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# DRYING OF LARGE CYLINDRICAL BALES WITH A SOLAR ENERGY INTENSIFIER-THERMAL ENERGY STORAGE SYSTEM

BY

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56

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This thesis is approved as creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable for meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Advisor — Date

Head of Major Department — Date

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# TABLE OF CONTENTS

## TABLE OF FIGURES

# INTRODUCTION

The U.S. agricultural system was developed with abundant supplies of low-cost energy which accounted for only a small fraction of the cost of supplying food, fiber, and wood products, Bender et al. (1975). Around 20 percent of the total energy used in the U.S. is for production, processing, marketing, distribution, and utilization of food as a natural fiber, and forest products. As population increases in the world, the demand for these products will increase and hence agricultural energy demands can be expected to increase.

Energy used in food production has been increasing faster than in many other sectors of the world economy. In 1970, some of the large inputs of energy came from machinery (1,037,400 kcal); fuel (1,971,420 kcal); drying (296,400 kcal) and electricity (765,700 kcal), Pimentel et al. (1973). Many of these energy outputs could be reduced by the use of solar energy. The maximum potential of solar thermal energy systems to provide industrial process heat will be 633 quadrillion Joules (0.6 quadrillion BTU's) per year in 1985, and 7,701 quadrillion Joules (7.3 quadrillion BTU's) per year in 2000. Solar energy will be economically competitive with the projected costs of conventional fossil fuels for applications having a maximum required temperature of $287^{0}$ C ($550^{0}$ F), Intertechnology Corporation Report (1977). Many of the agricultural processes requiring heat fall within this temperature level.

Direct application of solar energy has long been practiced for drying crops in the field, in the stack or windrow, on drying floors, and in ventilated sheds or cribs. However, the technical and economic feasibility of collecting and utilizing solar energy as a heat source in a drying system that is compatible with present day crop production, harvesting, handling and storage systems has not been adequately established.

Recent developments in hay harvesting equipment and limited labor availability have encouraged hay producers to harvest hay in large round bales. Although the hay is generally field dried before it is baled, some new pieces of equipment have a higher level of performance, if moisture levels in the hay are higher than those considered safe for storage, Baker and Shove (1978). Supplemental heat in hay drying was a major concern of many producers in the late 1940's. Solar energy was one of the suggested heat sources, Davis (1947), Davis and Barlow (1948) and Davis, Barlow and Brown (1950). However, drying technology combined with lower fuel costs for that period placed primary emphasis on other energy sources. Present day energy realities have enhanced the appeal of low temperature drying. Low temperature drying is not dependent on an increasingly uncertain supply of LP and natural gas, and appears well suited for solar thermal supplementation. Low air temperatures are desired, inexpensive solar collectors are adequate, and constant temperatures are not required, Kranzler et al. (1975).

Three major concerns in drying hay are the energy used, drying capacity and hay quality. Energy used in drying is currently receiving more attention because of the concern with energy supplies.
The emphasis is on making more efficient use of energy for drying as well as reducing the current reliance on high-grade fuels. A second

concern is drying capacity or performance, and the third is hay quality reflected in cattle output. A combination of solar energy and low temperature drying offers potential for answering the above concerns.

Recent energy conditions have caused a reexamination of the use of solar energy for the drying of agricultural crops. As a result, because of the great importance in developing alternate energy sources as substitutes for conventional energy sources, research was conducted with the following objectives:

1. Test a multi-use solar energy intensifier-thermal energy storage system using various drying systems for a low temperature hay drying application.

2. Evaluate the thermal efficiency in terms of useful energy collected for a solar energy intensifier used to provide supplemental heat to dry hay, under actual climatic conditions.

# LITERATURE REVIEW

## Agricultural Uses of Solar Energy

Research in agricultural applications of solar energy include: solar grain drying, application of solar energy for the drying of crops other than grain, use of solar energy in heating livestock confinement systems, solar heating and cooling of greenhouses and rural residences, and solar energy in food processing, Altman (1977).

Big round bales and rectangular stacks can be formed and transported with greater capacity (metric tons per hour) than conventional hay stacks, Baker and Shove (1978). For better machine operation these packages are formed at high moisture contents (35 percent w.b.). If these packages could be economically dried with the use of solar heated air, one-day hay harvesting might become a reality. Henry, Bledsoe and Eller (1977) tested a roof collector and a suspended plate collector for drying high-density large round bales. Results showed that approximately five more percentage points of moisture were removed using the solar systems as compared to conventional low temperature drying. It was also reported that the efficiency of the roof collectors was 45.4 percent, and for the suspended plate collector it was 55.5 percent. The system was designed for a minimum air flow rate of 16 $m^3$/minute, and 63.5 mm of static pressure. Research on the use of an integrated solar collector-building (covered plate collector on the south wall of a building) has shown that this type of low cost, low temperature rise solar system can provide an effective means of collecting solar energy for drying large round bales of hay, Baker and Shove (1978). Such a system can have an efficiency that approaches 70 percent, when used with high air flow rates and relatively low temperature rises.

Investigations on using supplemental heat in mow drying of hay conducted by Davis (1947) revealed that, when using heated air, the hay was dried from 59 percent to 20 percent moisture in 191 hours, with air flow rates of 4.60 $m^3$/min (162 cfm) per square meter of floor area. Brum (1947) emphasized that although barn hay curing has the advantages of reducing nutrient loss in the field, reducing dust and leaf shattering due to field chopping and pneumatic conveying, and reducing bleaching in the field by dew and rain, it has not overcome the difficulties encountered due to prolonged periods of cool, humid weather. Daniels (1964) indicates that in order to obtain good quality hay with early harvest, fuel heated or solar heated air should be blown through the stored hay. It was also reported that the use of supplemental heat, while the equipment will be an added expense, appears to be the only sure way of maintaining hay quality regardless of the weather conditions.

Investigations conducted by Strait (1944) in drying hay with heated air, confirm that under conditions of high atmospheric humidity and relatively low temperatures, drying would often be extended beyond the permitted time period. Therefore, the use of heated air seems to be a logical means of insuring that the drying period would not be excessively extended by weather conditions. Thus, solar drying appears to ge a good alternative solution.

Henry, Bledsoe and Eller (1977) indicated that the air flow rate is the most important factor in designing and operating a low-temperature hay drying system regardless of whether natural air, continuous supplemental heat, or solar supplementation is used. It was also indicated that, if the system is not designed for the proper air flow rates, the addition of supplemental heat will increase the amount of spoilage and will in many cases just warm the hay causing it to spoil faster. Air flow rates of 6 $m^3$/min per square meter of floor (20 cfm per $ft^2$ of floor) were reported by Weaver, Grimmells and Lovvorn (1947). The resistance of baled alfalfa to air flow appears to be related to the water-free density of the bale as modified by certain factors. These factors may result from actual shrinkage in volume of leaves and stems and/or the respiration loss of dry matter during drying.

Equations of air flow through a porous media were reported by Marchant (1976) and Brooker (1969). Values for the air flow resistance of large hay bales were calculated and used in prediction of the pressure-flow relationship of such bales. A computer simulation was used to solve these equations in the three dimensional situations. This computer simulation approach was the one used by Brooker et al. (1974) as an alternative approach in predicting the viability of solar energy as a supplemental heat source in drying grain. Similar studies conducted by Misra and Keener (1978) have shown that raising the ambient air temperature 2.2° C to 4.4° C (4° to 8° F) would satisfactorily facilitate the drying of Ohio's corn crop. These studies concluded that the use of the computer simulation approach could be applied to crops that obey the pressure-velocity relationships.

One of the most widely used and important applications of solar energy is in the grain drying process. Numerous reports have been published, and as a result, new methods and techniques are in a continuous stage of development. Nearly all of the estimated 5.89 x $10^{10}$ MJ/year (5.6 x $10^{13}$ BTU/year), Bender et al. (1976), used to dry corn in the United States is generated by burning high quality fossil fuels due to changing methods of grain harvesting techniques, as well as the rapid increase in grain production.

McLendon and Allison (1978), Morey and Cloud (1977), Foster and Peart (1976) as well as other researchers have evaluated some of the basic characteristics of selected solar and solar assisted drying systems. In addition, numerous researchers, such as Saienga, Hellickson and Peterson (1977) evaluated the thermal performance and drying characteristics of a solar energy intensifier system. Such a system collected 74.6 percent of the energy available on the horizontal, and its drying efficiency was sufficient to double the drying rate of a conventional ambient air drying system. Research conducted by Peterson and Hellickson (1975) on the design of a low cost solar collector mounted on the wall of a round steel bin to provide the necessary temperature rise for low-temperature grain drying application, showed that such collectors can supply an appreciable amount of the energy needed for the drying of shelled corn.

Pearson and Sorenson (1977) reported that approximately 78 million cubic feet of natural gas are consumed in Texas each year to dry peanuts. Walton et al. (1977) indicated that the recommended amount of supplemental heat to dry burley tobacco is approximately 145,000 J/s-ha

(200,000 BTU/hr-A). Dunn (1976) reported that tobacco producers have used as much as 2,800 liters/ha (300 gal/A) of LP gas in the new, two tier, forced ventilation barns. Thus, the use of the solar drying supplementation was an alternative considered by various researchers.

Investigations conducted by Troeger and Butler (1977) showed the feasibility of the use of solar energy in drying peanuts. It was also reported that the use of solar drying systems could supply 50 to 60 percent of the energy requirements for the drying of this product. Lambert and Vaughan (1978) used an integrated shed solar collector to dry peanuts. In addition, a matrix solar collector to dry peanuts was designed by Clary and Morgan (1977). A 30 to 40 percent fuel savings was reported by Huang and Bowers (1977) in a greenhouse bulk curing tobacco system with the use of solar energy. Similar results were obtained by Buttler (1978), who reported that during the solar curing of tobacco fuel requirements were reduced by 35 to 40 percent, and 10 to 15 percent when the unit was used as a greenhouse.

Solar energy can be utilized for a number of space heating types of applications common to farm operations. Pelletier (1959) indicated that heating of livestock confinement systems with solar energy is one of the most promising applications of solar energy. In livestock confinement buildings a vast amount of the energy created in the buildings is lost through the ventilating air, which is used to remove the moisture from the building. Supplemental heat is often added to the confinement buildings to maintain inside temperature within the range of animal comfort, to aid in maintaining moisture control and to allow a reduction in ventilation rate.

Poultry production depends on a source of energy for maintaining a suitable environmental temperature in confinement structures during at least part of the year in all regions in the U.S. Reece (1977) reported that heated structures, required about 1.95 x $10^{16}$ Joules (18.5 x $10^{12}$ BTU's) of energy per year, and about 80 percent is provided by liquified petroleum (LPG). Drury (1976) referred to solar heating as a promising substitute for up to 50 percent of the LP gas and other fossil fuels used for poultry brooder houses.

Investigations conducted by Reece (1977), showed that the total fuel consumption for the eight-week test with solar assistance was 8.2 gallons of LPG per 1000 chickens, which was 73 percent less than a similar test without solar assistance. A flat-plate collector area of 6.03 $m^2$ (65 $ft^2$) per 1000 chickens and an energy storage unit containing water to be used at night, with a capacity of 150 gallons per 1000 chickens was used. Among the benefits cited by Urner (1953) in the use of solar energy for ventilation of a poultry house are: increase in production, improved health in birds, greater growth with less feed consumption, reduction in labor and better control of poultry disease.

Research conducted by DeShazer et al. (1976) on a swine growing-finishing facility utilizing a flat-plate collector built on the roof, indicated that a reduction of 25 percent of the heating requirement could be realized for a solar heating system without storage. It was also indicated that 6.12 x $10^7$ Joules (5.8 x $10^4$ BTU's) per pig is required during winter periods, and the use of solar supplemental heat reduces the energy required to 1.26 x $10^7$ Joules (1.2 x $10^4$ BTU's) per pig.

Studies conducted by Hayden and Thompson (1977) in heating a milking parlor revealed that 250 Kw-hrs were recovered from 93 $m^2$ (1,001 $ft^2$) flat plate solar collector system mounted on the roof. Efficiency of this system was 55 percent, and a typical $10^o$ C temperature increase was noted.

Drying animal waste with solar energy appears to be a good method for treating and handling livestock wastes. The feasibility of this method was reported by De Baerdemaeker (1977), who indicated that under spring weather conditions in Southern California the fossil fuel savings were approximately $1.024 \times 10^{13}$ J ($9.70 \times 10^9$ BTU's). A low cost solar air heater was constructed by Brown (1976) to dry manure from 80 percent moisture content to a final 30 to 40 percent moisture content.

## Solar Concentrator Systems

A solar concentrator is a device that focuses or reflects energy from a relatively large area onto a relatively small area, Hellickson (1977). Winston (1974) indicated that for most solar power applications it is necessary to concentrate the solar radiation by at least an order of magnitude to either achieve high temperature or as Rabl (1976) stated to reduce the cost of the system when the absorber cost is much higher than the concentrator cost. Seitel (1975) indicated that reflectors for flat plate absorbers are particularly attractive alternatives when the collector is restrained to an unfavorable orientation.

The acceptance angle according to Rabl (1976) is the angular range over which radiation is accepted and then redirected to the absorber.

Hellickson (1977) reported that the concentration ratio is the aperture area divided by the absorber area. Tabor and Zeimer (1962) concluded that the maximum possible concentration that could be achieved with a stationary collector was approximately three. This value was accepted by the solar energy community until 1974, when Winston (1974) reported on the ideal or Winston concentrator that could achieve a concentration ratio of about 10 without diurnal tracking. The Winston concentrator is designed so that all of the solar rays entering the concentrator are received at the absorber. This type of concentrator actually acts as a radiant funnel. Although high concentration ratios are achieved, large reflector areas are required, Rabl (1976), and the acceptance angle is relatively limited.

The stationary shell concentrator, Rabl (1976), is an adaptation of the ideal concentrator. The output varies with the season, as do many heating and cooling loads. This shell concentrator consists of a single parabola with one axis parallel to one of the extreme rays and a focus at the absorber. Acceptance angles for this kind of concentrators are ± 36°, which allows seven-hour collection during all days, with a concentration ratio of 1.7 with normal incidence, but its concentration ratio varies from zero to 3.4.

