝ	B C	MCFAUL MCGAFFEY	C C	MENCMINEE MENTG	B C
MADELIA	~	MANVEL	c	MATCHER	A	MCGARY	c	MENTCR	B
MADELINE	C D	PANNOOD	D	MATFIELD	ĉ	MCGEHEE	č	MEQUEN	č
MADERA	D	MANZANITA	c	MATHERS	8	MCGILVERY	5	MERCED	C/D
MADISDN	в	MANZANO	č	MATHERICN	8	PCGINTY	B	MERCEDES	0
MADONNA	č	PANZANOLA	č	MATHESON	в	MCCIRK	č	MERCER	č
MADRAS	č	MAPES	č	MATHEWS	U	MCGCWAN	ĕ	MERCEY	č
MADRID	B	MAPLE MT.	8	MATHISTCN	C	MCGRATH	6	MEREDITH	£
MADUREZ	8	MAPLETON	C/D	MATLCCK	ō	MCGREW	A	MERETA	С
MAGALLON	в	MARATHON	8	MATHCN	Ď	MCHENRY	в	MERGLE	8
MAGENS	в	MARBLE	Α	MATTAPEX	C	MCILWAINE	A	MERIDIAN	в
MAGINNIS	C	MAKBLEMOUNT	B	MATTCLE	C	MCINTUSH	в	MER IND	0
MAGNA	D	MARCETTA	Α	MAUCE	в	MCINTYRE	в	MERKEL	B
MAGNOLIA	B	MARCUM	8	MAUGHAN	C	PCKAPIE	D	MERLIN	Ĺ
MAGNUS	C	MARCUS	С	MAUKEY	C	MCKAY	D	MERPILL	£/D
MAGUAYO	D	MARCY	D	MAGMEE	A/D	MCKENNA	C/0	MERNA	ç
MAHAFFY Mahala	C/D	MARDEM	C	MAUNABC	D	MCKENZIE	D	MERCS	A
MAHALASVILLE	C B/D	MARDIN MARENGO	C C/D	MAUPIN	C D	MCKINLEY MCKINNEY	C D	MERKIFIELD	6 C
MAHALASVILLE				MAURE PAS MAURINE				MERRILL	
MAHASKA	в В	MARESUA	8 6	MAURY	D B	MCLAIN	С В	MERRILLAN	Ŭ A
MAHASKA	č	₽ARGERUM MARGUERITE	B	MAVERICK	C B	MCLAURIN MCLEAN	C C	MERRIMAC MERRITT	8/0
MAHONING	ō	MARGOERITE		MAVIE	D	MCLECD	в	MER ROUGE	8
MAHUKDNA	в	MARIANA	c	MAWAE	Å	MCPAHON	č	PERTCN	в
MAIDEN	8	MARIAS	Ď	MAX	B	MCMEEN	č	MERTZ	
MAILE	A	MARICAO	B	MAXEY	č	PCPULLIN	č	MESA	в
MAJADA	в	MARICOPA	в	MAXFIELD	č	MCMURDIE	č	MESCAL	č
MAKAALAE	B	MARIETTA	č	MAXSCN	Ă	MCMURPHY	ĕ	MESCALERO	č
MAKALAPA	D	MARILLA	č	PAXTEN	8	MCMURRAY	D	MESITA	C
PAKAPILI	A	PARINA	A	MAXVILLE	A	MENARY	C	MESKILL	C
MAKAWAO	в	MARION	C	MAXWELL	D	MCPAUL	в	MESPAN	С
MAKAWELI	В	MARIPOSA	С	MAY	в	MCPHERSON	C	MESSER	С
MAKENA	в	MARISSA	С	MAYBERRY	C	MCPHIE	в	MET	D
MAKIKI	8	MARKES	D	MAYBESC	C	MCQUARR IE	C	METALINE	в
MAKOTI	C	MARKEY	D	PAY DAY	0	MCQUEEN	C	METAMORA	8
MAL	B	МАРКНАМ	C	MAYER	0	MCRAE	B	METEA	в
MALA	8	PARKLAND	C	MAYFIELO	в	MCTAGGART	в	METIGOSHE	Α
	NOTES		DOL OCL	SOLL CROUP IN	HCATES	THE SOLL CROUP H		DEEN DETERMINED	

NOTES A BLANK HYDROLOGIC SOIL GROUP INDICATES THE SOIL GROUP HAS NOT BEEN DETERMINED TWO SOIL GROUPS SUCH AS P/C INDICATES THE DRAINED/UNDRAINED SITUATION

metricul         0         MITHANGA         C         PCALT         C         NACIPICIND         C         NASTUCA           MADA         0         PLALT         C         PLALT         C         NACECCLUMENT         B         NASTUCA           MIAPIAN         C         CACRA         0         PLALTAN         C         NASTUCA         B         NASTUCA           MICALISANE         B         PCECI         A         PCALT         C         NAGESIN         B         NASTUCA           MICALISANE         B         PCECI         B         PCECI         A         NASTUCA         B         NASTUCA           MICALISANE         B         PCECI         C         NASTUCA         B         NASTUCA         B         NASTUCA           MICALISANE         B         PCECI         C         NASTUCA         C         NASTUCA         B         NASTUCA           MICALISANE         B         PCECI         C         NASTUCA         C         NASTUCA         C         NASTUCA           MICALISANE         B         PCECI         C         NASTUCA         C         NASTUCA         C         NASTUCA           MICALISANE         B	ETOLIUS ETRE	B D	MISSIDN MITCH	B	MCRGANFIELD MGRGNEC	8	NABESNA	c c	NESS NESSEL	
job         D         PIZPAM         C         PCAPER SCIENT         C         ACCCCCUPS         B         NETUCA           LANING         C         PCAPER SCIENT         C         MARA         NATE         B         NATE         C         NATE         NATE         C         NATE         C         NATE         C         NATE         C         NATE         C         NATE         C<		A 0	HITCHELL	B	MCRIARTY	D	NACHES	B	NESSOPAH	
BADT         B         PCANC         D         PCARCAC         C         PCARCAC         C         NACLAN         B         NATA           LACCAL         A         PCARCAC         A         PCARCAC         C         NACE         B         NACE           LICALAN         B         PODECTIE         B         PCARLE         C         NACESSI         B         NELETIE           LICALAN         B         PCARLE         C         NACESSI         C         NANATIN         NACESSI         C         NANATIN         NACESSI         C         NACESSI <td></td>										
CLD         A/D         PCAULA         A         PCAULA         C         NAFF         B         NITICION           CHLSDN         C         NAGESIT         C <ths< th=""> <ths< th=""> <ths< th=""></ths<></ths<></ths<>					MCRMCN MESA					
CHU LGAMM         OF CAR JUNCT         CARGESJ         OF MODERT         C         NUMBER           CA         C         PCCAR JUNCT         S         MARTIST         C         NUMBER           CA         O         PCCAR JUNCT         S         MARTIST         C         NUMBER           CA         O         PCCAR JUNCT         C         MARTIST         C         NUMBER           CA         PCCAR JUNCT         C         PCCAR JUNCT         C         MARTIST         C         NUMBER           DDI-FU         PCCAR JUNCT         C         PCCAR JUNCT         C         MARTIST         NUMERT         NUMERT <t< td=""><td></td><td>С</td><td></td><td></td><td>MCRCCCC</td><td></td><td>NAD INA</td><td>8</td><td></td><td></td></t<>		С			MCRCCCC		NAD INA	8		
Chilame         C         MCCA         D         PERFIL         B         MACIISY         C         NUSSE           CK         B         MCCA         DEPAIS         C         MAUDIA         C         NUSSE           DDE-TOR         C         MCDALE         C         PCRION         C         MAUDIA         C         NUSSE           DDE-TOR         C         MCDEA         C         PCRION         C         MAUDIA         C         NUSSE           DDE-TOR         C         PCRION         C         MALAI         B         NUSSE           DESA         B         MODEA         C         PCRISCO         C         MAUDIA         B         NUSSE           DENDET         C         PCSA         A         MANTY         B         NUSA         B         NUSA           DTAI         B         PCSA         A         MANTY         B         NUSA         B </td <td></td>										
CK         B         MOCND         B         MOCND         C         MAULE         B         MAULE         C         MAULE         MAULE <thmaule< th="">         MAULE         MAULE</thmaule<>										
DAYS         D         PGDA         D         PERSIDN         B         NAMPA         C         NEVADDR           DOLF         PGDA         C         PERSON         C         NAMPA         C         NEVADDR           DILEDURY         B         PGDEL         C         PERSON         C         NAMPA         B         NEVINE           DILEDURY         B         PGDEL         C         PERSON         C         NAMPA         B         NEVINE           DILEDURY         B         PGDEL         C         PERSON         C         NAMPA         C         NEVINE           DILEDURY         B         PGDEL         C         PERSON         C         NAMPA         C         NEVINE           DILEDURY         B         PGDEL         C         NAMPA         C         NEVIA           DILEDURY         A         NAMPA         C										
DDT         C         PMCALE         C         PMCAUE         C         PMAUDIA         C         NAVULE           DELAURY         MODESTO         C         PERSE         D         ANIAA         B         NEVIN           DESA         D         PEDESTO         C         PERSE         D         NARAER         B         NEVIN           DESA         D         PEDESTO         C         PEGEA         C         NARAER         B         NEVIN           NIGHT         C         PEDENSO         C         PEGEA         ANAAER         B         NEVIN           NIGHT         C         PEDENSO         PESEA         ANAAER         B         NARE           NAT         B         PEGEA         ANAAER         B         NARE         B         NARE           NAT         B         PEGEA         B         NARE         B         NARE         B         NEWEGA           SUBL         C         MADAER         B         RESET         C         NANTEN         B         NEWEGA           SUBL         C         MADAER         B         RESET         C         NANTEN         B         NEWEGA           SUBL							HADEE			
Did Eduly         #         MODEL         C         # (FSI         D         NAILA         B         NEVIN           BESA         MODENAD         C         # (FSI         C         NARAI         B         NEVIN           BARD         C         # (FSI         C         NARAI         B         NEVIN           BARD         C         # (FSI         C         NARAMEN         A         NEVIN           NAL         C         MORFAT         B         # (SSI         A         NARAMEN         A         NEVIN           NAL         C         MORFAT         B         # (SSI         A         NARAMEN         A         NEVAR           NULL         C         MORFAN         B         # (SSIEANCK)         C         NARAMEN         B         NELARC           VILL         C         MORFAN         B         # (SSIEANCK)         C         NARISA         B         NELARC         NARISA         B         NELARC										
DESSA         B         MODENA         E         MERTFNSCN         C         NARAEL         B         NEVINE           NIGHT         C         MODENC         MEGTN         C         NARAEL         B         NEVINE           NIGHT         C         MODENC         MEGTN         C         NARAEL         B         NEVINE           NIGHT         C         MODENC         MEGTN         C         NARAEL         B         NEVINE           NIGHT         C         MARAEL         NARAEL         C         NARAEL         B         NEVER           FILIN         B         MEGGLAN         B         NESISA         C         NANTEN         B         NEWATCO           C         MARAEL         C         NESTROL         C         NARAEL         C         NEWATCO           C         MODENA         B         MOSIAA         B         NARAEL         C         NEWATCO           C         MODENA         B         MOSIAA         B         NANDEN         C         NEWATCO           C         MOLANAEL         B         MODENA         B         MEGTNAL         B         NEWATCO           ACA         B         MO										
NIGHT         C         MODIC         C         MAPRE         B         NEVIA           WALE         C         MAPRE         B         MCSEY         C         MAAPKEN         B         NEVU           WAY         0         MOFFATON         B         MCSEY         C         MAAPKEN         B         NEVU         B           WAY         0         MOFFATON         B         MCSEY         C         MAANYEN         B         NEVEN         B<										
VALE         C         NAME IN         A         NEVU           WAY         D         MOFSAT         B         MCSCA         A         NANCY         B         NESLARK           FLIN         B         MCSCL         C         NANAY         B         NESLARK           FLIN         B         MCSTER         C         NANSENCE         B         NESERAT           FLIN         B         MCSTER         C         NANSENCE         B         NESERAT           FEIL         C         MCMAKE         B         MCSTER         C         NANUENCE         C         NESERAT           FEIL         C         MCMAKE         B         MCSTER         C         NANUENCE         NESE CASTER           FS         B         MCREA         C         POSCUTOK         B         NANUENCE         B         NEECASTER           FS         B         MCREA         C         MCSCUTOK         B         NANUENCE         B         NANUENCE         B         NEECASTER         B <td< td=""><td>LAND</td><td>D</td><td>PDDEST0</td><td>С</td><td>MCRTCN</td><td>6</td><td>NAKNEK</td><td>D</td><td>NEVCYER</td><td></td></td<>	LAND	D	PDDEST0	С	MCRTCN	6	NAKNEK	D	NEVCYER	
MAY         D         MÖFFAT         B         MCSCA         A         NANCY         B         NEMARK           FLINURG         B         MGGULON         B         MCSHL         C         NANNYTEN         B         NEMART           FLINURG         B         MGGULON         B         MCSHEVILLE         C         NANUP         C         NEMART           GE         C         MGMAK         B         MCSHEVILLE         C         NANUP         C         NEMERAY           GSELL         C         MGMAK         B         MCSISTULE         A         NANUP         C         NEMERAY           GSELL         C         MGMAK         B         MCSISTULE         A         NANUP         C         NEMERAY           GS         MGULAD         B         MCUTATINUE         A         NAPPAS         D         NANUE           HAM         C         MDULAD         B         MCUTATINUE         NANUE         NANUE <td>NIGHT</td> <td>С</td> <td>MODOC</td> <td></td> <td>MGRVAL</td> <td>С</td> <td>NAMBE</td> <td>8</td> <td>NEVTAH</td> <td></td>	NIGHT	С	MODOC		MGRVAL	С	NAMBE	8	NEVTAH	
FLIN         B         MCGULDN         B         MCSEL         C         NANNY         B         NEXART           UEL         C         MCMAVE         B         MCSARACC         C         NANNYEL         B         NEXARCC           UEL         C         MCMAVE         B         MCSTRE         C         NANNYEL         B         NEXACC           UEL         C         MCMAVE         B         MCSTRE         C         NANNYEL         C         NEXACC           ACA         B         MOSTAL         C         NANNYEL         C         NEXCENT           ACA         B         MOSTAL         C         NANNYEL         C         NEXCENT           ACA         B         MOSTAL         C         NANNYEL         C         NANNYEL         S	VALE									
FLIADURG         B         MGGUL         B         MOSHANACA         B         NANSTEN         B         ALMATCO           UEL         C         MGMAYE         B         MCSHER         O         NANSTEN         B         NEBERG           E         C         MGMAYE         B         MCSHERVILLE         C         NANSTEN         B         NEBERG           E         MGMAYE         B         MCSTAT         D         NAPIER         B         NEBERG           AN         B         MORELUMAR         C         MCSSTROCK         B         NAPIES         B         NEELCHAR           ES         B         MORELUMAR         C         MCSSTROCK         B         NAPIES         B         NEELCHAR           LARD         B         MCUTAINVILLE         A         NAPIES         B         NEELCHAR           LARD         B         MCUTAINVILLE         A         NAPIES         B         NEELLANS           LBRDR         B         MCUTAINVILLE         B         NAARCASSTT         B         NEELLANS           LBRDR         B         MCUTAINVILLE         B         NAARCASSTT         B         NEELLANS           LBRDR <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>										
UFL         C         MOMAYE         B         MCSHERVILLE         C         NANSENE         B         NENBERGY           E         C         MOMAYE         B         MOSIDA         B         NANIUKET         C         NEERAY           ESEL         C         MOHAK         B         MOSIDA         B         NANIUKET         C         NEERAY           ESE         B         MORENA         C         MCTA         B         NAPIER         B         NENCLAST           ES         B         MORENA         C         MCTA         B         NAPIER         B         NENCLAST           ES         B         MOLAD         MCTATSVILLE         A         NAPARS         B         NENCLAST           HAM         C         MOLAD         B         MOLUTO         B         NARLON         B         NENCLAST           LA         B         MOLAD         B         MOLUTO         B         NARLON         B         NENCLAST           LARDON         B         MOLUTAT         B         MCUTATATE         NARACAST         D         NENERATE           LARDON         B         MOLUTATATE         NARACAST         NENERATE         D <td></td>										
é         D         MCHAYE         B         MCSHEVILLE         C         NANUP         C         NEBERAY           ACA         B         MOIRA         C         MOSQUET         D         NAPLY         C         NEBECADE           ACA         B         MOIRA         C         MOSQUET         D         NAPLES         B         NEEE CARDEL           ACA         B         MOIRA         C         MCIACOR         B         NAPLES         B         NEEE CARDEL           FORN         C         MORULEIA         B         MCUTSTULLE         A         NAPAPASE         D         NEEELITON           HEIM         C         MOLAL         B         MCUTAIINBURO         O         NAARAALITU         C         NEEELITON           LERDON         B         MCUNTAIINBURO         O         NAARAANITU         C         NEEELITON           LERDON         B         MCUNTAIINBURO         O         NAARAANSIT         B         NEEVELIT           LERDON         B         MCUNTAIRBURO         O         NAARAANSIT         B         NEEVELIT           LERDON         B         MCUNTAIRBURO         NAARAANSIT         B         NEEVELIN										
ESELL         C         MOHAMK         B         MALUH         B         NANUH         C         NEW CAMBIN           AAA         B         MORELUMAE         C         MCSSYBOCK         B         NAPIER         B         NEW CASTLE           AN         B         MORELUMAE         C         MCSSYBOCK         B         NAPIER         B         NEW CASTLE           B         MORELUMAE         C         MCSSYBOCK         B         NAPIER         B         NEW CASTLE           HAP         C         MOLAND         B         MCUNTAINVIEW         B         NARADZO         C         NARADZO           LARD         B         MCLATAINVIEW         B         MCUNTAINVIEW         B         NARADZO         D         NARADZO         B         NARADZO         D         NARADZO         D         NARADZO         D         NARADZO         D         NEWELL         D         D         D         D         D         NARADZO         D         NARADZO         D         NEWELL         D         D         D         NARADZO         D         NARADZO         D         NARADZO         D         NARADZO         D         NARADZO         D         NARADZO         D										
ACA         B         MODIA         C         POSUET         D         NAPA         C         New CASTER           AN         B         MORENA         C         MCTA         B         NAPLES         B         NEWCATER         B         NACLINIS         B         NCUNTATER         B         NACUTATER         B         NACU										
AN         B         MOKELUMNE         D         MCSSYRDCK         B         NAPLER         B         Netuces           ES         B         MOKENA         C         MCTTSVILLE         A         NAPPARC.         D         NEELCH           FDRN         C         MDKADLEIA         B         MCTTSVILLE         A         NAPPARC.         D         NEELCH           HAP         C         MDKAD         B         MCLITAL         B         NAPTER         D         NEELCH           LARD         B         MCLITAL         A         MCLITAL         B         NAPTER         B         NAPTER         B         NEEKTRK           LBRDDK         B         MCUNTALIVIELE         B         NARC         C         NEEKTRK           LBRDDK         B         MCUNTALRY         A         NARC         C         NEEKTRK           LBRDDK         B         MCUNTALRY         A         NARC         NARCARAS         B         NEEKTRK           LERDDK         B         MCUNTAL         CANASASA         MCUNTAL         NARCARASASETT         B         NEEKTRK           LERTUR         B         MCUNTAL         CLENTULLE         A         NARESASA										
ES         B         MORENA         C         MCTA         B         NAPLES         B         NECCHB           HAP         C         MOLLAND         B         MCUITON         B         NAPLES         D         Needale           HAP         C         MOLGAL         B         MCUTON         B         NAPADC         D         Needale           L         B         MOLESAS         A         MCUNTAINBURG         D         NARADJUU         C         Needale           L         B         MOLESAS         A         MCUNTAINBURG         D         NARADSE         B         NEELIN           LBODO         O         MOLESAS         A         MCUNTAINBURG         D         NARACON         B         NEELIN           LBODON         B         MCUNTAINELLO         D         NARACONS         D         NEENT         B         N										
FORD         C         MORULEIA         B         MCTISVILLE         A         NAPPANE.         D         NEUDAL           HAP         C         MOLCAL         B         MOUND         C         NAPATALTON         B         NAPETANE         B         NEELL           HEIM         C         MOLCAL         B         MOUND         C         NAPATALTON         B         NAPATALTON         C         NEWERLETCN           LBDROD         MOLLY         B         MCUNTAINFULLE         B         NANCS         C         NEWLAND           LBROD         B         MOLNAI         B         KCUNTAINFULLE         B         NARCA         B         NEWLAND           LBROD         B         MOLNAI         RCUNTAINFULE         B         NARCA         B         NEWLAND           LBROD         B         MOLNAI         C         MCUNTICARBOLL         B         NARCA         B         NEWPARE           LER         D         MONAA         A         MCUNTICARBOLL         B         NARCA         B         NEWPARE           LER         D         MONAA         A         MCUNTICARBOLL         B         NARCA         B         NEWPARE					MCTA					
HAP         C         MOLAND         B         MAPTCANE         B         NEELLAND           L         B         MOLGAL         B         MOLNO         C         NARAJUC         C         NEELLCN           LARDD         B         PCLFNA         A         MCLNTAINVELW         B/         NARAJUC         C         NEEWFCRK           LARDD         B         PCLINATIANVELW         B/         NARTCANSUE         C         NEEWFCRK           LARDDK         B         POLDKAI         B         MCUNT AIRVELW         B/         NARCA         C         NEEWFCRK           LARDDK         B         POLDKAI         B         MCUNT AIRVELW         B         NARCA         C         NEWPORT           LER         D         PONAD         A         MCUNT HOCD         NARASCAS         D         NEWPORT           LER         D         PONADA         A         MCUNT HOLD         NASSCA         D         NEWPORT           LER         D         PONADA         C         MCUAT         D         NASSCA         NEWPORT           LER         D         MASSCA         D         NASSCA         C         NARASSCA           LER <td< td=""><td></td><td></td><td>MDKULEIA</td><td>8</td><td>MCTTSVILLE</td><td>A</td><td>NAPPANE.</td><td></td><td></td><td></td></td<>			MDKULEIA	8	MCTTSVILLE	A	NAPPANE.			
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LLSAP         C         MCATTEAU         D         PUDRAY         D         NATHROP         B         NIART           LLSADL#         B         MONMOUTH         C         HUD, SPKINGS         C         NATICNAL         B         NICHDLSON           LLSADL#         B         MONMOUTH         C         HUD, FKINGS         C         NATURITA         B         NICHOLSON           LLVILLE         B         MONDAGALEA         C         HURKIRK         B         NATURITA         B         NICHOLSON           LINGD         MCRGANA         C         MULRCH         D         NAMAGING         C         NICCEL           LINGT         MONRCEVILLF         C/D         MULRCH         D         NAMAGING         D         NICCEHUS           LIOY         MONRCEVILLF         C/D         MULRCH         C         NAVARCD         B         NICCLET           MGRSS         C         MCNTARA         D         MULTCROR         A         NAYLOR         NICCLET           MGRSS         C         MCNTARA         D         MULTCROR         A         NAYLOR         NICCLET           NATA         B         MONTAGAN         MULTCROR         A         NATCD </td <td></td>										
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NIDINACMONTPELLIERCMUSSEGEFCNEFIACNIPPENSINKNNEISKACMONTRUEEdMUSSELSHELLBNELLISBNIPSUMNNEUSAAMONTVALEDMUSSELSHELLBNELLISBNIPSUMNNEUSAAMONTVALEDMUSSELSHELLBNELSCTTBNIPSUMNNEUSAAMONTVALEDMUSSEVDNELSCTTBNISAANNEUGABMCNTVENDEA/DMUSTANGA/DNELSCNBNISFNANNETUNABMONTWELLCMUTNALABNEMAHCNISFNANNEWAUKANBMDCOTBMUTNALABNEMAHBNISCUALLYNNEWAUKANBMCCTCOBMYAKKAA/DNENCCBNISCUALLYNNEWAUKANBMCCOTBMYAKKAA/DNENCCBNISCUALLYNNEWACMCCALESCMYAKKAA/DNECTNIUNIUNIUNIUNIUNIULIINTOBMURADDCMYRESDNECTMABNIUCTNVALEBMCRECMYRESNIACNNIXANIXCNRABALCMCREADCMYRESANIXCNNIXCNRABALCMCREADCMYRESANIXCNNIXCNRABALCMCREADCMYRESANIXCNNIXCN										
NNEISKA     C     MONTRUSE     B     MUSSELSHELL     B     NEUIS     B     NIPSUP       NNEUSA     A     MONTVALE     D     PUSSEY     D     NELSCTT     B     NIRA       NNFQUA     B     MCNTVENDE     A/D     MUSTANG     A/D     NELSCN     B     NIRA       NNFQUA     B     MCNTVENDE     A/D     MUSTANG     A/D     NELSCN     B     NISHA       NNFGUARA     D     MONTVELL     C     PUTNALA     B     NEMAH     C     NISHCN       NNEWAUKAN     B     MCCOY     B     PUTUAL     B     NENAL     C     NISKULY       NNEWAUKAN     B     MCCOY     B     PUAKKA     A/D     NENC     B     NISKULY       NNEWAUKAN     C     MCCHEC     PYAKKA     A/D     NENC     B     NISKAULY       NIGA     C     MCCSE RIVEF     C     PYAKKA     A/D     NENC     B     NISKAULY       NUA     C     MCCSE RIVEF     C     PYAKKA     A/D     NENC     B     NISKAULY       NUA     C     MCCSE RIVEF     C     PYAKKA     A/D     NECLA     D     NIU       NU     D     MCRADD     C     PYERS <td></td>										
NNEUSAAMONTVALEDPUSSEYDNELSCCTTBNIRANNEUSABMCNTVERDEA/DMUSTANGA/DNELSCCTTBNIRANNETUNKADPONTVELLCPUTNALABNEHAHCNISCUALLYNNETUNKABMOCOYBPUTUALBNEHAHBNISCUALLYNhIFCEDPCCHCOBPYAKKAA/DNENCBNISCUALLYNGACPCCHCOBPYAKKAA/DNENCBNIULINGACPCCHCOBPYAKKAA/DNECCADNIUNGACPCCHCOBPYAKAA/DNECCADNIUNGACPCCABPYERSDNECTCAABNIULINTOBMURADDCPYERSDNECTCAABNIUCTNVALEBPCRDCPYRICKDNEPFLBNIXANVALEBPCRECPYRICKDNEPFLBNIXCNRATAHBMOREHCUSECPYSTICDNESDAANIZIANRATAHBMOREHCUSECPYSTICDNESDAANIZIANRATAHBMORELANDTÚNANIZIANNOBSCOTTNESHANINYBNOBLERESBPCRELANDTÚNANIZIANNESHANINYBNOBLE										
NNFQUA     B     MČNTVEŘĎE     Â/D     MŮŠTŘNG     Â/D     NĚĽŠČN     B     NÍŠHNA       NNETÚNKA     D     PONTWELL     C     PUTNALA     B     NEMAF     C     NIŠENA       NNEVAUKAN     B     MČCHCO     B     PUTUAL     B     NEMAKA     B     NIŠEUALLY       NNEVAUKAN     B     MČCHCO     B     PUTUAL     B     NENANA     B     NIŠEUALLY       NNEVAUKAN     B     MČCHCO     B     PYAKKA     A/D     NENC     B     NIŠEUALLY       NDA     C     PCCHCO     B     PYAKKA     A/D     NENC     B     NIŠEVALLY       NDA     C     PCCSE RIVER     C     PYAKS     D     NECICMA     D     NIÚLI       NDA     C     PCCA     B     PYAKS     D     NECICMA     B     NIULI       NTO     A     MCRADD     C     PYERS     D     NECICMA     B     NIUCT       NU     D     MCRADD     C     PYERS     D     NECICMA     B     NIUCT       NU     D     MCRADD     C     PYRICK     D     NEPPEI     B     NIXA       NVALE     B     PCRD     C     PYRICK     D<										
NNETONKA         D         PONTWELL         C         PUTNALA         B         NEMAF         C         NISECN           NNEWAUKAN         B         MDEDY         B         PUTUAL         B         NEMAA         B         NISECALLY           NNEWAUKAN         B         MDEDY         B         PUTUAL         B         NEMAA         B         NISECALLY           NDIFCE         D         PCONECO         B         PYAKKA         A/O         NENC         B         NISECALLY           NDA         C         PCONECO         B         PYAKKA         A/O         NENC         B         NISECALLY           NDA         C         PCONECO         B         PYAKKA         A/O         NENC         B         NISECALLY           NDA         C         PCONECO         B         PYAKKA         A/O         NENC         B         NISECALLY           NDA         C         PCONECO         PYAKS         D         NECT         B         NIULI         I           NTO         A         MCRADD         C         PYERSVILLE         B         NEPEI         B         NIXCO           NVALE         B         PCORFAU         C										
NN 1FCE         D         PC0 HCO         B         PYAKKA         A/D         NENC         B         NISSWA           NUA         C         PCCSE <rivef< td="">         C         PYAKKA         A/D         NENC         B         NISSWA           NUA         C         PCCSE<rivef< td="">         C         PYAKKA         A/D         NECLA         D         NIU           NCA         C         PCCSE<rivef< td="">         C         PYAKKA         A/D         NECLA         D         NIU           NTA         C         PCCSE<rivef< td="">         C         PYAKKA         B         NIULI           NTA         A         MCFADD         C         PYERS         D         NECTMA         B         NIULI           NTA         A         MCFADD         C         PYERS         D         NEPSTA         C         NIUCT           NU         D         MCFALS         C         PYRTE         B         NEPFL         B         NIXCN           NALE         B         MCFD         C         PYRTE         B         NETAK         NIXCN           RACLE         B         MCFFAU         C         PYSTEN         A         NESDA         A         <td< td=""><td></td><td></td><td>MDNTWELL</td><td>С</td><td></td><td>в</td><td></td><td>£</td><td></td><td></td></td<></rivef<></rivef<></rivef<></rivef<>			MDNTWELL	С		в		£		
NÚA         C         PÉCSE RIVEF         C         PYATT         B/C         NECLA         D         NIU           HORA         C         PÓPA         B         PYERS         O         NECTCPA         B         NIULI           HORA         C         PÓPA         B         PYERS         O         NECTCPA         B         NIULI           NT^         O         MCRADD         C         PYERSVILLE         B         NEPETA         C         NIVLCC           NU         D         MCPALES         C         MYLREA         B         NEPPI         B         NIWCT           NVALE         B         PCRD         C         PYRICK         D         NLPPEL         B         NIXCT           RARAL         C         PORFAU         C         PYRTE         B         NEFUNF         A         NIXCN           RACLE         B         MCREHEAD         C         PYSTEN         A         NEKESCN         B         NIXCN           RAMAR         B         MOREHCUSE         C         PYSTIC         D         NESDA         A         NIZIAN           RANDA         D         MCRELAND         D         PYTCN <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>										
NORA     C     POPA     B     PYERS     D     NECTCPA     B     NIULII       NTO     3     MURADD     C     PYERSVILLE     B     NEPESTA     C     NIUCC       NU     D     MCPALES     C     MYLREA     B     NEPP1     B     NIUCC       NVALE     B     MCRAD     C     MYLREA     B     NEPP1     B     NIUCT       NVALE     B     MCRAU     C     MYRICK     D     NEPPEL     B     NIXA       RABAL     C     MCREHEAD     C     MYRILE     B     NEPTUNE     A     NIXCN       RACLE     B     MCREHEAD     C     MYSTEN     A     NEESDA     A     NIZIAN       RAMAR     B     MOREHCUSE     C     MYSTIC     D     NESDA     A     NIZIAN       RANDA     D     MCRELAND     D     MYTON     B     NESHAMINY     B     NOBLE       RFS     B     MCRELANDTÚN     A     NESIKA     B     NOBSCOTT		-								
NT^     B     MCRADD     C     MYERSYLLE     B     NEPESTA     C     NÍVĚČČ       NU     D     MCPALES     C     MYLPEA     B     NEPPI     B     NIUCT       NVALE     B     MCPALES     C     MYLPEA     B     NEPPI     B     NIXA       RABAL     C     MCRFAU     C     MYRTE     B     NEPTINE     A     NIXCN       RACLE     B     MCREHEAD     C     MYSTEN     A     NESDA     A     NIZIAN       RAMAR     B     MCREHEAD     C     MYSTIC     D     NESDA     A     NIZIAN       RANDA     D     MCRELANDTON     D     MYTEN     B     NESHAMINY     B     NOBLE       RFS     B     MCRELANDTON     A     NESTA     B     NOBSCOTT										
NU     D     MCFALES     C     MYLHEA     B     NEPFI     B     NINCT       NVALE     B     PCRD     C     PYRICK     D     NLPPEL     B     NIXA       RABAL     C     PURFAU     C     PYRICK     D     NLPPEL     B     NIXCN       RACLE     B     PGREHEAD     C     PYSTEN     A     NERESCN     B     NIXCN       RAMAR     B     MOREHCUSE     C     PYSTIC     D     NESDA     A     NIZIAN       RANDA     D     MCRELAND     D     PYTCN     B     NESHAMINY     B     NOBLE       RFS     B     PDRELANDTON     A     NESTRA     B     NOBSCOTT										
NVALE     B     PČRO     Č     PÝRIČK     D     NEPPEL     B     NIXA       RABAL     C     PÚPFAU     C     PYRILE     B     NEPTUNE     A     NIXCN       RACLE     B     PGREHEAD     C     PYSTEN     A     NERESCN     B     NIXCN       RAMAR     B     MOREHCUSE     C     PYSTIC     D     NESDA     A     NIZIAN       RAMDA     D     MCRELANDTÚN     D     PYTEN     B     NESHAMINY     B     NOBLE       RFS     B     PORELANDTÚN     A     NESIKA     B     NOBSCOTT		-						-		
RABAL     C     MOPFAU     C     MYRTLE     B     NEPTUNE     A     NIXCN       RACLE     B     MOREHEAD     C     MYSTEN     A     NERESCN     B     NIXCNTON       RAMAR     B     MOREHCUSE     C     MYSTEN     A     NERESCN     B     NIXCNTON       RAMAR     D     MOREHCUSE     C     MYSTIC     D     NESTAMINY     B     NOBLE       RANDA     D     MORELAND     D     MYTCN     B     NESTAMINY     B     NOBSCDTT								-		
RACLE B MOREHEAD C MYSTEN A NERESCN B NIXONDN RAMAR B MOREHCUSE C MYSTIC D NESDA A NIZIAN RAMDA D MORELAND D MYTCN B NESHAMINY B NOBLE RFS B MORELANDTUN A NESIKA B NOBSCOTT										
RAMAR B MOREHOUSE C MYSTIC D NESDA A NIZIAN RANDA D MORELAND D MYTEN B NESHAMINY B NOBLE RFS B MORELANDTUN A NESIKA B NOBSCOTT										
RANDA DIMCRELAND DIMYTCN BINESHAMINY BINDBLE RES BIMDRELANDTUN AINTESIKA BINDBSCDTT	RAMAR	в	MOREHOUSE	C			NESDA	-		
RES B MORELANDTUN & NESIKA B NOBSCOTT		D								
NOTIO O MODEN O LOTA O							NESIKA	в		
	RRUR	8	MCREY	C	N-BAR	в	NESKCHIN	-		
RRUP LAKE A MCRETITE & NAALEHU B NESPELEM B NOEL NOTES A BLANK HYDPOLOGIC SOLL GROUP LUCICATES THE SOLL GROUP HAS NOT BEEN DETERMIN	KKUV LAKE									

