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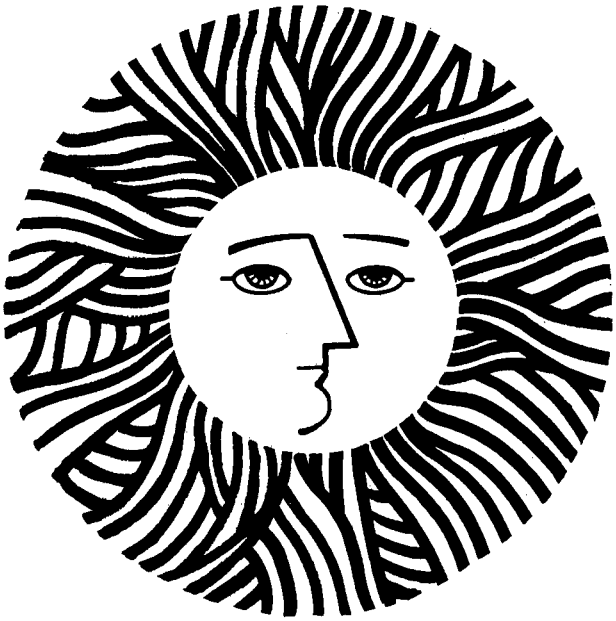

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ASSESSING THE ENERGY OUTPUT AND COST-EFFECTIVENESS

OF

RENEWABLE ENERGY RESOURCE SYSTEMS*

Bart Lucarelli

*This draft is unedited and not for circulation.

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INTRODUCTION

This paper describes methods and the data required to determine the energy output and economic feasibility of renewable energy resource systems. Assessment methods and data collection forms have been presented for 7 energy systems:

(1) Wind electric systems;

(2) Hydroelectric systems;

(3) Anaerobic digestion systems;

(4) Solar water heating and space heating systems;

(5) Passive solar systems

(6) Weatherization/Conservation; and

(7) Geothermal Space and Water Heating systems.

These technologies do not exhaust the realm of possible renewable resource applications. For example, wind and hydro energy can be used to generate mechanical shaft power which can directly power machinery or be converted into heat for space or water heating. Biomass can be converted into alcohol, heat and electricity through a variety of conversion processes. Nevertheless, the technologies and end uses discussed in this paper are those for which published information is most readily available and which are most commonly applied.

The paper has two sections. Section One presents the methods and data forms necessary in evaluating the energy output from specific renewable systems. Section Two presents a method and data collection form for evaluating the cost-effectiveness on a life-cycle basis of a particular energy system. In both sections, I attempted to develop simple estimation approaches that either a generalist or non-technical program administrator can use to evaluate

renewable energy systems. Moreover, I have devised the data forms to include only information that is relevant to the calculations but which all applicants should have before proceeding with their projects. The simplified estimation procedure, proposed in this paper, will result in some reduction in the accuracy of the estimates in comparison with more detailed methods of estimation. However, for purposes of providing a relative ranking of projects by energy output and cost-effectiveness, the methods will provide reasonable, ball-park numbers.

SECTION 1 - Estimating the Energy Output of Renewable Energy Systems

A Wind Electric System

Data form 1 lists most of the information needed to estimate the energy output from wind electric systems. Example 1 illustrates the steps in computing energy output from wind electric systems, using data form 1.

Example 1 - Assume that an applicant submits a proposal to install and operate a small wind electric generator in San Francisco. He fills out Form 1 and supplies the following data:

Monthly Average Wind Speed (data collected at San Francisco Airport at a height of 30 feet, averaged over a 5 year period).

Jan.	8.2 (in mph)	May	14.0	Sept.	12.5
Feb.	8.8	June	15.0	Oct.	10.0
March	11.2	July	14.2	Nov.	7.6
April	12.6	Aug.	13.2	Dec.	8.4

He supplies the following information about the wind electric system:

2a. Manufacturer and Hotel: Merkhom Wind Energy Corp; Model #_____ Hamburg, Pa.

b. Generator: alternator with diodes

c. Rated capacity of generator: 40 kw at 25 mph wind speed

d. Cut-in speed: 10 mph

e. Cut-off speed: 40 mph

f. Tower is 65' in height, is steel constructed and is set in a foundation of reinforced concrete, 11' x 11' x 14' deep.

3. Energy storage system:

11 lead-acid batteries, 12 volt D.C., 500 amp-hours storage capacity

4. Gemini Synchronous Inverter - 8 kw

5. Load:

   a. Total load: 120,000 kwh per year; wiring: #08 copper wire: 200 feet

   b. Monthly load:

Jan.	10,000 kwh	May	10,000 kwh	Sept.	10,000 kwh
Feb.	"	June	"	Oct.	"
March	"	July	"	Nov.	"
April	"	Aug.	"	Dec.	"

Step 1: From the data, one can compute the systems ~~net~~ electricity output by first adjusting the average wind speed data collected at 30' to the tower's 65' height:

(1) $\frac{V}{V_O} = \frac{H^{.4}}{H_O}$ = variation in wind velocity with variation in tower height

where:

V = wind velocity

H = height of tower = 65'

H_O = height wind data taken at = 30'

V_O = wind velocity at height of wind measurements

(The wind velocities are re-expressed below based on a 65' height)

Monthly Average Wind Speed Rate Re-expressed at 65' (in mph)

Jan.	11.2	May	19.0	Sept.	17.0
Feb.	12.0	June	20.4	Oct.	13.6
March	15.2	July	19.3	Nov.	10.3
April	17.1	Aug.	18.0	Dec.	11.4

Step 2: The next step is to convert the average wind speed data into estimates of the electricity delivered (in kwh) from the wind

generator. As a shortcut to what would otherwise be a tedious and complex estimation process, I have included a graph adapted from Leckie et al. (1975) that provides estimates of electricity output per kw of capacity (vertical axis) based on monthly average wind speed (horizontal axis), and assumptions about the wind generator coefficient of performance (see Figure 1). Figure 1 contains two curves, one for a wind system with a rated wind speed of 19 mph and the other for a wind system with a rated wind speed of 25 mph.* For this example, we are evaluating a system with a rated wind speed of 25 mph (see data element 2C). To compute energy output from the wind system, take the average wind speed for each month and match that against the same wind speed on the horizontal axis of Figure 1. Draw a line to the curve that reads 25 mph rated wind speed and read off the vertical axis the amount of electricity delivered in kilowatt hours. Sum these monthly estimates to obtain annual output. The results are expressed in Table 1 per kw of capacity:

Table 1

Electricity Output from Wind Generator, 25 mph rated wind speed, located in S.F. (per kw of capacity)

	Average wind speed (mph)	Electricity Output (kwh/kw)		Average wind (speed (mph)	Electricity Output (kwh/kw)
Jan.	11.2	85	July	19.3	365
Feb.	12.0	110	Aug.	18.0	310
March	15.2	205	Sept.	17.0	275
April	17.1	280	Oct.	13.6	145
May	19.0	355	Nov.	10.3	70
June	20.4	410	Dec.	11.4	90
				TOTAL	2,705 kwh/kw

*Rated wind speed refers to the wind speed at which the generator produces its full output of power.

Step 3: Now that we have monthly energy output per kw of capacity, we can adjust our estimates to account for losses due to:

-- transmission of power from the generator to the load

-- losses in battery storage

-- inverter losses

I suggest the following efficiency and loss factors be used to account for these losses:

-- inverter efficiency

rotary .60

electronic .85

-- battery losses .1

-- transmission losses .05-.1

Transmission or line losses are a function of

-- the distance the electricity is transmitted

-- the type and size of wire used

-- the voltage of the system

Properly designed wiring systems allow for a 4% voltage drop or loss. I have allowed for a higher allowance. You might ask someone with a basic understanding of electricity to eyeball the data supplied on Data Form 1 - Element 4 to determine whether my factors are too high or low for a specific system. Finally, we need to assume a plant use factor which is an estimate of the percentage of the time that the machine is operating. I recommend .8 or the applicant's estimate, whichever is lower.

To complete Example 1, I have reduced the estimate in Table 1 by 45% to account for a 15% inverter loss, a 10% battery loss, and a 10% line loss, and a .8 plant use factor. The final output figures are shown below in Table 2 for the 40 kw machine.

Table 2

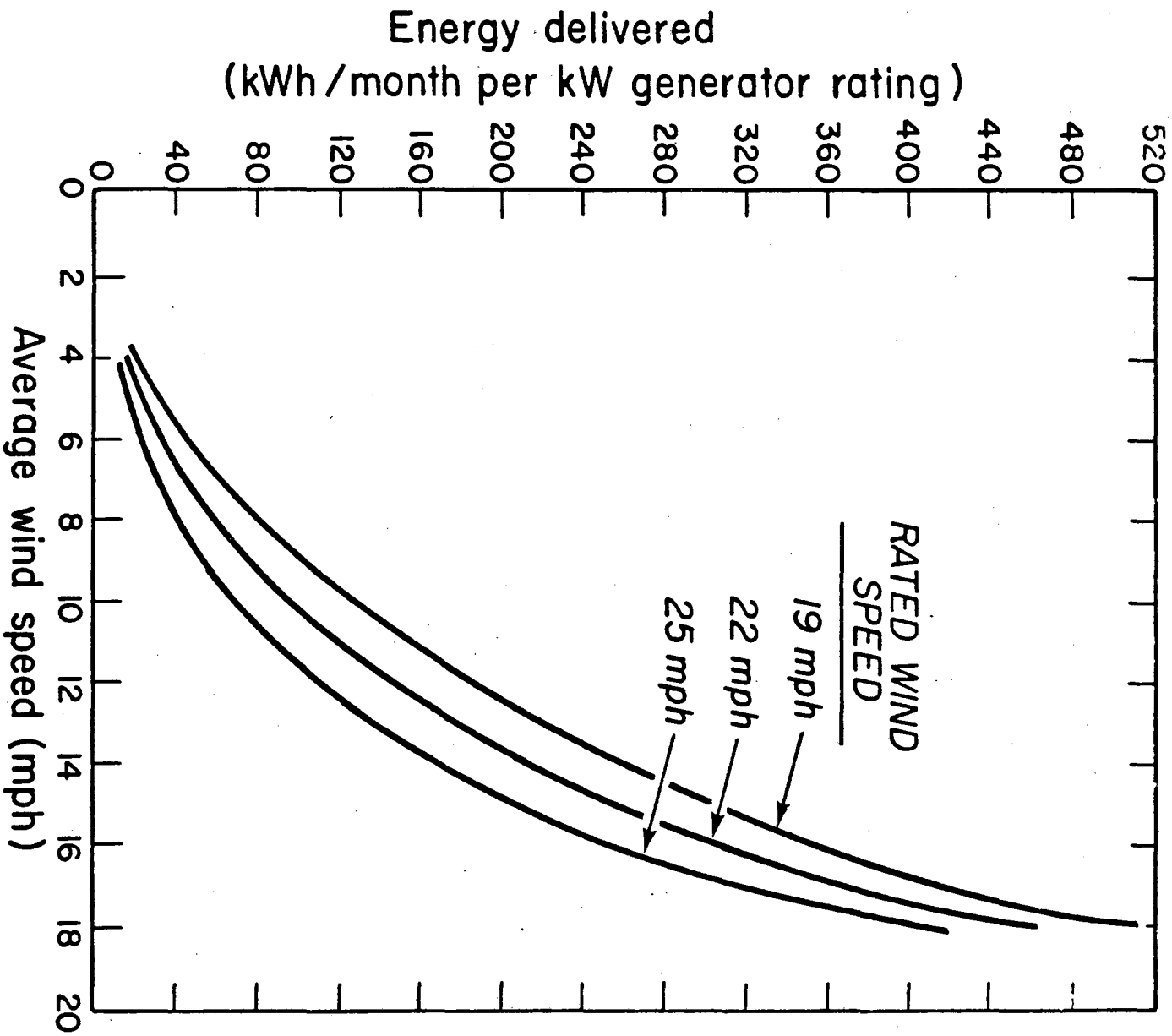
Electricity Output from a 40 kw Wind Generator Located in S.F. (in kwh)

Jan.	1870	July	8030
Feb.	2420	Aug.	6930
March	4510	Sept.	6050
April	6160	Oct.	3190
May	7810	Nov.	1540
Juen	9020	Dec.	1980
		TOTAL	59510 kwh

Comparing this with the load estimates (Data element 5), I find that the full monthly output can be used on site. If the monthly output exceeded the load estimates then I would simply use the monthly load as my estimate of monthly output.

Figure 1

Monthly Energy Delivered per Kilowatt of Installed Capacity for Three Wind Systems



Source: Adapted from Jim Leckie et al., 1978.

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Data Form 1: Wind Electric System

1. Average Wind Speed Data

(Note: please supply monthly wind speed data for the site that the wind machine will be located at or, if not available, data from the nearest airport. Specify the height at which wind speed measurements were taken and year(s) over which the data were compiled.)

(a) Source of wind data:

(b) Height at which wind measurements taken:

(c) Time period wind data collected:

(d) Wind speed data (specify units):

Jan. _____	July _____
Feb. _____	Aug. _____
March _____	Sept. _____
April _____	Oct. _____
May _____	Nov. _____
June _____	Dec. _____

2. Wind Electric System

(a) Manufacturer and Model of Wind Machine:

(If home built system attach detailed description.)

(b) Type of generator: _____Alternator w/diode

_____Other _____DC Generator

(c) Rated capacity of generator: ____kw in _____mph wind

(d) Cut-in speed:

(e) Cut-out speed:

(f) Describe type of tower, its height, and the dimensions and materials used in the foundation:

3. Energy Storage System

   (a) Batteries (give type and number, manufacturer and model #, and storage capacity)

   (b) Other

   (c) Will inverter be used to convert DC to AC? If so, give make, model, and capacity.

4. Load

   (a) Describe end use that electricity will be used for. Supply information on monthly demand in kwh and peak demand.

Jan.	____	May	____	Sept.	____
Feb.	____	June	____	Oct.	____
March	____	July	____	Nov.	____
April	____	Aug.	____	Dec.	____

   (b) How far will the wind generator be located from the load or point of energy use?

   (c) What type of wire is being used? (material and size)

   (d) Will a backup generator be used?

Example 2: Hydroelectric Project:

Assume that an applicant in Northern California proposes a hydroelectric project at a nearby stream. He completes data form 2 and supplies the following data:

(1) Stream flow rate: 750 cu. ft./min. (cfm)

(2) Usable flow (35%): 187.5 cfm

(3) Gross Head: 120 ft.

(4) Piping - Type: PVC Class 160 PSI, 6" diameter. Length: 100 ft.

(5) Turbine or wheel used: gear box attached to generator.

To compute theoretical power output (P_{th}), use the following formula:

$$P_{th} = \frac{62.4\ Q\ x(h_g - h_L)\ X'\ .745}{33{,}000} = 31.3\ kw$$

Q = usable flow in cfm - 187.5 cfm.

h_g = gross head = 120.0 feet

h_L = head losses due to friction based on piping used (see nomograph 1) = 1.5 feet head loss

.745 = factor to convert horsepower to kilowatts

33,000 = factor to convert ft. lbs./min to horsepower

62.4 = density of water in lbs/cu.ft.

To compute net power output, the P_{th} must be adjusted for the efficiencies of the turbine and the power drive system. The following conversion efficiencies are recommended:

Prime Mover	Efficiency	Range
Water wheel - undershot	35%	25-45%
breast	50%	35-65
poncelet	50%	40-60
overshot	65%	60-75
Turbine - reaction	80%	80%
impluse	80%	80-85
cross-flow	70%	60-80
Power drives		
belt drive	95%/belt	95-97%
gear boxes	95%	95%
Alternator and Generator	80%	--

For this example, net power output is:

(3) P = 31.3 kW x .8 (turbine efficiency) x .95 (gear box efficiency) x .8 alternator ≈ 19.0 kW

Concerning the load served by the system, the grantee supplied the following data:

Jan.	5,000	May	5,000	Sept.	5,000
Feb.	5,000	June	"	Oct.	"
March	"	July	"	Nov.	"
April	"	Aug.	"	Dec.	"

Wiring is #80 copper wire for a length of 200 feet. Estimate a 10% line loss.

Furthermore, ~~we learn~~ that the load is generated for eight hours each day. From these data we can compute net energy output from the system:

4 Annual Energy Output = P x hours of demand/month x 12 months x .1 line loss = 49,250 kwh/year.

$A = P \times D_{hm} \times 12 \times e$

A = annual energy output in kWh; P = net power output of system; 12 = months; D_{hm} = hours of demand/month; e = line losses = .1

Data Form 2: Hydroelectric System

1. Stream Flow Rate:

2. Usable Flow (25%):
(NOTE: Discuss method used to compute flow rate and usable flow.)

3. Gross head (in feet):
(Describe how measured)

4. Piping - Type: Length:

5. Prime mover (type of turbine)

6. Power drive:

7. Generator type:

8. Load (give monthly data on load served in kwh. Will any power be sold back to utility?)

Jan.	____	May	____	Sept.	____
Feb.	____	June	____	Oct.	____
March	____	July	____	Nov.	____
April	____	Aug.	____	Dec.	____

9. Wiring - Type:_____ Length:_____

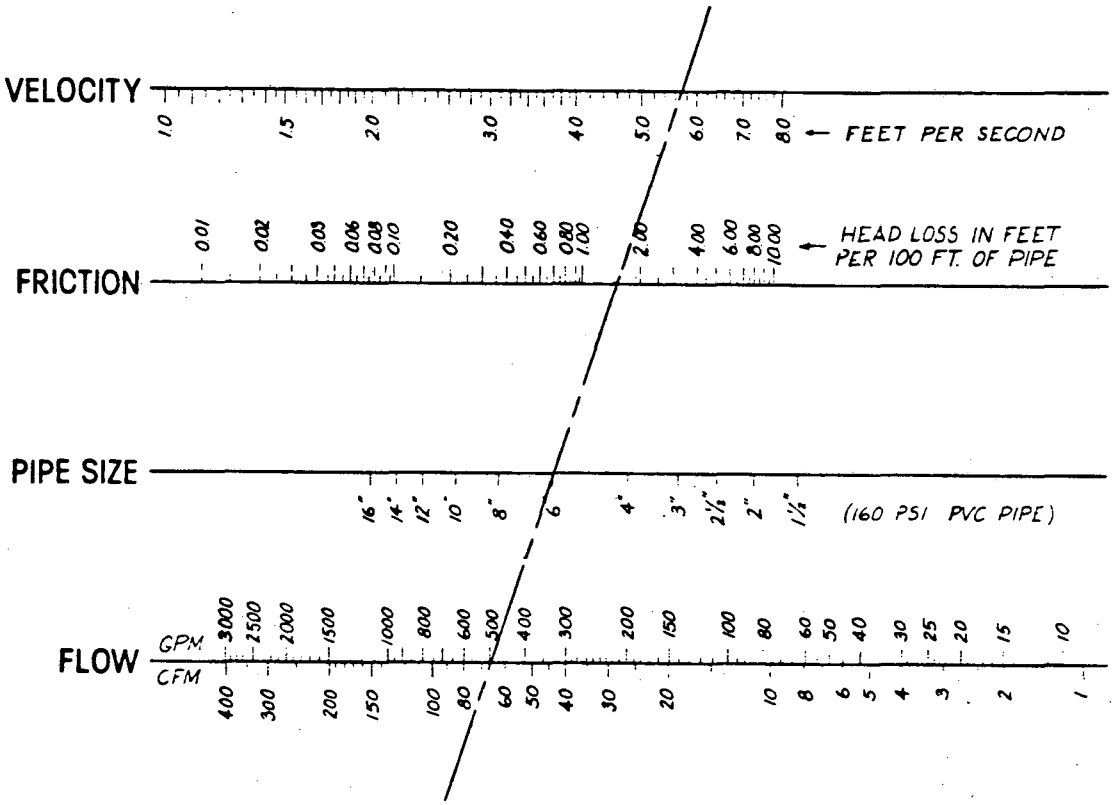
10. Energy Storage (if any):

Batteries:

Pumped Storage:

Figure 2

Nomograph to Determine Losses Due to Friction in PVC Pipe



Adapted from: Independent Power Developers' brochure "Hydroelectric Power".

Sample calculation to illustrate use of nomograph:

Suppose you have a water flow rate of 500 gallons per minute through a 6-inch diameter PVC pipe. To determine the head loss due to friction, locate the flow rate value, 500 gpm, on the FLOW line, and the pipe diameter, 6 inches, on the PIPE SIZE line. Using a straight edge, draw a straight line through these two points and continue it to cut the FRICTION line. The FRICTION line is cut at a value of 1.50, which means that for the pipe size and flow rate given, there is a head loss due to friction of about 1.50 feet for each 100 feet of pipe length used in your system. An extension of this same straight line to intersect the VELOCITY line indicates that the water is flowing through the pipe at about 5.8 feet per second.

Source: Ron Alward, Sherry Eisenbart and John Volkman, Micro-Hydropower: Reviewing an Old Concept (Butte, Montana: National Center for Appropriate Technology), January 1979.

Example 3: Anaerobic Digestion System:

To compute energy output from anaerobic digesters, I have once again used a short-cut approach developed by Leckie et al. (1975). Based on laboratory tests and field measurements, they have compiled data on:

(1) The daily output of manure from different animals

(2) The composition of manure and other organic materials in terms of % of total solids and volatile solids

(3) The amount of gas that will be produced from these materials when digested (expressed as cu. ft. of biogas per lb. total solids).

The data are summarized in Tables 4, 5, and 6. The following example will illustrate their use with Data Form 3. Assume that a small farmer proposes to construct a digester at his farm. He completes Form 3 and supplies the following information:

(1) Feedstock source: 260 pigs

(2) Moisture Content of Slurry: 92%

(3) Slurry input: 585 gal/day (5075 lbs/day or 78 cu. ft.)

(4) Digester Operating Temperature: 95° F.

(5) Digester Capacity: 11,700 gallons

(6) Retention Time: 20 days

(7) (a) Use of methane: water heating

(b) N.A.

(8) (a) Digester cap.

Gas output from the digester can be easily estimated by referring to Tables 4 and 5. Table 4 tells you that manure output from swine equals 1.8 lbs. of solids per animal per day (11.5 x .13), while Table 6 reveals that for each lb. of pig manure solids added to the digester, 7 cu. ft. of biogas with a mathane content of 60% will be produced. With 260 pigs, daily gas output will equal 1820 cu. ft. of biogass daily having a Btu content of 1.1 million Btu (1820 cu ft. x 600 Btu/cu. ft.). Assuming that the digester operates 80% of the time and is out of operation the remainder of the time, I estimate annual energy output at 320 million Btu/year.

This estimation procedure assumes that the raw materials are retained for a sufficient length of time to allow conversion to methane. Thus, additional computations are required to determine whether an adequate retention time has been allowed to digest the materials and whether the digester is of sufficient capacity to retain the daily slurry input for the stated retention period. These design features can be checked by first computing the minimum solids retention time (SRT_m) for the material by the following equation:

$$\frac{1}{SRT_m} = \left[a \times f \times \left(1 - \left(\frac{K_c}{K_c + COD} \right)^{\frac{1}{2}} \right) - b \right]$$

Where:

a = constant showing how many bacteria produced per amount of COD = .04

b = constant showing how fast bacteria die = .15

f = factor for COD use by bacteria (temperature dependent)

K_c = minimum amount of COD required before bacteria can start multiplying (temperature dependent)

Both f and k_c are temperature dependent and can be obtained from Table 3 .

Table 3

Values for f and k_c at different temperatures

Temperature	f	k_c
59° F	3.37	18,500
68° F	3.97	10,400
77° F	4.73	6,450
86° F	5.60	3,800
95° F	6.67	2,235

Since the digester will operate at 95° F, select 6.67 for f and 2,235 for k_c.

COD, or chemical oxygen demand, is the amount of oxygen required to oxidize or destroy the organic compounds in the raw material by chemical means. COD can be computed from:

COD = 12,000 ppm - cu. ft./lb x VS con

where 12,000 ppm = a constant need to express COD in parts per million

$$\text{VS con} = \frac{\text{VS total}}{\text{VSL}} = \frac{\text{(total weight of volatile solids)}}{\text{(volume of slurry in cu. ft.)}}$$

$$\text{COD} = 12{,}000 \text{ ppm cu. ft./lb} \times \frac{345 \text{ lbs.}}{78 \text{ cu. ft.}} = 53{,}077 \text{ ppm}$$

where 345 lbs. = daily slurry input in lbs. [(5075 lbs.) x solids content of slurry (8%) x volatile solids content as % of total solids (.85)] (See Table 4 and page 20 data element 3.)

78 cu. ft. = daily slurry input

Returning to the equation, we find that:

$$\frac{1}{SRT_m} = \left[.04 \times 6.67 \times \left[1 - \left(\frac{2{,}235}{2{,}235 + 53{,}077} \right)^{\frac{1}{2}} \right] - .15 \right]$$

SRT = 5 days

Typically, a safety factor of 3 or 4 is used to account for fluctuations in temperature and ph that may upset the digestion process. In this example, the 20 day retention time appears reasonable.

The size of the digester required to hold 20 days of the daily slurry input is 585 gal/day x 20 days or a 11,700 gallon digester capacity, which is the size the applicant is proposing for this project. These secondary calculations give one confidence in the estimates of gas output. I recommend that a safety factor of 4 be used to estimate the retention time (RT) for the digester contents. If the RT is less than 4 times SRT_m, I recommend that gas output be scaled down proportionally.

Table 4

Manure Output From Different Animals
(lbs. per animal day)

	Total Wet Manure	% Total Solids	Volatile Solids	$\frac{1}{SRT_m}$
Bovine (1000 lbs.)	72 lbs	14%	80%	
Horses (850 lbs.)	44	16	80	
Swine (160 lbs.)	11.5	13	85	
Sheep (67 lbs.)	4.5	11	80	
Humans (150 lbs.)	2.7	10	78	
Poultry:				
Geese, Turkeys (25 lbs.)	.5	35	65	--
Ducks (6 lbs.)	.5	35	65	--
Layer Chickens (3.5 lbs.)	.3	35	65	--

78 cu. ft.
Returning to the
$\frac{1}{SRT_m} = .04 \times 6.6$

Table 5

Total Solids, Volatile Solids and Carbon Nitrogen Ratio of Organic Materials

	% of Total Solids (TS)	Volatile Solids (% of TS)	C/N Ratio
Green Garbage	99.0	77.8	18
Kraft Paper	94.0	99.6	--
Newspaper	93.0	97.1	813
Garden Debris	75.2	87.0	--
White Fir	90.7	99.5	767
Average Refuse	92.7	63.6	45

Table 6

Biogas Production* as a Function of Total Solids
(per lb. of total solids added)

	Biogas (ft^3)	Range	Methane Content	C/N Ratio
Pig Manure	7.0	6.0 - 8.0	65%	
Cow Manure	3.9	3.1 - 4.7	60%	18:1
Chicken Manure	9.6	6.0 - 13.2	60	7:1
Conventional Sewage	7.5	6.0 - 9.0	60%	7:1
Newspapers and Sewage sludge 10:90 proportion	7.9	---	67%	30:1
White fir and Sewage slude 10-90 proportion	7.4	---	70%	30:1

*Methane content will vary with C/N ratio.

Data Form 3: Anareobic Digestion System

1. Feedstock source (given amount and type of feedstock or units of generating source) Example: 300 cows, averaging 500 lbs. each.

2. Moisture content of slurry:

3. Slurry input:

4. Digestion operating temperature:

5. Digester capacity:

6. Retention time:

7. (a) Use of the methane:

   (b) If methane used to produce electricity, provide the following data:

      (1) Monthly load:

      (2) Size and type of generator:

      (3) Wiring system: Type _____ Length of Wire _____

8. Gas handling and storage (describe system):

Active Solar Systems for Space and Water Heating: To compute energy savings from an active solar system, I suggest that F-Chart Level 3 be used. F-Chart is an inter-active computer program that was developed by the University of Wisconsin Solar Energy Laboratory as a tool in the design of solar systems. The F-Chart program computes water heating loads, space heating loads, and, based upon various inputs about the system, the fraction of the heating load that can be met by the specified solar system.

Once executed, the program provides the user with a list of questions to answer which, in effect, guide the user through the program. On the following page, you will find a data form listing the inputs to the F-Chart program. A copy of the data form should be sent to each applicant. However, not all of this information need be supplied by the applicant. For space heating systems, only question # 1, 4, 8, 9, 10, 11, 12, and 17 require applicant response. For solar water heating projects, question # 1, 4, 8, 9, 10, 11, 14 and 17 should be completed by the applicant. On questions 18 and 19 you should answer Yes and No respectively. Once you obtain the necessary data, you can contact two firms in the East Bay that provide F-Chart runs for a small fee. They are:

The Owner Builder Center in Berkeley (848-5950) and Interactive Resources at Point Richmond (236-7435; ask for Carl Bovill). In the remainder of this section I have provided a summary of low F-Chart calculates space and water heating loads and the fraction of these loads met by solar energy. The section conclude with a sample print-out of an F-Chart run.

Data Collection Form - 4

F-Chart Version 3.0 Worksheet - Sl Units

1	Air SH+WH=1, LIQ SH+WH=2,AIR OR LIO WH ONLY = 3	------	$Btu/h-^{o}F-ft^{2}$
2	IF 1,WHAT IS (FLOW RATE/COL.AREA)(SPEC.HEAT)?	------	
3	IF 2,WHAT IS (EPSILON)(CMIN)/(UA)?	------	
4	COLLECTOR AREA	------	ft^{2}
5	FRPRIME-TAU-ALPHA PRODUCTI(NORMAL INCIDENCE)	------	
6	FRPRIME-UL PRODUCT.	------	$Btu/h-^{o}F-ft^{2}$
7	INCIDENCE ANGLE MODIFIER (ZERO IF NOT AVAIL.)	------	
8	NUMBER OF TRANSPARENT COVERS	------	
9	COLLECTOR SLOPE	------	DEGREES
10	AZIMUTH ANGLE (E.G. SOUTH=O, WEST=90)	------	DEGREES
11	STORAGE CAPACITY	------	$Btu/^{o}F-ft^{2}$
12	EFFECTIVE BUILDING UA	------	$Btu/^{o}F-day$
13	CONSTANT DAILY BLDG HEAT GENERATION	------	Btu/day
14	HOT WATER USAGE	------	Gal.
15	WATER SET TEMP.(TO VARY BY MONTH,INPUT NEG.#	------	^{o}F
16	WATER MAIN TEMP(TO VARY BY MONTH,INPUT NEG.#	------	^{o}F
17	CITY CALL NUMBER	------	
18	THERMAL PRINT OUT BY MONTH=1, BY YEAR=2	------	1
19	ECONOMIC ANALYSIS ? YES=1, NO=2	------	2

Calculation of Space Heating Loads

The F-Chart program allows the user to calculate space heating loads in two different ways. The user can input monthly heating loads directly or can opt to use the degree-day method for calculating monthly heating loads. For most purposes the degree-day method will suffice.

The degree-day method for calculating space heating loads is based upon the effective building UA, or daily heat loss coefficient, and the number of degree-days in the month. A heating degree-day is defined as a day during which the average temperature is one degree less than 65° F. F-Chart has degree-day data for 266 locations and will allow the user to input his or her own data.

For the degree-day method the monthly heating load is assumed to be equal to the product of the building UA and the number of degree-days in the month. The building UA is calculated on the basis of the building design.

Calculation of Water Heating Loads

The F-Chart program accepts as input the number of gallons of hot water which are used per day and the input and output temperatures of the water. The daily hot water load is then calculated by the formula:

$$L_w = \frac{8.34 \text{ Btu/(Gal. - }^{\circ}\text{F)}}{\text{(Gals/day) x } T_{^{\circ}\text{F.}}}$$

The F-Chart Method

The fraction of the space and water heating loads which can be met by the solar system is calculated by the F-Chart program using the F-Chart method, which is an empirical method for determining the fraction of a heating load that can be met by a specified solar system in a specified location. This method has demonstrated a close agreement with detailed simulations of solar heating systems.

The F-Chart computer program accepts as input the size of the solar system, monthly insolation data, the type of system (air or liquid), and parameters which describe the efficiency curve of the collector and heat exchanger (if any).

The parameters for the efficiency curve can be obtained from product literature when available or from performance efficiency curves of generic solar systems. (Figure 3 represents a typical performance curve for a solar collector. The F-Chart program uses two parameters of the efficiency curve: the y intercept ($F_r [\tau\alpha]_n$) and the negative slope ($F_r U_l$) of a plot of efficiency versus the input temperature minus the ambient temperature divided by the total incident solar radiation (Fig. 3). These two values have complex definitions based upon characteristics of the specific solar collector. Suffice to say that these two parameters provide the necessary information for computing the efficiency of the collector system.)

The two input parameters from the performance curve must be modified if a heat exchanger is included in the system to reflect the efficiency of the heat exchanger. This is a simple correction factor which can be calculated using the formula given in ~~Solar Heating Design by the F-Chart Method~~. Rather than have the applicant or you estimate the values, the program contains default value for generic systems that are reasonable estimates of collector efficiency. I suggest that there default value be used.

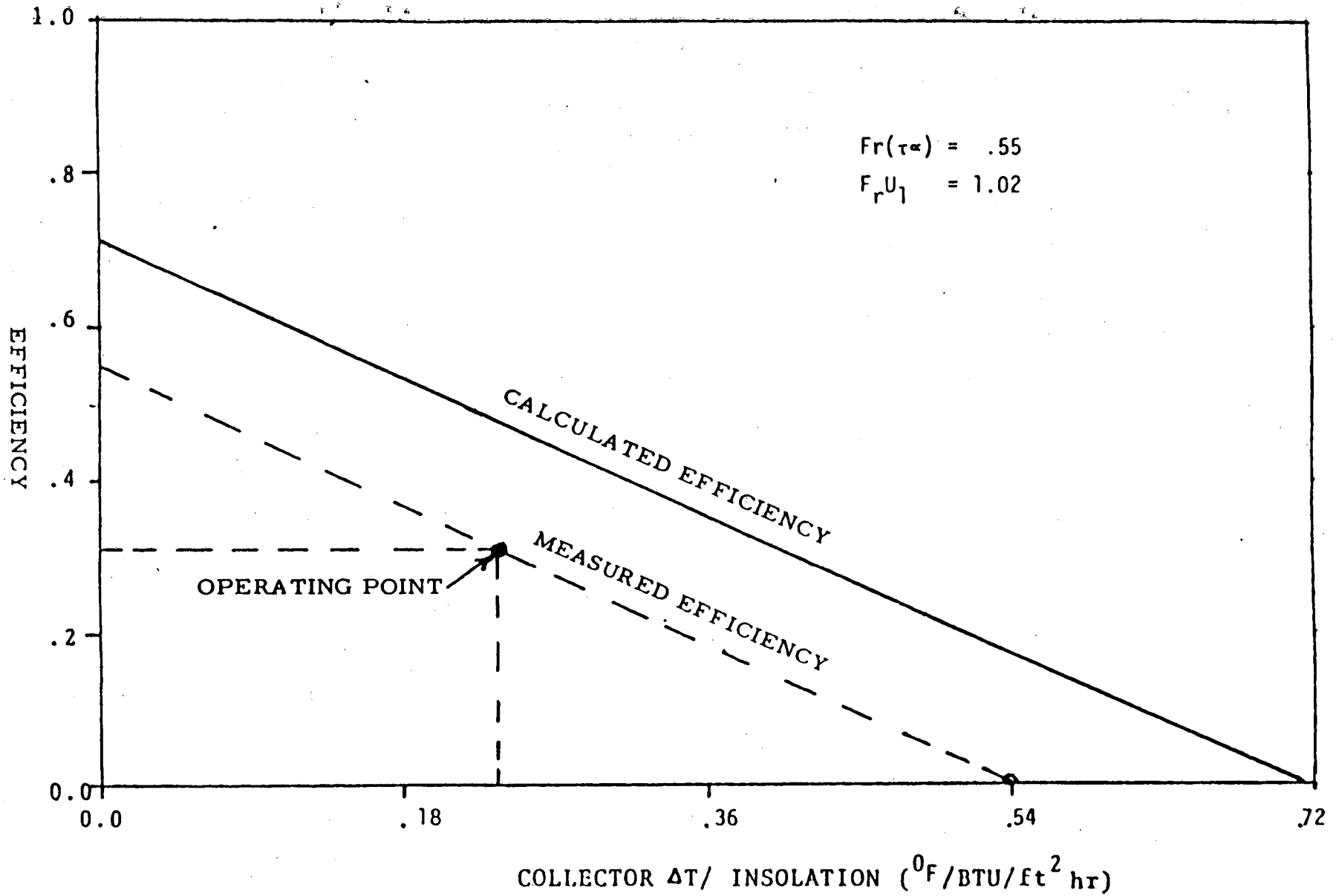


Figure 3

Collector Heating Efficiency Curve for Active Collector System

F-Chart Method

The amount of incident solar radiation is calculated by the program based on the input collector tilt and orientation using the method of Liu and Jordan (1960). Using the calculated incident radiation, the system of efficiency parameters, and the heating load, F-Chart calculates the fraction of the space and/or water heating load met by the solar system for each month.

