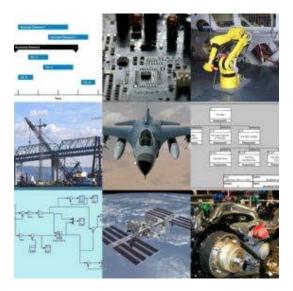
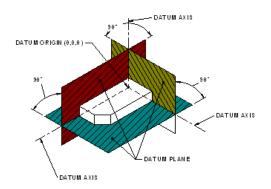


510 N. Crosslane Rd. Monroe, Georgia 30656 (770) 266-6915 fax (678) 643-1758

PDH & Professional Training







PDH Storm, by Engineers Edge, LLC



J. PAUL GUYER, P.E., R.A.

Paul Guyer is a registered civil engineer, mechanical engineer, fire protection engineer and architect with over 35 years experience designing all types of buildings and related infrastructure. For an additional 9 years he was a public policy advisor on the staff of the California Legislature dealing with infrastructure issues. He is a graduate of Stanford University and has held numerous local, state and national offices with the American Society of Civil Engineers and National Society of Professional Engineers. He is a Fellow of the American Society of Civil Engineers and the Architectural Engineering Institute.

CONTENTS

- 1. INTRODUCTION
- 1.1 SCOPE
- 1.2 RELATED CRITERIA
- 1.3 SOLAR ENERGY
- 2. FLAT PLATE SOLAR COLLECTORS
- 2.1 COLLECTORS
- 2.2 ENERGY STORAGE AND AUXILIARY HEAT
- 2.3 DOMESTIC HOT WATER SYSTEMS (DHW)
- 2.4 THERMOSYPHON, BATCH AND INTEGRAL COLLECTOR SYSTEMS
- 2.5 SPACE HEATING AND DHW SYSTEMS
- 2.6 PASSIVE SYSTEMS
- 2.7 SOLAR COOLING SYSTEMS
- 2.8 SYSTEM CONTROLS

This course is adapted from the *Unified Facilities Criteria* of the United States government, which is in the public domain, has unlimited distribution and is not copyrighted.

The Figures, Tables and Symbols in this document are in some cases a little difficult to read, but they are the best available. DO NOT PURCHASE THIS COURSE IF THE FIGURES, TABLES AND SYMBOLS ARE NOT ACCEPTABLE TO YOU.

1. INTRODUCTION

1.1 SCOPE. This course presents design criteria and cost analysis methods for the sizing and justification of solar heat collectors for potable water and space heaters. Information is presented to enable engineers to understand solar space conditioning and water heating systems or conduct feasibility studies based on solar collector performance, site location, and economics. Both retrofit and new installations are considered.

1.2 RELATED CRITERIA. Standards and performance criteria relating to solar heating systems have been evolved by government agencies and various associations and institutes. The most widely used are listed below. Because solar technology is a continuously evolving field, be aware that publications listed below may have been revised or superseded.

| Sub | ect |
|-----|-----|
| | |

Document

| Solar Collector Instantaneous Performance | ASHRAE Standard 93-77, "Methods of Testing to Determine the Thermal Performance of Solar Collectors" |
|---|--|
| Thermal Storage Devices | ASHRAE Standard 94-77, "Methods of Testing Thermal Storage Devices Based on Thermal Performance" |
| Complete Solar Collector Performance Evaluation | National Bureau of Standards, NBSIR 78-1305A, "Provisional Flat Plate Solar Collector Testing Procedures: First Revision" |
| Testing Solar Hot Water Heaters (includes Thermo- syphon, Batch, Breadbox, or Integral Storage Collectors) | ASHRAE Standard 95-81, "Methods of Testing to Determine the Thermal Performance of Solar Domestic Water Heating Systems" |
| Testing Swimming Pool Solar Collectors | ASHRAE Standard 98-80, "Methods of Testing to Determine the Thermal Performance of Unglazed Flat-Plate Liquid Solar Collectors" |

Testing Tracking Concentrator Collectors

Solar System Performance

Property Standards for Solar Systems

Property Standards Developed for HUD Domestic Hot Water Initiative

Solar Collector Certification and Labeling

Solar Collector Certification, Rating, and Labeling

Building Code

Overall Standards Summary

Installation Guidelines

Solar Energy Industries Association, "Methodology for Determining the Thermal Performance Rating for Tracking Concentrator Solar Collectors"

National Bureau of Standards, NBSIR 76-1187, "Interim Performance Criteria for Solar Heating and Cooling Systems in Commercial Buildings"

HUD Report 4930.2, "Intermediate Minimum Property Standards Supplement, Solar Heating and Domestic Hot Water Systems"

National Bureau of Standards, NBSIR 77-1272, "Intermediate Standards for Solar Domestic Hot Water Systems/HUD Initiative"

ARI Standard 910, "The Air Conditioning and Refrigeration Institute (ARI) Certification Program for Solar Collectors"

Solar Energy Industries Association Standard, Directory of SRCC Certified Solar Collector Ratings

Council of American Building Officials DOE/CS/34281-01, "Recommended Requirements to Code Officials for Solar Heating, Cooling, and Hot Water Systems"

National Bureau of Standards, NBSIR 78-1143A, "Plan for the Development and Implementation of Standards for Solar Heating and Cooling Applications"; or "ASTM Standards on Solar Energy", ASTM Committee E-44

National Bureau of Standards, NBS Tech. Note 1134, "Guidelines for the Installation of Solar Components on Low Sloped Roofs"; and Dept. of Energy,

| | "Installation Guidelines for Solar DHW Systems in One and Two-Family Dwellings"; and National Bureau of Standards, NBSIR 80-2116, "Dimensional Considerations in Solar Installations"; and Sheet Metal and Air Conditioning Contractor National Association, Inc., "Installation Standards for One and Two- Family Dwellings and Multifamily Housing Including Solar" |
|-----------------------------------|--|
| Solar Materials and Components | Dept. of Energy, DOE/TIC-11374 "Solar Heating Materials Handbook"; and National Bureau of Standards Technical Note 1132, "Solar Energy Systems - Standards for Cover Plates for Flat Plate Collectors"; and National Bureau of Standards, NBSIR |
| | National Bureau of Standards, NBSIR 79-1913, "Solar Energy Systems - Standards for Rubber Hose"; and National Bureau of Standards, NBSIR |
| | 81-2232, "Solar Energy Systems - Standards for Absorber Materials" |
| Miscellaneous Tests | National Bureau of Standards, NBSIR 81-2344, "Fire Testing of Roof-Mounted Solar Collectors by ASTM E108"; and |
| | National Bureau of Standards, NBSIR 81- 2199, "Wind, Earthquake, Snow, and Hail Loads on Solar Collectors"; and |
| | NBSIR 82-2487, "Hail Impact Testing Procedures for Solar Collector Covers" |
| Product Safety | National Bureau of Standards, NBSIR78- (See also HUD Report 4930.2) 1532, "Environmental and Safety Considerations for Solar Heating and Cooling Applications" |
| Certified Test Labs | National Bureau of Standards, NBSIR |
| © Paul Guyer 2012 | 5 |

78-1535, "Laboratories Technically Qualified to Test Solar Collectors in Accordance with ASHRAE Standard 93-77"

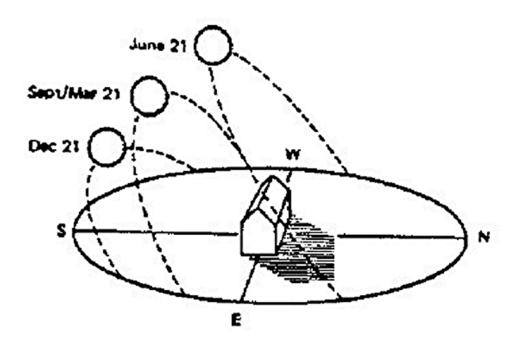
In addition to these standards, there are plumbing standards published by The International Association of Mechanical and Plumbing Officials (IAMPO), and various state building codes.