## Table B.1--Continued

NOHILI	0	CCILLA	С	CNSLCW	в	DWGSSO	в	PARALCHA	C
NDKASIPPI	0	CCKLEY	в	ONTARIC	в	GWYHEE	8	PARAMORE	D
NOKAY	С	DCCEE	A/0	CNTKO	B/O	CXALIS	C	PARASOL	8
NOKOMIS	в	OCONEE	C	ONTCHAGCH	0	0×8CH	C	PARCELAS	0
NULAM	8	CCONTO	в	<b>UNYX</b>	в	DXERINE	c	PARDEE	0
NDLICHUCKY	B	CCUSTA	č	CCKALA	Ă	CXFCRD	č	PAREHAT	8
NOLIN	в	OCQUEOC	8	CPAL	0	CZAMIS	8/0	PARENT	č
NULO	8	CCTAGON	в	OPEQUON	č/0	DZAN	0	PARIETTE	č
NDME	č	CDELL	в	CPMIR	c	CZAUKEE	č	PARIS	
		COERMOTT				CEMUREE	C		с
NENDAL TON	в		C	GPIHIKAC	0			PARISHVILLE	
NONOPAHU	0	COESSA	0	CEUAGA	c	PAAIKI	в	PARKAY	8
NOUKACHAMPS	C/D	CDIN	С	ORA	C	PAALCA	8	PARKOALE	8
NDUKSACK	8	OONE	с	CRAN	в	PAAUHAU	A	PARKE	8
NDONAN	υ	OFFALLON	0	CRANGE	D	PACHAPPA	B	PARKER	8
NOKA	8	OGOEN	D	CRANCEBURG	в	PACHECO	8/C	PARKFIELD	c
NORAD	в	CGEECHEE	C	CRCAS	0	PACK	C	PARKHELL	ō
NCKBGRNE	6	CGFMAW	č	GFCHARD	8	PACKARO	B	PARKHURST	0
NORBY	в	CGILVIE	č	ORD	A	PACKER	č	PARKINSON	8
			в	CRENANCE	ĉ	PACKHAM			
NORD	в	CGLALA					В	PARKVILLE	C
NDRDEN	8	UGLE	9	UPOWAY	U	PACKSADDLE	в	PARKHDCO	A/C
NORDNESS	в	CHAYSI	с	ÛRELIA	D	PACKWCCL	σ	PARLEYS	8
NORFOLK	8	CHIA	Α	ORELLA	С	PACULET	8	PARLIN	С
NCRGE	в	U AL U	8	CREM	A	PACTCLUS	C	PARLO	8
NCKKA	8	OJATA	υ	CRESTIMBA	С	PADEN	С	PARMA	C
NCRMA	в	CKANCGAN	в	CRECKO	с	PADRENI	в	PARNELL	0
NORBEST	č	CKAW	ō	CRIDIA	č	PADUCAH	8	PARR	в
NORRIS	č	OKEECHOBEE	A/D	CRIF	Ă	PADUS	в	PARRAN	õ
NORTHDALE	č	CKEELANTA	A/0	CRIC	ĉ	PAESL	8	PARRISH	č
NORTHFIFLD	8	CKEMAH	C	CRICN	B	PAGET	B	PARSHALL	В
NURTHPORT		CKLAREO	в	CHITÁ	в	PAGOCA	С	PARSIPPANY	D
NOPTH PCADER	С	CKLAWAHA	A/0	CPLANO	в	PAHKANAGAT	С	PARSONS	0
NORTHUMBERLAND	C/U	OKMOK	С	CRLANOC	A	PANKEAH	D	PARTRI	с
NORTON	С	OKD	U U	CHMAN	С	PAHROC	D	PASAGZHAK	8
NURTONVILLE	С	CKUBGJI	С	URMSBY	B/C	PAIA	С	PASCO	в
NDS TUNE	ů.	OKELONA	c	CHODELL	C	PAICE	č	PASC SECO	Ď
NORWALK	8	CKPEEK	ΰ	GREFINE	Ř	PAINESVILLE	v	PASCUETTI	č/0
NURWAY FLAT	A	DKTIBBEHA	ō	CHC GRANDE	č	PAINTROCK	в	PASCUOTANK	8/0
NDEWFLL	с	DLA	C	CPENC	D	PAIT	в	PASSAR	C
NORWICH	C	DLAA	A	URCVAUA	C	PAJARITO	в	PASS CANYON	D
NCFWOUD	8	OLALLA	с	Скн	с	PAJARD	С	PASSCREEK	9
NOTI	D	CLANTA	в	LPRVILLE	с	PAKALA	в	PASTURA	0
NUTUS	Α	CLATHE	с	CRSA	Α	PAKINI	в	PATAHS	8
NEVARA	8	CLU CAMP	C	CRSINU	Α	PALA	в	PATENT	С
VUARA	в	OLUHAM	C	OKTELLC	A	PALACIC	в	PATILLAS	8
NDWCUD	c	CLOS	č	GRTIGALITA	C	PALAPALAI	8	PATILO	c
NDYC	č	CLUSMAR	BZD	URTING	č	PALATINE	в	PATIT CREEK	в
NUHY	č	CLOWICK	8	CRTIZ	č	PALESTINE	6	PATNA	č
NUCKOLLS	C	CLELO	d	CRWGOD	в	PALISADE	в	PATCUTVILLE	C
NUCLA	в	GLENA	6	( SACE	0	PALMA	B	PATRICIA	8
NUECES	С	CLEQUA	в	CSAKIS	в	PALMARÉJG	С	PATRICK	8
NUGGET	С	CLETE	в	LSGCCD	в	PALM BEACH	Α	PATROLE	С
NUMA	С	OLEX	8	LSFA	в	PALMER	0	PATTANI	C
NUNDA	С	CLGA	ί	GSHAWA	D	PALMER CANYON	8	PATTENBURG	в
NUNICA	С	CLT	6	C * SHEA	ċ	PALMICH	в	PATTERSON	С
NUNN	С	CLIAGA	ь	C SEKC SH	С	PALMS	С	PATION	8/C
NUSS	Ū	CLINDA	6	CSHICHD	Ř	PALMYRA	в	PATHAY	c
NUTLEY	č	LLIPHANT	6	CSICR	B/D	PALU	8	PAUL	8
NUTRAS	č	CLIVCHAIN	č	CSKA	c	PALLMAS	ē	PAULOING	õ
NUTRICSC			ß		8	PALLMIND	õ	PAULINA	c
	в	CLIVER		LSMUND					
NUVALDE	C	CLIVIER	C	LSC	в	PALCS VERDES	e	PAULSELL	0
NYALA	D	CLMITO	D	0.2066	D	PALCUSE	в	PAULVILLE	в
NY4CRF	Α	CLMITZ	3	USCHIDGE	L	PALSGROVE	e	PAGFALU	в
NAZZA	С	CLMOS	ĉ	CSLTE	в	PAMLICO	υ	PAUNSAUGUNT	υ
NYSSATON	в	CLMSTED	e/o	CSS MAN	с	PAMCA	С	PAUSANT	8
NYSTROM	С	CLNEY	8	CST	в	PAMSDEL	0	PAUHELA	в
		CLCKUI	С	CSTRANCER	в	PANA	в	PAVAHRCC	8
LAHE	8	CLPE	č	CTERC	в	PANALA	ē	PAVANT	ō
UAKDALE	в	DLSCN	c	CTHELLC	ŭ	PANAENA	ō	PAVILLICN	8
CANDEN	ő	CLTDN	ŭ	6715	č	PANASCFFKEE	õ	PAWCATUCK	มั
CAKFERD	н	OLUSTEE	e/o	CTISCO	Ă	PANCHERI	8	PAWLET	B
CAKE GLEN	ä		c/U	DTISVILLE	A A	PANCHERI	č	PANLEI PANLEI	Ď
OAK GPUVE	č	~~ ~ ~ ~ ~	5			PANCHUELA	•	PANNEE	•
UAK LAKE		CLYMPIC	٤ ٥	LTLEY	8		e		ç
	в	CMAHA	6	CISFCC	C	PANCLAH	С	PAYETTE	8
UAKLAND	C	CMAK	с	FILE B	8/0	PANUGRA	U	PAYMASTER	в
DAKS KINGE	C	C™EGA	Δ	CTTERBEIN	с	PANCURA	0	PAYNE	С
<b>UVKAIFF</b>	Α	CMENA	B	CTIERHOLT	в	PANE	8	PAYSON	D
CAFECUU	0	CMNI	с	CITLKEF	Α	PANGUITCH	в	PEACHAM	С
CANAPUKA	в	CNA		CTWAY	D	PANHILL	ē	PEARL HARBOR	Ū
UASIS	6	CNALASKA	ы	UTHELL	с	PANICCUE	в	PEARMAN	
UATMAN	8	CNAMIA	6	CUACHITA	č	PANKY	č	PEARSOLL	0
OBAN	č	LNAKGA	6	LURAY	<u>د</u>	PANCCHE	8	PEAVINE	č
DBARI									
	B	UNAWA	l:	CLTLET	c	PANULA	υ	PECATCNICA	в
('FRAA	D	CNAWAY	в	GVALL	с	PANSEY	0	PECCS	C
OBURN	U	CNUAMA	ü	GVERGAARD	с	PANTHE	С	PEDEE	С
UCALA	0	CNEIDA	в	CVERLY	с	PANTEN	С	PEDERNALES	С
UCEANET	D	G*NEILL	e	EVERTON	C	PAGLA	Α	PEDIGG	B/C
UCEANG	Δ	ONECNTA	н	CAIC	č	PALLI	в	PEULAN	C
UCHEYEDAN	3	ONITA	c	IVINA	в	PAPAA	Ĉ	PEDRICK	в
LCHLOCKONEC	в	ENITE	ĕ	UNECC	õ	PAPAL	A	PEEBLES	č
ULHI	õ	CNUTA	č	CHEN CREEK	č	PAPAKATING	ĉ	PEEL	č
CCHOCI	č	ENCINA	C C	INENS	D	PAPCESE	č	PEELER	в
GCHUPE!	BZD	CNKAY	D	intro fulli	B	PARACISE	c	PEEVER	ĩ
									C
,	OTES	A PLANK HYDI	010010	THE GROUP IN	T PATES T	HE SOLL GROUP HA	S MOT	REEN DETERMINED	

POTES A PLANK HYDROLOCIC SOLL GROUP INDICATES THE SOLL GROUP HAS NOT BEEN DETERMINED TWO SOLL GROUPS SUCH AS B/C INDICATES THE DRAINED/UNDRAINED SITUATION

					0.46	004.005	~		
PEGLER	0	PIE CREEK	C	PCE	B/C	PREBLE	C	QUINN	0
PEGRAM	B C	PIEPIAN	A C	PEGANEAB	C	PRENTISS	C	QUINNEY	С
PEKIN	C	PIERPONT PIEPPE	C	PLGUE	8 A	PRESQUE ISLE	8	QUINTEN	~
PELHAM	BID		υ	PEHAKUPU	8	PRESTO	A	QUITHAN	c
PELIC	C D	PIIHENUA PIKE	8	PLINSETT PCINT	8	PRESTLN PREWITT	ĉ	QUONSET	A
PELLA	-	PILCHUCK	A	PLINT ISAPEL	č	PREY	D	RABEP	с
PELUNA PEMBERTUN	C A	PILGPIM	8	POJOAQUE	в	PRICE	č	RABEY	A
PEMOINA	ĉ	PILOT	в	PGKEGCMA	8	PRIOA	õ	RABIOEUX	8
PEMBRUKE	а	PILCT ROCK	č	PCKER	в	PRIDHAM	ũ	RABUN	8
PENA	8	PIMA	в	PELAND	0	PRIETA	č	RACE	D
PENCE	A	PINAL	ũ	PCLAK	в	PRIFEAUX	č	RACHERT	0
PENDEN	8	PINALENO	в	PELATIS	č	PPIMGHAR	8	RACINE	в
PEND LREILLE	8	PINATA	č	PGLE	Ă	PRINCETON	8	RACCON	õ
PENDRUY	ΰ	PINAVETES	Ă	PCLEBAK	ĉ	PRINEVILLE	č	RAC	č
PENISTAJA	8	PINCHER	ĉ	PCLELINE	8	PRING	8	RADFORO	в
PENITENTE	8	PINCKNEY	č	POLEC	č	PRINS	c	RADLEY	č
PLNN	č	PINCONNING	õ	PCLEY	č	PRECIER	B	RADNOR	õ
PENNEL	č	PINCUSHION	8	PLLICH	c	PRGGRESSO	c	RAFAEL	ō
PENNINGTUN	8	PINEDA	8/0	PELLARO	с	PRUMISE	0	RAGLAN	0
PENNISULA	c	PINECALE	в	POLLASKY	С	PRCMC	0	RAGNAR	8
PENO	С	PINEGUEST	в	PCLLY	в	PROMENTORY	в	RAGC	С
PENDYER	c	PINELLOS	A/0	PCLC	в	PRUNG	С	RAGSOALE	8/0
PENRUSE	0	PINETOP	С	PELSEN	ç	PROSPECT	в	RAGTGWN	0
PENTHOUSE	Ð	PINEVILLE	8	PCLVADERA	С	PROSPER	в	RAHP	С
PENTZ	0	PINEY	С	PCFAT	C	PROSSER	C	RAIL	C/O
PÉNWOOO	Α	PINICON	6	PEMELLC	С	PROTIVIN	С	RAINBOW	C
PEUGA	С	PINKEL	C	PCMPANC	A/0	PROUT	С	RAINEY	в
PEOH	С	PINKSTON	в	PCMPCNIC	С	PREVIDENCE	C	RAINS	B/O
PEONE	8/0	PINNACLES	C	PEMPTEN	8	PROVG	C	RAINSBORD	C
PEUTUNE	C	PINU	C	PCHROY	в	PREVE BAY	0	RAKE	0
PEPOON	в	PINULA	С	PENCENA	0	PRCWERS	8	RALSEN	8/ <b>C</b>
PEQUEA	C	PINOLE	в	FENCHA	A	PTARMIGAN	в	RAMADA	C
PERCHAS	0	PINCN	С	PEND	B/C	PUAULU	Α	RAMADERO	в
PERCIVAL	C	PINCHES	D	PUNC CREEK	в	PUCHYAN	A	RAMBLER	в
PERELLA	C	PINTAS	υ	PENEILLA	A	PUDDLE	0	RAMELLI	C
PERHAM	C	PINTLAR	A	PENIL	0	PUERCO	0	RAMIRES	D
PERICO	8	PINTO	C	PENTETEE PENZER	В	PUETT	C C	RAMPEL	C
PERKINS	C A	PINTURA	A C	POCKU	0	PUGET	C	RAMC	C
PERKS		PINTHATER				PUGSLEY	в	RAMENA	В
PERLA	C A	PIOPGLIS PIPER	0	PCOLE	8/0	PUHI	A	RAMPART	В
PERMA PERMANENTE	ĉ	PIROUETTE	e/c c	PECLER PCCFMA	0	PUH1MAU	0	RAMPARTAR	A
PERRIN	в	PISGAH	č	PUPF	8 8	PULASKI PULEHU	8 8	RAMSEY RAMSHORN	D
PERKINE	Ö	PISHKUN	в	PCPPLETCN	۵ ۵	PULLMAN	Ö	RANCE	B C
PERROT	õ	PISTAKEE	в	PCGUGNECK	ĉ	PULS	0	RANCHERIA	в
PERRY	ŏ	PIT	ĉ	PCKRETT	8/0	PULSIPHER	C	RANC	8
PERRYVILLE	8	PITTMAN	č	PCHT	B	PULTNEY	č	RANDADC	č
PERSAY	ō	PITTSFIELD	e	PERTAGEVILLE	0	PUMPER	č	RANDALL	Ď
PERSHING	č	PITTSTOWN	č	PORTALES	č	PUNA	Ă	RANCOLPH	Ď
PERSIS	в	PITTWOOD	в	PCPT BYRCN	8	PUNALUU	ĉ	RANCS	č
PEKT	ō	PLACENTIA	C	PCPTERS	8	PUNCHU	Ă	RANGER	õ
PERU	c	PLACERITOS	č	PCRTERVILLE	Ō	PURDAM	С	RANIER	Ū.
PESCADEPC	C/0	PLACIO	A/0	PGRTHILL	с	PUROY	0	RANKIN	c
PESET	C	PLACK	С	PEPTINE	С	PURGATORY	0	RANTOUL	0
PESHASTIN	в	PLAINFIELO	A	PEPTLAND	0	PURNER	0	RANYHAN	в
PESU	С	PLAINVIEW	С	PERTNEUF	8	PURSLEY	в	RAPELJE	С
PETEETNEET	0	PLAISTEO	С	PERTELA	С	PURVES	υ	RAPHO	в
PCTERBORD	8	PLANO	ь	PCKTSMOUTH	0	PUSTOI	A	RAPIOAN	в
PETERS	0	PLATA	в	PCSANT	C	PUTNAM	С	RARCEN	С
PETOSKEY		PLATEA	C	PCSEY	8	PUUKALA	0	RARICK	В
PETRIE	0	PLATEAU	в	PESITAS	0	PUUCNE	C	RARITAN	C
PETHOLIA	0	FLATNER	C	PCSKIN	С	PUU CO	A	RASBANC	в
PETTUNS	C	PLATC	C	PCSCS	C	PUU CPAE	В	KASSET	В
ΡΕΨΑΜΩ ΡΕΥΤΟΝ	870 8	PLATTE PLATTVILLE	С 8	PEST PETAME	0 0	PUU PA PUYALLUP	B B	RATHBUN	С В
PHACE	8	PLAZA	8/6	PUTAPU	c	PYLE	A	RATLIFF	
PHAR	в	PLEASANT	L L	PETRATZ	č	PYLCN	ĉ	RATCN RATTLER	С В
PHARCLIC	υ	PLEASANT GROVE	с 8	POTSCAM	c	PYCIE	A	RAUB	8
PHEBA	č	PLEASANTUN	8	PCTTER	č	PYRAMIO	ĉ	RAUVILLE	c C
PHEENIY	B	PLEASANT VALF	8	PCTTER	č	PYRMENT	0	RAUZI	в
PHELAN	в	PLEASANT VIEW	8	PCTTS	8		0	RAVALLI	č
PHLLPS	Ð	PLENGER	C	PELCRE	в	CUAKER	С	RAVENOALE	õ
PHIECHSON	н	PLEEK	с	PCULTNEY	в	QUAKERTCHN	e	RAVENNA	c
PHILSCH	8/0	PLEINE	C	PCVERTY	A	QUAMBA	Ō	RAVCLA	B
PHILLIPS	C	PLEVNA	C	PCWCER	в	QUANAH	в	RAWAH	В
PHILLIPSBURG	Α	PLCME	С	PEWDERHURN	С	QUANDAHL	8	RAWHIDE	0
PHILJ	ь	PLOVER	8	PLWELL	С	GUARLES	C	RAWSON	в
PHILOMATH	C	PLUMAS	P	PCWER	8	<b>GUARTZBURG</b>	С	RAY	В
PHIPPS	С	PLUMMER	870	PCWHITE	C	QUATAPA	С	RAYADO	С
PHOEBE	в	PLUSH	9	PCWLEY	0	QUAY	С	RAYENOUF	в
PHOENIX	0	PLUTH	6	PCHHATKA	С	QUEBRADA	С	RAYPONOVILLE	0
PIASA	D	PLUTOS	Ĺ	PCY	0	QUEETS	В	RAYNE	В
PICACHE	C	PLYMCUTH	Δ	PCYGAN	0	QUEMADO	С	RAYNESFCRO	в
PICAYUNE	B	PRALL	c	PEZC	C/0	GUENZER	0	RAYNHAM	C
PICKENS	C D	PCARCH	B	PLZC BLANCO	B	QUICKSELL	C	RAYNOR	D
PICKENS	ы В	POCALLA PGCATELLO	A 0	PRAG PRATHER	C	QUIGLEY	8	RAZCR	C
PICKETT	в 0	POCKEP	8		в	GUILCENE	C	RAZCRT REACING	B
PICKEURD	8	PUCKEP	0	PKATLEY PPATT	C A	QUILLAYUTE GUIMBY	в		c
PICO	B	POOD	ι 0	PREACHER	B		C	READINGTON READLYN	C
PICTUU	8	PODU PCDUNK	0 8	PREACHER	в	GUINCY GUINLAN	A C	READLYN REAGAN	8
			L	incoran	0	WOTHERN	C	REAGAN	8
	MOTES	A REARIE UVDDO	DOLO	SOLL GROUP LUDIC	ATCO	THE SOLL CROUP HA	C POT	DEEN DETERMINED	

NOTES A REANK HYDROLDOID SOLE GROUP INDICATES THE SOLE CROUP MAS NOT REEN DETERMINED TWO SDLE CROUPS SUCH AS BYC INDICATES THE DRAINED/UNORALMED SITUATION

# Table B.1--Continued

					-				
REAKOR	в	RHOADES	D C	RCCK RIVER RCCKTON	В 8	RUDYARC Ruella	С 8	SALPCN SALOL	0 0
REAL	0	RIB RICCO	Ď	RCCKWELL	8	RUGGLES	ß	SALCNIE	в
REARDAN	č	RICETON	8	RCCKWOCD	в	RUIDOSO	č	SALTAIR	õ
REAVILLE	Ċ	RICEVILLE	с	RGCKY FCRD	8	RUKO	D	SALT CHUCK	Ā
REBA	С	RICHARDSON	в	RCDDY		RULE	в	SALTER	в
REBEL	в	RICHEAU	D	RODMAN	A	RULICK	С	SALTERY	D
REBUCK		RICHEY	c	ROE	_	RUMBO	с	SALT LAKE	D
RECLUSE	0	RICHFIELD	c	RCEBUCK	0	RUMFORD	B	SALUDA	с
REDBANK	B	RICHFORD	A A	ROELLEN RCESIGER	0 8	RUMNEY Rumple	с с	SALUVIA SALVISA	с
RED BAY RED BLUFF	B	RICHLIE RICHMOND	ĉ	RCHNERVILLE	8	RUM RIVER	c	SALZER	D
RED BUTTE	B	RICHTER	B	RCHRERSVILLE	č	RUNE	c	SAMEA	Ď
REDBY	č	RICHVALE	B	ROKEBY	Ď	RUNNELLS	č	SAMISH	č/0
REDCHIEF	č	RICHVIEW	č	ROLETTE	č	RUNNYMEDE	в	SAMPAMISH	c
KEDCLOUD	в	RICHWOOD	в	ROLFE	С	RUPERT	Α	SAMPSEL	Ð
REDDICK	С	R ICKMORE	С	ROLISS	D	RUSCO	c	SAMPSON	в
REDDING	D	RICKS	A	RCLLA	c	RUSE	D	SAMSIL	D
REDFIELD	B	RICREST	B	ROLLIN	D	RUSH	c	SAN ANDREAS	c
RED HILL RED HOOK	c c	R I D D R I D G E B U R Y	с с	ROLCFF PUMBO	с с	RUSHTCWN RUSHVILLE	A C	SAN ANTON San Antonid	в С
REDLAKE	Ď	RIDGECREST	č	ROMED	č	RUSS	B	SAN ARCACID	в
REDLANDS	8	RIDGEDALE	B	ROMNEY	č	RUSSELL	8	SAN BENITO	8
REDMANSON	в	RIDGELAND	D	ROMULUS	D	RUSSELLVILLE	ċ	SANCHEZ	D
REDMOND	С	RIDGELAWN	Α	RCND	D	RUSSLER	с	SANDALL	С
REDNUN	С	RIDGELY	в	RCNNEBY	8	RUSTON	B	SANDERSCN	9
REDOLA	в	RIDGEVILLE	в	RGNSCN	В	RUTLAND	c	SANCLAKE	D
REDONA	в	RIDGEWAY	0	ROSACH	c	RUTLEGE	D	SANCLEE	A
REDRIDGE REDROB	8 8	RIETBROČK RIFFE	С В	RCSAMEND	B C	RYAN Ryan Park	С 8	SANELI SAN EMIGDIO	D B
RED ROCK	8	RIFLE	A/D	RCSARIC	c	KYDE	8/0	SANGER	8
RED SPUR	в	RIGA	0	RESCE	D	RYDER	c	SAN GERMAN	Ď
REDSTOE	в	RIGGINS	A	RUSCCMMCN	õ	RYEGATE	B	SANGO	č
REDTHAYNE	в	RILEY	с	RCSEBERRY	в	RYEPATCH	D	SANGREY	Ā
REDTOM	c	RILLA	В	ROSEBLCGM	D	RYER	c	SANILAC	с
REDVALE	С	RILLITO	8	RCSEBUD	в	RYUS	с	SAN ISABEL	в
REDVIEW	С	RIMER	С	RGSEBURG	в			SAN JOAGUIN	D
REE	B	RIMINI	A	ROSE CREEK	ç	SABANA	C	SAN JON	c
REED	c	RIMROCK	D	ROSEGLEN	В	SABANA SECA	0	SAN JOSE	в
REEDER REEDPOINT	B C	RIN RINCON	а С	RUSEHILL RCSELAND	D	SABENYO SABINA	8 C	SAN JUAN San Luis	A B
REFDY	č	RINCONADA	c	ROSELMS	õ	SABINE	Ă	SAN MATEO	č
REELFOOT	č	RINGLING	č	RCSEMOLNT	в	SABLE	õ	SAN MIGUEL	č
REESER	č	RINGC	D	ROSENDALE	8	SAC	в	SANPETE	Ā
REESVILLE	Ċ	RINGCLD	в	RCSEVILLE	8	SACO	C	SANPITCH	с
REFUGE	с	RINGWOOD	8	RC SEWORTH	С	SACRAMENTO	C/D	SAN POIL	в
REGAN	в	RIC	D	RCSHE SPRINGS	с	SACUL	0	SAN SABA	D
REGENT	C	RIC ARRIBA	0	ROSITAS	A	SADULE	в	SAN SEBASTIAN	B
REHM	c	RIU GRANDE	в	RGSLYN	в	SADDLEBACK	в	SANTA CLARA	с с
REICHEL REIFF	В 8	RIO KING RIO LAJAS	C A	RCSMAN KCSNEY	В С	SAD I E SADLER	B C	SANTA CLARA Santa Fe	D
REILLY	A	RIO PIEDRAS	A B	RCSS	в	SAFFELL	в	SANTA ISABEL	D
REINACH	B	RIPLEY	8	RCSS FORK	č	SAGANING	D	SANTA LUCIA	č
RELAN	A	RIPON	в	RCSSI	č	SAGE	ō	SANTA MARTA	č
RELAY	в	RIRIE	в	RCSSMCYNE	1	SAGEHILL	B	SANTANA	c
RFLIANCE	С	RISTA	с	RCSS VALLEY	с	SAGEMOOR	C	SANTAQUIN	A
RELIZ	D	RISUE	D	RCTAN	с	SAGERTGN	с	SANTA YNEZ	с
RELSE	в	RITCHEY	0	RCTHIEMAY	В	SAGINAW	_	SANTEE	0
REMBERT	D A	RITNER	c	RCTHSAY	B	SAGC	0	SANTIAGO	8 C
REMMIT	Ď	RITTER RITTMAN	B C	RCUBIDEAU RGUEN	с с	SAGOUSPE SAGUACHE	C A	SANTIAM San Timoteo	č
REMUDAR	в	RITZCAC	8	ROUND BUTTE	D	SAHALI	Ê.	SANTCNI	õ
REMUNDA	č	RITZVILLE	B	RCUNDIGP	č	SAINT ALBANS	B	SANTOS	ē
RENERGH	D	RIVERHEAD	в	RCUNDUP	č	SAINT CHARLES	8	SANTO TCHAS	в
RENO	D	RIVERSIDE	Α	RCUNDY	с	SAINT CLAIR	D	SAN YSIDRO	D
RENOHILL	с	RIVERTCN	в	REUSSEAU	A	SAINT ELMO	A	SAPP	D
RENOVA	в	RIVERVIEW	B	REUTON	D	SAINT CEORGE	c	SAPPHIRE	в
RENOX	в	RIVRA	A	RCUTT	c	SAINT HELENS	A	SAPPINGTON	B
RENSHAW	B B	RIXIE KIZ	C D	RCVAL	D D	SAINT IGNACE SAINT JOE	с в	SARA SARALEGUI	8 C
RENSSELAER	č	RCANCKE	c	FC WENA	0	SAINT JCPNS	azu	SARANAC	č
RENTIDE	č	RUBBINS	B	RCHLAND	č	SAINT LUCIE	A	SARAPH	č
RENTON	87C	RC88S	D	RCHLEY	в	SAINT MARTIN	с	SARATOGA	8
RENTSAC	с	ROBERTS	D	RCXBURY	в	SAINT MARYS	в	SARCO	8
REPARADA	D	ROBERTSDALE	С	KCA	в	SAINT NICHCLAS	C	SARDINIA	С
REPPART	в	ROBERTSVILLE	D	RCYAL	8	SAINT PAUL	в	SARGEANT	D
REPUBLIC	B C	ROBIN RCBINSON	BD	ROYALTON	С В	SAINT THOMAS	D B	SARITA	A C
RESERVE	в	RUNINSON	B	RCYSTONE	υ	SALAUU Salal	ß	SARKAR SARPY	Ă
RESNER	B	ROBLEDO	Ď	RCZELLVILLE	в	SALAMATOF	č	SARTELL	Ä
KET	B/C	ROB ROY	č	FCZETTA	8	SALAS	č	SASKA	ē
RETRIEVER	D	ROBY	č	RCZLEE	č	SALCHAKET	в	SASSAFRAS	8
RETSOF	С	RCCHE	c	PUARK	Ċ	SALEM	6	SASSER	ß
RETSOK	в	ROCHELLE	с	RUBICON	Δ	SALE#SEURG	в	SATANKA	С
REXBURG	В	RCCHEPORT	C	RUBIO	с	SALGA	C	SATANTA	e
REXCR	A	ROCKAWAY	c	RUEY	B	SALIDA	A	SATELLITE	C
REVES	C / D	ROCKCASTLE	J D	PUCH	8	SALINAS	ç	SATT	0
REYNOLUS	в	RICK CREEK ROCKFORD	0 8	RUCKLES	D C	SALISBURY SALIX	D B	SATTLEY	8 8
REYWAT	D	ROCKFORD	8 C/D	RUCLICK	δ	SALIX	C	SATUS	6
RHAME	B	ROCKLIN	c	RUDEEN	8	45ALLISAW	в	SAUCE	8
RHINEBECK	D	FOLKPORT	-	RUDGLPH	c	SALLYANN	č	SAUGATUCK	č
	NOTES		0010			THE SOLL GROUP HAS			