A parabolic trough with a cylindrical absorber is another form of concentrator. Rabl (1976) found that the maximum concentration ratio for this concentrator was one-quarter short of the ideal limit, defined by Rabl (1976) as the maximum concentration permitted by the second law of thermodynamics. Later in the study Rabl (1976) evaluated a compound parabolic concentrator (CPC). Results of this study showed that such a concentrator has a concentration of two to four times as high as other concentrators, but requires a large reflection area. Temperature rises of up to 500° C (932° F) were noted. If the acceptance angle varied on the order of 15° to 20°, a circular profile could provide better overall focusing than a parabolic profile. This is explained in that a parabolic mirror rapidly loses symmetry with respect to the incoming beam, as the beam deflects from the paraxial position, whereas a circular profile is always symmetrical, Seitel (1975).

In large installations it is often advantageous to use a field of Fresnel mirrors, i.e., a group of mirrors, Rabl (1976), each of which can be separately moved to direct light to a common focus. Nelson et al. (1975) found that as a seasonally-adjusted concentrator, the linear Fresnel lens can give a weighted concentration ratio that could vary from 10 at noon to zero about four hours on either side of noon. It was also reported that using smaller apertures and longer focal lengths helps to improve the efficiency.

Investigations conducted by Tabor and Zeimer (1962), revealed that inflated plastic circular cylinders, partially metalized as a rigidized reflector, together with a triangular profile receiver are expected to have 40 percent efficiency and a raise in temperatures up to 150° C (302° F).

Tabor and Zeimer (1962) conducted studies involving side mirrors to increase the amount of radiation on a fixed, flat-plate collector. These studies follow the result of the Shuman system which comprises flat mirrors on the north and south sides of a collector oriented in an east-west direction. Studies conducted by Seitel (1975) and

McDaniels et al. (1975) showed that the collector can increase the light gathering ability by about 1.4 to 1.7 with the use of horizontal reflectors on the south side of a vertical flat plate collector. Kreith (1975) reported that the cost of concentrating type focusing collectors should be evaluated against the benefits over the useful life of the system.

## Collector Design Considerations

During the past century, flat-plate collectors have been constructed from many different materials, and in a wide variety of designs. These collectors have been used to heat water, water plus an anti-freeze additive such as ethylene glycol, water plus refrigerants, fluorinated hydrocarbons, air and other gases, Yellott (1974). The major objective in designing flat plate collectors, according to ASHRAE (1978), is to transmit as much radiation as possible through the glazing, to lose as little heat as possible upward to the atmosphere and downward through the back of the container, and to transfer the retained heat to the transport fluid. The absorbance depends upon the nature and color of the coating and upon the incident angle. Peterson (1977) reported that the best angle for solar collectors is about the latitude plus 20°. A 60 degree slope is better than a 30 degree slope from October to December, and both are better than horizontal collectors from October through March. Collector orientation normal to the sun's rays is not necessary due to the presence of significant diffused radiation, Buelow (1962). The energy collected is not reduced noticeably for angular changes of 15° to 40° away from the optimum collection angle, McDaniels et al. (1975).

Souka (1965), experimented with a double exposure flat plate collector in which both sides of the collector were exposed to sunlight. While the south side was receiving direct solar irradiation, the north side received the sun's beam indirectly with the use of reflectors. Temperature rises of $11^{o}$ C ($19.8^{o}$ F) at 0900 and $38.5^{o}$ C ($69.3^{o}$ F) at 1245 were reported.

Studies conducted by Duffie and Beckman (1974) indicated that the solar energy incident on most buildings is more than adequate to meet the energy requirements for heating and cooling. Shove (1978) suggested that the integration of units to collect solar energy for farmstead operations should be given serious consideration as existing buildings are remodeled or new buildings planned. Research conducted by Lipper et al. (1978) on a solar collector-storage wall for heating and cooling of a farrowing house and for drying corn, showed that it can be justified economically, when used for a farrowing house, and that, the combined use of this solar collector-storage, heating-cooling wall should prove to be nearly ideal. Buelow (1962) reported that the overall design of a solar energy collector is influenced by the building orientation, and shape and the internal configuration of the drying duct work. It was also indicated that it was possible to construct a solar heating unit as an integral part of a building roof without great extra cost and with commonly available building materials.

The effect of the cover on tube-type collectors was reported by Foster and Peart (1976). Data collected showed that adding the clear plastic cover over a single exposed black plastic absorber tube increased by 50 percent the amount of energy collected and retained in a tube approximately 0.91 m (3 ft) in diameter and 30.5 m (100 ft) long.

When selecting materials for the use in solar systems for agricultural uses, it is often necessary to make trade offs, e.g. durability vs. low cost, Schlag et al. (1977). In considering the glazing, the most important items to consider are the cost, transmissivity, durability and heat retention. Glass with low iron content has a relatively high transmittance for solar radiation (approx. 0.85 to 0.90 at normal incidence) and its transmittance is essentially zero for long wave thermal radiation (5.0 to 50 millimicrons) emitted by sun heated surfaces.

Ultra-violet radiation, which is a major cause of degradation, causes photochemical processes in clear plastics and the solar radiation spectrum band between 0.3 to 3.5 millimicrons is detrimental to most plastic polymers. Foster and Peart (1976) reported that plastic materials are subject to damage from wind, ice, snow, rodents and farm animals, hail, flying gravel and vandals. It was also indicated that plastic films possess high shortwave transmittance, and may have long wave transmittances as high as 0.4. Plastics may deteriorate and undergo dimensional changes due to high temperatures and therefore, may have limited use. In addition to serving as a heat-trap by admitting shortwave solar radiation and retaining long wave thermal radiation, glazings also reduce heat loss by convection, ASHRAE (1978). Jordan (1967) indicated that a two percent reduction in transmittance due to dust buildup on the covers was normal for a sealed system with only the outer cover exposed.

Studies conducted by Holman (1976) on specific heat of various absorber materials, indicated the following as the most efficient kinds of absorbers (at $20^{o}$ C): aluminum (0.88 KJ/kg$^{o}$ C), Copper (0.38 KJ/k$^{o}$ C) and steel (0.47 KJ/kg$^{o}$ C). For the air type collectors a 26 gauge corrugated sheet metal is commonly used, Forbes (1976). Later it was also indicated that good results can be obtained with the equivalent thermal resistance of R = 1.40 ($m^{2}$ $^{o}$ C/watt) insulation behind the plate and R = 0.70 ($m^{2}$ $^{o}$ C/watt) insulation around the edges. Fiberglass and polystyrene of 2.54 cm (1 in) thickness are among the most common insulating materials used in solar systems.

## Low-Temperature Drying

Cost of collector systems to provide high temperatures, $120^{o}$ to $180^{o}$ C ($248^{o}$ to $356^{o}$ F) or $49^{o}$ to $82^{o}$ C ($120^{o}$ to $180^{o}$ F) are considerably greater than for the lower temperature systems, Foster and Peart (1976). Collector efficiencies are reduced in high-temperature collectors unless measures are taken to limit heat losses. Troeger and Butler (1977) reached similar conclusions and reported that minimizing the temperature differential between the absorber plate and the air decreases losses, with a corresponding increase in useful energy gain. Foster and Peart (1976) indicated that solar energy is considered more applicable to low-temperature, in storage drying systems than to high-temperature, high-speed drying systems. Daniels (1964) indicated that the removal of moisture for most agricultural products required only low temperature heating, which can be rapidly supplied by solar radiation. In addition, Chau et al. (1978) reported that the drying efficiency does not take into account the collection efficiency. Thus, a low-temperature drying application is a good alternative to be used. It was also reported that the drying efficiency is the ratio of actual amount of water removed to the drying potential of the heated air going through the product.

## Solar Energy Availability

The availability of solar energy varies throughout the year, and depends on the location. Solar radiation is relatively low in intensity, rarely exceeding 3.40 x $10^6$ J/hr-$m^2$ (300 BTU's/hr-$ft^2$), which makes large collectors necessary when large amounts of energy are required. Solar radiation is intermittent and variations can differ about 40 percent from the monthly averages from year to year, and typically varies 20 to 30 percent from site to site, Williams (1977).

There are many factors which affect the actual daily levels of availability of solar energy. These include: angle of incidence of the sun's rays, extent and type of cloud cover, number of hours of daily sunshine and others.

## Energy Storage

For about 50 percent of the hours of the year, any given location is in darkness, and some means of heat or energy storage must be used if continuous operation is essential, as it is with most solar heating or cooling systems in residential and some agricultural applications, Yellott (1974). Eckhoff and Okos (1977) define the thermal storage device as a component in which energy is accepted as heat from a transfer fluid and is stored in the thermal storage media usually as sensible heat or the heat of fusion of the media.

Telkes (1975) used phase change materials for heat storage.

Eckhoff and Okos (1977) used dry soil for sensible heat storage, Short et al. (1977) used a solar pond, and Smith (1976) used rocks as means for storing solar energy.

Two systems for storing heat in the quantities needed are specific heat storage and heat-of-fusion storage. According to Yellott (1974), the specific heat storage is the most widely used system, and employs tanks of water or beds of rocks to store heat by virtue of a change in temperature. The specific heat of water at $20^0$ C ($68^0$ F) is 4.179 KJ/kg$^0$ C (1.0 BTU/lb $^0$ F) and its density is 997.4 kg/m$^3$ (62.4 lb/ft$^3$), so a single cubic meter of water could store 23,250 KJ (624 BTU/ft$^3$), if its temperature is raised by $18^0$ C ($32.4^0$ F). Beds of rock provide an alternative means of storing heat when air is used as the transfer fluid and fans are available to overcome the pressure drop required to force or draw the air through the storage, Yellott (1974). The specific heat of rocks and most other solid materials is close to 0.838 KJ/kg$^0$ C (0.2 BTU/lb $^0$ F) and a cubic meter of solid rock, weighing 1.6 metric tonnes, has a heat capacity of 83.8 KJ/kg $^0$ C (20 BTU/lb $^0$ F). The bulk density for crushed gravel or small stones ranges from 1400 to 1700 kg/m$^3$, Duffie and Beckman (1974). Duffie and Beckman (1974) also reported that rock has the additional advantage of not requiring a heat exchanger. Daniels (1962) noted that one cubic meter has only 19.7 square meters (1 ft$^3$ has 6 ft$^2$) of surface, but the surface is greatly increased if the material is used in the form of 5 cm (2 in) spheres.

Schlag et al. (1977) reported that in order to achieve an average rock temperature of $60^0$ C ($140^0$ F) with air circulation, the rock bed thickness should be no more than 0.3 meters. Rock bed storage is used because it is an efficient heat transfer device and the air quickly gives up its heat in flowing through the labyrinthine path, Balcomb et al. (1975).

Extensive studies performed by Telkes (1975) in heat-of-fusion storage systems gives a clearer understanding of the possibilities of virtually all available salt hydrates, beginning with the familiar "Glauber's Salt" ($Na_2SO_4 \cdot 10H_2O$) which melts and freezes at $33^o$ C ($91.4^o$ F) with a heat of fusion of 251.2 KJ/kg (108 BTU/lb). When mixed with three to four percent borax, which serves as a nucleating agent, it costs less than four cents per kilogram, and its melting and freezing temperature is $32^o$ C ($89^o$ F).

## Hay Physiology

Hay quality is a combination of chemical, physical and biological properties that influence the intake, digestion and utilization of the forage. This further determines the growth and productivity of the animals consuming the forage. To produce a high quality forage at least two conditions must be met: good forage must be harvested and must be dried with a minimum loss of nutrients. Shepherd, et al. (1954).

When the herbage is cut, as by mowing, there is a sudden interruption of the transpiration stream. The shutting off of the water supply from the roots and a continued evaporation from the leaf surface leads to wilting, drying, and death. During drying, some enzyme activity continues for a time and certain nutrients diminish in quality. The more rapid the drying the more quickly enzyme activity ceases and, in general, the smaller the loss in nutritive value. Undoubtedly the stage of maturity is a very important factor influencing the chemical composition of the forage, Sullivan (1973).

Mineral composition of hay by weight includes: calcium 0.41 percent, phosphorus 0.12 percent, potassium 0.74 percent, magnesium 0.27 percent, iron 0.012 percent, copper 12.8 mg/lb, and manganese 32.8 mg/lb. Sullivan (1973) reported the following mean composition of the hay:

| | |
|---|---|
| Dry matter | 89.1 percent |
| Crude protein | 8.2 percent |
| Ash | 6.2 percent |
| Ether extract | 2.8 percent |
| Crude fiber | 29.8 percent |
| N-free extract | 42.1 percent |

Shepherd et al. (1954) reported that the rate of drying of the hay depends on the difference between the vapor pressure exerted by the internal water near the surface, and the vapor pressure of the water in the surrounding air. Factors affecting the vapor pressures are the temperature, the concentration of dissolved substances, the movement of the water within the tissues and air movement.

Sullivan (1973) indicated that, depending on the temperatures, losses in nutritive value are usually reduced by drying at moderately increased temperatures. However, losses may be increased at higher temperatures, particularly, the digestibility of carbohydrates and protein may be lowered. Slow drying with an optimum temperature of about $37^{0}$ C ($98^{0}$ F) in the sun may cause over 80 percent destruction in carotene, Sullivan (1973). Rapid drying whether by natural or artificial means, quickly inactivates the lipoxidase enzyme and with the absence of sunlight, heat dried forages are, as a rule, much higher in carotene than those dried in the field or dried slowly under cover, Strait (1944) and Sullivan (1973). The carotene content is correlated with the green color (chlorophyll) of the herbage. Hayhoe and Jackson (1974) and Shepherd et al. (1954), reported that rainfall is the most destructive force on the quality of hay and carotene. Water can remove as much as 20 to 40 percent of the dry matter, 30 percent of the phosphorus, 65 percent of the potash, 20 percent of the crude protein and 35 percent of the nitrogen free extract.

Hay of 25 percent moisture will heat spontaneously to about $45^{o}$ C ($113^{o}$ F) and become moldy, mainly with aspergillus glaucus. Wet bales with more than 40 percent water become very hot, 60 to $65^{o}$ C (140 to $149^{o}$ F), and contained a number of thermophillic fungi. The resultant fermentation accounts for the loss of sugars and for the formation of volatile nitrogenous bases which tended to raise the PH. Monroe et al. (1946) indicated that hay with more than 30 percent moisture was not safe for ordinary storage and might heat to yield a charred product lower in digestibility, particularly in protein and with little carotene.