1.3 SOLAR ENERGY.

1.3.1 SOLAR RADIATION. Energy from the sun is received by the earth as electromagnetic radiation. Most of the energy is received in the visible and infrared portions and a small amount as ultraviolet radiation. North of the Tropic of Cancer (23 deg. N latitude), the sun makes a daily arc across the southern sky from east to west as shown in Figure 1-1. For a typical location at 32 deg. N latitude the sun would be 81.5 deg. above the southern horizon or nearly overhead at noon (solar time) on June 21 while on December 21 it would be only 34.6 deg. above the horizon. Solar insolation (I) is measured in Langleys (L) or Btu/ft². One Langley equals 3.688 Btu/ft². The amount of solar energy that exists outside the atmosphere, often called the solar constant, is 116.4 L/hr or 429.2 Btu/ ft²-hr. At most 70% to 80% of this amount will strike the earth's surface, the remainder being absorbed or reflected in the atmosphere. Monthly average and yearly average daily insolation data for numerous locations are given in Table 1-1. In general, the higher the latitude, the less insolation is received on a horizontal surface.

1.3.2 COLLECTING SOLAR ENERGY. Collection of solar energy is based on the very high absorption of radiant energy by dull, black surfaces and on the "greenhouse effect." The latter refers to the ability of glass to transmit visible radiation but prevent the loss of heat from the collector plate which radiates at longer wavelengths (infrared frequencies). Glass (or plastic) cover plates are generally used over flat absorber plates to reduce heat loss (see Figure 1-2). The heated absorber plate may have a fluid (water, air or other) pass over it or through tubes attached to the plate. The fluid thus

heated may be used to heat potable water, heat spaces, or drive an absorption or Rankine power cycle air conditioner.





The sun's path across the sky at specific times of year

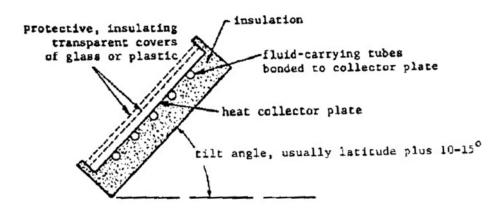


Figure 1-2

Schematic cross-section of typical solar collector with heavy black insulation and two cover sheets

| STATE AND STATION | LATITUDE | (ML | 603 | W | Bay | HAT. | NUL . | 14 | ¥16 | SXP | 901 | NUM | DRC | AUTHUAL |
|-------------------|-----------|---------|-----------|---------|--------|--------|--------|----------|---------|----------|---------|---------|--------|---------|
| Fi crui rughan | #.+5.55 | 106.6 | 1.1.46 | 1296.5 | 3673.5 | 1054.4 | 1918.5 | 1809.8 | 1123.8 | 1454.6 | 1210.9 | 6.128 | 661.4 | 1346.1 |
| Mobile | R.14.00 | 528.2 | 9. 0001 | 1407.5 | 1724.7 | 1672.1 | 1868.5 | 1715.3 | 1641 5 | 1449.4 | 1298.7 | 1 556 | 159.2 | 1.1861 |
| Nontgonery | H.BYCT | 1.121 | 1013.0 | 1340.4 | 1729.9 | 1897.4 | 1972.3 | 0.1481 | 1.245.7 | 1.1340 | 1266.6 | 4.74 | 119.4 | 9.1961 |
| ALASKA | | | | | | | | | | | | | | |
| Adak | *.E5.15 | 231.2 | 432.4 | 716.4 | 1032.6 | 1179.6 | 0.2811 | 1120.4 | 9.840 | 159.3 | \$28.7 | 0.100 | 187.7 | 118.8 |
| Annelte | N.2 .55 | 177.9 | 7.410 | 1.11 | 1149.5 | 1473.1 | 1465.6 | 1439.2 | 1162.3 | 812.2 | 422.2 | 218.6 | 122.5 | 3.44.6 |
| Parrow | H.BTT.L | 0.0 | 13.6 | 490.5 | 1050.2 | 1140.0 | 1527.5 | 1.9241 | 8.728 | 6.418 | 125.7 | 9 - | 0.0 | \$15.0 |
| Fetrbanks | A.64.49 | 10.1 | 122 | 674.2 | 9.5911 | 1603.6 | 9751.9 | 1542.5 | 2118.0 | 109.4 | 292.6 | 74.1 | 2.5 | 747.8 |
| Kodiak | R. 51.15 | C.941 | 9.550 | 6.184 | 1207.0 | 1376.3 | 1529.9 | 1406.2 | 1164.2 | 194.0 | 469.2 | 204.5 | 1.16 | 196.1 |
| A1120KA | | | | | | | | | | | | | | |
| PROGREE | A.92.52 | C.1501 | 1.4761 | 1914.1 | 8.4265 | 2676.5 | 2139.2 | 2486.5 | 2297.6 | 2015.4 | 1576.5 | 2.0211 | 932.0 | 1867.4 |
| Turson | R.1 .26 | 1040.0 | 0. ((+1 | 1864.3 | 2363.0 | 2673.4 | 2729.6 | 1.6+65 | 2187.9 | 978.8 | 1601.9 | 1208.4 | 9.200 | 1872.3 |
| Yuna | N.04.20 | 1046.1 | 2.6441 | 1919.2 | 2412.8 | 2728.3 | 2013.9 | 4.6245 | 2329.3 | 2051.0 | 1622.8 | 1214.7 | 1000.1 | 1923.7 |
| ANKANSAS | | | | | | | | | | | | | | |
| Port Smith | R.02-55 | 1.241 | 9.866 | 1311.7 | 1615.9 | 1.5161 | 2089.4 | 2045.3 | 1877.4 | 5-1051 | 1200.7 | | | 1404.3 |
| Little Rock | A | C. (Ct | 1002.8 | 1312.7 | 1410.7 | 1+29.3 | 2106.5 | 2032.3 | 1069.5 | 1519.0 | 1226.3 | 2-1+B | 1.613 | 1404.4 |
| CALTPORNEA | s (, | } | | | | | | | | | | | | |
| Rekeretield | 35*25* | 766.4 | 1101.9 | 1594.8 | 1.4602 | 2509.1 | 2749.3 | 2683.5 | 2420.7 | 8.1991.8 | 1456.3 | £"245 | | 1749.2 |
| China Lake | A,14.50 | 4.909.4 | 1229.5 | 9.4611 | 2233.5 | 2548.5 | 2746.8 | 2612.2 | 2615.9 | 1.9461 | 1472.6 | 1033.7 | 810.8 | 8.9581 |
| Decort | A.25.+6 | 938.2 | 1260.7 | 1172.3 | 1.4152 | 2.692. | 2766.3 | \$. [032 | 2382.6 | 2007.9 | 9.8181 | 1.4801 | 826.0 | 1642.9 |
| E! 7ero | A.01-60 | 0.14 | 1236.0 | 2.0(4 | 5-8261 | 2010.2 | 1.4614 | 1363.4 | 2151.0 | E.1212 | 1356.9 | 1074.4 | 849.2 | 1624.5 |
| Freanc | R. 94.96 | 656.7 | 1012.3 | 1545.8 | 3.2902 | 3483.8 | 1.2275 | 2485.1 | 2121.3 | 1. Swot | 1439.2 | C. 888 | \$74.2 | 1710.6 |
| Long Reach | 8.64.CE | 927.7 | 1715.0 | 1609.9 | 1.1001 | 2064.5 | 2139.9 | \$.99.9 | 2099.8 | 1701.0 | 1326.4 | 1003.5 | 846.0 | 1597.7 |
| Los Angeles | A.95.66 | 926.1 | \$214.0 | 1.818.7 | 6.0241 | 1059.5 | 2119.1 | \$101.5 | 2019.5 | 1681.4 | 1317.0 | 6. 0001 | 848.5 | 1593.6 |
| brack) and | R.++.ct | 107.6 | 1071.5 | 1456.3 | 1.2261 | 2213.3 | 2350.0 | 2322.5 | 2052.4 | 1.1011 | 1212.0 | 822.1 | 647.0 | 1535.2 |
| Point Mugu | R.1 .NC | 927.2 | 1229.9 | 1.2631 | 0.1611 | 2018.0 | 2054.6 | 2118.3 | 1934.9 | 1. 1081 | 1296.1 | 1004.4 | 856.2 | 1552.2 |
| Sucramento | A. 16.80 | 5.945 | •.929.4 | 1458.4 | 9.002 | 3434.8 | 2483.8 | 2688.0 | 2368.3 | 1.9061 | P. 1184 | 781.9 | \$38.4 | 1642.9 |
| San Dirgo | R. ++.25 | 4.516 | 1266.3 | 1431.6 | 1.9261 | 1002.8 | 2062.2 | 2186.5 | 2051.3 | 1717.4 | C. 6761 | 1082.7 | | 1598.0 |
| San Francisco | R. / C./C | 107.6 | 1009.3 | 1455.1 | 1920.0 | 2225.6 | 2375.9 | 9.1665 | 2136.5 | 1742.0 | 1226.1 | 821.4 | 6.2.4 | 1552.8 |
| Sente Merie | 8.45.46 | 833.8 | 1140.9 | 1581.9 | 1921.0 | 2140.6 | 2348.6 | 2341.2 | 2105.1 | 1730.3 | 1353.4 | 973.6 | 803.9 | 1401.9 |
| Sunnyvale | H. \$2.46 | 137.6 | 1037.5 | 1485.3 | 1943.6 | 2276.8 | 2452.8 | 2441.3 | 2167.1 | 1759.5 | 1248.4 | 841.1 | 660.3 | 1587.8 |