NOTES A BLANK HYDROLOGIC SOLL GROUP INDICATES THE SOLL GROUP HAS NOT REEN DETERMINED TWO SOLL GROUPS SUCH AS B/C INDICATES THE DRAINED/INDRAINED SITUATION

SAUGUS	в	SELFRIDGE	с	SHICCTON	в	SKIYCU	6	SPARTA	Α
SAUK	8	SELKIRK	õ	SHIPLEY	č	SKOKCPISH	B/C	SPEARFISH	8
SAULICH	D	SELLE	в	SHIPRCCK	8	SKOUKUMCHUCK	в	SPEARVILLE	С
SAUM	C	SELLERS	A/D	SHIRK	В	SKCWHEGAN	6	SPECK	D
SAUNDERS	с с/р	SELMA SEMIAHMOD	н С	SHCALS SHOEFFLER	C B	SKULL CREEK SKUNFAH	D C	SPECTER SPEELVAI	D C
SAUVULA	c	SEMINMOD	Ď	SHORKIN	Ď	SKUTUM	č	SPEIGLE	e
SAVAGE	c	SEMINARIO	D	SHDCK	Α	SKYBERG	с	SPENARC	c
SAVANNAH	C	SEN	В	SHCREWDCD	C	SKYHAVEN	D	SPENCER	в
SAVC	Ç	SENECAVILLE	С В	SHCREY SHCRN	B	SKYKCMISH SKYLINE	6 C	SPERRY SPICER	с с
SAVOIA SAWABF	B D	SEQUATCHIE SEQUIM	A	SHORT CREEK	Ď	SKYWAY	8	SPILLVILLE	8
SAWATCH	č	SEGUCIA	ĉ	SECSHONE	D	SLAB	č	SPINKS	Ă
SAWCREEK	8	SERENE	D	SHCTWELL	D	SLATE CREEK	С	SPIRIT	в
SAWMILL	c	SERNA	C	SHOUNS	B	SLAUGHTER	C	SPIRD	в
SAWYER SAXBY	C D	SERDCD SERPA	A C/D	SHCWALTER Showlûw	c c	SLAVEN SLAWSCN	С 8	SPLENDCRA SPLITRDCK	C D
SAXCN	8	SERVCSS	0	SHREWSBURY	Ď	SLAVICN	ũ	SPCFFORD	č
SAYBROUK	в	SESAME	c	SHRINE	в	SLEETH	C	SPDKANE	в
SAYLESVILLE	c	SESPE	C	SHRCUTS	D	SLETTEN	D	SPONSELLER	В
SAYLOR	A B	SESSIONS SESSUM	C D	SHUBUTA Shule	C B	SLICKROCK SLIGHTS	в С	SPDON BUTTE SPOCNER	D C
SCAMMAN	č	SETTERS	č	SHULLSBURG	č	SLIGC	в	SPOTTSWCOD	в
SCANDIA	8	SETTLEMEYER	D	SHUMWAY	Ď	SLIKDK	c	SPRAGUE	B/C
SCANTIC	C	SEVERN	в	SHUPERT	c	SLIP	в	SPRECKELS	C
SCAR SCARHORU	A D	SEVILLE SEVY	D C	SHUWAH SI	6 6	SLCAN SLOCUM	C E	SPRING SPRING CREEK	C/D C
SCAVE	č	SEWARD	в	SIBLEWVILLE	8	SLODUC	č	SPRINGDALE	8
SCHAFFENAKER	Ă	SEWELL	8	SIBYLEE	D	SLOSS	č	SPRINGER	8
SCHAMBER	A	SEXTON	D	SICILY	6	SLUICE	в	SPRINGERVILLE	D
SCHAMP	C	SEYMOUR	c	SICKLESTEETS	c	SMARTS	8	SPR INGFIELD	D
SCHAPVILLE SCHEBLY	C D	SHAAK SHADELAND	D C	SIDELL SIEANCIA	6 6	SMITH CREFK Smithneck	A B	SPR INGMEVER SPR INGTDWN	с с
SCHERRAPD	ŏ	SHAFFER	A	SIEBER	A	SMITHTON	D	SPUR	в
SCHLEY	в	SHAKOPEE	с	SIELC	с	SHCLAN	с	SPURLOCK	в
SCHNCRBUSH	С	SHALCAR	D	SIERCCLIFF	D	SMOCT	D	SQUALICUM	8
SCHODACK SCHODSON	с	SHAM Shambo	D B	SIERRA SIERRAVILLE	6 6	SNAG SNAHCPISH	6 6	SQUAW SQUILLCHUCK	B B
SCHOFIELD	8	SHAMEL	8	SIESTA	D	SNAKE	č	SQUIM	8
SCHCHARIE	č	SHANAHAN	в	SIFTON	8	SNAKE HOLLOW	8	SQUIRES	B
SCHOLLE	C	SHANDON	_	SIGNAL	D	SNAKELUM	в	STAATSBURG	
SCHOOLEY	C/D B	SHANE SHAND	D B	SIGURD SIKESTON	BD	SNEAD SNELL	D C	STABLER	6 6
SCHROOK	8	SPANTA	8	SILCCX	8	SNELLING	8	STADY	6
SCHUMACHER	8	SHAPLEIGH	Č/D	SILENT	õ	SNOHCHISH	õ	STAFFORD	č
SCHUYLKILL	в	SHARATIN	6	SILER	в	SNOQUALMIE	6	STACECOACH	в
SCIC	В	SHARKEY SHARON	D	SILERTON	в	SNDW	B	STAPL	C
SCIOTUVILLE	C B	SHARPSBURG	B	SILI SILVER	D	SNOWDEN SNOWLIN	C B	STALEY STAMBAUGH	C B
SCITUATE	č	SHAR VANA	č	SILVERBOW	ŏ	SNUWVILLE	õ	STAPFCRD	Ď
SCOBEY	С	SHASKIT	B/C	SILVER CREEK	D	SNOWY	A	STAPPEDE	D
SCODTENEY	в	SHASTA	A	SILVERTON	C	SOAP LAKE	в	STAN	8
SCUTT	C D	SHAVANO Shaver	6 6	SILVIES SIMAS	D C	SDBOBA SOBRANTE	A C	STANDISH STANEY	C/D D
SCOTT LAKE	8	SHAWAND	Ă	SIMCOE	č	SODA LAKE	в	STANFIELD	č
SCOUT	Α	SHAWMUT	в	SIMECN	A	SDOHOUSE	C	STANLEY	С
SCOWLALE	C C	SHAY	D	SIMPLER	D	SCDUS	C	STANSBURY	D
SCRANTUN SCRIBA	B/D C	SHEAR SHECKLER	C C	SIMNER SIMCN	A C	SCELBERG SOFIA	B C	STANTON STAPLETON	D B
SCRIVER	8	SHECD	č	SIMCNA	в	SCGN	D	STARBUCK	Ď
SCROGGIN	С	SHEEGE	D	SIMPERS	8	SOGZIE	в	STARICHKDF	D
SCULL IN	c	SHEEP CREEK	c	SIMPSON	c	SOLANO	0	STARKS	C
SEABROOK SEAMAN	A C	SHEEPHEAD	C A	SIMS SINAI	D C	SCLDATNA SDLCIER	B D	STARR STASER	B B
SEAQUEST	č	SHEETIRCN	ĉ	SINCLAIR	в	SDL DUC	B	STATE	8
SFARCHLIGHT	č	SHEFFIELD	D	SINE	č	SOLLEKS	č	STATEN	Ď
SEARING	В	SHEL BURNE	C	SINGLETREE	D	SCLLER	D	STAVE	C
SEARLA SEARLES	B C	SHELBY SHELBYVILLE	6 6	SING SAAS SINNIGAM	B C	SCLOPCN SOLONA	D B	STAYTON STEAMBOAT	D
SFATON	в	SHELDON	b	SINUK	в	SOMBREKO	D	STEARNS	D
SEATTLE	D	SHEL IKOF	с	SIDN	e	SOMERS	в	STECUM	A
SEBAGL	D	SHELLABARGER	в	SICUX	A	SCMERSET	C	STEED	A
SEBASTIAN SEBASTOPOL	D C	SHELLDRAKE SHELLROCK	A A	ZI SKIACN ZI SKIACN	A 8	SOMERVELL SCMSEN	B C	STEEDMAN STEEKEE	D C
SEBEKA	Ď	SHELMADINE	ô	SISSETCN	6	SCNCITA	в	STEELE	8
SEBEWA	B/D	SHELDCTA	8	SISSON	в	SDNCMA	D	STEESE	c
SEBREE	D	SHELTON	c	SITES	с	SCNTAG	C	STEFF	с
SEBRING SECATA	D C	SHENA SHENANDDAH	с с	SITKA SIXMILE	e 6	SCPER SCQUEL	8 B	STEGALL STEIGER	C A
SECRET	č	SHEPPARD	Ă	SIZEMORE	6	SORF	č	STEINAUER	8
SECRET CREEK	в	SHERIDAN	8	SIZER	8	SCRPENTD	8	STE INBECK	в
SEDAN		SHERM	D	SKAGGS	в	SCRTER	B/D	STEINMET2	D
SEE CSKADEE SEES	D C	SHERRYL SHIBLE	8	SKAGIT Skama	B/C	SCSA SCTELLA	с с	STEINSBURG	c
SEEWEF	в	SHIELOS	e C	SKALAN	A C	SUTELLA	D	STEIWER STELLAR	C D
SEGAL	Ď	SHIFFER	ß	SKAPANIA	в	SUUTHGATE	C	STEMILT	С
SEGND	с	SHILCH	c	SKAPCKANA	в	SOUTHWICK	С	STENDAL	С
SEHCRN SEJITA	D	SHINAKU	C	SKANEE	C	SPAA	D	STEPHEN	C
SEKIU	D	SHINGLE SHINGLETDWN	D C	SKELLCCK SKERRY	в	SPACE CITY SPADE	A B	STEPHENSBURG STEPHENVILLE	6 6
SELAH	č	SHINN	в	SKILLET	с	SPALDING	C	STERLING	Å
SELDEN	c	SHINROCK	С	SKINNER	С	SPANAWAY	в	STERLINGTON	6
	NOTES					THE SOLL GROUP HAD E DRAINED/UNDRAIN			

S A BLANK HYDROLOGIC SOLL GROUP INDICATES THE SOLL GROUP HAS NOT REEN DETERMINE THO SOLL GROUPS SUCH AS B/C INDICATES THE DEALMED/INFORATIVED SITUATION