The preceding discussion of the F-Chart computer program is a broad overview of the program's function. More detailed information on the program may be obtained from the F-Chart Version 3.0 Users Manual.[1] A detailed description of the F-Chart method and the calculation of parameters can be found in Solar Heating Design by the F-Chart Method.[2]

On the following two pages the input data and resulting outputs for a sample project analyzed by F-Chart is presented. The tables are self-explanatory, for the most part, with the input data listed in the top half, followed by the thermal analysis.

Table 7

F-Chart Data for Solar Water Heating Project

Code	Variable description	Value units
1	Air SH+WH=1, Liq SH+WH=2, Air or Liq WH only=3	3.00
2	If 1, what is (Flow rate/Col. area)(Spec. heat)	0 Btu/h-^{o}F-ft^{2}
3	If 2, what is (Epsilon)(Cmin)/UA	2.00
4	Collector area	33.38 ft^{2}
5	FR prime-Tau-Alpha product (normal incidence)	.69
6	FR prime-UL product	1.53 Btu/h-^{o}F-ft^{2}
7	Incidence angle modifier (zero if not avail)	0
8	Number of transparent covers	1.00
9	Collector slope	45.00 degrees
10	Azimuth angle (e.g. South=0, West=90)	0 degrees
11	Storage capacity	12 Btu/^{o}F-ft^{2}
12	Effective building UA	0 Btu/^{o}F-day
13	Constant daily bldg heat generation	0 Btu/day
14	Hot water usage	100 gal/day
15	Water set temp (to vary by month, input neg)	140 ^{o}F
16	Water main temp (to vary by month, input neg)	55 ^{o}F
17	Site location	184.00
18	Thermal printout by month = 1, by year = 2	1.00
19	Economic analysis (yes = 1, no = 2	2.00

Table 8

Thermal Analysis for Solar Water Heater

Time	Percent solar	Incident solar (MMBtu)*	Heating load (MMBtu)	Water load (MMBtu)	Degree days (°F-Day)	Ambient temp (°F)
JAN	25.2	1.81	0.0	2.20	866	37.4
FEB	30.7	1.82	0.0	1.99	686	41.0
MAR	35.6	2.21	0.0	2.20	643	44.6
APR	38.3	2.21	0.0	2.13	32	69.8
MAY	38.2	2.22	0.0	2.20	166	60.8
JUN	38.1	2.07	0.0	2.13	394	51.8
JUL	33.7	1.89	0.0	2.20	0	75.2
AUG	35.0	1.94	0.0	2.20	0	73.4
SEP	41.3	2.16	0.0	2.13	23	68.0
OCT	39.2	2.23	0.0	2.20	254	57.2
NOV	31.4	1.92	0.0	2.13	576	46.4
DEC	23.7	1.73	0.0	2.20	817	39.2
YR	34.2	24.23	0.0	25.92	4457	

* (MMBtu) = million Btu

PASSIVE SOLAR SYSTEMS

To compute energy savings from passive solar systems and weatherization projects, I have borrowed a simple three-step procedure developed by Mazria (1978). Data Forms list the information required to compute energy savings from this method.

Estimating Energy Savings for a Passive Solar Building

The following three-step procedure provides a quick estimate of the annual energy savings for a passive solar building.

Step 1: Estimate the Building Load Coefficient (BLC), exclusive of the south glazing, and divide this by the total south glazed area to obtain the Load Collector Ratio (LCR).

$$LCR = BLC/(\text{net south glazed area}),\ Btu/DD\ ft^2$$

Step 2: Look up the estimate of Solar Savings Fraction (SSF) in Appendix F for the particular type of passive solar heating approach being considered.* (See page F-1 for explanation of table).

Step 3: Multiply BLC by degree days for location to obtain annual heating load, multiply this number by solar fraction and then divide the number by the efficiency of the back-up heating system to obtain an estimate of energy savings from the passive solar building.

The three steps are explained below in greater detail.

Step 1: ESTIMATING BUILDING LOAD COEFFICIENT

The first step in the process is potentially a difficult one: obtaining an estimate of the thermal load of the building--even before it is fully defined. Accepted procedures which have been established for predicting the heating load of buildings are described in the 1977 ASHRAE Handbook of Fundamentals. Given detailed knowledge of the building geometry and construction, they provide comprehensive estimates of each element of the heating load. They are customarily

used during the construction documents phase of the design, to accompany detailed drawings and specifications.

This procedure is of little help to the designer during the design development phase of a project. It has two failings:

--Detailed specifications of the building are not known. Windows have not yet been precisely sized, wall construction details have not yet been firmed up, and exact wall areas and building volumes are not yet known. Thus the input parameters required for a detailed design load calculation are unknown.

--Few designers would take the time to go through this involved calculation. Design development is an iterative process and a much faster procedure is needed if it is to be used.

Thus there is a need for a "quick and dirty" method for estimating heating load. The procedure should take account of the important gross characteristics of the building which have been established prior to design development. These characteristics are: the building gross floor area and perimeter, the number of stories, the R-values of the walls and roof, whether the building is to be built with slab on grade, over a basement, or over a crawl space, and a rough idea of the fraction of the wall area which is to be allocated to windows. Even if these parameters are not known prior to design development it is important to establish them during design development. If heating load is to be an important design consideration, then the influence of these parameters on heating load should be known as a basis for determining R-values, number of glazings, and air change rates.

The procedure to be described is designed to fill this need. It will give answers which are usually within 10% of the ASHRAE detailed heating load

calculation and it will show the relative contribution of the various important factors which make up heating load.

In the process of calculating a heating load, a Building Load Coefficient (BLC) is determined. This coefficient also is useful in estimating the building balance point temperature, considering both the effect of internal energy generation (due to people, lights, equipment, and other energy sources within the building) and due to solar gains. However, the primary use of the Building Load Coefficient is in estimating the solar savings of passive solar heated buildings.

The procedure is not intended to be comprehensive and it will not handle all situations. For example, it is not recommended for use in underground structures. It is primarily intended for use on small buildings with skin-dominated loads. It is not particularly appropriate for large size buildings where the bulk of the heating energy is contributed from internal energy generation. It is by no means intended to substitute for a detailed ASHRAE heating load calculation which should always be done during the construction documents phase. It is only intended to be used for purposes of rough thermal estimation during design development.

Procedure

The procedure consists of calculating several components of the Building Load Coefficient. This coefficient is the additional heating required to maintain a one degree Farenheit increase in the building inside temperature if the solar collect~~ion~~or wall were covered with a perfect insulator. For example, if the heat required to maintain the building at 70 F were determined to be 420,000 BTU/day, then the Building Load Coefficient is equal to the difference or 20,000 BTU/day F.

The procedure consists of adding together several estimated contributions of heat loss.

Start by making rough estimates of the combined area of all floors (sq ft) and the "perimeter" (the combined length of all external walls of all floors (ft)). Then, either estimate the combined area of all east, west, and north windows, or use:

non-south window area = (2/3) x (perimeter) x (ceiling height)
x (non-south window fraction)

The non-south window fraction will normally be between 0.05, for a situation with minimum window area, and 0.10 for a case with ample window area.

Next, carefully estimate the south (solar) window area being careful to only include net exposed portion of the window.

Then, compute the following:*

Walls

$$L_w = 24 \times \frac{\text{wall area}}{\text{R value of walls}}$$

where wall area = (perimeter) x (ceiling height)
-(non-wouth window area) - (south window area)

Non-South Window

$$L_g = 26 \times \frac{\text{non-south window area}}{\text{number of glazings}}$$

Perimeter (slab on grade)

$$L_p = 100 \times \frac{\text{length of perimeter foundation}}{\text{R value of perimeter insulation} + 5}$$

*The derivation of these formulas is based on a simplified use of the ASHRAE-type heat loss approach. All terms contain a factor of 24 to convert from Btu/hr F to Btu/day F. The terms L_w, L_g, L_f, and L_r, are simply 24 x U x A, where U is the U-value of the element (which is equal to 1/R) and A is the area of the element. For glazings, the approximation is made that U = 1.1/(number of glazings). For the perimeter and basement loss terms, the form is an approximation to tabular data where the constants are chosen to give good fit.

Floor (over vented crawl space)

$$L_f = 24 \times \frac{\text{area of ground floor}}{\text{R value of floor}}$$

Basement (heated basement or other fully-bermed wall, including floor losses)

$$L_b = 256 \times \frac{\text{length of wall}}{\text{R value of wall insulation} + 8}$$

Note: normally only one of L_p, L_f, or L_b will apply.

Roof

$$L_r = 24 \times \frac{\text{roof area}}{\text{R value of roof}}$$

Infiltration:

$$L_i = (0.432) \times (\text{average air changes per hour}) \times (\text{ADR})$$
$$\times (\text{ceiling height}) \times (\text{combined area of all floors})$$

where ADR is the Air Density Ratio (assume .075lb/ft^3).

Add the appropriate components to obtain the final BLC estimate, for example:

$$BLC = L_w + L_g + L_r + L_p + L_i$$

Note that the solar glazing is not included in the calculation of the Building Load Coefficient. This is done for three reasons:

--The solar glazing would not be present in a non-solar building which is the principal basis of comparison.

--The solar wall is a net energy gainer, not a loser, and to represent it as part of the load would be misleading.

--The tables which are to be used are given in terms of the BLC defined without the solar wall included.

Step 2: ESTIMATE OF SOLAR SAVINGS FRACTION (SSF)

The next step is to use the table in Appendix A to estimate the fraction of the building heating load that the passive solar system can meet. The table list for different locations, LCR's and passive systems the fraction of the heating load

that the passive system can meet. The tables have been developed for only six system types:

(1) WW-Water Wall
(2) WWNI-Water Wall with Night Insulation(R9)
(3) TW-Trombe Wall
(4) TWNI-Trombe Wall with Night Insulation(R9)
(5) DG-Direct Gain
(6) DGNI-Direct Gain with Night Insulation(R9)

Although the tables have been determined only for water wall, Trombe wall, and direct gain systems, on an interim basis until other tables are published it is recommended that the tables for Trombe walls be used for attached sunspace situations.

The tables are based on particular reference designs which are defined on the following page.

For designs which are mixtures of different system types: (1) calculate a single LCR, based on the total load and the total combined collection area, (2) look up the resulting value of SSF for each of the system types, and (3) average between the table values for each type of system based on the relative proportions of glazed area of each.

If the location is not listed in Appendix A, then the value can be estimated from neighboring locations with similar heating degree-day conditions.

---

*The Load Collector Ratio tables are the end product of a long and complex process. First, mathematical models were generated to represent heat flow and heat storage within the particular types of passive solar buildings. These models were then validated by comparing the hour-by-hour calculations with corresponding experimental results obtained in test rooms located at the Los Alamos Scientific Laboratory. These test rooms are 5' x 8' simple structures that contain the same key elements present in the tabulated system types. The test rooms were allowed to simply "free run" in response to the weather without auxiliary heating or controls. The results normally compare within approximately 2 F with maximum short term errors of no more than 8 F. The next step was to use the same mathematical model procedure to describe buildings of the general generic types in accordance with the reference designs detailed on page 40. Hour-by-hour calculations were then done using these models for weather data taken from ten representative climates and several values of LCR in each climate. Based on these results, a Solar Load Ration correlation was

Step 3: OBTAINING ANNUAL HEATING LOAD

Finally with the BLC and SSF estimated, one can then estimate the energy savings for the solar home as follows:

Annual Energy Savings = BLC x heating degree days x SSF

Example 5: (This example is taken directly from the DOE Passive Solar Design Handbook (1980))

A 1500 sq ft single story house is to be built on a floor slab with R-19 walls, R-25 roof, R-12 perimeter insulation, 7.5% of the E, W, and N wall area in double-glazed windows and with 0.65 air change per hour. The house is to be built in Dodge City, Kansas (elev = 2,582 ft). The ceiling height is 8 ft. The south glazing is 234 sq ft of water wall and 156 sq ft of direct gain, both with R4 night insulation. The perimeter is 165 ft.

Non-south window area = (2/3) x 164 x 8 x .075

= 65 sq ft.

Then:

L_w = (24) x (165 x 8 - 65 - 390)/19 = 1090 Btu/DD

L_g = (26) x (65) /2 = 850 Btu/DD

L_p = (100) x (165) / (12 + 5) = 970 Btu/DD

L_r = (24) x (1500)/25 = 1440 Btu/DD

L_i = (0.432) x (0.65) x (0.91) x (8) x (1500) = 3070 Btu/DD

BLC = sum = 7420 Btu/DD

This is 4.9 Btu/DD per sq ft of house, exlusive of the south glazing. ~~This is close to the 4.6 value selected in making up the rule of thumb table (see pp. 24).~~ The percentage of the total made up by each component is as follows:

Walls	15%
Non-south glazing	11%
Perimeter	13%
Roof	19%
Infiltration	41%

---

determined which yielded a minimum mean square error in annual Solar Savings Fraction across the entire ensemble of yearly calculations. The final step was then to use the resulting monthly Solar Load Ratio curves, together with the monthly heating degree-day and solar radiation data given in Appendix A, to determine the Solar Savings Fraction associated with a particular LCR. This process was iterated to determine the LCR values corresponding to each 10% increment in solar savings. The table is presented in these terms rather than vice-versa, because the range of LCR values is so large from city to city.

As can be seen in the example, the contributions to the Building Load Coefficient from conduction through the walls, non-solar glazing, perimeter and roof are all significant and roughly comparable in magnitude. The largest contribution by far is associated with the heating of infiltration air (41% of the total). This deserves special comment.

During design development there is insufficient information available to estimate the building infiltration. Rather, at this point, the designer should consider the determination of the air change parameter to be a matter of design criteria rather than prediction. The minimum value which might be chosen will depend on one of two considerations:

1. The minimum air change rate recommended for residential applications is 1/2 air change per hour (ACH). Below this, the building becomes stuffy, odors build up, and humidity buildup due to water release within the building may be a problem. In the few buildings which have been constructed with lower natural rates than this (for example the Saskatchewan house, the Phillips house in Aschen, Germany and the Denmark Zero-Energy house), forced ventilation with heat recovery units was employed. Although this approach may be routinely used in large commerical buildings, it is very unlikely that it will achieve wide acceptance in the small, skin-dominated buildings being considered here.
2. The natural air infiltration rate associated with normal building construction normally exceeds the 1/2 ACH lower limit. To achieve this low number requires meticulous attention to sealing all cracks where air might leak into or out of the building. A more useful lower limit, which might be associated with careful construction practices, would be in the range of 3/4 to 1 ACH. Other applications may require much higher air exchange rates as a matter of both common sense and building code requirements. For example, a restaurant or lounge

might require 4 ACH during periods of occupancy, and many other commercial applications might also require high values.

(Step 2) The Load Ratio is calculated as:

$$LCR = \frac{7420 \text{ BTU/DD}}{390 \text{ sq ft}} = 19 \text{ BTU/DD-sq ft}$$

Table entries for Dodge City, Kansas in Appendix A are:

SSF	0.5	0.6	0.7	0.8
WWNI	36.0	29.0	23.0	18.0

By interpolation between LCR values of 23 and 18 a value of SSF of 0.78 corresponding to LCR = 19 is obtained for the WWNI case. Thus the savings would be estimated to be 78% if the glazing were all water wall with R9 night insulation.

(Step 3) The annual energy savings (AES) are calculated as follows:

AES = BLC x heating degree days x SSF ÷ eff. of back-up heater

$$AES = \frac{(7420 \text{ Btu/dd} \times 5046 \times .78)}{.65 - 45 \text{ Million Btu}}$$

Assume the following efficiencies for back-up systems:

(1) electricity - 1.0

(2) natural gas fuel oil/propane - .65

(3) wood and other - .5

The above example has a natural gas back-up heating system.

DATA FORM 5 - PASSIVE SOLAR SYSTEMS

1. Project Location: City _____, State _____

2. Passive System Type: (Total square feet of south glazing _____

   a. WW - Water Wall _____ sq ft

   b. WWNI - Water Wall with Night Insulation (R9) _____ sq ft

   c. TW - Trombe Wall _____ sq ft

   d. TWNI - Trombe Wall with Night Insulation (R9) _____ sq ft

   e. DG - Direct Gain _____ sq ft

   f. DGNI - Direct Gain with Night Insulation (R9) _____ sq ft

3. Building Parameters

   a. Non-south Window Area _____ # of Glazings _____

   b. Wall Area _____ R Valve _____

   c. Perimeter (describe)

      Length _____ R Value of Perimeter Insulation _____

   d. Floor Area _____ R Value _____

   e. Basement

      Length of Wall _____

      R Value of Wall Insulation _____

   f. Roof Area _____ R Value of Roof _____

   g. Infiltration

      Average Air Change per Hour: _____

      Ceiling Height: _____

      Combined Area of All Floors: _____

4. Back-up Heating System

   Type: _____

   Capacity: _____

WEATHERIZATION

The method outlined for passive systems can be used in modified form to estimate energy savings from weatherization projects. The following procedure is recommended:

1. Compute BLC before and after weatherization.
2. Multiply BLC (before and after) by heating degree days for location (Table A//F) to obtain annual heating.
3. Calculate annual energy savings by taking difference of before and after heating load and dividing this by efficiency of back-up heating system.

I suggest that you use the same data form as for passive systems and cross out type of passive.

DATA FORM 6 - WEATHERIZATION PROJECTS

1. Project Location: City _____ State _____

2. Building Parameters (Before/After)

   a. Non-south Window Area _____/_____ # of Glazings _____

   b. Wall Area _____/_____ R Value _____/_____

   c. Perimeter (Describe)

      Length _____/_____

      R Value of Perimeter Installation _____/_____

   d. Floor Area _____/_____ R Value _____/_____

   e. Basement (Describe)

      Length of Wall _____/_____

      R Value of Wall Insulation _____/_____

   f. Roof Area _____/_____ R Value of Roof _____/_____

   g. Infiltration

      Average per Change per Hour _____/_____

      Ceiling Height _____/_____

      Combined Area of all Floors _____/_____

3. Back-up Heating System

   Type: _____

   Capacity: _____

Geothermal - Direct Application*: Under this heading, I have included projects that use geothermal hot water to generate industrial process heat or to meet the space and hot water requirements of residential and commercial buildings. I assume that all applications use a closed-loop, water-to-water, heating exchanger. To determine the energy savings from a geothermal system, a two step calculation, similar to that used for anaerobic digesters, is required. First, you should compare the operating features of the heat exchange-energy delivery system against the flow rate of the geothermal well and the temperature of the water at the well head to insure that the system is properly sized. Secondly, you should convert the energy delivery from the heat exchange system into a fossil fuel equivalent by adjusting for conversion losses. Data Form 7 contains the necessary information for computing energy savings for direct use of geothermal hot water.

The following example should illustrate how to use the data. Assume that an applicant owns a factory that dehydrates onions. Currently, the factory is using a natural gas boiler to supply the heat to dry the onions. He submits a proposal to retrofit the factory with a heat exchange system and to install a transmission pipe from the well to factory. He provides you with the following data:

---

*Source: U.S. Department of Energy. Rules of Thumb for Geothernal Direct Applications, Undated publication.

1. Well Data:

   a) Depth of well - 500 feet

   b) Diameter of well - 10 inches

   c) Heater temperature at well head - 200° F

   d) Flow rate into heat exchanger (gpm) - 200 gpm

   e) Transmission pipe - 300 feet (level length, 8 inch diameter)

   f) Pump horsepower - 40

2. Energy Delivery System:

   a) Describe system: Closed loop water-to-water heat exchange-counter flow

   b) Heat delivery requirement: 42.5 MBtu/br.

   c) Approach Temperature Drop (Δ T): 50° F

   d) Operating Head (feet): 100 feet

   e) Flow rate of load water into heat exchanger: 100 gpm

3. Back-up energy system: Natural gas boiler

4. System Operation (hrs/year): 3600 hours

From these data, we can compute the required flow rate ($\dot{w}$) using equation (1):

$$(1) \quad \dot{w} = \frac{E}{T_L \quad T}$$

where $\dot{w}$ = required flow rate

E = energy required in Btu/hr.= 42.5 MBtu

T_L= length of transmission line = 300 feet

T = temperature drop system water = 50° F

$\dot{w}$ =42.5/(500 x 50) = 1700 gpm

As you can see from the data supplied by the applicant, the system has a flow rate of only 200 gpm or 12% of the total required. Thus the system can only deliver 5.1 MBtu of the energy required. To convert this into a fossil energy equivalent, the following fuel to energy conversion factors should be used:

Natural gas, propane, diesel - .80

Electricity 1.0

Coal or other solid fuel .6

The onion factory uses natural gas as a backing fuel. Thus, the system will save 22.95 billion Btu of natural gas each year.

The data will also allow you to check the horsepower of the pump for proper sizing by the following formula:

$$HP = (8.33 \ \dot{w} H/33{,}000) \div 8,$$

where HP = pump horsepower

8.33 = weight of gallon of water in lbs. at 40C

$\dot{w}$ = flow rate of well - 200 gpm

H = total head = depth of well (500 feet) + system head (100 feet) + frictional head loss (N.A.) = 600 feet

33000 = conversion factor ft. lbs/min. to horsepower

.8 = pump efficiency

HP = 39

Data Form 7 : Geothermal Hot Water System - Direct Use

1. Well Data

   a) Depth of well: _____

   b) Diameter of well: _____

   c) Temperature of water at well head: _____ ^{o} F

   d) Flow rate (gpm):

   e) Transmission Pipe: _____ diameter (inches) _____ length distance from well to end use

   f) Pump horsepower:

2. Energy Delivery/Heat Exchange System

   a) Describe unit in detail; provide flow diagram:

   b) Heat requirement of system (heat flow in Btu/hr)

   c) Temperature drop (ΔT ^{o}F): _____

   d) Operating head (feet): _____

SECTION 2 - Estimating an Energy System's Cost-Effectiveness

Data form 8 lists the data required to determine whether an energy system is cost-effective. An energy system is cost-effective if it generates, over its economic life, net revenues equal to or greater than its capital or first costs. The method proposed for evaluating a system's cost-effectiveness was developed by the National Bureau of Standards (Ruegg et al., 1978) and used by Lawrence Berkeley Laboratory (Lucarelli et al., 1981) to evaluate appropriate energy technology projects funded by the U.S. Department of Energy. Definitions of key concepts and a description of the general methodology is provided below, followed by a brief computational example.

LCC is the method for evaluating all relevant costs and revenues for an energy system over its economic life. The LCC method is applied in four steps:

(1) Estimation of Capital Costs

First costs include the costs of purchasing and installing an energy system less any capital savings from not using a fossil fuel system. Whenever possible, we should base a system's first cost on the actual cost or expected cost of the system in the commercial market. In the case of this program, the capital costs will be those claimed by the applicant for the system on data form 8. In cases where the project is developing a prototype system, first costs are estimated either from the applicant's best estimate of what his system will cost when commercially available or from comparisons to similar systems already being marketed. The cost of a commercial system will usually be less than a project's grant, which in many cases includes cost of design, development, and testing.

(2) Estimation of Annual Net Revenues

Net revenues are the dollar value of energy or other output produced or saved over a system's life-cycle minus operating, maintenance, and replacement costs. Similar to capital costs, these revenues are computed on a net basis, taking into account any additional savings and/or costs incurred by the prospective user for not using a fossil fuel alternative.

(3) Conversion of Costs and Revenues to Present Values

The costs and revenues estimated in (1) and (2) occur at different times. To convert these values into time-equivalent amounts, future costs are discounted by a real rate of interest that reflects the real time value of money. In other words, future benefits resulting from an investment are worth less to an investor today because he could have invested his funds in an alternative investment and generated a monetary return.

In estimating life-cycle costs for each project, assumptions were made about future energy and nonenergy costs. The following guidelines for conducting the LCC analysis are recommended:

-- All future costs and revenues are expressed in <u>real</u> 1980 dollars: that is, they are net of inflation (Ruegg et al., 1978).

-- Nonenergy costs and revenues are assumed to increase annually at the rate of inflation, i.e., at a 0% <u>real</u> rate of increase

-- The <u>real</u> discount rate is 10% (Federal Register, 1980).

-- Base year energy prices are either the actual price per unit paid by the grantee or regional DOE estimates of energy prices for 1980 (Federal Register, 1980).*

-- Energy prices escalate at a real annual rate of 5%.

(4) Determination of Cost-Effectiveness

After computing life-cycle costs, a system's cost-effectiveness can be determined. A system is deemed cost-effective if, on a life-cycle basis, the net present value of before-tax revenues equals or exceeds first costs. As an indicator of cost-effectiveness, the savings to investment ratio (SIR)- which is the ratio of the net present value of before-tax revenues to first costs is recommended as an indicator of effectiveness. By definition, energy systems with a SIR equal to or greater than 1.0 are cost-effective.

The before-tax SIR roughly indicates whether a specific energy system that relies on renewable energy resources can compete against the fossil fuel alternative without government subsidies. It does not indicate whether a private firm or individual will invest in a particular energy system. To determine whether a firm or individual will

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*The DOE energy prices are average prices paid for each fuel in a specific region by economic sector. The prices underrate the actual value of the energy savings from each project as they do not measure the original cost of imported oil to the economy, which, in the final analysis, is what each project displaces and hide tax and other subsidies fossil fuels have enjoyed which keep their prices artificially low.

invest in an energy system would require a detailed analysis of the economic sectors in which the system can be used and of the applicable investment criteria and tax laws. Because many systems can be applied in more than one sector, economic analysis on an after-tax basis is unduly cumbersome and beyond the scope of this report. Thus, I opted for the simpler, before-tax approach which still allows you to rank projects according to their relative cost-effectiveness.

Example 7: Economic Analysis (Wind Electric System)

To illustrate how this methodology is used, let's return to the San Francisco Wind Project (Example 1). The application completed data form 1-2 and supplied the following economic data:

(1)	Capital Cost		$40,500
	Equipment	$34,500	
	Materials	3,000	
	Installation	3,000	
(2)	Operating and Maintenance Cost (O&M) (2 year service contract with mfg.)		600/year
(3)	Project Life		25 years
(4)	Base Year Energy Costs		.11/kwh (attach utility bill)
(5)	Non Energy Savings: 0		

To compute the system's SIR, the following assumptions are made:

(1) Discount rate - 10%/year

(2) Fuel price escalation rate - 5%/year (real)

We already know that capital costs equal $40,500. The next step is to compute the present value of revenue and O&M costs over the life of the project. In Example 1, we estimate annual energy output at 59,510 kwh/year. Given a .11/kwh charge in 1980, the value of the base year energy savings will be $6,546. To simplify the process of computing the present value of revenue and O&M costs, I have included a table (Table 9) that calculates uniform present worth (UPW) factors based on a 10% discount rate and different rates of fuel price escalation. With this table, the present value of energy revenue can be easily determined by selecting the UPW factor

Table 9

Uniform Present Wort for Energy Price Escalation Rate from 0% to 10% (Based Upon a 10% Discount Rate

	Energy Price Escalation Rates										
Year	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.9091	0.9182	0.9273	0.9364	0.9455	0.9546	0.9636	0.9727	0.9818	0.9909	1.0000
2	1.7355	1.7612	1.7871	1.8131	1.8393	1.8657	1.8921	1.9188	1.9457	1.9727	2.0000
3	2.4868	2.5353	2.5844	2.6340	2.6844	2.7354	2.7869	2.8391	2.8921	2.9456	3.0000
4	3.1698	3.2460	3.3237	3.4027	3.4834	3.5656	3.6492	3.7344	3.8213	3.9097	4.0000
5	3.7907	3.8986	4.0092	4.1225	4.2388	4.3581	4.4801	4.6053	4.7336	4.8650	5.0000
6	4.3552	4.4978	4.6449	4.7966	4.9531	5.1146	5.2808	5.4524	5.6294	5.8117	6.0000
7	4.8684	5.0480	5.2344	5.4278	5.6284	5.8367	6.0524	6.2765	6.5089	6.7498	7.0000
8	5.3449	5.5521	5.7810	6.0188	6.2669	6.5260	6.7959	7.0780	7.3723	7.6793	8.0000
9	5.7590	6.0159	6.2878	6.5722	6.8705	7.1839	7.5124	7.8577	8.2201	8.6004	9.0000
10	6.1445	6.4417	6.7577	7.0903	7.4411	7.8118	8.2028	8.6161	9.0524	9.5130	10.0000
11	6.4930	6.8328	7.1935	7.5755	7.9807	8.4113	8.8682	9.3539	9.8696	10.4174	11.0000
12	6.8137	7.1919	7.5977	8.0299	8.4909	8.9837	9.5095	10.0717	10.6722	11.3138	12.0000
13	7.1034	7.5216	7.9725	8.4553	8.9733	9.5300	10.1274	10.7698	11.4601	12.2020	13.0000
14	7.3667	7.8243	8.3199	8.8536	9.4293	10.0513	10.7227	11.4487	12.2335	13.0819	14.0000
15	7.6061	8.1022	8.6421	9.2266	9.8604	10.5490	11.2964	12.1092	12.9929	13.9539	15.0000
16	7.8238	8.3574	8.9408	9.5758	10.2680	11.0240	11.8492	12.7516	13.7384	14.8178	16.0000
17	8.0216	8.5918	9.2179	9.9029	10.6535	11.4776	12.3821	13.3767	14.4706	15.6742	17.0000
18	8.2014	8.8069	9.4747	10.2090	11.0177	11.9103	12.8953	13.9844	15.1891	16.5223	18.0000
19	8.3649	9.0044	9.7129	10.4957	11.3622	12.3235	13.3900	14.5757	15.8947	17.3630	19.0000
20	8.5135	9.1857	9.9337	10.7641	11.6878	12.7178	13.8666	15.1507	16.5873	18.1958	20.0000
21	8.6486	9.3512	10.1385	11.0154	11.9957	13.0942	14.3259	15.7101	17.2674	19.0211	21.0000
22	8.7715	9.5042	10.3285	11.2509	12.2870	13.4537	14.7688	16.2546	17.9355	19.8394	22.0000
23	8.8832	9.6446	10.5046	11.4714	12.5623	13.7968	15.1955	16.7841	18.5913	20.6501	23.0000
24	8.9847	9.7735	10.6679	11.6777	12.8225	14.1241	15.6065	17.2989	19.2349	21.4531	24.0000
25	9.0770	9.8919	10.8193	11.8710	13.0686	14.4367	16.0026	17.7998	19.8670	22.2490	25.0000

for the relevant project life (25 years) and energy and price escalation (5%). The UPW for this case is 14.4367 and is circled on Table ~~B-3~~. Multiplying this factor (14.4367) by the value of base year energy revenues ($6546) gives the present value of energy revenues over the life of the project ($94,500). Similarly, the present value of O&M costs can be determined by selecting the UPW factor under year 25 and fuel price escalation rate = 0% (9.077), (since we are assuming that non-energy costs increase at the rate of inflation) and multiplying this factor by annual O&M costs ($600 per year) which yields $5446. Substracting energy revenue ($94,500) from O&M costs ($5446) gives a net revenue of $89,054. To compute the system's SIR, divide net revenue ($89,054) by the system's capital cost $40,500. This yields a SIR of 2.2 which by definition makes the system cost-effective. The SIR can be used to rank projects according to their relative cost-effectiveness and enable you to select those with the highest level of cost-effectiveness for funding.

Data Form 8: Economic Analysis Data

1. Capital Cost

   Equipment:

   Materials :

   Labor:

   Other:

   _____

   _____

   _____

   Total _____

2. Capital Savings (Itemize savings resulting from not installing alternative to above system. For any project note these savings may not occur for all projects)

3. Annual Operating and Maintenance Cost (Itemize)

4. Annual Cost of Parts Replacement (Itemize)

5. Life of Energy System (years)

6. Fuel being displaced and Cost ~~permit~~

Electricity	_____	$._____/kwh
Natural gas	_____	._____/therm
Propane	_____	._____/gallon
Distillate	_____	._____/gallon
Other	_____	._____/

APPENDIX A

Tables of LCR and D vs SSF

These tables are presented for use with the Load Collector Ratio method. They are based on Solar Load Ratio calculations, using the weather data tabulated in Appendix A of the DOE Passive Solar Design Handbook (1980).

For each location, two sets of numbers are tabulated for each six system type and for values of SSF ranging from 0.1 to 0.9. In the upper set, values of LCR (in Btu/DD ft^2) are tabulated for use with the Load Collector Ratio method. In the lower set of numbers, value of D are tabulated for use in the economic optimization procedure. D is the derivative of SSF with respect to 1/LCR and has units of Btu/DD ft^2 (The physical significance of D is that it represents the equivalent additional load, in Btu/DD, which can be fully satisfied by one additional square foot of solar collection area.)

The six system types are abbreviated as follows:

WW - Water Wall
WWNI - Water Wall with Night Insulation (R9)
TW - Trombe Wall
TWNI - Trombe Wall with Night Insulation (R9)
DG - Direct Gain
DGNF - Direct Gain with Night Insulation (R9)

Certain assumptions regarding system design parameters are embodied in these numbers; these assumptions are listed on the next page.

Reference Passive System Designs

General

Thermal storage capacity = 45 Btu/F ft^2 of glazing

Other thermal mass of building is negligible

Double glazing, with normal transmittance = .747, spacing = 1/4 inch.

Room temperature control range = 65 F to 75 F

Night insulation (when used) is R9

In place 5 pm to 8 am (Trombe and water walls)

In place 5 pm to 7 am (Direct gain)

Thermal mass-to-room air conductance = 1.0 Btu/F hr ft^2

Masonry properties (Trombe walls and direct gain)

k = 1.0 Btu/ft hr F	(thermal conductivity)
ρ = 150 lb/ft^3	(density)
c = 0.2 Btu/lb F	(specific heat)

Infrared emittance of mass surface = 0.9

No internal heat generation (from appliances, etc.)