Danilenko and Valigura (1973) reported that artificially dried hay lost hardly any protein and had two or three times as much carotene as the field dried hay. Energy retention from lucerne was 776 kcal/day from field dried and 1.112 kcal/day from artificially dried material. The effective utilization of ME (metabolizable energy) was 47.8 percent and 57.2 percent, respectively. Digestibility of hay dried with warm air was about 83 percent, compared to 79 percent for silage and hay dried on the ground, Kirchgessner and Pallauf (1975). With higher temperature drying, digestibility of protein dropped by about eight percent. Tabular data reported by Genzmer (1976) showed that milk production costs increase with decreasing hay quality.

The greater the variation in velocity the more drying air may be wasted by the uneven emergence of the distorted drying front. During in-storage or mow drying the fan used for this operation should be capable of delivering 260 ℓ/s per Mg (tonne) of hay against static pressures of 25.4 to 50.8 mm of water, ASHRAE (1978). It was also indicated that drying temperatures of $71.5^{0}$ C ($160.7^{0}$ F) are efficient for hay of 45 percent moisture content and 128 $kg/m^3$ of density.

# RESEARCH PROCEDURE

The solar energy intensifier system was designed with a two-sided vertical collector, a parabolic trough reflector and a thermal energy storage (TES) unit. The design of the system emphasized the use of generally available materials. All the materials for the construction of the system were obtained locally with the exception of the plastic and fiberglass used for the collector covers, and the reflective film surface for the reflectors.

The reflector, Figure 1, had a height of 3.62 m (11.86 ft) and was 11.00 m (36 ft) long. It was constructed in three sections, each 3.65 m (12 ft) long, to allow better handling during construction and easier focusing. The frame was 0.15 cm (16 gauge) sheet steel, and the reflective surface consisted of a metalized acrylic film with a pressure type adhesive backing that was applied to the parabolic metal sheet. The reflectivity of the film was 80 to 90 percent for wavelengths of 0.3 to 2.2 millimicrons. The parabolic shape selected for the reflector, when used with the pivot point at the bottom required a 3.50 m (11.5 ft) segment of a 4.57 m (15 ft) parabolic curve. The segment used was that portion from 0.61 m (2 ft) above the directrix to a point 4.11 m (13.5 ft) above the directrix. This provided a focal strip on the collector surface from winter solstice through summer solstice for the Brookings, South Dakota, latitude ($44^{\circ}$ 14'55"). The reflector was elevated to the proper height with wooden posts having concrete base foundations, and additional structural support was provided by 15.24 cm x 15.24 cm (6 in x 6 in) wooden posts.

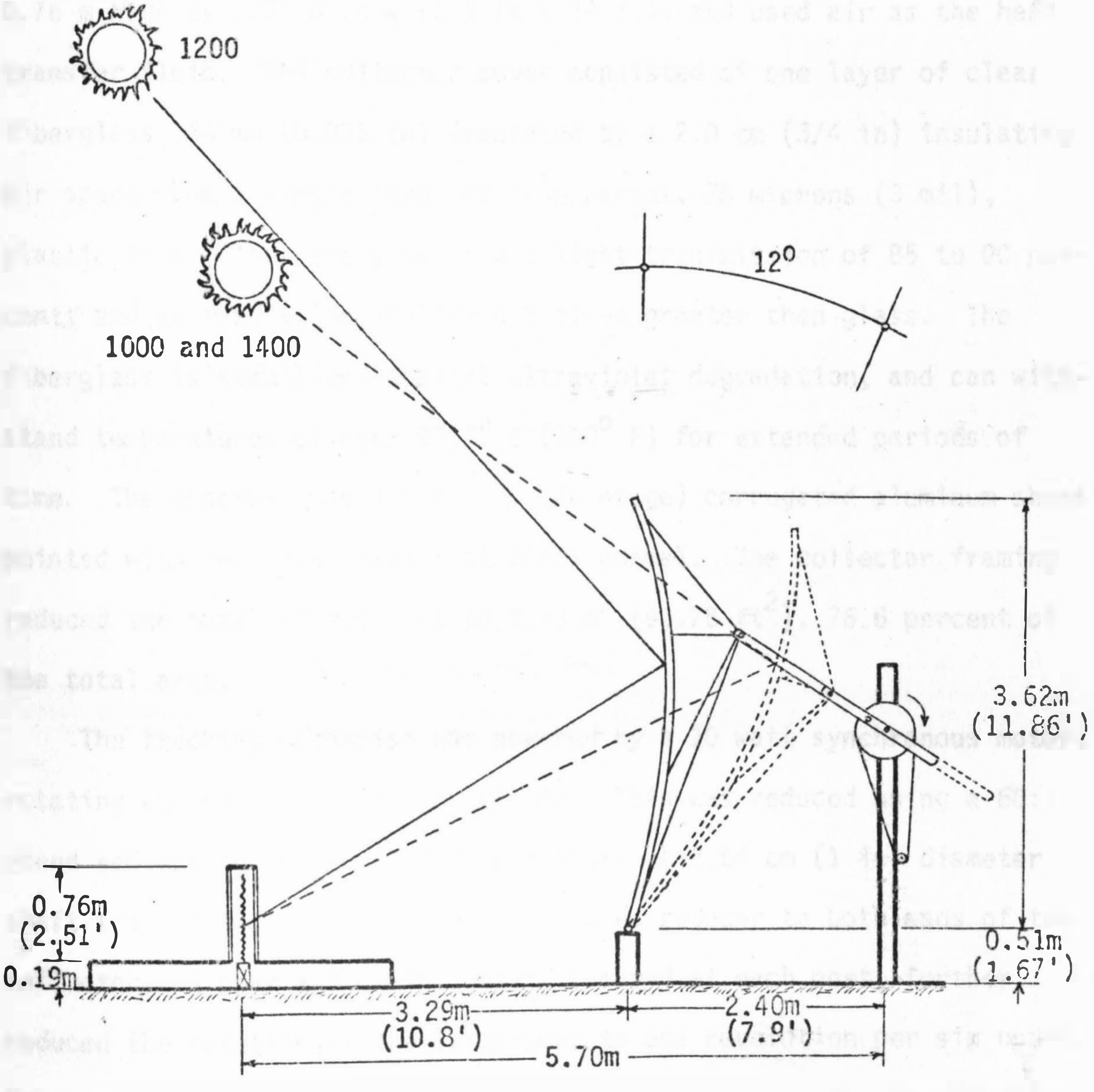

Figure 1. Profile of the solar energy-intensifier system.

The collector, Figure 2, had a nominal outside dimension of 0.76 m high by 7.31 m long (2.5 ft x 24 ft), and used air as the heat transfer fluid. The collector cover consisted of one layer of clear fiberglass .64 mm (0.025 in) separated by a 2.0 cm (3/4 in) insulating air space from a single layer of transparent, 76 microns (3 mil), plastic film. The fiberglass had a light transmission of 85 to 90 percent, and an insulating quality 6.8 times greater than glass. The fiberglass is stabilized against ultraviolet degradation, and can withstand temperatures of over $93.3^{0}$ C ($200^{0}$ F) for extended periods of time. The absorber was a 0.455 mm (26 gauge) corrugated aluminum sheet painted with heat resistant flat black enamel. The collector framing reduced the total usable area to 8.43 $m^2$ (90.75 $ft^2$), 76.6 percent of the total area.

The tracking mechanism was powered by a 10 watt synchronous motor, rotating at one revolution per minute. This was reduced using a 60:1 speed reducer to one revolution per hour. A 2.54 cm (1 in) diameter shaft transmitted the power from the speed reducer to both ends of the reflector. A gear and chain system, located at each post, further reduced the rotation of the large gear to one revolution per six hours. Movement and adjustment of the reflector was accomplished by attaching a shaft from the reflector to a connector on the rim of the large gear, Figure 1.

The plenum, located at the bottom of the collector, was made of 1.27 cm (1/2 in) plywood insulated inside with 2.5 cm (1 in) of polystyrene with an R value of 0.63 $m^{2} \cdot {}^{0}C$/watt (2.57 $h \cdot ft^{2} \cdot {}^{0}F$/BTU). The plenum varied from 15.20 cm (1/2 ft) wide on each side of the collector

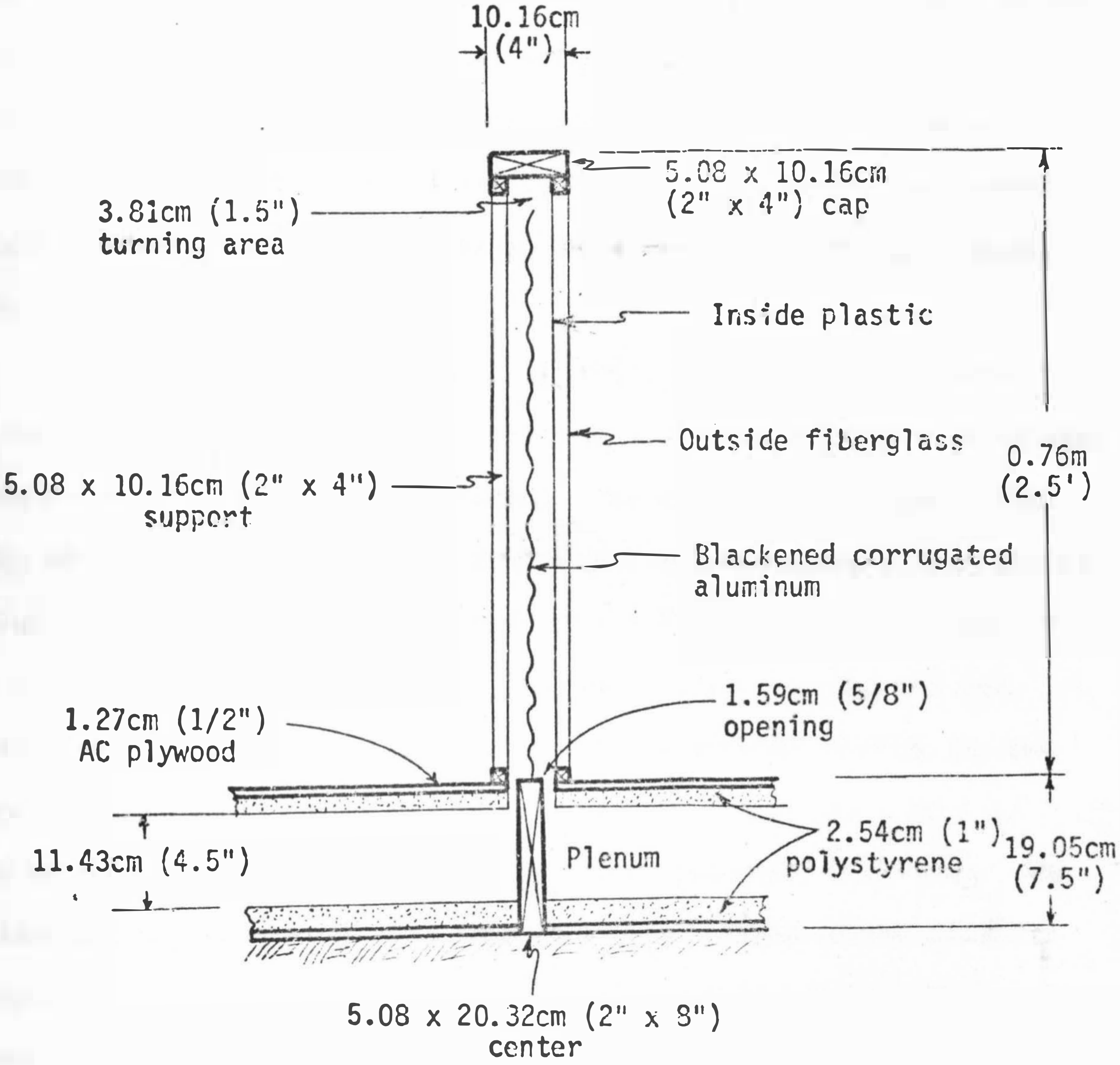

Figure 2. Cross section of the solar collector and plenum.

on the end located furthest from the thermal energy storage to 1.20 m (4 ft) wide on each side of the collector nearest the rock storage unit. This shape was an expansion of the idea used in air conditioning ducts illustrated in ASHRAE (1978), and was used to more evenly distribute air flow over the entire collector surface. The intake and exhaust ends of this plenum chamber were connected to the thermal storage unit. At the exit of the collector a shuttered, sheet metal duct transported air to those bales dried directly with solar heated air.

The thermal energy storage (TES) unit was a rectangular wood-framed structure constructed with 5.0 cm x 10.1 cm (2 in x 4 in) frames and 2.0 cm (3/4 in) plywood covering. The outside dimensions of the box were 1.90 m (6.2 ft) wide, 2.50 m (8.2 ft) long, and 1.21 m (4 ft) high. An angle iron 3.17 cm x 3.17 cm x 9.5 mm (1 1/4 in x 1 1/4 in x 3/8 in) structural support was used horizontally around the box. It was held in place by 3.17 mm (1/8 in) rods extending through the box and located 0.60 m (2 ft) on center along the length and 0.82 m (2.7 ft) on center along the width to provide extra structural stability. The sides and top of the box were insulated with 7.60 cm (3 in) of polystyrene, with an R value of 1.90 $m^2 \cdot {}^oC$/watt (10.70 $h \cdot ft^2 \cdot {}^oF$/BTU). The bottom had approximately the same insulation value as the sides and the top. The insulation on the sides was covered with a layer of masonite to minimize rock damage. The bottom of the box was covered with 36, 20 cm x 20 cm x 40 cm (8 in x 8 in x 16 in) concrete blocks placed on edge with the openings along the length of the box. These blocks were evenly spaced to provide 0.63 $m^2$ (990 sq in) of total void space and were covered with 1.27 cm (1/2 in) wire mesh. The rock box contained approximately 3.05 $m^3$ (4 cubic yards), of rock weighing 1.60 tonnes/$m^3$ (100 lb/$ft^3$). The 3.80 cm (1 1/2 in) diameter rocks were placed on top of the wire mesh and the box was then filled to the lower edge of the top duct.