STF100         B         JUNGET         C         TALLATCALA         C         THRAS         D         THRAS           STF101         B         JUNGET         C         TALLATON         B         THRAS         D         THRAS         D           STFVARS         B         JUNAR         C         TALLATON         B         THRAS         D           STFVARS         B         JUNAR         C         TALLATON         B         THRAS         D           STFVARS         B         JUNAR         C         TALLATON         B         THRAS         D           STFVARS         B         JUNAR         TALLATON         B         THRAS         D         THRAS         D           STFVARS         B         JUNAR         THALATON         B         THRAS         D         THRAS         D           STFVARS         C         JUNAR         TALATON         B         THRAS         D										
STUDEN         B         SUBSPECT         C         IALS         B         TUPNISH         C         TU	STETSON									
Situston         B         TALLULA         B         TECCULI         B         TIPPARTO         C           Situston         Suppart         Situston         Situsto										
Siturgion         B         SUPPRION         C         TALLY         N         TIPEE         D         TIPEE         D <tht< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tht<>										
Sirvari Sirvari										
STICHARY         C         SUPERVISOR         C         TALEA         DEFINAL         C         TIPLAL										
STORAM         A         SUPPLEE         B         TALKAR         O         TERMAL         O         TENAL         B           STORAM         C         SUPPLEE         B         TATA         O         TERCE         O         TENAL         B           STORAM         D         TATA         CD         TERAL         A         CD         TERAL         CD         TERAL         CD         TERAL         A           STORAM         D         TATA         CD         TERAL										
STILLER         C         SUPE         B         TAPA         O         TEPRC         C         T         TAPA         C           STILLEAR         A         SUPERCY         P/O         TAPA         C         TEPRCE         C         TITACATAY         A           STILLEAR         B         SUPERCY         P/O         TAPA         C         TEPRCE         C         TITACATAY         A           STILLEAR         B         SUPERCY         P/O         TAPA         C         TEPRA         C         TATAY         A           STILLEAR         B         SUPERCY         P/O         TAPA         C         TEPRA         C         TATAY         A           STILLEAR         B         SUPERCY         TARAY         C         TEPRA         C         TERA										
STILLANA         A         D         TIPOTO         D         TIPOTO         A           STILLANA         D         SUPPLO         P         TAPAG         D         TIPOTO         A           STILLANA         D         SUPPLO         P         TAPAG         D         TIPOTO         A           STIPACA         B         SUE CEPER         D         TAPAG         C         TEMPERA         C         TIPOTO         B           STIPACA         B         SUE CEPER         D         TAPAG         C         TEMPERA         A										
STILLATER         0         STAPALCO         0         Térké ČELA         A/D         TÍNE (A         A           STILACA         0         SARADON         CA         TARALO         0         Térké ČELA         A/D         TÍNE (A         A           STILACA         0         SARADON         CA         TARALO         CA         TÉRÉRA         0         TÍNE (A         0										
Silissin         B         Sipricity         First         C         TARMAY         C/D         TERRET         D         TIATON         A           Silissin         B         Sipricity         B         TERRET         B         TERRET         B         TIATON         A           Silissin         C         SUSIEN         B         TERRET         B         TIATON         C         TIATON         B         TIATON         C         TIATON         B         TIATON         B         TIATON         C         TIATON         B         TIATON         B         TIATON         C         TIATON         B         TIATON         C         TIATON         B         TIATON         C         TIATON         C         TIATON         B         TIATON         C         TIATON         TIATON<										
SiPSON         8/C         JUNYA         C         TARASY CREEK         D         TERREAK         C         TINTON         A           SIPACAL         B         SUSCEPANNA         D         TARASY         C         TERBIL         B         TINTON         A           SIPACA         D         SUSCEPANNA         D         TARASA         C         TERBIL         C         TINTON         B           SIPACA         SUSCEPANNA         D         TARASA         C         TERSAC         TINTON         B           SIPSCALADO         SUSCEPANNA         TARASA         C         TERSAC         TINTON         B           SINCALADO         SUSCEPANNA         TARASA         C         TERSAC         TERSAC         TERSAC           SINCALADO         SUSCEPANNA         TARASA         C         TERSAC         C         TERSAC										
Singal         B         Singal         C         Singal         C         Singal         B         Tinchom         B         Tin										
STIMA         C         SUSTINA         B         TAPPICO         B         TERV         B         TIGGAMO         D           STIAC         O         SUSTINA         B         TANAPA         D         TESCT         C         TIGGAMO         B           STISSON         B         SUTPERING         C         TANAPA         D         TESCT         C         TIGGAMO         B           STISSON         B         SUTPERING         C         TANAPA         C         TESCUT         C         TIGGAMO         B         TANAPA         C         TESCUT         C         TIGGAMO         B         TANAPA         C         TESCUT         C         TIGGAMO         SUTTER         SUTTER         SUTTER         SUTTER         SUTTER         SUTTER         SUTTER         SUTTER         TESCUT         SUTTER										
Silver         O         SUSSUEHAMMA         O         TANAMA         O         TENULLIGE         C         TIGAL         B           SILVER         SUSSUEHAMMA         O         TANAMA         C         TESLOC         A         TIPAL         C           SILVER         SUSSUEHAMMA         O         TANAMA         C         TESLOC         A         TIPAL         C         TESLOC         A         TIPAL         C         TESLOC         C         TESLOC         C         TESLOC         TANA         C         TESLOC         C         TESLOC         TESL										
SiTupu         B         SUTHER         C         TANARA         C         TESAC         A         TEPRANA         C           SITUSIOC         SUTHER         SUTHER         TANARA         C         TESCUT         A         TIPPEANA         A           SICCAMP         SUTTON         B         TANCUM         C         TETENA         A         TIPPEANA         A           SICCAPAN         SUTTON         B         TANCUM         C         TETENA         C										
S1153/HAC         SUTHER, IN         C         TANNERG         D         TESCUTY         C         TIPPECANOE         B           S11485/HLADE         B         SUTHEN, IN         C         TANNERY         C         TESCUTY         C         TIPPECANOE         B         TIPPECANOE         TIPPECANOE         B         TIPPECANOE         B         TIPPECANOE         B         TIPPECANOE         B         TIPPECANOE         B         TIPPECANOE         TIPPECANOE         TIPPECANOE         TIPPECANOE         TIPPECANOE <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		-								
S11/EFSVILLE         B         SUTPREM         D         TANDY         C         TESUDIE         B         TIPPER         A           S10CADE JOGO         D         SVEAD         B         TARADIC         C         TESUDIE         B         TIPPER         A           S10CADE JOGO         D         SVEAD         B         TARADIC         C         TERTONA         C         TIPPER         C           S10CADE JOGO         SVEAD         B         TARADIC         TERTONA         C         TIPPER         C           S10DE ALL         D         SVEAD         C         TARADIC         TERLINE         B         TIPPER         B           S10DE ALL         D         SVAAD         C         TARADIC         C         TARADIC         C         TIPPER         B         TIPPER         A           S10DE ALL         D         SVAAD         C         TAPAL         D         TERLINE         C         TIPPER         A         TIPPER         A         TIPPER         A         TIPPER         A         TIPPER         C         TIPPER         A         TIPPER         A         TIPPER         A         TIPPER         TIPPER         TIPPER         TIPPER<		8								
STOCKAPIDE         B         SUTTAN         B         TAREY         C         TETON         A         TTPPERAFY         A           STOCKAP         B         SATAC         C         TETON         C         TIPPERAFY         C           STOCKAP         B         STACKAP         C         TETON         C         TIPPERAFY         C           STOCKAP         B         STACKAP         C         TARAFR         C         TETON         C         TIPPERAFY         C           STOCKAP         D         SATAC         C         TAASER         C         TETON         C         TIPPERAFY         C         TETON         C         TETON										
STUCKLAND         B         SUTCH         B         TANCH         C         TETCHAA         B         TIPPIPAM         D           STUCKPH         D         SYNLD         FTANCHAR         C         TETCHAA         FTANCHAR         C         TETCHAA         B         TIPPIPAM         B           STUDICK         D         SYNLD         C         TANAFA         C         TETCHAA         B         TIPPIPAM         B         B         STUDICK         B         TIPPIPAM         B         TIPPIPAM         B         STUDICK         C         TANAFA         B         TANAFA         B         TANAFA         B         TIPPIPAM         B         TANAFA         B         TANAFA         B         TANAFA         B         TANAFA         C         TANAFA         TIPPIPAM         D         TANAFA         TANAFA         T										
STOCKPRM         D         SYEA         B         TAAAGAIR         C         TETCTUAR         C         TETCTUAR         C         TETCTUAR         C         TETPPO         C           STOCKTOM         D         SVMLD         C         TAAMAR         C         TETCTUAR         C         TIPPO         C         TIPO <td></td>										
STUGTUM         D         SKREDUP         B         TANAA         C         TETCUM         C         TETCUM         C         TETCUM         B           STUDICA         O         SYULD         C         TANAGE         C         TETCUM         B         TIPTOM         B           STUDICA         O         SAMAANE         C         TANAGUS         A         TETCUME         B         TTTSOURY         B           STORER         SAMAANE         C         TANAGUS         A         TETCUME         B         TTSOURY         B           STORE         SAMANDY         D         TAZPI         C         TMACERY         E         TTTSOURY         B           STOREY         B         SAMATON         C         TAARLIN         C         TTATCHERA         C         TTYVLL         C           STORY         B         SAMATON         C         TAARLIN         C         THEOLUMO         C         TOBLER         B           STORY         B         SAMATON         C         TAARLIN         C         THEOLUMO         C         TOBLER         B           STORY         D         SAMATON         C         TAARLIN         C										
STUDICK         D         SVNLD         C         TANKER         C         TEX         B/D         B/D         B           STURAS         D         SAACRA         C         TAAKER         C         TAAKER         B         TIAK         C         TIAKA         B         TIAKA         C         TIAKA         B         TIAKA         C         TIAKA         B         TIAKA         C         TIAKA         TIAKA         TIAKA         TIAKA         TIAKA         TIAKA<										
SINAGÉR         C         TANSER         B         TEX         B         TEX         B         TIAN         B           STOMAR         C         SAMA         C         TANGEN         C         TINE         E         TINE         E         TINE         E         TINE         TINE         E         TINE <td></td>										
STORAR         C         SUBARANC         D         TANTÁLUS         Á         TERLINE         E         TÍSBUAY         C         TÍSBUAY         C <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>										
STORER         B         SAMA         C         TANUAX         D         TEQUAL         C         TISCH         C           STORE MALL         A SHANGOY         D         TACS         C         THACKEY         E         TIST TAGE         B           STORE MALL         A SHANGOY         D         TACS         C         THACKEY         E         TIST TAGE         B         TIST TAGE         C         TAGES         B         TOGE         C         TAGES         B         TOGE         C         TAGES         B         TOGE         D         TIST TAGE         C         TAGES         B         TOGE         D         TAGES         B         TOGE         D         TIST TAGE         C         TAGES         B         TOGE         D         TAGES         D         TOGES         D         TOGES         D         TAGES         TAGES         D         TOGES         D         TAGES         TAGES         TAGES         TAGES										
STORE ALL         A         SMANEGY         D         TAGPI         C         THACKERY         E         TISH TAME         D           STORAD         B/D         SMANNER         C         TARDER         C         TISH TAME         D         STORAPTIND         D         SMANDER         C         TARDER         C         TISH TAME         D         TISH TAME         D         TISH TAME         C         TISH TAME         D         TISH TAME         D         TISH TAME         C         TISH TAME         D         TISH TAME         C         TISH TAME         TISH TAME         TISH TAME         TISH TAM										
STOND         B/D         SMANNER         D         TACS         C         THADRER         C         TITUSVILE         C           STONZEV         B         SMANTON         D/D         TAPPEN         D         TAATCHER         B         TITUSVILE         C           STONZEV         B         SMANTON         D/D         TAPPEN         D         TAATCHER         B         TITUSVILE         C           STONZ         B         SMARTON         D/D         TAPPEN         D         TAATCHER         B         TITUSVILE         C           STONA         B         SMARTON         C         TARKLIN         C         THEBES         B         TOBLER         B           STONSEL         C         SMARTZ         D         TARPAN         C         THEBES         B         TOBLER         B           STOND         D         SMALK         C         TASSEL         D         THEBES         B         TOBLER         B         B         TOBLER         B         S         TOBLER         B         S         S         TOBLER         B         S         S         TASTATCHER         TOBLER         B         TOBLER         S         TOBLER										
STORYFRID         O         SHANSON         C         TAPA         C         THANTCH         A         TIVERTATION         A           STORY         B         SWANTON         C         TARA         B         THATUNAR         C         TIVELI         A           STOPIN         B         SWANTON         C         TARA         B         THATUNAR         C         TIVELIA         A           STOPIN         B         SWANTON         C         TARA         B         THATUNAR         C         TIVELIA         C         TIVELIA         C         TIVELIA         C         TIVELIA         C         TIVELIA         B         TIVELIA         C										
STOCKY         8         SWANTON         0/0         TAPPEN         0         THATCHER         8         TIVLI         A           STOPPEN         8         SWANTON         C         TARA         8         THATUNA         C         TIVY         C           STOPAL         8         SWANTON         C         TARA         8         THATUNA         C         TIVY         C           STOPALAING         8         SWANTON         C         TARA         8         THATUNA         C         THATUNA         C         THATUNA         C         THORNO         S           STOPALL         C         SWAST         C         TAPARA         A         TASCOSA         8         THERAS         C         TOBELA         S           STOW         C         SWASTA         A         TASCOSA         8         THERAS         C         TOBELA         S         TASUAR         S         TASUAR         S         TASCOSA         8         THORAL         C         THORAL         S         TASUAR         S         TASUAR         S         THORAL         C         THORAL         TOBELA         TOBELA         TOBELA         TOBELA         TOBELA         TASUAR										
STOP2N         B         SUMPTON         C         TARA         B         THATUNA         C         TIVY         C           STORLA         B         SWARTS         C         TARKIC         D         THATUNA         C         TIVY         C         TIVE         B         TODA         C         STORLA         B         TODA         C         TODA         C         STORLA         C         THATUNA         THATUNA         C         THATUNA         THATUNA         THATUNA										A
STADALA         B         SWAPPS         C         TARKIC         D         THAYNE         B         TOA         C           STUMA         C         SAMATSMODD         C         TARKIN         C         THERC         B         TOBIN         B         SUD										
STORM         O         SWARTSMOOD         C         TARKLIN         C         THEBES         B         TOBIO         D           STORY         C         SWARTZ         D         TARPAC         C         THEBES         D         TOBIN         B           STORY         C         SWASEY         D         TARPAC         C         THEDULUND         C         TOBER         B           STORY         D         SWASEY         D         TARPAC         C         THEDULUND         C         TOBER         B           STUY         D         SWANK         C         TASSEL         D         THERICT         C         TOCCOA         B           STAN         G         SWANK         C         TATTYCE         C         THERICT         C         TODOLER         B           STASUEC         SWANK         C         TATYCE         C         THERICT         A         TODOLER         B           STRAN         B         SWEET         C         TATYCE         C         THERICT         TODOLER         C         TODOLER         C         TODOLER         C         TODOLER         C         TODOLER         C         TODOLER         C <td></td>										
STORY         C         SHARTZ         D         TARPC         C         THERC         D         TODER         B           STOSSEL         C         SMASTY         D         TARPATI         B         THERAS         C         TODER         B           STOSSEL         C         SMASTY         C         SMASTY         B         THERAS         C         TODER         B           STOSSEL         C         SMARIAL         C         TARYALL         B         THERAS         C         TODER         B           STRAIN         C         SMARIAL         A         TATE         B         THERAT         C         TODOLER         B           STRAISUNG         C         SMARIAL         A         TATE         B         THERAT         C         THORCL         C         TODOLER         B           STRAICO         B         SMARIAL         C         THATCOR         C         THERATCOR         A         TODOLER         B         STATESTAL         C         THERAT         TODOLER         C         THORAC         C         TODOLER         S         STATESTAL         C         THERAT         C         THATAC         STATESTAL         THERAT										
SY13SEL         C         SWASEY         D         TAMPANT         C         THEDULUND         C         TOBLER         B           STUDGH         C         SWASTIKA         A         TASCOSA         B         THERESA         B         TOBLER         B           STUDUT         C         SWASTIKA         A         TASCOSA         B         THERESA         B         TOBLER         B           STUDUT         C         SWASTIKA         C         TASTO         D         THERESA         B         TOBCTA         B           STRATEOR         SWASTIKA         C         TATUT         C         THERESA         D         TODOVILLE         B           STRATEOR         SWEDEN         B         TATUT         C         THERESA         D         TODOVILLE         B         TODOVILLE         C         TODOVILLE         C         TODOVILLE         B         TATUT         C         THERESA         A         THORESA         C         TODOVILLE         B         TODOVILLE         B         TODOVILLE         C         TODOVILLE         B         TODOVILLE         B         TODOVILLE         B         TATUT         TATUT         THERESA         A         TATUT										
STUDUCH         C         SHASTIRA         C         TAPYALL         B         THEMAS         C         TODESA         D           STUVELL         D         SHAATARA         A         TASCOJA         B         THERESA         B         THERESA         B         THERESA         B         THERMAL         C         TODDD         B           STUVELL         D         SHAUK         C         TATTERE         D         THERESA         D         TODDELLE         B           STRAM         C         SHAUK         C         THERESA         D         TODDELLE         B           STRAM         B         SHEETA         C         THEMASL         C         THORAL         C         THORAL         C         THORAL         C         STRAM         B         SHEETA         C         TAVARDES         C         TODELA         C         TODELA         C         STRAM         B         SHETA         C         THORAL         C         TODELA         C         <										
STIVELL         D         SHATARA         A         TASCOSA         B         THEREŠA         B         TOBY         B           STRJUY         D         SNANUK         C         TASSEL         D         THERIGT         D         TODCOA         B           STRAIM         B         SALAUK         C         TATTE         B         THERMAL         C         TODCLER         B           STRAIM         B         SALAUK         C         TATTE         B         THERCOL         C         TODCLER         B           STRAIM         B         SKER         C         TALAUK         C         THERCOL         A         TODCLER         B           STRAIM         B         SKER         TALAUK         C         THERCOL         A         TODCLER         C         TODCLER         C           STRAIM         B         SKER         C         TALAUK         C         THERCOL         C         TODCLER         <										
STUP         D         SMARK         C         TAŠSEL         D         THÉRIGT         D         TOČCOA         B           STRAIGHT         C         SMARILLIA         A         TATE         B         THÉRIGT         C         TODOLER         B           STRAIGHT         C         SMARILLIA         A         TATIVEE         C         THÉRPÉRCUIS         D         TODOLER         B           STRAIGUE         C         SMEDE         B         TATURE         C         THÉRPÉRCUIS         D         TODOLER         B           STRAIGUE         SSMEDE         B         SMEDE         C         TATURE         C         THÉRÉCOL         C         TODECA         C           STRAIGUE         SSMEDE         C         TATURE         C         THÉRÉCOL         C         TODECA         C           STRAIGUE         SSEENE         C         TANLOR         C         THÉRÉCOL         C         TODECA         C         TODECA         C         TAVICAR CARER         D	STOUGH		SWASTIKA							
STRAIN         C         SWAINLIA         A         TATE         B         THEFMAL         C         TODD         B           STRAIN         B         SWAINAN         C         TATU         C         THEFFCRD         A         TODDVILLE         B           STRAID         C         SWEEN         B         TATU         C         THEFFCRD         A         TODDVILLE         B           STRAID         C         SWEEN         C         TAUN         C         THEFFCRD         A         TODDVILLE         B           STRAIN         B         SWEET         C         TAUNT         C         THEKAN         C         TODENA         C           STRAIN         B         SWEET         C         TAUAS         A/O         THORNAL         C         TODENA         TODENA         TODENA         T			SWATARA							
STRAIN         B         SHEATMANN         C         TATUTEE         C         THEFFCRD         D         TODULER         B           STRAISUNG         C         SWDE         P         TATUN         C         THEFFCRD         C         TODULER         B           STRAISUNG         C         SWDEN         B         TATUN         C         THEFFCRD         TATUR         C         THEFFCRD         TATUR         C         THEFFCRD         C         TADAR         TATUR         C         THECKNY         TATUR         TATUR         C         THECKNY         TATUR         TATUR         TATUR         TATUR         THECKNY         TATUR         TATUR         THECKNY         TATUR         THECKNY         THECKNY         TATUR         TATUR         THECKNY         THECKNY         TATUR         TATUR         THECKNY         TATUR         THECKNY         THECKNY         THECKNY         TATUR         THECKNY         THECKNY         TATUR         THECKNY         THECKNY         TATUR         THECKNY         THECKNY         THECKNY         THECKNY	STUY	D	SWAUK	С	TASSEL	D	THERIGT	D	TOCCOA	8
STRAFLEYON         C         SWEDEN         C         TATU         C         THETECHO         A         TODDVILLE         B           STRAFLEYON         B         SWEDEN         C         TAUM         C         THERCU         D         TODELAD         C           STRAM         B         SWEENEY         C         TAVARES         A         THOMAS         C         TODELAD         C           STRAM         B         SWEET         C         TAVARES         A         TAVORA         C         TODAS         C         TODA	STRAIGHT	C	SWAWILLIA		TATE		THERMAL	С	TODD	8
STRAIDSO         B         SWEEN         B         TATUM         C         THICKL         C         TOCKL         C         TOC			SHEATMAN							
SIPAUSS         C         SMEAN         C         FAVARES         A         INCRA         D         TUDEAA         C           STRAM         B         SWEENEY         B         TAVARES         A         INCRAS         C         TUDEAA         T	STRASBURG	С	SWEDE	6	TATU	С			TODDVILLE	8
SIPAUSS         C         SMEAN         C         FAVARES         A         INCRA         D         TUDEAA         C           STRAM         B         SWEENEY         B         TAVARES         A         INCRAS         C         TUDEAA         T		8	SWEDEN	6	TATUM	C	THIOKCL	с		
STHAINN         B         SWEET         C         TAMAS         A/O         THORNDALE         C         TOGC         B           STHAIDN         C         SHETGASS         B         TAYLOR         C         THORNDALE         CD         TOGNA         C           STRONGHUBST         B         SHETGASS         B         TAYLOR SFLAT         D         THORNTOK         C         TOINE         C           STRONGHUBST         B         SHETGAS         A         TAYLOR SFLAT         D         THORNTOK         C         TOINE         C           STRONGHUBST         B         SHETSA         A         TAYLOR SFLAT         C         THORNTOK         C         TOLLAN         B           STRONGHUBST         B         SHITSEN         A         TAYLOR SFLAT         C         THORNTOK         C         TOLLAN         B           STWATCH         B         SHITSEN         A         TAYLOR SFLAT         C         THORNTOK         C         TOLLAN         B           STWATCH         C         TAYLOR SFLAT         C         THORNTOK         B         TOLEDU         D         SULEN         B         TOLLAN         B         TOLEDU         D         TOLE	STRAUSS	С	SWEEN	С	TAUNTON	С	THCENY	D	TOE JA	С
STRALTOR         C         SHEATLOR         C         THORDIXE         C/D         TODAM         C           STROLE         B         SHEETWATER         D         TAYLCR FREK         D         THORNOCK         D         TODNAE         C           STRONTIA         B         SHEETWATER         D         THORNOCK         D         TODNAE         C         C           STRONTIA         B         SHEFTON         A         TAYLCR SPLAT         D         THORNOCO         B         TONKEL         C         TODNAE         C         TODNAE         C         TODNAE         C         STRONTIA         B         SHETON         A         TAYLCR SPLAT         D         THORNOCO         B         TONKEL         D         THORNOCO         B         THORNOCO         B         TONKEL         D         THORNOCO         B         TONKEL         D         THORNOCO         B         THORNOCO         B         TONKEL         D         TONE         D         STRONTIA         B         TOLLON         B         THORNOCO         B         TOLLON         STRONTIA         S         TOLLANDIE         D         TOLLANDIE         D         THORNOCO         TOLLANDIE         D         THORNOCO	STRAW	8	SWEENEY	в	TAVARES	A	THOMAS	C	TOEM	С
STPOLE         B         SWEETWATER         O         TAYLCR CREEK         D         THORATCK         D         TOINE         C           STRONTIA         B         SWENDAD         A         TAYLCR CREEK         D         THORATCN         C         TOINE         C           STRONTIA         B         SWENDAD         A         TAYLCR CREEK         THORATCN         C         TOINE         C           STRONTIA         B         SWENDAD         A         TAYLCR SPELAT         C         THORATCO         B         TOKU         B           STRONTE         SWINGE         D         TAZILINA         A         THORATCO         B         TOKUL         B           STUVKL         B         SWITCHAAND         B         TAZILINA         A         THORATCO         B         TOKU         B         TOKU         B         TOKU         B         TOKU         B         TOKU         B         TOLEDA         B	STRAWN	B	SWEET	С	TAWAS	A/D	THORNDALE	C	TOGO	8
STRONTIA         B         SWIFTON         A         TAYLORSFLAT         D         TIMORTION         C         TOTABE         C           STRONTIA         B         SWIFCON         A         TAYLORSFLAT         D         TIMORTION         C         TOREN         C           STRONTIA         B         SWIFCON         A         TAYLORSFLAT         D         TIMORTON         C         TOUL         B           STRONTIA         B         SWIFCHACK         C         TIMORNOCO         TOUL         B         B           STUKKL         C         SWIFCHACK         C         TEAL         D         THCR         B         TOLLED         D           STUMP         SWITCHBACK         C         TEANHAY         C         THCR         B         TOLLA         A           STUMP         D         SWUTCHACK         C         TEANHAY         C         THCR         C         TOLLATE         A           STUMP         D         SWUTCHACK         C         TEANHAY         C         THCR         C         TOLLATE         B           STUMP         D         SWACADA         A         TEANHAY         C         THCR         C         TOL	STREATOR	С	SHEETGRASS	в	TAYLOR	С	THORNDIKE	C/D		С
STRONTIA         B         SUFTON         A         TAYLOR SVILLE         C         THORNACCO         B         TORREM         C           STROUPE         D         SAINS         A         TAYLOR SVILLE         C         THORNACCO         B         TORULA         B           STROUPE         D         SAINS         A         TAYLOR SVILLE         C         THORNACCO         B         THAR         B         TORULA         B         B         STATANA         C         THORNACCO         THORNACCO         TOLLON         B         B         STATANA         C         THORNACCO         THORNACCO         TOLLON         A         A         THORNACCO         THORNACCO         TOLLANA         B         THORNACCO         THORNACCO         THORNACCO         TAYLOR SVILLE         C         THORNACCO         TOLCHANA         A         THORNACCO         THORNACCO         TOLCHANA         A         THORNACCO         TAYLOR SVILLE         C         THORNACCO         TOLLGATE         B         THURLANACCO         TOLLGATE         B         THURLANA         THORNACCO         TOLLGATE         B         THURLANA         A         TOLGATE         B         THURLANA         A         TOLGATE         TOLLGATE         TOLLGATE	STROLE	6	SWEETWATER	0	TAYLCR CREEK	D	THORNOCK	D	TOINE	С
STRUCUPE         D         SING         A         TAYSCH         B         THERUGURHARE         D         TOUL         B           STWYKIK         B         SWINCLE         D         TAZLINA         A         THORP         C         TOULEDO         D           STUKKIK         C         SWISTCHBACK         C         TEAL         D         THCRR         B         TOLICHA         D           STUMY         B         SWITCHBACK         C         TEAL         D         THCRR         B         TOLICHA         D           STUMP         D         SWITCHBACK         C         TEANHAY         C         THCRR         B         TOLICHA         D           STUMP         D         SWOTCT         C         TEANHAY         C         THCRR         C         TOLLA         A           STUMP         D         SWOTCT         C         TEANHAY         C         THCRR         C         TOLLAT         D         TOLLATE         B         TULLA         A         TOLATE         D         TOLLATE         D         TOLLATE         B         TOLLATE         D         TOLATE         D         TOLATE         D         TOLATE         D         T	STRONGHUR ST	8	SWENUDA	B	TAYLCRSFLAT	D	THORNTON	С	TOIVABE	c
STURYLE         B         Swincle         D         TAZLINA         A         THORP         C         TOLETY         B           STURKL         C         SWISBOB         TEAL         D         THCRB         B         TOLEDD         D           STURKL         C         SWISTERLAND         B         TEALWHIT         C         THCKREL         B         TOLEDA         D           STUMP         B         SWITCRBACK         C         TEALWHIT         C         THCKREL         B         TOLLCAATE         A           STUMP         B         SWITCRELAND         B         TEALANAY         C         THCKREL         C         TOLLCATE         B           STUTFYDILE         D         SVCAPORE         C         TEAPC         B         THURCKHE         C         TOLLAT         A           SUTATZYDILE         D         SYCAPORE         A         TECASCALE         B         THURCKHIC         C         TOLAC         B         SUTAVANA         B         TOLCCA         B         SUTAVANA         B         TOLCAC         B         SUTAVANA         B         TECASCALE         B         THURCKHIC         C         TOLACA         B         SUTAVANA	STRONTIA	8	SWIFTON	A	TAVLORSVILLE	С	THORNWCCO	8	TOKEEN	С
STUREL         C         SWISTOB         D         TEAL         D         THCRR         B         TOLEDO         D           STURY         B         SWISTOBACK         C         TEANAMAY         C         THCRR         B         TOLEDA         D           STUMP         A         SWISTERLAND         B         TEANAMAY         C         THCRR         B         TOLEDA         A           STUMP         D         SWOFE         C         TEANAMAY         C         THCRR         B         TOLLATE         A           STUMP         D         SWOFE         C         TEANAMAY         C         THCRR         B         TOLLATE         A           STUTGAN         SWORT         C         TEAL         D         THCRCR         C         TOLLATE         B           STUTGAN         SWORT         C         TEAL         D         THUKCRACC         TOLLATE         B           STUTGAN         B         SYCANAN         A         TEGO         B         THURCH         C         TOLANA         B           SUDETAN         B         TECCLOTE         B         THUKANA         A         TOLANA         B         TOLANA	STROUPE	D	SWIMS	Δ	TAYSCM	0	THCRCUGHFARE	8	TOKUL	8