Table 1-1 Total Horizontal Solar Radiation Intensity (Btu/ft²-day) from Solar Energy Research Institute

| Nature 600.7 1134.7 5136.7 </th <th>STATE AND STATION</th> <th>LATITUDE</th> <th>JAN U</th> <th>100</th> <th>M</th> <th>APR</th> <th>MAY</th> <th>Int</th> <th>JUL .</th> <th>AUC</th> <th>SEP.</th> <th>0CT</th> <th>NOR</th> <th>DEC</th> <th>ASTUAL</th> | STATE AND STATION | LATITUDE | JAN U | 100 | M | APR | MAY | Int | JUL . | AUC | SEP. | 0CT | NOR | DEC | ASTUAL |
|--|----------------------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|---------|---------|
| xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx | COLORADO | | | | | | | | | | | | | | |
| ord 1973'R 60.1 1127.0 139.3 199.4 239.5 295.2 204.4 137.4 99.1 31.1 r Jourtian 37'7 X 11.1 11.1 113.0 159.5 196.5 169.5 193.4 191.1 191.1 191.1 r Jourtian 37'7 X 11.1 113.0 159.5 166.5 169.5 161.1 191.1 1 | Colorado Springs | N.67.80 | 890.7 | 1178.2 | 1550.0 | 5.1661 | 2128.7 | 2368.9 | 2211.0 | 2025.4 | | 9.82CT | 944.2 | P.187.9 | 1594.1 |
| 37 Jourtian 39° 778 79.1 113.0 1533.5 196.4 209.4 209.4 209.5 265.2 186.5 184.5 184.5 184.5 191.1 311.1 365.1 365.5 184.5 | Denver | 19.45.8 | 840.1 | 1127.0 | 4.0221 | 1879.3 | 9.4615 | 1.0262 | 2272.6 | 2044.1 | 1726.8 | 1300.5 | 883.5 | \$.101 | 1568.4 |
| Circuit Circuit <t< td=""><td>Crar. Junition</td><td>X. 2 .65</td><td>191.3</td><td>0.0111</td><td>1553.5</td><td>1986.4</td><td>2379.8</td><td>2598.5</td><td>2465.2</td><td>2182.0</td><td>1834.4</td><td>0.245.0</td><td>918.1</td><td>6.166</td><td>1658.7</td></t<> | Crar. Junition | X. 2 .65 | 191.3 | 0.0111 | 1553.5 | 1986.4 | 2379.8 | 2598.5 | 2465.2 | 2182.0 | 1834.4 | 0.245.0 | 918.1 | 6.166 | 1658.7 |
| (1) (1) <td>CONNECTION</td> <td></td> | CONNECTION | | | | | | | | | | | | | | |
| Anome Nay 19*54*N 1403.0 1484.1 1324.3 2170.0 207.4 396.4 1011.0 393.9 444.9 483.6 Anome Nay 3*70' 371.4 877.0 148.1 1710.2 182.4 1317.1 981.9 444.9 483.6 Anome Nay 3*70' 372.0 153.0 1148.2 1480.1 1710.2 182.4 1317.1 981.9 444.9 483.6 Anote Nature 952.9 1135.0 1148.2 1480.1 1710.2 182.4 187.1 189.1 481.1 190.0 481.1 190.1 411.1 481.1 481.1 481.1 190.1 411.1 481.1 <t< td=""><td>Karl tord</td><td>N.95.14</td><td>411.5</td><td>714.7</td><td>978.5</td><td>1315.0</td><td>1568,5</td><td>1685.0</td><td>1649.0</td><td>1421.7</td><td>1154.5</td><td>852.9</td><td>6.794</td><td>365.1</td><td>1050.3</td></t<> | Karl tord | N.95.14 | 411.5 | 714.7 | 978.5 | 1315.0 | 1568,5 | 1685.0 | 1649.0 | 1421.7 | 1154.5 | 852.9 | 6.794 | 365.1 | 1050.3 |
| Ame Name | ÇUPA | | | | | | | | | | | | | | |
| K S71.4 877.0 1144.2 1400.1 1710.2 1887.4 1872.4 1811.7 983.4 144.4 1317.7 983.4 144.4 1317.7 983.4 144.1 183.4 T OF COLORMAL 375.7 1125.0 1438.4 1135.0 1438.4 1140.2 1480.1 1100.2 1817.4 140.0 1001.8 50.9 441.1 Micula 377.4 135.3 1352.0 1458.7 1956.2 1985.2 1952.0 1817.4 140.0 1001.8 401.1 Micula 307.90 1391.4 1393.7 1956.5 1885.7 1952.0 1895.2 1952.0 1897.2 1912.4 1910.1 1910.1 1910.1 1910.1 1910.1 1911.4 | Guard animo Bay | N. 45.61 | 1403.0 | 1648.1 | C.9261 | 2120.0 | 2037.6 | 1960.8 | 2082.4 | 2002.5 | 1824.0 | 1584.6 | | 0.0101 | 1777.9 |
| RUO 39°40'H 571.4 827.0 1140.1 110.2 1682.6 1132.0 1430.0 1417.4 1317.1 93.9 444.4 93.9 441.1 T OF COLOMBIA 39°57'H 572.0 613.3 1135.0 1456.9 1131.1 160.1 157.4 1301.1 96.9 411.1 Alicelia 39°44'F 552.9 1125.9 1474.0 1393.2 1995.2 1437.4 1301.1 96.0 411.1 Alicelia 39°5.4 114.0 153.1 1855.7 1855.2 1855.2 1855.2 1855.2 1855.2 1855.2 1855.2 1855.2 1855.2 1855.2 1855.7 1875.1 1875.1 1875.1 1875.1 1875.1 1875.1 1875.1 1875.2 1855.7 1185.2 1875.2 1855.7 1187.2 1875.1 1875.2 1875.2 1875.2 1875.2 1875.2 1875.2 1875.2 1875.2 1875.2 1875.2 1875.2 1875.2 1875.2 1875.2 1875.2 <td>DELAVARE</td> <td></td> | DELAVARE | | | | | | | | | | | | | | |