Trombe Walls

Wall has vents at top and bottom, with backdraft dampers

Vent area = 3% of wall area (each of 2 vents)

Direct Gain

Mass is 6-inch thick masonry

Mass area is 3 times glazing area

Transmitted solar radiation is uniformly distributed on mass

Non-mass absorption fraction = 0.2

(heats air directly)

Additional Assumptions for LCR Method

Vertical, south-facing glass

Ground reflectance = 0.3

No shading of solar aperture

Mass absorptance = 1.0 (thermal storage walls)

= 0.8 (direct gain)

BIRMINGHAM ALABAMA

33.6 N
2844 DD
T(JAN)=44

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 186	87	53	37	27	21	15	10	5
	L	WWNI 281	134	85	60	45	36	29	23	16
	C	TW 179	82	50	33	23	16	11	7	4
	R	TWNI 265	126	79	56	42	32	25	18	12
		DG 192	83	47	28	15	-	-	-	-
		DGNI 296	139	86	61	45	34	25	18	11
		WW 17.1	14.8	12.6	11.4	9.5	7.4	4.6	2.2	.4
		WWNI 26.1	25.0	21.2	19.4	18.3	15.6	12.9	8.3	3.4
	D	TW 16.3	13.9	11.6	8.9	6.6	4.5	2.9	1.6	.6
		TWNI 24.9	22.5	20.0	18.2	15.8	12.7	9.0	5.5	2.2
		DG 16.6	12.9	8.9	5.1	2.0	-	-	-	-
		DGNI 27.7	24.3	21.8	19.0	15.9	11.9	8.2	4.8	1.8

MOBILE ALABAMA

30.7 N
1684 DD
T(JAN)=51

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 318	144	89	64	48	37	29	21	13
	L	WWNI 441	205	127	92	71	56	45	36	25
	C	TW 293	135	83	57	40	30	22	15	10
	R	TWNI 412	191	120	86	65	51	39	29	19
		DG 354	159	96	63	43	29	18	10	-
		DGNI 469	216	135	96	72	55	42	30	20
		WW 29.8	24.2	23.0	21.1	18.3	15.1	10.5	5.9	2.0
		WWNI 42.6	34.9	32.9	32.4	29.0	25.3	20.8	13.4	5.6
	D	TW 27.0	23.4	19.7	16.1	12.6	9.5	6.7	4.2	1.8
		TWNI 39.1	33.2	31.4	28.4	25.2	20.3	14.5	8.9	3.7
		DG 31.7	26.4	21.5	15.9	11.0	7.0	3.6	1.2	-
		DGNI 43.8	37.6	34.9	31.0	26.5	20.2	14.3	8.6	3.5

MONTGOMERY ALABAMA

32.3 N
2269 DD
T(JAN)=48

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 236	111	68	48	36	27	21	15	8
	L	WWNI 339	165	103	73	56	44	35	28	20
	C	TW 224	103	63	43	30	22	15	11	7
	R	TWNI 320	153	96	68	51	40	30	23	15
		DG 257	115	67	42	27	16	7	-	-
		DGNI 362	171	107	75	56	42	32	23	15
		WW 22.7	18.9	16.6	15.2	12.8	10.3	6.8	3.6	1.0
		WWNI 32.7	29.9	25.6	24.2	22.5	19.3	15.9	10.2	4.3
	D	TW 20.6	17.9	15.0	11.8	8.9	6.4	4.4	2.6	1.0
		TWNI 31.0	27.2	24.5	22.2	19.3	15.6	11.1	6.8	2.8
		DG 22.9	18.6	14.1	9.4	5.7	2.7	.5	-	-
		DGNI 34.9	30.0	27.2	23.7	20.0	15.1	10.5	6.3	2.4

PHOENIX ARIZONA

33.4 N
1552 DD
T(JAN)=51

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 467	219	139	100	75	58	45	34	22
	L	WWNI 620	293	188	136	104	82	65	51	36
	C	TW 436	202	126	87	63	46	34	25	16
	R	TWNI 583	275	176	126	95	73	56	42	28
		DG 555	256	157	107	75	53	37	24	12
		DGNI 673	316	201	143	107	82	62	45	29
		WW 42.5	39.7	37.2	32.9	28.2	23.2	17.0	9.9	3.7
		WWNI 56.5	54.3	50.3	48.3	40.8	35.1	28.6	18.8	7.9
	D	TW 40.1	35.6	31.1	25.6	20.3	15.2	10.9	7.0	3.1
		TWNI 53.8	50.0	47.3	41.3	35.6	29.0	20.6	12.6	5.1
		DG 50.4	44.2	37.5	29.5	21.9	15.1	9.4	4.8	1.4
		DGNI 62.2	57.3	52.7	46.2	39.2	30.0	21.1	12.8	5.3

PRESCOTT ARIZONA

34.6 N
4456 DD
T(JAN)=37

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 189	89	56	40	30	23	17	12	7
	L	WWNI 286	135	88	63	48	39	31	25	18
	C	TW 183	85	53	36	25	18	13	9	5
	R	TWNI 269	128	82	59	45	35	27	20	14
		DG 198	89	52	32	20	10	-	-	-
		DGNI 300	142	90	64	49	37	28	20	13
		WW 17.1	16.5	14.3	13.1	11.3	8.9	5.7	2.9	.7
		WWNI 26.2	25.4	23.7	21.5	20.3	18.0	14.6	9.3	3.9
	D	TW 16.9	14.9	12.7	10.0	7.6	5.5	3.5	2.0	.9
		TWNI 24.9	23.8	21.7	20.2	17.7	14.1	10.0	6.2	2.5
		DG 17.6	14.6	10.6	6.8	3.6	1.0	-	-	-
		DGNI 27.7	25.8	23.7	21.4	17.8	13.4	9.3	5.5	2.1

TUCSON ARIZONA

32.1 N
1752 DD
T(JAN)=51

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 425	199	127	92	70	55	43	32	21
	L	WWNI 571	268	172	125	97	77	62	49	36
	C	TW 394	185	116	81	59	43	32	23	16
	R	TWNI 533	252	161	116	89	69	54	40	27
		DG 498	231	143	98	69	49	34	22	12
		DGNI 613	289	185	132	100	77	59	43	29
		WW 39.0	36.4	33.8	31.6	27.6	23.3	16.7	9.8	3.7
		WWNI 53.0	49.5	46.6	44.5	41.0	35.4	29.5	18.8	8.0
	D	TW 36.9	33.2	29.0	23.9	19.1	14.7	10.4	6.7	3.3
		TWNI 49.8	46.1	43.6	39.9	35.1	28.2	20.2	12.5	5.2
		DG 46.0	40.7	34.7	27.2	20.3	14.2	8.8	4.5	1.4
		DGNI 57.3	52.6	49.4	44.2	37.9	29.0	20.6	12.7	5.3

WINSLOW ARIZONA

35.0 N
4733 DD
T(JAN)=33

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 165	78	49	34	25	19	14	9	4
	L	WWNI 255	123	79	57	43	34	27	21	15
	C	TW 162	75	46	31	22	15	10	7	4
	R	TWNI 242	116	74	53	40	31	24	18	12
		DG 168	74	42	24	12	-	-	-	-
		DGNI 268	127	81	57	43	32	24	17	11
		WW 15.3	14.0	12.2	10.8	8.9	6.8	4.1	1.9	.2
		WWNI 23.8	23.4	20.8	19.2	17.6	15.3	11.9	7.8	3.2
	D	TW 14.6	13.1	10.8	8.4	6.2	4.3	2.7	1.5	.6
		TWNI 22.6	21.4	19.5	17.8	15.1	12.2	8.6	5.3	2.1
		DG 14.7	11.6	7.7	4.2	1.2	-	-	-	-
		DGNI 25.1	23.1	20.9	18.4	15.2	11.3	7.7	4.5	1.6

YUMA ARIZONA

32.7 N
1010 DD
T(JAN)=55

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 728	342	219	155	116	89	70	52	35
	L	WWNI 932	442	283	204	154	119	94	74	53
	C	TW 670	313	194	135	97	72	53	38	25
	R	TWNI 877	413	264	187	140	108	82	61	40
		DG 887	412	254	174	124	89	64	44	26
		DGNI 1021	481	305	215	160	122	92	67	44
		WW 68.9	61.9	58.9	49.2	42.7	35.4	26.9	16.1	6.6
		WWNI 88.7	80.0	77.5	67.6	57.4	49.4	41.5	27.2	11.6
	D	TW 61.7	55.0	47.8	39.2	31.4	24.0	17.3	10.3	5.4
		TWNI 81.9	75.7	68.5	59.7	51.2	41.9	29.6	18.1	7.5
		DG 81.2	71.5	61.0	49.4	37.6	27.3	18.2	10.4	4.0
		DGNI 94.8	88.2	77.6	67.9	57.7	44.5	31.3	19.2	8.2

FORT SMITH ARKANSAS

35.3 N
3336 DD
T(JAN)=39

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 158	74	45	31	23	17	13	8	-
	L	WWNI 246	119	75	53	40	32	26	20	14
	C	TW 153	70	43	29	20	14	9	6	3
	R	TWNI 233	111	70	50	37	29	22	17	11
		DG 156	67	36	20	-	-	-	-	-
		DGNI 258	121	76	53	40	30	22	16	10
		WW 15.0	12.4	10.8	9.7	8.0	6.1	3.6	1.6	-
		WWNI 23.5	21.8	18.8	17.6	16.5	14.2	11.7	7.4	3.1
	D	TW 14.0	12.0	9.9	7.5	5.4	3.7	2.3	1.2	.4
		TWNI 22.3	19.9	17.9	16.4	14.2	11.4	8.1	5.0	2.0
		DG 13.4	10.1	6.2	2.8	-	-	-	-	-
		DGNI 24.6	21.3	19.3	16.9	14.0	10.4	7.1	4.1	1.5

LITTLE ROCK ARKANSAS

34.7 N
3354 DD
T(JAN)=39

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 157	72	44	31	22	17	12	8	-
	L	WWNI 246	117	74	52	40	31	25	20	14
	C	TW 153	69	42	28	19	13	9	6	3
	R	TWNI 232	110	69	49	37	29	22	16	11
		DG 154	65	35	18	-	-	-	-	-
		DGNI 257	120	75	53	39	29	22	15	10
		WW 14.6	12.1	10.5	9.4	7.7	5.8	3.4	1.5	-
		WWNI 23.0	21.4	18.5	17.2	16.1	13.9	11.4	7.3	3.0
	D	TW 13.8	11.7	9.6	7.3	5.2	3.5	2.2	1.2	.3
		TWNI 21.9	19.6	17.6	16.0	13.9	11.2	7.9	4.9	2.0
		DG 13.0	9.6	5.8	2.4	-	-	-	-	-
		DGNI 24.2	21.0	18.9	16.5	13.7	10.2	7.0	4.0	1.5

BAKERSFIELD CALIFORNIA

35.4 N
2185 DD
T(JAN)=48

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 323	143	89	63	46	35	26	18	10
	L	WWNI 449	203	127	91	69	54	42	32	22
	C	TW 297	135	81	55	39	28	20	14	8
	R	TWNI 418	191	119	85	63	48	36	27	17
		DG 359	158	93	60	40	26	15	-	-
		DGNI 475	216	135	94	69	52	39	27	17
		WW 28.6	24.4	22.6	19.7	15.7	11.9	8.5	4.5	1.3
		WWNI 41.9	34.7	33.5	31.1	26.5	21.1	16.2	11.1	4.6
	D	TW 26.9	22.7	18.8	15.1	11.6	8.5	5.7	3.3	1.2
		TWNI 38.0	33.2	30.7	26.9	22.3	18.1	12.7	7.6	3.0
		DG 31.5	25.4	19.8	14.3	9.5	5.4	2.3	-	-
		DGNI 42.9	37.5	34.0	28.8	23.6	18.2	12.4	7.2	2.8

DAGGETT CALIFORNIA

34.9 N
2203 DD
T(JAN)=47

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 360	165	103	73	55	42	32	24	15
	L	WWNI 491	228	144	103	79	62	49	39	27
	C	TW 334	153	94	65	46	34	25	17	11
	R	TWNI 461	214	135	96	72	56	43	32	21
		DG 411	185	112	74	51	35	23	13	-
		DGNI 526	244	153	108	81	61	46	33	22
		WW 33.0	28.9	26.3	24.2	20.3	16.2	11.6	6.5	2.2
		WWNI 46.6	40.2	37.7	35.4	32.0	26.8	21.3	14.2	5.9
	D	TW 30.6	26.6	22.6	18.3	14.4	10.8	7.4	4.6	1.9
		TWNI 42.6	38.2	35.1	31.6	27.0	22.0	15.6	9.5	3.9
		DG 36.9	31.1	25.3	19.0	13.5	8.7	4.8	1.9	-
		DGNI 48.3	43.0	39.6	34.5	29.0	22.3	15.5	9.3	3.8

FRESNO CALIFORNIA

36.8 N
2650 DD
T(JAN)=45

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 272	122	74	51	37	27	20	13	7
	L	WWNI 383	179	110	77	58	45	34	26	18
	C	TW 252	114	68	45	31	22	15	10	5
	R	TWNI 361	166	102	72	53	40	30	22	14
		DG 295	128	72	44	27	15	-	-	-
		DGNI 408	186	114	79	57	42	31	22	13
		WW 25.8	19.8	17.4	15.1	11.7	8.5	5.8	2.8	.6
		WWNI 37.0	29.9	27.4	24.9	21.6	17.1	12.7	8.8	3.6
	D	TW 22.6	18.8	15.1	11.6	8.7	6.2	3.9	2.2	.7
		TWNI 34.1	28.4	25.3	22.0	18.0	14.4	10.2	6.0	2.3
		DG 25.6	19.6	14.1	9.3	5.4	2.2	-	-	-
		DGNI 37.7	31.8	27.9	23.2	18.6	14.3	9.6	5.5	2.0

LONG BEACH CALIFORNIA

33.8 N
1606 DD
T(JAN)=54

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 527	249	156	112	85	67	53	40	27
	L	WWNI 689	331	208	150	115	91	74	59	42
	C	TW 488	228	142	99	72	53	39	29	19
	R	TWNI 650	307	195	139	106	83	64	48	32
		DG 630	291	180	123	87	63	44	30	17
		DGNI 753	354	224	159	120	92	70	52	34
		WW 50.5	43.9	40.6	37.1	33.3	28.8	20.7	12.4	4.9
		WWNI 66.1	59.1	54.6	51.7	47.0	42.1	34.8	22.4	9.6
	D	TW 45.3	40.4	35.5	29.2	23.0	17.8	13.0	8.3	4.2
		TWNI 62.3	55.2	51.2	46.5	41.5	33.3	23.9	14.8	6.2
		DG 57.9	50.8	43.8	34.6	26.2	18.8	12.3	6.8	2.4
		DGNI 71.4	63.6	58.1	52.3	45.0	34.6	24.7	15.3	6.5

LOS ANGELES CALIFORNIA

33.9 N
1819 DD
T(JAN)=54

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 563	259	161	115	87	68	54	41	27
	L	WWNI 737	342	215	153	117	93	75	60	43
	C	TW 513	238	147	101	73	54	40	29	20
	R	TWNI 687	320	200	143	108	84	65	49	33
		DG 665	304	187	127	90	65	46	31	18
		DGNI 793	369	231	163	123	94	72	53	35
		WW 52.5	45.3	41.1	37.7	33.7	29.6	21.2	12.8	5.1
		WWNI 71.1	60.1	55.3	52.1	47.4	42.5	35.7	22.9	9.8
	D	TW 47.7	41.4	36.1	29.5	23.7	18.3	13.1	8.7	4.3
		TWNI 64.3	56.3	51.7	47.0	42.6	33.9	24.3	15.1	6.3
		DG 61.0	52.0	44.7	35.3	27.0	19.4	12.7	7.1	2.7
		DGNI 74.0	64.7	58.9	53.0	45.9	35.3	25.2	15.7	6.7

MOUNT SHASTA CALIFORNIA

41.3 N
5890 DD
T(JAN)=34

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 142	62	37	25	18	13	9	5	-
	L	WWNI 230	106	66	46	35	27	21	16	11
	C	TW 137	61	36	23	15	10	7	4	-
	R	TWNI 216	99	62	43	32	25	19	14	9
		DG 130	50	23	-	-	-	-	-	-
		DGNI 237	107	66	46	33	25	18	12	7
		WW 12.4	10.1	8.5	7.0	5.4	3.6	1.9	.5	-
		WWNI 21.0	18.3	16.6	15.0	13.2	11.4	8.5	5.7	2.3
	D	TW 12.1	9.7	7.6	5.6	3.9	2.4	1.3	.5	-
		TWNI 20.0	17.2	15.4	13.6	11.6	9.2	6.5	3.9	1.5
		DG 10.4	6.5	2.7	-	-	-	-	-	-
		DGNI 21.4	18.3	15.9	13.7	11.0	8.1	5.4	2.9	.9

NEEDLES CALIFORNIA

34.8 N
1428 DD
T(JAN)=52

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	508	239	152	108	81	62	47	35	23
L	WWNI	668	317	202	147	111	86	68	53	37
C	TW	474	220	136	94	67	49	36	26	17
R	TWNI	630	297	189	134	100	77	59	44	29
	DG	608	280	171	116	81	57	40	26	13
	DGNI	729	342	217	153	114	86	65	47	30
	WW	47.4	42.8	40.9	34.3	29.0	23.6	17.5	10.2	3.9
	WWNI	62.3	57.4	54.6	49.8	41.8	34.9	28.8	19.1	8.1
D	TW	43.3	38.5	33.1	27.3	21.3	16.1	11.4	6.9	3.3
	TWNI	59.0	53.9	49.8	43.2	36.5	29.9	21.1	12.8	5.2
	DG	55.1	48.1	40.2	31.7	23.3	16.2	10.1	5.2	1.5
	DGNI	67.6	62.2	55.5	48.0	40.6	31.2	21.7	13.1	5.4

OAKLAND CALIFORNIA

37.7 N
2909 DD
T(JAN)=49

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	348	170	107	75	56	42	32	23	14
L	WWNI	472	234	150	106	80	62	49	38	27
C	TW	327	155	96	66	47	34	24	17	11
R	TWNI	446	219	139	98	73	56	43	31	20
	DG	405	189	115	76	51	35	22	12	-
	DGNI	512	249	157	110	82	61	46	33	21
	WW	34.8	31.7	26.6	23.1	20.0	15.3	11.0	6.1	2.0
	WWNI	47.2	44.8	39.1	33.8	30.6	26.4	19.8	13.5	5.6
D	TW	31.7	27.6	23.2	18.7	14.3	10.4	7.0	4.2	2.0
	TWNI	44.5	40.8	35.4	31.5	26.6	21.0	15.0	9.1	3.6
	DG	38.8	32.5	25.8	19.2	13.3	8.3	4.4	1.6	-
	DGNI	50.6	45.6	39.7	34.7	28.1	21.6	15.0	8.9	3.5

RED BLUFF CALIFORNIA

40.1 N
2688 DD
T(JAN)=45

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	258	115	69	48	35	26	19	13	6
L	WWNI	365	170	104	74	56	43	33	26	18
C	TW	239	108	64	43	30	21	15	10	5
R	TWNI	345	158	98	69	51	39	29	21	14
	DG	276	119	68	41	25	14	-	-	-
	DGNI	389	177	109	76	55	41	30	21	13
	WW	24.4	18.5	16.7	14.8	11.4	8.3	5.7	2.7	.6
	WWNI	35.5	28.4	26.0	24.1	21.6	17.1	12.6	8.7	3.5
D	TW	21.4	18.0	14.4	11.1	8.4	6.0	3.9	2.1	.7
	TWNI	32.6	27.0	24.3	21.6	17.7	14.2	10.1	6.0	2.3
	DG	23.9	18.4	13.2	8.6	4.9	1.8	-	-	-
	DGNI	35.9	30.1	26.7	22.6	18.2	14.0	9.4	5.4	1.9

SACRAMENTO CALIFORNIA

38.5 N
2843 DD
T(JAN)=45

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	258	119	73	50	36	26	19	13	6
L	WWNI	368	174	108	76	57	44	34	26	18
C	TW	244	110	66	44	31	22	15	10	5
R	TWNI	347	162	101	71	52	39	30	21	14
	DG	283	124	71	44	27	15	-	-	-
	DGNI	393	182	112	78	57	42	31	22	13
	WW	23.9	20.2	17.4	15.0	11.6	8.3	5.7	2.7	.5
	WWNI	34.2	30.7	27.1	24.4	21.7	17.1	12.4	8.7	3.5
D	TW	22.0	18.5	15.0	11.8	8.6	6.0	3.9	2.0	.6
	TWNI	32.6	28.4	25.2	22.1	17.9	14.1	10.1	6.0	2.3
	DG	24.7	19.4	13.9	9.2	5.1	2.0	-	-	-
	DGNI	36.3	31.4	27.6	23.2	18.4	14.1	9.4	5.4	1.9

SAN DIEGO CALIFORNIA

32.7 N
1507 DD
T(JAN)=55

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	612	284	179	129	98	77	61	46	31
L	WWNI	796	373	235	170	131	104	84	67	48
C	TW	562	261	163	113	82	61	46	33	23
R	TWNI	744	348	220	158	120	94	73	54	37
	DG	734	338	210	144	103	75	53	37	22
	DGNI	864	403	255	181	137	105	80	59	40
	WW	56.7	49.9	47.0	43.3	39.0	33.5	24.4	14.7	6.0
	WWNI	74.2	66.1	62.3	59.7	53.5	48.3	39.3	25.5	10.9
D	TW	51.9	46.0	40.5	33.6	26.8	20.9	15.3	9.9	4.9
	TWNI	69.7	62.0	58.3	52.9	47.6	38.0	27.3	16.9	7.1
	DG	67.0	58.8	51.2	41.1	31.7	23.1	15.5	8.9	3.5
	DGNI	80.7	71.9	66.4	60.1	51.4	39.9	28.5	17.7	7.6

SAN FRANCISCO CALIFORNIA

37.6 N
3042 DD
T(JAN)=48

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	332	163	103	72	53	40	31	22	13
L	WWNI	453	225	145	103	77	60	47	37	26
C	TW	313	149	92	63	45	33	23	16	10
R	TWNI	428	210	134	94	71	54	41	30	20
	DG	385	180	109	72	49	32	20	11	-
	DGNI	491	239	151	106	79	59	44	32	20
	WW	33.2	30.6	25.5	22.0	19.0	14.7	10.5	5.8	1.9
	WWNI	45.3	43.2	37.9	32.5	29.4	25.5	19.3	13.1	5.4
D	TW	30.4	26.5	22.3	17.9	13.6	9.9	6.7	4.0	1.9
	TWNI	42.8	39.6	34.2	30.4	25.7	20.4	14.6	8.8	3.6
	DG	37.0	30.9	24.5	18.1	12.4	7.7	3.9	1.3	-
	DGNI	48.7	44.0	38.2	33.4	27.1	20.8	14.4	8.6	3.4

SANTA MARIA CALIFORNIA

34.9 N
3053 DD
T(JAN)=50

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	327	164	107	77	58	46	35	26	17
L	WWNI	448	224	148	108	83	66	53	42	30
C	TW	311	152	97	67	49	36	27	19	12
R	TWNI	423	211	138	100	76	59	46	34	23
	DG	383	185	116	79	55	38	26	16	7
	DGNI	485	241	156	112	85	65	50	36	24
	WW	32.7	32.3	29.1	25.7	22.4	19.1	13.2	7.6	2.8
	WWNI	44.8	44.8	42.6	37.4	33.8	29.6	24.9	15.9	6.8
D	TW	30.9	28.2	24.8	20.2	15.9	12.0	8.4	5.1	2.6
	TWNI	42.3	41.6	37.8	34.0	30.3	23.9	17.1	10.5	4.4
	DG	37.7	33.6	28.3	21.5	15.5	10.3	6.0	2.7	.6
	DGNI	48.5	46.9	42.3	37.7	32.0	24.3	17.1	10.4	4.3

COLORADO SPRINGS COLORADO

38.8 N
6473 DD
T(JAN)=29

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	130	60	38	26	19	15	11	7	-
L	WWNI	211	102	65	47	36	29	23	18	13
C	TW	128	59	36	24	17	11	8	5	2
R	TWNI	201	96	61	44	33	26	20	15	10
	DG	120	51	26	10	-	-	-	-	-
	DGNI	220	104	66	47	35	26	20	14	9
	WW	12.5	10.5	9.2	8.1	6.9	4.9	2.8	1.1	-
	WWNI	20.4	18.7	17.4	16.0	14.6	13.2	10.8	6.8	2.8
D	TW	11.8	10.2	8.3	6.3	4.5	3.0	1.8	.8	.3
	TWNI	19.4	17.6	16.2	14.7	13.1	10.4	7.4	4.5	1.8
	DG	10.4	7.5	3.8	.4	-	-	-	-	-
	DGNI	20.9	19.0	16.9	15.2	12.5	9.2	6.3	3.6	1.3

DENVER
COLORADO

39.7 N
6016 DD
T(JAN)=30

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 136	63	39	27	20	15	11	7	-
	L	WWNI 218	105	67	48	37	29	24	19	13
	C	TW 132	61	38	25	17	12	8	5	3
	R	TWNI 207	99	63	45	34	27	21	15	10
		DG 127	54	28	13	-	-	-	-	-
		DGNI 227	108	68	48	36	27	20	14	9
		WW 12.9	11.1	9.6	8.4	7.1	5.1	3.0	1.2	-
		WWNI 21.8	19.1	18.2	16.2	15.0	13.6	10.8	6.9	2.9
	D	TW 12.5	10.6	8.7	6.5	4.7	3.2	1.9	.9	.3
		TWNI 20.2	18.2	16.5	15.1	13.3	10.6	7.5	4.6	1.9
		DG 11.2	8.0	4.3	1.1	-	-	-	-	-
		DGNI 21.8	19.6	17.4	15.6	12.8	9.5	6.5	3.7	1.3

EAGLE
COLORADO

39.6 N
8426 DD
T(JAN)=18

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 95	43	26	17	12	8	5	-	-
	L	WWNI 172	81	52	37	28	22	17	13	9
	C	TW 96	43	25	16	10	7	4	-	-
	R	TWNI 163	77	49	34	26	20	15	11	7
		DG 72	22	-	-	-	-	-	-	-
		DGNI 174	81	51	35	26	19	14	9	5
		WW 8.5	7.1	5.8	4.7	3.3	1.9	.6	-	-
		WWNI 16.0	15.2	13.4	12.2	10.8	9.3	7.1	4.7	1.9
	D	TW 8.7	7.0	5.4	3.7	2.3	1.3	.5	-	-
		TWNI 15.3	13.8	12.5	11.1	9.5	7.6	5.3	3.2	1.2
		DG 5.4	1.5	-	-	-	-	-	-	-
		DGNI 16.2	14.3	12.6	10.8	8.6	6.2	4.0	2.1	.6

GRAND JUNCTION
COLORADO

39.1 N
5605 DD
T(JAN)=27

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 135	61	37	25	18	13	9	5	-
	L	WWNI 222	104	66	46	35	28	22	17	12
	C	TW 133	60	36	23	16	11	7	4	1
	R	TWNI 210	98	61	43	33	25	19	14	9
		DG 125	50	24	-	-	-	-	-	-
		DGNI 229	106	66	46	34	25	18	13	8
		WW 12.0	10.3	8.7	7.5	5.7	4.1	2.2	.7	-
		WWNI 20.1	18.7	16.8	15.2	13.9	11.8	9.1	6.0	2.4
	D	TW 11.8	9.8	7.9	5.9	4.1	2.6	1.5	.6	.1
		TWNI 19.2	17.4	15.6	14.1	11.9	9.6	6.8	4.1	1.6
		DG 10.2	6.7	3.0	-	-	-	-	-	-
		DGNI 20.9	18.4	16.3	14.1	11.5	8.5	5.7	3.2	1.1

PUEBLO
COLORADO

38.3 N
5394 DD
T(JAN)=30

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 145	67	41	29	21	16	12	8	-
	L	WWNI 234	109	70	50	38	30	24	19	14
	C	TW 143	65	39	26	18	13	9	5	3
	R	TWNI 220	103	66	47	36	28	21	16	11
		DG 140	59	32	16	-	-	-	-	-
		DGNI 242	113	71	50	38	28	21	15	9
		WW 12.8	11.8	10.2	9.0	7.5	5.5	3.2	1.4	-
		WWNI 21.2	20.3	18.6	16.9	15.4	13.9	11.2	7.1	3.0
	D	TW 12.9	11.0	9.1	7.0	5.1	3.4	2.1	1.1	.4
		TWNI 20.2	18.9	17.2	15.7	13.7	11.0	7.8	4.8	1.9
		DG 11.8	8.8	5.1	1.9	-	-	-	-	-
		DGNI 22.1	20.1	18.1	16.2	13.4	9.9	6.8	3.9	1.4

HARTFORD
CONNECTICUT

41.9 N
6350 DD
T(JAN)=25

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 62	26	14	9	5	-	-	-	-
	L	WWNI 134	62	39	28	21	16	13	10	7
	C	TW 66	28	16	9	5	-	-	-	-
	R	TWNI 127	59	37	26	19	15	11	8	5
		DG -	-	-	-	-	-	-	-	-
		DGNI 131	60	37	25	18	13	9	6	3
		WW 5.2	3.8	2.8	1.7	.6	-	-	-	-
		WWNI 12.4	11.3	10.0	8.9	7.9	6.6	5.1	3.3	1.3
	D	TW 5.6	4.2	2.8	1.6	.5	-	-	-	-
		TWNI 11.6	10.6	9.3	8.2	6.9	5.5	3.8	2.3	.8
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.8	10.2	8.8	7.3	5.7	3.9	2.4	1.1	.2

WILMINGTON
DELAWARE

39.7 N
4940 DD
T(JAN)=32

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 95	44	26	18	12	9	5	-	-
	L	WWNI 171	83	52	37	28	22	18	14	9
	C	TW 97	44	26	17	11	7	4	-	-
	R	TWNI 163	78	49	35	26	20	15	11	7
		DG 74	24	-	-	-	-	-	-	-
		DGNI 174	82	51	36	26	19	14	10	5
		WW 8.9	7.2	6.0	4.8	3.5	2.1	.7	-	-
		WWNI 16.1	15.5	13.4	12.3	11.1	9.3	7.4	4.8	1.9
	D	TW 8.7	7.2	5.5	3.9	2.5	1.4	.6	-	-
		TWNI 15.4	14.1	12.7	11.3	9.6	7.7	5.4	3.3	1.3
		DG 5.7	1.9	-	-	-	-	-	-	-
		DGNI 16.5	14.5	12.8	10.9	8.8	6.4	4.1	2.2	.7

WASHINGTON
DC

38.9 N
5010 DD
T(JAN)=32

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 92	42	25	17	11	8	4	-	-
	L	WWNI 169	80	51	36	27	21	17	13	9
	C	TW 94	42	25	16	10	6	3	-	-
	R	TWNI 160	76	48	34	25	19	15	11	7
		DG 69	19	-	-	-	-	-	-	-
		DGNI 171	80	50	35	25	19	13	9	5
		WW 8.4	6.9	5.5	4.4	3.1	1.8	.5	-	-
		WWNI 15.6	14.9	13.1	11.7	10.7	8.9	7.1	4.6	1.8
	D	TW 8.4	6.8	5.2	3.6	2.2	1.2	.4	-	-
		TWNI 14.9	13.7	12.2	10.9	9.3	7.4	5.2	3.1	1.2
		DG 5.0	.9	-	-	-	-	-	-	-
		DGNI 15.9	14.0	12.3	10.4	8.4	6.0	3.9	2.1	.6

APALACHICOLA
FLORIDA

29.7 N
1361 DD
T(JAN)=54

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 405	182	114	81	61	48	37	27	18
	L	WWNI 547	249	156	113	87	68	55	44	31
	C	TW 371	170	104	72	51	38	28	20	13
	R	TWNI 511	233	147	105	79	62	48	36	24
		DG 464	208	126	84	59	41	28	17	8
		DGNI 585	267	168	119	89	68	52	38	25
		WW 36.6	31.0	29.9	26.7	23.1	19.7	13.9	8.0	2.9
		WWNI 50.2	42.8	41.4	39.2	34.7	30.4	25.3	16.3	6.9
	D	TW 33.7	29.1	25.2	20.5	16.3	12.4	8.8	5.6	2.5
		TWNI 46.7	40.7	38.4	34.5	31.0	24.7	17.6	10.9	4.5
		DG 41.1	34.7	29.2	22.5	16.4	11.1	6.6	3.1	.6
		DGNI 53.0	46.7	43.0	38.3	32.9	25.2	17.8	10.8	4.5

AUGUSTA GEORGIA
33.4 N
2547 DD
T(JAN)=46

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	213	101	62	43	32	25	19	13	7
L	WWNI	312	152	95	67	51	41	33	26	18
C	TW	204	94	58	39	27	20	14	9	6
R	TWNI	295	141	89	63	48	37	28	21	14
	DG	228	101	59	37	22	12	-	-	-
	DGNI	332	157	98	69	52	39	29	21	13
	WW	20.5	17.2	15.0	13.8	11.6	9.4	6.0	3.1	.8
	WWNI	30.0	27.9	23.8	22.4	21.0	18.0	15.0	9.6	4.0
D	TW	18.7	16.3	13.7	10.7	8.0	5.7	3.8	2.2	.9
	TWNI	28.5	25.2	22.7	20.7	18.0	14.5	10.4	6.4	2.6
	DG	20.3	16.3	12.0	7.8	4.3	1.6	-	-	-
	DGNI	32.0	27.7	25.1	21.9	18.5	13.9	9.7	5.7	2.2

MACON GEORGIA
32.7 N
2240 DD
T(JAN)=48

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	244	114	70	49	37	28	21	15	9
L	WWNI	349	169	105	74	57	45	36	28	20
C	TW	230	106	65	44	31	22	16	11	7
R	TWNI	330	156	98	69	52	41	31	23	16
	DG	266	119	70	44	28	17	9	-	-
	DGNI	373	175	109	77	57	43	33	24	15
	WW	23.8	19.1	17.1	15.7	13.4	11.0	7.2	3.8	1.1
	WWNI	34.0	29.7	26.0	25.0	23.1	19.9	16.7	10.6	4.4
D	TW	21.2	18.4	15.5	12.2	9.1	6.7	4.6	2.8	1.1
	TWNI	32.1	27.5	25.0	22.7	19.9	16.1	11.5	7.1	2.9
	DG	23.7	19.2	14.7	10.0	6.1	3.1	.9	-	-
	DGNI	35.9	30.5	27.8	24.3	20.7	15.6	10.9	6.5	2.6