STURY         B         SWITZNBACK         C         TEALWHIT         C         THCKREL         B         TOLICHA         D           STUMPP         0         SWIDZE         C         TEAPC         B         THURE         C         TOLLCATE         B           STUMPP         0         SWIDZE         C         TEAPC         B         THURE         C         TOLLCATE         B           STUMPS         0         SWORD         C         TEAPC         B         THURE         C         TOLLCATE         B           STUTYILE         B         SWORD         A         TEADCAL         B         THURE         C         TOLAM         B           SULTIT         B         SVCANDA         A         TEADCAL         B         THURE         C         TOLAM         B           SULTIT         B         SVCANDA         B         TECCLETE         B         THURANDA         A         TOLACA         B         SULTIT         D         SUCANDA         B         TOLACA         B         SUCA         SULTA         B         TOLACA         B         TOLACA         B         TOLACA         B         SULTA         B         TOLACA         B <td>STRAKER</td> <td>8</td> <td>SWINGLE</td> <td>0</td> <td>TAZLINA</td> <td>Α</td> <td>THORP</td> <td>С</td> <td>TOLBY</td> <td>8</td>	STRAKER	8	SWINGLE	0	TAZLINA	Α	THORP	С	TOLBY	8
STUMPLE         A         SHITZERLAND         B         TEAMAMAY         C         THOM         B         TULL         A           STUMPP         D         SNUPER         C         TEAPG         B         THPERLILE         C         TOLLGATE         B           STUMP SPRINGS         B         SNUPERT         C         TEAPG         B         THUNCENBRC         C         TOLLGATE         B           STUTTGAT         D         SYCARDE         A         TEGSCALE         B         THUNCENBRC         C         TOLLGATE         B           SUNETIC         B         SYLARDE         A         TEGSCALE         B         THUNCENBRC         C         TOLLGATE         B           SUNETIC         B         SYLARDE         B         TELECLETE         B         THUNCENN         A         TOLSONA         D           SUFFIELD         C         SYNREP         A         TECCLETE         B         THUNCENN         B         TOLTECC         C         TOLAR         B         TOLTECC         C         TOLAR         B         TOLTECC         C         TOLAR         B         TOLAC         TOLAR         B         TOLECC         TOLAR         D         TO	STUKEL	С	SWISBOB	D	TEAL	D	THCRR	в	TOLEDO	D
STUMPLE         A         SHITZERLAND         B         TEAMAMAY         C         THOM         B         TULL         A           STUMPP         D         SNUPER         C         TEAPG         B         THPERLILE         C         TOLLGATE         B           STUMP SPRINGS         B         SNUPERT         C         TEAPG         B         THUNCENBRC         C         TOLLGATE         B           STUTTGAT         D         SYCARDE         A         TEGSCALE         B         THUNCENBRC         C         TOLLGATE         B           SUNETIC         B         SYLARDE         A         TEGSCALE         B         THUNCENBRC         C         TOLLGATE         B           SUNETIC         B         SYLARDE         B         TELECLETE         B         THUNCENN         A         TOLSONA         D           SUFFIELD         C         SYNREP         A         TECCLETE         B         THUNCENN         B         TOLTECC         C         TOLAR         B         TOLTECC         C         TOLAR         B         TOLTECC         C         TOLAR         B         TOLAC         TOLAR         B         TOLECC         TOLAR         D         TO	STUKY	8	SWITCHBACK	С	TEALWHIT	С	THCRKEL	8	TOL ICHA	D
STUMP         SPRINGS         B         SWYGERT         C         TEAS         C         THUNCEHBIRC         C         TCLLHOUSE         D           STUTTGATI         D         SYCANNE         A         TEGO         B         THURLENIC         C         TOLKA         B           SUULTITIC         B         SYCANNE         A         TEGO         B         THURLENIC         C         TOLKA         B           SUULTITIC         B         SYLACAUGA         B/D         TECHICK         B         THURLENIC         C         TOLKA         D           SUULTIC         B         SYLACAUGA         B/D         TECHICK         B         THURLENIC         C         TOLSONA         D           SUGARLUAR         B         SYLAREP         A         TECCLE         B         THURMANN         B         TOLYAR         B           SULA         G         SYRETT         C         TERCKA         B         THURMANN         B         TOLYAR         B           SULY         B         SYRETT         C         TEACHAPP         A         TECLA         B         TOLYAR         B           SULY         B         SYRETT         C         T	STUMBLE	A	SWITZERLAND	в	TEANAWAY	¢			TULL	A
STUTIGAPT D SYCAPORE À TEASCALE & THUPREN C TOLAM B SUDIETIC B/C SYCAN A TEGO B THUPREN C TOLC B SUDIETIC B/C SYCAN B TECHICK B THURLEN C TOLC B SUDIETIC B/S SYLACAUGA B/C TECHICK B THURLEN C TOLC B/ SUDIETIC C SYMERTON B TECCLETE B THURLEN A LOLSTOI D SUDALE C SYMERTON B TECCLETE B THURLEN A LOLSTOI D SUGALUAE B SYNAREP À TECRC B THURLEN A LOLSTOI D SUGALUAE B SYNAREP À TECRC B THURLEN C TELECA B SULA C SYMERED D'ELECACIN B THURLEN C TELECA B SULA B SYRENE D'ELEL B THAK C TELECA B SULA B SYRENE D'ELEL B THAK C TELECA B SULA B SYRENE D'ELECACIN B TELECA C TOLA C TOMAN B SULA B SYRENE D'ELECACIN B TELECACIN B TOLYAR B SULA B SYRENE D'ELECACIN B TELECACIN C TOMAN C TOMAS SULA B SYRENE D'ELECACIN B TELECACIN B TOLYAR B SULA B SYRENE D'ELECACIN B TELECACIN C TOMAS B SULA B TABERNASH H TELECA C TELECACIN C TOMAS B SULA B TABERNASH B TELECA C TELECOC D'ELECACIN D'ENAL SUMMA B TABERNASH B TELECA C TELECOC D'ELECACIN B'ECACIN C'ONAST C SUMAS B/C TABERNASH B TELECA C TELEPACHA B TELECAR D'ELECACIN B'ECACIN C'ONAST C'ON SUMUMA B TABER D'ELELA B TELECAR D'ELECACIN B'ECACAN C'ON SUMMA B TABER C'ELEPACINE D'ELECACIN D'ELECACIN B'ECACAN C'CONAST C'ON SUMMA B TABER D'ELELA B'ELECACIN D'ELECACIN B'ECACAN C'CONAST C'ON SUMMA B TABER D'ELELA B'ELECACIN D'ELECACIN B'ECACAN C'CONAST C'ON SUMMA B'AGERT C'ELELEPACINE D'ELECACIN B'ECACAN C'CONAST C'ON SUMMA D'E TABERA D'ELECACIN B'ELECACIN B'ECACAN C'CONAST C'CONASTA C'CONACAN C'ELECACIN B'ECACAN C'CONACAN C'CONACA	STUMPP	D	SWOPE	С	TEAPC		THREE MILE		TOLLGATE	8
STUTYVILLE         B/C         SYCAN         A         TEGO         B         THURLCMI         C         TOLC         B           SUUNETTIE         B         SYLACAUGA         B/C         TECHTCK         B         THURLCM         C         TOLSONA         D           SUUNETTIE         B         SYLACAUGA         B/C         TECHTCK         B         THURLCM         C         TOLSONA         D           SUUNETTIE         B         SYLACAUGA         B         TECHTCK         B         THURHAM         A         IOLSTON         D         TOLSONA         D           SUGARLDAE         B         SYNAREP         R         TECHTCK         B         THURSTON         B         TOLYAR         B           SULA         C         SYRETT         C         TEHACHAR         D         TICE         C         TOMAR         B           SULY         B         SYRETT         C         TEHACHAR         D         TICE         C         TOMAR         B         TOLYAR         B         TICHCAR         D         TOKAR         B         SULYAN         B         TELA         B         TICHAR         D         TICE         TOMAR         D         TOLYA	STUMP SPRINGS	в	SWYGERT	С	TEAS	С	THUNCERBIRC		TCLLHOUSE	
SUBLETTC B SULCAUGA B/C TECHTCK B THURCK C TOISONA D SUGNURY B SYLVAN B TECHCLE B THURMAN A IGLSTOI D SUGAUDAE S SYLVAN B TECULSAH B THURMAN A IGLSTOI D SUGALDAE B SYNAREP A TECRCH B THURMAN A IGLSTOI D SUGALDAE B SYNAREP A TECRCH B THURSTON B TOLTEC C SULA G SYRENE D TEFACHAPI D TIBBITTS B TOLVAR B SULLY B SYRETT C TEFAMA C TICA C TOMAN C SULA B SYRENE D TEFACHAPI D TIBBITTS B TOLVAR B SULLY B SYRETT C TEFAMA C TICA C TOMAN C SULA B TABERNASH B TELA D TIBBITTS B TOLVAR B SULA B TABERNASH B TELA D TICH CAN C TOMAS C SUMMA B TABERNASH B TELA C TICH CAN C TOMAS C SUMMA B TABERNASH B TELA B TICKARDO C TOMICHI A A SUMMA B TABERNASH B TELA B TICKARDO C TOMICHI A A SUMMA B TABERNASH D TELEENC D TICKASDON G TOMAS C SUMMA B TABLER D TELEENC D TICKASDON G TOMACA A/D SUMMA B TABLER O TELEFER A TIEKRA C TOMAATA C SUMMA B TABLER D TELEFER A TIEKRA C TOMAATA C SUMMA B TABERNASH D TELEFER A TIEKRA C TOMAATA C SUMMA B TABLER D TELEFER A TIEKRA C TOMAATA C SUMMA B TABLER D TELEFER A TIEKRA C TOMAANCA C SUMMA B TABER C TELEFFER A TIEKRA C TOMAANCA C SUMMA B TABLER D TELEFER A TIEKRA C TONATA C SUMMA B TABLER D TELEFER A TIEKRA C TONATA C SUMMA B TABLER C TELEFER A TIEKRA C TONATA C SUMMA B TABLER C TELEFER B TICKN B TONINI SUMMA B TABLER C TELLEFER B TIETCN B TIFTUN B TONINI SUMMA B TABLER C TELLEFER B TIETCN B TONNA C SUMMA C TAHOUANENON D TELLSTAD B TIGER CRIEK B TONKA C SUM C TAHOUANENON D TELSTAD B TIGER CRIEK B TONKA C SUM C TAHOUANENON D TELSTAD B TIGER CRIEK B TONKA C SUNADU A TAJO C TEMPLE B/C TIGHCN B TONNEN B SUNGO C TAKEUCHI C TEMABC D TIJERAS B TONSINA B SUNGOL C TAKEUCHI C TEMABC D TIJERAS B TONSINA B SUNGOL C TAKEUCHI C TEMABC D TIJERAS B TONSINA B SUNGOL C TAKEUCHI C TENABC D TIJERAS B TONSINA B SUNGOL C TALEDTA C TENAG B TILSIT C TOPPENISH SUNATION C TALENTA C TEMABC D TINCES D SUNATION C TALENTA C TENAG B TILSIT C TOPPENISH SUNATES C TALEDTA C TENAG B TILSIT C TOPPENISH B/C SUNATION C TALEDTA C TENAG B TILSIT C TOPPENISH B/C SUNATION C TALEDTA C TENAG B TILSIT C TOPPENISH B/C SUNATYSIDE B TALLHINA D TENAG B TIC	STUTIGAPT	D	SYCAPORE	8	TEASDALE	в	THURBER	C	TOLNA	8
SUDATORY B STUAR B TICCLOTE B THURMAN À LOLSTOI D' SUFFIELD C SYMERTON B TICCUMSAM B THURMONT B TOLT D' SUGARLOAE B SYMAREP A TICCRÚM B THURMONT B TOLTEC C SUISUN O SYMACUSE B TEEL B TIAK C TICLUCA B SULA C SYRENE D TEHACHAPI D TIBBITTS B TOLVAR B SULLY B SYRETT C TEHACHAPI O TIBBITTS B TOLVAR C SULY B SYRETT C TEHACHAPI O TIBBITTS B TOLVAR C SULY B SYRETT C TEHACHAPI O TIBBITTS B TOLVAR C SULY B SYRETT C TEHACHAPI O TIBBITTS B TOLVAR C SULY B SYRETT C TEHACHAPI O TIBBITTS B TOLVAR C SULY B SYRETT C TEHACHAPI O TIBBITTS B TOLVAR C SULY B SYRETT C TEHACHAPI O TIBBITTS B TOLVAR C SULY B SYRETT C TEHACHAPI O TICC C TOMAH C SULY B SYRETT C TEHACHAPI O TICL C TOMAS C SULY AN B TABERNASH B TELA D TICKAPCO C TOMAS C SUMAS B/C TABIDNA B TEKCA C TICHACR D TOPFRA O SUMAY O TABLE MCUNTAIN B TELA B TICKAPCO C TOMICHI A SUMMA B TABLER D TELEECNC D TICKASUN B TOPCKA A//D SUMMUM O TABLE MCUNTAIN B TELA B TICKAPCO C TOMAST C SUMMAR B TACCHA D TELEFER A TIEKRA C TOMAATA C SUMMAR B TACCHA D TELEFER A TIEKRA C TONAATA C SUMMITY LILLE A TACCHA D TELEFER A TIEKRA C TONAATA C SUMMITY C TAAT C TELLIFCC B TIFTON B TONKA C SUMMITY LILLE A TACCHA D TELEFER A TIEKRA C TONAATA C SUMMITY LILLE A TACCHA D TELEFER A TIEKRA C TONAATA C SUMMITY LILLE A TACCHA D TELEFER A TIEKRA C TONGUE RIVER B SUMTER C TAADMA S TELLMAN B TIGGE CRFEK B TONKA C SUMMITY LILLE A TAGCERT C TELLICC B TIFTON B TONKA C SUMMITY LILLE A TAADCET C TELLICC B TIFTON B TONKA C SUMATER C TAHOMA S TELLMAN B TIGGE CRFEK B TONKA C SUNAUKST C TAHOMA S TELLMAN B TIGGE CRFEK B TONKA C SUNAU C TAALOUATS C TEMPSCAL D TIGLICON B TONCO B SUNCOK A TAINTOR C TEMPSCAL D TIGLARS B TONSINA B SUNCOK C TAKEUCHI C TENSAL D TIGLARS B TONCO B SUNCOK A TALANTE C TENSAL D TIGLARS C TILLEDA B TOCKEK B SUNAD C TALEDUT C TENTA B TICKAP C TOPPENISH B/C SUNATAR C TALEDUT C TENTA A TILAA C TOPPENISH B/C SUNATAR D TALANTE C TENSA A TILMAN C TOPPENISH B/C SUNATAR C TALAC B TINNC B TOCKES D SUNATAR C TALAC B TINNC B TORCHLIGHT C	STUTZVILLE	B/C	SYCAN		TEBO		THURLONI		TOLC	
SUFFIELDCSYMERTONBTCCUMSAMBTHUMSTONBTOLTECCSUGARLDAEBSYNAREPATECRCWBTHUMSTONBTOLTECCSULANDSYNAREPATECRCWBTHUMSTONBTOLTECCSULANDSYNAREPATECRCWBTHUMSTONBTOLTECCCSULACSYNAREPDTECHAMACTIGACTOLMANBSULACSYNAREPDTECHAMACTIGACTOMAHBSULAASYNAREPTELADTICECTOMAHCSUNARBSULAASYNAREPTELADTICECTOMAHCSUNARBSULAASYNAREPTELADTICECTOMAHCSUNARBSULTANBTABERNASHHTELABTICHACRDTOMERAASUMASB/CTABERNASHHTELABTICHACRDTOMERAASUMASB/CTABERNASHHTELABTICKASONBTOCKAAA/ASUMASB/CTABERNASHDTELEECNCDTICKASONBTOCKAAA/ASUMASB/CTABERNASHDTELEECNCDTICKASONBTOCKAAA/ASUMASSUMACHARERERCTAACRACTOMAHA	SUBLETTE	8	SYLACAUGA	B/C	TECHICK	в	TPURLEW	С	TOLSONA	D
SUGACLÍDAEBSÝNÄRÉPŘTČČRČMBTHÚRSTONBTÓĽTÉCCSULSUMDSYRACUSEBTEELBTIAKCTÓĽTÉCCSULACSYRACUSEBTEELBTIAKCTÓLTÉCCSULACSYRACUSEBTEELBTIAKCTÓLYARBSULACSYRACUSEDTEFACHAPIDTIBBITTSBTÓLYARBSULABSYRETTCTEHAACTÍCACTÓMASBSULABSYRETTCTEHAADTÍCECTÓMASBSULABTABERNASHHTCJCNBTÍCHCACCTÓMASBSUMASB/CTABLE MCUNTAINBTELACTÍCKASONBTÓMERADSUMASB/CTABLE MCUNTAINBTELEABTÍCKASONBTÓMERAA/DSUMARDTABLE MCUNTAINBTELEABTÍCKASONBTÓMERAA/DSUMARDTELERDTÍDWELLDTÓNATACCSUMARBTABLEMCUNSHDTÉLERRATÍERASONBTÓNATACSUMARCTABLECTABLECTÓNATACTÓNATACCSUMARDTELERRATÍERASONBTÍCARACTÓNATAC	SUDBURY	8		8	TECCLOTE	8	THURMAN	Α	IULSTOI	D
SUISUN O SYRACUSE B TEL B TIAK C TOLVAR B SULA G SYRENE D TEHACHAPI D TIBBITTS B TOLVAR G SULPARA C TICA C TOWAH C SULPARA D TELACHAPI D TIBBITTS B TOLVAR B SULLY B SYRETT C TEHAAA C TICA C TOMAS C SULPARA D TELAC C TICA C TOMAS B SULTAN B TABERNASH B TCJCN B TICHICAN C TOMAS C SUMAS B/C TABIDNA B TEKCA C TICHICAN D TOMERA D SUMMUM O TABLE MCUNTAIN B TELA B TICKAPROD C TOMICHI A SUMMA B TABLER D TELEEPCNE D TICKASUN B TOMCKA A/D SUMMA B TABLER C TELEPPCNE D TIOWELL D TOMAANCA C SUMMAN B TABLER C TELEPPCNE D TIOWELL D TOMAANCA C SUMMAN D TABLE CHA D TELEECNC D TICKASUN B TOMCKA A/D SUMMAN B TABLER D TELEEPCNE D TIOWELL D TOMATA C SUMMAN B TABLER C TELEPPCNE D TIOWELL D TOMATA C SUMMAN B TABLER C TELEPPCNE D TIOWELL D TONATA C SUMMAN B TABLER C TELEPPCNE D TIOWELL D TONATA C SUMMAN B TABLER C TELEPPCNE D TIOWELL D TONATA C SUMMAN B TABLER C TELEPPCNE D TIOWELL D TONATA C SUMMERVILLF C TACUTSH D TELE B A TIFTAN B TON INI B SUMMITVILLE A TAGGERT C TELLICA B TIFTAN B TON INI B SUMMITVILLE A TAGGERT C TELLICC B TIFTAN B TON INI B SUMMITVILLE A TAGGERT C TELLARN B TIGER CRFEK B TONKA C SUNAUNST C TAMUAANNO D TELESTAD B TIGER CRFEK B TONKA C SUNAUNST C TAMUAANNO D TELESTAD B TIGER CRFEK B TONKA C SUNAUNST C TAMUAANNO C TEMPLE B/C TIGNCN B TONCKEK B SUNAO C TAKEUCHI C TEMPIK B TIGUA D TONCKEK B SUNAO C TAKEUCHI C TEMPIK B TIGUA D TONCKEK B SUNAO C TAKEUCHI C TENALA B TILANA B TILCAD B TONCO B SUNAO C TAKEUCHI C TENALA B TILLON B TOCKEK B SUNAO C TAKEUCHI C TENALA B TILLAN C TOPPENSH B/CC SUNANIAND C TALADIS P TENERIFEC C TILLEOA B TONCO B SUNAO C TALADIS P TENER FERA C TILLEOA B TONCO B SUNAO C TALADIS P TENER FERA A TILMA C TOPPENSH B/C SUNNYALF C TALARDS P TENER FERA A TILMA C TOPPENSH B/C SUNNYALF C TALACT C TENER A TILMA C TOPPENSH B/C SUNNYALF C TALACE B TALININA B TENAL B TILLON B TOQUERVILLE D SUNNYALF C TALLAC B TENNC B TILLIAN C TOPPENSH B/C SUNNYALF C TALLAC B TENNC B TILLIAN C TOPON C	SUFFIELD	с	SYMERTON	ы	TECUMSAH				TOLT	
SULA 6 SYRENE D TEFACHAPI 0 TIBBITTS 8 TOLVAR 8 SULLY 8 SYRETT C TEHAMA C TIGA C TOMAH C SULTAN 8 TABERNASH 8 TEJA 0 TICE C TOMAS 8 SULTAN 8 TABERNASH 8 TEJA 0 TICE C TOMAS 8 SUMAS 8/C TABIDNA 8 TEKCA C TICHACR 0 TOMEAN 0 SUMMUM 0 TABLE MCUNTAIN 8 TELA 8 TICKAPCO C TOMICHI A SUMMA 8 TABLER D TELEECNC 0 TICKASUN 8 TOMECA A/D SUMMA 8 TABLER 0 TELEECNC 0 TICKASUN 8 TOMECA A/D SUMMAR 8 TABLER 0 TELEECNC 0 TICKASUN 8 TOMECA A/D SUMMAR 8 TABLER 0 TELEECNC 0 TICKASUN 8 TOMECA A/D SUMMAR 8 TABLER 0 TELEECNC 0 TICKASUN 8 TOMECA A/D SUMMAR 8 TABLER 0 TELEFER A TIEKRA C TONANACA C SUMMAR 8 TAGERT C TELEFECNE 0 TIOMELL 0 TONATA C SUMMERVILLE C TACCOSH 0 TELEECNC 8 TIFTON 8 TOMECA A/D SUMMITVILLE R TAGGERT C TELLER 8 TIFFANY C TONGUE RIVER 8 SUMMITVILLE R TAGGERT C TELLICC 8 TIFTON 8 TONKA C SUMAINT C TAHOMA S TELLMAN 8 TIGER CRFEK 8 TONKA C SUNAURST C TAHOMA S TELLMAN 8 TIGER CRFEK 8 TONKA C SUNAURST C TAHOMARKON D TELSTAD 8 TIGERCKN A TONKEY C SUNAURST C TAHOMARKON D TELSTAD 8 TIGERCKN 8 TONSINA 8 SUNCOCK A TAJO C TEMPLE 8/C TIGNEC 8 TIFTON 8 TONSINA 8 SUNCOCK A TAJO C TEMPLE 8/C TIGNEC 8 TONKA C SUNCOCK A TAJO C TEMPLE 8/C TIGNEC 8 TONCO 8 SUNCOCK A TAJO C TEMPLE 8/C TIGNEC 8 SUNCOCK A TAJO C TEMPIK 8 SUNCOCK A TALATE C THOLE C TINNE 8 SUNCOCK A TALATE C TENES C TILLEO 8 SUNCOCK A TALATE C TENES C			SYNAREP		TECRCW					
SULLYBSYRETCTEHAPACTICACTOMAHCSULPHURA0TABERNASHBTLONBTICHIGANCTOMAHGSULPHURA0TABERNASHBTLONBTICHIGANCTOMASBSUMAN0TABLEMEUNTAINBTEKCACTICHIGANCTOMASTCCSUMAN0TABLEMEUNTAINBTEKCACTICHACRDTOMERADDSUMAN0TABLEMEUNTAINBTELEECONCDTICKASIONBTOMCKAA/DSUMMAR8TABLERDTELEEPCNEDTIOHELLDTONATACSUMMERFIELUCTABCRCTELEPFONEDTIOHELLDTONATACSUMMERVILLECTACUANDTELEPFONEDTIOHELLDTONATACSUMMITYLLECTAACUANDTELLRBTIFFANYCTONKAKCCSUMMITYLLEATAGGERTCTELLRANBTIGERCANATONKAKCCSUNTERCTAHOUATSCTEMESCALDTIGINCNBTONKAKCCSUNAUNDTAHOUATSCTEMESCALDTIGERCANATONKEKBSSUNAUNYDTAHOUATSCTEMESCALDTIGERCANATONCAKB <td>SULSUN</td> <td></td> <td>SYKACUSE</td> <td>в</td> <td>TEEL</td> <td></td> <td></td> <td></td> <td></td> <td></td>	SULSUN		SYKACUSE	в	TEEL					
SULPHURA0TEJA0TICECTOMAS8SULTANBTABERNASHHTEJCNBTICHIGANCTOMASTCSUMASB/CTABLDNAHTELCNBTICHIGANCTOMASTCSUMMAOTABLE MCUNTAINRTELABTICHACRDTOMERAASUMMAOTABLE MCUNTAINRTELABTICKASUNGTOMERAASUMMARANDAOTABLE MCUNTAINRTELABTICKASUNGTOMATACSUMMARANDACTABCRCTELEPECNCDTIOWELLDTONATACSUMMERFIELUCTABCRCTELEPECNCDTIOWELLDTONATACSUMMERFIELUCTABCRDTELFERATIERCABTONCACSUMMERFIELUCTABCRADTELFERATIERCABTONCACSUMMERFIELUCTAHCUNANDADTELLRANBTIERCABTONEDSUMMERFIELUCTAHOUANENONDTELSTADBTICERCNATONCACSUNAURSTCTAHOUANENONDTELSTADBTICERCNATONCAESUNAURSTCTAHOUANENONDTELSTADBTICERCNATONCAESUNAURSTCTAHOUANENONDTELSTADBTICERCN <td></td> <td></td> <td>SYRENE</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			SYRENE							
SULTAN6TABERNASHHTEJGNBTICHIGANCTOMASTCSUMASB/CTABLENASHHTEKCACTICHIGANCTOMERAOSUMASB/CTABLE MOUNTAINBTEKCACTICKAPCOCTOMICHIASUMASBTABLE MOUNTAINBTELECNCDTICKAPCOCTOMICHIASUMAABTABLERDTELEECNCDTICKAPCOCTOMATACSUMMERFIELUCTABCRCTELEPENDEDTIONELLDTONATACSUMMERVILLFCTACUNSHOTELEERATIFFANYCTONGUE RIVERBSUMMITVILLFATAGGERTCTELLIRABTIFFANYCTONGUE RIVERBSUMITERCTAHOMASTELLMANBTIGER CRFEKBTONKACSUNAUNSTCTAHOMANENONDTELSTADBTIGER CRFEKBTONKACSUNAUNSTCTAHOMANENONDTELSTADBTIGUANBTONCPAHBSUNAUNSTCTAHOMANENONDTELSTADBTIGUANBTONCPAHBSUNAUNSTCTAHOMANENONDTELSTADBTIGUANBTONCPAHBSUNAUNSTCTAHOMANENONDTELSTADBTIGUANBTONCPAHBSUNAUNSTCTAHO			SYRETT	С						
SUMASB/CTABIDNABTEKCACTICHNCRDTOMERADSUMUUM0TABLE MCUNTAINBTELABTICKAPCOCTOMERAASUMMABTABLE MCUNTAINBTELABTICKAPCOCTOMERAASUMMARABTABLE MCUNTAINBTELABTICKAPCOCTOMERAAASUMMERFIELDCTABCRCTELEPCONEDTIONELLDTONATACSUMMERFIELDCTACUCSHOTELLBTIETCABTOREYCSUMMITCTACUCSHOTELLBTIETCABTONATACSUMMITCTACUCSHOTELLBTIETCABTONEYBSUMMITCTAAUCSHOTELLRBTIETANBTONEYCSUMMITCTAHOMASTELLMANBTIGER CEFEKBTONKACSUNAUKSTCTAHOMASTELLMANBTIGER CEFEKBTONKACSUNAUKSTCTAHOMAPENONOTELSTADBTIGER CEFEKBTONKACSUNAUKSTCTAHOMAPENONOTELSTADBTIGER CENATONKACSUNAUKSTCTAHOMAPENONOTELSTADBTOKENSBCCSUNAUKSTCTAHOMAPENONOTELSTADB										
SUMOUM0TABLE MCUNTAIN MCUTESBTELABTICKAPROCTOMELAASUMMABTABLER0TELEECNC0TICKASUN6TOMELAA/DSUMMARBTABCRCTELEPENE0TICKASUN6TOMATACSUMMERFIELUCTABCRCTELEPENE0TICKASUN6TOMATACSUMMERFIELUCTAACMA0TELFERATIERAACTONATACSUMMERVILECTACCMA0TELFERATIERTANCTONGUE RIVER8SUMMITCTAHCTELLERBTIFTUNBTONINI8SUMMITCTAHOMASTELLMANBTIGER CRFEKBTONKACSUNAURSTCTAHOMAMENON0TELSTADBTIGER CRFEKBTONKACSUNAURSTCTAHOMAMENON0TELSTADBTIGER CRFEKBTONCAKBSUNAURSTCTAHOMAMENON0TELSTADBTIGER CRBTONCAKBSUNAURSTCTAHOMAMENON0TELSTADBTIGER CRBTONCAKBSUNAURSTCTAHOMAMENON0TELSTADBTIGER CRBTONCAKBSUNAURSTCTAHOMAMENON0TELSTADBTIGER CRBTONCAKBSUNAURSTCTAHOMARST										
SUMMA 8 TABLER 0 TELEECNC 0 TICKASUN 6 TOMCKA A/D SUMMERFIELU C TABCR C TELEPENDE D TIOWELL 0 TONATA C SUMMERVILLE C TACUCSH 0 TELFER A TIEKRA C TONAHANDA C SUMMERVILLE C TACUCSH 0 TELL 8 TIETCN 8 TONEN 0 SUMMITYILLE A TAGGERT C TELL 8 TIETCN 8 TONEN 8 SUMMITYILLE A TAGGERT C TELL 8 TIETON 8 TONINI 8 SUMMITYILLE A TAGGERT C TELL 8 TIETON 8 TONINI 8 SUMMITYILLE A TAGGERT C TELL 8 TIETON 8 TONINI 8 SUMMITYILLE A TAGGERT C TELL 8 TIETON 8 TONINI 8 SUMMITYILLE A TAGGERT C TELL 8 TIETON 8 TONINI 8 SUMMITYILLE A TAGGERT C TELL 8 TIETON 8 TONINI 8 SUMMITYILLE A TAGGERT C TELL 8 TIETON 8 TONINI 8 SUMMO 0 TAHOUAMENON 0 TELSTAD 8 TIGER CREEK 8 SUMON 0 TAHOUAMENON 0 TELSTAD 8 TIGER 8 SUNON 0 C TAHOUATS C TEMESCAL 0 TIGINCN 8 TONENA 8 SUNONY 4 TAINTOR C TEMESCAL 0 TIGINCN 8 TONENA 8 SUNONGK A TAJO C TEMESCAL 0 TIGINCN 8 TONENA 8 SUNOCGK A TAJO C TEMENK 8 TIGUA 0 TONCMEK 8 SUNCOGK A TAJO C TEMENK 8 TIGUA 0 TONCMEK 8 SUNCOGK A TAJO C TEMENK 8 TILECN 8 TONSINA 8 SUNDELL C TAKILMA 8 TENAHA 8 TILECN 8 TONENA 8 SUNDELL C TAKILMA 8 TENAHA 8 TILECN 8 TONENA 8 SUNCENA 8 TALANTE C TENESCAL 0 TILEDA 8 TONEO 8 SUNCENA 8 TALANTE C TENESCA 0 TILEDA 8 TONEO 8 SUNCENA 8 TALANTE C TENESCA 0 TILEDA 8 TONEO 8 SUNCENA 8 TALANTE C TENESCA 0 TILEDA 8 TONEO 8 SUNNCENA 8 TALANTE C TENESCA 0 TILEDA 8 TONEO 8 SUNNCENA 8 TALANTE C TENESCA 0 TILLEDA 8 TONEO 8 SUNNYHAY 0 TALCOT C TENESCA 0 TILL 60 8 TONEO 8 SUNNYHAY 0 TALCOT C TENESCA 0 TILL 60 8 TOLE 0 SUNNYHAY 0 TALCOT C TENESCA 0 TILL 60 8 TOLE 0 SUNNYHAY 0 TALCOT C TENESCA 0 TILEDA 8 TOLE 0 SUNNYHAY 0 TALCOT C TENESCA 8 TILSIT C TOPTEN SUNNYHAY 0 TALCOT C TENESCA 8 TILSIT C TOPTEN 8 SUNNYHAY 0 TALCOT C TENESCA 8 TILSIT C TOPTEN 8 SUNNYHAY 0 TALCOT C TENESCA 8 TILSIT C TOREOV 8 SUNNYHAY 0 TALCOT C TENESCA 8 TILSIT C TOPTEN										
SUMMERFIELUCTABCRCTELEPPONEDTIONELLDTONATACSUMMERFIELUCTACUO'SHDTELFERATIEKRACTONATACSUMMERVILLECTACUO'SHDTELLBTIETCNBTONATACSUMMITCTACUO'SHDTELLBTIETCNBTONATACSUMMITCTACUO'SHDTELLBTIETCNBTONATACSUMMITCTAFTCTELLERBTIFFANYCTONGUE RIVERBSUMMITCTAHOMASTELLMANBTIGER CREEKBTONKACSUNAURSTCTAHOUANENONDTELSTADBTIGER CREEKBTONCACCSUNAURSTCTAHOUANENONDTELSTADBTIGER CREEKBTONCACCSUNAURYHTAINTORCTEMPLEB/CTIGER CREEKBTONCACBSUNAURYHTAINTORCTEMPLEB/CTIGER CREEKBTONCACBSUNAURYHTAINTORCTEMPLEB/CTIGER CREEKBTONCACBSUNCOUKATAINTORCTEMPLEB/CTIGER CREEKBTONCEBSUNCOUKATAINTORCTEMPLEBTIGEABTONCOUBSUNCOUNCTAKEUCHICTEMPLE <td></td> <td></td> <td>TABLE MCUNTAIN</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			TABLE MCUNTAIN							
SUMMPPS       B       TACCMA       D       TELFER       A       TIERAA       C       TONAMANCA       C         SUMMERVILLE       C       TACUNA       D       TÉLL       B       TIETGN       B       TONEY       D         SUMMITVILLE       C       TAT       C       TELLER       B       TIFFANY       C       TONGUE RIVER       B         SUMMITVILLE       A       TAGGERT       C       TELLER       B       TIFFANY       C       TONGUE RIVER       B         SUMMITVILLE       A       TAGGERT       C       TELLER       B       TIFFANY       C       TONGUE RIVER       B         SUMTER       C       TAHOMA       S       TELLER       B       TIFFANY       C       TONGUE RIVER       B         SUMTER       C       TAHOMA       S       TELLER       B       TIFFANY       C       TONSUE       B         SUMTER       C       TAHOMANENON       D       TELSTAD       B       TIGER CRFEK       B       TONEY       C       C       SUNCANA       C       TONEY       C       SUNCANA       C       TONEY       C       SUNCANA       C       TONEY       SUNCANA       S										
SUMARVILLFCTAGURSHDTÉLLBTIETCNBTONEYDSUMMITCTAFTCTELLERBTIFFANYCTONGUE RIVERBSUMMITVILLEATAGGERTCTELLERBTIFFANYCTONGUE RIVERBSUMTTVILLEATAGGERTCTELLMANBTIGER CRFEKBTONKACSUMDTAHOUAMENONDTELSTADBTIGER CRFEKBTONKACSUNAUKSTCTAHOUAMENONDTELSTADBTIGERCNATONKACSUNAURYSTCTAHOUAMENONDTELSTADBTIGERCNATONKACSUNAURYSTCTAHOUAMENONDTELSTADBTIGERCNATONKACSUNAURYSTCTAHOUAMENONDTELSTADBTIGERCNATONKACSUNAURYSTCTAHOUAMENONDTELSTADBTIGERCNATONKABSUNAURYSTCTAHOUAMENONDTELSTADBTIGUADTONCPAHBSUNAURYSTCTAHOUAMENONCTEMPLEB/CTIGUADTONCOMEKBSUNAUCTAKEUCHICTENASCTILEONBTONCOBSUNAUNCTAKEUCHICTENASCTILLEONBTONCOBSUNAULADCTALANTEC										
SUMMITCTAFTCTELLERBTIFFANYCTONGUE RIVERBSUMMITVILLEHTAGGERTCTELLICCBTIFTUNBTONINIBSUMMITVILLEHTAHOMASTELLMANBTIGER CREEKBTONKACSUNAUKSTCTAHOUAMENONDTELSTADBTIGER CREEKBTONKACSUNAUKSTCTAHOUAMENONDTELSTADBTIGER CREEKBTONKACSUNAUKSTCTAHOUAMENONDTELSTADBTIGERCNATONCPAHBSUNAUKSTCTAHOUAMENONCTERVIKBTIGUADTONCPAHBSUNAUKSTCTAROUATSCTERVIKBTIGUADTONCPAHBSUNAUKSTCTAKUCHICTERVIKBTIGUADTONCORBSUNGELLCTAKILMABTENARGECTILEGROBTONCOBSUNDELLCTAKILMABTENARGECTILLEDABTOCLEDSUNDELLANDCTAKANTECTENKEFECTILLEDABTOCLEDSUNAUKNABTALANTECTENKEFECTILLEDABTOCLEDSUNAUKNABTALANTECTENKEFECTILLEDABTOQUENASUNNILANDCTALANTECTENKEFE <td></td>										
SUMMITVILLE     A     TAGGERT     C     TELLICC     B     TIFTUN     B     TONINI     B       SUMTER     C     TAHOMA     S     TELLMAN     B     TIGERCREK     B     TONKA     C       SUM     D     TAHOMA     S     TELLMAN     B     TIGERCR     A     TONKA     C       SUN     D     TAHOMANENON     D     TLESTAD     B     TIGERCN     A     TONKAY     C       SUNAURY     C     TAHQUATS     C     TEMPESCAL     D     TIGHCN     B     TONCPAH     B       SUNOURY     H     TAINTOR     C     TEMPLE     B/C     TIGHCN     B     TONCPAH     B       SUNOURY     H     TAINTOR     C     TEMPLE     B/C     TIGHCN     B     TONCPAH     B       SUNOURY     H     TAINTOR     C     TEMPLE     B/C     TIGHCN     B     TONCPAH     B       SUNDEL     C     TAKEUCHI     C     TENABA     B     TILEOA     B     TONCO     B       SUNDEL     C     TAKEUCHI     C     TENABA     B     TILEOA     B     TONCO     B       SUNOUCH     A     TALANTE     C     TENABA     B										
SUMTERCTAHOMASTELLMANBTIGER CRFEKBTONKACSUNDTAHOUAMENONOTELSTADBTIGER CRFEKBTONKACSUNAUKSTCTAHOUAMENONOTELSTADBTIGER CNATONKACSUNAUKSTCTAHOUAMENONOTELSTADBTIGER CNBTONKACSUNAUKSTCTAHOUATSCCTEMPLEB/CTIGER CNBTONCABSUNAUKSTCTAHOUATSCCTEMPLEB/CTIGER CNBTONCABSUNAUKSTCTAKUNACTEMPLEB/CTIGER CNBTONCABSUNCOUKATAJOCTEMPLEBTILFCRDBTONCOBSUNCELLANDC/OTAKEUCHICTENARBTILFCRDBTONCOBSUNCELLANDC/OTAKEUCHICTENARBTILFCRDBTONCOBSUNCELLANDC/OTAKANANABTENARCTILEDABTONCOBSUNCENATALANTECTENARCTILLEDABTOCMESDCSUNNELLANDCTALANTECTENARCTILLMANCTOPCCSUNNELLANDCTALANTECTENARATILMANCTOPCCSUNNELLANDCTALANTEC <td></td>										
SUN     D     TAHOUAMENON     D     TELSTAD     B     TIGERCN     A     TONKEY     C       SUNAURST     C     TAHOUATS     C     TEMESCAL     D     TIGINCN     B     TCKKS     B       SUNAURST     C     TAHOUATS     C     TEMESCAL     D     TIGINCN     B     TCKKS     B       SUNAURST     C     TAHOUATS     C     TEMESCAL     D     TIGINCN     B     TCKKS     B       SUNCORK     A     TAJO     C     TEMENCAL     B     TIGUA     D     TONCEAH     B       SUND     C     TAKEUCHI     C     TEMENCAL     B     TIGUA     D     TONCEAH     B       SUNDELL     C     TAKEUCHI     C     TENABL     D     TONLO     B     TONLO     B       SUNDELL     C     TAKUNA     B     TENABL     C     TILEGA     B     TOLE     D       SUNDELL     C     TAKUNA     B     TENAS     C     TILLEGA     B     TOLE     D       SUNDELL     C     TAKUNA     B     TENER     C     TILLEGA     B     TOLE     D       SUNNELAND     C     TALAPUS     P     TENEREFE     C										
SUNAURSTCTAHQUATSCTEMESCALDTIGIHONBTONKSESUNAURYHTAINTORCTEMPLEB/CTIGRETTTONKPAHBSUNAURYHTAINTORCTEMPLEB/CTIGRETTTONKPAHBSUNAURYHTAINTORCTEMPLEB/CTIGRETTTONKPAHBSUNAURYCTAKEUCHICTEMPLEB/CTONKEKBSUNDELCTAKEUCHICTENAHABTILFCRDBTONKOBSUNCELLANDC/OTAKOTNAHTENAHABTILFCRDBTONKOBSUNCENATALANECTENERSCTILLEDABTOCHESDSUNAURIANDGTALANECTENERFECCTILLEDABTOCHESDSUNAURIANDGTALANECTENERFECCTILLEDABTOCHESDSUNNILANDGTALANECTENERFECCTILLIANCTOPCOCSUNNYSTOEBTALCOTCTENERFATILTONBTOQUERVILLEDSUNNYVALFCTALKETNACTENNCDTIMBERGCTORBCYBSUNATSECTALLACBTENOTCTIMBERGCTORBCHBSUNAURYCTALKETNACTENNCDTIMBERGCTORBCHB										
SUN-SUN-SUN-SUN-SUN-SUN-SUN-SUN-SUN-SUN-										
SUNCOUR       A       TAJO       C       TEMVIK       B       TIGUA       D       TONCWEK       B         SUNO       C       TAKEUCHI       C       TERABL       D       TIJERAS       B       TONSINA       B         SUNO       C       TAKEUCHI       C       TERABL       D       TIJERAS       B       TONSINA       B         SUNDELL       C       TAKILMA       B       TERABL       D       TILECD       B       TONSINA       B         SUNDELL       C       TAKOINA       H       TERAS       C       TILLEDA       B       TOCLE       D         SUNDEN       R       TALANE       C       TERENFIFE       C       TILLEDA       B       TOCLE       D         SUNNIAND       C       TALANE       C       TENERIFE       C       TILMAN       C       TOPP       C         SUNNIAND       C       TALOT       C       TENERIFE       C       TILMAN       C       TOPP       C         SUNNYALP       D       TALCOT       C       TENER       B       TILSIT       C       TOPCHON         SUNNYALP       D       TALCOT       C       TENNC								8		
SUND     C     TAKEUCHI     Č     TENABL     D     TIJERAS     B     TÖNŠIŇA     B       SUNDELL     C     TAKILMA     B     TENABL     B     TIJERAS     B     TÖNŠIŇA     B       SUNDELL     C     TAKILMA     B     TENABL     B     TILECA     B     TÖNCU     B       SUNDELL     C     TAKILMA     B     TENABL     B     TILECA     B     TÖNCU     B       SUNDOWN     A     TALANTE     C     TÉNCEE     C     TILLEOA     B     TOCKES     D       SUNFIELD     B     TALANUS     P     TENTRIFFE     C     TILLAN     C     TOP     C       SUNNIAND     C     TALROTT     C     TENTRIFFE     C     TILLMA     C     TOPTON       SUNNYHAY     D     TALCOT     C     TENTR     A     TILTON     B     TOQUERVILLE     D       SUNNYVALF     C     TALKETNA     C     TENTR     B     TINBERG     C     TOBUOP     A       SUNNYVALF     C     TALKETNA     C     TENTR     C     TINBERG     C     TORBOY     B       SUNNYVALF     C     TALKETNA     C     TENT     C										
SUNDELL     C     TAKILMA     B     TEKAHA     B     TIEFCHO     B     TONUCO     B       SUNDERLAND     C/D     TAKDINA     B     TEKAS     C     TILEGA     B     TOLE     D       SUNDERLAND     C/D     TAKDINA     B     TEKAS     C     TILEGA     B     TOLE     D       SUNDERLAND     C/D     TAKDINA     B     TEKAS     C     TILEGA     B     TOLE     D       SUNDERLAND     C/D     TALANTE     C     TENER     C     TILLICUM     B     TOCLES     D       SUNNIAND     B     TALAPUS     P     TENERIFE     C     TILLICUM     C     TOP     C       SUNNIAND     C     TALAPUS     P     TENERF     A     TILMA     C     TOP     C       SUNNIANYHAY     D     TALCOT     C     TENINC     B     TILSIT     C     TOPTEN       SUNNYSIDE     B     TALLHINA     D     TENINC     B     TILON     B     TOQUERVILLE     D       SUNNYALF     C     TALLAE     R     TENOT     C     TIMBERLY     D     TORBOY     B       SUNNISE     C     TALLAC     R     TENOT     C										
SUNCERLAND     C/O     TAKOTNA     B     TÉNAS     C     TÍLLÉDÁ     B     TÓCLÉ     D       SUNCERLAND     C/O     TAKOTNA     B     TÉNAS     C     TÍLLÉDÁ     B     TÓCLÉ     D       SUNCERLAND     R     TALANE     C     TÉNAS     C     TÍLLÉDÁ     B     TÓCLÉ     D       SUNCERLAND     R     TALANE     C     TÉNERE     C     TÍLLEDA     B     TÓCHES     D       SUNNELLIND     B     TALAPUS     P     TENERIFEC     C     TÍLLMAN     C     TÓPPE     C       SUNNELAND     C     TALADET     C     TENER     A     TÍLMA     C     TÓPPENISH     B/C       SUNNYALY     D     TALCOT     C     TENER     A     TÍLMA     C     TÓPPENISH     B/C       SUNNYALY     D     TALCOT     C     TENER     B     TÍLNO     B     TÓQUEVILLE     D       SUNNYALF     C     TALKETNA     C     TENNLO     D     TÍNBERG     C     TÓQUOP     A       SUNPAY     C     TALLAC     B     TENOT     C     TÍNBERLY     B     TÓRCHLIGHY     B       SUNPAY     C     TALAC     B     TÍNCH<										
SUNDOWN     B     TALANTE     C     TÉNCEE     C     TILICUM     P     TOCMES     D       SUNFIELD     B     TALAPUS     P     TENTRIFFE     C     TILLMAN     C     TOP     C       SUNNILAND     C     TALADUS     P     TENTRIFFE     C     TILLMAN     C     TOPPENISH     B/C       SUNNILAND     C     TALADUT     C     TENTRE     A     TILMA     C     TOPPENISH     B/C       SUNNYHAY     D     TALLOT     C     TENTRC     B     TILSIT     C     TOPTCN       SUNNYSIDE     B     TALLHINA     D     TENTRC     B     TILTON     B     TOQUERVILLE     D       SUNNYALF     C     TALKEETNA     C     TENTC     D     TIMBERG     C     TORBOY     B       SUNNALSE     C     TALLAC     R     TENT     C     TIMBERLY     D     TORBOY     B       SUNNALSE     C     TALLAC     R     TENT     C     TIMBERLY     B     TORBOY     B       SUNNAS     C     TALLAC     R     TENTRE     TIMENTMA     B     TORCHLIGHT     C										
SUNFIELD     B     TALAPUS     P     TENTRIFFE     C     TILLMAN     C     TOP     C       SUNNIAND     C     TALBOTT     C     TENTR     A     TILMAN     C     TOPPENISH     B/C       SUNNIAND     C     TALBOTT     C     TENTR     A     TILMAN     C     TOPPENISH     B/C       SUNNYAY     D     TALLOT     C     TENTR     B     TILSIT     C     TOPTON       SUNNYALF     B     TALHAN     D     TENTR     C     TOQUERVILLE     D       SUNNYALF     C     TALKEETNA     C     TENTR     C     TOQUERVILLE     D       SUNNYALF     C     TALLAC     B     TENTR     C     TOQUERVILLE     D       SUNNYALF     C     TALKEETNA     C     TENT     C     TOQUERVILLE     D       SUNNYALF     C     TALLAC     B     TENTR     C     TORBOY     A       SUNNISC     C     TALLAC     B     TENTRA     B     TORCHLIGHT     C       SUNNISC     C     TALLAC     C     TENTRA     B     TORCHLIGHT     C       NOTES     A     BLANK     HYDROLOGIC     SOIL     COUP     HAS     HOT REH <td></td>										
SUNNILAND     C     TALBOTT     C     TENFX     A     TILMA     C     TOPPENISH     Ø/C       SUNNYHAY     D     TALCOT     C     TENIBAC     B     TILSIT     C     TOPTCN       SUNNYSIDE     B     TALIHINA     D     TENIBAC     B     TILTON     B     TOPTCN       SUNNYSIDE     C     TALKETNA     C     TENNC     B     TILTON     B     TOQUEPVILLE     D       SUNNYSIDE     C     TALKETNA     C     TENNC     D     TIMBERG     C     TOQUOP     A       SUNNYSIDE     C     TALKETNA     C     TENNC     D     TIMBERG     C     TOQUOP     A       SUNNYSALF     C     TALLAC     B     TENNT     C     TOMBERG     C     TOQUOP     A       SUNNYSALF     C     TALLAC     B     TENNT     C     TIMBERG     C     TORBCY     B       SUNNSISE     C     TALLAC     B     TENNT     C     TIMBERG     NOT BCHIGHT     C       NOTES     A     BLANK     HYDROLOGIC     SOIL     COULP     HYDROLOGIC     SOIL     COULP HAS     HOT BCHIGHT										
SUNNYHAY     D     TALCOT     C     TENIBAC     B     TILSIT     C     TOPTON       SUNNYSIDE     B     TALIHINA     D     TENINC     B     TILSIT     C     TOPTON       SUNNYSIDE     B     TALIHINA     D     TENINC     B     TILSIT     C     TOQUERVILLE     D       SUNNYSIDE     C     TALIHINA     C     TENINC     B     TIMERG     C     TOQUERVILLE     D       SUNNYALF     C     TALLAC     R     TENIT     C     TORBOY     B       SUNNISC     C     TALLAC     R     TENIT     C     TORBOY     B       SUNNISC     C     TALLAC     R     TENIT     C     TORBOY     B       NUTES     A     BLANK     HYDBOLOGIC     SOL     TILCOUP     HOLDATES     THE SOLL OPUP HAS NOT DETED										-
SUNNYSIDE     B     TALIHINA     D     TENINC     B     TILTON     B     TOQUERVILLE     D       SUNNYVALF     C     TALKEETNA     C     TENNC     D     TIMBERG     C     TOQUOP     A       SUNNYVALF     C     TALKEETNA     C     TENNC     D     TIMBERG     C     TOQUOP     A       SUNPAY     C     TALLAC     B     TENNT     C     TIMBERGY     B     TORBCY     B       SUNRISE     C     TALLAC     C     TENNTG     B     TIPENTMA     B     TORCHLIGHT     C       NOTES     A     BLANK     HYDROLOGIC     SOLL     COUPL     HPLICATES     THE SOLL GROUP HAS NOT BEEN DETERMINED										8/C
SUNNYVALE C TALKEETNA C TENNC D TIMBERG C TOQUOP A SUNRAY C TALLAC B TENOT C TIMBERLY B TORBOY B SUNRISE C TALLACER TENOT C TIMBERLY B TORBOY B SUNRISE C TALLACER C TENNES B TIMENTMA B TORCHLIGHT C NOTES A BLANK HYDBOLOGIC SOLL COOUP HYDICATES THE SOLL COOUP HAS NOT BEEN DETERMINED										
SUNPAY C TALLAC B TENOT C TIMBERLY B TORBOY B SUNRISE C TALLADECA C TENKEG B TIMENTWA B TORCHLIGHT C NOTES A BLANK HYDROLOGIC SOLL COOUP LUDICATES THE SOLL GROUP HAS NOT BEEN DETERMINED										
SUNRISE C TATTADECA C TENERG B LIPENTHA B TORCHLIGHT C NOTES A BLANK HYDROLOGIC SOLL COOUP LIPLICATES THE SOLL GROUP HAS NOT BEEN DETERMINED										
NUTES A BLANK HYDROLOGIC SOLL COOUP LUDICATES THE SOLL CROUP HAS NOT BEEN DETERMINED										
The second s	200K121	-						-		ι
		NOTES	A BLANK HYDROL	0010 3	SOLE CROUP IMPLC	ATES TH	IF SOIL GROUP HA	S HOT F	FEN DETERMINED	