| T OF COLOMBIA T OF COLOMBIA 1 OF COLOMBIA 39'57'H 572.0 815.3 1125.0 1456.4 1141.1 1900.0 1817.5 1617.4 1140.0 1001.8 650.9 481.1 hilocula 29'44'H 895.9 1145.3 1521.7 1855.7 1895.3 1895.1 1895.3 < | 41 Inington | 10-40-N | \$71.4 | 827.0 | 1149.2 | 1480.1 | 1710.2 | | | 1614.6 | 1.1101 | 983.9 | 6.44.9 | 489.6 | 1207.7 |
| Cloar/Stacling 39'57'1 572.0 613.3 1135.0 168.6 114.1 1900.5 1617.5 114.0 600.3 650.3 610.1 650.3 610.1 610.3 650.3 610.1 610.3 650.3 610.1 610.3 650.3 610.1 610.3 650.3 610.1 610.3 650.3 610.1 610.3 650.3 610.1 610.3 <td>DISTRICT OF COLUMNIA</td> <td></td> | DISTRICT OF COLUMNIA | | | | | | | | | | | | | | |
| bicula 29*44'K 552.9 1125.9 1474.0 1875.7 1852.7 1852.7 1852.7 1852.7 1852.7 1852.7 1852.7 1852.7 1852.7 1852.7 1852.7 1852.7 1857.7 1857.7 1857.7< | Washington/Sterling | 38-57'N | \$72.0 | 615.3 | 1125.0 | 1458.9 | 1.81/1 | | | 1617.4 | 0.0464 | 1001.8 | 650.9 | 1.184 | 1208.4 |
| hicula 29-44'K 652.9 1135.9 1474.0 1855.7 1855.7 1855.2 1852.2< | FLORIDA | | | | | | | | | | | | | | |
| mulli 30°30°K 899.9 1144.3 1521.7 1855.3 1865.2 1802.0 1644.2 142.3 1221.1 946.0 817.4 25°46°B 1057.4 1134.0 1603.3 1893.0 1843.6 1707.9 1707.9 1453.1 1952.3 1106.7 1114.0 1603.3 1893.0 1843.4 1707.9 1463.1 1902.0 1444.2 1402.1 1902.7 1116.4 1107.8 950 817.4 27'56°B 717.6 548.9 1035.6 1845.1 1903.7 1803.7 1803.7 1802.7 1802.7 1314.4 1107.8 915.7 31'357 751.0 1015.2 1396.5 1751.4 1852.3 1801.5 1802.7 1314.4 1107.8 912.7 915.7 915.7 915.7 916.7 915.7 915.7 915.7 915.7 915.7 915.7 915.7 915.7 915.7 915.7 915.7 915.7 915.7 915.7 915.7 915.7 915.7 915. | Apaluchicula | N | 852.9 | 1125.9 | 1474.0 | 1878.9 | 2090.6 | 1996.3 | 1813.6 | 1687.5 | 1535.4 | 4.1761 | 10401 | 817.6 | B.C(1) |
| 25*60*b 1057.4 1114.0 1607.3 1899.0 1847.4 1752.7 1853.1 1845.3 1302.7 1114.4 1107.3 955.4 27*58*b 1010.7 1259.4 1591.7 1906.5 1998.2 1847.4 1752.7 1653.1 1492.0 1346.4 1107.3 955.4 27*58*b 717.6 940.9 1301.6 1465.1 1901.7 1401.7 1402.0 1395.4 647.4 317*32 751.0 1015.2 1331.6 1465.1 1901.7 1401.7 1401.7 982.4 647.1 731.7 911.1 751.7 911.1 751.7 911.1 751.7 711.4 752.6 145.7 751.7 911.1 751.7 711.7 911.1 751.7 711.1 751.7 711.1 751.7 711.1 751.7 711.1 751.7 711.1 751.7 711.1 751.7 711.1 751.7 711.1 751.7 711.1 751.7 701.3 751.7 701.3 751.7 | Jacksonvî []e | N.06.0E | 6.99.9 | 1164.3 | 1521.7 | 1855.7 | 1956.3 | 1865.2 | 1802.0 | 1694.2 | 1442.3 | 1223.1 | 9.96 | 817.6 | 1438.2 |
| 27*56*V 1010.7 1259.4 1593.7 1906.5 1996.5 1991.6 1175.1 1593.7 1906.5 1991.6 1175.1 1107.4 910.7 1175.6 9103.6 1664.2 1653.6 1913.6 1812.2 1706.5 1195.9 874.2 914.3 1745.1 914.5 174.5 914.5 174.5 914.5 174.5 914.1 1553.7 1553.6 1915.5 1872.5 1195.5 817.2 1709.5 814.5 1875.7 1195.7 914.1 1553.7 915.7 1553.7 915.7 915.7 1553.7 a 122*8* 1194.6 1105.2 1306.5 1561.4 1852.0 1654.5 1845.5 1847.5 1845.7 1951.7 1553.7 b 119*4.7 1207.7 1441.0 1652.7 1795.6 1561.7 1795.6 1644.5 1684.5 1847.5 1561.7 1553.7 1552.6 1114.4 1552.7 1114.6 1152.6 1114.6 11152.6 11124.6 11152.6 11124.6 11154.7 1540.4 1154.7 1540.4 1154.7 1540.7 | Xiacı | 25-48.2 | 1057.4 | 1314.0 | 1603.3 | 1859.0 | 1843.6 | 1707.9 | 1763.4 | 1629.8 | 1456.3 | 1302.7 | 1110.4 | 1019.1 | 1472.9 |
| 31'39'K 717.6 948.9 1303.6 1913.6 1913.2 1708.5 182.2 1199.9 87.4 87.1 a 33'39'K 717.6 948.9 1303.6 1913.6 1913.5 1412.2 1708.5 182.4 874.3 a 33'22'K 731.0 105.2 1338.5 1751.4 1952.7 1903.5 1620.4 1453.7 941.1 1301.6 1312.1 1403.6 1214.6 941.1 753.7 b 21'19'K 120'7 1441.0 1445.1 1892.5 2014.5 1931.6 1913.5 1753.5 941.1 1535.7 941.1 1535.7 941.1 1535.7 1441.0 1445.1 1753.5 1620.4 1465.7 1441.7 2554.8 1455.5 1884.5 1913.7 1540.1 1153.7 1535.7 1540.2 1540.7 1153.7 1540.1 1153.7 1545.7 1153.7 1545.1 1153.5 1545.7 1545.7 1545.7 1545.7 1545.7 1545.7 1545. | tanpa | 27*58·W | 1010.7 | 1259.4 | 1593.7 | 1906.S | 1998.2 | 1847.4 | 1752.7 | 1653.1 | 1492.0 | 4.9461 | 1107.8 | 4.35.4 | 1492.3 |
| 13''39''R 717.6 960.9 1303.6 1665.2 1695.3 1913.6 1812.2 1706.5 1822.0 1190.9 622.9 674.2 13<'22''R | GEORUIA | | | | | | | | | | | | | | |