SAVANNAH GEORGIA
32.1 N
1952 DD
T(JAN)=50

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	278	131	81	57	43	33	26	19	11
L	WWNI	389	189	118	84	65	51	41	32	23
C	TW	260	122	75	51	37	26	19	13	9
R	TWNI	367	175	110	79	59	46	36	27	18
	DG	309	141	84	55	37	24	14	6	-
	DGNI	417	197	124	88	66	50	38	27	18
	WW	27.5	22.5	20.4	18.7	15.9	13.3	9.0	4.9	1.6
	WWNI	38.9	33.7	30.0	28.9	26.2	22.6	19.1	12.1	5.1
D	TW	24.5	21.4	18.2	14.3	11.1	8.2	5.7	3.5	1.5
	TWNI	36.1	31.2	28.7	25.8	22.8	18.4	13.1	8.1	3.3
	DG	28.4	23.5	18.7	13.4	8.9	5.2	2.4	.4	-
	DGNI	40.5	35.0	32.0	28.0	23.9	18.1	12.7	7.7	3.1

BOISE IDAHO
43.6 N
5833 DD
T(JAN)=29

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	132	58	34	22	15	10	5	-	-
L	WWNI	215	101	63	44	32	25	19	14	9
C	TW	127	56	32	20	13	8	4	-	-
R	TWNI	203	95	59	41	30	22	16	12	7
	DG	117	42	-	-	-	-	-	-	-
	DGNI	221	102	62	42	30	22	15	10	5
	WW	11.8	9.5	7.2	5.4	3.6	2.1	.7	-	-
	WWNI	21.1	17.5	15.8	13.4	11.3	9.2	6.5	4.4	1.7
D	TW	11.4	8.9	6.5	4.6	3.0	1.6	.6	-	-
	TWNI	19.2	16.7	14.3	12.1	9.8	7.5	5.3	3.1	1.1
	DG	9.3	4.6	-	-	-	-	-	-	-
	DGNI	20.5	17.4	14.5	11.9	9.0	6.6	4.1	2.1	.6

LEWISTON IDAHO
46.4 N
5464 DD
T(JAN)=31

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	110	46	26	15	9	4	-	-	-
L	WWNI	192	88	54	37	27	20	15	11	7
C	TW	108	46	25	15	9	4	-	-	-
R	TWNI	181	82	50	34	25	18	13	9	6
	DG	85	-	-	-	-	-	-	-	-
	DGNI	194	87	52	34	24	17	11	7	3
	WW	9.2	7.1	4.9	3.0	1.5	.3	-	-	-
	WWNI	18.5	14.8	13.3	10.9	8.7	6.8	4.8	3.3	1.3
D	TW	9.3	6.7	4.6	2.9	1.5	.4	-	-	-
	TWNI	16.5	14.0	11.9	9.7	7.7	5.8	4.1	2.3	.8
	DG	5.8	-	-	-	-	-	-	-	-
	DGNI	17.4	14.4	11.6	9.0	6.7	4.7	2.8	1.3	.2

POCATELLO IDAHO
42.9 N
7063 DD
T(JAN)=23

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	105	47	28	18	12	8	3	-	-
L	WWNI	182	88	55	39	29	22	17	13	9
C	TW	104	47	27	17	11	6	3	-	-
R	TWNI	173	82	51	36	26	20	15	11	7
	DG	84	27	-	-	-	-	-	-	-
	DGNI	186	87	54	37	26	19	14	9	5
	WW	9.9	7.8	5.9	4.4	2.8	1.5	.2	-	-
	WWNI	17.7	15.6	14.2	12.1	10.4	8.5	6.1	4.1	1.6
D	TW	9.5	7.5	5.5	3.7	2.3	1.1	.3	-	-
	TWNI	16.8	14.7	12.8	11.0	9.1	7.0	4.9	2.9	1.1
	DG	6.5	2.1	-	-	-	-	-	-	-
	DGNI	17.6	15.3	12.8	10.5	8.1	5.8	3.7	1.8	.5

CHICAGO ILLINOIS
41.8 N
6127 DD
T(JAN)=24

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	73	31	17	11	6	-	-	-	-
L	WWNI	149	69	43	30	22	17	14	10	7
C	TW	78	33	18	11	6	-	-	-	-
R	TWNI	141	65	40	28	21	16	12	9	5
	DG	34	-	-	-	-	-	-	-	-
	DGNI	148	67	41	28	20	14	10	7	3
	WW	6.3	4.6	3.4	2.2	1.1	-	-	-	-
	WWNI	13.1	12.7	10.6	9.3	8.4	6.9	5.3	3.5	1.3
D	TW	6.5	4.9	3.4	2.0	.9	-	-	-	-
	TWNI	12.6	11.4	10.0	8.8	7.3	5.8	4.0	2.4	.9
	DG	1.3	-	-	-	-	-	-	-	-
	DGNI	13.1	11.3	9.6	7.9	6.2	4.3	2.6	1.3	.2

MOLINE ILLINOIS
41.4 N
6395 DD
T(JAN)=21

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	72	30	17	10	6	-	-	-	-
L	WWNI	147	68	42	30	22	17	13	10	7
C	TW	76	32	18	10	6	-	-	-	-
R	TWNI	139	64	40	28	21	16	12	9	5
	DG	29	-	-	-	-	-	-	-	-
	DGNI	145	66	40	27	19	14	10	6	3
	WW	6.2	4.4	3.2	2.1	1.0	-	-	-	-
	WWNI	13.1	12.3	10.4	9.1	8.3	6.9	5.3	3.4	1.3
D	TW	6.4	4.7	3.3	1.9	.8	-	-	-	-
	TWNI	12.6	11.2	9.7	8.7	7.2	5.7	4.0	2.4	.9
	DG	.8	-	-	-	-	-	-	-	-
	DGNI	13.0	11.0	9.4	7.8	6.1	4.2	2.6	1.2	.2

DAYTONA BEACH FLORIDA
29.2 N, 902 DD, T(JAN)=58

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	603	281	180	130	100	79	62	48	32
	L	WWNI	784	367	235	172	133	106	86	69	49
	C	TW	556	260	164	114	83	62	47	34	23
	R	TWNI	735	344	221	159	122	96	74	56	38
		DG	725	337	211	146	105	76	55	38	23
		DGNI	852	399	256	183	139	107	82	61	41
		WW	55.5	50.8	49.4	45.2	39.8	35.4	25.3	15.3	6.3
		WWNI	73.8	66.4	65.2	61.3	55.2	49.0	41.9	26.4	11.4
	D	TW	50.7	46.6	41.7	34.3	27.9	21.7	15.9	10.5	5.4
		TWNI	67.6	63.0	59.8	54.4	49.3	39.1	28.1	17.5	7.3
		DG	65.9	59.8	52.8	42.3	32.8	24.1	16.2	9.4	3.7
		DGNI	78.1	73.2	68.4	61.6	53.3	41.1	29.4	18.3	7.9

JACKSONVILLE FLORIDA
30.5 N, 1327 DD, T(JAN)=55

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	425	191	120	87	66	52	41	31	20
	L	WWNI	573	260	164	119	92	74	60	47	34
	C	TW	390	179	111	77	55	41	30	22	15
	R	TWNI	533	244	154	111	85	66	52	39	26
		DG	489	221	136	92	65	46	32	21	11
		DGNI	611	279	177	126	96	73	56	41	27
		WW	37.8	32.9	32.3	29.8	26.0	22.6	15.8	9.3	3.5
		WWNI	52.8	44.9	44.0	43.2	38.5	33.9	28.8	18.1	7.7
	D	TW	35.4	31.2	27.3	22.4	18.0	13.9	10.0	6.4	3.1
		TWNI	48.4	42.9	41.4	37.7	33.9	27.1	19.4	12.0	5.0
		DG	43.5	37.7	32.3	25.2	18.8	13.1	8.1	4.1	1.2
		DGNI	55.2	49.2	46.6	41.9	36.1	27.8	19.7	12.1	5.1

MIAMI FLORIDA
25.8 N, 206 DD, T(JAN)=67

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	2285	1138	731	516	389	307	242	186	130
	L	WWNI	2804	1401	906	641	483	382	307	242	174
	C	TW	2102	1013	641	449	329	245	184	135	94
	R	TWNI	2638	1304	832	589	446	344	265	198	133
		DG	2912	1403	886	620	452	336	249	181	121
		DGNI	3119	1534	975	692	520	398	303	224	151
		WW	229.	218.	189.	166.	153.	131.	101.	64.	28.
		WWNI	280.	274.	240.	205.	188.	178.	136.	92.	39.
	D	TW	206.	185.	163.	137.	110.	84.	63.	42.	23.
		TWNI	264.	247.	214.	192.	169.	136.	97.	61.	25.
		DG	286.	255.	226.	188.	149.	114.	81.	52.	25.
		DGNI	312.	287.	251.	228.	190.	149.	107.	68.	30.

ORLANDO FLORIDA
28.5 N, 733 DD, T(JAN)=60

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	723	346	224	163	124	98	78	60	41
	L	WWNI	927	446	289	211	163	130	105	84	60
	C	TW	663	319	202	142	104	78	58	43	30
	R	TWNI	867	418	270	195	149	117	91	68	46
		DG	879	421	265	185	134	99	72	51	32
		DGNI	1010	487	314	226	171	132	101	75	50
		WW	69.8	64.7	61.8	56.4	49.8	43.6	31.9	19.6	8.2
		WWNI	90.9	83.1	81.9	75.0	67.1	60.0	50.3	32.1	13.8
	D	TW	64.0	58.4	52.1	43.2	35.1	27.4	20.1	12.8	7.0
		TWNI	83.7	78.8	73.7	66.7	59.7	47.7	34.2	21.2	8.9
		DG	84.3	76.5	67.6	54.9	43.0	32.0	22.0	13.1	5.6
		DGNI	97.3	92.0	84.6	76.2	65.8	50.7	36.3	22.6	9.8

TALLAHASSEE FLORIDA
30.4 N, 1563 DD, T(JAN)=53

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	359	162	101	72	55	43	33	24	16
	L	WWNI	491	226	141	102	79	62	50	40	28
	C	TW	330	152	93	64	46	34	25	18	12
	R	TWNI	458	211	133	95	72	56	43	32	22
		DG	405	183	110	74	51	35	23	14	5
		DGNI	523	240	151	107	80	62	47	34	22
		WW	33.2	27.3	26.3	24.0	20.8	17.8	12.3	7.0	2.5
		WWNI	46.5	38.5	36.9	36.6	32.0	28.0	23.7	15.0	6.4
	D	TW	30.2	26.2	22.5	18.2	14.5	11.0	7.8	4.9	2.1
		TWNI	42.7	36.7	35.1	31.5	28.2	22.6	16.2	10.0	4.1
		DG	36.2	30.5	25.3	19.2	13.8	9.1	5.2	2.2	.3
		DGNI	48.2	41.9	39.0	34.7	29.9	22.9	16.1	9.8	4.0

TAMPA FLORIDA
28.0 N, 718 DD, T(JAN)=60

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	720	343	223	162	124	98	78	59	41
	L	WWNI	926	441	288	211	162	129	105	83	60
	C	TW	663	317	201	141	104	78	58	43	30
	R	TWNI	866	415	269	195	149	117	90	68	46
		DG	878	418	264	184	134	98	72	50	32
		DGNI	1008	484	312	225	171	132	101	75	50
		WW	67.7	64.8	61.7	56.0	49.6	43.5	31.8	19.5	8.2
		WWNI	87.2	83.2	82.5	74.9	66.5	59.8	50.9	32.0	13.8
	D	TW	63.4	57.8	51.8	43.2	35.1	27.3	20.1	12.8	6.5
		TWNI	82.1	78.7	73.7	66.5	59.6	47.6	34.1	21.2	8.9
		DG	83.5	75.8	67.2	54.9	42.9	31.9	21.9	13.1	5.6
		DGNI	95.7	91.5	84.2	76.1	65.6	50.6	36.2	22.5	9.8

WEST PALM BEACH FLORIDA
26.7 N, 299 DD, T(JAN)=65

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	1523	761	494	350	264	208	164	126	88
	L	WWNI	1886	943	619	441	331	261	211	167	120
	C	TW	1407	682	433	304	223	167	125	91	63
	R	TWNI	1775	884	568	403	305	237	183	136	92
		DG	1930	935	592	415	302	224	165	119	79
		DGNI	2093	1038	663	471	355	272	207	153	103
		WW	152.	151.	130.	112.	103.	90.	68.	43.	19.
		WWNI	189.	189.	168.	141.	128.	121.	96.	6[illegible].	28.
	D	TW	139.	125.	111.	93.	75.	58.	42.	28.	15.
		TWNI	178.	171.	150.	132.	118.	94.	67.	42.	18.
		DG	192.	171.	152.	125.	99.	75.	53.	34.	16.
		DGNI	209.	197.	172.	155.	132.	102.	73.	46.	21.

ATLANTA GEORGIA
33.6 N, 3095 DD, T(JAN)=42

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	172	79	48	33	25	19	14	9	4
	L	WWNI	264	126	79	56	42	33	27	21	15
	C	TW	166	75	46	31	21	15	10	7	4
	R	TWNI	249	118	74	52	39	30	23	17	11
		DG	173	74	41	23	10	-	-	-	-
		DGNI	276	129	80	56	42	32	23	17	10
		WW	15.8	13.5	11.5	10.2	8.5	6.6	4.0	1.8	.2
		WWNI	24.6	22.9	20.0	18.3	16.9	14.6	12.1	7.7	3.2
	D	TW	15.0	12.8	10.5	8.1	5.8	4.1	2.5	1.4	.5
		TWNI	23.3	21.0	18.8	17.0	14.8	11.9	8.4	5.2	2.1
		DG	14.8	11.2	7.3	3.7	.8	-	-	-	-
		DGNI	25.9	22.6	20.3	17.6	14.8	11.0	7.5	4.4	1.6

SPRINGFIELD ILLINOIS

39.8 N
5558 DD
T(JAN)=27

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	90	39	22	14	10	6	-	-	-
L	WWNI	168	78	49	34	25	20	16	12	8
C	TW	92	39	23	14	9	5	2	-	-
R	TWNI	159	74	46	32	24	18	14	10	6
	DG	61	-	-	-	-	-	-	-	-
	DGNI	169	77	47	32	23	17	12	8	4
	WW	7.9	5.9	4.7	3.6	2.4	1.1	-	-	-
	WWNI	15.0	14.1	12.0	10.6	9.8	8.2	6.4	4.2	1.7
D	TW	7.8	6.1	4.5	2.9	1.7	.8	.1	-	-
	TWNI	14.4	12.8	11.2	10.0	8.5	6.8	4.8	2.9	1.1
	DG	4.0	-	-	-	-	-	-	-	-
	DGNI	15.2	13.0	11.2	9.4	7.6	5.4	3.4	1.8	.5

EVANSVILLE INDIANA

38.0 N
4629 DD
T(JAN)=33

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	104	46	26	17	12	8	5	-	-
L	WWNI	182	86	54	37	28	22	17	13	9
C	TW	104	45	26	17	11	7	4	-	-
R	TWNI	173	81	50	35	26	20	15	11	7
	DG	81	25	-	-	-	-	-	-	-
	DGNI	186	85	52	36	26	19	14	9	5
	WW	9.3	7.2	5.6	4.5	3.3	1.9	.6	-	-
	WWNI	16.9	15.6	13.3	11.6	10.9	9.1	7.2	4.7	1.9
D	TW	9.1	7.2	5.5	3.7	2.3	1.3	.5	-	-
	TWNI	16.1	14.2	12.3	11.1	9.4	7.5	5.3	3.2	1.2
	DG	5.9	1.9	-	-	-	-	-	-	-
	DGNI	17.1	14.5	12.5	10.6	8.6	6.2	4.0	2.1	.6

FORT WAYNE INDIANA

41.0 N
6209 DD
T(JAN)=25

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	62	25	13	8	-	-	-	-	-
L	WWNI	136	62	39	27	20	16	12	9	6
C	TW	67	28	15	8	4	-	-	-	-
R	TWNI	128	59	37	25	19	14	11	8	5
	DG	-	-	-	-	-	-	-	-	-
	DGNI	132	60	36	24	17	12	9	5	2
	WW	5.1	3.6	2.4	1.3	-	-	-	-	-
	WWNI	12.1	11.3	9.6	8.3	7.4	6.2	4.7	3.1	1.2
D	TW	5.5	4.0	2.6	1.3	.2	-	-	-	-
	TWNI	11.5	10.3	8.9	7.9	6.5	5.2	3.6	2.1	.8
	DG	-	-	-	-	-	-	-	-	-
	DGNI	11.7	9.9	8.4	6.9	5.3	3.6	2.2	1.0	.1

INDIANAPOLIS INDIANA

39.7 N
5577 DD
T(JAN)=28

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	74	31	17	11	7	-	-	-	-
L	WWNI	148	69	43	30	23	17	14	11	7
C	TW	77	33	18	11	6	2	-	-	-
R	TWNI	141	65	41	28	21	16	12	9	6
	DG	35	-	-	-	-	-	-	-	-
	DGNI	147	67	41	28	20	14	10	7	3
	WW	6.5	4.6	3.4	2.3	1.3	-	-	-	-
	WWNI	13.4	12.6	10.6	9.3	8.5	7.1	5.5	3.6	1.4
D	TW	6.6	4.9	3.4	2.1	.9	.1	-	-	-
	TWNI	12.9	11.4	9.9	8.9	7.4	5.9	4.1	2.4	.9
	DG	1.4	-	-	-	-	-	-	-	-
	DGNI	13.4	11.3	9.6	8.0	6.3	4.4	2.7	1.3	.3

SOUTH BEND INDIANA

41.7 N
6462 DD
T(JAN)=24

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	60	24	12	6	-	-	-	-	-
L	WWNI	137	61	38	26	19	15	11	9	6
C	TW	66	26	14	7	-	-	-	-	-
R	TWNI	129	58	36	25	18	13	10	7	5
	DG	-	-	-	-	-	-	-	-	-
	DGNI	132	58	35	23	16	12	8	5	-
	WW	4.8	3.2	1.9	.7	-	-	-	-	-
	WWNI	11.8	10.8	9.1	7.8	6.9	5.6	4.2	2.8	1.0
D	TW	5.3	3.6	2.2	1.0	-	-	-	-	-
	TWNI	11.2	9.9	8.5	7.4	6.1	4.8	3.3	1.9	.7
	DG	-	-	-	-	-	-	-	-	-
	DGNI	11.3	9.4	7.8	6.3	4.8	3.2	1.9	.8	-

BURLINGTON IOWA

40.8 N
6149 DD
T(JAN)=23

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	83	36	20	13	8	5	-	-	-
L	WWNI	159	74	46	32	24	19	15	11	8
C	TW	85	36	21	13	7	4	-	-	-
R	TWNI	151	70	43	30	22	17	13	9	6
	DG	50	-	-	-	-	-	-	-	-
	DGNI	159	72	44	30	22	16	11	7	4
	WW	7.2	5.4	4.1	3.0	1.9	.6	-	-	-
	WWNI	14.3	13.4	11.4	10.0	9.2	7.6	5.9	3.9	1.5
D	TW	7.3	5.6	4.0	2.6	1.3	.5	-	-	-
	TWNI	13.7	12.2	10.6	9.5	7.9	6.4	4.4	2.6	1.0
	DG	3.0	-	-	-	-	-	-	-	-
	DGNI	14.4	12.2	10.5	8.8	6.9	4.9	3.1	1.5	.4

DES MOINES IOWA

41.5 N
6710 DD
T(JAN)=19

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	78	33	18	11	7	3	-	-	-
L	WWNI	155	71	44	31	23	18	14	11	7
C	TW	81	34	19	11	6	3	-	-	-
R	TWNI	146	67	41	29	21	16	12	9	6
	DG	41	-	-	-	-	-	-	-	-
	DGNI	153	69	42	29	20	15	11	7	3
	WW	6.6	4.8	3.6	2.5	1.5	.2	-	-	-
	WWNI	13.9	12.7	10.8	9.5	8.6	7.3	5.6	3.7	1.4
D	TW	6.8	5.1	3.6	2.2	1.0	.2	-	-	-
	TWNI	13.2	11.6	10.1	9.0	7.5	6.1	4.2	2.5	1.0
	DG	2.0	-	-	-	-	-	-	-	-
	DGNI	13.7	11.5	9.8	8.2	6.5	4.5	2.8	1.4	.3

MASON CITY IOWA

43.1 N
7901 DD
T(JAN)=14

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	68	27	14	8	4	-	-	-	-
L	WWNI	143	65	40	28	21	16	12	9	6
C	TW	72	29	16	9	4	-	-	-	-
R	TWNI	136	62	38	26	19	15	11	8	5
	DG	-	-	-	-	-	-	-	-	-
	DGNI	141	63	37	25	18	13	9	6	2
	WW	5.5	3.7	2.6	1.5	.3	-	-	-	-
	WWNI	13.0	11.3	9.7	8.5	7.5	6.3	4.8	3.2	1.2
D	TW	5.9	4.2	2.7	1.4	.4	-	-	-	-
	TWNI	12.2	10.6	9.1	8.0	6.7	5.3	3.7	2.2	.8
	DG	-	-	-	-	-	-	-	-	-
	DGNI	12.3	10.2	8.5	7.1	5.4	3.7	2.3	1.0	.1

SIOUX CITY
IOWA

42.4 N
6953 DD
T(JAN)=18

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 77	32	17	11	7	-	-	-	-
	L	WWNI 153	70	44	30	22	17	14	10	7
	C	TW 80	33	18	11	6	-	-	-	-
	R	TWNI 144	66	41	28	21	16	12	9	6
		DG 37	-	-	-	-	-	-	-	-
		DGNI 151	68	41	28	20	14	10	7	3
		WW 6.5	4.6	3.3	2.3	1.2	-	-	-	-
		WWNI 14.0	12.4	10.6	9.2	8.4	7.0	5.4	3.5	1.4
	D	TW 6.7	5.0	3.4	2.0	.9	-	-	-	-
		TWNI 13.2	11.4	9.9	8.8	7.3	5.9	4.1	2.4	.9
		DG 1.6	-	-	-	-	-	-	-	-
		DGNI 13.6	11.3	9.5	7.9	6.2	4.3	2.7	1.3	.3

DODGE CITY
KANSAS

37.8 N
5046 DD
T(JAN)=31

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 140	64	39	27	19	15	10	6	-
	L	WWNI 228	107	67	48	36	29	23	18	13
	C	TW 138	62	37	25	17	11	8	5	2
	R	TWNI 215	100	63	45	34	26	20	15	10
		DG 132	54	27	10	-	-	-	-	-
		DGNI 236	109	68	47	35	26	20	14	8
		WW 12.5	10.6	9.1	8.1	6.6	4.7	2.7	1.0	-
		WWNI 20.6	19.6	17.1	15.6	14.4	12.8	10.3	6.6	2.7
	D	TW 12.2	10.3	8.4	6.3	4.5	2.9	1.7	.8	.2
		TWNI 19.7	17.8	16.0	14.6	12.7	10.2	7.2	4.4	1.8
		DG 10.8	7.5	3.9	.3	-	-	-	-	-
		DGNI 21.6	18.9	16.8	14.9	12.3	9.1	6.2	3.5	1.2

GOODLAND
KANSAS

39.4 N
6119 DD
T(JAN)=28

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 120	55	33	23	17	12	8	5	-
	L	WWNI 202	95	61	43	33	26	21	16	12
	C	TW 118	54	32	21	14	10	6	4	1
	R	TWNI 190	90	57	40	31	24	18	13	9
		DG 105	42	18	-	-	-	-	-	-
		DGNI 206	97	60	42	31	24	17	12	7
		WW 10.8	9.4	7.8	6.7	5.4	3.7	1.9	.6	-
		WWNI 19.7	17.2	16.0	14.2	12.9	11.7	9.3	5.9	2.5
	D	TW 10.9	9.0	7.2	5.3	3.7	2.4	1.3	.5	.1
		TWNI 18.1	16.4	14.6	13.2	11.6	9.2	6.5	4.0	1.6
		DG 8.7	5.4	1.7	-	-	-	-	-	-
		DGNI 19.3	17.1	15.2	13.4	10.9	8.0	5.4	3.0	1.0

TOPEKA
KANSAS

39.1 N
5243 DD
T(JAN)=28

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 112	50	29	20	14	10	6	-	-
	L	WWNI 194	91	57	40	30	23	19	14	10
	C	TW 112	49	29	18	12	8	5	2	-
	R	TWNI 183	85	53	37	28	21	16	12	8
		DG 93	33	-	-	-	-	-	-	-
		DGNI 198	91	56	39	28	21	15	10	6
		WW 10.0	7.9	6.4	5.4	4.0	2.6	1.1	-	-
		WWNI 17.7	16.5	14.2	12.6	11.6	9.9	7.9	5.1	2.1
	D	TW 9.8	7.9	6.1	4.3	2.8	1.7	.8	.2	-
		TWNI 16.9	14.9	13.2	11.9	10.1	8.1	5.7	3.5	1.4
		DG 7.1	3.4	-	-	-	-	-	-	-
		DGNI 18.2	15.6	13.5	11.6	9.4	6.8	4.5	2.4	.8

WICHITA
KANSAS

37.6 N
4687 DD
T(JAN)=31

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 138	63	38	26	19	14	10	6	-
	L	WWNI 224	106	66	47	35	28	22	17	12
	C	TW 135	61	36	24	16	11	7	4	2
	R	TWNI 212	99	62	44	33	25	19	14	9
		DG 128	52	25	-	-	-	-	-	-
		DGNI 232	107	66	46	34	26	19	13	8
		WW 12.6	10.3	8.7	7.6	6.1	4.4	2.4	.8	-
		WWNI 20.7	19.1	16.8	15.1	14.1	12.2	9.8	6.3	2.6
	D	TW 12.0	10.1	8.1	5.9	4.1	2.7	1.5	.7	.1
		TWNI 19.8	17.5	15.6	14.2	12.2	9.8	7.0	4.3	1.7
		DG 10.5	7.1	3.3	-	-	-	-	-	-
		DGNI 21.4	18.7	16.4	14.3	11.8	8.7	5.9	3.3	1.1

LEXINGTON
KENTUCKY

38.0 N
4729 DD
T(JAN)=33

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 96	42	24	16	11	7	4	-	-
	L	WWNI 174	82	51	36	27	21	17	13	9
	C	TW 98	42	25	15	10	6	3	-	-
	R	TWNI 165	77	48	34	25	19	15	11	7
		DG 71	17	-	-	-	-	-	-	-
		DGNI 177	81	50	34	25	18	13	9	5
		WW 8.6	6.6	5.2	4.1	2.9	1.6	.4	-	-
		WWNI 16.0	14.9	12.7	11.2	10.4	8.7	7.0	4.5	1.8
	D	TW 8.5	6.7	5.0	3.4	2.0	1.1	.3	-	-
		TWNI 15.3	13.5	11.8	10.6	9.0	7.2	5.1	3.1	1.2
		DG 4.9	.4	-	-	-	-	-	-	-
		DGNI 16.2	13.8	11.9	10.1	8.2	5.8	3.8	2.0	.6

LOUISVILLE
KENTUCKY

38.2 N
4645 DD
T(JAN)=33

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 98	44	25	17	12	8	4	-	-
	L	WWNI 176	84	52	37	27	21	17	13	9
	C	TW 99	44	25	16	10	6	3	-	-
	R	TWNI 167	78	49	34	25	19	15	11	7
		DG 74	21	-	-	-	-	-	-	-
		DGNI 179	83	51	35	25	19	14	9	5
		WW 8.9	6.9	5.4	4.3	3.1	1.8	.5	-	-
		WWNI 16.3	15.3	13.1	11.4	10.6	8.9	7.1	4.6	1.8
	D	TW 8.7	6.9	5.2	3.5	2.2	1.2	.4	-	-
		TWNI 15.6	13.8	12.1	10.8	9.2	7.4	5.2	3.1	1.2
		DG 5.3	1.2	-	-	-	-	-	-	-
		DGNI 16.5	14.2	12.2	10.3	8.4	6.0	3.9	2.1	.6

BATON ROUGE
LOUISIANA

30.5 N
1670 DD
T(JAN)=51

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 312	142	87	62	46	36	28	20	12
	L	WWNI 430	203	125	90	69	54	43	34	24
	C	TW 287	133	81	55	39	28	21	15	9
	R	TWNI 405	188	118	84	63	49	38	28	19
		DG 346	156	93	61	41	27	17	8	-
		DGNI 460	213	133	94	70	53	40	29	19
		WW 30.3	23.6	22.1	20.0	17.2	14.1	9.7	5.4	1.7
		WWNI 43.0	34.4	31.8	31.4	27.5	23.9	19.6	12.7	5.3
	D	TW 26.6	22.8	19.3	15.2	12.0	9.0	6.2	3.9	1.6
		TWNI 39.0	32.7	30.5	27.2	24.1	19.4	13.8	8.5	3.5
		DG 31.2	25.5	20.4	14.8	10.2	6.3	3.1	.9	-
		DGNI 43.5	37.0	33.8	29.7	25.2	19.3	13.5	8.1	3.3

LAKE CHARLES LOUISIANA

30.1 N
1498 DD
T(JAN)=52

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	330	144	89	63	48	37	28	21	13
L	WWNI	457	205	127	92	70	55	44	35	25
C	TW	301	136	83	56	40	29	21	15	10
R	TWNI	425	192	120	85	64	50	39	29	19
	DG	364	160	95	62	42	28	18	9	-
	DGNI	482	218	136	96	71	54	41	30	19
	WW	29.3	23.9	23.1	20.6	17.8	14.4	10.0	5.6	1.8
	WWNI	43.2	34.2	33.1	31.7	28.2	24.7	19.7	12.9	5.4
D	TW	27.1	23.0	19.4	15.8	12.4	9.3	6.5	4.0	1.7
	TWNI	38.8	32.9	30.9	27.9	24.8	19.9	14.1	8.7	3.5
	DG	31.8	25.9	20.9	15.5	10.7	6.7	3.4	1.0	-
	DGNI	43.6	37.3	34.3	30.6	25.8	19.8	13.9	8.3	3.3

NEW ORLEANS LOUISIANA

30.0 N
1465 DD
T(JAN)=53

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	374	169	104	74	56	44	34	25	16
L	WWNI	506	235	146	105	80	64	51	40	29
C	TW	342	158	97	66	47	35	25	18	12
R	TWNI	474	219	137	98	74	57	44	33	22
	DG	423	191	115	76	52	36	24	14	6
	DGNI	542	249	156	110	83	63	48	35	23
	WW	35.5	28.2	26.8	24.6	21.3	17.7	12.5	7.1	2.5
	WWNI	50.6	39.6	37.4	36.6	32.7	28.6	23.2	15.1	6.4
D	TW	31.5	27.2	23.2	18.6	14.8	11.2	8.0	5.0	2.2
	TWNI	45.0	37.9	35.6	32.1	28.6	22.9	16.4	10.1	4.1
	DG	38.1	31.8	26.1	19.7	14.2	9.5	5.4	2.3	.3
	DGNI	50.6	43.2	39.8	35.4	30.2	23.2	16.4	10.0	4.1

SHREVEPORT LOUISIANA

32.5 N
2167 DD
T(JAN)=47

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	250	115	70	50	37	29	22	15	9
L	WWNI	356	170	105	75	57	45	36	29	20
C	TW	234	108	66	45	32	23	16	11	7
R	TWNI	336	158	99	70	53	41	32	23	16
	DG	271	120	71	45	29	18	9	-	-
	DGNI	380	177	110	78	58	44	33	24	15
	WW	23.9	19.2	17.5	15.9	13.6	10.9	7.3	3.9	1.1
	WWNI	34.8	29.7	26.5	25.6	23.3	20.1	16.5	10.6	4.5
D	TW	21.5	18.6	15.6	12.2	9.3	6.9	4.7	2.8	1.2
	TWNI	32.2	27.6	25.4	22.9	20.1	16.2	11.6	7.1	2.9
	DG	24.0	19.5	14.9	10.2	6.4	3.3	.9	-	-
	DGNI	35.9	30.8	27.9	24.6	20.8	15.8	11.0	6.6	2.6

CARIBOU MAINE

46.9 N
9632 DD
T(JAN)=11

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	48	18	8	-	-	-	-	-	-
L	WWNI	119	55	34	24	18	13	10	7	5
C	TW	54	21	10	3	-	-	-	-	-
R	TWNI	113	52	32	22	16	12	9	6	4
	DG	-	-	-	-	-	-	-	-	-
	DGNI	114	51	31	20	14	10	6	4	-
	WW	3.8	2.3	.9	-	-	-	-	-	-
	WWNI	11.1	9.5	8.4	7.4	6.2	4.9	3.5	2.2	.8
D	TW	4.5	2.8	1.4	.1	-	-	-	-	-
	TWNI	10.5	8.9	7.9	6.7	5.4	4.1	2.9	1.6	.6
	DG	-	-	-	-	-	-	-	-	-
	DGNI	10.3	8.5	7.0	5.4	3.9	2.6	1.4	.4	-

PORTLAND MAINE

43.6 N
7498 DD
T(JAN)=21

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	60	24	13	7	-	-	-	-	-
L	WWNI	133	61	38	27	20	15	12	9	6
C	TW	65	27	14	8	3	-	-	-	-
R	TWNI	126	58	36	25	19	14	11	8	5
	DG	-	-	-	-	-	-	-	-	-
	DGNI	130	58	35	24	17	12	8	5	2
	WW	4.8	3.4	2.3	1.2	-	-	-	-	-
	WWNI	12.2	10.5	9.7	8.4	7.3	6.1	4.7	3.0	1.2
D	TW	5.4	3.8	2.4	1.2	.2	-	-	-	-
	TWNI	11.6	10.0	8.8	7.7	6.5	5.1	3.6	2.1	.8
	DG	-	-	-	-	-	-	-	-	-
	DGNI	11.5	9.8	8.2	6.8	5.2	3.6	2.1	.9	.1

BALTIMORE MARYLAND

39.2 N
4729 DD
T(JAN)=33

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	101	46	28	19	13	9	6	-	-
L	WWNI	178	86	55	39	29	23	18	14	10
C	TW	102	46	27	18	12	7	4	2	-
R	TWNI	169	81	51	36	27	21	16	12	8
	DG	81	29	-	-	-	-	-	-	-
	DGNI	182	86	54	37	27	20	15	10	6
	WW	9.5	7.7	6.4	5.2	3.9	2.4	1.0	-	-
	WWNI	16.8	16.1	14.0	12.7	11.6	9.7	7.8	5.0	2.0
D	TW	9.1	7.6	5.9	4.2	2.7	1.6	.7	.1	-
	TWNI	16.1	14.7	13.1	11.8	10.0	8.0	5.6	3.4	1.3
	DG	6.4	2.8	-	-	-	-	-	-	-
	DGNI	17.1	15.2	13.4	11.4	9.3	6.7	4.4	2.4	.7

BOSTON MASSACHUSETTS

42.4 N
5621 DD
T(JAN)=29

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	81	35	20	13	9	5	-	-	-
L	WWNI	159	73	46	32	24	19	15	11	8
C	TW	85	36	21	13	8	4	-	-	-
R	TWNI	150	69	43	30	23	17	13	10	6
	DG	49	-	-	-	-	-	-	-	-
	DGNI	158	72	44	30	22	16	11	8	4
	WW	6.8	5.3	4.2	3.1	2.0	.8	-	-	-
	WWNI	14.1	13.2	11.5	10.3	9.3	7.7	6.1	4.0	1.6
D	TW	7.2	5.5	4.1	2.6	1.4	.5	-	-	-
	TWNI	13.5	12.1	10.8	9.6	8.1	6.5	4.5	2.7	1.0
	DG	2.9	-	-	-	-	-	-	-	-
	DGNI	14.0	12.1	10.6	8.9	7.1	5.0	3.2	1.6	.4