ES A BLANK HYDROLOGIC SOIL COOP INDICATES THE SOIL GROUP HAS NOT BEEN DETERMINED TWO SOIL GROUPS SUCH AS B/C INDICATES THE DRAINED/UNDRAINED SITUATION

#### January 1971

TORNING TORODA TORODA TORPEDC LAKE TORREON TORRES TORRINGTON TORRO TORTUGAS TOTEM TOTEN TOUTEN TOUCHET TOULON TOURN TOURN TOURS TOURS	8 C C C B B C D B B B B B B B B B B B B B	TRUCKTON TRUESDALE TRULU TRUUON TRUMBOUL TRUMBULL TRUMR TRYON TSCHICOMA TUB TUBAC TUCANNON	B C C B B D D C C	ULEN ULUQA ULM ULRICHER ULUPALAKUA ULUPALAKUA ULYSSES UMA UMAPINE	8 8 8 8 8	VASQUEZ VASSAR VASTINE VAUCLUSE VAUGHNSVILLE VAYAS	B C C C O	VOLKE VOLKMAR VOLNEY VOLPERIE VOLTAIRE	C B C D
TORPEDC LAKE TORREON TORRES TORRINGTON TORRO TORTOGAS TOTEM TOUTEN TOUCHET TOUHEY TOUHEY TOURN TOURN TOURN TOURN TOURN	С В В В В В В В С	TRULON TRUMAN TRUMBULL TRUMR TRYON TSCHIEOMA TUB TUBAC	B D D C C	ULRICHER ULUPALAKUA ULYSSES UMA	B B B	VAUCLUSE VAUGHNSVILLE	C C	VOLPERIE	c
TORREON TORRES TORRINGTON TORRO TORTEA TOTEM TOTEM TOUCHET TOUHEY TOUCN TOURN TOURN TOURN TOURS	С В В С D В В В В В В С	TRUMAN TRUMBULL TRUMR TRYON TSCHIEOMA TUB TUBAC	B D D C C	ULUPALAKUA ULYSSES UMA	B	VAUGHNSVILLE	С		
TORRES TORRINGTON TORRO TORTUGAS TOTTEM TOTTEN TOUCHET TOUHEY TOULON TOURN TOURN TOURN TOURS	8 8 0 8 8 8 8 8 8 8 8 8	TRUMBULL TRUMR TRYON TSCHICOMA TUB TUBAC	D D C C	ULYSSES UMA	в			VULIMIKE	
TORRINGTON TORTUGAS TOTEM TOTEM TOUCHET TOUHEY TOUHEY TOURN TOURN TOURN TOURS	8 C D 8 8 8 8 8 6 6	TRUMR TRYON TSCHICOMA TUB TUBAC	D D C C	U#A				VOLUSIA	c
TORTUGAS TOTEM TOTEN TOUCHET TOUHEY TOULON TOURN TOURNOUIST TOURS	D B B B B C	TSCHICOMA TUB TUBAC	с с	LIMADING	A	VEAL	B	VONA	B
TOTEM TOTTEN TOUCHET TOUHEY TOULON TOURN TOURNOUIST TOURS	8 8 8 8 8 6	TUB TUBAC	с		B/C	VEAZIE	В	VORE	в
TÖTTEN TOUCHET TOUHEY TOULON TOURN TOURNOUIST TOURS	8 8 8 8 6	TUBAC		UMIKCA	B D	VEBAR VEBAR	B	VRGCHAN	B
TOUCHET TOUHEY TOULON TOURN TOURN TOURNQUIST TOURS	B B B C		С	UMIL UMNAK	B	VEGA	č	VULCAN VYLACH	C O
TOULON TOURN TOURNQUIST TOURS	B C		č	UMPA	в	VEGA ALTA	č	TTERCT.	0
TOURN TOURNOUIST TOURS	C	TUCKERMAN	D	UNA	D	VEGA BAJA	С	WABANICA	D
TOURNOUIST TOURS		TUCUMC AR I	c	UNADILLA	В	VEKOL	D	WABASH	0
TOURS		TUFFIT TUGHILL	O D	UNAWEEP UNCEMPAGHRE	B C	VELMA	B	WABASHA WABASSA	D B∕D
	B	TUJUNGA	Ă	UNEEDA	B	VENA	в	WABEK	B
	Α	TUKEY	С	UNGERS	8	VENANGO	С	WACA	с
TOWER	D	TUKWILA	D	UNICN	C	VENATOR	D	WACCTA	В
TOWNER	B	TULA TULANA	C C/D	UNIONTOWN UNIONVILLE	B C	VENETA VENEZIA	C D	WACCUSTA WADAMS	C
TOWNLEY Townsbury	C B	TULARE	C/D	UNISCN	č	VENICE	D	WADCELL	B B
TOWNSEND	č	TULAROSA	c	UPSAL	č	VENLC	D	WADDOUPS	6
TOWSON	в	TULIA	в	UPSHUR	C	VENUS	в	WADENA	в
TOXAWAY	D	TULLER	D	UPTON	C.	VERBCORT	D	WADESBORO	В
TOYAH Toyah	D B	TULLOCK	B C	URACCA URBANA	B C	VERDE VERDEL	C D	WAOLEIGH WADMALAW	C O
TOZE	в	TUMBEZ	D	URBC	õ	N.RDELLA	Ď	WADSWORTH	č
TRABUCO	č	TUMEY	D	URICH	D	VERDIGRIS	е	WAGES	B
TRACK	в	TUMITAS	в	URNE	в	VEROUN	0	WAGNER	D
TRACY TRAER	8	TUMWATER	A	URSINE	C	VERGENNES VERHALEN	C	WAGRAM	Α
TRALL	C A	TUNEHEAN TUNICA	D	URTAH URWIL	C D	VERMEJC	C D	WAHA WAHEE	C D
TRAIL CREEK	B	TUNIS	Ď	USAL	8	VERNAL	8	WAHIAWA	в
TRANSYLVANIA	в	TUNKHANNOCK	Α	USPAR	в	VERNALIS	в	WAHIKULI	8
TRARPER	A	TUNNEL	в	USINE	8	VERNON	D	WAHKEENA	в
TRAPRIST	C	TURELO	C D		0	VERONA	c	WAHKIACUS	В
TRASK	с в/с	TUPUKNUK TURBEVILLE	c	UTALINE UTE	B C	VESSER VESTON	с с	WAHLUKE WAHPETON	в С
TRAVESSILLA	D	TURBOTVILLE	č	UTICA	Ă	VETAL	Ă	WARTIGUP	8
TRAVIS	c	TURBYFILL	в	UTLEY	в	VETERAN	в	WAHTUM	B/C
TRAWICK	в	TURIN	в	UTUACO	в	VEYO	D	WAIAHA	C
TRAY TREADWAY	C D	TURK TURKEYSPR INGS	D C	UVACA UVALDE	D C	VIA VIAN	8 8	WAIAKOA	C
TREASURE	6	TURLEY	c	UNALA	в	VIBORAS	D	WAIALEALE WAIALUA	D 8
TREBLOC	D	TURLIN	B	Unich	Ū	VIBORG	8	MAIAWA	ō
TREGO	C	TURNBOW	С	VACHERIE	С	VICKERY	С	WAIHUNA	Ď
TRELONA	D	TURNER	в	VADER	в	VICKSBURG	в	WAIKALCA	в
TREMBLES TREMRE	B A	TURNERVILLE TURNEY	B B	VADC VAIDEN	A 0	VICTOR VICTORIA	A C	WAIKANE	8
TREMPEALEAU	B	TURRET	B	VAILTEN	B	VICTORY	8	WAIKAPU WAIKOMO	B D
TRENARY	8	TURRIA	č	VALCC	č	VICU	č	WAILUKU	8
TRENT	в	TUSCAN	D	VALCEZ	B/C	VIUA	в	WAIPEA	в
TRENTON	D	TUSCARAWAS	ç	VALE	В	VIDRINE	C	WAINEE	e
TREP TRES HERMANOS	B C	TUSCARORA TUSCOLA	С В	VALENCIA VALENT	B	VIENNA VIEQUES	в В	WAINCLA WAIPAHU	A C
TRES HERMANOS	č	TUSCUMBIA	č	VALENTINE	Å	VIEW	č	WAISKA	в
TRETTEN	c	TUSEL	с	VALERA	С	VIGAR	С	WAITS	в
TREVINO	D	TUSKEEGO	c	VALKARIA	B/D	VIGO	0	WAKE	D
TREXLER TRIAMI	C C	TUSLER TUSQUITEE	8 6	VALLAN VALLECITCS	D C	VIKING VIL	D	WAKEEN WAKEFIELD	8 6
TRIASSIC	C .	TUSTIN	в	VALLERS	č	VILAS	Ă	WAKELAND	B/U
TRICON	С	TUSTUMENA	в	VALMENT	č	VILLA GREVE	8	WAKENDA	c
TRIDELL	8	TUTHILL	8	VALMY	в	VILLARS	в	WALCOTT	в
TRIDENT TRIGO	D		8	VALCIS	8	VINA	В	WALGECK	C
TRIMBLE	C B	TUTWILER TUXEDO	6	VANAJC VANANDA	D	VINCENNES VINCENT	C C	WALCO WALCRGN	D D
TRIMMER	B	TUXEKAN	в	VAN BUREN		VINEYARD	č	WALDROUP	õ
TRINCHERA	C	TWILACKS	Α	VANCE	С	VINGC	в	WALES	c
TRINITY	D	TWIN CREEK	8	VANDA	D	VINING	C	WALFCRD	С
TRIPLEN TRIROLI	C C	TWINING TWISP	C B	VANDALIA VANCERDASSON	C O	VINITA Vinland	C C	WALKE	C
TRIPR	8	TWO DOT	č	VANDERGRIFT	č	VINTON	в	WALLACE	8 8
TRITON	c	TYEE	õ	VANDERHCFF	D	VIRA	ć	WALLA WALLA	в
TRIX	8	TYGART	D	VANDERLIR	Α	VIRATON	С	WALLER	B∕D
TROJAN	в	TYLER	D	VAN DUSEN	8	VIRDEN	C	WALLINGTON	С
TRUMMALD TROMP	D 8/C	TYNDALL TYNER	6/C A	VANET VANG	C B	VIRGIL Virgin Reak	8 D	WALLIS WALLKILL	8 C / C
TRONSEN	6	TYRONE	ĉ	VANHORN	в	VIRGIN RIVER	D	WALLMAN	C
TROOK	8	TYSON	č	VAN NESTERN	в	VIRTUE	6	WALLOWA	č
TROPAL	D			VANNEY	в	VISALIA	в	WALLPACK	
TROSI	D	UBAR	C	VANUSS	8	VISTA	C	WALLROCK	8
TROUR TROUT CREEK	A C	UBLY UCOLA	8 C	VANTAGE VAN WAGONER	C D	VIVES VIVI	8 8	WALLSBURG WALLSON	D
TROUTDALE	8	UCCRIA	B	VARCO	c	VLASATY	č	MALLSUN	С В
TROUT LAKE	c	UDEL	D	VARELUM	č	VCCA	č	WALSH	в
TROUT RIVER	A	UDOL PHO	С	VARICK	D	VCDERPAIER	е	WALSHVILLE	D
TROUTVILLE TROXEL	8 6	UFFENS UGAK	D	VAR INA VARNA	ç	VELADORA	8	WALTERS	A
TROY	C	UHLIG	в	VARRE	C B	VOLGA	C D	WALTON WALLM	С В
TRUCE	č	UINTA	8	VARYSBURG	в	VOLIN	в	WALVAN	B
N	INTES	A BLANK HYDRO	LOGIC	SOLL GPOUP INDI	CATES 1		AS NOT	DEEN DETERMINED	

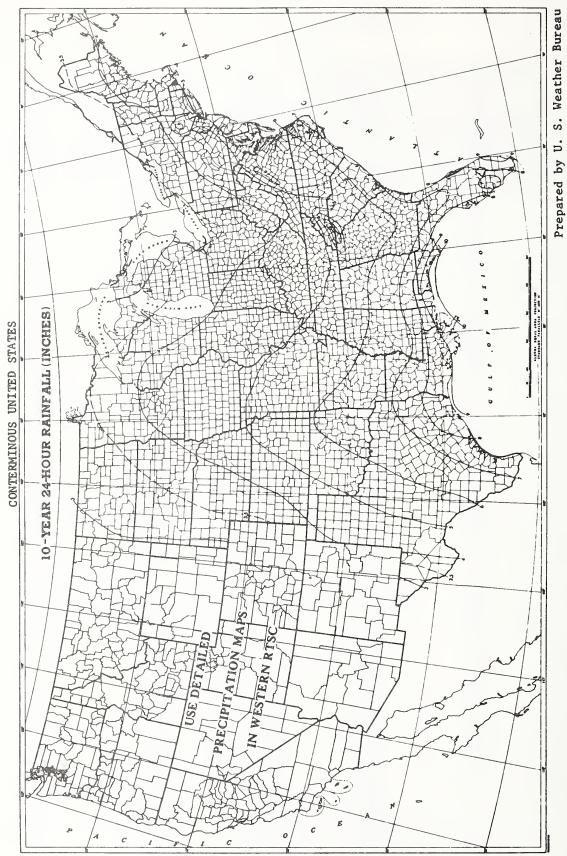
A6MAW	B/C	WEHADKEE	D	WHITNEY	B	WINU	с	YANPA	C
a/va IC	8	WEIKERT WEINER	C/D	WHITDRE WHITSCL	A B	WINZ WIOTA	C	YAMSAY YANA	0 B
WAMPSVILLE WANATAH	8 6	WEINBACH	D C	WHITSCN	D	WISHEYLU	B C	YAQUINA	8/0
WANGLEE	0	WEIR	D	WHITWELL	č	WISKAH	č	YARCLEY	C
WANDO	Ă	WEIRMAN	9	WHCLAN	č	WISNER	D	YATES	õ
WANFTTA	Α	WEISER	C	WIBAUX	D	WITBECK	0	YAWCIM	C
#ANN	Α	WEISHAUPT	С	WICHITA	С	WITCH	0	YAWKEY	с
h ANN	Α	WEISS	A	WICHUP	0	WITHAM	C	YAXON	B
WAPAL	8	WEITCHPEC	в	WICKERSHAM	B C	WITHEE WITT	с с	YEATES HOLLOW YEGEN	C B
WAPATE WAPELLC	C/O B	WELBY WELCH	B C	WICKETT WICKHAM	B	WITZEL	C	YELM	8
WAPINITIA	в	WELD	č	WICKIUP	č	WCDEN	8	YENRAB	A
MAPPING	8	WELOA	č	WICKLIFFE		WODSKOW	8	YECMAN	8
WAPSIC	Ь	WELDON	ĉ	WICKSBURG	8	WCLCCTTSBURG		YETULL	Ā
KAR HA	а	#EL DONA	3	WIDTSOE	С	WOLDALE	C/D	YODER	8
# AR D	υ	WELLER	C	WIEHL	C	WCLF	в	YUKCHL	C
WARDBORD	Α	WELLERHORN	C	WIEN	0	WOLFESEN	C	YOLLABCLLY	D
WARDELL	С В	WELLINGTDN WELLMAN	0 3	WIGGLETCN WILBRAHAM	B C	WDLFCRO WOLF PCINT	B E	YOLC YOLCGO	В 0
AARDEN WARDWELL	c	WELLNER	B	WILBUR	c	WOLFTEVER	č	YCHCNT	в
RARDRELL	8	WELLSBORD	č	WILCO	č	WOLVERINE	Ă	YONCALLA	č
WAREHAY	č	WELLSTCN	e	WILCCX	õ	WCODBINE	8	YONGES	õ
WAFMAN	ũ	WELLSVILLE	Β,	WILCCXSON	C	WCODBRIDGE	č	YONNA	8/0
NARM SPRINGS	С	WEMPLE	8	WILCCAT	D	HOODBURN	с	YORCY	8
<pre>mAPNERS</pre>	A/D	WENAS	87C	WILCER	в	WOODBURY	0	YDRK	С
WARREN		WENATCHEE	С	<b>HILDERNESS</b>	С	WCCDCOCK	8	YORKVILLE	D
WARRENTON	6/0	WENDEL	B/C	WILCROSE	D	WOODENV ILLE	C	YOST	C
WARRIOR WARSAW	в	WENHAM WENDNA	с	WILCWOCC WILEY	0 C	WOCOGLEN WDODHURST	0 A	YOUGA YDUPAN	B C
WARSING	8	WENTWORTH	B	WILKES	c	WOODLY	B	YOUNGSTON	B
WARWICK	Δ.	WERNER	8	MILKESON	č	WOODLYN	č	YOURAME	A
WASATCH	A	WESU	č	WILKINS	ŏ	WOUDMANSIE	ă	YOVIMPA	õ
WASEPI	в	WESSEL	в	WILL	0	WODOMERE	в	YSIDORA	с
WASHBURN		WESTBROOK	D	WILLACY	в	WCDO RIVER	C	<b>YTURBIDE</b>	Α
WASHINGTON	в	WESTBURY	С	WILLAKENZIE	С	WOCOROCK	в	YUBA	0
WASHOE	C	WESTCREEK	8	HILLAMAR	D	WOUGROW	C	YUKGN	0
WASHUUGAL	6	WESTERVILLE	C	WILLAMETTE	B	WOODS CRESS	D	YUNES	D
WASHTENAW	C/F C	WESTFALL WESTFIELD	C	WILLAPA WILLARD	с с	WOODSFIELD WOODSIDE	C A	YUNQUE	С
WASILIA WASIJA	c	WESTFORD		WILLETTE	A/D	WOODSCN	Ď	ZAAR	D
WASSAIC	8	WESTLAND	8/0	WILLHAND	8	WOUDSTOCK	č/0	ZACA	č
ATAB	č	WESTMINSTER	C/C	WILLIAMS	8	WCODSTCWN	c	ZACHARIAS	B
WATAUGA	B,	<b>WESTMORE</b>	в	WILL IAM SBURG	в	WOODWARD	8	ZACHARY	D
<b>WATCHAUG</b>	в	WESTMORELAND	в	WILLIAMSCN	С	WODLMAN	в	ZAFRA	8
WATCHUNG	Э	WESTON	0	WILLIS	C	WOOLPER	С	ZAHILL	B
WAIERBURD		WESTPHALTA	в	WILLITS	B	WOOLSEY	c	ZAHL	8
WATERBURY	D	RESTPLAIN	c	WILLUUGHBY	8	WGCSLEY	8	ZALESKI	C
WATERIND WATERS	C C	WESTPORT WESTVILLE	<b>۵</b>	WILLCW CREEK WILLOWDALE	6 6	WOOSTER WOCSTERN	C B	ZALLA ZAMORA	A B
WATELS	в	WETHERSFIELD	č	WILLOWS	D	WOCTEN	A	ZANE	č
WATKINS RIDGE	8	WETHEY	B/C	WILLWCCD	A	WORCESTER	в	ZANEIS	8
WATOPA	в	WETZEL	0	WILMER	С	WORF	D	ZANESVILLE	c
WATROUS	в	<b>WEANCOLH</b>	в	WILPAR	0	WORK	С	ZANDNE	с
WATSEKA	С	WHALAN	8	WILSCN	D	WCRLAND	B	ZAPATA	С
WATSON	C	WHAR TON	C	WILTSHIRE	C	WORLEY	С	ZAVALA	в
WATSONIA	0	WHATCOM	c	HINANS	B/C	WORMSER	C	ZAVCO	C
WATSONVILLE	D	WHATELY	0	WINCHESTER	Α.	WOROCK	8	268	B C
WATT WATTON	0 C	WHEATLEY WHEATRIDGE	C C	WINCHUCK WINDER	C B/D	WCRSHAM WORTH	D C	ZEESIX ZELL	6
WAUBAY	8	MEATVILLE	B	WINCHILL	8	WDRTHEN	B	ZEN	č
WAUBEEK	6	WHEELER	в	WINDOM	8	WORTHING	Ď	ZENDA	č
WAUBUNSIE	8	WHEELING	В	WING RIVER	8	WORTHINGTON	С	ZENIA	в
WAUCHULA	B/D	WHE ELOCK	С	WINDSOR	Α	WORTMAN	С	ZENIFF	8
WAUCOMA	8	WHEELON	0	WINCTHORST	С	WRENTHAM	С	ZEONA	A
WAUCONDA	8 6	WHELCHEL	В	WINDY	C B	WRIGHT WRIGHTSVILLE	C O	ZIEGLER ZIGWEID	С В
WAUKEE WAUKEGAN	e	WHETSTONE WHIOBEY	B B	WINEG WINEMA	č	WUNJEY	8	ZILLAH	₿/C
WAUKENA	D	WHIPPANY	č	WINETTI	8	WURTSBURD	č	ZIM	0
WAUKON	3	WHIPSTDCK	č	WINFIELD	č	WYALUSING	ō	ZIMMERMAN	Ā
WAUMBEK	в	WHIRLO	Ċ	WING	Ď	WYARO	8	ZING	с
MAUPIKA	D	WHIT	в	WINGATE	8	WYARNG	С	ZINZER	в
WAUSEON	870	<b>WHITAKER</b>	С	WINGER	С	WYATT	С	ZION	C
AVAENTA	870	WHITCO#B	С	WINGVILLE	8/0	WYEAST	C	ZIPP	C/D
WAWAKA	c	WHITE BIRD	c	WINIFRED	C	WYEVILLE	C	ZITA	B C
WAYCUP	8 0	WHITECAP WHITEFISH	0 8	₩INK WINKLEMAN	B C	WYGANT WYKOFF	8 8	ZOAR ZDHNER	6/D
WAYLAND	C/D	WHITEFORD	8	WINKLERAN	0	WYMAN	8	ZOOK	c
WAYNE	8	WHITEHDRSE	8	WINLCCK	č	WYMORE	č	ZORRAVISTA	Ă
WAYNESBORD	в	WHITE HOUSE	С	WINN	С	WYNN	8	ZUFELT	в
WAYSICE		WHITELAKE	8	WINNEBAGC	8	WYNOCSE	D	ZUMBRO	8
WEA	в	WHITELAW	в	WINNEMUCCA	8	WYO	в	ZUMWALT	C
WEAVER	C	WHITEMAN	0	WINNESHIEK	8	WYOCENA	8	ZUNDELL	B
WEBB UEBER	C	WHITEROCK	D	WINNETT	D	YACOLT			B
WEBER WEBSTER	B C	WHITESBURG	C	WINCNA WINUOSKI	0 8	YACOLT	6 6	ZUNI ZURICH	C B
WEOGE	Á	WHITE STORE WHITE SWAN	C C	WINSTON	A	YAHARA Yahola	8	LUNION	0
WEOUWEE	8	WHITEWATER	8	WINTERS	ĉ	YAKIMA	8		
₩EED	c	WHITEWOOD	č	WINTERSBURG	B	YAKUS	ō		
WEEDING	A	WHITLEY	в	WINTERSET	c	YALLANI	в		
WEEDMAPK	8	WHITLOCK	В	WINTHROP	A	YALMER	B		
WEEKSVILLE	B∕ú	WHI TMAN	0	WINTONER	C	YAMHILL	с		
	NOTES	A BLANK HYDRO	LOGIC	SOIL GROUP INDI	CATES T	HE SDIL GROUP HA	S POT	BEEN DETERMINED	

OTES A BLANK HYDROLOGIC SOIL GROUP INDICATES THE SOIL GROUP HAS NOT BEEN DETERMINED TWO SOIL GROUPS SUCH AS B/C INDICATES THE DRAINED/UNDPAINED SITUATION

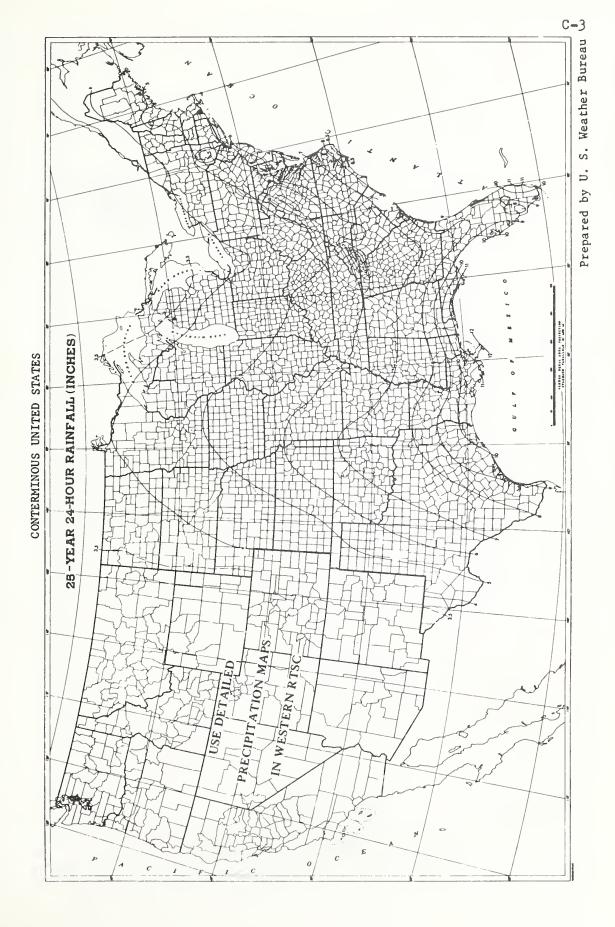
#### APPENDIX C

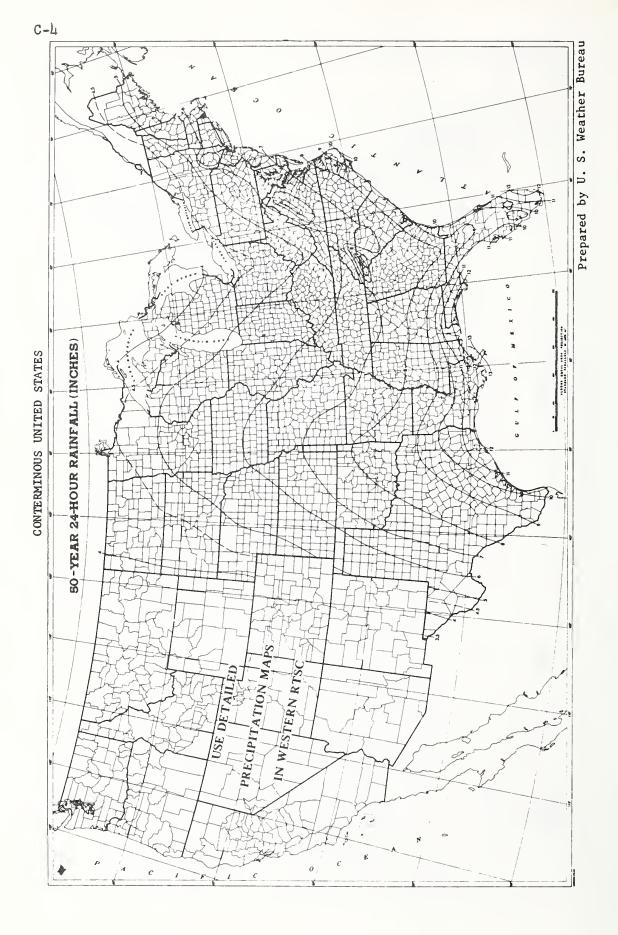
# RAINFALL MAPS OF CONTERMINOUS UNITED STATES FOR 24-HOUR RAINFALL AMOUNTS

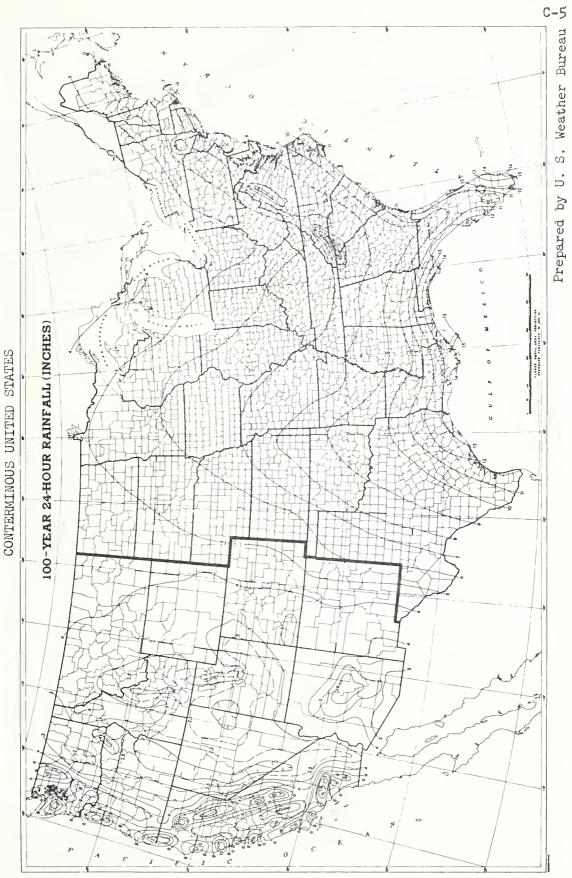
This appendix contains maps of the conterminous United States showing 24-hour rainfall amounts up to 100-year frequency for areas east of  $105^{\circ}$  longitude. For areas west of  $105^{\circ}$  longitude, use the detailed precipitation maps provided for each state. These may be obtained from the West Technical Service Center, SCS, Portland, Oreg.