| 137:22'K 751.0 105.2 1328.4 1865.1 1903.7 1903.5 1667.1 1400.6 1219.4 916.5 720.9 nh 22'8'Y 794.7 1003.8 1398.5 1761.4 1852.3 1804.3 1783.5 1667.1 1810.6 1216.7 941.1 751.7 rs 22'8'Y 794.7 1003.8 1398.5 1751.5 1813.5 1872.5 2024.5 2018.3 1911.1 1814.7 2554.6 1164.9 1010.3 rs 19'43'Y 1119.8 1244.2 1348.6 1813.5 1872.5 2024.5 2018.3 1911.1 1814.7 2554.6 1105.3 ulu 21'75'Y 119.8 1246.2 1348.6 1499.3 2004.4 2002.2 1964.5 1010.3 1409.4 1165.7 1010.3 ulu 21'75'Y 148.6 1482.6 1867.8 1867.8 1867.5 1010.3 1010.3 1019.3 1019.3 1019.3 1019.3 1019.3 1019.3 1019.3 1019.3 1019.3 1019.3 1019.3 1019.3 1019.3< | At lant . | A.66.56 | 3.117 | 968.9 | 3.5051 | 1686.2 | 1853.8 | 8.0101 | 1812.2 | 1708.5 | 1422.0 | 1199.9 | 882.9 | 674.2 | 1145.3 |
| Anh 32* B'4.7 100.18 1396.5 1761.4 1852.3 1844.3 1783.5 1620.6 1362.7 1216.7 941.1 753.7 V:a Point 21'19'K 1207.7 1441.0 1455.1 1833.5 1872.5 2024.5 2018.3 1971.1 1814.7 355.4.8 1865.7 Viu 21'20'Y 1119.8 1246.2 1346.6 1833.5 1654.5 1624.5 1814.6 1372.1 1104.9 1019.3 Viu 21'20'Y 1119.8 1246.2 1346.6 1833.5 1654.5 1624.5 1816.1 1372.1 1104.9 1019.3 Viu 21'20'Y 1119.8 1246.2 1346.6 1353.0 1654.5 1624.5 1824.6 1372.1 1104.9 1019.3 Viu 21'59'K 1109.0 1299.7 1475.6 1430.1 1826.9 2004.4 2003.2 1986.5 1019.3 1019.3 Viu 21'59'K 1109.0 1299.7 1475.6 1824.0 1862.5 1845.3 1011.1 1144.2 1019.3 Viu 21'59'K 1394.1 1852.6 246.1.2 2461.2 2461.2 1191.2 1015.1 1019.3 | August a | ¥.22.55 | 751.0 | 1015.2 | C.8CEI | 1728.4 | 1865.1 | 1903.7 | 1803.5 | 1667.1 | 1409.6 | 1219.6 | 916.5 | 120.9 | 1361.6 |
| No. 21'19'K 1207.7 1441.0 1645.1 1813.5 1972.5 2014.5 1971.1 1814.7 2554.6 1299.4 1165.7 ulu 21'20'Y 1119.6 1246.2 1346.6 1935.5 1624.5 1624.5 1624.5 1972.1 1104.7 2554.6 1372.1 1104.9 1019.2 ulu 21'20'Y 1119.6 1246.2 1346.6 1435.0 1658.5 1624.5 1849.3 2004.4 2002.2 1946.5 1372.1 1104.9 1019.2 ulu 21'20'Y 1179.6 1396.7 1755.6 1640.7 1857.8 1867.5 1845.5 1624.3 1372.1 1104.9 1019.2 21'20'Y 1109.0 1299.7 1405.6 1826.9 2004.4 2002.2 1965.5 1742.4 1449.4 1134.2 1039.7 40 1109.0 1299.7 1004.9 1826.9 2016.8 2196.5 1742.4 1449.4 1134.2 1059.1 157.2 40 139.1 609.0 1019.6 1842.5 2016.2 2196.5 1017. | denneves | 32. 8.4 | 194.7 | 10+3.8 | 2.86CE | 1761.4 | 1852.3 | 1844.3 | 1783.5 | 1620.0 | 1363.7 | 1216.7 | 941.1 | 1.020 | 1364.5 |
| v:s Point 21'19'K 1207.7 1441.0 1645.1 1893.5 1971.1 1814.7 255.4.6 1244.4 1165.7 ulu 21'20'Y 1119.8 1246.2 1344.6 1375.1 1104.9 1019.3 ulu 21'20'Y 1179.6 1396.3 1621.7 1795.8 1949.3 2004.4 2002.2 1946.6 1372.1 1104.9 1019.3 ulu 21'20'Y 1179.6 1396.3 1621.7 1795.8 1949.3 2004.4 2002.2 1946.5 1910.1 1540.3 1019.3 21'50'Y 1109.0 1299.7 1475.6 1867.8 1862.5 1946.5 1910.1 1540.1 1193.2 1019.3 . 21'59'W 1103.0 1299.7 1475.6 1867.8 1862.5 1946.5 1772.1 1194.9 1019.3 1055.1 . 43'34.0 1351.0 1867.8 1867.8 1862.5 1911.3 1434.6 1373.2 1054.3 1057.2 1055.1 1055.1 1055.1 1055.1 1055.2 1055.2 1055.2 1055.2 | HAWNED | | | | | | | | | | | | | | |
| 19*43'K 1119.6 1246.2 1343.6 1434.8 1553.0 1654.5 1624.5 1553.0 1654.5 1592.4 1546.6 1372.1 1104.9 1019.3 ulu 21*20'Y 1179.8 1396.3 1621.7 1795.8 1949.3 2004.4 2002.2 1566.5 1810.1 1540.3 1266.1 1132.5 ulu 21*59'K 1103.0 1299.7 1475.6 1640.7 1867.8 1867.5 1818.1 1742.4 1449.4 1153.2 1035.1 von 21*59'K 1103.0 1299.7 1475.6 1640.7 1867.8 1867.5 1818.1 1742.4 1449.4 1153.2 1035.1 von 43*24 1645.9 1824.0 1867.8 1867.5 1818.1 1742.4 1439.4 153.2 1053.1 von 43*24 1835.0 1826.5 2014.4 1824.5 2014.5 1772.4 1439.4 153.2.2 1053.1 von 46*23 1842.5 2014.4 2465.2 2014.4 2134.6 1351.4 1372.4 1401.5 177. | Barbers Point | X.61.12 | 1207.7 | 1441.0 | 1645.] | 2.001 | 1972.5 | 2024.5 | 2018.3 | 1.1791 | 1814.7 | 8.4261 | 1299.4 | 1165.7 | 1462.4 |