ALPENA MICHIGAN

45.1 N
8518 DD
T(JAN)=18

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	53	19	8	-	-	-	-	-	-
L	WWNI	126	57	35	24	17	13	10	7	5
C	TW	58	22	10	-	-	-	-	-	-
R	TWNI	119	54	33	22	16	12	9	6	4
	DG	-	-	-	-	-	-	-	-	-
	DGNI	121	53	31	20	14	10	6	3	-
	WW	4.0	2.2	.7	-	-	-	-	-	-
	WWNI	11.6	9.5	8.5	7.1	5.8	4.6	3.3	2.2	.8
D	TW	4.7	2.8	1.4	-	-	-	-	-	-
	TWNI	11.0	9.0	7.7	6.4	5.2	4.0	2.7	1.6	.5
	DG	-	-	-	-	-	-	-	-	-
	DGNI	10.8	8.5	6.7	5.2	3.7	2.4	1.3	.4	-

DETROIT MICHIGAN
42.4 N
6228 DD
T(JAN)=25

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 62	26	14	8	-	-	-	-	-
	L	WWNI 137	63	39	27	20	16	12	9	6
	C	TW 68	28	15	8	3	-	-	-	-
	R	TWNI 130	60	37	26	19	14	11	8	5
		DG -	-	-	-	-	-	-	-	-
		DGNI 134	60	36	25	17	12	9	5	2
		WW 5.2	3.6	2.5	1.2	-	-	-	-	-
		WWNI 12.0	11.4	9.6	8.4	7.4	6.1	4.6	3.0	1.1
	D	TW 5.6	4.0	2.6	1.3	.2	-	-	-	-
		TWNI 11.5	10.3	9.0	7.9	6.5	5.1	3.6	2.1	.8
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.8	10.0	8.4	6.8	5.2	3.6	2.1	.9	.1

FLINT MICHIGAN
43.0 N
7041 DD
T(JAN)=22

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 54	21	10	-	-	-	-	-	-
	L	WWNI 129	58	36	25	18	14	11	8	5
	C	TW 60	24	12	5	-	-	-	-	-
	R	TWNI 122	55	34	23	17	13	9	7	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 124	54	32	21	15	10	7	4	-
		WW 4.1	2.6	1.3	-	-	-	-	-	-
		WWNI 11.6	9.8	8.7	7.3	6.3	5.2	3.8	2.5	.9
	D	TW 4.8	3.1	1.7	.5	-	-	-	-	-
		TWNI 10.8	9.4	8.0	6.9	5.6	4.4	3.0	1.8	.6
		DG -	-	-	-	-	-	-	-	-
		DGNI 10.6	8.8	7.1	5.7	4.2	2.8	1.6	.6	-

GRAND RAPIDS MICHIGAN
42.9 N
6801 DD
T(JAN)=23

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 57	22	10	-	-	-	-	-	-
	L	WWNI 133	59	37	25	19	14	11	8	5
	C	TW 63	25	12	6	-	-	-	-	-
	R	TWNI 125	56	34	24	17	13	10	7	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 128	56	33	22	15	11	7	4	-
		WW 4.4	2.8	1.5	-	-	-	-	-	-
		WWNI 11.5	10.3	8.8	7.5	6.5	5.2	3.8	2.5	.9
	D	TW 5.0	3.2	1.9	.6	-	-	-	-	-
		TWNI 10.9	9.6	8.2	7.0	5.7	4.4	3.1	1.8	.6
		DG -	-	-	-	-	-	-	-	-
		DGNI 10.9	9.0	7.4	5.9	4.3	2.9	1.6	.6	-

SAULT STE. MARIE MICHIGAN
46.5 N
9193 DD
T(JAN)=14

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 45	15	-	-	-	-	-	-	-
	L	WWNI 116	53	33	22	16	12	9	6	4
	C	TW 51	19	8	-	-	-	-	-	-
	R	TWNI 110	50	31	21	15	11	8	6	3
		DG -	-	-	-	-	-	-	-	-
		DGNI 110	49	29	19	12	8	5	2	-
		WW 3.4	1.5	-	-	-	-	-	-	-
		WWNI 10.8	9.0	7.9	6.6	5.3	4.0	2.8	1.8	.7
	D	TW 4.1	2.2	.8	-	-	-	-	-	-
		TWNI 10.2	8.5	7.2	5.9	4.7	3.5	2.4	1.3	.4
		DG -	-	-	-	-	-	-	-	-
		DGNI 10.0	7.9	6.1	4.5	3.1	1.9	.9	.2	-

TRAVERSE CITY MICHIGAN
44.7 N
7698 DD
T(JAN)=21

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 51	18	-	-	-	-	-	-	-
	L	WWNI 127	56	34	23	17	13	9	7	4
	C	TW 58	21	9	-	-	-	-	-	-
	R	TWNI 120	53	32	22	16	11	8	6	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 121	52	30	20	13	9	6	3	-
		WW 3.6	1.9	-	-	-	-	-	-	-
		WWNI 11.3	9.1	8.1	6.7	5.5	4.3	3.1	2.0	.7
	D	TW 4.4	2.6	1.1	-	-	-	-	-	-
		TWNI 10.6	8.9	7.4	6.2	4.9	3.7	2.6	1.4	.5
		DG -	-	-	-	-	-	-	-	-
		DGNI 10.2	8.1	6.4	4.9	3.4	2.2	1.1	.3	-

DULUTH MINNESOTA
46.8 N
9756 DD
T(JAN)= 9

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 42	15	-	-	-	-	-	-	-
	L	WWNI 113	52	32	22	16	12	9	7	4
	C	TW 49	18	8	-	-	-	-	-	-
	R	TWNI 107	49	30	21	15	11	8	6	3
		DG -	-	-	-	-	-	-	-	-
		DGNI 107	48	28	18	12	8	5	3	-
		WW 3.2	1.5	-	-	-	-	-	-	-
		WWNI 10.2	9.0	7.9	6.6	5.4	4.2	3.0	2.0	.7
	D	TW 3.9	2.2	.8	-	-	-	-	-	-
		TWNI 9.8	8.4	7.2	6.0	4.8	3.6	2.5	1.4	.5
		DG -	-	-	-	-	-	-	-	-
		DGNI 9.6	7.8	6.1	4.6	3.3	2.0	1.0	.2	-

INTER. FALLS MINNESOTA
48.6 N
10547 DD
T(JAN)= 2

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 38	10	-	-	-	-	-	-	-
	L	WWNI 109	49	30	21	15	11	8	6	4
	C	TW 45	16	-	-	-	-	-	-	-
	R	TWNI 104	47	28	19	14	10	7	5	3
		DG -	-	-	-	-	-	-	-	-
		DGNI 103	45	26	16	11	7	4	-	-
		WW 2.7	.4	-	-	-	-	-	-	-
		WWNI 9.8	8.4	7.2	5.7	4.5	3.5	2.5	1.6	.5
	D	TW 3.5	1.6	-	-	-	-	-	-	-
		TWNI 9.3	7.9	6.6	5.3	4.1	3.1	2.1	1.2	.4
		DG -	-	-	-	-	-	-	-	-
		DGNI 9.0	7.1	5.3	3.8	2.5	1.4	.6	-	-

MINNEAPOLIS MINNESOTA
44.9 N
8159 DD
T(JAN)=12

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 54	21	10	-	-	-	-	-	-
	L	WWNI 126	58	36	25	18	14	11	8	5
	C	TW 59	24	12	5	-	-	-	-	-
	R	TWNI 120	55	34	23	17	13	9	7	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 122	54	32	22	15	10	7	4	-
		WW 4.3	2.5	1.3	-	-	-	-	-	-
		WWNI 11.6	10.1	8.6	7.3	6.4	5.3	3.8	2.5	.9
	D	TW 4.8	3.2	1.7	.5	-	-	-	-	-
		TWNI 10.9	9.4	8.0	6.9	5.7	4.4	3.1	1.8	.6
		DG -	-	-	-	-	-	-	-	-
		DGNI 10.8	8.8	7.2	5.7	4.3	2.8	1.6	.6	-

ROCHESTER MINNESOTA
43.9 N
8227 DD
T(JAN)=13

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	53	20	9	-	-	-	-	-
	L	WWNI	126	57	35	24	18	14	11	8	5
	C	TW	59	23	12	5	-	-	-	-	-
	R	TWNI	120	54	33	23	17	13	9	7	4
		DG	-	-	-	-	-	-	-	-	-
		DGNI	121	54	32	21	15	10	7	4	-
		WW	4.1	2.5	1.3	-	-	-	-	-	-
		WWNI	11.3	9.8	8.5	7.3	6.4	5.4	4.0	2.6	1.0
	D	TW	4.7	3.1	1.7	.5	-	-	-	-	-
		TWNI	10.7	9.3	7.9	6.9	5.7	4.5	3.1	1.8	.7
		DG	-	-	-	-	-	-	-	-	-
		DGNI	10.6	8.7	7.1	5.8	4.3	2.9	1.6	.6	-

JACKSON MISSISSIPPI
32.3 N
2300 DD
T(JAN)=47

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	230	108	66	46	34	26	20	14	8
	L	WWNI	331	161	100	71	54	43	34	27	19
	C	TW	218	101	62	42	29	21	15	10	6
	R	TWNI	313	149	94	66	50	39	30	22	15
		DG	248	111	65	41	26	15	5	-	-
		DGNI	354	167	104	73	55	41	31	22	14
		WW	22.4	18.2	16.1	14.7	12.5	10.0	6.6	3.4	.9
		WWNI	32.3	29.0	25.0	23.8	22.0	18.9	15.6	10.0	4.2
	D	TW	20.1	17.5	14.6	11.5	8.6	6.2	4.2	2.5	1.0
		TWNI	30.5	26.5	24.0	21.7	19.0	15.3	10.9	6.7	2.7
		DG	22.2	17.9	13.4	8.9	5.2	2.4	.2	-	-
		DGNI	34.1	29.3	26.5	23.1	19.5	14.8	10.3	6.1	2.4

MERIDIAN MISSISSIPPI
32.3 N
2388 DD
T(JAN)=47

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	216	103	63	44	33	25	19	13	7
	L	WWNI	315	154	97	69	53	41	33	26	19
	C	TW	206	96	59	40	28	20	14	10	6
	R	TWNI	298	144	90	64	48	38	29	21	14
		DG	233	104	61	38	24	13	-	-	-
		DGNI	335	160	100	71	53	40	30	21	14
		WW	21.0	17.8	15.4	14.2	11.9	9.5	6.2	3.2	.8
		WWNI	30.6	28.8	24.4	22.8	21.4	18.3	15.1	9.7	4.1
	D	TW	19.2	16.8	14.1	11.0	8.2	5.9	4.0	2.3	.9
		TWNI	28.9	25.9	23.3	21.1	18.3	14.8	10.5	6.5	2.6
		DG	20.9	17.0	12.6	8.2	4.6	1.9	-	-	-
		DGNI	32.6	28.4	25.7	22.4	18.8	14.2	9.8	5.8	2.3

COLUMBIA MISSOURI
38.8 N
5083 DD
T(JAN)=29

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	102	45	26	17	12	8	5	-	-
	L	WWNI	182	85	53	37	28	22	17	13	9
	C	TW	103	45	26	16	10	6	3	-	-
	R	TWNI	173	80	50	35	26	20	15	11	7
		DG	79	23	-	-	-	-	-	-	-
		DGNI	185	84	51	36	26	19	14	9	5
		WW	9.1	7.0	5.5	4.5	3.2	1.9	.6	-	-
		WWNI	16.5	15.2	13.1	11.6	10.7	9.1	7.1	4.6	1.9
	D	TW	8.9	7.1	5.3	3.6	2.2	1.2	.4	-	-
		TWNI	15.8	13.9	12.2	10.9	9.3	7.5	5.2	3.2	1.2
		DG	5.6	1.6	-	-	-	-	-	-	-
		DGNI	16.8	14.3	12.4	10.5	8.5	6.1	4.0	2.1	.6

KANSAS CITY MISSOURI
39.3 N
5357 DD
T(JAN)=27

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	102	45	26	17	12	8	5	-	-
	L	WWNI	182	85	53	37	28	22	17	14	9
	C	TW	103	45	26	17	11	7	4	-	-
	R	TWNI	172	80	50	35	26	20	15	11	7
		DG	79	25	-	-	-	-	-	-	-
		DGNI	184	84	52	36	26	19	14	10	5
		WW	9.1	7.1	5.7	4.6	3.4	2.0	.7	-	-
		WWNI	16.5	15.5	13.3	11.8	10.9	9.2	7.4	4.8	1.9
	D	TW	8.9	7.2	5.5	3.8	2.3	1.3	.5	-	-
		TWNI	15.8	14.0	12.4	11.1	9.5	7.6	5.3	3.2	1.3
		DG	5.7	1.9	-	-	-	-	-	-	-
		DGNI	16.9	14.5	12.5	10.7	8.7	6.2	4.1	2.2	.6

SAINT LOUIS MISSOURI
38.7 N
4750 DD
T(JAN)=31

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	113	50	29	19	14	10	6	-	-
	L	WWNI	194	91	57	40	30	23	18	14	10
	C	TW	113	49	29	18	12	8	4	2	-
	R	TWNI	184	86	53	37	28	21	16	12	8
		DG	94	32	-	-	-	-	-	-	-
		DGNI	199	91	56	38	28	21	15	10	6
		WW	10.2	8.0	6.3	5.2	3.9	2.5	1.0	-	-
		WWNI	17.8	16.4	14.1	12.4	11.5	9.7	7.8	5.0	2.0
	D	TW	9.8	7.9	6.1	4.2	2.7	1.6	.7	.2	-
		TWNI	17.0	15.0	13.1	11.7	10.0	8.0	5.7	3.4	1.3
		DG	7.0	3.3	-	-	-	-	-	-	-
		DGNI	18.2	15.5	13.4	11.4	9.3	6.7	4.4	2.4	.7

SPRINGFIELD MISSOURI
37.2 N
4570 DD
T(JAN)=33

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	123	55	33	22	16	11	8	4	-
	L	WWNI	207	97	61	43	32	25	20	16	11
	C	TW	122	54	32	21	14	9	6	3	-
	R	TWNI	196	91	57	40	30	23	18	13	8
		DG	108	41	16	-	-	-	-	-	-
		DGNI	213	97	60	42	31	23	17	12	7
		WW	11.0	8.9	7.3	6.3	4.9	3.3	1.7	.4	-
		WWNI	18.7	17.6	15.2	13.6	12.6	10.9	8.8	5.7	2.3
	D	TW	10.6	8.8	6.9	5.0	3.4	2.1	1.1	.4	-
		TWNI	17.9	15.9	14.1	12.8	11.0	8.9	6.3	3.8	1.5
		DG	8.4	5.0	1.0	-	-	-	-	-	-
		DGNI	19.2	16.8	14.7	12.7	10.4	7.6	5.1	2.8	.9

BILLINGS MONTANA
45.8 N
7265 DD
T(JAN)=22

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	91	41	23	15	9	6	-	-	-
	L	WWNI	165	80	50	35	26	20	15	12	8
	C	TW	92	40	23	14	9	5	-	-	-
	R	TWNI	158	75	47	32	24	18	14	10	6
		DG	64	-	-	-	-	-	-	-	-
		DGNI	168	78	48	33	23	17	12	8	4
		WW	8.5	6.5	4.7	3.4	2.0	.8	-	-	-
		WWNI	16.0	14.2	12.8	10.8	9.3	7.8	5.8	3.9	1.5
	D	TW	8.2	6.4	4.6	2.9	1.7	.6	-	-	-
		TWNI	15.2	13.4	11.5	9.9	8.3	6.4	4.5	2.7	1.0
		DG	4.4	-	-	-	-	-	-	-	-
		DGNI	15.8	13.6	11.3	9.4	7.2	5.1	3.2	1.6	.4

CUT BANK MONTANA
48.6 N
9033 DD
T(JAN)=16

		SSF =	.1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	77	33	18	10	5	-	-	-	-
	L	WWNI	153	71	44	31	23	17	13	9	6
	C	TW	80	34	18	11	5	-	-	-	-
	R	TWNI	144	67	42	29	21	15	11	8	5
		DG	40	-	-	-	-	-	-	-	-
		DGNI	151	69	42	28	20	14	9	6	-
		WW	6.5	5.0	3.2	1.8	.4	-	-	-	-
		WWNI	14.1	12.7	11.1	9.4	7.7	6.1	4.3	2.9	1.1
	D	TW	7.0	5.0	3.3	1.8	.6	-	-	-	-
		TWNI	13.3	11.7	10.1	8.5	6.9	5.1	3.6	2.0	.7
		DG	1.7	-	-	-	-	-	-	-	-
		DGNI	13.8	11.7	9.5	7.5	5.6	3.8	2.2	.9	-

DILLON MONTANA
45.2 N
8354 DD
T(JAN)=20

		SSF =	.1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	90	40	24	15	10	6	-	-	-
	L	WWNI	168	78	50	35	26	20	16	12	8
	C	TW	92	40	23	15	9	5	-	-	-
	R	TWNI	158	74	47	33	24	18	14	10	6
		DG	64	-	-	-	-	-	-	-	-
		DGNI	168	78	48	33	24	17	12	8	4
		WW	7.8	6.6	5.1	3.7	2.3	1.0	-	-	-
		WWNI	15.2	14.4	12.9	11.4	9.7	8.1	5.9	4.0	1.5
	D	TW	8.1	6.3	4.7	3.1	1.8	.8	-	-	-
		TWNI	14.6	13.3	11.9	10.3	8.6	6.6	4.7	2.7	1.0
		DG	4.5	-	-	-	-	-	-	-	-
		DGNI	15.3	13.6	11.7	9.7	7.5	5.4	3.4	1.7	.4

GLASGOW MONTANA
48.2 N
8969 DD
T(JAN)= 9

		SSF =	.1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	60	23	10	-	-	-	-	-	-
	L	WWNI	130	61	38	26	19	14	10	8	5
	C	TW	64	25	13	5	-	-	-	-	-
	R	TWNI	124	58	35	24	17	13	9	7	4
		DG	-	-	-	-	-	-	-	-	-
		DGNI	128	58	34	22	15	10	7	4	-
		WW	5.0	2.9	1.2	-	-	-	-	-	-
		WWNI	12.4	10.6	9.0	7.2	6.1	4.9	3.5	2.3	.8
	D	TW	5.3	3.4	1.8	.4	-	-	-	-	-
		TWNI	11.7	10.0	8.2	6.8	5.5	4.1	2.9	1.6	.6
		DG	-	-	-	-	-	-	-	-	-
		DGNI	11.6	9.4	7.3	5.6	4.0	2.6	1.4	.5	-

GREAT FALLS MONTANA
47.5 N
7652 DD
T(JAN)=20

		SSF =	.1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	86	38	21	13	7	-	-	-	-
	L	WWNI	161	77	48	33	25	19	14	10	7
	C	TW	88	38	21	13	7	3	-	-	-
	R	TWNI	153	72	45	31	23	17	12	9	5
		DG	56	-	-	-	-	-	-	-	-
		DGNI	163	75	46	31	22	15	11	7	3
		WW	7.8	5.9	4.0	2.6	1.1	-	-	-	-
		WWNI	14.9	13.7	12.1	10.1	8.5	6.9	4.8	3.3	1.2
	D	TW	7.6	5.8	4.0	2.4	1.2	.2	-	-	-
		TWNI	14.3	12.7	10.9	9.2	7.5	5.6	4.0	2.3	.8
		DG	3.4	-	-	-	-	-	-	-	-
		DGNI	15.0	12.9	10.5	8.4	6.3	4.4	2.6	1.2	.2

HELENA MONTANA
46.6 N
8190 DD
T(JAN)=18

		SSF =	.1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	77	34	19	11	6	-	-	-	-
	L	WWNI	151	71	45	31	23	17	13	10	6
	C	TW	80	34	19	11	6	-	-	-	-
	R	TWNI	144	67	42	29	21	16	12	8	5
		DG	41	-	-	-	-	-	-	-	-
		DGNI	151	69	42	29	20	14	10	6	2
		WW	6.9	5.2	3.5	2.1	.7	-	-	-	-
		WWNI	13.7	13.0	11.4	9.7	8.0	6.4	4.6	3.0	1.1
	D	TW	6.9	5.1	3.5	2.0	.8	-	-	-	-
		TWNI	13.1	11.9	10.4	8.7	7.1	5.3	3.8	2.1	.8
		DG	2.0	-	-	-	-	-	-	-	-
		DGNI	13.8	11.9	9.8	7.8	5.8	4.0	2.4	1.0	.1

LEWISTOWN MONTANA
47.0 N
8586 DD
T(JAN)=19

		SSF =	.1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	76	33	19	11	6	-	-	-	-
	L	WWNI	153	71	45	31	23	18	13	10	7
	C	TW	80	34	19	11	6	-	-	-	-
	R	TWNI	144	67	42	29	21	16	12	9	5
		DG	41	-	-	-	-	-	-	-	-
		DGNI	151	69	42	29	20	14	10	6	3
		WW	6.5	5.2	3.5	2.2	.9	-	-	-	-
		WWNI	13.8	12.8	11.3	9.7	8.1	6.6	4.8	3.2	1.2
	D	TW	6.9	5.1	3.5	2.1	.9	-	-	-	-
		TWNI	13.2	11.8	10.3	8.8	7.3	5.5	3.9	2.2	.8
		DG	1.9	-	-	-	-	-	-	-	-
		DGNI	13.6	11.8	9.9	8.0	6.0	4.2	2.5	1.1	.2

MILES CITY MONTANA
46.4 N
7889 DD
T(JAN)=15

		SSF =	.1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	78	33	18	10	5	-	-	-	-
	L	WWNI	151	72	44	31	22	17	13	10	6
	C	TW	80	34	18	10	5	-	-	-	-
	R	TWNI	144	67	41	28	21	15	11	8	5
		DG	39	-	-	-	-	-	-	-	-
		DGNI	151	69	41	28	19	14	9	6	2
		WW	6.8	4.7	3.1	1.8	.6	-	-	-	-
		WWNI	14.7	12.5	10.8	9.0	7.7	6.3	4.6	3.1	1.2
	D	TW	6.9	5.0	3.2	1.8	.7	-	-	-	-
		TWNI	13.7	11.7	9.9	8.3	6.9	5.3	3.7	2.2	.8
		DG	1.6	-	-	-	-	-	-	-	-
		DGNI	14.0	11.5	9.3	7.5	5.6	3.9	2.3	1.0	.1

MISSOULA MONTANA
46.9 N
7931 DD
T(JAN)=21

		SSF =	.1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	66	27	13	-	-	-	-	-	-
	L	WWNI	140	65	40	28	20	15	11	8	5
	C	TW	71	28	15	7	-	-	-	-	-
	R	TWNI	133	61	38	26	18	13	10	7	4
		DG	-	-	-	-	-	-	-	-	-
		DGNI	138	62	37	24	16	11	7	4	-
		WW	5.7	3.7	1.8	-	-	-	-	-	-
		WWNI	12.4	11.4	9.7	8.2	6.4	4.9	3.4	2.2	.8
	D	TW	5.8	3.9	2.2	.8	-	-	-	-	-
		TWNI	12.0	10.5	9.0	7.3	5.7	4.2	2.9	1.6	.5
		DG	-	-	-	-	-	-	-	-	-
		DGNI	12.4	10.2	8.1	6.1	4.3	2.8	1.5	.5	-

GRAND ISLAND NEBRASKA
41.0 N
6425 DD
T(JAN)=22

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	98	43	25	16	11	7	4	-	-
L	WWNI	178	82	52	36	27	21	17	13	9
C	TW	99	43	25	16	10	6	3	-	-
R	TWNI	168	78	48	34	25	19	15	11	7
	DG	73	18	-	-	-	-	-	-	-
	DGNI	179	82	50	34	25	18	13	9	5
	WW	8.4	6.7	5.2	4.2	3.0	1.6	.4	-	-
	WWNI	16.4	14.7	12.8	11.3	10.2	8.8	7.0	4.5	1.8
D	TW	8.6	6.8	5.0	3.5	2.1	1.1	.3	-	-
	TWNI	15.4	13.6	11.9	10.6	9.1	7.3	5.1	3.1	1.2
	DG	5.1	.7	-	-	-	-	-	-	-
	DGNI	16.2	13.8	11.9	10.2	8.2	5.9	3.8	2.0	.6

NORTH OMAHA NEBRASKA
41.4 N
6601 DD
T(JAN)=20

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	85	36	20	13	9	5	-	-	-
L	WWNI	163	75	47	33	24	19	15	12	8
C	TW	87	37	21	13	8	4	-	-	-
R	TWNI	154	71	44	30	23	17	13	10	6
	DG	52	-	-	-	-	-	-	-	-
	DGNI	162	73	44	31	22	16	12	8	4
	WW	7.2	5.4	4.1	3.2	2.1	.8	-	-	-
	WWNI	14.8	13.3	11.4	10.1	9.2	7.9	6.2	4.0	1.6
D	TW	7.4	5.7	4.1	2.6	1.4	.6	-	-	-
	TWNI	13.9	12.2	10.7	9.6	8.1	6.5	4.6	2.7	1.1
	DG	3.1	-	-	-	-	-	-	-	-
	DGNI	14.5	12.2	10.5	8.9	7.1	5.0	3.2	1.6	.4

NORTH PLATTE NEBRASKA
41.1 N
6743 DD
T(JAN)=23

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	103	46	27	18	13	9	5	-	-
L	WWNI	181	85	54	38	29	22	18	14	10
C	TW	103	46	27	17	11	7	4	1	-
R	TWNI	172	80	50	35	27	20	16	11	7
	DG	81	27	-	-	-	-	-	-	-
	DGNI	184	85	53	37	27	20	14	10	6
	WW	9.1	7.5	6.0	5.0	3.6	2.2	.9	-	-
	WWNI	17.3	15.1	13.9	12.3	10.9	9.7	7.6	4.9	2.0
D	TW	9.2	7.4	5.7	3.9	2.6	1.5	.6	.1	-
	TWNI	16.1	14.4	12.7	11.3	9.8	7.8	5.5	3.3	1.3
	DG	6.1	2.3	-	-	-	-	-	-	-
	DGNI	17.0	14.8	12.8	11.1	9.0	6.5	4.2	2.3	.7

SCOTTSBLUFF NEBRASKA
41.9 N
6774 DD
T(JAN)=25

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	103	47	28	19	13	9	6	-	-
L	WWNI	180	86	55	39	29	23	18	14	10
C	TW	103	46	28	18	12	7	4	2	-
R	TWNI	171	81	51	36	27	21	16	12	8
	DG	82	29	-	-	-	-	-	-	-
	DGNI	183	86	54	37	27	20	15	10	6
	WW	9.5	7.9	6.3	5.3	3.9	2.4	1.0	-	-
	WWNI	17.8	15.4	14.4	12.6	11.3	10.1	7.8	5.1	2.0
D	TW	9.4	7.7	5.9	4.1	2.7	1.6	.7	.1	-
	TWNI	16.5	14.7	13.0	11.7	10.1	8.1	5.7	3.4	1.3
	DG	6.5	2.9	-	-	-	-	-	-	-
	DGNI	17.4	15.3	13.3	11.5	9.3	6.7	4.4	2.4	.7

ELKO NEVADA
40.8 N
7483 DD
T(JAN)=23

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	113	52	31	21	15	10	7	-	-
L	WWNI	195	92	58	42	31	24	19	15	10
C	TW	114	51	30	20	13	8	5	2	-
R	TWNI	184	87	55	39	29	22	17	12	8
	DG	97	36	-	-	-	-	-	-	-
	DGNI	199	93	58	40	29	22	16	11	6
	WW	10.2	8.7	7.2	5.8	4.2	2.7	1.2	-	-
	WWNI	17.9	17.0	15.2	13.6	12.0	10.3	7.6	5.1	2.0
D	TW	10.1	8.3	6.5	4.7	3.1	1.8	.8	.2	-
	TWNI	17.1	15.6	14.1	12.4	10.5	8.3	5.8	3.5	1.3
	DG	7.8	4.2	-	-	-	-	-	-	-
	DGNI	18.4	16.4	14.3	12.3	9.7	7.1	4.6	2.5	.7

ELY NEVADA
39.3 N
7814 DD
T(JAN)=24

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	111	52	32	22	16	12	8	4	-
L	WWNI	191	91	59	42	32	26	20	16	11
C	TW	111	51	31	20	14	9	6	3	1
R	TWNI	180	86	55	39	30	23	18	13	9
	DG	96	38	16	-	-	-	-	-	-
	DGNI	195	92	58	41	31	23	17	12	7
	WW	10.1	9.1	7.8	6.7	5.2	3.5	1.8	.4	-
	WWNI	17.8	17.1	15.8	14.4	13.0	11.5	8.9	5.8	2.3
D	TW	10.2	8.7	7.0	5.1	3.6	2.2	1.2	.5	.1
	TWNI	16.9	15.9	14.6	13.2	11.4	9.1	6.4	3.9	1.5
	DG	8.0	4.9	1.2	-	-	-	-	-	-
	DGNI	18.3	16.8	15.1	13.2	10.7	7.9	5.2	2.9	1.0

LAS VEGAS NEVADA
36.1 N
2601 DD
T(JAN)=44

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	311	144	90	64	48	37	28	20	12
L	WWNI	430	204	129	92	70	56	44	35	24
C	TW	291	134	83	56	40	29	21	15	9
R	TWNI	405	191	120	86	64	50	38	28	19
	DG	350	158	95	62	42	28	17	9	-
	DGNI	461	216	136	96	71	54	41	29	19
	WW	29.2	25.4	22.7	20.9	17.5	14.0	9.8	5.4	1.7
	WWNI	41.4	36.4	33.2	31.2	28.6	24.0	19.1	12.7	5.3
D	TW	26.6	23.4	19.8	15.8	12.3	9.2	6.3	3.9	1.7
	TWNI	38.2	34.1	31.2	28.2	24.0	19.6	13.9	8.5	3.4
	DG	31.5	26.5	21.2	15.4	10.6	6.5	3.2	.9	-
	DGNI	43.0	38.2	35.0	30.5	25.7	19.6	13.6	8.2	3.2

LOVELOCK NEVADA
40.1 N
5990 DD
T(JAN)=29

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	160	73	45	31	22	16	12	7	-
L	WWNI	248	118	74	53	40	31	25	19	13
C	TW	153	70	42	28	19	13	9	5	3
R	TWNI	235	110	70	49	37	28	22	16	10
	DG	156	66	35	18	-	-	-	-	-
	DGNI	259	121	75	53	39	29	21	15	9
	WW	14.8	12.5	10.7	9.1	7.3	5.2	3.0	1.2	-
	WWNI	24.1	20.8	19.7	17.3	15.4	13.4	10.1	6.7	2.7
D	TW	14.0	11.8	9.5	7.1	5.2	3.5	2.0	1.0	.3
	TWNI	22.3	19.9	17.8	15.8	13.5	10.8	7.6	4.6	1.8
	DG	13.5	9.6	5.7	2.2	-	-	-	-	-
	DGNI	24.2	21.5	18.8	16.3	13.2	9.9	6.6	3.7	1.3

RENO
NEVADA

39.5 N
6022 DD
T(JAN)=32

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 166	77	47	33	24	18	13	8	-
	L	WWNI 258	122	77	55	42	33	26	20	14
	C	TW 161	74	45	30	21	14	10	6	3
	R	TWNI 243	115	73	51	39	30	23	17	11
		DG 166	71	39	22	-	-	-	-	-
		DGNI 269	126	79	56	41	31	23	16	10
		WW 15.3	13.2	11.7	10.0	8.2	5.9	3.6	1.5	-
		WWNI 24.0	22.3	20.1	18.5	16.5	14.4	10.9	7.2	2.9
	D	TW 14.6	12.5	10.2	7.8	5.7	3.9	2.4	1.1	.4
		TWNI 22.8	20.6	18.8	16.8	14.4	11.5	8.1	4.9	1.9
		DG 14.4	10.8	6.9	3.3	-	-	-	-	-
		DGNI 25.2	22.4	19.9	17.5	14.1	10.6	7.2	4.1	1.4

TONOPAH
NEVADA

38.1 N
5900 DD
T(JAN)=30

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 163	75	47	33	24	18	13	9	4
	L	WWNI 251	120	76	55	42	33	26	21	15
	C	TW 156	72	44	30	21	14	10	6	3
	R	TWNI 238	113	72	51	39	30	23	17	11
		DG 161	70	39	22	9	-	-	-	-
		DGNI 263	124	78	55	41	31	23	16	10
		WW 15.3	13.1	11.5	10.1	8.5	6.3	3.8	1.7	.2
		WWNI 24.6	21.5	20.5	18.4	16.8	14.8	11.5	7.5	3.1
	D	TW 14.5	12.5	10.3	7.8	5.8	4.0	2.5	1.3	.4
		TWNI 22.8	20.5	18.6	16.9	14.7	11.8	8.3	5.1	2.0
		DG 14.2	10.8	6.9	3.4	.5	-	-	-	-
		DGNI 24.8	22.4	19.9	17.6	14.5	10.8	7.4	4.3	1.5

WINNEMUCCA
NEVADA

40.9 N
6629 DD
T(JAN)=28

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 131	60	37	25	18	13	9	5	-
	L	WWNI 214	103	65	47	35	28	22	17	12
	C	TW 129	59	35	23	16	11	7	4	1
	R	TWNI 203	96	61	43	32	25	19	14	9
		DG 121	49	24	-	-	-	-	-	-
		DGNI 222	104	65	46	34	25	18	13	7
		WW 12.2	10.3	8.8	7.3	5.7	3.9	2.1	.6	-
		WWNI 20.2	18.8	16.9	15.4	13.7	11.8	8.8	5.9	2.4
	D	TW 11.7	9.9	7.9	5.8	4.0	2.6	1.5	.6	.1
		TWNI 19.2	17.4	15.8	14.0	11.9	9.4	6.7	4.0	1.6
		DG 10.2	6.7	2.9	-	-	-	-	-	-
		DGNI 21.0	18.6	16.4	14.2	11.3	8.4	5.6	3.1	1.0

CONCORD
NEW HAMPSHIRE

43.2 N
7360 DD
T(JAN)=21

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 56	23	12	6	-	-	-	-	-
	L	WWNI 129	59	37	26	19	15	12	9	6
	C	TW 62	25	13	7	-	-	-	-	-
	R	TWNI 123	56	35	24	18	14	10	7	5
		DG -	-	-	-	-	-	-	-	-
		DGNI 125	56	34	23	16	12	8	5	-
		WW 4.4	3.1	2.0	.9	-	-	-	-	-
		WWNI 11.5	10.2	9.4	8.1	7.1	5.9	4.5	2.9	1.1
	D	TW 5.1	3.6	2.2	1.0	-	-	-	-	-
		TWNI 11.1	9.8	8.6	7.5	6.3	5.0	3.4	2.0	.7
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.0	9.4	7.9	6.5	5.0	3.4	2.0	.9	-