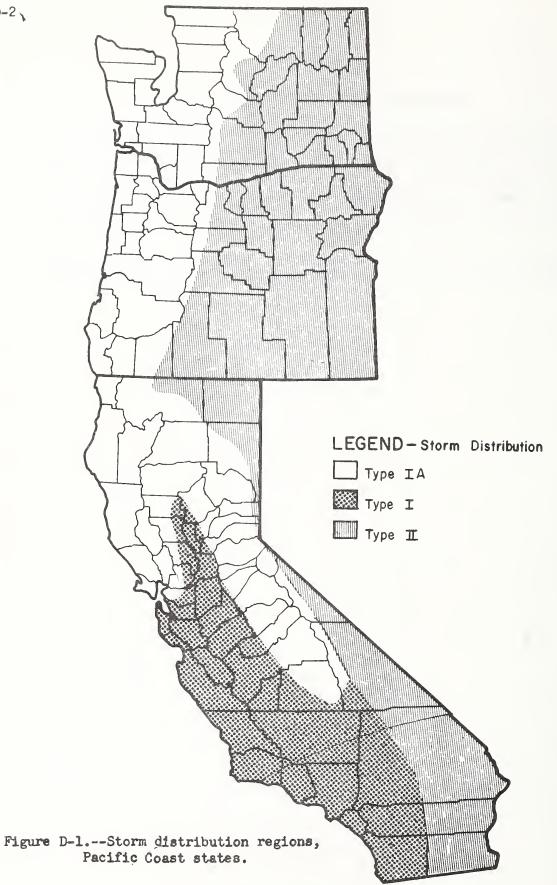
#### APPENDIX D

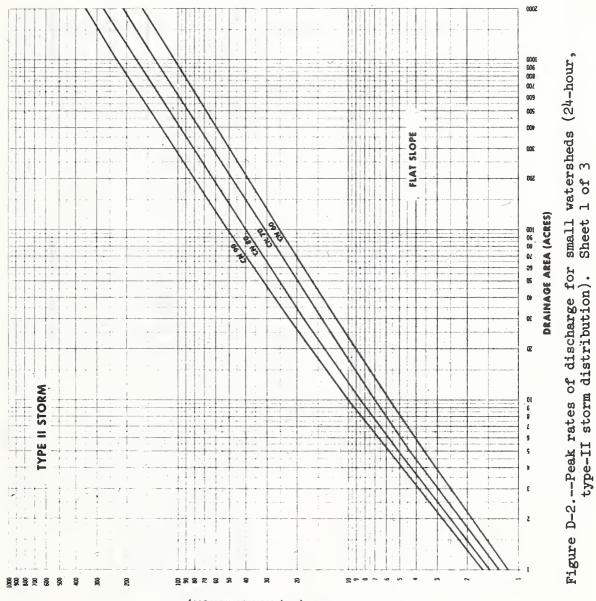
#### PEAK RATES OF DISCHARGE FOR SMALL WATERSHEDS

This appendix contains charts for estimating peak rates of runoff from small watersheds for use with procedures in chapter 4 of this technical release. They provide a basic peak discharge rate for a 24-hour duration storm associated with a watershed in a natural condition. To use these charts to determine peak rates of runoff in urban areas, the peaks must be modified for the amount of urbanization according to factors discussed in chapter 4 and for other factors discussed in appendix E.

Figure D-1 shows the storm distribution regions for the Pacific Coast states. For all other states SCS uses only type-II storm distribution.

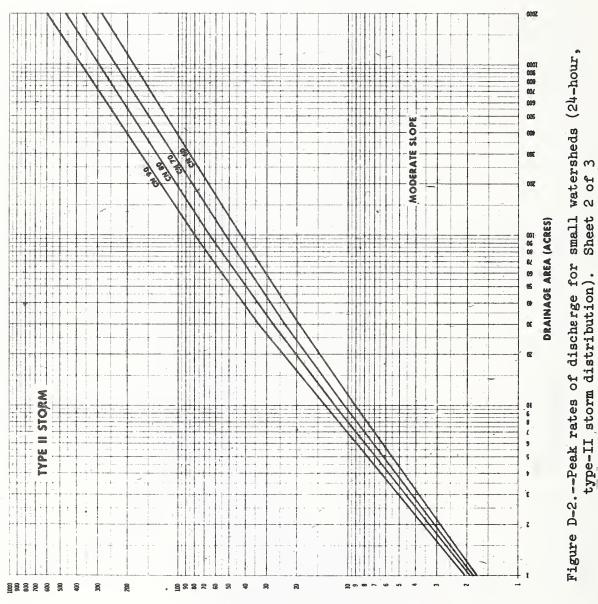
D-2





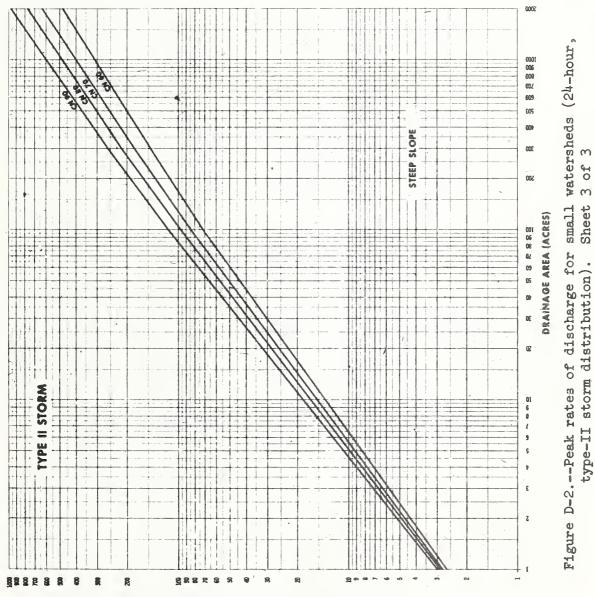
PEAK DISCHARGE (CFS/INCH OF RUNOFF)

D-3



PEAK DISCHARGE (CFS/INCH OF RUNOFF)

D-4



FEAK DISCHARGE (CFS/INCH OF RUNOFF)



#### APPENDIX E

#### ADJUSTMENT FACTORS FOR PEAKS DETERMINED USING CHARTS IN APPENDIX D

#### Introduction

This appendix describes methods for adjusting peak rates of discharge for ranges of flat, moderate, and steep slopes; for conditions where swamps or ponding areas exist; and for conditions where the watershed shape factor (l/w) varies significantly from that used in the development of appendix D charts.

#### Slope Interpolation

Table E-1 provides interpolation factors to be used in determining peak rates of discharge for specific slopes within ranges of flat, moderate, and steep slopes for a range of drainage areas. Appendix D charts for FLAT slope are based on 1-percent slope, for MODERATE slope on 4-percent slope, and for STEEP slope on 16-percent slope. For slopes other than 1, 4, and 16 percent, use the factors shown in table E-1 to modify the peak discharges.

#### Example E-1

Compute the peak discharge for a 1,000-acre watershed with an average watershed slope of 7 percent and a runoff curve number (CN) of 80 for 4 inches of rainfall.

- Determine the peak discharge for a watershed with a moderate slope (4 percent). From appendix D, read a peak discharge of 295 cfs per inch of runoff for 1,000 acres and a CN of 80. From table 2-1, find 2.04 inches of runoff for 4 inches of rainfall and a CN of 80. The peak discharge is then 295 x 2.04 or 602 cfs (cubic feet per second).
- 2. Determine the interpolation factor. From table E-1 find 7-percent slope under MODERATE heading and read an interpolation factor of 1.23 for a drainage area of 1,000 acres. (The peak from a 1,000-acre watershed with a watershed slope of 7 percent is 1.23 times greater than for an average watershed slope of 4 percent.)
- 3. Determine the peak discharge for 7-percent slope.

$$q = (602)(1.23) = 740 \text{ cfs}$$

## Example E-2

Compute the peak discharge for a 15-acre watershed with an average slope of 0.5 percent and a runoff curve number of 80 for 4 inches of rainfall.

1. Determine the peak discharge for a watershed with a flat slope (1 percent). From appendix D read a peak discharge of 11.2 cfs per inch of runoff for 15 acres and a CN of 80. From table 2-1, find 2.04 inches of runoff for 4 inches of rainfall and a CN of 80. The peak discharge is then 11.2 x 2.04 or 23 cfs.

FLAT SLOPES									
Slope (per- cent)	10 acres	20 acres	50 acres	100 acres	200 acres	500 acres	<b>1,</b> 000 acres	2,000 acres	
0.1 0.2 0.3 0.4 0.5 0.7 1.0 1.5 2.0	0.49 .61 .69 .76 .82 .90 1.00 1.13 1.21	0.47 .59 .67 .74 .80 .89 1.00 1.14 1.24	0.44 .56 .65 .72 .78 .88 1.00 1.14 1.26	0.43 .55 .64 .71 .77 .87 1.00 1.15 1.28	0.42 .54 .63 .70 .77 .87 1.00 1.16 1.29	0.41 .53 .62 .69 .76 .87 1.00 1.17 1.30	0.41 .53 .62 .69 .76 .87 1.00 1.17 1.31	0.40 .52 .61 .69 .76 .87 1.00 1.17 1.31	
			MODER	ATE SLOPI	ES				
3 4 5 6 7	.93 1.00 1.04. 1.07 1.09	.92 1.00 1.05 1.10 1.13	.91 1.00 1.07 1.12 1.18	.90 1.00 1.08 1.14 1.21	.90 1.00 1.08 1.15 1.22	.90 1.00 1.08 1.16 1.23	.89 1.00 1.09 1.17 1.23	.89 1.00 1.09 1.17 1.24	
			STE	EP SLOPES	S				
8 9 10 11 12 13 14 15 16 20 25 30 40 50	.92 .94 .96 .97 .97 .97 .98 .99 1.00 1.03 1.06 1.09 1.12 1.17	.88 .90 .92 .94 .95 .97 .98 .99 1.00 1.04 1.08 1.11 1.16 1.21	.84 .86 .88 .91 .93 .95 .97 .99 1.00 1.05 1.12 1.14 1.20 1.25	.81 .84 .90 .92 .94 .96 .98 1.00 1.06 1.14 1.17 1.24 1.29	.80 .83 .86 .89 .91 .94 .96 .98 1.00 1.07 1.15 1.20 1.29 1.34	.78 .82 .85 .88 .90 .93 .96 .98 1.00 1.08 1.16 1.22 1.31 1.37	.78 .81 .84 .87 .90 .93 .95 .98 1.00 1.09 1.17 1.23 1.33 1.40	.77 .81 .84 .87 .90 .92 .95 .98 1.00 1.10 1.19 1.24 1.35 1.43	

Table E-1.--Slope adjustment factors by drainage areas

- 2. Determine the interpolation factor. From table E-1 find 0.5-percent slope under FLAT heading. Read a slope interpolation factor of 0.81 interpolated between the values for 10 acres and 20 acres.
- 3. Determine the peak discharge for 0.5-percent slope.

$$q = (23)(.81) = 19 \text{ cfs}$$

#### Adjustment Factors for Swampy and Ponding Areas

Peak flows determined from appendix D assume that the topography is such that surface flow into ditches, drains, and streams is approximately uniform. On very flat areas and where ponding or swampy areas occur in the watershed, a considerable amount of the surface runoff may be retained in temporary storage. The peak rate of runoff should be reduced to reflect this condition. Tables E-2, E-3, and E-4 provide adjustment factors to determine this reduction based on the ratio of the ponding or swampy area to the total watershed area for a range of storm frequencies.

Table E-2 contains adjustment factors to be used when the ponding or swampy areas are located in the path of flow in the vicinity of the design point. Table E-3 contains adjustment factors to be used when a significant amount of the flow from the total watershed passes through ponding or swampy areas and these areas are spread throughout the watershed. Table E-4 contains adjustment factors to be used when a significant amount of the flow passes through ponding or swampy areas that are located only in the upper reaches of the watershed.

Ratio of drainage area to ponding	Percentage of ponding and		Storm frequency (years)							
and swampy area	swampy area	2	5	10	25	50	100			
500	0.2	0.92	0.94	0.95	0.96	0.97	0.98			
200	.5	.86	.87	.88	.90	.92	.93			
100	1.0	.80	.81	.83	.85	.87	.89			
50	2.0	.74	.75	.76	.79	.82	.86			
40	2.5	.69	.70	.72	.75	.78	.82			
30	3.3	.64	.65	.67	.71	.75	.78			
20	5.0	.59	.61	.63	.67	.71	.75			
15	6.7	.57	.58	.60	.64	.67	.71			
10	10.0	.53	.54	.56	.60	.63	. 68			
5	20.0	.48	.49	.51	.55	.59	. 64			

Table E-2.--Adjustment factors where ponding and swampy areas occur at the design point

Table E-3.--Adjustment factors where ponding and swampy areas are spread throughout the watershed or occur in central parts of the watershed

Ratio of drainage area to ponding	Percentage of ponding and		Stor	m freq	uency	(years)	
and swampy area	swampy area	2	5	1Ò	25	50	100
500	0.2	0.94	0.95	0.96	0.97	0.98	0.99
200	.5	.88	.89	.90	.91	.92	.94
100	1.0	.83	.84	.86	.87	.88	<b>.9</b> 0
50	2.0	.78	.79	.81	.83	.85	.87
40	2.5	.73	.74	.76	.78	.81	.84
30	3.3	.69	.70	.71	.74	.77	.81
20	5.0	.65	.66	.68	.72	.75	.78
15	6.7	.62	.63	.65	.69	.72	.75
10	10.0	.58	.59	.61	.65	.68	.71
5	20.0	.53	.54	.56	.60	.63	.68
4	25.0	.50	.51	.53	.57	.61	.66

Table E-4.--Adjustment factors where ponding and swampy areas are located only in upper reaches of the watershed

Ratio of drainage area to ponding	Storm frequency (years)							
and swampy area	ponding and swampy area	2	5	10	25	50	100	
500	0.2	0.96	0.97	0.98	0.98	0.99	0.99	
200	.5	.93	.94	.94	.95	.96	.97	
100	1.0	.90	.91	.92	.93	.94	.95	
50	2.0	.87	.88	.88	.90	.91	.93	
40	2.5	.85	.85	.86	.88	.89	.91	
30	3.3	.82	.83	.84	.86	.88	.89	
20	5.0	.80	.81	.82	. 84	.86	.88	
15	6.7	.78	.79	.80	.82	.84	.86	
10	10.0	.77	.77	.78	.80	.82	.84	
5	20.0	.74	.75	.76	.78	.80	.82	

These conditions may occur in a proposed or existing urban or suburban area and the adjustment factors from tables E-2, E-3, or E-4 should be applied after the peaks have been adjusted for the effects of urbanization as described in chapter 4.

#### Example E-3

A 5-acre pond is located at the downstream end of a 100-acre watershed in which a housing development is proposed. The average watershed slope is 4 percent and the present-condition curve number is 75. After the installation of the housing development, 30 percent of the watershed will be impervious and 50 percent of the hydraulic length will be modified. The future-condition curve number is estimated to be 80. For a rainfall of 6 inches (100-year frequency event) determine the present-condition and future-condition peak discharges downstream of the pond.

- Determine the present-condition peak discharge assuming the pond is not in place. From appendix D, find the peak discharge to be 59 cfs per inch of runoff. From table 2-1, find the runoff to be 3.28 inches. The peak discharge is then 59 x 3.28 or 194 cfs.
- 2. Determine the ponding adjustment factor. Since the pond is at the lower end of the watershed, use table E-2. The ratio of the drainage area to pond area is 100/5 or 20. For a 100-year frequency event the adjustment factor is 0.75.
- 3. Compute the present-condition peak discharge.

$$q = 0.75(194) = 146$$
 cfs

- 4. Compute the basic future-condition peak discharge. From appendix D, find the peak discharge to be 65 cfs per inch of runoff. From table 2-1, find the runoff to be 3.78 inches. The peak discharge is then 65 x 3.78 or 246 cfs.
- 5. Determine the modification factors for proposed urbanization. From chapter 4 and figures 4-1 and 4-2 for a curve number of 80: impervious factor = 1.16; hydraulic length factor = 1.31; urbanization factor = (1.16)(1.31) = 1.52.
- 6. Compute the future-condition peak discharge.

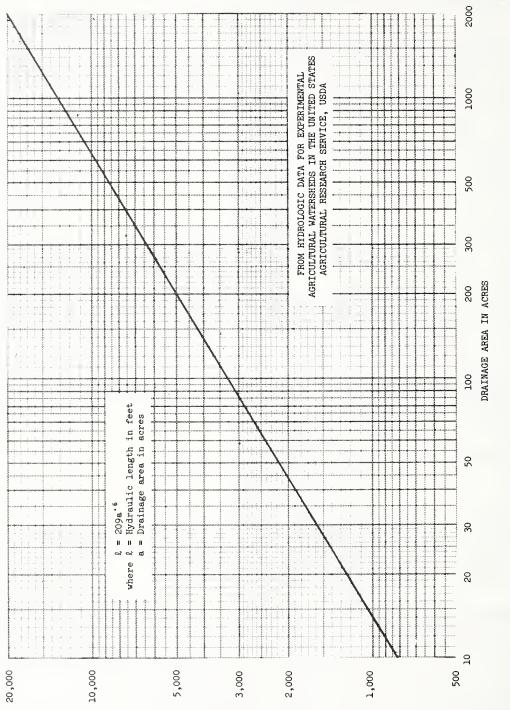
q = 1.52(246) = 374 cfs

7. Compute the future-condition peak below the pond. From step 2 the ponding factor is 0.75.

$$q = 0.75(374) = 280$$
 cfs

#### Adjustment for Watershed Shape Factor

The equation used in computing peak discharges from appendix D was based in part on a relationship between the hydraulic length and the watershed area from Agricultural Research Service's small experimental watersheds. Figure E-1 shows the best fit line relating length to drainage area. The equation of the line is  $\ell = 209a^{0.6}$ . A watershed shape factor,  $\ell/w$ (where w is the average width of the watershed), is then fixed for any given drainage area. For example, for drainage areas of 10, 100, and 1,000 acres the watershed shape factor is 1.58, 2.51, and 3.98, respectively.



LENGTH OF WATERSHED IN FEET

Figure E-1.--Hydraulic length and drainage area relationship.

There are watersheds that deviate considerably from these relationships. The peaks can be modified for other shape factors. The procedure is as follows:

- 1. Determine the hydraulic length of the watershed and compute an "equivalent" drainage area using  $\ell = 209a^{0.6}$  or figure E-1.
- 2. Determine the "equivalent" peak flow from the charts for the "equivalent" drainage area.
- 3. Compute the "actual" peak discharge for the watershed by multiplying the equivalent peak discharge by the ratio of actual drainage area to the equivalent drainage area.

The factors for modifying the peak for urbanization following procedures in chapter 4 can then be applied to the revised peak discharge.

#### Example E-4

From a topographic map the hydraulic length of a 100-acre watershed with moderate slopes and a CN of 75 was measured to be 2,200 feet. Determine the peak discharge for a 6-inch 24-hour rainfall.

- Determine the "equivalent" drainage area for a watershed with a hydraulic length of 2,200 feet. From figure E-1 read 51 acres. (Note that for a 100-acre watershed the hydraulic length would be 3,300 feet from figure E-1.)
- 2. Determine the "equivalent" peak flow from appendix D for a drainage area of 51 acres and a CN of 75. Read 37 cfs per inch of runoff. From table 2-1, find the runoff to be 3.28 inches. The peak discharge is then 37 x 3.28 or 121 cfs.
- 3. Compute the actual peak discharge for 100 acres.

actual = equivalent discharge (<u>actual drainage area</u>) discharge

$$q = 121 \left(\frac{100}{51}\right) = 237 \text{ cfs}$$

The peak discharge for the 100-acre watershed with a hydraulic length of 2,200 feet is 237 cfs (versus 194 cfs for a "normal" 100-acre watershed). Adjustments to this peak discharge for urbanization can be made using factors discussed in chapter 4.

4. The procedure in steps 1, 2, and 3 can be used to determine peak discharges when the actual hydraulic length is longer than that shown on figure E-1. For example, if the actual length were 4,500 feet instead of 3,300 feet, the equivalent area would be 170 acres, as shown in figure E-1.



#### APPENDIX F

#### SAMPLE PEAK DISCHARGE WORKSHEETS

#### Introduction

Peak discharge worksheets have been developed to provide guidance in the use of TR-55 procedures. The worksheets contain examples that illustrate the use of several TR-55 techniques.

#### Procedure: Chapter 4 (appendices D & E)

The primary procedure, using chapter 4 with appendices D and E, is illustrated by an example on page F-3. This procedure uses a fixed watershed shape relation (figure E-1) and a fixed lag curve number (CN) relation (figure 3-3). The peak discharge per inch of runoff is read from one of the charts in Figure D-2 using a watershed slope range, drainage area, and CN. Appendix E and urban adjustments may be applied to the chart value, if appropriate.

One of the adjustments, the watershed shape factor, is applied on the worksheet as a muliplication factor and requires a second reading of the Figure D-2 chart. This is a similar but easier to apply procedure than example E-4 in appendix E.

#### Procedure: Tabular Method (chapter 5)

The Graphical  $(T_c)$  - Peak Discharge Worksheet, page F-5, illustrates the procedure using figure 5-2 with a computed time of concentration  $(T_c)$ . The worksheet example uses the same input as the previous example, but shows a  $T_c$  computed by the Lag-CN method. The comparison of peak discharge at the bottom of page F-5 (1% difference between procedures) is meant to show how these procedures are related when a Lag-CN  $T_c$ is used. If the  $T_c$  is estimated more accurately by some method other than Lag-CN, the Graphical  $(T_c)$  procedure should be used. If you do not wish to calculate a  $T_c$  or information to develop a  $T_c$  is not available, the primary chapter 4 (appendices D and E) procedure is recommended.

(TR Notice 55-A, September 1981)

#### Procedure: Tabular Method (chapter 5)

The Tabular Method, a manual procedure to determine peak discharges for complex watersheds, is contained in Chapter 5. Tables 5-1 and 5-2 are samples of how a worksheet can be set up for this procedure.

#### Use of Worksheets

The slope range (flat, moderate or steep) used in appendices D and E is the average watershed (land) slope. This is not a channel slope. The base slope for each range is given on page E-l and the factors for interpolation when using other than the base slope is in table E-l.

The worksheets in this appendix give guidance as to which adjustments are required and which, when applicable, are recommended for each procedure. However, some of those recommended may be required modifications in some regions. If not used on the worksheet, a factor of 1.0 is used in the multiplication.

Do not use the ponding and swampy adjustment factor for the design point (table E-2) if the approximate routing procedures in chapter 7 (figures 7-1 or 7-2) are to be used at the design point. This will double count the storage.

A present urban condition is used in the worksheet examples to show how the urban adjustments can be used to estimate peak discharges from watersheds with existing urban areas. The references to future curve numbers in relation to figures 3-4, 3-5 and figures 4-1, 4-2, will be removed in the next revision of TR-55.

Blank worksheets, pages F-7 and F-9 are included.

(TR Notice 55-A, September 1981)

URBAN HYDROLOGY FOR SMALL WATERSHEDS (TR-55) PEAK DISCHARGE WORKSHEET FOR CHAPTER 4 (APPENDICES D & E)

Project AN	Y CREEK @ US RT. 242		Ву	HF	R	Date	9/z.	9/81	
НС	WARD COUNTY, SOME STAT	ΓE	Chee	cked [	NYM	Date	9/3	0/81	
	scharge Computations for up to 3 Storn							, .	
1. Data: Wate	ershed Condition = Present				(pi	:esent	or fut	ure).	
Drainage	Area (DA) = $200$ acres.	Ave.	Watershe	ed Slo	pe (S)	=	2	%.	
2. Runoff Curv	ve Number (CN)								
HydrologicLand Use DescriptionSoil GroupInclude Treatment, Practice & Condition(Appendix B)(Table 2-2)				4 <b>% or</b> Are (acres) (4)			Prod (3)x (5	(4)	
С	Cultivated w/o Conservation Tree	tment	88	5	12	0	105	60	
С	Industrial Area		91			0 4		550	
С	Residential - 1/8 Ac		90		18	}	162	520	
С	Paved Parking Areas		98		12	2 117		6	
Alexandria Cardington Soils									
L Soils J									
			Totals	=	20	0	1790	6	
CN (weighted)	$= \frac{\text{total col. (5)}}{\text{total col. (4)}} \begin{bmatrix} 17906 \\ 200 \end{bmatrix}$	"	89.53	;	use Cl	4 =	90	) ,	
	(-)	1st	Storm	2nd	Storm	3rd	Storm	]	
3. Rainfall F		1	Oyr.	25 YR		10	Oyr	yrs.	
Rainfall De	eptn (P)		4.0	5	0	6	.5	inches	
4 Euroff Don	rh (0)			-				]	
4. <u>Runoff Depth</u> (Q) Use P, CN, and Table 2-1.			.92	.92 3.88 5. ×		34	inches		
5. <u>Basic Peak Discharge</u> (q) Use S, DA, CN, and Figure D-2.						cfs/1	inch of (		
For grapl labeled:	h ) X Flat (S = less than 3%)				ĸ		-     		
<ol> <li>Watershed Slope Factor Use S, DA, and Table E-1.</li> </ol>				1.2	29		]		
7. Peak Discha				=	=				
	= Steps $\frac{\#}{2}$ x 5 x 6	3	01	4(	0	55	5	cfs	

<u>Peak Discharge</u>  $(q_p)$ where  $q_p = \text{Steps } \#4 \times 5 \times 6$ 

See Steps 8 to 13 for adjustments that may be applicable.

Q

F-4

TR-55, CHAPTER 4 (APPENDICES D & E), PEAK DISCHARGE WORKSHEET (CONT.)

Steps Peak Discharge Computations with Adjustments

8. Data: Obtain if Adjustments are Applicable Ponding and Swampy areas (PND) =  $\frac{4}{acres}$ ,  $\frac{2}{2}$  % of DA = 60 acres, 30 % of DA Impervious Area (IMP) = 7600 feet Total Hydraulic Length (HL) Hydraulic Length Modified (HLM) = <u>3800</u> feet, <u>50</u> % of HL 1st Storm 2nd Storm 3rd Storm Rainfali Frequency (F) from Step 3 25 YR 100yr 10YR yrs. Peak Discharge (q<sub>n</sub>) from Step 7 400 55/ 301 cfs х Х Х \*9. Ponding and Swampy Area Peak Factor .87 . 81 .83 Use % PND, F, and Tables E-2, 3 or 4. Location in Watershed: (check one) Upper Reaches (E-4) \*10. Watershed Shape Peak Factor Use HL with Figure E-1 and read; Equiv. Drainage Area (EDA) = 400 acres. Use Figure D-2 graph from Step 5, CN, and EDA for; Equiv. Peak/Inch Runoff  $(q_{a}) = 125$  cfs/in. Factor =  $\begin{bmatrix} q_e \\ \hline q \text{ from Step 5} \end{bmatrix} x \begin{bmatrix} DA \\ EDA \end{bmatrix}$ Х Factor =  $\frac{125 \text{ cfs/in}}{80 \text{ cfs/in}} \times \frac{200 \text{ Ac}}{400 \text{ Ac}} =$ 0.78 X \*11. Impervious Area Peak Factor 1.09 Use % IMP, CN and Figure 4-1. х \*12. Hydraulic Length Modified Peak Factor 1.17 Use % HLM, CN and Figure 4-2. 477 330 243 13. Adjusted Peak Discharge (qp) cfs  $q_{p} = q_{p}$  (from Step 7) x Steps #9 x 10 x 11 x 12

\* If the adjustment is not applicable, enter a Factor of 1.0

URBAN HYDROLOGY FOR SMALL WATERSHEDS (TR-55) PEAK DISCHARGE WORKSHEET FOR GRAPHICAL (T\_) METHOD (FIGURE 5-2) Project ANY CREEK @ US R+ 242 By AR Date 9/29/81 HOWARD COUNTY, SOME STATE Checked WHM. Date 9/30/81 Peak Discharge Computation for up to 3 storms: Type <u>II</u>, Duration <u>24</u> hours. Steps 1. Data: Watershed Condition = Present (present or future). Drainage Area (DA) = 200 acres. Ave. Watershed Slope (S) = 2 %. Ponding and Swampy areas (PND) = 4 acres, 2 % of DA = <u>60</u> acres, <u>30</u> % of DA Impervious Area (IMP) Total Hydraulic Length (HL) = 7600 feet Hydraulic Length Modified (HLM) = 3800 feet, 50 % of HL lst Storm 2nd Storm 3rd Storm 2. Rainfall Frequency (F) 25yr 100 YR 10 yr yrs. 3. Rainfall Depth (P) 4.0 5.0 6.5 inches 90 4. Runoff Curve Number (CN) = See other side for computation 5. Runoff Depth (Q) 5.34 2.92 3,88 inches Use P, CN, and Table 2-1. 6. Time of Concentration  $(T_{0}) = 0.94$ hrs See other side for computations Velocity Method (check one) Other х 7. Unit Peak Discharge (q) Use T and Figure 5-2 335 csm/inch of Q Х  $\frac{DA(acres)}{640(ac/sm)} = \frac{200}{640}$ 8. Drainage Area 0.31 sq. miles Х \*9. Ponding and Swampy Area Peak Factor .81 .83 .87 Only use % PND, F and Table E-3; when PND is spreadout in watershed and not related to T flow path. = 10. Peak Discharge Area Factor 246 482 334 where  $q_p = \text{Steps } \#5 \times 7 \times 8 \times 9$ cfs Graphice (Te) Peak comparison 246/243 334/330 482/477 \*If the adjustment is not applicable, (Difference in Methods = 1%) enter a Factor of 1.0.