| ulu 21'20'V 1179.8 1396.3 1621.7 1795.8 1949.3 2004.4 2002.2 1966.5 1910.1 1540.3 1266.1 1132.5 21'59'Y 1100'0 1299.7 1475.6 1640.7 1824.0 1867.8 1862.5 1818.1 1742.4 1449.4 1154.2 1053.1 4)'14'V 695.3 539.7 1304.1 1826.9 2276.7 2463.2 2612.7 2196.5 1737.2 1137.8 628.3 437.2 tun 46'23'W 339.7 609.0 1019.6 1435.0 1842.5 2014.8 2335.8 1931.3 1434.6 859.8 412.8 286.1 15 10 10 11'47'W 507.0 759.5 1106.9 1459.0 1788.9 2007.0 1942.8 1719.4 1351.9 968.9 565.4 401.5 15 15'5 11'47'W 507.0 759.5 1106.9 1459.0 1788.9 2007.0 1942.8 1719.4 1351.9 968.9 565.4 401.5 15'5 11'47'W 507.0 759.5 1106.9 1459.0 1788.9 2007.0 1942.8 1709.4 1351.9 968.9 565.4 401.5 15'5 11'47'W 507.0 759.5 11'06.9 1459.0 1788.9 2007.0 1942.8 1709.4 1351.9 968.9 565.4 401.5 15'5 11'5 11'5 11'5 11'5 11'5 11'5 11'5 | ніце | N-64-61 | 1119.8 | 1246.2 | 1348.6 | 1434,B | 1553.0 | 1658.5 | 1624.5 | 1592.4 | 1546.8 | 1372.1 | 1104.9 | 1019.3 | 1.285.1 |
| 21'59'K 1103.0 1299.7 1475.6 1640.7 1867.8 1867.5 1818.1 1742.4 1449.4 1154.2 1053.1 .ton 43'34'U 435.3 839.7 1304.1 1826.9 2276.7 2463.2 2612.7 2196.5 1137.2 1137.8 428.3 437.2 .ton 45'23'U 339.7 509.0 1019.6 1825.5 2016.8 2135.0 1931.3 1439.6 437.2 266.1 205.6 4172.8 437.2 1055.1 2016.5 4172.8 437.2 1055.1 2055.6 4172.4 4154.2 405.3 401.5 1055.1 2057.0 1788.9 2007.0 1942.8 1055.9 401.5 2055.6 401.5 401.5 401.5 401.5 401.5 401.5 401.5 401.5 401.5 401.5 401.5 401.5 401.5 401.5 400.1 401.5 401.5 401.5 401.5 400.1 400.1 400.1 400.1 400.1 400.1 401.5 400.1 400.1 400.1 400.1 400.1 400.1 400.1 4 | بالاستين المالين | 21.20.4 | 1179.8 | 1396.3 | 1621.7 | 1795.8 | 1949.3 | 2004.4 | 2002.2 | 1966.5 | 1910.1 | 1540.3 | 1266.1 | 1132.5 | 1638.7 |
| 4)"34"L 495.3 839.7 1304.1 1826.9 2276.7 2463.2 2612.7 2196.5 1737.2 1137.8 628.3 437.2 ton 45"23"L 339.7 609.0 1019.6 1435.0 1842.5 2014.6 2335.6 1931.3 1434.6 859.8 412.3 286.1 15 41"47"L 507.0 759.5 1106.9 1459.0 1788.9 2007.0 1942.4 1351.9 968.9 555.6 401.5 16 31"47"L 507.0 759.5 1106.9 1459.0 1788.9 2007.0 1942.4 1351.9 968.9 565.6 401.5 16 31"50"L 515.0 1865.5 2007.0 1942.4 1351.9 968.9 565.6 401.5 16 31"50"L 515.0 1865.5 2007.0 1942.4 1353.9 1068.9 565.6 401.5 16 31"50"L 515.0 1855.5 2096.7 2058.2 1065.9 565.6 401.5 | Lilmu | N.65.12 | 1103.0 | 1299.7 | 1175.6 | 1640.7 | 1824.0 | 1867.8 | 1862.5 | 1918.1 | 1742.4 | 1449.4 | 1154.2 | 1053.1 | 1524.2 |
| n 49:23 89:3 89:7 104.1 1826.9 2276.7 2463.2 2612.7 2196.5 137.2 137.8 420.3 437.2 n 46'23'H 339.7 609.0 1019.6 1435.0 1842.5 2014.8 2335.8 1931.3 1434.4 859.8 412.8 266.1 1 46'23'H 509.7 1019.6 1435.0 1842.5 2014.8 2335.8 1931.3 1434.4 369.8 412.8 266.1 1 41'47'H 507.0 7395.5 1106.9 1865.5 2007.0 1941.4 1515.9 968.7 401.5 1 39'50'H 566.0 1143.0 1515.0 1865.5 2007.0 1943.4 1058.9 968.9 401.5 1 19'50'H 515.0 1865.5 2096.7 2056.2 1865.9 1056.9 401.5 | EDAHG | | | | | | | | | | | | | | |
| n 46'23'N 339.7 609.0 1019.6 1435.0 1842.5 2016.8 2335.6 1931.3 1434.6 859.8 412.8 266.1 41'47'W 507.0 759.5 106.9 1459.0 1788.9 2007.0 1941.8 1719.4 1351.9 968.9 565.4 401.5 1 39'50'W 584.7 860.9 1106.9 1459.0 1788.9 2007.0 1941.8 1719.4 1351.9 968.9 565.4 401.5 1 39'50'W 584.7 860.9 1143.0 1515.0 1865.5 2094.7 2058.2 1805.8 1068.3 490.1 | Boise | N.46.64 | 6.284 | 1.968 | 1.4001 | 1826.9 | 2276.7 | 2463.2 | 2612.7 | 2196.5 | 1737.2 | 8.7611 | 420.3 | 437.2 | 1495.5 |
| 41'47'N 507.0 759.5 1106.9 1459.0 1788.9 2007.0 1943.8 1719.4 1353.9 968.9 565.6 401.5 1eld 39"50"E 584.7 860.9 1143.0 1515.0 1865.5 2094.7 2058.2 1805.8 1453.9 1068.3 676.6 490.1 | Luwiston | N.EZ.94 | 1.966 | 0.803 | 1019.6 | 0.2641 | 1842.5 | 2014.8 | 2335.8 | 1931.3 | 1.4541 | 859.8 | 412.8 | 266.1 | 1210.1 |
| A1*47'W 507.0 759.5 1106.9 1459.0 1788.9 2007.0 1943.8 1719.4 1351.9 968.9 545.4 401.5 e1d 39*50'W 584.7 840.9 1143.0 1515.0 1865.5 2094.7 2058.2 1805.M 1453.9 1048.3 674.6 490.1 | t ct. frors | | | | | | | | | | | | | | |
| 39*50'# 584.7 860.9 1143.0 1515.0 1865.5 2094.7 2058.2 1805.8 1453.9 1068.3 676.6 490.1 | Chic.Igo | N.(>.1+ | 507.0 | 2.927 | 1106.9 | 1459.0 | 1788.9 | 2007.0 | 8.6461 | 1719.4 | 9.L2CI | 968.9 | 565.6 | 401.5 | 1215.1 |
| - | Springfield | 1.05-6 E | 584.7 | 860.9 | 0.6411 | 1515.0 | 1865.5 | 2094.7 | 2058.2 | 1805.8 | 1453.9 | 1068.3 | 676.6 | 1.061 | 2.1001 |