Air was circulated in three circuits as the heat transfer medium. The first circuit, was from the collector into the rock storage unit (TES) and then out to the 15.24 cm (6 in) in diameter and 4 m (13.1 ft) long sheet metal duct. This circuit moved the air to the bales dried using TES during the daytime operation. The second circuit, operated during the night, with the air circulating from the outside to the bottom of the TES and then toward the top, absorbing heat from the rocks that was released at the TES bales. The third circuit, was from the collector directly to the 15.24 cm (6 in) in diameter and 5 cm (16.4 ft) long sheet metal duct. This circuit moved the air to the bales dried directly with solar heated air from 0090 to 1900 hours in the second drying test, and from 1000 to 2000 hours in the third drying test. The first and second circuits were used during the three drying tests, and the third circuit was used only during the second and third drying tests.

Air flow rates were measured at a point near the bales in the 15.24 cm (6 in) diameter sheet metal ducts. A hot wire anemometer was used to monitor the air velocity upstream of the fans at a point before the air was forced into each bale. A shutter in the sheet metal duct was used to control the air flow. Copper-constantan thermocouples were located at 16 points in the system, Figure 3, and the

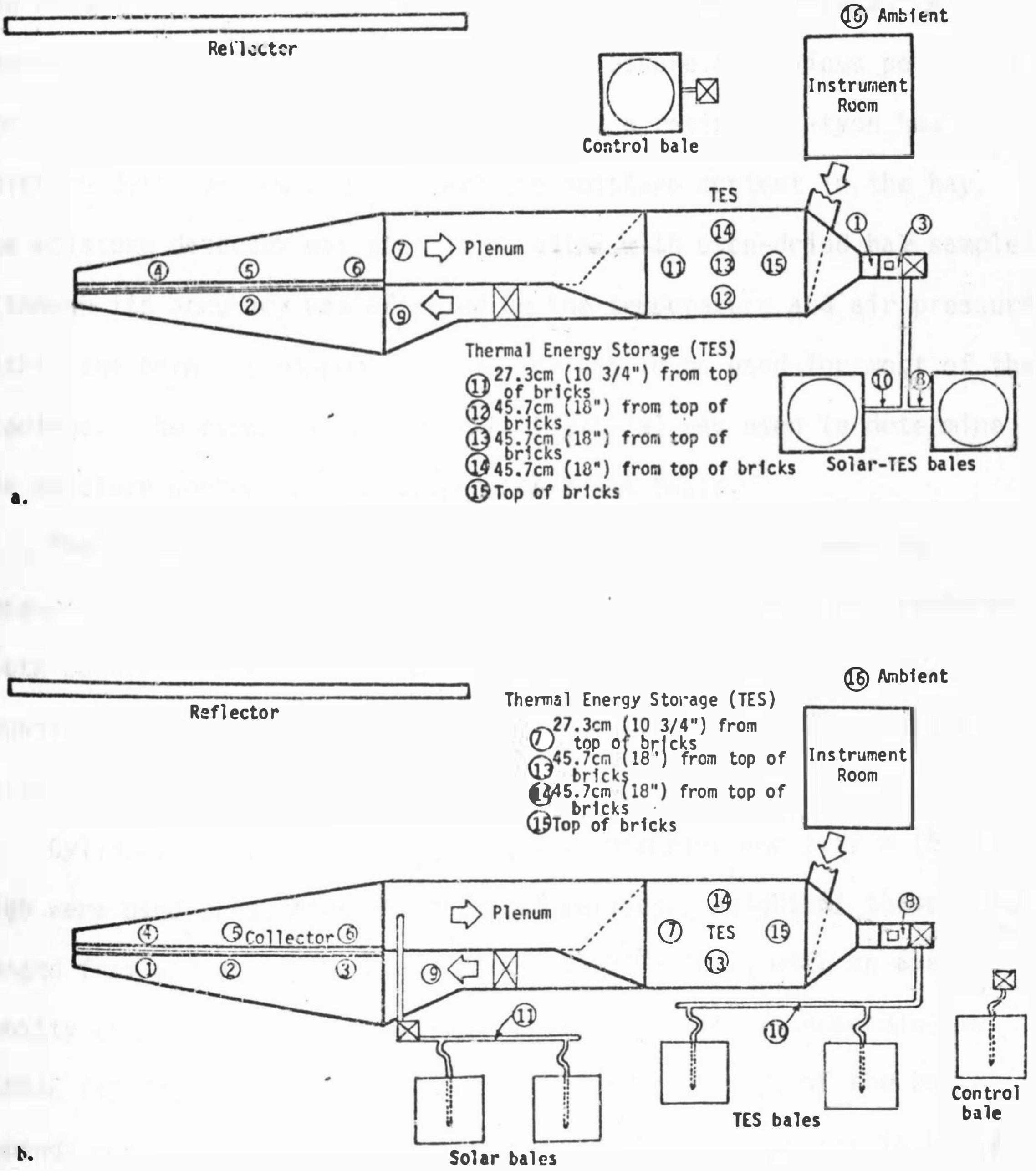

Figure 3. Thermocouple Locations: Drying Test No. 1 (a), August, 1977, and Drying Test No. 2 and 3 (b), June and July to August, 1978

temperatures were recorded on a multi-point, strip chart, potentiometer. The solar radiation was measured using an Epply pyranometer, and was recorded on a strip chart recorder. All efficiency data were based on the amount of solar energy available on a horizontal surface. A manometer was used to record the static pressure at various points in the system. During the third drying test, a resistance-type hay moisture detector was used to test the moisture content in the hay. The moisture detector was used in parallel with oven-dried hay samples, although its accuracy was affected by the temperature and air pressure within the bale. A compensating factor had to be used for most of the readings. The oven-dry method, ASAE (1978-79) was used to determine the moisture content of the samples on a wet basis.

The research was conducted at the Agricultural Engineering Research Farm, approximately 11.3 km (7 miles) southwest of Brookings, South Dakota. Three drying tests were performed; the first from August 5 to 17, 1977, the second from June 21 to 29, 1978, and the third from July 28 to August 8, 1978.

Cylindrical bales 1.68 m (5.5 ft) in diameter and 1.52 m (5 ft) high were used throughout all the test periods. Weight of these bales ranged from 600 kg to 750 kg (1322 lbs to 1653 lbs), with an average density of 200 to 250 kg/m$^3$ (12.50 to 15.77 lbs/ft$^3$). According to ASHRAE (1978), physical properties, including density, of the hay depends mostly on the initial moisture content at which hay is baled. Brome-alfalfa hay, with 50 percent alfalfa by weight was dried during the June, 1978, drying test, and brome-alfalfa with 70 percent alfalfa by weight was dried during the August, 1977, and July and August, 1978, drying tests.

During the first drying test in August, 1977, three cylindrical bales were dried; two with solar heated air, and thermal energy storage supplement (solar-TES bales), to offset the cool hours, and the third bale was dried with ambient air (control bale). Fan operation time for all the bales was from 0800 to 1800 hours. Air flow rates of 10 $m^3$/min (353 cfm) were supplied to each of the bales. Two hay samples were obtained at each of the two levels in the bale. The lower level was located at 1/3 of the distance from the base to the top of the bale and the other at 2/3 the distance from the base to the top of the bale. A view of the hay drying system is shown in Figure 4.

The bales were placed on a perforated 2.43 m x 2.43 m (8 ft x 8 ft) platforms, 17.7 cm (7 in) thick. The perforated area was approximately equal to one third of the cross-sectional area of the bale, Figure 5.

During the second drying test in June, 1978, five cylindrical bales were dried; two with direct solar heated air (solar bales), two with TES supplement (TES bales), and one with ambient air (control bale). A plan view of the facility is illsutrated in Figure 6, and a general view of the hay drying system is shown in Figure 7. Fan operation time for the solar bales was from 0900 to 1900 hours, and the fan operation time for the TES bales and control bale was continuous.

Due to the problems encountered during the first drying test in August, 1977, in trying to force the air uniformly through the bales the drying platforms were replaced with perforated plastic ducts that were located in the center of the bales, Figure 8. These plastic ducts

Figure 4. Large cylindrical bales drying facility: Drying Test No. 1, August, 1977.

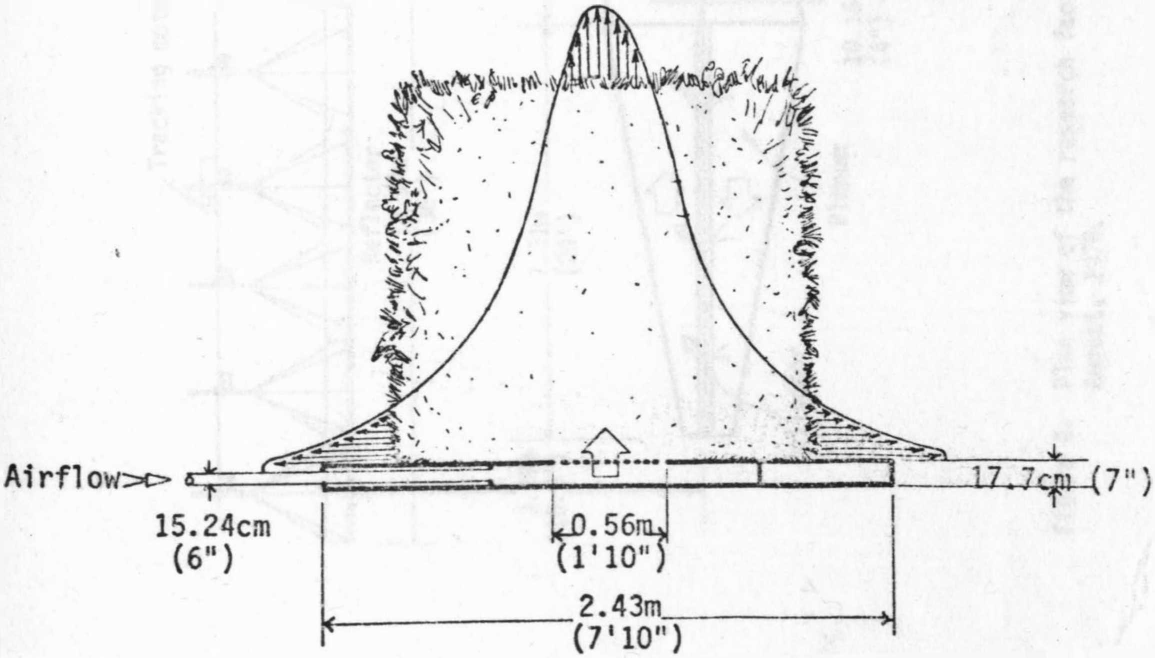

Figure 5. Cylindrical bale, airflow pattern and drying platform: Drying Test No. 1, August, 1977.

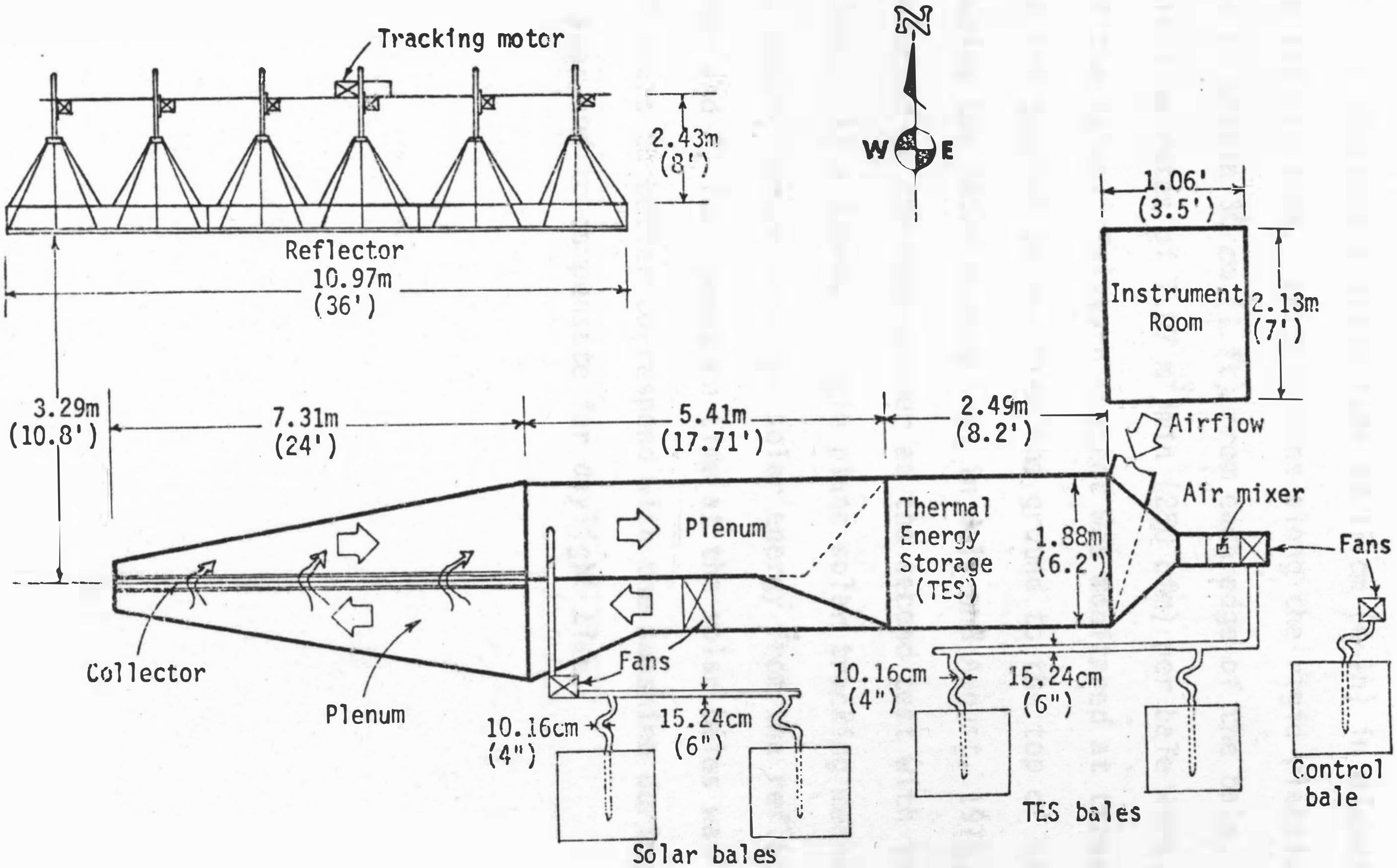

Figure 6. Plan view of the research facility: Drying Test No. 2 and 3, June and July to August, 1978.

were 1.0 m (3.28 ft) long and 7.60 cm (3 in) in diameter and were connected to a flexible plastic tube 10.15 cm (4 in) in diameter and 3.04 cm (10 ft) long. Perforations along the rigid plastic duct were located to within 30 cm (1 ft) from each edge of the bale.