NEWARK
NEW JERSEY

40.7 N
5034 DD
T(JAN)=31

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 91	42	25	16	11	8	4	-	-
	L	WWNI 167	80	51	36	27	21	17	13	9
	C	TW 93	42	25	16	10	6	3	-	-
	R	TWNI 158	76	48	34	25	19	15	11	7
		DG 67	18	-	-	-	-	-	-	-
		DGNI 169	79	49	34	25	19	13	9	5
		WW 8.5	6.7	5.5	4.3	3.1	1.7	.5	-	-
		WWNI 15.7	15.1	12.9	11.8	10.6	8.9	7.1	4.6	1.8
	D	TW 8.3	6.8	5.2	3.5	2.1	1.2	.4	-	-
		TWNI 15.0	13.6	12.2	10.9	9.3	7.4	5.2	3.1	1.2
		DG 5.0	.8	-	-	-	-	-	-	-
		DGNI 16.0	13.9	12.3	10.4	8.4	6.0	3.9	2.1	.6

ALBUQUERQUE
NEW MEXICO

35.0 N
4292 DD
T(JAN)=35

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 178	84	53	37	28	21	16	11	6
	L	WWNI 270	130	83	60	46	37	30	23	17
	C	TW 171	80	50	34	24	17	12	8	5
	R	TWNI 255	122	78	56	43	33	26	19	13
		DG 183	82	47	29	16	-	-	-	-
		DGNI 283	135	86	61	46	35	26	19	12
		WW 16.8	14.9	13.3	12.1	10.3	8.0	5.0	2.5	.5
		WWNI 26.3	24.5	22.1	20.5	19.1	16.9	13.6	8.7	3.6
	D	TW 16.0	14.2	11.9	9.2	7.0	4.9	3.2	1.8	.8
		TWNI 24.5	22.5	20.6	19.1	16.6	13.3	9.5	5.8	2.4
		DG 16.5	13.3	9.3	5.6	2.6	-	-	-	-
		DGNI 27.1	24.6	22.3	20.0	16.6	12.5	8.6	5.1	1.9

CLAYTON
NEW MEXICO

36.4 N
5212 DD
T(JAN)=33

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 160	73	46	32	24	18	14	9	4
	L	WWNI 251	117	75	54	41	33	27	21	15
	C	TW 154	71	43	29	20	14	10	6	4
	R	TWNI 235	111	70	50	38	30	23	17	11
		DG 157	68	38	21	9	-	-	-	-
		DGNI 260	122	77	54	41	31	23	17	10
		WW 14.3	13.1	11.3	10.2	8.8	6.6	4.0	1.9	.3
		WWNI 23.6	21.3	20.1	18.1	16.9	15.3	12.5	7.9	3.3
	D	TW 14.2	12.2	10.1	7.8	5.8	4.1	2.5	1.4	.5
		TWNI 22.0	20.3	18.3	16.9	15.1	11.9	8.5	5.2	2.1
		DG 13.6	10.6	6.8	3.4	.6	-	-	-	-
		DGNI 24.1	21.8	19.7	17.8	14.7	11.0	7.6	4.4	1.7

FARMINGTON
NEW MEXICO

36.7 N
5713 DD
T(JAN)=29

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 145	66	41	29	21	16	11	7	-
	L	WWNI 234	108	70	50	38	30	24	19	13
	C	TW 142	64	39	26	18	13	8	5	3
	R	TWNI 220	103	65	47	35	27	21	16	10
		DG 138	58	31	15	-	-	-	-	-
		DGNI 241	112	70	50	37	28	21	15	9
		WW 12.7	11.7	10.1	9.0	7.3	5.4	3.1	1.3	-
		WWNI 21.3	19.8	18.7	16.8	15.5	13.7	10.6	6.9	2.9
	D	TW 12.8	10.9	9.0	6.9	5.0	3.4	2.0	1.0	.3
		TWNI 20.1	18.7	17.0	15.6	13.5	10.8	7.7	4.7	1.9
		DG 11.6	8.6	4.9	1.7	-	-	-	-	-
		DGNI 21.9	20.0	18.1	16.1	13.2	9.8	6.6	3.8	1.3

LOS ALAMOS
NEW MEXICO

35.9 N
6359 DD
T(JAN)=29

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 128	58	36	26	19	14	10	7	-
	L	WWNI 210	100	64	46	35	28	23	18	13
	C	TW 125	58	35	24	16	11	8	5	2
	R	TWNI 199	94	60	43	33	26	20	15	10
		DG 116	49	25	-	-	-	-	-	-
		DGNI 217	102	64	46	34	26	19	14	9
		WW 11.9	10.0	9.2	8.2	7.0	4.9	2.8	1.1	-
		WWNI 19.9	18.1	16.8	16.1	14.8	13.4	10.9	6.8	2.9
	D	TW 11.5	10.0	8.1	6.2	4.4	3.0	1.8	.9	.3
		TWNI 18.9	17.0	16.0	14.7	13.1	10.4	7.4	4.6	1.9
		DG 9.9	7.1	3.5	-	-	-	-	-	-
		DGNI 20.5	18.2	16.7	15.1	12.4	9.2	6.3	3.6	1.3

ROSWELL
NEW MEXICO

33.4 N
3697 DD
T(JAN)=38

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 200	95	59	42	32	24	18	13	7
	L	WWNI 299	142	92	66	50	40	32	25	18
	C	TW 194	89	55	38	27	19	14	9	6
	R	TWNI 283	134	86	61	47	36	28	21	14
		DG 214	95	56	35	22	12	-	-	-
		DGNI 316	149	95	67	51	38	29	21	13
		WW 18.2	17.3	14.9	13.7	11.7	9.3	5.9	3.0	.7
		WWNI 27.3	27.0	24.6	22.1	20.9	18.3	14.8	9.5	4.0
	D	TW 17.6	15.7	13.4	10.5	8.0	5.7	3.7	2.2	1.0
		TWNI 26.0	24.9	22.5	20.8	18.0	14.5	10.3	6.3	2.6
		DG 18.8	15.7	11.6	7.5	4.2	1.5	-	-	-
		DGNI 29.1	27.1	24.6	22.0	18.4	13.8	9.6	5.7	2.2

TRUTH OR CONSEQ.
NEW MEXICO

33.2 N
3392 DD
T(JAN)=40

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 229	109	69	49	37	29	22	16	9
	L	WWNI 332	160	103	74	57	45	37	29	21
	C	TW 220	102	64	44	31	23	16	11	7
	R	TWNI 314	150	96	69	53	41	32	24	16
		DG 251	114	69	44	29	18	9	-	-
		DGNI 354	168	107	76	58	44	33	24	15
		WW 21.5	19.7	17.6	16.3	14.1	11.3	7.5	4.0	1.2
		WWNI 31.2	30.1	27.7	25.2	24.0	21.0	16.8	10.9	4.6
	D	TW 20.4	18.3	15.6	12.4	9.6	6.9	4.8	2.8	1.3
		TWNI 29.7	27.7	25.4	23.7	20.4	16.4	11.7	7.2	3.0
		DG 22.8	19.4	15.0	10.4	6.5	3.4	1.0	-	-
		DGNI 33.5	30.8	28.1	25.2	21.2	16.0	11.2	6.7	2.6

TUCUMCARI
NEW MEXICO

35.2 N
4047 DD
T(JAN)=37

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 194	90	56	40	30	23	17	12	7
	L	WWNI 291	138	88	63	48	39	31	25	18
	C	TW 187	86	53	36	25	18	13	9	5
	R	TWNI 274	130	82	59	45	35	27	20	13
		DG 203	90	53	32	20	10	-	-	-
		DGNI 306	144	91	65	49	37	28	20	13
		WW 17.7	16.0	14.3	12.9	11.2	8.8	5.6	2.9	.7
		WWNI 27.2	25.4	23.3	21.5	20.0	17.9	14.6	9.3	3.9
	D	TW 17.0	15.0	12.7	9.9	7.6	5.5	3.6	2.0	.9
		TWNI 25.4	23.6	21.7	20.0	17.6	14.0	10.0	6.2	2.5
		DG 17.8	14.7	10.6	6.7	3.5	1.0	-	-	-
		DGNI 28.2	25.8	23.5	21.2	17.7	13.3	9.2	5.5	2.1

ZUNI
NEW MEXICO

35.1 N
5815 DD
T(JAN)=30

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 144	66	41	29	22	16	12	8	-
	L	WWNI 231	109	69	50	38	31	25	19	14
	C	TW 140	64	39	26	18	13	9	6	3
	R	TWNI 218	103	65	47	36	28	21	16	11
		DG 137	59	32	16	-	-	-	-	-
		DGNI 238	112	71	50	38	28	21	15	9
		WW 13.1	11.6	10.2	9.2	7.7	5.7	3.3	1.4	-
		WWNI 22.5	19.5	18.9	17.1	15.8	14.2	11.4	7.2	3.0
	D	TW 12.9	11.1	9.1	6.9	5.1	3.5	2.2	1.1	.4
		TWNI 20.5	18.6	17.2	15.8	13.9	11.1	7.9	4.8	2.0
		DG 11.9	8.8	5.1	2.0	-	-	-	-	-
		DGNI 22.2	20.2	18.2	16.4	13.5	10.1	6.9	4.0	1.4

ALBANY
NEW YORK

42.7 N
6888 DD
T(JAN)=21

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 56	23	12	6	-	-	-	-	-
	L	WWNI 129	59	37	26	19	15	11	9	6
	C	TW 62	25	13	7	-	-	-	-	-
	R	TWNI 123	56	35	24	18	14	10	7	5
		DG -	-	-	-	-	-	-	-	-
		DGNI 125	56	34	23	16	12	8	5	-
		WW 4.5	3.1	2.0	.8	-	-	-	-	-
		WWNI 11.8	10.4	9.2	8.0	7.0	5.8	4.4	2.9	1.1
	D	TW 5.1	3.6	2.2	1.0	-	-	-	-	-
		TWNI 11.0	9.8	8.5	7.5	6.2	4.9	3.4	2.0	.7
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.0	9.3	7.8	6.4	4.9	3.3	1.9	.8	-

BINGHAMTON
NEW YORK

42.2 N
7285 DD
T(JAN)=22

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 42	15	-	-	-	-	-	-	-
	L	WWNI 115	52	32	22	16	12	10	7	5
	C	TW 50	19	8	-	-	-	-	-	-
	R	TWNI 109	49	30	21	15	11	8	6	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 109	48	28	19	13	9	6	3	-
		WW 3.1	1.5	-	-	-	-	-	-	-
		WWNI 10.3	8.7	7.7	6.6	5.7	4.7	3.6	2.3	.8
	D	TW 3.8	2.3	.9	-	-	-	-	-	-
		TWNI 9.7	8.4	7.2	6.1	5.1	4.0	2.8	1.6	.6
		DG -	-	-	-	-	-	-	-	-
		DGNI 9.3	7.6	6.2	4.9	3.6	2.3	1.2	.4	-

BUFFALO
NEW YORK

42.9 N
6927 DD
T(JAN)=24

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 46	17	6	-	-	-	-	-	-
	L	WWNI 121	54	33	23	17	13	10	7	5
	C	TW 54	20	9	-	-	-	-	-	-
	R	TWNI 115	51	31	21	16	12	9	6	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 115	50	29	20	13	9	6	3	-
		WW 3.4	1.8	.4	-	-	-	-	-	-
		WWNI 10.7	9.2	8.0	6.8	5.8	4.7	3.5	2.3	.8
	D	TW 4.2	2.6	1.2	-	-	-	-	-	-
		TWNI 10.0	8.7	7.4	6.4	5.2	4.0	2.8	1.6	.6
		DG -	-	-	-	-	-	-	-	-
		DGNI 9.7	8.0	6.5	5.1	3.8	2.4	1.3	.4	-

MASSENA
NEW YORK

44.9 N
8237 DD
T(JAN)=14

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 42	14	-	-	-	-	-	-	-
	L	WWNI 115	51	32	22	16	12	9	7	5
	C	TW 50	18	8	-	-	-	-	-	-
	R	TWNI 109	49	30	21	15	11	8	6	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 109	47	28	18	13	9	6	3	-
		WW 3.0	1.4	-	-	-	-	-	-	-
		WWNI 10.1	8.7	7.8	6.5	5.6	4.4	3.3	2.1	.8
	D	TW 3.8	2.2	.8	-	-	-	-	-	-
		TWNI 9.7	8.3	7.1	6.1	5.0	3.8	2.6	1.5	.5
		DG -	-	-	-	-	-	-	-	-
		DGNI 9.3	7.6	6.1	4.8	3.4	2.2	1.1	.3	-

NYC (CNTRL. PARK)
NEW YORK

40.8 N
4848 DD
T(JAN)=32

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 85	37	22	14	10	6	-	-	-
	L	WWNI 159	76	48	34	25	20	16	12	8
	C	TW 87	38	22	14	8	5	2	-	-
	R	TWNI 151	72	45	32	24	18	14	10	6
		DG 56	-	-	-	-	-	-	-	-
		DGNI 161	74	46	32	23	17	12	8	4
		WW 8.0	5.8	4.7	3.6	2.4	1.1	-	-	-
		WWNI 15.0	13.8	11.8	10.9	9.8	8.2	6.5	4.2	1.7
	D	TW 7.6	6.1	4.5	3.0	1.7	.8	.1	-	-
		TWNI 14.3	12.6	11.3	10.1	8.5	6.8	4.8	2.9	1.1
		DG 3.8	-	-	-	-	-	-	-	-
		DGNI 15.2	12.9	11.2	9.4	7.6	5.4	3.5	1.8	.5

ROCHESTER
NEW YORK

43.1 N
6719 DD
T(JAN)=24

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 50	18	8	-	-	-	-	-	-
	L	WWNI 124	55	34	24	17	13	10	8	5
	C	TW 56	22	10	-	-	-	-	-	-
	R	TWNI 117	53	32	22	16	12	9	6	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 118	52	31	20	14	10	6	4	-
		WW 3.8	2.1	.8	-	-	-	-	-	-
		WWNI 10.9	9.6	8.3	7.0	6.0	4.8	3.7	2.4	.9
	D	TW 4.4	2.8	1.4	-	-	-	-	-	-
		TWNI 10.2	9.0	7.6	6.6	5.3	4.2	2.9	1.7	.6
		DG -	-	-	-	-	-	-	-	-
		DGNI 10.1	8.3	6.8	5.3	3.9	2.6	1.4	.5	-

SYRACUSE
NEW YORK

43.1 N
6678 DD
T(JAN)=24

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 50	18	8	-	-	-	-	-	-
	L	WWNI 124	55	34	24	17	13	10	8	5
	C	TW 56	22	11	4	-	-	-	-	-
	R	TWNI 117	53	32	22	16	12	9	6	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 118	52	31	20	14	10	7	4	-
		WW 3.8	2.1	.9	-	-	-	-	-	-
		WWNI 10.9	9.7	8.3	7.0	6.1	5.0	3.8	2.4	.9
	D	TW 4.4	2.8	1.4	.1	-	-	-	-	-
		TWNI 10.3	9.0	7.7	6.6	5.4	4.3	2.9	1.7	.6
		DG -	-	-	-	-	-	-	-	-
		DGNI 10.1	8.4	6.8	5.4	4.0	2.6	1.4	.5	-

ASHEVILLE
NORTH CAROLINA

35.4 N
4237 DD
T(JAN)=38

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 138	64	39	27	20	15	11	7	-
	L	WWNI 225	106	68	49	37	29	23	18	13
	C	TW 136	62	38	25	17	12	8	5	2
	R	TWNI 212	100	64	45	34	26	20	15	10
		DG 131	55	28	12	-	-	-	-	-
		DGNI 232	109	68	48	36	27	20	14	9
		WW 12.5	11.2	9.5	8.2	6.7	4.9	2.8	1.1	-
		WWNI 21.0	19.5	18.0	16.2	14.6	12.7	10.4	6.6	2.7
	D	TW 12.4	10.5	8.6	6.5	4.6	3.1	1.8	.8	.2
		TWNI 19.8	18.3	16.5	14.9	12.9	10.4	7.3	4.5	1.8
		DG 11.1	7.9	4.2	.8	-	-	-	-	-
		DGNI 21.6	19.4	17.3	15.2	12.6	9.3	6.3	3.6	1.3

CAPE HATTERAS
NORTH CAROLINA

35.3 N
2731 DD
T(JAN)=45

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 214	97	60	42	31	23	18	12	7
	L	WWNI 312	148	93	66	50	39	31	25	18
	C	TW 200	92	56	38	26	19	13	9	5
	R	TWNI 294	138	87	61	46	36	27	20	13
		DG 223	98	56	34	21	10	-	-	-
		DGNI 329	154	96	67	50	38	28	20	13
		WW 20.4	16.5	14.9	12.5	10.9	8.7	5.6	2.8	.6
		WWNI 31.2	25.7	24.1	21.9	19.1	17.2	14.3	9.1	3.8
	D	TW 18.6	15.7	13.1	10.0	7.6	5.5	3.6	1.9	.8
		TWNI 28.5	24.5	22.2	19.6	17.4	14.0	9.9	6.1	2.5
		DG 20.0	15.4	11.2	7.0	3.7	1.1	-	-	-
		DGNI 31.3	27.2	23.8	21.0	17.7	13.3	9.2	5.4	2.1

CHARLOTTE
NORTH CAROLINA

35.2 N
3218 DD
T(JAN)=42

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 177	82	50	35	25	19	14	9	4
	L	WWNI 270	129	81	57	43	34	27	21	15
	C	TW 170	78	47	31	22	15	10	7	4
	R	TWNI 255	121	76	53	40	31	24	18	12
		DG 180	77	43	24	12	-	-	-	-
		DGNI 283	133	82	58	43	32	24	17	11
		WW 16.2	14.0	11.8	10.5	8.7	6.8	4.1	1.9	.3
		WWNI 25.3	23.7	20.4	18.5	17.2	14.8	12.3	7.9	3.3
	D	TW 15.5	13.2	10.8	8.3	6.1	4.2	2.6	1.4	.5
		TWNI 23.9	21.6	19.1	17.3	15.1	12.1	8.6	5.3	2.1
		DG 15.5	11.7	7.8	4.1	1.2	-	-	-	-
		DGNI 26.5	23.2	20.7	18.0	15.1	11.2	7.7	4.5	1.7

GREENSBORO
NORTH CAROLINA

36.1 N
3825 DD
T(JAN)=39

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 151	70	43	29	22	16	12	7	-
	L	WWNI 239	113	72	51	39	31	24	19	14
	C	TW 147	67	41	27	19	13	9	5	3
	R	TWNI 226	107	67	48	36	28	21	16	10
		DG 147	62	33	16	-	-	-	-	-
		DGNI 249	117	73	51	38	28	21	15	9
		WW 13.8	12.2	10.1	8.9	7.2	5.4	3.1	1.3	-
		WWNI 22.6	20.9	18.8	16.6	15.4	13.2	10.9	7.0	2.9
	D	TW 13.5	11.4	9.3	7.0	5.1	3.4	2.0	1.0	.3
		TWNI 21.2	19.4	17.2	15.6	13.5	10.8	7.7	4.7	1.9
		DG 12.5	9.1	5.3	1.9	-	-	-	-	-
		DGNI 23.1	20.7	18.3	15.9	13.3	9.8	6.6	3.8	1.4

RALEIGH-DURHAM
NORTH CAROLINA

35.9 N
3514 DD
T(JAN)=40

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 155	73	45	31	23	17	12	8	-
	L	WWNI 244	117	75	53	40	31	25	20	14
	C	TW 151	69	42	28	19	13	9	6	3
	R	TWNI 230	110	69	49	37	29	22	16	11
		DG 153	65	36	19	-	-	-	-	-
		DGNI 254	120	75	53	39	29	22	15	9
		WW 14.4	12.8	10.6	9.3	7.6	5.8	3.4	1.4	-
		WWNI 23.4	21.8	19.3	17.2	15.8	13.6	11.2	7.2	3.0
	D	TW 13.9	11.9	9.7	7.3	5.4	3.6	2.2	1.1	.3
		TWNI 21.8	20.1	17.8	16.1	13.9	11.2	7.9	4.8	1.9
		DG 13.3	9.8	5.9	2.5	-	-	-	-	-
		DGNI 23.9	21.4	19.0	16.5	13.7	10.2	6.9	4.0	1.4

BISMARCK
NORTH DAKOTA

46.8 N
9044 DD
T(JAN)= 8

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 60	24	11	5	-	-	-	-	-
	L	WWNI 132	61	38	26	19	14	11	8	5
	C	TW 64	26	13	7	-	-	-	-	-
	R	TWNI 125	58	36	24	18	13	10	7	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 129	58	34	23	16	11	7	4	-
		WW 4.9	3.1	1.6	.3	-	-	-	-	-
		WWNI 12.3	10.6	9.2	7.7	6.6	5.4	3.9	2.6	1.0
	D	TW 5.3	3.6	2.1	.8	-	-	-	-	-
		TWNI 11.6	10.0	8.4	7.1	5.8	4.5	3.1	1.8	.7
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.6	9.5	7.7	6.1	4.5	3.0	1.7	.7	-

FARGO
NORTH DAKOTA

46.9 N
9271 DD
T(JAN)= 6

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 48	17	-	-	-	-	-	-	-
	L	WWNI 119	55	34	23	17	12	9	7	5
	C	TW 54	20	9	-	-	-	-	-	-
	R	TWNI 114	52	31	21	15	11	8	6	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 114	51	29	19	13	9	6	3	-
		WW 3.7	1.6	-	-	-	-	-	-	-
		WWNI 10.9	9.4	7.9	6.5	5.5	4.5	3.2	2.1	.8
	D	TW 4.3	2.5	1.0	-	-	-	-	-	-
		TWNI 10.3	8.8	7.3	6.1	4.9	3.8	2.6	1.5	.5
		DG -	-	-	-	-	-	-	-	-
		DGNI 10.1	8.1	6.3	4.8	3.4	2.2	1.1	.3	-

MINOT
NORTH DAKOTA

48.3 N
9407 DD
T(JAN)= 8

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 54	19	7	-	-	-	-	-	-
	L	WWNI 126	58	35	24	17	13	10	7	5
	C	TW 59	22	10	-	-	-	-	-	-
	R	TWNI 120	55	33	22	16	12	9	6	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 122	54	31	20	14	9	6	3	-
		WW 4.2	2.1	.4	-	-	-	-	-	-
		WWNI 11.5	9.9	8.3	6.6	5.5	4.5	3.2	2.1	.8
	D	TW 4.7	2.8	1.2	-	-	-	-	-	-
		TWNI 10.9	9.3	7.6	6.2	5.0	3.8	2.6	1.5	.5
		DG -	-	-	-	-	-	-	-	-
		DGNI 10.8	8.6	6.6	5.0	3.5	2.3	1.2	.3	-

AKRON-CANTON
OHIO

40.9 N
6224 DD
T(JAN)=26

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 61	25	13	7	-	-	-	-	-
	L	WWNI 137	62	39	27	20	15	12	9	6
	C	TW 67	27	14	8	-	-	-	-	-
	R	TWNI 130	59	36	25	18	14	10	7	5
		DG -	-	-	-	-	-	-	-	-
		DGNI 133	59	35	24	17	12	8	5	2
		WW 4.9	3.3	2.2	1.0	-	-	-	-	-
		WWNI 12.0	10.9	9.3	8.1	7.2	5.9	4.5	2.9	1.1
	D	TW 5.4	3.8	2.4	1.1	-	-	-	-	-
		TWNI 11.4	10.1	8.7	7.6	6.3	5.0	3.5	2.0	.8
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.5	9.7	8.1	6.6	5.1	3.4	2.0	.9	.1

CINCINNATI
OHIO

39.1 N
5070 DD
T(JAN)=31

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 81	36	20	13	8	5	-	-	-
	L	WWNI 156	74	46	32	24	19	15	11	8
	C	TW 84	36	21	13	8	4	-	-	-
	R	TWNI 148	70	43	30	22	17	13	9	6
		DG 49	-	-	-	-	-	-	-	-
		DGNI 157	72	44	30	22	16	11	8	4
		WW 7.3	5.4	4.1	3.0	1.9	.7	-	-	-
		WWNI 14.3	13.6	11.5	10.0	9.2	7.7	6.1	3.9	1.6
	D	TW 7.3	5.6	4.1	2.6	1.4	.5	-	-	-
		TWNI 13.7	12.2	10.7	9.5	8.0	6.4	4.5	2.7	1.0
		DG 3.0	-	-	-	-	-	-	-	-
		DGNI 14.4	12.3	10.5	8.8	7.0	4.9	3.1	1.6	.4

CLEVELAND
OHIO

41.4 N
6154 DD
T(JAN)=27

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 59	23	11	5	-	-	-	-	-
	L	WWNI 135	60	37	26	19	14	11	8	6
	C	TW 65	26	13	7	-	-	-	-	-
	R	TWNI 128	57	35	24	18	13	10	7	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 130	57	34	23	16	11	8	5	-
		WW 4.6	3.0	1.7	.5	-	-	-	-	-
		WWNI 11.7	10.6	8.9	7.7	6.7	5.4	4.2	2.7	1.0
	D	TW 5.1	3.4	2.1	.8	-	-	-	-	-
		TWNI 11.1	9.7	8.3	7.2	5.9	4.7	3.2	1.9	.7
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.2	9.2	7.6	6.1	4.6	3.1	1.8	.7	-

COLUMBUS
OHIO

40.0 N
5702 DD
T(JAN)=28

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 67	28	15	9	5	-	-	-	-
	L	WWNI 141	65	41	29	21	16	13	10	7
	C	TW 71	30	16	9	5	-	-	-	-
	R	TWNI 133	62	38	27	20	15	11	8	5
		DG -	-	-	-	-	-	-	-	-
		DGNI 138	63	38	26	19	13	9	6	3
		WW 5.7	4.1	2.9	1.8	.7	-	-	-	-
		WWNI 12.7	11.8	10.1	8.8	7.9	6.5	5.1	3.3	1.3
	D	TW 6.0	4.4	3.0	1.7	.6	-	-	-	-
		TWNI 12.1	10.8	9.4	8.3	6.9	5.5	3.8	2.3	.9
		DG -	-	-	-	-	-	-	-	-
		DGNI 12.5	10.6	8.9	7.3	5.7	4.0	2.4	1.1	.2

DAYTON OHIO

39.9 N, 5641 DD, T(JAN)=28

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 72	30	17	10	6	-	-	-	-
	L	WWNI 146	68	43	30	22	17	13	10	7
	C	TW 76	32	18	10	6	-	-	-	-
	R	TWNI 139	64	40	28	21	16	12	9	6
		DG 30	-	-	-	-	-	-	-	-
		DGNI 145	66	40	27	20	14	10	7	3
		WW 6.2	4.4	3.3	2.2	1.1	-	-	-	-
		WWNI 13.1	12.4	10.4	9.2	8.4	6.9	5.4	3.5	1.4
	D	TW 6.4	4.8	3.3	2.0	.8	-	-	-	-
		TWNI 12.6	11.2	9.8	8.7	7.3	5.8	4.1	2.4	.9
		DG .9	-	-	-	-	-	-	-	-
		DGNI 13.1	11.1	9.4	7.8	6.2	4.3	2.7	1.3	.3

TOLEDO OHIO

41.6 N, 6381 DD, T(JAN)=25

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 62	25	13	7	-	-	-	-	-
	L	WWNI 138	62	39	27	20	15	12	9	6
	C	TW 68	27	15	8	3	-	-	-	-
	R	TWNI 130	59	36	25	19	14	10	8	5
		DG -	-	-	-	-	-	-	-	-
		DGNI 134	60	36	24	17	12	8	5	2
		WW 5.0	3.4	2.3	1.0	-	-	-	-	-
		WWNI 12.1	11.1	9.4	8.2	7.2	5.9	4.5	2.9	1.1
	D	TW 5.5	3.8	2.4	1.2	.0	-	-	-	-
		TWNI 11.5	10.2	8.8	7.7	6.4	5.0	3.5	2.0	.8
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.6	9.8	8.2	6.7	5.1	3.5	2.0	.9	.1

YOUNGSTOWN OHIO

41.3 N, 6426 DD, T(JAN)=26

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 52	20	9	-	-	-	-	-	-
	L	WWNI 126	57	35	24	18	14	10	8	5
	C	TW 58	23	11	5	-	-	-	-	-
	R	TWNI 120	54	33	23	17	12	9	7	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 121	53	32	21	15	10	7	4	-
		WW 4.0	2.4	1.1	-	-	-	-	-	-
		WWNI 11.2	9.9	8.4	7.2	6.3	5.1	3.9	2.6	1.0
	D	TW 4.6	3.0	1.6	.4	-	-	-	-	-
		TWNI 10.5	9.2	7.9	6.8	5.6	4.4	3.1	1.8	.6
		DG -	-	-	-	-	-	-	-	-
		DGNI 10.4	8.6	7.0	5.6	4.2	2.8	1.6	.6	-

OKLAHOMA CITY OKLAHOMA

35.4 N, 3695 DD, T(JAN)=37

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 161	74	45	31	23	17	13	8	-
	L	WWNI 251	119	75	53	40	32	26	20	14
	C	TW 156	71	43	28	20	14	9	6	3
	R	TWNI 237	111	70	50	37	29	22	16	11
		DG 158	67	36	19	-	-	-	-	-
		DGNI 262	122	76	53	40	30	22	16	10
		WW 14.7	12.5	10.7	9.6	8.0	6.0	3.6	1.6	-
		WWNI 23.5	21.3	19.0	17.4	16.3	14.1	11.6	7.4	3.1
	D	TW 14.0	11.9	9.8	7.5	5.4	3.7	2.3	1.2	.4
		TWNI 22.2	19.9	17.8	16.3	14.2	11.4	8.1	5.0	2.0
		DG 13.4	10.0	6.1	2.8	-	-	-	-	-
		DGNI 24.4	21.3	19.1	16.8	14.0	10.4	7.1	4.1	1.5

TULSA OKLAHOMA

36.2 N, 3680 DD, T(JAN)=37

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 147	67	41	28	21	15	11	7	-
	L	WWNI 235	111	70	49	38	30	24	19	13
	C	TW 144	65	39	26	18	12	8	5	3
	R	TWNI 222	104	65	46	35	27	21	15	10
		DG 141	58	30	14	-	-	-	-	-
		DGNI 245	113	70	49	37	28	20	14	9
		WW 13.5	11.2	9.7	8.6	7.0	5.2	3.0	1.2	-
		WWNI 21.8	19.8	17.7	16.4	15.2	13.1	10.7	6.8	2.8
	D	TW 12.9	10.8	8.8	6.7	4.8	3.2	1.9	1.0	.2
		TWNI 20.8	18.5	16.7	15.2	13.2	10.6	7.5	4.6	1.8
		DG 11.7	8.4	4.7	1.3	-	-	-	-	-
		DGNI 22.7	19.7	17.8	15.5	12.9	9.5	6.5	3.7	1.3

ASTORIA OREGON

46.1 N, 5295 DD, T(JAN)=41

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 122	59	36	24	17	11	7	-	-
	L	WWNI 201	100	64	46	34	26	20	15	10
	C	TW 121	56	34	22	14	9	6	2	-
	R	TWNI 191	94	60	42	31	23	17	13	8
		DG 112	46	19	-	-	-	-	-	-
		DGNI 208	101	64	44	32	23	17	11	6
		WW 12.2	10.2	8.3	6.4	4.5	2.6	1.1	-	-
		WWNI 20.1	19.7	16.6	14.7	12.4	10.1	7.2	4.6	1.8
	D	TW 11.5	9.6	7.3	5.3	3.5	2.0	.9	.2	-
		TWNI 19.1	17.5	15.5	13.2	10.8	8.2	5.8	3.4	1.2
		DG 9.9	5.8	1.7	-	-	-	-	-	-
		DGNI 20.8	18.4	15.8	13.0	10.0	7.3	4.6	2.4	.7

BURNS OREGON

43.6 N, 7212 DD, T(JAN)=25

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 100	44	26	17	11	7	-	-	-
	L	WWNI 179	84	52	37	28	21	16	12	8
	C	TW 101	44	25	16	10	6	2	-	-
	R	TWNI 170	79	49	34	25	19	14	10	6
		DG 76	19	-	-	-	-	-	-	-
		DGNI 182	83	51	35	25	18	13	8	4
		WW 8.9	7.0	5.5	4.0	2.4	1.2	-	-	-
		WWNI 16.3	15.0	13.3	11.7	9.9	8.2	5.9	4.0	1.5
	D	TW 8.8	6.9	5.1	3.4	2.0	1.0	.1	-	-
		TWNI 15.6	13.8	12.3	10.5	8.8	6.7	4.8	2.8	1.0
		DG 5.5	.8	-	-	-	-	-	-	-
		DGNI 16.6	14.3	12.2	10.0	7.7	5.6	3.5	1.7	.4

MEDFORD OREGON

42.4 N, 4930 DD, T(JAN)=37

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 134	57	34	22	15	9	5	-	-
	L	WWNI 222	100	62	44	32	25	19	14	9
	C	TW 130	56	32	20	13	8	4	-	-
	R	TWNI 209	94	58	40	29	22	16	12	7
		DG 118	42	-	-	-	-	-	-	-
		DGNI 227	102	62	42	30	21	15	10	5
		WW 11.3	9.4	7.4	5.4	3.5	1.9	.6	-	-
		WWNI 20.2	16.9	15.9	13.6	11.4	9.0	6.3	4.2	1.6
	D	TW 11.2	8.7	6.4	4.5	2.9	1.6	.6	-	-
		TWNI 18.7	16.2	14.2	12.1	9.8	7.4	5.2	3.0	1.1
		DG 9.0	4.5	-	-	-	-	-	-	-
		DGNI 19.9	17.2	14.4	11.8	8.9	6.5	4.1	2.0	.5

NORTH BEND OREGON

43.4 N
4688 DD
T(JAN)=45

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 172	86	55	39	29	21	15	10	5
	L	WWNI 260	130	86	63	48	37	29	23	16
	C	TW 168	81	51	34	24	17	12	8	4
	R	TWNI 247	123	80	58	44	33	25	19	12
		DG 181	84	49	30	17	-	-	-	-
		DGNI 275	137	88	63	47	35	26	18	11
		WW 17.2	16.8	14.4	11.9	9.9	7.0	4.5	2.0	.3
		WWNI 26.0	26.0	24.4	21.4	18.3	15.9	11.8	7.9	3.2
	D	TW 16.6	14.7	12.1	9.5	7.0	4.9	2.9	1.5	.5
		TWNI 24.7	24.2	21.9	19.1	16.3	12.6	9.0	5.4	2.1
		DG 17.4	14.0	9.7	5.7	2.5	-	-	-	-
		DGNI 27.5	26.3	23.2	20.2	16.1	12.1	8.1	4.6	1.7

PENDLETON OREGON

45.7 N
5240 DD
T(JAN)=32

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 117	49	28	17	10	5	-	-	-
	L	WWNI 204	90	56	39	28	21	15	11	7
	C	TW 115	48	26	16	9	5	-	-	-
	R	TWNI 190	85	52	35	25	19	14	10	6
		DG 94	22	-	-	-	-	-	-	-
		DGNI 205	91	54	36	25	17	12	8	3
		WW 9.5	7.5	5.3	3.3	1.7	.5	-	-	-
		WWNI 18.4	15.3	13.7	11.2	8.9	7.1	5.0	3.4	1.3
	D	TW 9.7	7.1	4.9	3.2	1.7	.6	-	-	-
		TWNI 16.9	14.4	12.2	10.0	8.0	6.0	4.2	2.4	.9
		DG 6.5	.9	-	-	-	-	-	-	-
		DGNI 17.8	14.8	12.0	9.5	7.0	4.9	2.9	1.4	.3