Table 1-1 (continued) Total Horizontal Solar Radiation Intensity (Btu/ft²-day) from Solar Energy Research Institute

| INDIANA | | | | | | | | | 307 MIC | 202 | 8 | NON | Data | WINN |
|---------------------|----------|--------|---------|--------|---------|----------|----------|----------|---------|--------|--------|--------|--------|---------|
| Evanyville. | 18. 3.6 | 574.1 | 823.2 | 1151.0 | 1500.8 | 1782 4 | 1982.7 | 1 0201 | 1 2421 | 1403 2 | tant o | | | |
| fadi section | | | | | | | | | | | A-1907 | C. 799 | | B. F421 |
| AT The Burn Paur | | 4.064 | | ISOL | - 26C | 10.858.0 | 1.9461 | L. 9081 | 1413.5 | 1324.0 | 0.114 | 1.972 | 416.6 | 1165.0 |
| South Bend | 4.21.11 | 415.7 | 659.6 | 992.5 | 1387.4 | 1722.5 | 1921.9 | 1852.4 | 1666.3 | 1291.3 | 909.2 | 497.1 | 340.3 | 1118.0 |
| TOWN | | | | | | | | | | | | | | |
| Des Moines | E.Z1.It | 580.7 | 860.7 | 1180.5 | 1556.6 | 1867.5 | 2324.6 | \$0.96.3 | 1827.9 | 9.5641 | 1067.8 | 658.3 | 486.9 | 1311.8 |
| Mason City | N.6 -54 | \$53.7 | 834.2 | 1168.0 | 1518.6 | 1095.3 | 8.0112 | 2084.2 | 3.25st | 1405.4 | 1010.5 | 6. 665 | 443.2 | 1288.5 |
| CUISAS | | | | | | | | | | | | | į | |
| bodge City | H.94.46 | 826.6 | 1122.0 | 1474.4 | 1885.8 | 1.6805 | 2358.2 | 2295.5 | 2055.3 | 1686.7 | 1300.7 | 1.698 | 6.161 | 1560.2 |
| Topeka | N.7 .6E | 6.089 | 0.149 | 1256.9 | 4.1491 | 1915.4 | 2126.4 | 2127.9 | 1910.0 | 1516.4 | 1146.6 | 111.6 | 583.5 | 1384.8 |
| KENTUCKY | | | | | | | | | | | | | | |
| Lexington | 38. 2.8 | 5.245 | 279.5 | 2099.5 | 1479.2 | 1747.0 | 1.7991 | 1850.4 | 1685.3 | 1362.1 | 1044.2 | 651.3 | 485.5 | 1219.4 |
| Coulsville | M. 11.86 | \$45.3 | 789.3 | 1102.0 | 1466.7 | 1719.8 | 1903.5 | 1837.5 | 1480.2 | 1361.2 | 2042.2 | 652.8 | 487.9 | 1215.7 |
| LOUTSTANA | | | | | | | | | | | | | | |
| Lake Charles | M.1 .00 | 128.4 | 8. 6001 | A.ELEL | 1570.4 | 1849.4 | 1970.3 | 1781.7 | 1457.4 | 1485.2 | 1361.1 | 916.6 | 1.05.6 | 1364.6 |
| Vew Orleans | R.65.67 | 4.458 | 6.1111 | B.ALAL | 1780.3 | 1.1401 | \$.003.8 | 1812.5 | 3736.6 | 1513.6 | 0.2121 | 912.6 | 4.611 | 0. TEAL |
| Shreveport | M.82.20 | 762.3 | 1038.4 | 1341.5 | 1612.6 | 1866.2 | 2064.8 | 2013.9 | 1.7781 | 1552.9 | 1303.5 | 928.6 | 3.021 | 1.426.1 |
| 301 ME | | | | | | | | | | | | | | |
| Caribou | N.25.91 | 419.3 | 724.0 | 1133.1 | 1414.2 | 1577.8 | 4757.4 | 1767.4 | 1300.7 | 1102.6 | 6.88.3 | 366.4 | 110.5 | 1063.1 |
| Poctland | H.6E.E. | 450.3 | 6.185 | 969.6 | 1303.9 | 1567.4 | 9.111.6 | 1659.1 | 1460.9 | 8.1211 | \$22.4 | 454.3 | 362.9 | 1050.6 |
| DINALTAND | | | | | | | | | | | | | | |
| Balt imore | #. CT.65 | 5.485 | 840.0 | 2162.2 | 1487.9 | 1713.9 | 1.979.1 | 1873.2 | 1599.5 | 1330.3 | 9.166 | 6.048 | 6.994 | 1215.0 |
| MASSACHUSETTS | | | | | | | | | | | | | | |
| Bonton | #.22.24 | 475.5 | 109.6 | 1016.4 | 1325.8 | 1620.5 | 1617.1 | 1749.2 | 2-3841 | 1259.9 | 889.6 | 502.9 | 403.0 | 1104.7 |
| NICHIGAK | | | | | | | | | | | | | | |
| Detruit | #. 52.24 | 477.4 | 4.085 | 1000.2 | 0.9961 | 9.2111 | 1.9581 | 4.258t | 1375.5 | 1253.2 | 876.1 | 477.8 | 343.5 | 1120.0 |
| Crand Sapids | R.15.24 | 369.6 | 6.843 | 1014.4 | 9.1141 | 1755.2 | 1956.5 | 1914.4 | 1.676.3 | 1262.1 | 8.128 | 1.254 | 330.7 | 1135.3 |
| Smult Ste. Marie | N. 82.91 | 324.8 | 6.508 | 1028.6 | 1383.3 | 1688.1 | 1810.8 | 1835.1 | 1522.7 | 1049.1 | 673.0 | 1.166 | 252.9 | 1041 9 |
| MEMMESOTA | | | | | | | | | | | | | | |
| Dujkith | N.05.91 | 338.6 | 672.8 | 1034.5 | 8.272.8 | 1642.5 | 1767.2 | 1854.3 | 1546.9 | 0.2601 | 724.6 | 1.0.86 | 291.7 | 1064.3 |
| Minnapolis/St. Paul | H.ES.WY | 464.0 | 743.9 | 1103.5 | 9.1441 | 2.1211 | 1927.5 | 1970.0 | 1687.0 | 1254.7 | 859.6 | 480.4 | 153.3 | 1170.2 |
| 14415212214 | | | | | | | | | | | | | S. | 8 |
| | | | | | | | | | | | | | | |