Air flow rates of 7.07 $m^3$/min (250 cfm) per bale were supplied to each of the bales. Moisture content was monitored at three levels; at each of the quarter points from the ground to the top of the bale.

During the third drying test in July and August, 1978, the test was conducted in the same manner as the second test with the following exceptions: 1) a diurnal single plane solar tracking mechanism was used to better concentrate the solar energy from the reflector to the collector and 2) fan operation time at the solar bales was from 1000 to 2000 hours to better correspond with the sunshine during this time of the year and to compensate for daylight time.

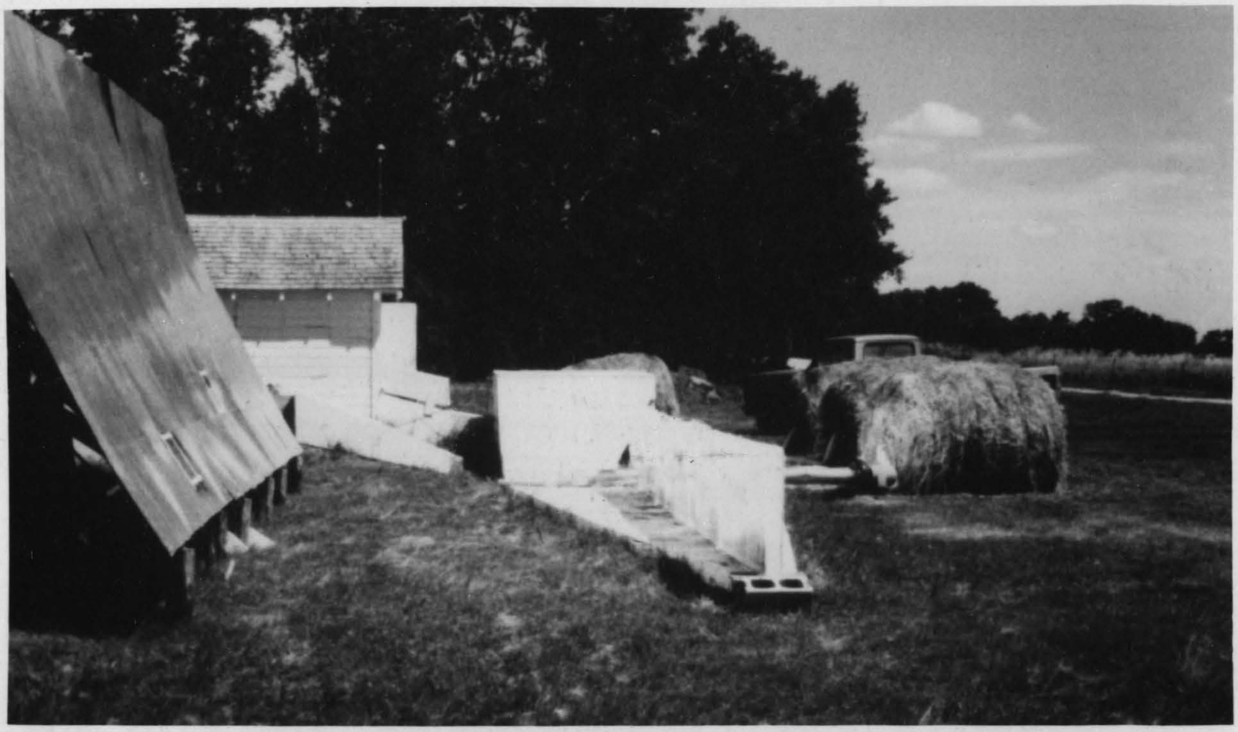

Figure 7. Large cylindrical bales drying facility: Drying Test No. 2, June, 1978, and Drying Test No. 3, July to August, 1978.

Figure 8. Airflow system: Drying Test No. 2, June, 1978, and Drying Test No. 3, July to August, 1978.

# RESULTS AND DISCUSSION

Results of this study include the reflector-collector evaluation, effectiveness of various drying systems and the overall system effectiveness for providing supplemental heat for drying cylindrical bales in a low temperature application. The results will be presented under the following subheadings: Drying Test No. 1; August 5 to 17, 1977, Drying Test No. 2; June 21 to 29, 1978, and Drying test No. 3; July 28 to August 8, 1978. Temperature, solar radiation and moisture content data are listed in Appendixes C and D.

## DRYING TEST NO. 1; AUGUST 5 TO 17, 1977

### Solar System Performance Characteristics

The system efficiency was evaluated in terms of "useful energy collected" compared to the solar energy available on a horizontal surface. The evaluation of the collection efficiency was based on the nominal surface area of the reflector (3.65 m x 12 m, 12 ft x 36 ft), and the total area of the south side of the collector (1.22 m x 7.31 m, 4 ft x 24 ft).

Average hourly efficiencies of the system are presented from 0900 to 1700 hours, Figure 9. The efficiency curve increases from 18.5 percent at 0900 to 47.0 percent at 1700 hours. This trend was due to the thermal storage unit, which absorbed energy during the hottest hours of the day, and released it when the collector's temperature was lower than the temperature in the TES, consequently, the system outlet temperature was higher later in the afternoon.

The average diurnal and nocturnal temperature curves for the

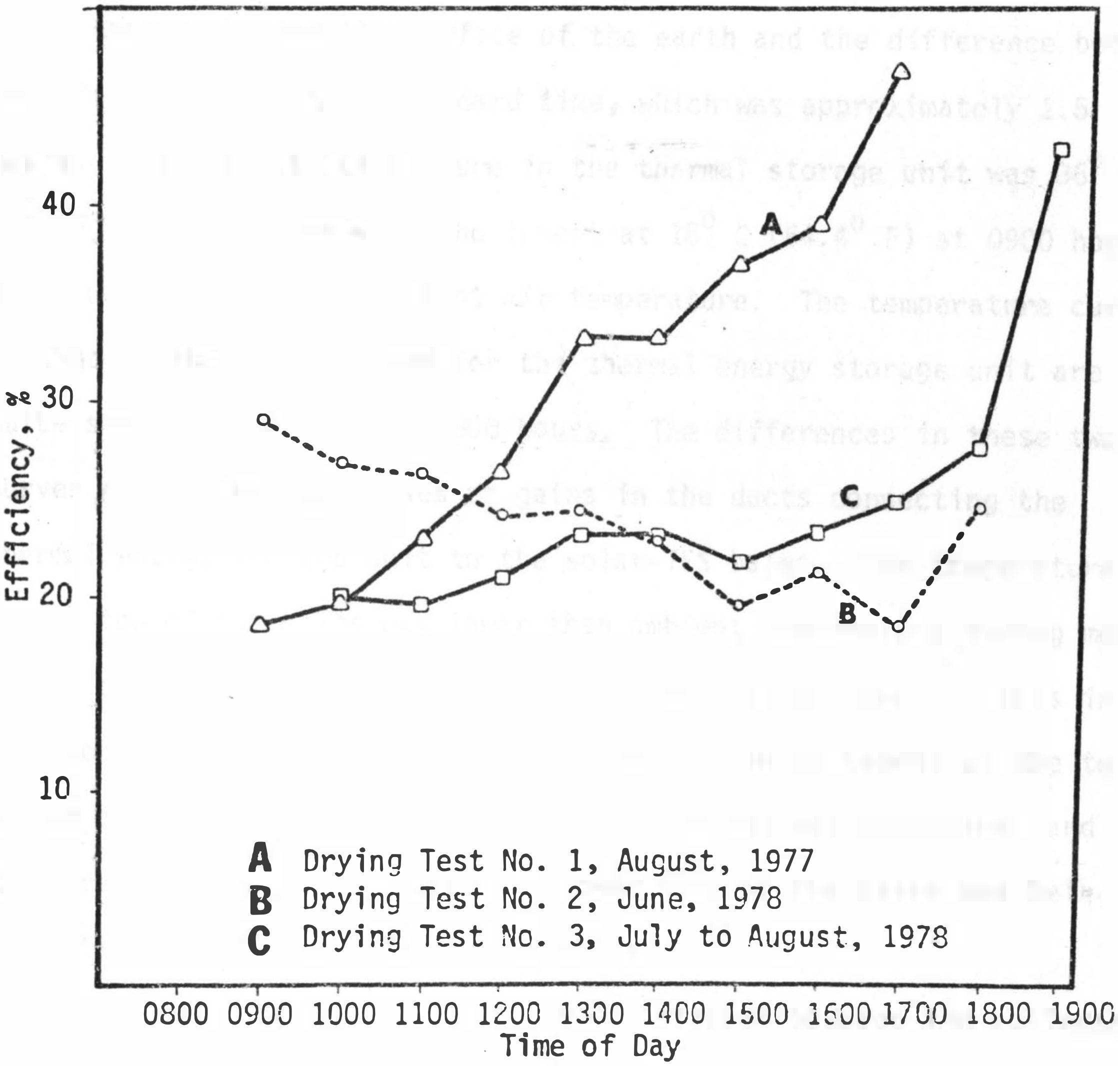

Figure 9. Average system efficiency as influenced by time of day, solar energy on a horizontal surface used as the datum.

collector outlet, air entering the solar-TES bales, thermal storage unit and ambient air are illustrated in Figure 10. The average collector outlet temperature, was the highest, 43° C, (109° F) at 1600 hours. This time corresponded to the highest ambient air temperature, 26° C (79° F), and is a consequence of the atmospheric thermal lag of the sun's energy warming the surface of the earth and the difference between solar time and daylight standard time, which was approximately 1.5 hours. The highest temperature in the thermal storage unit was 36° C (97° F) at 1800 hours with the lowest at 18° C (64.4° F) at 0900 hours, which was equal to the ambient air temperature. The temperature curves for the solar-TES bales and for the thermal energy storage unit are quite similar from 0800 to 1800 hours. The differences in these two curves reflect energy losses or gains in the ducts connecting the thermal energy storage unit to the solar-TES bales. The temperature at the top of the bales was lower than ambient temperature during most of the drying period, especially during the daylight hours. This in addition to high moisture conditions (detectable by touch) at the top of the bales, indicated that evaporative cooling was occurring, and moisture that was removed from the lower part of the bales was being relocated to the middle-top of the bales.

The maximum average temperature differences between the collector outlet and inlet, the inlet and outlet of the thermal energy storage unit and between the air entering the solar-TES bales and the ambient air were 14.4° C (26° F), 12.7° C (23° F) and 6.5° C (11.8° F), respectively, Figure 11. The maximum differences were observed at 1500 hours.

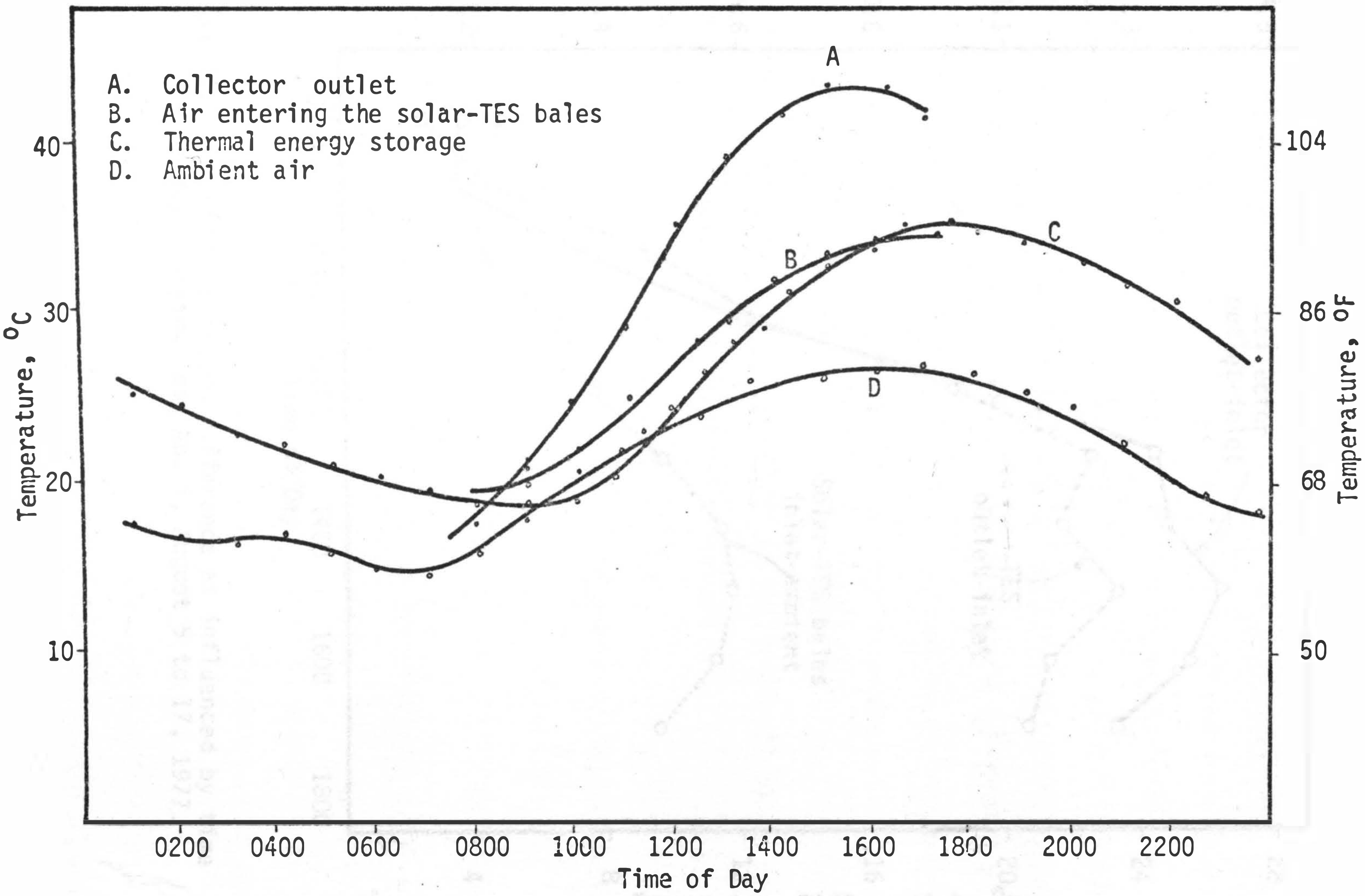

Figure 10. Average temperature of selected points in the system as influenced by time of day: Drying Test No. 1, August 5 to 17, 1977.