TR-55 GRAPHICAL (T\_) METHOD, PEAK DISCHARGE WORKSHEET (CONT.)

Steps from other side

4. Runoff Curve Number (CN)

Hydrologic Soil Group (Appendix B)	Land Use Description Include Treatment, Practice & Condition (Table 2-2)	CN (Table 2-2) (3)	<del>% cy</del> Area (acres) (4)	Product (3)x(4) (5)
C	Cultivated w/o Conservation Treatment	88	120	10560
С	Industrial Area	91	50	4550
С	Residential - 1/8 Ac	90	18	1620
С	Paved Parking Areas	98	12	1176
		Totals =	200	17906
CN (weighted) =	$\frac{\text{total col. 5}}{\text{total col. 4}} \begin{bmatrix} 17906 \\ 200 \end{bmatrix} = \frac{89.5}{1000}$	<u>3</u> ;	use CN =	90

5. Time of Concentration (T) Select computation method, (a) is recommended.

(a) <u>Velocity Method</u>

Reach	Description of Flow $\frac{1}{2}$	Length (ft.) (3)	Velocity (ft/sec) (4)	Travel Time (sec.) (3) <del>:</del> (4)
/ Use Figure 3.	l for overland flow portion of travel time	e.	Totals =	

$$T_{c} = \frac{\text{Total Travel Time (sec.)}}{3,600 \text{ (sec./hr.)}} = \boxed{3,600} = \boxed{\text{hrs}}$$

(b) Lag-CN Method

(1) Unadjusted Lag (L) 0.8 hrs. Use HL, S, CN, and Figure 3-3. (7600, 2%, 90) х \*(2) Hydraulic Length Modified Lag Factor Use % HLM, CN, and Figure 3-4. (50%, 90) 0.80 х \*(3) Impervious Area Lag Factor 0.88 Use % IMP, CN, and Figure 3-5. (30%, 90) х (4) Constant ( $T_c = 1.67L$ ) 1.67 == (5) <u>Time of Concentration</u> (T<sub>c</sub>) 0.94 hrs. where  $T_c = (1)x(2)x(3)x(4)$ 

(TR NOTICE 55-A, September 1981)

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## URBAN HYDROLOGY FOR SMALL WATERSHEDS (TR-55) PEAK DISCHARGE WORKSHEET FOR CHAPTER 4 (APPENDICES D & E)

Project		By			Date		
		Chec	ked		Date		
Steps Peak Discharge Computations for up to 3 Storm							
Drainage Area (DA) = acres. A							
2. Runoff Curve Number (CN)		ater she	d broj	je (5)			/0 e
HydrologicLand Use DescriptionSoil GroupInclude Treatment, Practice & Condit(Appendix B)(Table 2-2)	ion	CN (Table (3)	2-2)	% or (acr (4	es)	Prod (3)x (5)	(4)
		Totals	=				
$CN (weighted) = \frac{total col. (5)}{total col. (4)}$	=			use Cl	N =		
3. <u>Rainfall Frequency</u> (F)	1st	Storm	2nd	Storm	3rd S	Storm	yrs.
Rainfall Depth (P)							inches
4. <u>Runoff Depth</u> (Q) Use P, CN, and Table 2-1.				x			inches
5. <u>Basic Peak Discharge</u> (q) Use S, DA, CN, and Figure D-2. For graph labeled: (check one) 5. <u>Basic Peak Discharge</u> Flat (S = less than 3%) Moderate (S = 3% to 7.9%) Steep (S = 8% & greater)				x			nch of (
6. Watershed Slope Factor Use S, DA, and Table E-1.				1			
7. <u>Peak Discharge</u> (q <sub>p</sub> ) where q <sub>p</sub> = Steps #4 x 5 x 6			-		·		cís

See Steps 8 to 13 for adjustments that may be applicable.

(TR NOTICE 55-A, September 1981)

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TR-55, CHAPTER 4 (APPENDICES D & E), PEAK DISCHARGE WORKSHEET (CONT.)

Ste	ps Peak Discharge Computations with Adjustments				
8.	Data: Obtain if Adjustments are Applicable				
	Ponding and Swampy areas (PND) =a Impervious Area (IMP) =a				
	Total Hydraulic Length (HL) =f Hydraulic Length Modified (HLM) =f		% of HI	5	
	Rainfall Frequency (F) from Step 3	lst Storm	2nd Storm	3rd Storm	yrs
	Peak Discharge (q ) from Step 7				cfs
*9.	Ponding and Swampy Area Peak Factor Use % PND, F, and Tables E-2, 3 or 4. Location in Watershed: (check one)		X	X	
*10.	Watershed Shape Peak Factor Use HL with Figure E-1 and read; Equiv. Drainage Area (EDA) =acres.				; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;
	Use Figure D-2 graph from Step 5, CN, and EDA Equiv. Peak/Inch Runoff ( $q_e$ ) = cfs/in. Factor = $\begin{bmatrix} q_e \\ q \text{ from Step 5} \end{bmatrix} \times \begin{bmatrix} DA \\ EDA \end{bmatrix}$	for;	x		
	Factor = x =		×		
*11.	Impervious Area Peak Factor Use % IMP, CN and Figure 4-1.		X	1	
*12.	Hydraulic Length Modified Peak Factor Use % HLM, CN and Figure 4-2.				     
13.	Adjusted Peak Discharge (q <sub>p</sub> )				cfs
	$q_p = q_p$ (from Step 7) x Steps #9 x 10 x 11 x	12			

 $\star$  If the adjustment is not applicable, enter a Factor of 1.0

## URBAN HYDROLOGY FOR SMALL WATERSHEDS (TR-55) PEAK DISCHARGE WORKSHEET FOR GRAPHICAL (T<sub>c</sub>) METHOD (FIGURE 5-2)

Proj	ect	Ву	D	ate	
		Checked	l D.	ate	
Ster	es Peak Discharge Computation for up to 3	storms: Type	e <u>II</u> , Dura	tion <u>24</u> ho	urs.
1,	Data: Watershed Condition =		(pre	sent or futu	re).
	Drainage Area (DA) = acres. Ponding and Swampy areas (PND) = Impervious Area (IMP) = Total Hydraulic Length (HL) = Hydraulic Length Modified (HLM) =	acres, acres, feet	% %	of DA of DA	<u>%</u> .
2.	Rainfall Frequency (F) Rainfall Depth (P)	lst Storm	2nd Storm	3rd Storm	yrs.
4.	Runoff Curve Number (CN) = See other side for computation	[		,	1
5.	Runoff Depth (Q) Use P, CN, and Table 2-1.				inches
6.	Time of Concentration (T) =       hrs.         See other side       Velocity Method         for computations       Lag-CN Method         (check one)       Other		х		             
7.	Unit Peak Discharge (q) Use T <sub>c</sub> and Figure 5-2		X	csm/incl	ı of Q I
8.	$\frac{\text{Drainage Area}}{640 (\text{ac/sm})} = \boxed{640}$		X	sq. mil	   23   1
*9.	Ponding and Swampy Area Peak Factor Only use % PND, F and Table E-3; when PND is spreadout in watershed and not related to T flow path.		=		
10.	$\frac{\text{Peak Discharge Area Factor}}{\text{where } q_p = \text{Steps } \#5 \times 7 \times 8 \times 9}$				cfs

\*If the adjustment is not applicable, enter a Factor of 1.0.

(TR NOTICE 55-A, September 1981)

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TR-55 GRAPHICAL (T\_) METHOD, PEAK DISCHARGE WORKSHEET (CONT.)

Steps from other side

4. Runoff Curve Number (CN)

Hydrologic	Land Use Description	CN	% or Area	Product
Soil Group	Include Treatment, Practice & Condition	(Table 2-2)		(3)x(4)
(Appendix B)	(Table 2-2)	(3)	(4)	(5)
		1		
		l		
		Totals =		
N (weighted) =	total col. 5 total col. 4	;	use CN =	
				line and the second sec
. Time of Con	centration (T <sub>c</sub> ) Select computation metho	od, (a) is re	commended.	
(a) Velocit	v Method			
(4)	<u></u>			
		Length	Velocity	Travel Tim
Reach	Description of Flow $\frac{1}{}$	(ft.)		(sec.)
				(3) - (4)

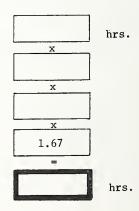
Reach	Description of Flow $\frac{1}{}$	Length (ft.) (3)	Velocity (ft/sec) (4)	Travel Time (sec.) (3) : (4)

 $\frac{1}{Use}$  Figure 3.1 for overland flow portion of travel time.

 $T_{c} = \frac{\text{Total Travel Time (sec.)}}{3,600 \text{ (sec./hr.)}} = \boxed{3,600} = \boxed{3,600}$ 

(b) Lag-CN Method

- (1) Unadjusted Lag (L) Use HL, S, CN, and Figure 3-3.
- \*(2) Hydraulic Length Modified Lag Factor Use % HLM, CN, and Figure 3-4.
- \*(3) Impervious Area Lag Factor Use % IMP, CN, and Figure 3-5.
- (4) Constant ( $T_c = 1.67L$ )
- (5) <u>Time of Concentration</u>  $(T_c)$ where  $T_c = (1)x(2)x(3)x(4)$



Totals =

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P.O. Box 2890 Washington, D.C. 20013

November 12, 1981

ENGINEERING - TECHNICAL RELEASE NOTICE 55-A

SUBJECT: SAMPLE PEAK DISCHARGE WORKSHEETS FOR USE IN URBAN HYDROLOGY

<u>Purpose</u>. To supplement Technical Release 55, "Urban Hydrology for Small Watersheds," with a new appendix F.

Effective Date. Effective when received.

Explanation of changes. The enclosed appendix F supplements TR-55 with worksheets and examples for the computation of peak discharges for small watersheds. The appendix provides additional guidance on the use of the TR-55 techniques to improve accuracy and reproducibility of peak flow estimates.

Filing Instructions. Appendix F should be inserted in TR-55 inside the back cover, after appendix E. The notice may be filed inside the front cover. Page 2 of the table of contents should be updated by a pen & ink change to include appendix F.

Distribution. This notice should be distributed to all SCS offices that have copies of Technical Release 55 (dated January 1975).

Copies will be distributed from the National Office only to Federal agencies at their National Office level. States should make copies of this notice available to other Federal, State and local agencies who may be using Technical Release 55.

Additional copies may be ordered from Central Supply by using the order number: TR55A, or Non-SCS from the National Technical Information Service.

I M. How and

PAUL M. HOWARD Deputy Chief for Technology Development and Application

Enclosure

(TR Notice 55-A, September 1981)

DIST: TR-55A





#### APPENDIX F

## SAMPLE PEAK DISCHARGE WORKSHEETS

#### Introduction

Peak discharge worksheets have been developed to provide guidance in the use of TR-55 procedures. The worksheets contain examples that illustrate the use of several TR-55 techniques.

#### **Procedure:** Chapter 4 (appendices D & E)

The primary procedure, using chapter 4 with appendices D and E, is illustrated by an example on page F-3. This procedure uses a fixed watershed shape relation (figure E-1) and a fixed lag curve number (CN) relation (figure 3-3). The peak discharge per inch of runoff is read from one of the charts in Figure D-2 using a watershed slope range, drainage area, and CN. Appendix E and urban adjustments may be applied to the chart value, if appropriate.

One of the adjustments, the watershed shape factor, is applied on the worksheet as a muliplication factor and requires a second reading of the Figure D-2 chart. This is a similar but easier to apply procedure than example E-4 in appendix E.

### Procedure: Tabular Method (chapter 5)

The Graphical  $(T_c)$  - Peak Discharge Worksheet, page F-5, illustrates the procedure using figure 5-2 with a computed time of concentration  $(T_c)$ . The worksheet example uses the same input as the previous example, but shows a  $T_c$  computed by the Lag-CN method. The comparison of peak discharge at the bottom of page F-5 (1% difference between procedures) is meant to show how these procedures are related when a Lag-CN  $T_c$ is used. If the  $T_c$  is estimated more accurately by some method other than Lag-CN, the Graphical  $(T_c)$  procedure should be used. If you do not wish to calculate a  $T_c$  or information to develop a  $T_c$  is not available, the primary chapter 4 (appendices D and E) procedure is recommended.

(TR Notice 55-A, September 1981)

# Procedure: Tabular Method (chapter 5)

The Tabular Method, a manual procedure to determine peak discharges for complex watersheds, is contained in Chapter 5. Tables 5-1 and 5-2 are samples of how a worksheet can be set up for this procedure.

### Use of Worksheets

The slope range (flat, moderate or steep) used in appendices D and E is the average watershed (land) slope. This is not a channel slope. The base slope for each range is given on page E-1 and the factors for interpolation when using other than the base slope is in table E-1.

The worksheets in this appendix give guidance as to which adjustments are required and which, when applicable, are recommended for each procedure. However, some of those recommended may be required modifications in some regions. If not used on the worksheet, a factor of 1.0 is used in the multiplication.

Do not use the ponding and swampy adjustment factor for the design point (table E-2) if the approximate routing procedures in chapter 7 (figures 7-1 or 7-2) are to be used at the design point. This will double count the storage.

A present urban condition is used in the worksheet examples to show how the urban adjustments can be used to estimate peak discharges from watersheds with existing urban areas. The references to future curve numbers in relation to figures 3-4, 3-5 and figures 4-1, 4-2, will be removed in the next revision of TR-55.

Blank worksheets, pages F-7 and F-9 are included.

(TR Notice 55-A, September 1981)

UREAN HYDROLOGY FOR SMALL WATERSHEDS (TR-55) PEAK DISCHARGE WORKSHEET FOR CHAPTER 4 (APPENDICES D & E)

Projec	t AN	Y CREEK @ US RT. 242		By	HF	R	Date	9/2	9/81
	НС	WARD COUNTY, SOME STATE	-	Cheo	ked _	NYM.	Date	7/3	121
Steps		scharge Computations for up to 3 Storms						,	
1. <u>D</u> a	ita: Wate	ershed Condition = Present				(pi	resent	or fut	ure).
		Area (DA) = $200$ acres. Ave							
		ve Number (CN)							
Soi	rologic 1 Group endix B)	Land Use Description Include Treatment, Practice & Conditio (Table 2-2)	on	CN (Table (3	2-2)	<del>% or</del> (acr (4	es)	Prod (3)x (5	(4)
	С	Cultivated w/o Conservation Treatm	rent	88	)	12	0	105	60
	С	Industrial Area		91		50	3	45	50
	С	Residential - 1/8 Ac		90		18	3	162	20
	С	Paved Parking Areas		98		12		117	6
Alex	andria lington								
L Su	ل ان								
				Totals	-	20	0	1790	)6
CN (we	eighted)	$= \frac{\text{total col. (5)}}{\text{total col. (4)}} \begin{bmatrix} 17906 \\ 200 \end{bmatrix} =$	{	89.53	;	use Cl	N =	9(	>
			lst	Storm	2nd	Storm	3rd	Storm	
		requency (F)	10	OYR.	25	YR	10	Oyr	yrs.
Ra	infall De	2pth (P)		4.0	5	0	6	.5	inches
4 D.									
	noff Dept Use P, Cl	N, and Table 2-1.	2	.92		88 «	5.	34	inches
	the second s	Discharge (q)			80			] cfs/i	i Inch of Q
	For graph labeled:	A, CN, and Figure D-2. a) $X$ Flat (S = less than 3%) b) Moderate (S = 3% to 7.9%)						ן ו נ	
		(S = 8% & greater)		t t	:	к I		i	
		Slope Factor A, and Table E-1.			1.2	2 9			
	ak Discha		2			=			
		= Steps $\#4 \times 5 \times 6$	2	01	40	0	55		cfs

See Steps 8 to 13 for adjustments that may be applicable.

TR-55, CHAPTER 4 (APPENDICES D & E), PEAK DISCHARGE WORKSHEET (CONT.)

Steps Peak Discharge Computations with Adjustments

8.	Data: Obtain if Adjustments are Applicable				
	Ponding and Swampy areas (PND) = $\frac{4}{60}$ and Swampy areas (IMP) = $\frac{60}{60}$ and Swampy areas (IMP) = $\frac{100}{60}$ areas (IMP) = $\frac{100}{60}$ and Swampy areas (IMP) = $\frac{100}{60}$ areas (IMP) = $\frac{100}{60}$ and Swampy areas (IMP) = $\frac{100}{60}$ areas (IMP) = \frac{100}{60} areas (IMP) = $\frac{100}{60}$ areas (IMP) = $\frac{100}{60}$ areas (IMP) = \frac{100}{60}	acres, 2	% of DA		
	Impervious Area (IMP) = 60 a	acres, $30$	D% of DA		
	Total Hydraulic Length (HL) = $7600$	feet			
	Hydraulic Length Modified (HLM) = $3800$	feet, <u>5(</u>	) % of HL		
		1st Storm	2nd Storm	3rd Storm	
	Rainfali Frequency (F) from Step 3	IOYR	25 yr	100yr	yrs.
	Peak Discharge (q ) from Step 7	301	400	55/	cfs
		X	X	X	
*9。	Ponding and Swampy Area Peak Factor Use % PND, F, and Tables E-2, 3 or 4.	. 81	.83	.87	
	Location in Watershed: (check one)				7 F I I I
*10.	Watershed Shape Peak Factor Use HL with Figure E-1 and read; Equiv. Drainage Area (EDA) =400acres				
	Use Figure D-2 graph from Step 5, CN, and EDA Equiv. Peak/Inch Runoff (q <sub>e</sub> ) = <u>125</u> cfs/in.	for;			
	Factor = $\begin{bmatrix} q_e \\ \overline{q \text{ from Step 5}} \end{bmatrix} \times \begin{bmatrix} DA \\ \overline{EDA} \end{bmatrix}$		х		
	$Factor = \begin{bmatrix} 125 cfs/in \\ 80 cfs/in \end{bmatrix} \times \begin{bmatrix} 200 Ac \\ 400 Ac \end{bmatrix} =$		0.78		
			X		
*11.	Impervious Area Peak Factor Use % IMP, CN and Figure 4-1.		1.09		
	····, ····, ········		Х		
*12.	Hydraulic Length Modified Peak Factor Use % HLM, CN and Figure 4-2.		1.17		
	USE & Mari, ON dill Figure 4-2.		=		
13.	Adjusted Peak Discharge (q <sub>p</sub> )	243	330	477	cfs
	$q_p = q_p$ (from Step 7) x Steps #9 x 10 x 11 x	12			

\* If the adjustment is not applicable, enter a Factor of 1.0

(TR NOTICE 55-A, September 1981)

URBAN HYDROLOGY FOR SMALL WATERSHEDS (TR-55) PEAK DISCHARGE WORKSHEET FOR GRAPHICAL (T\_) METHOD (FIGURE 5-2) Project ANY CREEK @ US R+ 242 By AR Date 9/29/81 HOWARD COUNTY, SOME STATE Checked WHM Date 9/30/81 Peak Discharge Computation for up to 3 storms: Type II, Duration 24 hours. Steps 1. Data: Watershed Condition = \_\_\_\_ Present (present or future). Drainage Area (DA) = 200 acres. Ave. Watershed Slope (S) = 2 %. Ponding and Swampy areas (PND) = \_\_\_\_\_\_ acres, \_\_\_\_\_ % of DA = <u>60</u> acres, <u>30</u> % of DA Impervious Area (IMP) = 7600 feet Total Hydraulic Length (HL) Hydraulic Length Modified (HLM) = 38000 feet, 50 % of HL 1st Storm 2nd Storm 3rd Storm 2. Rainfall Frequency (F) 10 YR 25yr 100 YR vrs. 3. Rainfall Depth (P) 4.0 5.0 6.5 inches 90 4. Runoff Curve Number (CN) = See other side for computation Runoff Depth (Q) Use P, CN, and Table 2-1. 2.92 5,34 5. 3.88 inches Time of Concentration (T) = 0.94 See other side for computations (check one) 6. hrs. Х 7. Unit Peak Discharge (q) Use T and Figure 5-2 335 csm/inch of Q х  $\frac{\text{Drainage Area}}{640 (\text{ac/sm})} = \boxed{\frac{2.00}{640}}$ 8. 0.31 sq. miles Х \*9. Ponding and Swampy Area Peak Factor Only use % PND, F and Table E-3; .81 .83 . 87 when PND is spreadout in watershed and not related to T flow path. = 10. Peak Discharge Area Factor 246 334 482 cfs where  $q_p = \text{Steps } \#5 \times 7 \times 8 \times 9$ 246/243 334/330 482/477 (Tc) (Difference in Methods = 1%) Poge F.4 Peak companison \*If the adjustment is not applicable, enter a Factor of 1.0.

TR-55 GRAPHICAL (T<sub>c</sub>) METHOD, PEAK DISCHARGE WORKSHEET (CONT.)

# Steps from other side

## 4. Runoff Curve Number (CN)

Hydrologic Soil Group (Appendix B)	Land Use Description Include Treatment, Practice & Condition (Table 2-2)	CN (Table 2-2) (3)	<del>% or</del> Area (acres) (4)	Product (3)x(4) (5)
С	Cultivated w/o Conservation Treatment	88	120	10560
С	Industrial Area	91	50	4550
С	Residential - Ve Ac	90	18	1620
C	Paved Parking Areas	98	12	1176
		Totals =	200	17906
		2		

 $CN \text{ (weighted)} = \frac{\text{total col. 5}}{\text{total col. 4}} \begin{bmatrix} 17906 \\ 200 \end{bmatrix} = \frac{89.53}{\text{; use CN}} = \frac{17906}{1000}$ 

5. <u>Time of Concentration</u> (T<sub>c</sub>) Select computation method, (a) is recommended.

(a) Velocity Method

Reach	Description of Flow $\frac{1}{}$	Length (ft.) (3)	Velocity (ft/sec) (4)	Travel Iimc (sec.) (3) <del>:</del> (4)	
$\frac{1}{\text{Use}}$ Figure 3.	l for overland flow portion of travel time	е.	Totals =		sec.
	$T_{c} = \frac{\text{Total Travel Time (sec.)}}{3,600 \text{ (sec./hr.)}} = \boxed{3},$	600	-] =		hrs.
(b) Lag-CN	Method				
	djusted Lag (L) Ise HL, S, CN, and Figure 3-3.		0.8	hrs.	
	(7600, 2%, 90) raulic Length Modified Lag Factor		×	]	
	(50%, 90)		0.80 ×	]	
*(3) <u>Imp</u>	ervious Area Lag Factor		0.88	]	
U	<pre>/se % IMP, CN, and Figure 3-5. (30%, 90) stant (T<sub>c</sub> = 1.67L)</pre>		x	1	
(4) Con	$rat (T_c = 1.6/L)$		1.67	]	
	the of Concentration $(T_c)$ where $T_c = (1)x(2)x(3)x(4)$		0,94	hrs.	

(TR NOTICE 55-A, September 1981)

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### URBAN HYDROLOGY FOR SMALL WATERSHEDS (TR-55) PEAK DISCHARGE WORKSHEET FOR CHAPTER 4 (APPENDICES D & E)

Project	Ву	Date	<u>.</u>
	Checked _	Date	
Steps Peak Discharge Computations for up to 3 Storms:	Type,	Duration _	24 hours.
1. Data: Watershed Condition =		(present	or future).
Drainage Area (DA) = acres. Ave	. Watershed Slo	ope (S) =	~
2. Runoff Curve Number (CN)			
Hydrologic Soil Group (Appendix B) Land Use Description Include Treatment, Practice & Condition (Table 2-2)	CN (Table 2-2) (3)	% or Area (acres) (4)	Product (3)x(4) (5)
	Totals =		
$CN (weighted) = \frac{total col. (5)}{total col. (4)} \begin{bmatrix} \\ \end{bmatrix} = -$	;	use CN =	
	st Storm 2nd	Storm 3rd	Storm
3. Rainfall Frequency (F)			yrs.
Rainfall Depth (P)			inches
4. Runoff Depth (Q)			
Use P, CN, and Table 2-1.		x	inches
5. <u>Basic Peak Discharge</u> (q) Use S, DA, CN, and Figure D-2.	1		cfs/inch of
For graph ) labeled: (check one) Flat (S = less than 3%) Moderate (S = 3% to 7.9%) Steep (S = 8% & greater)		x	
*6. Watershed Slope Factor Use S, DA, and Table E-1.			]
7. <u>Peak Discharge</u> $(q_p)$ where $q_p$ = Steps #4 x 5 x 6			cîs

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See Steps 8 to 13 for adjustments that may be applicable.

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	Data: Obtain if Adjustments are Applicable				
	Ponding and Swampy areas (PND) =	acres,	% of DA	A	
	Impervious Area (IMP) =	acres,	% of DA	A	
	Total Hydraulic Length (HL) =				
	Hydraulic Length Modified (HLM) =	feet,	% of H1	L	
		lst Storm	2nd Storm	3rd Storm	]
	Rainfall Frequency (F) from Step 3				] :
	Posk Discharge (s.) from Stor 7		1	1	- ר
	Peak Discharge (q ) from Step 7		ļ	<u> </u>	· اِ
		X	X	X	.; T
•	Ponding and Swampy Area Peak Factor Use % PND, F, and Tables E-2, 3 or 4. Location in Watershed: (check one) Upper Reaches (E-4)				
•	Watershed Shape Peak Factor Use HL with Figure E-1 and read; Equiv. Drainage Area (EDA) =acres	5.			1 
	Use Figure D-2 graph from Step 5, CN, and ED, Equiv. Peak/Inch Runoff $(q_p) = \_$ cfs/in				t L L
			x		i i
	Factor = $\begin{bmatrix} q_e \\ \hline q \text{ from Step 5} \end{bmatrix} x \begin{bmatrix} DA \\ EDA \end{bmatrix}$				
	Factor = $\begin{bmatrix} - & - & - & - \\ - & from & Step & 5 \end{bmatrix} \times \begin{bmatrix} - & - & - & - \\ - & - & - & - \end{bmatrix} =$		i	<u>.</u>	
	Factor = $\begin{bmatrix} \end{bmatrix} \times \begin{bmatrix} \end{bmatrix} =$		x	·	
•			1		and share the state that the state that the
•	Factor = Impervious Area Peak Factor		X		and many and the form the star and and the form and they are

 $\ast$  If the adjustment is not applicable, enter a Factor of 1.0

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# URBAN HYDROLOGY FOR SMALL WATERSHEDS (TR-55) PEAK DISCHARGE WORKSHEET FOR GRAPHICAL (T<sub>c</sub>) METHOD (FIGURE 5-2)

Pro	ject	Ву	D	ate	_
		Checke	d D.	ate	
Ste	ps Peak Discharge Computation for up to 3 Data: Watershed Condition =				
-,					
	Drainage Area (DA) = acres. Ponding and Swampy areas (PND) =				/o •
	Impervious Area (IMP) =				
	Total Hydraulic Length (HL) =				n <u>24</u> hours. at or future). 
	Hydraulic Length Modified (HLM) =		% of HL		yrs. inches
		lst Storm	2nd Storm	3rd Storm	
2.	Rainfall Frequency (F)				yrs.
		[	۰ <u>۰</u>	 	1
3.	Rainfall Depth (P)				inches
4.	Runoff Curve Number (CN) = See other side for computation		,		
5.	Runoff Depth (Q) Use P, CN, and Table 2-1.				inches
6.	Time of Concentration (T) = hrs. See other side for computations Lag-CN Method (check one) 0ther		X		
7.	Unit Peak Discharge (q) Use T and Figure 5-2		1	csm/inch	n of Q
		l l	X		
8.	Drainage Area $\left[\frac{DA(acres)}{640(ac/sm)}\right] = \left[\frac{640}{640}\right]$		X	sq. mila	25
*9.	Ponding and Swampy Area Peak Factor Only use % PND, F and Table E-3; when PND is spreadout in watershed				
	and not related to $T_c$ flow path.	1	=		
10.	Peak Discharge Area Factor where q = Steps #5 x 7 x 8 x 9				cfs

\*If the adjustment is not applicable, enter a Factor of 1.0.

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TR-55 GRAPHICAL (T<sub>c</sub>) METHOD, PEAK DISCHARGE WORKSHEET (CONT.)

### Steps from other side

#### 4. Runoff Curve Number (CN)

Hydrologic Soil Group (Appendix B)	Land Use Description Include Treatment, Practice & Condition (Table 2-2)	CN (Table 2-2) (3)	% or Area (ácres) (4)	Product (3)x(4) (5)
		Totals =		
CN (weighted) =	total col. 5	iotais -	use CN =	

5. <u>Time of Concentration</u>  $(T_c)$  Select computation method, (a) is recommended.

(a) Velocity Method

total col. 4

CN (weighted) =

Reach	Description of Flow $\frac{1}{2}$	Length (ft.) (3)	Velocity (ft/sec) (4)	Travel Time (sec.) (3) <del>:</del> (4)	
./ -/Use Figure 3.	1 for overland flow portion of travel tim	e.	Totals =		sec

 $\pm$ 'Use Figure 3.1 for overland flow portion of travel time.

$$T_{c} = \frac{\text{Total Travel Time (sec.)}}{3,600 \text{ (sec./hr.)}} = \boxed{3,600} = \boxed{\text{hrs.}}$$

use CN =

hrs.

hrs.

х

х

х

1.67 Ħ

ì

(b) Lag-CN Method

- (1) Unadjusted Lag (L) Use HL, S, CN, and Figure 3-3.
- \*(2) Hydraulic Length Modified Lag Factor Use % HLM, CN, and Figure 3-4.
- \*(3) Impervious Area Lag Factor Use % IMP, CN, and Figure 3-5.
- (4) Constant ( $T_{c} = 1.67L$ )
- (5) <u>Time of Concentration</u>  $(T_{c})$ where  $T_{c} = (1)x(2)x(3)x(4)$

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