Table 1-1 (continued) Total Horizontal Solar Radiation Intensity (Btu/ft²-day) from Solar Energy Research Institute

| STATE AND STATELY NESSAURE | LATITUDE | Ň | 2 | ¥. | T | MAY | | Ę | VNC | 245 | S. | NOR | . PEC | - |
|-------------------------------|-----------|---------|---------|--------|--------|----------------------|---------------|---------|--------|---------------|--------|--------|---------|--------|
| Columbia | M.64.86 | 411.5 | 874.8 | 1178.8 | 1525.9 | 1879.8 | 2089.5 | 2216.1 | 1817.9 | 1450.4 | 1109.6 | 1.501 | \$.554 | 3.7551 |
| Vab: As City | 7.01.65 | \$12.9 | 1.168 | 1202.9 | 1575.0 | 1872.6 | 2079.6 | 1.5465 | 1862.4 | 1452.4 | 1092.3 | C.1ct | \$11.5 | 1340.0 |
| Si Ivouis | 8.59.86 | \$21.4 | 885.6 | 1.4021 | 1564.2 | 1871.3 | 2092.5 | 2049.5 | 1816.5 | 1459.2 | 1049.8 | C.811 | \$30.6 | 1326.4 |
| MUTLARA | | | | | | | | | | | | | | |
| RILLINGS | R.21.11 | 4619.0 | 163.2 | 1189.5 | 1526.3 | 1912.8 | 1.0115 | 2303.7 | 2022.4 | 1470.0 | 1.980 | 9.152 | 2.154 | 1324.7 |
| Great Valla | R.62.11 | \$20.5 | 720.2 | 1170.4 | 1488.7 | 1847.6 | \$101.4 | 2329.0 | 9.0001 | 5.9161 | 924.6 | 9.164 | 2.960 | 1262.3 |
| TIS.OULS | H. 55.91 | 911.6 | 5.4.2 | \$11.5 | 1362.2 | 1782.5 | 1933.0 | 2.1265 | 1060.9 | 1357.6 | 5.550 | 410.2 | 2+2.2 | 1168.5 |
| HERRASKA | | | | | | | | | | | | | | |
| Knrrh Omeha | M. 22.14 | 6.424 | 8.248 | 3222.5 | 1558.4 | 1872.6 | 2122.5 | 2104.5 | 1059.5 | 2.6161 | 8.9401 | 1.446 | 5.112 | 1320.5 |
| Scoresbluff | N.25.14 | 67%.7 | \$20.5 | 1307.4 | 1668.0 | 1933.2 | 2236.4 | 2263.7 | 1449.5 | 1596.9 | 1145.0 | 5.057 | 575.1 | 1424.7 |
| HEVACA | | | | | | | | | | | | | | |
| 6134 | N.05-01 | 4.88.4 | + .+Cot | 1463.0 | 1899.7 | 2303.3 | 7.0124 | 26.22.9 | 2315.4 | 1802.6 | 1323.5 | 812.1 | 617.0 | 1625.5 |
| I AN Vegas | 36. 5.8 | 978.0 | 5.9001 | 1823.5 | 2)11.0 | 2646.3 | 2117.8 | 1.9425 | 2354.8 | 2037.3 | 1539.6 | 1085.5 | 8.088 | 1964.2 |
| - ED | N.07-65 | \$.00å | 1149.9 | 1649.4 | 2159.3 | 2523.1 | \$101.4 | 2692.1 | 2405.7 | 1.1991 | 1431.0 | \$12.3 | \$105.5 | 1760.7 |
| NEW MAMPSHIJRE | | | | | | | | | | | | | | |
| Curi ard | H.21.C* | 459.5 | 1.484 | 9.0.6 | 1.171 | 1371.1 1582.2 1704.6 | 1104.6 | 1674.6 | | 1+55.3 1140.2 | 817.1 | 442.7 | 342.1 | 1053.0 |
| NPW | | | | | | | | S | | | | | | |
| K-Wei h | A0-42'W | 1.145 | 193.0 | 1106.7 | 1448 6 | 1487.1 | 1195.3 | 1759.9 | 1544.8 | 6.5751 | 950.9 | 2.165 | 4.454 | 1165.3 |
| NEW MAXICO | | | | | | | | | | | | | | |
| Albuquerque | B.E -55 | 1016.5 | 1342.0 | 1767.6 | 2228. | 2538.1 | 2678.9 | 2488.6 | 2290.1 | 1.1791 | 1546.7 | 1.000 | 1. 129 | 1821.5 |
| Famington | #. 45.91 | 944.5 | 1280.9 | 1493.0 | 2132.9 | 3-14+2 | 2445.5 | 2478.2 | 2252.1 | 1934.3 | 1.0141 | 1047.2 | 1.168 | 1766.3 |
| Roswell | H. \$2.55 | 1046.5 | 1.2761 | 1801.4 | 2217.6 | 2.6545 | 2610.3 | 2440.6 | 2241.6 | 1913.0 | 1527.1 | 1.1611 | 951.0 | 0.0181 |
| ANDY NOW | | | | | | | | | | | | | | |
| Albuny | K.5+.2+ | \$195.5 | 4.88.4 | 9.286 | 1335.2 | 1549.4 | 1549.9 1729.9 | 1724.9 | 1498.9 | 1170.3 | 617.3 | 1.123 | 9.856 | 1065.8 |
| Buliato | R. 95.24 | 348.9 | \$46.4 | 5.959 | 9.4161 | 1594.5 | 1.001.7 | 1776.4 | 1513.2 | 8.1214 | 764.4 | +. 60+ | 283.3 | 1034.3 |
| New York City (La Guardia) | H. 94-64 | 576.6 | 2.461 | 111.6 | 3456.6 | 1690.4 | 1690.4 1891.9 | 1744.1 | 1543.2 | 1280.1 | 930.6 | 0.692 | 454.8 | 101.4 |
| NURTH CAROLINA | | 3 | | | | | | | | | | | | |
| Cape Halteras | K.91.56 | 6.85.6 | 952.2 | 1326.4 | 9.644 | 1961.8 | 2035.9 | 1920.6 | 1705.4 | 1470.4 | 4.9CIT | \$72.9 | 658.7 | 1375.0 |
| Grupphero | N.5 .95 | 115.3 | 910.0 | 1313.2 | 1683.2 | 1869.0 | 1953.1 | 1843.6 | 1696.6 | 1417.6 | 9.1411 | 5.9.8 | 658.7 | 1303.3 |

Table 1-1 (continued) Total Horizontal Solar Radiation Intensity (Btu/ft²-day) from Solar Energy Research Institute

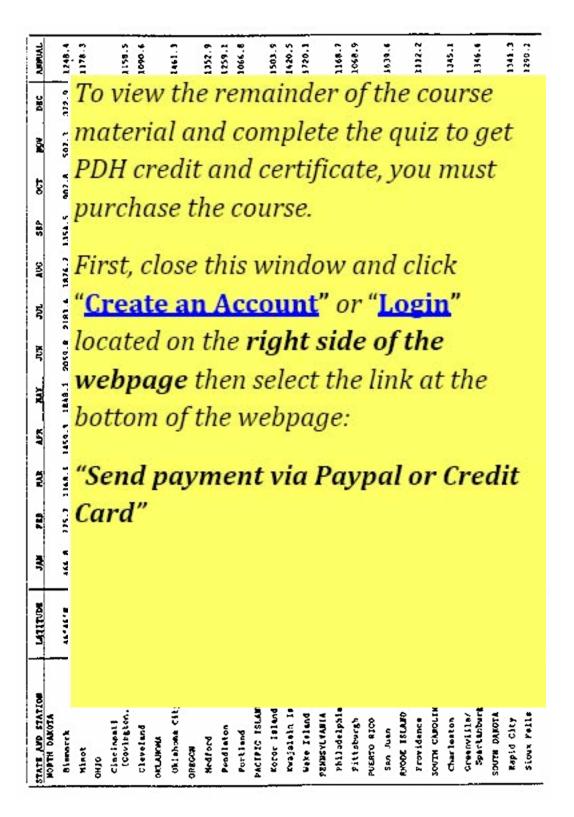


Table 1-1 (continued) Total Horizontal Solar Radiation Intensity (Btu/ft²-day) from Solar Energy Research Institute