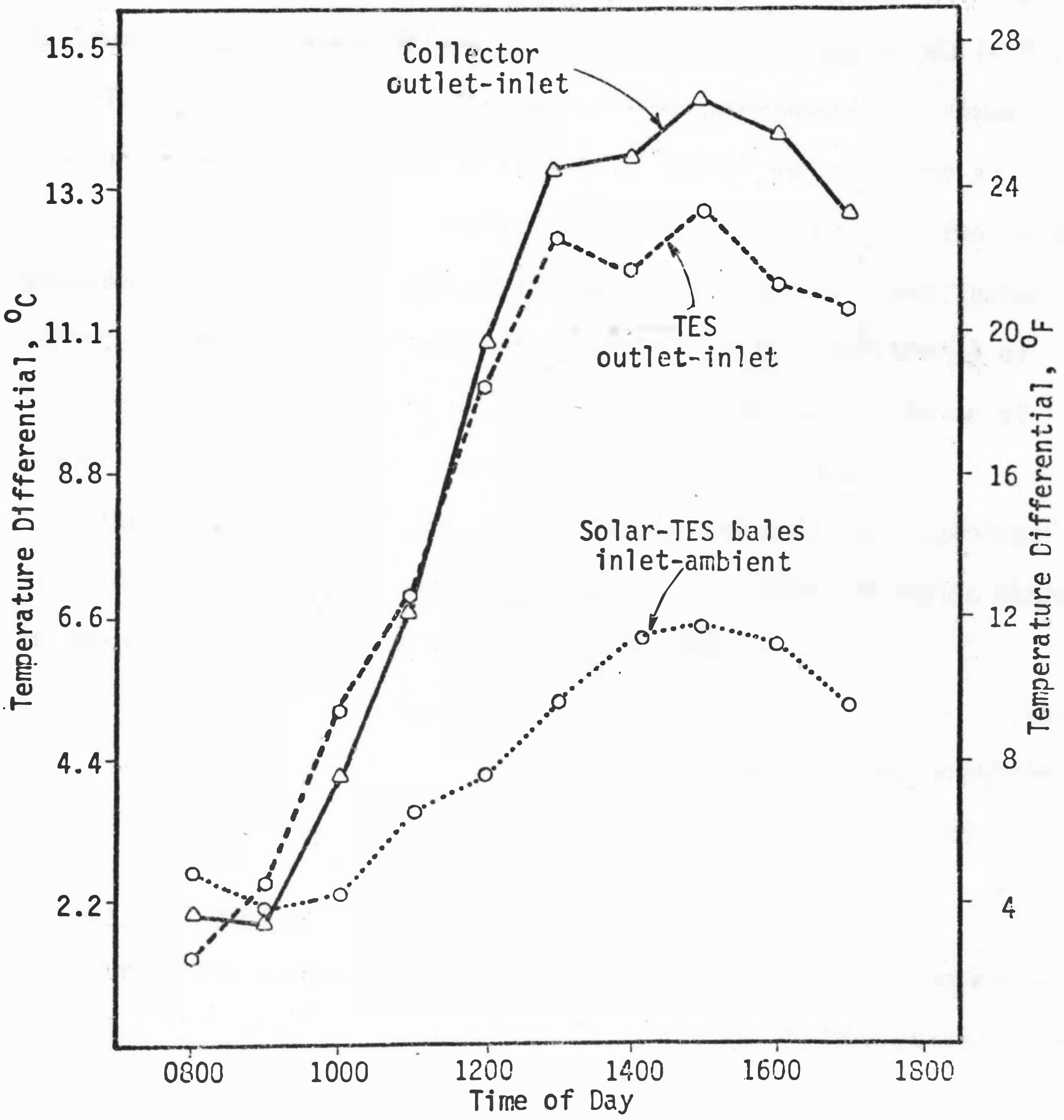

Figure 11. Average temperature difference as influenced by time of day: Drying Test No. 1, August 5 to 17, 1977.

The energy provided to the solar-TES bales and the solar energy available on a horizontal surface are presented in Figure 12. The maximum energy provided to the solar-TES bales averaged 31 MJ (2.9 x $10^4$ BTU's) and occurred at 1500 hours. The corresponding maximum average solar energy was 85 MJ (8.1 x $10^4$ BTU's) and occurred at approximately 1300 hours. During the 12-day drying period, the system provided 31.0 percent of the solar energy available on a horizontal surface to the bales. A total of 2,577.6 MJ (2.44 x $10^6$ BTU's) of solar energy, equivalent to 26.0 gallons of LP gas or 715 Kw-hr of electricity, was collected and used in the drying process.

The following linear and significant relationship was developed to predict the amount of energy provided to the solar-TES bales based on the energy available on a horizontal surface:

$$E_{st} = 2791 + 0.26E_a \qquad \text{(B-1)}$$

The independent variable accounted for 63.6 percent of the variation in the energy released, with a standard error of estimate of 0.018.

## Hay Drying Characteristics

During the 12-day drying period, the average moisture content of the solar-TES bales was reduced from 57.1 percent to 39.8 percent, and the average moisture content of the control bale was reduced from 32.1 percent to 28.4 percent. Tabular data of daily energy and moisture content of the bales are presented in Appendix C-1.

The drying rates for the solar-TES bales and control bale are illustrated at two levels, 1/3 and 2/3 the distance from the base to the top of the bales, Figure 13. The faster drying rates noted in the

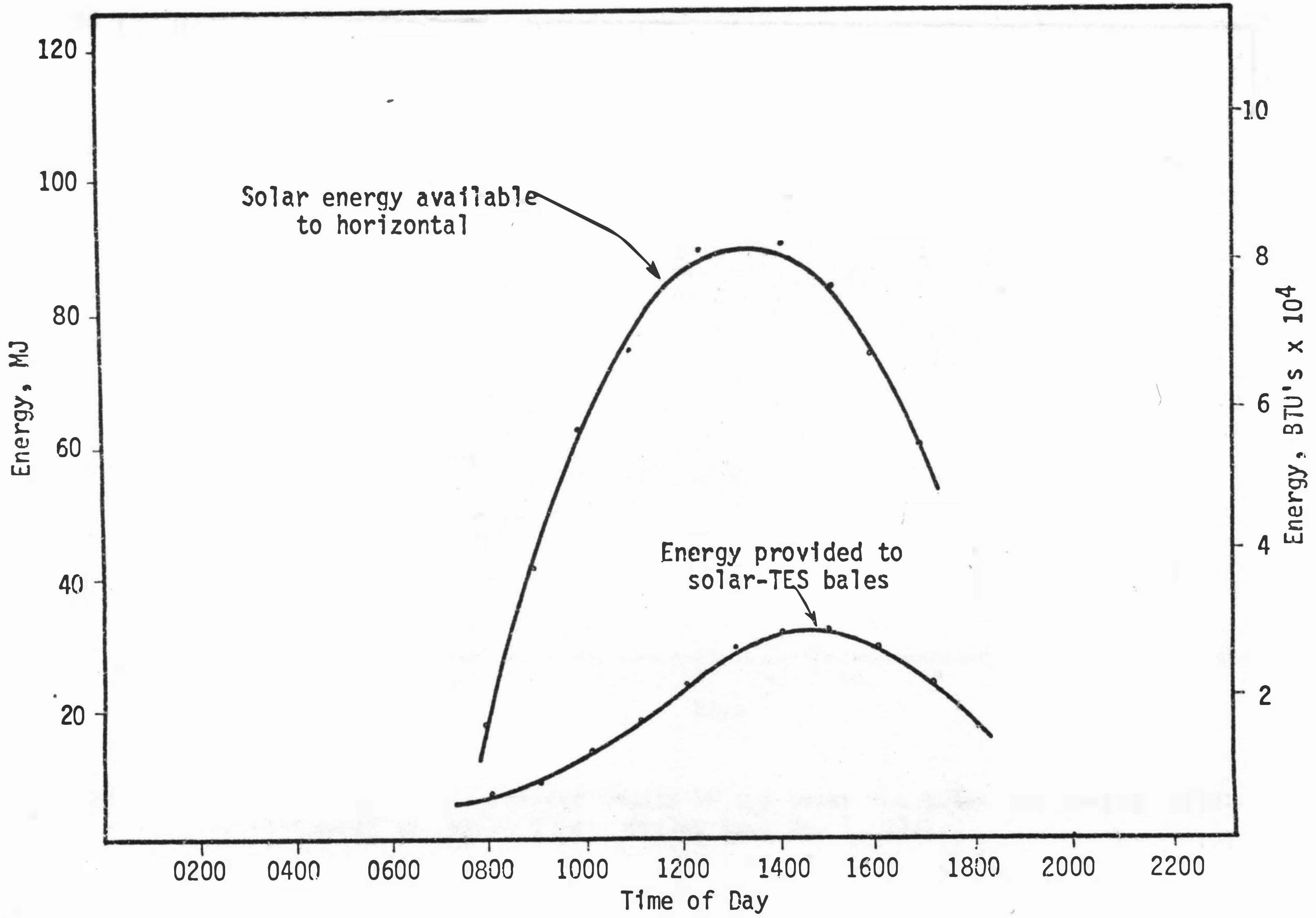

Figure 12. Energy provided to the solar-TES bales and solar energy available as influenced by time of day: Drying Test No. 1, August 5 to 17, 1977 (non-tracking).

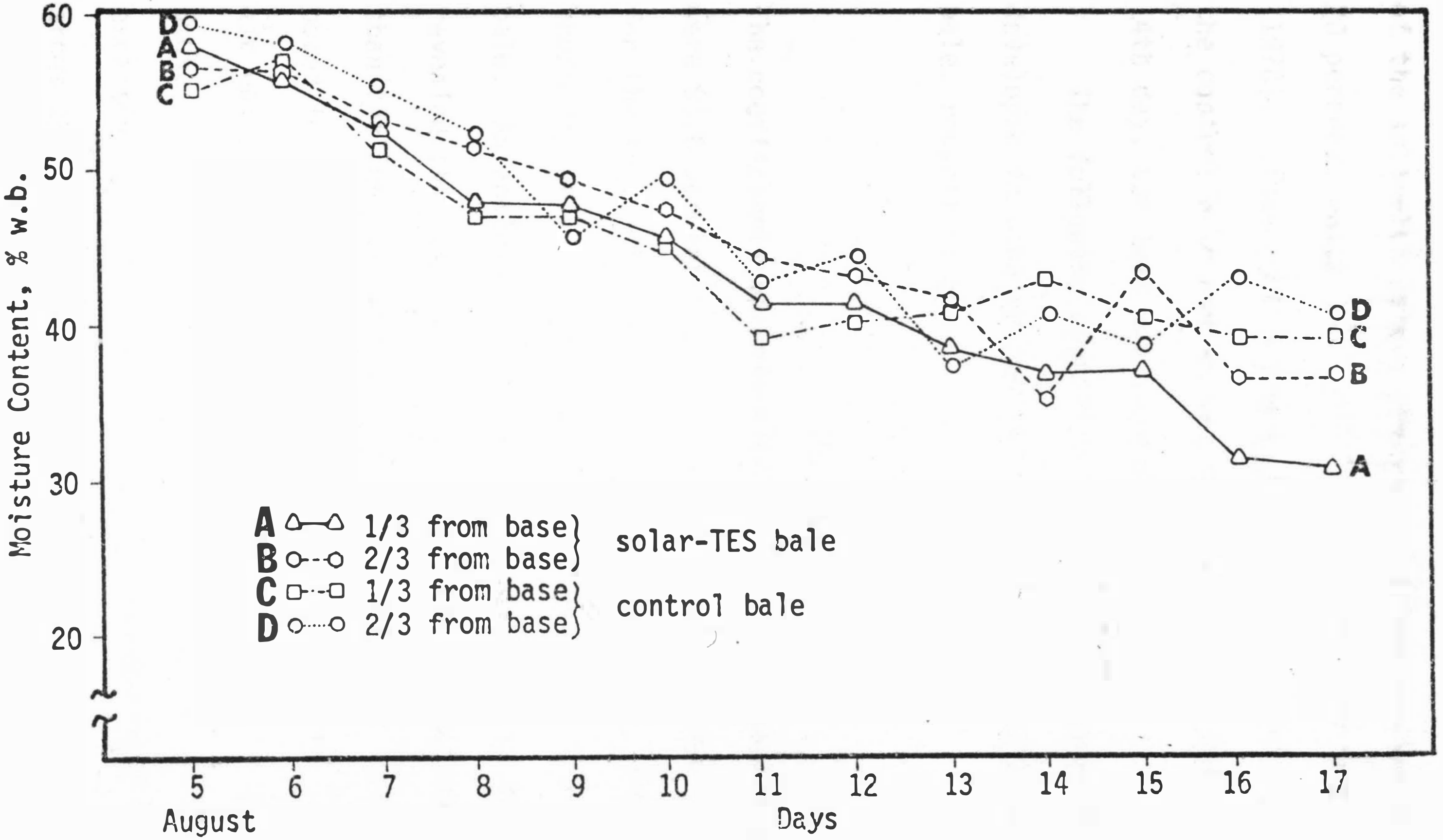

Figure 13. Moisture content at selected levels in the solar-TES bales and control bale, as influenced by drying time: Drying Test No. 1, 1977.

lower portions of the bales coincide with the movement of the drying front. These faster drying rates were more evident in the lower portion of the solar-TES bales. Moisture content in the bales did not reach 20 percent, which is a level considered to be safe for storage, ASHRAE (1978). Since moisture contents remained constant at both levels in the control bale and at the top level in the solar-TES bales after the 14th day, the test was terminated.