PORTLAND OREGON

45.6 N
4792 DD
T(JAN)=38

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 135	56	32	20	13	8	-	-	-
	L	WWNI 223	100	61	42	31	23	17	13	8
	C	TW 130	55	31	19	12	7	3	-	-
	R	TWNI 209	94	57	39	28	21	15	11	7
		DG 117	38	-	-	-	-	-	-	-
		DGNI 228	100	60	40	28	20	14	9	4
		WW 11.4	8.5	6.6	4.6	2.8	1.4	-	-	-
		WWNI 20.2	16.6	14.8	12.7	10.5	8.2	5.8	3.8	1.5
	D	TW 11.2	8.1	6.0	4.0	2.4	1.2	.3	-	-
		TWNI 19.0	15.6	13.5	11.3	9.1	6.8	4.8	2.8	1.0
		DG 8.6	3.5	-	-	-	-	-	-	-
		DGNI 20.3	16.4	13.5	10.8	8.2	5.9	3.6	1.8	.4

REDMOND OREGON

44.3 N
6643 DD
T(JAN)=30

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 125	56	33	22	15	10	6	-	-
	L	WWNI 209	98	61	43	32	25	19	15	10
	C	TW 122	54	32	20	13	9	5	2	-
	R	TWNI 196	92	57	40	30	22	17	12	8
		DG 110	41	12	-	-	-	-	-	-
		DGNI 213	98	61	42	30	22	16	11	6
		WW 11.1	9.0	7.5	5.9	4.2	2.5	1.1	-	-
		WWNI 19.8	17.4	15.4	14.0	12.0	9.9	7.3	4.9	1.9
	D	TW 11.0	8.7	6.6	4.8	3.1	1.8	.9	.1	-
		TWNI 18.4	16.1	14.5	12.5	10.4	8.1	5.7	3.4	1.3
		DG 8.8	4.7	.2	-	-	-	-	-	-
		DGNI 19.8	16.9	14.7	12.3	9.6	7.1	4.5	2.4	.7

SALEM OREGON

44.9 N
4852 DD
T(JAN)=39

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 137	57	34	22	15	9	5	-	-
	L	WWNI 226	101	62	43	32	24	18	14	9
	C	TW 133	56	32	20	13	8	4	-	-
	R	TWNI 212	95	58	40	29	22	16	11	7
		DG 121	41	-	-	-	-	-	-	-
		DGNI 231	102	62	42	30	21	15	10	5
		WW 11.5	8.8	7.2	5.3	3.5	1.9	.6	-	-
		WWNI 20.3	16.9	15.1	13.4	11.3	8.9	6.3	4.2	1.6
	D	TW 11.3	8.5	6.4	4.5	2.8	1.5	.5	-	-
		TWNI 19.1	15.8	14.0	12.0	9.7	7.4	5.2	3.0	1.1
		DG 9.1	4.3	-	-	-	-	-	-	-
		DGNI 20.4	16.8	14.2	11.6	8.9	6.4	4.0	2.0	.5

ALLENTOWN PENNSYLVANIA

40.6 N
5827 DD
T(JAN)=28

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 76	33	19	12	8	5	-	-	-
	L	WWNI 152	71	45	32	24	18	15	11	8
	C	TW 80	35	20	12	7	4	-	-	-
	R	TWNI 143	67	42	30	22	17	13	9	6
		DG 43	-	-	-	-	-	-	-	-
		DGNI 150	69	43	29	21	16	11	7	4
		WW 6.6	5.2	4.0	2.9	1.8	.6	-	-	-
		WWNI 13.9	12.9	11.4	10.1	9.1	7.6	5.9	3.9	1.5
	D	TW 6.9	5.4	3.9	2.5	1.3	.4	-	-	-
		TWNI 13.1	12.0	10.6	9.4	8.0	6.3	4.4	2.6	1.0
		DG 2.4	-	-	-	-	-	-	-	-
		DGNI 13.6	11.9	10.3	8.7	6.9	4.8	3.0	1.5	.4

ERIE PENNSYLVANIA

42.1 N
6851 DD
T(JAN)=25

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 53	19	8	-	-	-	-	-	-
	L	WWNI 129	57	35	24	17	13	10	7	5
	C	TW 59	22	11	4	-	-	-	-	-
	R	TWNI 122	54	33	22	16	12	9	6	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 124	53	31	21	14	10	6	4	-
		WW 3.8	2.2	.8	-	-	-	-	-	-
		WWNI 11.5	9.4	8.3	7.1	6.0	4.8	3.6	2.3	.9
	D	TW 4.6	2.8	1.4	.1	-	-	-	-	-
		TWNI 10.7	9.1	7.7	6.6	5.3	4.1	2.9	1.6	.6
		DG -	-	-	-	-	-	-	-	-
		DGNI 10.4	8.4	6.8	5.3	3.9	2.6	1.4	.5	-

HARRISBURG PENNSYLVANIA

40.2 N
5224 DD
T(JAN)=30

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 83	37	22	14	10	6	-	-	-
	L	WWNI 158	75	47	34	25	20	16	12	8
	C	TW 86	38	22	14	8	5	2	-	-
	R	TWNI 150	71	44	31	23	18	14	10	6
		DG 55	-	-	-	-	-	-	-	-
		DGNI 158	74	46	32	23	17	12	8	4
		WW 7.5	5.9	4.6	3.5	2.4	1.1	-	-	-
		WWNI 14.7	13.8	12.1	10.7	9.8	8.2	6.5	4.2	1.7
	D	TW 7.6	6.0	4.4	2.9	1.7	.8	.1	-	-
		TWNI 14.1	12.7	11.2	10.1	8.5	6.8	4.8	2.8	1.1
		DG 3.6	-	-	-	-	-	-	-	-
		DGNI 14.8	12.8	11.2	9.4	7.5	5.3	3.4	1.8	.5

PHILADELPHIA
PENNSYLVANIA

39.9 N
4865 DD
T(JAN)=32

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 95	43	26	17	12	8	5	-	-
	L	WWNI 171	82	52	37	28	22	17	13	9
	C	TW 96	43	25	16	10	6	4	-	-
	R	TWNI 162	77	49	34	26	20	15	11	7
		DG 72	22	-	-	-	-	-	-	-
		DGNI 174	81	51	35	26	19	14	9	5
		WW 8.8	6.9	5.7	4.5	3.3	1.9	.6	-	-
		WWNI 16.0	15.3	13.2	12.0	10.8	9.1	7.3	4.7	1.9
	D	TW 8.6	7.0	5.3	3.7	2.3	1.3	.5	-	-
		TWNI 15.3	13.8	12.4	11.1	9.4	7.6	5.3	3.2	1.2
		DG 5.4	1.4	-	-	-	-	-	-	-
		DGNI 16.3	14.2	12.5	10.6	8.6	6.2	4.0	2.1	.6

PITTSBURGH
PENNSYLVANIA

40.5 N
5930 DD
T(JAN)=28

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 62	25	13	7	-	-	-	-	-
	L	WWNI 137	62	39	27	20	15	12	9	6
	C	TW 68	28	15	8	3	-	-	-	-
	R	TWNI 130	59	37	25	19	14	11	8	5
		DG -	-	-	-	-	-	-	-	-
		DGNI 134	60	36	24	17	12	8	5	2
		WW 5.1	3.5	2.3	1.1	-	-	-	-	-
		WWNI 12.2	11.1	9.6	8.2	7.2	5.9	4.6	3.0	1.1
	D	TW 5.5	3.9	2.5	1.2	.1	-	-	-	-
		TWNI 11.5	10.3	8.9	7.7	6.4	5.0	3.5	2.1	.8
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.7	9.9	8.2	6.7	5.1	3.5	2.1	.9	.1

SCRANTON
PENNSYLVANIA

41.3 N
6277 DD
T(JAN)=26

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 63	26	14	8	4	-	-	-	-
	L	WWNI 137	63	40	28	20	16	12	9	6
	C	TW 68	28	15	9	4	-	-	-	-
	R	TWNI 130	60	37	26	19	14	11	8	5
		DG -	-	-	-	-	-	-	-	-
		DGNI 134	61	37	25	18	13	9	6	2
		WW 5.2	3.7	2.5	1.4	.3	-	-	-	-
		WWNI 12.5	11.2	9.8	8.5	7.5	6.3	4.9	3.1	1.2
	D	TW 5.6	4.1	2.7	1.4	.4	-	-	-	-
		TWNI 11.7	10.5	9.1	8.0	6.7	5.3	3.7	2.2	.8
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.9	10.1	8.5	7.0	5.4	3.7	2.2	1.0	.1

PROVIDENCE
RHODE ISLAND

41.7 N
5972 DD
T(JAN)=28

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 77	34	20	13	8	5	-	-	-
	L	WWNI 153	71	45	32	24	19	15	11	8
	C	TW 81	35	20	12	7	4	-	-	-
	R	TWNI 145	67	42	30	22	17	13	9	6
		DG 44	-	-	-	-	-	-	-	-
		DGNI 152	69	43	30	22	16	11	8	4
		WW 6.5	5.3	4.2	3.1	1.9	.7	-	-	-
		WWNI 14.0	12.7	11.6	10.3	9.2	7.8	6.1	3.9	1.6
	D	TW 7.0	5.5	3.9	2.5	1.4	.5	-	-	-
		TWNI 13.2	12.1	10.7	9.6	8.1	6.5	4.5	2.7	1.0
		DG 2.5	-	-	-	-	-	-	-	-
		DGNI 13.6	11.9	10.5	8.8	7.0	5.0	3.1	1.6	.4

CHARLESTON
SOUTH CAROLINA

32.9 N
2146 DD
T(JAN)=49

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 252	118	72	51	38	29	22	16	9
	L	WWNI 358	173	108	76	58	46	37	29	21
	C	TW 238	110	67	46	32	23	17	11	7
	R	TWNI 339	161	101	71	54	42	32	24	16
		DG 276	124	73	47	30	19	10	-	-
		DGNI 384	180	113	79	59	45	34	24	16
		WW 24.6	19.9	17.9	16.1	13.7	11.3	7.5	4.0	1.2
		WWNI 35.0	30.8	27.0	25.9	23.5	20.3	17.0	10.9	4.6
	D	TW 21.9	19.0	16.0	12.6	9.5	7.0	4.8	2.9	1.3
		TWNI 33.0	28.4	25.9	23.2	20.5	16.5	11.8	7.2	3.0
		DG 24.8	20.1	15.5	10.7	6.7	3.5	1.1	-	-
		DGNI 36.8	31.6	28.4	24.9	21.2	16.0	11.2	6.7	2.7

COLUMBIA
SOUTH CAROLINA

33.9 N
2598 DD
T(JAN)=45

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 215	102	62	43	32	25	19	13	7
	L	WWNI 315	153	96	68	52	41	33	26	18
	C	TW 206	95	58	39	28	20	14	9	6
	R	TWNI 298	142	89	63	48	37	28	21	14
		DG 231	102	60	37	23	12	-	-	-
		DGNI 335	158	99	69	52	39	29	21	13
		WW 20.6	17.2	15.1	13.7	11.6	9.4	6.1	3.1	.8
		WWNI 30.2	27.9	23.8	22.4	20.9	18.0	15.1	9.6	4.0
	D	TW 18.9	16.4	13.7	10.7	7.9	5.7	3.9	2.3	.9
		TWNI 28.6	25.3	22.8	20.6	18.1	14.6	10.4	6.4	2.6
		DG 20.5	16.4	12.1	7.8	4.3	1.7	-	-	-
		DGNI 32.2	27.8	25.1	21.9	18.5	13.9	9.7	5.7	2.2

GREENVILLE
SOUTH CAROLINA

34.9 N
3163 DD
T(JAN)=42

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 178	83	51	35	26	20	14	10	4
	L	WWNI 272	129	82	58	44	35	28	22	15
	C	TW 172	78	48	32	22	16	11	7	4
	R	TWNI 257	121	76	54	41	31	24	18	12
		DG 182	78	44	25	13	-	-	-	-
		DGNI 285	134	83	58	43	33	24	17	11
		WW 16.4	14.2	12.0	10.8	8.9	7.0	4.3	2.0	.3
		WWNI 25.4	23.8	20.7	18.8	17.5	15.1	12.5	8.0	3.3
	D	TW 15.6	13.4	11.0	8.5	6.3	4.3	2.7	1.5	.5
		TWNI 24.0	21.8	19.4	17.6	15.3	12.3	8.7	5.4	2.2
		DG 15.7	12.0	8.1	4.4	1.4	-	-	-	-
		DGNI 26.7	23.4	21.0	18.3	15.3	11.4	7.8	4.6	1.7

HURON
SOUTH DAKOTA

44.4 N
8054 DD
T(JAN)=13

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 63	25	12	6	-	-	-	-	-
	L	WWNI 136	62	39	27	19	15	11	9	6
	C	TW 67	27	14	7	-	-	-	-	-
	R	TWNI 129	59	36	25	18	14	10	7	5
		DG -	-	-	-	-	-	-	-	-
		DGNI 133	59	35	24	16	12	8	5	-
		WW 5.0	3.2	1.9	.7	-	-	-	-	-
		WWNI 12.7	10.9	9.3	7.8	6.9	5.6	4.2	2.8	1.1
	D	TW 5.5	3.7	2.2	1.0	-	-	-	-	-
		TWNI 11.8	10.1	8.5	7.4	6.1	4.8	3.3	1.9	.7
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.8	9.7	7.9	6.3	4.8	3.2	1.9	.8	-

PIERRE
SOUTH DAKOTA

44.4 N
7677 DD
T(JAN)=16

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	77	32	17	10	6	-	-	-	-
L	WWNI	153	70	44	30	22	17	13	10	7
C	TW	80	33	18	10	6	-	-	-	-
R	TWNI	144	67	41	28	21	16	12	8	5
	DG	36	-	-	-	-	-	-	-	-
	DGNI	151	68	41	28	20	14	10	6	3
	WW	6.4	4.5	3.1	2.0	.9	-	-	-	-
	WWNI	14.4	12.3	10.5	9.0	8.0	6.6	5.0	3.3	1.3
D	TW	6.8	4.8	3.2	1.9	.7	-	-	-	-
	TWNI	13.3	11.5	9.8	8.5	7.0	5.6	3.9	2.3	.9
	DG	1.3	-	-	-	-	-	-	-	-
	DGNI	13.6	11.2	9.3	7.6	5.9	4.1	2.5	1.2	.2

RAPID CITY
SOUTH DAKOTA

44.0 N
7324 DD
T(JAN)=22

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	91	40	23	15	10	6	-	-	-
L	WWNI	166	79	50	35	26	20	16	12	8
C	TW	92	40	23	14	9	5	2	-	-
R	TWNI	158	75	47	33	24	18	14	10	6
	DG	64	-	-	-	-	-	-	-	-
	DGNI	168	78	48	33	24	17	12	8	4
	WW	8.3	6.4	4.8	3.7	2.3	1.1	-	-	-
	WWNI	15.9	14.1	12.7	10.9	9.5	8.2	6.2	4.1	1.6
D	TW	8.2	6.4	4.7	3.0	1.8	.8	.1	-	-
	TWNI	15.1	13.4	11.5	10.1	8.5	6.7	4.7	2.8	1.1
	DG	4.4	-	-	-	-	-	-	-	-
	DGNI	15.7	13.5	11.4	9.6	7.5	5.4	3.4	1.7	.4

SIOUX FALLS
SOUTH DAKOTA

43.6 N
7838 DD
T(JAN)=14

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	68	28	15	8	4	-	-	-	-
L	WWNI	143	66	41	28	21	16	12	9	6
C	TW	72	30	16	9	4	-	-	-	-
R	TWNI	135	62	38	26	19	15	11	8	5
	DG	-	-	-	-	-	-	-	-	-
	DGNI	140	63	38	25	18	13	9	6	2
	WW	5.6	3.8	2.6	1.4	.3	-	-	-	-
	WWNI	13.2	11.5	9.9	8.5	7.5	6.2	4.7	3.1	1.2
D	TW	6.0	4.3	2.7	1.5	.4	-	-	-	-
	TWNI	12.3	10.7	9.1	8.0	6.6	5.3	3.7	2.1	.8
	DG	-	-	-	-	-	-	-	-	-
	DGNI	12.5	10.4	8.6	7.0	5.4	3.7	2.2	1.0	.1

CHATTANOOGA
TENNESSEE

35.0 N
3505 DD
T(JAN)=40

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	136	63	38	26	19	14	10	6	-
L	WWNI	220	106	67	47	35	28	22	17	12
C	TW	133	61	36	24	16	11	7	4	2
R	TWNI	208	99	62	44	33	25	19	14	9
	DG	127	52	25	-	-	-	-	-	-
	DGNI	228	108	67	47	34	26	19	13	8
	WW	12.7	10.6	8.7	7.6	6.0	4.3	2.4	.8	-
	WWNI	21.4	19.7	16.8	15.0	14.1	11.9	9.8	6.3	2.6
D	TW	12.2	10.2	8.1	6.0	4.2	2.7	1.5	.7	.1
	TWNI	19.9	17.9	15.6	14.2	12.2	9.8	6.9	4.2	1.7
	DG	10.6	7.1	3.3	-	-	-	-	-	-
	DGNI	21.6	18.8	16.5	14.3	11.8	8.7	5.8	3.3	1.1

KNOXVILLE
TENNESSEE

35.8 N
3478 DD
T(JAN)=41

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	143	66	39	27	20	14	10	6	-
L	WWNI	230	110	69	48	37	29	23	18	13
C	TW	140	63	38	25	17	11	8	5	2
R	TWNI	217	103	64	45	34	26	20	15	10
	DG	136	56	28	10	-	-	-	-	-
	DGNI	238	111	69	48	35	26	19	14	8
	WW	13.2	11.0	9.0	7.9	6.4	4.6	2.6	.9	-
	WWNI	21.9	20.1	17.2	15.4	14.5	12.2	10.0	6.5	2.7
D	TW	12.7	10.6	8.4	6.3	4.4	2.9	1.7	.8	.2
	TWNI	20.5	18.4	16.0	14.5	12.5	10.1	7.1	4.3	1.7
	DG	11.3	7.7	3.9	.3	-	-	-	-	-
	DGNI	22.4	19.4	17.0	14.7	12.2	9.0	6.0	3.4	1.2

MEMPHIS
TENNESSEE

35.0 N
3227 DD
T(JAN)=40

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	161	74	44	31	22	17	12	8	-
L	WWNI	251	119	75	52	40	31	25	20	14
C	TW	156	70	42	28	19	13	9	6	3
R	TWNI	237	112	70	49	37	28	22	16	11
	DG	159	66	35	18	-	-	-	-	-
	DGNI	263	122	75	53	39	29	22	15	9
	WW	14.8	12.1	10.4	9.2	7.6	5.7	3.3	1.4	-
	WWNI	23.3	21.7	18.4	17.0	15.9	13.6	11.1	7.2	3.0
D	TW	14.0	11.8	9.6	7.3	5.2	3.5	2.2	1.1	.3
	TWNI	22.2	19.6	17.5	15.9	13.7	11.1	7.9	4.8	1.9
	DG	13.3	9.7	5.8	2.4	-	-	-	-	-
	DGNI	24.6	21.0	18.8	16.3	13.6	10.1	6.9	3.9	1.4

NASHVILLE
TENNESSEE

36.1 N
3696 DD
T(JAN)=38

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	124	56	32	22	16	11	8	4	-
L	WWNI	207	98	61	42	32	25	20	16	11
C	TW	122	54	32	21	14	9	6	3	-
R	TWNI	195	92	57	40	30	23	17	13	8
	DG	108	41	15	-	-	-	-	-	-
	DGNI	212	98	60	42	31	23	17	11	7
	WW	11.2	8.8	7.2	6.1	4.8	3.2	1.6	.3	-
	WWNI	19.4	17.6	14.8	13.4	12.6	10.7	8.6	5.6	2.3
D	TW	10.8	8.8	6.8	4.9	3.3	2.0	1.1	.4	-
	TWNI	18.3	16.0	14.0	12.7	10.9	8.8	6.2	3.8	1.5
	DG	8.5	4.9	.8	-	-	-	-	-	-
	DGNI	19.8	16.7	14.6	12.5	10.3	7.5	5.0	2.8	.9

ABILENE
TEXAS

32.4 N
2610 DD
T(JAN)=44

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	236	111	69	49	37	28	22	15	9
L	WWNI	339	164	104	74	57	45	36	29	20
C	TW	224	104	64	44	31	22	16	11	7
R	TWNI	321	153	97	69	52	41	31	23	16
	DG-	257	116	69	44	29	18	9	-	-
	DGNI	362	171	108	77	57	44	33	24	15
	WW	22.6	19.5	17.3	16.0	13.7	11.0	7.3	3.9	1.1
	WWNI	32.6	30.0	26.7	25.1	23.6	20.3	16.6	10.7	4.5
D	TW	20.8	18.3	15.5	12.3	9.3	6.9	4.6	2.8	1.2
	TWNI	30.9	27.7	25.3	23.1	20.2	16.2	11.6	7.2	2.9
	DG	23.2	19.3	14.8	10.2	6.3	3.2	.9	-	-
	DGNI	34.5	30.6	28.1	24.7	20.9	15.8	11.0	6.6	2.6

AMARILLO TEXAS

35.2 N
4183 DD
T(JAN)=36

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 178	83	52	36	27	21	16	11	5
	L	WWNI 271	130	83	59	45	36	29	23	16
	C	TW 173	79	49	33	23	16	11	8	5
	R	TWNI 256	122	77	55	42	33	25	19	12
		DG 183	80	46	27	15	-	-	-	-
		DGNI 285	134	85	60	45	34	25	18	12
		WW 16.5	14.5	12.8	11.6	9.9	7.7	4.8	2.4	.5
		WWNI 25.2	24.2	21.5	19.8	18.4	16.5	13.5	8.6	3.6
	D	TW 15.6	13.8	11.5	9.0	6.7	4.7	3.1	1.7	.7
		TWNI 24.0	22.1	20.1	18.5	16.3	13.0	9.3	5.7	2.3
		DG 15.9	12.8	8.9	5.2	2.2	-	-	-	-
		DGNI 26.6	24.0	21.7	19.4	16.2	12.1	8.4	5.0	1.9

AUSTIN TEXAS

30.3 N
1737 DD
T(JAN)=50

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 311	143	89	63	48	37	28	21	13
	L	WWNI 432	203	127	91	70	55	45	35	25
	C	TW 288	134	82	56	40	29	21	15	10
	R	TWNI 404	189	119	85	64	50	39	29	19
		DG 348	157	95	62	42	28	18	9	-
		DGNI 460	214	135	95	71	54	41	30	19
		WW 29.0	24.4	23.0	20.8	18.0	14.7	10.2	5.7	1.9
		WWNI 41.6	35.3	33.0	31.8	28.5	25.0	20.1	13.1	5.5
	D	TW 26.7	23.2	19.6	15.9	12.4	9.3	6.5	4.1	1.7
		TWNI 38.3	33.3	31.2	28.1	25.0	20.0	14.3	8.8	3.6
		DG 31.4	26.2	21.2	15.6	10.8	6.7	3.5	1.1	-
		DGNI 43.4	37.7	34.7	30.8	26.0	20.0	14.0	8.4	3.4

BROWNSVILLE TEXAS

25.9 N
650 DD
T(JAN)=60

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 656	308	192	137	105	82	65	49	33
	L	WWNI 846	402	252	180	138	111	89	70	50
	C	TW 609	280	175	121	88	65	48	35	24
	R	TWNI 797	373	235	168	128	99	77	57	38
		DG 799	365	226	155	111	80	58	40	24
		DGNI 929	432	272	194	146	112	85	63	42
		WW 60.7	53.8	49.0	46.4	41.9	34.5	25.8	15.6	6.3
		WWNI 78.3	71.7	64.3	62.0	57.7	50.8	40.0	26.6	11.3
	D	TW 54.4	49.4	43.2	35.8	28.2	22.0	16.2	10.7	5.3
		TWNI 74.1	66.0	61.2	56.5	49.2	39.9	28.6	17.7	7.3
		DG 71.5	63.6	54.7	44.2	34.0	24.8	16.7	9.7	3.9
		DGNI 86.3	76.2	70.7	63.6	53.8	42.0	30.0	18.6	7.9

CORPUS CHRISTI TEXAS

27.8 N
930 DD
T(JAN)=56

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 469	225	146	105	80	62	49	37	24
	L	WWNI 621	299	195	141	109	86	69	55	39
	C	TW 442	208	131	92	67	50	37	26	18
	R	TWNI 586	282	182	131	100	78	60	45	30
		DG 564	264	165	113	81	58	41	27	15
		DGNI 677	325	208	149	113	87	66	48	32
		WW 43.4	43.4	39.0	35.3	31.5	25.6	18.8	11.1	4.3
		WWNI 57.6	57.5	53.8	49.2	44.2	40.3	30.9	20.5	8.7
	D	TW 40.8	37.6	33.2	27.5	21.9	16.8	11.6	7.6	3.7
		TWNI 54.5	53.4	49.2	44.5	38.8	31.2	22.2	13.7	5.6
		DG 52.3	47.2	40.5	32.1	24.1	17.1	10.9	5.7	1.9
		DGNI 63.0	60.5	55.8	50.3	41.9	32.4	22.9	14.1	5.9

DALLAS TEXAS

32.8 N
2290 DD
T(JAN)=45

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 237	109	68	48	36	28	21	15	9
	L	WWNI 343	162	102	73	56	45	36	28	20
	C	TW 223	103	64	43	31	22	16	11	7
	R	TWNI 321	151	95	68	52	40	31	23	15
		DG 255	114	68	43	28	17	8	-	-
		DGNI 362	169	106	75	57	43	32	23	15
		WW 22.2	18.6	17.4	15.8	13.5	10.8	7.2	3.8	1.1
		WWNI 33.4	28.7	26.3	25.6	23.2	20.2	16.3	10.5	4.4
	D	TW 20.7	17.9	15.2	12.0	9.3	6.7	4.6	2.8	1.1
		TWNI 30.6	26.8	25.1	22.8	20.1	16.1	11.5	7.1	2.9
		DG 22.9	18.7	14.4	9.9	6.1	3.1	.8	-	-
		DGNI 34.2	29.9	27.5	24.4	20.6	15.6	10.9	6.5	2.5

DEL RIO TEXAS

29.4 N
1523 DD
T(JAN)=51

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 375	167	105	75	57	44	34	25	16
	L	WWNI 512	232	146	106	81	64	51	40	29
	C	TW 343	158	97	66	48	35	26	18	12
	R	TWNI 476	218	138	98	74	58	44	33	22
		DG 424	191	115	77	53	36	24	14	5
		DGNI 543	248	157	111	83	63	48	35	23
		WW 33.4	28.8	28.3	24.5	21.3	17.6	12.4	7.0	2.5
		WWNI 47.5	39.9	39.2	37.8	32.2	28.1	22.9	14.9	6.3
	D	TW 31.3	27.0	23.0	19.0	15.0	11.3	8.0	5.0	2.2
		TWNI 43.4	38.2	36.6	32.3	28.3	22.9	16.3	10.0	4.1
		DG 37.7	31.8	26.4	20.1	14.4	9.5	5.4	2.3	.3
		DGNI 49.3	43.7	40.2	35.8	30.4	23.3	16.3	9.8	4.0

EL PASO TEXAS

31.8 N
2678 DD
T(JAN)=44

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 274	131	82	58	44	34	26	19	12
	L	WWNI 384	189	119	85	65	52	42	33	24
	C	TW 258	122	76	52	37	27	19	14	9
	R	TWNI 363	175	111	79	60	47	36	27	18
		DG 307	141	85	56	37	25	15	7	-
		DGNI 413	197	125	89	66	51	38	28	18
		WW 27.4	22.9	20.5	19.4	16.7	13.6	9.3	5.1	1.6
		WWNI 38.4	34.5	30.2	28.9	27.6	23.7	19.2	12.4	5.2
	D	TW 24.5	21.8	18.5	14.7	11.3	8.4	5.9	3.6	1.6
		TWNI 36.2	31.6	28.9	26.7	23.1	18.7	13.4	8.3	3.4
		DG 28.5	24.1	19.1	13.8	9.2	5.5	2.6	.6	-
		DGNI 40.6	35.4	32.5	28.8	24.4	18.5	13.0	7.9	3.2

FORT WORTH TEXAS

32.8 N
2382 DD
T(JAN)=45

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 225	104	65	46	34	26	20	14	8
	L	WWNI 328	155	98	71	54	43	34	27	19
	C	TW 212	99	61	41	29	21	15	10	6
	R	TWNI 307	146	92	66	50	39	30	22	15
		DG 240	108	64	40	25	15	6	-	-
		DGNI 345	162	102	73	54	41	31	22	14
		WW 21.0	18.1	16.6	14.9	12.7	10.0	6.7	3.5	.9
		WWNI 32.1	28.1	25.6	24.6	22.2	19.2	15.5	10.1	4.2
	D	TW 19.8	17.2	14.5	11.4	8.8	6.3	4.3	2.5	1.1
		TWNI 29.4	26.1	24.3	21.9	19.3	15.4	11.0	6.7	2.7
		DG 21.6	17.6	13.4	9.0	5.4	2.4	.2	-	-
		DGNI 32.7	28.9	26.4	23.4	19.6	14.9	10.3	6.1	2.4

HOUSTON TEXAS

30.0 N
1434 DD
T(JAN)=52

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 336	148	93	66	50	39	30	22	14
	L	WWNI 466	209	131	95	73	58	46	36	26
	C	TW 309	140	86	59	42	31	22	16	10
	R	TWNI 433	196	124	88	67	52	40	30	20
		DG 375	166	99	66	45	30	19	11	-
		DGNI 492	223	140	99	74	57	43	31	20
		WW 29.1	25.4	24.1	21.7	18.9	15.3	10.7	6.0	2.0
		WWNI 42.2	35.9	35.3	32.7	29.3	25.9	20.6	13.5	5.7
	D	TW 27.7	23.8	20.5	16.6	13.1	9.8	6.9	4.1	1.8
		TWNI 38.8	34.3	32.2	29.2	25.9	20.7	14.7	9.1	3.7
		DG 32.7	27.3	22.4	16.7	11.7	7.4	3.9	1.3	-
		DGNI 43.9	39.0	35.9	32.1	27.1	20.8	14.5	8.8	3.5

LAREDO TEXAS

27.5 N
876 DD
T(JAN)=56

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 528	252	163	115	87	67	52	39	26
	L	WWNI 693	331	216	156	117	92	74	58	41
	C	TW 495	231	145	101	73	54	40	28	19
	R	TWNI 652	312	200	143	108	83	64	48	32
		DG 639	297	184	126	89	64	45	30	17
		DGNI 756	360	230	163	122	93	70	51	34
		WW 48.3	48.1	43.3	36.9	33.0	27.1	20.0	11.9	4.7
		WWNI 63.4	63.1	59.6	51.5	45.1	40.5	32.4	21.5	9.2
	D	TW 46.0	41.0	36.2	29.8	23.7	18.0	12.5	7.7	4.0
		TWNI 60.2	58.9	52.7	46.8	41.0	32.8	23.3	14.3	5.9
		DG 59.0	51.9	44.7	35.4	26.6	18.8	12.1	6.4	2.2
		DGNI 69.8	67.0	59.5	53.1	44.5	34.3	24.1	14.8	6.2

LUBBOCK TEXAS

33.6 N
3545 DD
T(JAN)=39

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 206	97	61	43	32	25	19	13	8
	L	WWNI 306	146	94	67	51	41	33	26	19
	C	TW 198	92	57	39	28	20	14	10	6
	R	TWNI 288	137	87	63	48	37	29	21	14
		DG 220	99	58	37	23	13	-	-	-
		DGNI 323	153	97	69	52	39	30	21	14
		WW 19.1	17.4	15.3	14.1	12.2	9.7	6.3	3.3	.9
		WWNI 28.6	27.5	25.0	22.6	21.5	18.8	15.6	9.9	4.2
	D	TW 18.3	16.2	13.7	10.8	8.3	5.9	4.0	2.3	1.1
		TWNI 27.1	25.2	22.9	21.2	18.6	14.9	10.6	6.6	2.7
		DG 19.7	16.4	12.2	8.0	4.6	1.9	-	-	-
		DGNI 30.3	27.7	25.1	22.5	18.9	14.3	9.9	5.9	2.3

LUFKIN TEXAS

31.2 N
1940 DD
T(JAN)=49

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 273	125	78	55	42	32	25	18	11
	L	WWNI 385	182	113	81	63	50	40	32	22
	C	TW 254	118	73	49	35	25	18	13	8
	R	TWNI 361	170	107	76	58	45	35	26	17
		DG 299	135	80	52	34	22	13	-	-
		DGNI 409	191	120	85	63	48	36	26	17
		WW 25.8	21.2	19.7	18.2	15.6	12.6	8.6	4.7	1.4
		WWNI 38.0	31.8	29.1	28.4	25.8	22.4	18.1	11.8	4.9
	D	TW 23.6	20.5	17.3	13.8	10.6	7.9	5.5	3.4	1.5
		TWNI 34.6	29.8	27.8	25.3	22.3	17.9	12.8	7.9	3.2
		DG 27.0	22.3	17.6	12.5	8.3	4.8	2.1	-	-
		DGNI 38.8	33.5	30.8	27.3	23.1	17.6	12.3	7.4	2.9

MIDLAND-ODESSA TEXAS

31.9 N
2621 DD
T(JAN)=44

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 265	127	79	56	43	33	26	19	11
	L	WWNI 373	182	115	83	64	51	41	32	23
	C	TW 249	118	74	50	36	26	19	13	9
	R	TWNI 352	170	108	77	59	46	35	27	18
		DG 294	136	82	54	36	24	14	6	-
		DGNI 400	191	121	86	65	50	37	27	18
		WW 26.4	22.4	20.1	19.0	16.3	13.4	9.1	5.0	1.6
		WWNI 37.3	33.7	29.9	28.5	26.9	23.3	19.1	12.3	5.2
	D	TW 23.7	21.1	18.0	14.4	11.1	8.2	5.7	3.5	1.7
		TWNI 34.8	30.9	28.4	26.1	23.0	18.4	13.2	8.2	3.4
		DG 27.4	23.2	18.4	13.3	8.9	5.2	2.4	.5	-
		DGNI 39.0	34.6	31.9	28.3	24.0	18.2	12.8	7.7	3.1

PORT ARTHUR TEXAS

29.9 N
1518 DD
T(JAN)=52

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 339	153	95	67	51	40	31	22	14
	L	WWNI 466	215	134	96	74	59	47	37	27
	C	TW 311	143	88	60	43	31	23	16	11
	R	TWNI 435	201	126	90	68	53	41	30	20
		DG 380	170	102	68	46	31	20	11	-
		DGNI 496	228	143	101	76	58	44	32	21
		WW 31.5	25.6	24.5	22.4	19.4	15.8	11.1	6.3	2.1
		WWNI 44.7	36.5	34.7	33.6	30.3	26.6	21.3	13.9	5.8
	D	TW 28.5	24.7	20.8	17.0	13.3	10.1	7.1	4.4	2.1
		TWNI 40.9	34.9	32.8	29.7	26.4	21.2	15.1	9.3	3.8
		DG 33.9	28.3	23.1	17.2	12.1	7.8	4.2	1.6	-
		DGNI 46.0	39.6	36.5	32.6	27.6	21.3	15.0	9.0	3.7