The following significant direct and linear relationships were developed for the drying rates for the solar-TES bales and the control bale, respectively:

$$Y_{st} = 57.0 - 2.0X_1 \qquad \text{(B-2)}$$

$$Y_C = 55.0 - 1.5X_1 \qquad \text{(B-3)}$$

The coefficients of determination and the standard errors of estimate were 95.6 percent and 0.13, and 81.2 percent and 0.22, respectively, for the solar-TES bales and the control bale. Figure 14 illustrates these drying rate relationships for the solar-TES bales and control bale. An analysis of variance of the slopes of the above equations revealed that the solar-TES drying rate was not significantly faster than the control drying rate. This may be at least partially attributed to the deficiency of the drying platforms in trying to force the air uniformly through the bales and to leaks in the air flow circuits. Smoke tests indicated that air leakage at the bottom of the bale was excessive and more energy was lost than was used for drying. Figure 5 shows the air flow pattern found across the bales.

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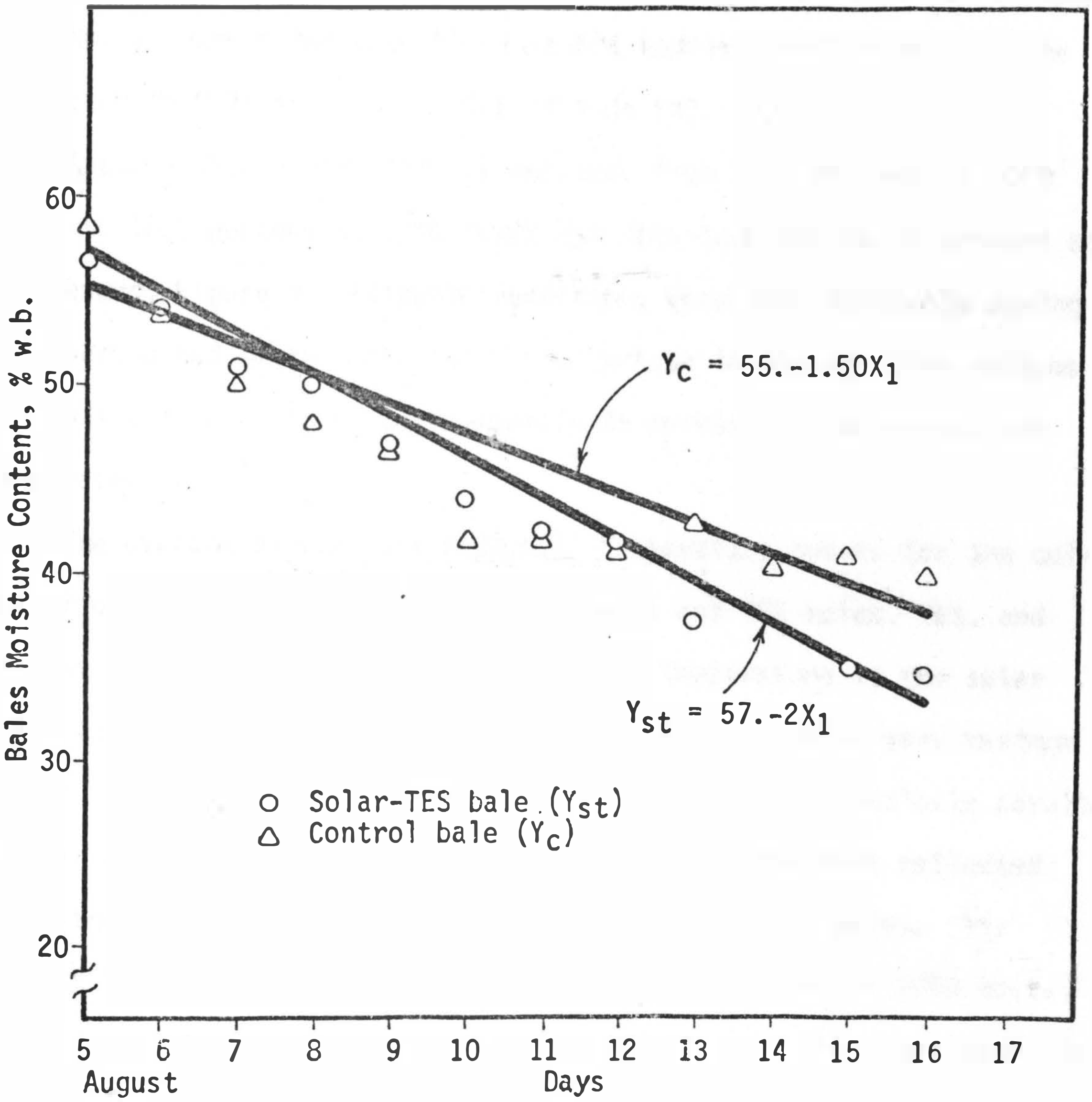

Figure 14. Average moisture content of the bales as influenced by the drying time: Drying Test No. 1, 1977.

## DRYING TEST NO. 2; JUNE 21 TO 29, 1978

### Solar System Performance Characteristics

The system efficiency was evaluated in the same terms as in Drying Test No. 1, except for a decrease in the nominal surface area of the collector to 0.76 m x 7.31 m (2.5 ft x 24 ft).

Average hourly efficiencies decrease from 29.0 percent at 0900 hours to 18.5 percent at 1700 hours and then increase to 25 percent at 1800 hours, Figure 9. Climatic conditions were less favorable during this period and smoke tests indicated leakage in the air flow systems that was estimated to be approximately 25 percent of the normal air flow rate.

The average diurnal and nocturnal temperature curves for the collector outlet, air entering the solar bales and TES bales, TES, and ambient air are illustrated in Figure 15. Temperature at the solar collector outlet and of the air entering the solar bales were maximum at $41^{o}$ C ($107^{o}$ F) at 1300 hours. These curves were essentially parallel and the slight temperature difference was due to the heat collected along the circular metal ducting leading to the solar bales. The highest TES temperature was $35^{o}$ C ($95^{o}$ F) and occurred at 1800 hours, and the lowest was at $24^{o}$ C ($75^{o}$ F) at 0800 hours. The temperature in the TES was higher than the ambient temperatures except from 0800 to 1300 hours, when the rocks were being heated. Average temperature in the TES exceeded ambient temperature by $6^{o}$ C ($10.8^{o}$ F) for most of the day with the exception of that portion of the day when most solar energy was being collected. The temperature of the air entering the TES bales was higher than the TES temperature from 0300 to 1600 hours

## DRYING TEST NO. 2; JUNE 21 TO 29, 1978

### Solar System Performance Characteristics

The system efficiency was evaluated in the same terms as in Drying Test No. 1, except for a decrease in the nominal surface area of the collector to 0.76 m x 7.31 m (2.5 ft x 24 ft).

Average hourly efficiencies decrease from 29.0 percent at 0900 hours to 18.5 percent at 1700 hours and then increase to 25 percent at 1800 hours, Figure 9. Climatic conditions were less favorable during this period and smoke tests indicated leakage in the air flow systems that was estimated to be approximately 25 percent of the normal air flow rate.

The average diurnal and nocturnal temperature curves for the collector outlet, air entering the solar bales and TES bales, TES, and ambient air are illustrated in Figure 15. Temperature at the solar collector outlet and of the air entering the solar bales were maximum at 41$^{o}$ C (107$^{o}$ F) at 1300 hours. These curves were essentially parallel and the slight temperature difference was due to the heat collected along the circular metal ducting leading to the solar bales. The highest TES temperature was 35$^{o}$ C (95$^{o}$ F) and occurred at 1800 hours, and the lowest was at 24$^{o}$ C (75$^{o}$ F) at 0800 hours. The temperature in the TES was higher than the ambient temperatures except from 0800 to 1300 hours, when the rocks were being heated. Average temperature in the TES exceeded ambient temperature by 6$^{o}$ C (10.8$^{o}$ F) for most of the day with the exception of that portion of the day when most solar energy was being collected. The temperature of the air entering the TES bales was higher than the TES temperature from 0300 to 1600 hours

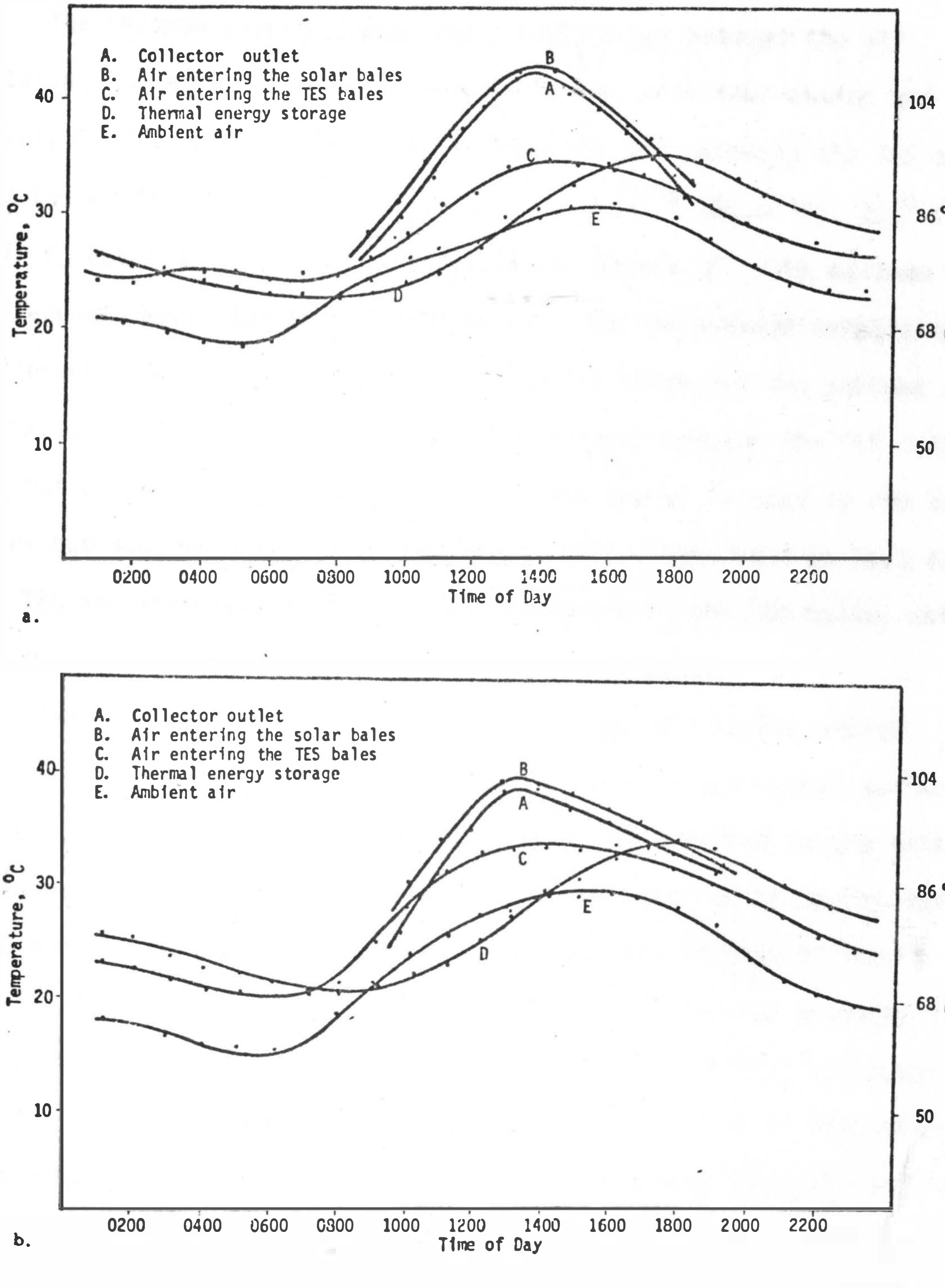

Figure 15. Average temperature at selected points in the system as influenced by time of day: Drying Test No. 2 (a), June, 1978, and Drying Test No. 3 (b), July to August, 1978.

due to the energy gain from the solar collector and the heat absorbed by the metal ducting leading from the TES to the bales.

The maximum average temperature differences between the air entering the solar bales and the ambient air, collector outlet and inlet, TES outlet and inlet, and between the air entering the TES bales and the ambient air were $13^{0}$ C ($23.5^{0}$ F), $11.4^{0}$ C ($20.5^{0}$ F), $9.5^{0}$ C ($17^{0}$ F) and $5.3^{0}$ C ($9.5^{0}$ F), respectively, Figure 16. The maximum differences were observed at 1300 hours. The low average temperature differences between the air entering the TES bales and the ambient air compared to the average temperature differences between the TES inlet and outlet is explained in that not all the energy is used to dry the bales but some is retained by the rocks. Also, some heat is lost from the TES and from the airflow circuit connected to the TES bales, which reduces the amount of energy provided to these bales.