SAN ANGELO TEXAS

31.4 N
2240 DD
T(JAN)=46

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 269	129	80	57	43	33	26	19	11
	L	WWNI 377	185	117	84	65	51	41	33	23
	C	TW 253	120	75	51	36	26	19	13	9
	R	TWNI 357	172	109	78	59	46	36	27	18
		DG 300	138	84	55	37	24	15	6	-
		DGNI 405	194	123	87	66	50	38	27	18
		WW 26.9	22.6	20.4	19.0	16.3	13.4	9.1	5.0	1.6
		WWNI 37.7	34.2	30.2	28.8	26.8	23.2	19.2	12.3	5.2
	D	TW 24.1	21.4	18.2	14.6	11.2	8.3	5.8	3.6	1.6
		TWNI 35.5	31.3	28.8	26.2	23.1	18.5	13.3	8.2	3.4
		DG 27.9	23.6	18.8	13.5	9.0	5.3	2.5	.5	-
		DGNI 39.7	35.0	32.3	28.4	24.1	18.3	12.9	7.8	3.1

SAN ANTONIO TEXAS

29.5 N
1570 DD
T(JAN)=51

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 345	156	97	70	52	41	31	23	14
	L	WWNI 474	219	137	99	76	60	48	38	27
	C	TW 318	146	90	62	44	32	24	17	11
	R	TWNI 443	204	129	92	70	54	42	31	21
		DG 389	175	105	70	48	33	21	12	-
		DGNI 505	232	146	103	78	59	45	33	21
		WW 31.9	26.6	25.6	22.8	19.9	16.3	11.4	6.5	2.2
		WWNI 44.9	37.5	36.0	34.5	30.6	27.0	21.7	14.2	6.0
	D	TW 29.2	25.2	21.5	17.4	13.8	10.4	7.3	4.6	2.0
		TWNI 41.4	35.8	33.7	30.4	27.0	21.6	15.4	9.5	3.9
		DG 34.8	29.1	23.8	18.0	12.7	8.2	4.5	1.8	-
		DGNI 46.6	40.8	37.6	33.4	28.4	21.8	15.3	9.2	3.8

SHERMAN TEXAS
33.7 N
2864 DD
T(JAN)=42

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	191	88	54	38	28	21	16	11	6
	L	WWNI	286	136	85	61	47	37	30	23	17
	C	TW	182	83	51	34	24	17	12	8	5
	R	TWNI	271	127	80	57	43	33	26	19	13
		DG	197	86	49	29	17	-	-	-	-
		DGNI	302	141	88	62	46	35	26	19	12
		WW	17.8	14.9	13.4	11.9	10.2	7.9	5.0	2.4	.5
		WWNI	27.5	24.2	21.8	20.7	18.9	16.5	13.4	8.6	3.6
	D	TW	16.6	14.3	11.9	9.2	6.9	4.9	3.2	1.8	.7
		TWNI	25.6	22.6	20.7	18.8	16.5	13.2	9.4	5.8	2.3
		DG	17.1	13.5	9.5	5.6	2.6	-	-	-	-
		DGNI	28.1	24.7	22.3	19.8	16.6	12.4	8.6	5.0	1.9

WACO TEXAS
31.6 N
2058 DD
T(JAN)=47

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	263	121	75	53	40	31	24	17	10
	L	WWNI	373	176	110	79	61	48	39	30	22
	C	TW	245	114	70	47	34	24	18	12	8
	R	TWNI	350	164	103	74	56	43	33	25	17
		DG	287	129	77	49	32	21	12	-	-
		DGNI	396	185	116	82	61	47	35	25	16
		WW	24.7	20.5	19.2	17.3	14.9	11.9	8.1	4.4	1.3
		WWNI	36.6	30.8	28.5	27.4	24.8	21.6	17.4	11.3	4.7
	D	TW	22.7	19.7	16.7	13.2	10.2	7.5	5.2	3.2	1.4
		TWNI	33.5	29.0	27.0	24.4	21.6	17.3	12.3	7.6	3.1
		DG	25.8	21.2	16.6	11.7	7.6	4.2	1.7	-	-
		DGNI	37.6	32.5	29.7	26.4	22.2	17.0	11.8	7.1	2.8

WICHITA FALLS TEXAS
34.0 N
2904 DD
T(JAN)=41

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	207	96	59	41	31	24	18	13	7
	L	WWNI	304	145	91	65	50	40	32	25	18
	C	TW	197	90	55	37	26	19	13	9	5
	R	TWNI	288	136	85	61	46	36	28	21	14
		DG	217	96	56	34	21	11	-	-	-
		DGNI	322	151	94	67	50	38	28	20	13
		WW	19.6	16.3	14.6	13.4	11.4	9.0	5.8	2.9	.7
		WWNI	29.2	26.1	23.2	22.1	20.6	17.9	14.6	9.4	3.9
	D	TW	18.0	15.6	13.1	10.1	7.7	5.5	3.7	2.2	.9
		TWNI	27.4	24.2	22.1	20.2	17.7	14.3	10.2	6.3	2.5
		DG	19.1	15.4	11.2	7.1	3.9	1.3	-	-	-
		DGNI	30.3	26.5	24.2	21.4	18.0	13.6	9.4	5.6	2.1

BRYCE CANYON UTAH
37.7 N
9133 DD
T(JAN)=20

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	98	47	29	20	15	11	7	3	-
	L	WWNI	171	85	55	40	30	24	19	15	11
	C	TW	99	46	28	19	12	8	5	3	-
	R	TWNI	163	80	52	37	28	22	17	12	8
		DG	80	32	-	-	-	-	-	-	-
		DGNI	175	85	54	39	29	22	16	11	7
		WW	9.7	8.3	7.1	6.0	4.7	3.0	1.4	.2	-
		WWNI	17.1	16.2	15.0	13.7	12.2	11.0	8.6	5.5	2.3
	D	TW	9.5	8.1	6.4	4.6	3.1	1.9	1.0	.3	-
		TWNI	16.3	15.2	13.9	12.5	10.9	8.6	6.1	3.7	1.5
		DG	6.9	3.7	-	-	-	-	-	-	-
		DGNI	17.4	15.9	14.1	12.5	10.1	7.3	4.9	2.7	.9

CEDAR CITY UTAH
37.7 N
6137 DD
T(JAN)=29

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	139	64	39	27	20	15	11	7	-
	L	WWNI	223	106	68	49	37	29	23	18	13
	C	TW	135	62	38	25	17	12	8	5	2
	R	TWNI	211	100	64	45	34	27	20	15	10
		DG	130	55	29	12	-	-	-	-	-
		DGNI	231	109	68	48	36	27	20	14	9
		WW	12.9	11.1	9.6	8.4	6.9	5.0	2.8	1.1	-
		WWNI	22.1	19.0	18.3	16.3	14.9	13.2	10.4	6.7	2.8
	D	TW	12.5	10.6	8.6	6.4	4.7	3.2	1.9	.9	.3
		TWNI	20.3	18.2	16.5	15.0	13.1	10.5	7.4	4.5	1.8
		DG	11.3	8.0	4.3	1.0	-	-	-	-	-
		DGNI	21.8	19.7	17.4	15.4	12.7	9.4	6.4	3.6	1.3

SALT LAKE CITY UTAH
40.8 N
5983 DD
T(JAN)=28

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	131	59	35	23	16	11	7	3	-
	L	WWNI	215	101	64	45	33	26	20	15	11
	C	TW	127	57	34	22	14	9	6	3	-
	R	TWNI	203	95	59	42	31	23	18	13	8
		DG	118	45	18	-	-	-	-	-	-
		DGNI	221	102	63	44	32	23	17	11	6
		WW	11.7	9.9	7.9	6.4	4.6	3.1	1.4	.2	-
		WWNI	20.9	17.8	16.2	14.2	12.4	10.5	7.8	5.2	2.1
	D	TW	11.6	9.3	7.1	5.2	3.5	2.1	1.0	.3	-
		TWNI	19.1	16.9	14.8	13.0	10.8	8.6	6.0	3.6	1.4
		DG	9.5	5.5	1.5	-	-	-	-	-	-
		DGNI	20.5	17.7	15.2	12.9	10.2	7.5	4.9	2.6	.8

BURLINGTON VERMONT
44.5 N
7876 DD
T(JAN)=17

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	42	14	-	-	-	-	-	-	-
	L	WWNI	115	51	32	22	16	12	9	7	5
	C	TW	50	18	8	-	-	-	-	-	-
	R	TWNI	109	49	30	21	15	11	8	6	4
		DG	-	-	-	-	-	-	-	-	-
		DGNI	109	47	28	19	13	9	6	3	-
		WW	3.1	1.5	-	-	-	-	-	-	-
		WWNI	10.0	8.8	7.8	6.6	5.6	4.5	3.3	2.2	.8
	D	TW	3.8	2.3	.9	-	-	-	-	-	-
		TWNI	9.6	8.4	7.2	6.1	5.0	3.9	2.7	1.5	.5
		DG	-	-	-	-	-	-	-	-	-
		DGNI	9.2	7.6	6.2	4.8	3.5	2.2	1.1	.3	-

NORFOLK VIRGINIA
36.9 N
3488 DD
T(JAN)=40

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW	162	75	46	32	23	17	13	8	-
	L	WWNI	251	120	76	54	41	32	26	20	14
	C	TW	156	72	43	29	20	14	9	6	3
	R	TWNI	237	113	71	50	38	29	22	17	11
		DG	160	68	37	20	-	-	-	-	-
		DGNI	263	123	77	54	40	30	22	16	10
		WW	15.2	12.6	11.1	9.5	7.9	6.0	3.6	1.6	-
		WWNI	24.5	21.6	19.5	17.9	15.9	13.9	11.6	7.3	3.1
	D	TW	14.3	12.1	10.0	7.5	5.4	3.8	2.3	1.2	.4
		TWNI	22.7	20.1	18.2	16.2	14.2	11.4	8.1	4.9	2.0
		DG	13.9	10.2	6.3	2.9	-	-	-	-	-
		DGNI	24.9	21.9	19.3	16.8	14.1	10.4	7.1	4.1	1.5

RICHMOND VIRGINIA

37.5 N, 3939 DD, T(JAN)=37

	SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
L WW	132	61	37	25	18	13	9	5	-
L WWNI	216	103	65	46	35	27	22	17	12
C TW	130	59	35	23	16	11	7	4	2
R TWNI	205	97	61	43	32	25	19	14	9
DG	122	49	24	-	-	-	-	-	-
DGNI	223	105	65	45	34	25	18	13	8
WW	12.1	10.3	8.5	7.3	5.7	4.1	2.2	.7	-
WWNI	20.5	19.0	16.9	14.9	13.6	11.5	9.4	6.1	2.5
D TW	11.7	9.8	7.9	5.8	4.1	2.6	1.4	.6	.1
TWNI	19.2	17.5	15.5	13.9	11.9	9.6	6.7	4.1	1.6
DG	10.1	6.7	2.9	-	-	-	-	-	-
DGNI	20.8	18.5	16.3	13.9	11.5	8.4	5.6	3.2	1.1

ROANOKE VIRGINIA

37.3 N, 4307 DD, T(JAN)=36

	SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
L WW	124	58	35	24	18	13	9	5	-
L WWNI	206	99	63	45	34	27	21	17	12
C TW	123	56	34	22	15	10	7	4	1
R TWNI	195	93	59	42	32	24	19	14	9
DG	113	46	21	-	-	-	-	-	-
DGNI	212	100	63	44	33	24	18	13	7
WW	11.6	9.9	8.3	7.1	5.6	3.9	2.1	.6	-
WWNI	19.3	18.5	16.4	14.7	13.5	11.5	9.4	6.0	2.5
D TW	11.3	9.5	7.6	5.6	3.9	2.5	1.4	.6	.1
TWNI	18.5	17.0	15.3	13.7	11.8	9.5	6.7	4.1	1.6
DG	9.5	6.2	2.4	-	-	-	-	-	-
DGNI	20.1	18.0	15.9	13.7	11.3	8.3	5.5	3.1	1.0

OLYMPIA WASHINGTON

47.0 N, 5530 DD, T(JAN)=37

	SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
L WW	112	48	28	17	10	5	-	-	-
L WWNI	191	90	55	38	28	21	16	11	7
C TW	109	48	27	16	10	5	-	-	-
R TWNI	181	84	52	36	26	19	14	10	6
DG	90	23	-	-	-	-	-	-	-
DGNI	195	89	54	36	25	18	12	8	3
WW	10.1	7.3	5.6	3.6	1.9	.5	-	-	-
WWNI	19.1	15.6	13.3	11.7	9.5	7.2	5.0	3.2	1.2
D TW	9.8	7.3	4.9	3.2	1.8	.7	-	-	-
TWNI	17.3	14.5	12.4	10.3	8.2	6.1	4.2	2.4	.8
DG	6.6	1.1	-	-	-	-	-	-	-
DGNI	18.3	14.9	12.3	9.6	7.1	5.0	3.0	1.4	.2

SEATTLE-TACOMA WASHINGTON

47.4 N, 5185 DD, T(JAN)=38

	SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
L WW	128	54	30	19	11	6	-	-	-
L WWNI	213	98	59	41	30	22	16	11	7
C TW	123	53	29	18	11	6	-	-	-
R TWNI	199	91	55	38	27	20	14	10	6
DG	108	33	-	-	-	-	-	-	-
DGNI	217	97	58	38	27	19	13	8	3
WW	11.1	8.0	6.0	3.9	2.1	.7	-	-	-
WWNI	20.3	16.5	14.0	12.1	9.7	7.3	5.1	3.2	1.2
D TW	10.8	7.9	5.4	3.6	2.0	.8	-	-	-
TWNI	18.6	15.3	13.0	10.7	8.4	6.2	4.3	2.4	.8
DG	8.0	2.5	-	-	-	-	-	-	-
DGNI	19.9	15.9	12.9	10.0	7.4	5.1	3.1	1.4	.2

SPOKANE WASHINGTON

47.6 N, 6835 DD, T(JAN)=25

	SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
L WW	91	37	20	10	-	-	-	-	-
L WWNI	169	78	47	32	23	17	12	9	6
C TW	92	38	20	11	5	-	-	-	-
R TWNI	161	73	44	30	21	15	11	8	4
DG	56	-	-	-	-	-	-	-	-
DGNI	171	75	45	29	20	13	9	5	-
WW	7.6	5.3	3.3	1.4	-	-	-	-	-
WWNI	15.4	13.0	11.2	9.3	7.2	5.5	3.7	2.5	.9
D TW	7.6	5.3	3.3	1.7	.5	-	-	-	-
TWNI	14.7	12.3	10.3	8.2	6.4	4.7	3.3	1.8	.6
DG	2.9	-	-	-	-	-	-	-	-
DGNI	15.0	12.3	9.7	7.3	5.2	3.5	1.9	.7	-

YAKIMA WASHINGTON

46.6 N, 6009 DD, T(JAN)=28

	SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
L WW	117	48	26	15	8	-	-	-	-
L WWNI	201	90	55	38	27	20	14	10	7
C TW	114	47	25	15	8	4	-	-	-
R TWNI	190	85	51	35	25	18	13	9	5
DG	92	-	-	-	-	-	-	-	-
DGNI	205	89	53	35	24	16	11	7	3
WW	9.6	7.0	4.9	2.8	1.2	-	-	-	-
WWNI	18.3	14.9	13.0	10.8	8.4	6.5	4.5	3.1	1.2
D TW	9.5	6.8	4.5	2.8	1.4	.2	-	-	-
TWNI	16.9	14.0	11.8	9.5	7.5	5.5	3.9	2.2	.8
DG	6.1	-	-	-	-	-	-	-	-
DGNI	17.7	14.4	11.5	8.8	6.4	4.5	2.6	1.1	.2

CHARLESTON WEST VIRGINIA

38.4 N, 4590 DD, T(JAN)=34

	SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
L WW	93	41	23	15	10	7	3	-	-
L WWNI	170	80	50	35	26	20	16	12	9
C TW	94	41	24	15	9	5	2	-	-
R TWNI	161	75	47	33	24	19	14	10	7
DG	66	-	-	-	-	-	-	-	-
DGNI	172	79	48	33	24	18	13	8	5
WW	8.2	6.4	4.9	3.7	2.6	1.3	.1	-	-
WWNI	15.5	14.5	12.6	10.9	9.9	8.2	6.6	4.3	1.7
D TW	8.2	6.4	4.8	3.1	1.9	.9	.2	-	-
TWNI	14.9	13.3	11.6	10.3	8.6	7.0	4.9	2.9	1.1
DG	4.5	-	-	-	-	-	-	-	-
DGNI	15.7	13.5	11.5	9.7	7.8	5.5	3.5	1.8	.5

HUNTINGTON WEST VIRGINIA

38.4 N, 4624 DD, T(JAN)=34

	SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
L WW	99	44	26	17	12	8	4	-	-
L WWNI	178	84	53	37	28	21	17	13	9
C TW	101	44	26	16	10	6	3	-	-
R TWNI	169	79	49	34	26	20	15	11	7
DG	76	22	-	-	-	-	-	-	-
DGNI	181	83	51	35	26	19	14	9	5
WW	8.9	7.1	5.4	4.3	3.1	1.7	.5	-	-
WWNI	16.3	15.2	13.2	11.5	10.5	8.7	7.0	4.5	1.8
D TW	8.8	7.0	5.3	3.6	2.2	1.1	.4	-	-
TWNI	15.6	14.0	12.2	10.8	9.1	7.3	5.1	3.1	1.2
DG	5.5	1.3	-	-	-	-	-	-	-
DGNI	16.6	14.3	12.3	10.3	8.4	6.0	3.9	2.0	.6

EAU CLAIRE
WISCONSIN

44.9 N
8388 DD
T(JAN)=12

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 50	19	8	-	-	-	-	-	-
	L	WWNI 121	56	34	24	17	13	10	8	5
	C	TW 56	22	11	4	-	-	-	-	-
	R	TWNI 115	53	32	22	16	12	9	6	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 117	52	31	20	14	10	7	4	-
		WW 3.9	2.2	.9	-	-	-	-	-	-
		WWNI 10.9	9.7	8.4	7.0	6.1	5.1	3.7	2.4	.9
	D	TW 4.5	2.9	1.4	.1	-	-	-	-	-
		TWNI 10.4	9.1	7.7	6.6	5.4	4.2	2.9	1.7	.6
		DG -	-	-	-	-	-	-	-	-
		DGNI 10.2	8.5	6.9	5.4	4.0	2.6	1.4	.5	-

GREEN BAY
WISCONSIN

44.5 N
8098 DD
T(JAN)=15

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 57	22	11	5	-	-	-	-	-
	L	WWNI 132	59	37	26	19	14	11	8	5
	C	TW 63	25	13	6	-	-	-	-	-
	R	TWNI 125	56	35	24	17	13	10	7	4
		DG -	-	-	-	-	-	-	-	-
		DGNI 127	56	34	22	16	11	7	4	-
		WW 4.4	2.9	1.6	.3	-	-	-	-	-
		WWNI 11.8	10.1	9.1	7.7	6.6	5.4	4.0	2.6	1.0
	D	TW 5.1	3.4	1.9	.7	-	-	-	-	-
		TWNI 11.2	9.7	8.3	7.1	5.9	4.6	3.2	1.8	.7
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.1	9.2	7.5	6.0	4.5	3.0	1.7	.7	-

LA CROSSE
WISCONSIN

43.9 N
7417 DD
T(JAN)=16

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 59	23	12	6	-	-	-	-	-
	L	WWNI 133	61	37	26	19	15	11	9	6
	C	TW 64	26	13	7	-	-	-	-	-
	R	TWNI 126	57	35	24	18	13	10	7	5
		DG -	-	-	-	-	-	-	-	-
		DGNI 129	57	34	23	16	11	8	5	-
		WW 4.8	3.0	1.9	.7	-	-	-	-	-
		WWNI 12.0	10.5	9.1	7.8	6.9	5.8	4.3	2.8	1.1
	D	TW 5.2	3.6	2.1	.9	-	-	-	-	-
		TWNI 11.2	9.9	8.4	7.3	6.1	4.8	3.3	1.9	.7
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.3	9.4	7.8	6.3	4.8	3.2	1.9	.8	-

MADISON
WISCONSIN

43.1 N
7730 DD
T(JAN)=17

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW. 62	25	13	7	-	-	-	-	-
	L	WWNI 137	62	39	27	20	15	12	9	6
	C	TW 67	27	15	8	3	-	-	-	-
	R	TWNI 130	59	36	25	19	14	11	8	5
		DG -	-	-	-	-	-	-	-	-
		DGNI 133	59	36	24	17	12	8	5	2
		WW 4.9	3.4	2.3	1.1	-	-	-	-	-
		WWNI 12.3	10.7	9.6	8.3	7.3	6.2	4.6	3.0	1.1
	D	TW 5.5	3.9	2.4	1.2	.1	-	-	-	-
		TWNI 11.7	10.2	8.9	7.7	6.5	5.1	3.5	2.1	.8
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.7	9.8	8.2	6.8	5.2	3.5	2.1	.9	.1

MILWAUKEE
WISCONSIN

42.9 N
7444 DD
T(JAN)=19

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 64	26	14	8	-	-	-	-	-
	L	WWNI 140	63	39	27	20	16	12	9	6
	C	TW 69	28	15	8	4	-	-	-	-
	R	TWNI 132	60	37	26	19	14	11	8	5
		DG -	-	-	-	-	-	-	-	-
		DGNI 136	60	36	25	17	12	9	5	2
		WW 5.0	3.6	2.4	1.2	-	-	-	-	-
		WWNI 12.9	10.7	9.8	8.5	7.4	6.1	4.6	3.0	1.1
	D	TW 5.6	4.0	2.5	1.3	.2	-	-	-	-
		TWNI 11.8	10.4	9.0	7.8	6.5	5.1	3.6	2.1	.8
		DG -	-	-	-	-	-	-	-	-
		DGNI 11.8	10.0	8.3	6.8	5.2	3.6	2.1	.9	.1

CASPER
WYOMING

42.9 N
7555 DD
T(JAN)=23

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 107	49	30	20	14	10	7	-	-
	L	WWNI 184	90	57	41	31	24	19	15	10
	C	TW 107	49	29	19	12	8	5	2	-
	R	TWNI 175	84	53	38	28	22	17	12	8
		DG 90	34	-	-	-	-	-	-	-
		DGNI 190	90	56	39	29	21	16	11	6
		WW 10.3	8.4	6.9	5.7	4.3	2.8	1.2	-	-
		WWNI 17.7	16.4	14.9	13.3	11.8	10.4	7.9	5.2	2.1
	D	TW 9.8	8.2	6.4	4.6	3.0	1.8	.8	.2	-
		TWNI 16.9	15.3	13.7	12.2	10.5	8.4	5.9	3.5	1.4
		DG 7.3	3.8	-	-	-	-	-	-	-
		DGNI 18.1	16.1	14.0	12.1	9.7	7.1	4.7	2.5	.8

CHEYENNE
WYOMING

41.1 N
7255 DD
T(JAN)=27

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 111	52	32	22	16	12	8	5	-
	L	WWNI 190	91	58	42	32	25	21	16	11
	C	TW 112	51	31	20	14	9	6	3	1
	R	TWNI 181	86	55	39	30	23	18	13	9
		DG 96	38	16	-	-	-	-	-	-
		DGNI 195	92	58	41	31	23	17	12	7
		WW 10.3	8.9	7.7	6.6	5.4	3.6	1.9	.5	-
		WWNI 17.7	17.2	15.5	14.3	12.9	11.7	9.3	5.9	2.4
	D	TW 10.1	8.7	7.0	5.1	3.5	2.3	1.3	.5	.1
		TWNI 16.9	15.8	14.5	13.1	11.6	9.2	6.5	4.0	1.6
		DG 7.9	5.0	1.2	-	-	-	-	-	-
		DGNI 18.3	16.7	14.9	13.3	10.8	7.9	5.3	3.0	1.0

ROCK SPRINGS
WYOMING

41.6 N
8410 DD
T(JAN)=19

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
		WW 98	45	28	19	13	9	6	-	-
	L	WWNI 176	84	54	38	29	23	18	14	10
	C	TW 100	45	27	17	11	7	4	2	-
	R	TWNI 167	79	50	36	27	21	16	12	8
		DG 78	28	-	-	-	-	-	-	-
		DGNI 179	84	53	37	27	20	15	10	6
		WW 9.1	7.7	6.3	5.2	3.8	2.4	.9	-	-
		WWNI 16.4	15.7	14.1	12.8	11.4	9.9	7.6	5.0	2.0
	D	TW 9.0	7.5	5.8	4.1	2.6	1.5	.7	.1	-
		TWNI 15.7	14.4	13.1	11.7	10.0	8.0	5.6	3.4	1.3
		DG 6.2	2.6	-	-	-	-	-	-	-
		DGNI 16.8	15.1	13.3	11.5	9.2	6.7	4.4	2.3	.7

SHERIDAN WYOMING
44.8 N
7708 DD
T(JAN)=21

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	86	38	22	14	9	5	-	-	-
L	WWNI	161	77	48	34	25	19	15	12	8
C	TW	88	38	22	14	8	4	-	-	-
R	TWNI	153	72	45	32	23	18	13	10	6
	DG	57	-	-	-	-	-	-	-	-
	DGNI	163	75	46	32	23	17	12	8	4
	WW	8.0	6.2	4.5	3.3	1.9	.8	-	-	-
	WWNI	14.9	13.8	12.4	10.6	9.1	7.8	5.8	3.9	1.5
D	TW	7.7	6.0	4.4	2.8	1.5	.6	-	-	-
	TWNI	14.2	12.8	11.2	9.7	8.2	6.4	4.5	2.7	1.0
	DG	3.7	-	-	-	-	-	-	-	-
	DGNI	15.1	13.1	11.0	9.2	7.1	5.1	3.2	1.6	.4

CANADA

EDMONTON ALBERTA
53.6 N
10268 DD
T(JAN)= 7

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	66	26	10	-	-	-	-	-	-
L	WWNI	139	65	39	27	19	13	10	7	4
C	TW	69	27	13	-	-	-	-	-	-
R	TWNI	132	61	37	25	17	12	9	6	3
	DG	-	-	-	-	-	-	-	-	-
	DGNI	136	61	35	23	15	10	6	3	-
	WW	5.5	3.1	.9	-	-	-	-	-	-
	WWNI	13.1	11.3	9.0	7.2	5.5	4.2	2.8	1.8	.6
D	TW	5.8	3.5	1.7	-	-	-	-	-	-
	TWNI	12.3	10.3	8.3	6.5	5.0	3.6	2.5	1.4	.4
	DG	-	-	-	-	-	-	-	-	-
	DGNI	12.5	9.8	7.3	5.2	3.5	2.2	1.0	.2	-

SUFFIELD ALBERTA
50.3 N
8644 DD
T(JAN)=17

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	92	40	23	14	8	4	-	-	-
L	WWNI	170	79	50	35	26	19	15	11	7
C	TW	93	40	23	14	8	4	-	-	-
R	TWNI	160	75	46	32	23	17	13	9	6
	DG	64	-	-	-	-	-	-	-	-
	DGNI	170	78	48	32	23	16	11	7	3
	WW	7.9	6.3	4.5	3.0	1.4	.2	-	-	-
	WWNI	15.6	14.3	12.5	10.8	8.8	7.1	5.0	3.3	1.3
D	TW	8.2	6.1	4.3	2.7	1.4	.4	-	-	-
	TWNI	14.8	13.2	11.5	9.6	7.8	5.8	4.1	2.4	.8
	DG	4.2	-	-	-	-	-	-	-	-
	DGNI	15.6	13.3	11.1	8.9	6.6	4.7	2.8	1.3	.2

NANAIMO BRITISH COLUMBIA
49.2 N
5515 DD
T(JAN)=37

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	140	61	35	21	13	7	-	-	-
L	WWNI	229	105	65	44	32	23	17	12	8
C	TW	135	58	32	20	12	7	-	-	-
R	TWNI	214	98	60	40	29	21	15	10	6
	DG	126	43	-	-	-	-	-	-	-
	DGNI	233	106	63	42	29	20	14	9	4
	WW	12.2	9.5	6.9	4.4	2.6	1.1	-	-	-
	WWNI	21.5	18.2	15.4	12.9	9.9	7.4	5.4	3.4	1.3
D	TW	12.0	8.8	6.1	4.1	2.3	1.0	-	-	-
	TWNI	19.8	16.7	14.1	11.2	8.7	6.5	4.5	2.5	.9
	DG	9.7	4.1	-	-	-	-	-	-	-
	DGNI	21.3	17.4	13.9	10.7	8.0	5.5	3.3	1.6	.3

VANCOUVER BRITISH COLUMBIA
49.3 N
5515 DD
T(JAN)=37

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	111	47	26	15	9	4	-	-	-
L	WWNI	193	89	54	37	27	20	15	11	7
C	TW	109	46	25	15	8	4	-	-	-
R	TWNI	181	83	50	34	24	18	13	9	6
	DG	86	-	-	-	-	-	-	-	-
	DGNI	195	88	52	34	24	17	11	7	3
	WW	9.5	6.9	4.7	2.8	1.4	.1	-	-	-
	WWNI	18.3	15.2	12.7	10.8	8.4	6.6	4.9	3.2	1.2
D	TW	9.5	6.7	4.5	2.8	1.4	.4	-	-	-
	TWNI	16.9	14.1	11.7	9.5	7.6	5.7	4.0	2.3	.8
	DG	5.9	-	-	-	-	-	-	-	-
	DGNI	17.8	14.3	11.4	8.8	6.6	4.6	2.7	1.3	.2

WINNIPEG MANITOBA
49.9 N
10679 DD
T(JAN)= -

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	53	21	9	-	-	-	-	-	-
L	WWNI	125	58	36	25	18	13	10	7	5
C	TW	59	23	11	4	-	-	-	-	-
R	TWNI	119	55	34	23	17	12	9	6	4
	DG	-	-	-	-	-	-	-	-	-
	DGNI	121	54	32	21	15	10	6	3	-
	WW	4.3	2.7	1.0	-	-	-	-	-	-
	WWNI	11.4	10.1	8.8	7.4	5.9	4.7	3.4	2.2	.8
D	TW	4.8	3.1	1.6	.2	-	-	-	-	-
	TWNI	10.7	9.4	8.1	6.6	5.3	4.1	2.8	1.6	.5
	DG	-	-	-	-	-	-	-	-	-
	DGNI	10.8	9.0	7.1	5.4	3.9	2.5	1.3	.4	-

DARTMOUTH NOVA SCOTIA
44.6 N
7361 DD
T(JAN)=26

		SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
	WW	73	31	18	11	7	4	-	-	-
L	WWNI	148	68	43	30	23	18	14	11	7
C	TW	76	33	18	11	6	3	-	-	-
R	TWNI	140	64	40	28	21	16	12	9	6
	DG	34	-	-	-	-	-	-	-	-
	DGNI	146	66	41	28	20	15	11	7	3
	WW	6.0	4.8	3.7	2.7	1.5	.3	-	-	-
	WWNI	13.5	11.9	11.1	9.8	8.8	7.5	5.7	3.7	1.4
D	TW	6.6	5.0	3.5	2.2	1.1	.3	-	-	-
	TWNI	12.9	11.4	10.2	9.1	7.7	6.1	4.3	2.5	1.0
	DG	1.5	-	-	-	-	-	-	-	-
	DGNI	13.1	11.3	9.8	8.3	6.5	4.6	2.9	1.4	.3

MOOSONEE ONTARIO

51.3 N
11572 DD
T(JAN)=-1

	SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
L WW	34	11	-	-	-	-	-	-	-
L WWNI	102	48	30	21	15	11	8	6	4
C TW	42	15	-	-	-	-	-	-	-
R TWNI	98	45	28	19	14	10	7	5	3
R DG	-	-	-	-	-	-	-	-	-
R DGNI	96	43	26	17	11	7	4	-	-
D WW	2.5	.9	-	-	-	-	-	-	-
D WWNI	9.7	8.3	7.3	6.4	4.9	3.6	2.5	1.6	.5
D TW	3.4	1.7	-	-	-	-	-	-	-
D TWNI	9.2	7.8	6.9	5.6	4.3	3.2	2.2	1.2	.4
D DG	-	-	-	-	-	-	-	-	-
D DGNI	8.7	7.1	5.6	4.0	2.7	1.6	.6	-	-

OTTAWA ONTARIO

45.5 N
8735 DD
T(JAN)=13

	SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
L WW	65	26	14	8	-	-	-	-	-
L WWNI	140	63	39	27	20	16	12	9	6
C TW	69	28	15	8	3	-	-	-	-
R TWNI	133	60	37	26	19	14	11	8	5
R DG	-	-	-	-	-	-	-	-	-
R DGNI	137	60	36	25	17	12	9	5	2
D WW	5.1	3.6	2.4	1.2	-	-	-	-	-
D WWNI	12.6	10.7	9.7	8.6	7.4	6.0	4.6	3.0	1.1
D TW	5.7	4.0	2.5	1.3	.2	-	-	-	-
D TWNI	12.0	10.2	9.0	7.8	6.5	5.1	3.5	2.1	.8
D DG	-	-	-	-	-	-	-	-	-
D DGNI	12.0	10.0	8.4	6.8	5.2	3.6	2.1	.9	.1

TORONTO ONTARIO

43.7 N
6827 DD
T(JAN)=25

	SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
L WW	73	31	17	11	7	-	-	-	-
L WWNI	148	68	43	30	22	17	14	10	7
C TW	76	32	18	11	6	2	-	-	-
R TWNI	140	65	40	28	21	16	12	9	6
R DG	32	-	-	-	-	-	-	-	-
R DGNI	146	66	40	28	20	14	10	7	3
D WW	6.0	4.6	3.4	2.4	1.2	-	-	-	-
D WWNI	13.7	11.9	10.9	9.5	8.3	7.1	5.5	3.6	1.4
D TW	6.5	4.9	3.3	2.0	1.0	.1	-	-	-
D TWNI	12.8	11.3	10.0	8.8	7.5	5.9	4.1	2.4	.9
D DG	1.2	-	-	-	-	-	-	-	-
D DGNI	13.0	11.2	9.5	8.0	6.3	4.4	2.7	1.3	.3

NORMANDIN QUEBEC

48.8 N
10528 DD
T(JAN)= 4

	SSF = .1	.2	.3	.4	.5	.6	.7	.8	.9
L WW	49	19	9	-	-	-	-	-	-
L WWNI	118	56	35	24	18	13	10	7	5
C TW	54	22	11	4	-	-	-	-	-
R TWNI	112	52	33	23	16	12	9	6	4
R DG	-	-	-	-	-	-	-	-	-
R DGNI	113	52	31	21	14	10	6	4	-
D WW	4.1	2.5	1.0	-	-	-	-	-	-
D WWNI	11.4	9.9	8.6	7.7	6.2	4.8	3.4	2.2	.8
D TW	4.6	2.9	1.5	.2	-	-	-	-	-
D TWNI	10.6	9.2	8.1	6.7	5.4	4.1	2.8	1.6	.5
D DG	-	-	-	-	-	-	-	-	-
D DGNI	10.6	8.7	7.1	5.5	3.9	2.6	1.4	.4	-

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