The energy provided to the solar bales and TES bales, energy stored by the TES, and solar energy available on a horizontal surface are presented in Figure 17. The maximum energy provided to the solar bales averaged 14.5 MJ ($1.37 \times 10^{4}$ BTU's) and occurred at approximately 1300 hours. The energy stored in the TES was the highest at 7.5 MJ ($.67 \times 10^{4}$ BTU's) and occurred at 1400 hours. The energy provided to the TES bales was the highest at 4.5 MJ ($0.43 \times 10^{6}$ BTU's) and occurred at 1300 hours, and the lowest 2.0 MJ ($0.19 \times 10^{4}$ BTU's) at 0800 hours. During the night, from 2000 to 0500 hours, the energy provided to the TES bales averaged 3.5 MJ ($0.33 \times 10^{4}$ BTU's). The maximum average solar energy was 110 MJ ($10.4 \times 10^{4}$ BTU's) and occurred at approximately 1400 hours. The difference in the energy levels of the energy

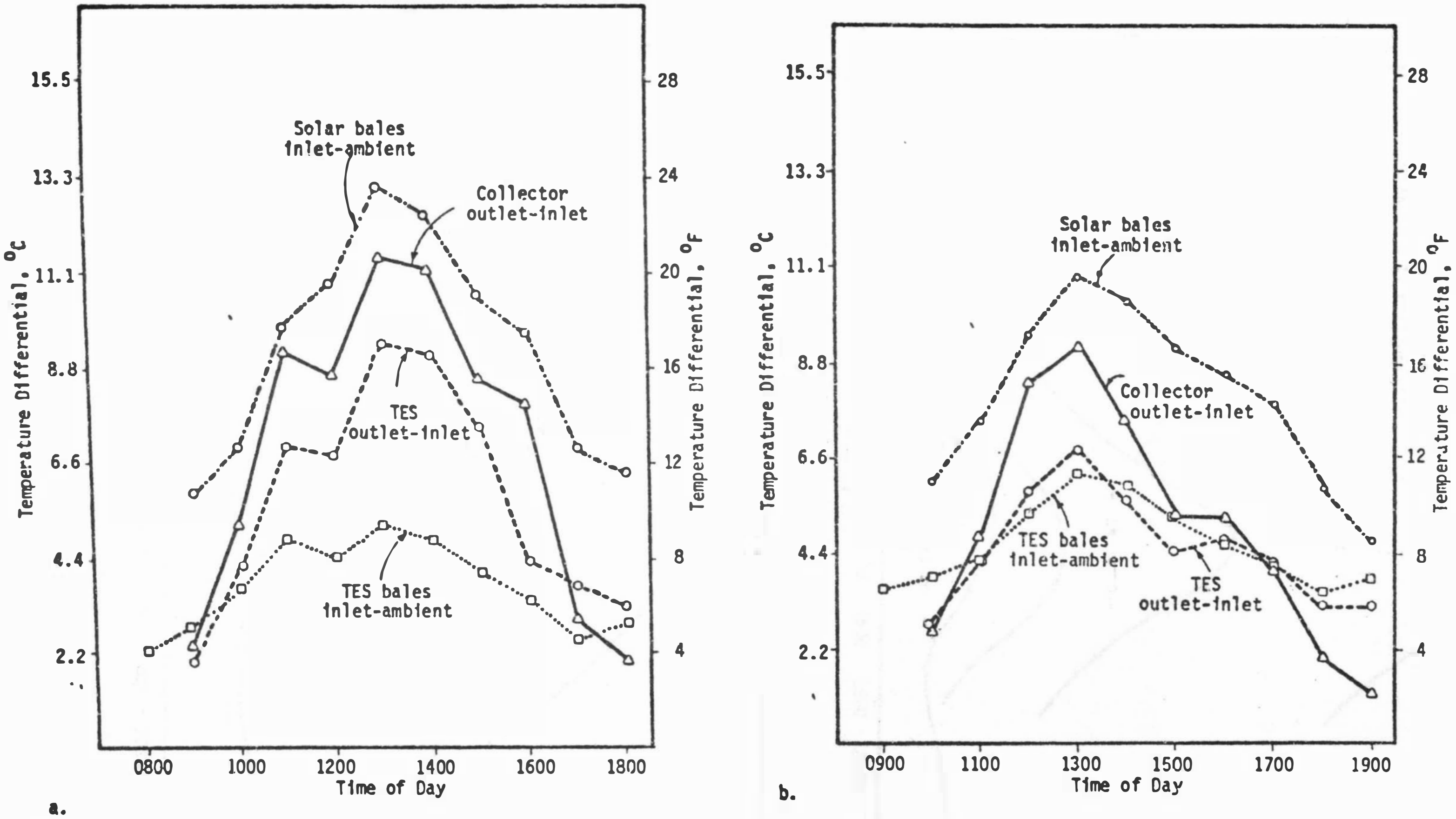

Figure 16. Average temperature difference as influenced by time of day: Drying Test No. 2 (a), June, 1978, and Drying Test No. 3 (b), July to August, 1978.

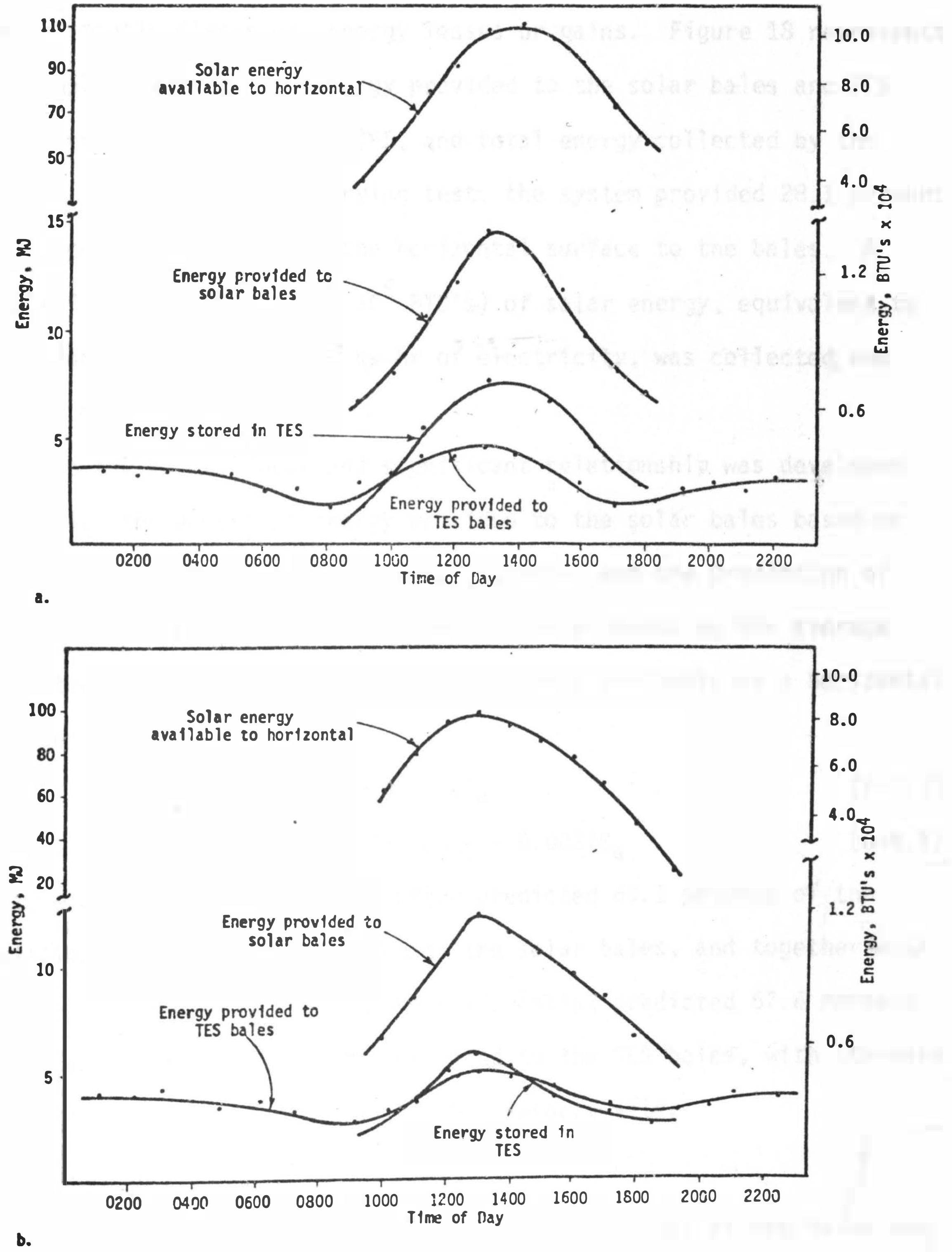

Figure 17. Energy at selected points in the system and solar energy available as influenced by time of day: Drying Test No. 2 (a), June, 1978, and Drying Test No. 3 (b), July to August, 1978.

stored in the TES and the energy provided to the TES bales is due to the previously discussed, energy losses or gains. Figure 18 represents the cumulative totals of energy provided to the solar bales and TES bales, energy stored by the TES, and total energy collected by the system. During the 9-day drying test, the system provided 28.1 percent of the energy available on the horizontal surface to the bales. A total of 1,792.8 MJ (1.69 x $10^6$ BTU's) of solar energy, equivalent to 18 gallons of LP gas or 498 Kw-hr of electricity, was collected and used in the drying process.

The following linear and significant relationship was developed to predict the amount of energy provided to the solar bales based on the energy available on a horizontal surface, and the prediction of the amount of energy provided to the TES bales based on the average collector temperature differential and energy available on a horizontal surface:

$$E_s = 810 + 0.11E_a \qquad \text{(B-7.1)}$$

$$E_t = 425 + 620X_2 - 0.0027E_a \qquad \text{(B-8.1)}$$

Solar energy on a horizontal surface predicted 69.1 percent of the variation in the energy provided to the solar bales, and together with the average collector temperature differential predicted 67.6 percent of the variation in the energy provided to the TES bales, with standard errors of estimate of 0.009 and 47.05, respectively.

## Hay Drying Characteristics

During the 9-day drying period, moisture removal at the bales was the following: 38.8 percent to 21.3 percent at the solar bales, 30.9 percent to 23.1 percent at the TES bales and 26.6 percent to 24.5 percent

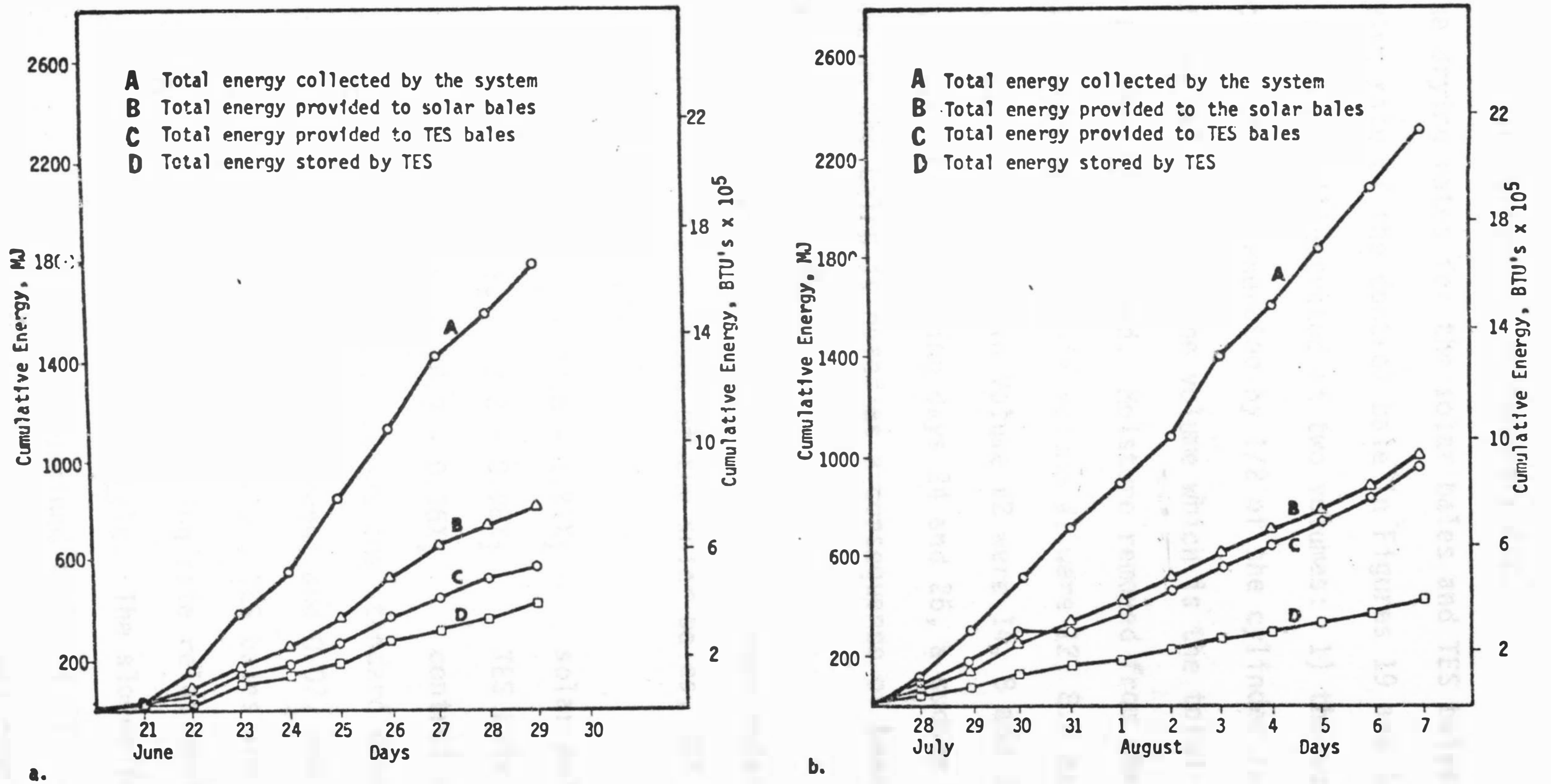

Figure 18. Cumulative totals of energy provided to the bales, stored in the TES and total energy collected by the system: Drying Test No. 2 (a), and Drying Test No. 3 (b), 1978.

at the control bale. Tabular data of daily energy and moisture content of the bales are presented in Appendix C-2.

The drying rates for the solar bales and TES bales are compared to the drying rate of the control bale in Figures 19 and 20. These drying rates are illustrated at two volumes: 1) the volume enclosed by displacing the area generated by 1/2 of the cylinder radius along the axis of the bale, and 2) the volume which is the total volume minus the volume previously mentioned. Moisture removed from the solar bales, TES bales and control bale in Volume #1 were 12, 8.2 and 0.5 percentage points, respectively, and in Volume #2 were 14, 8 and 3.5 percentage points, respectively. During days 24 and 26, a sudden increase of the moisture in the bales is noted as a consequence of heavy rainfall recorded during those days.

The following significant, direct and linear relationships were developed for the drying rates of the solar bales, TES bales and control bale, respectively:

$Y_s = 32.6 - 1.21X_1$ solar bale (B-4.1)

$Y_t = 32.2 - 0.98X_1$ TES bale (B-5.1)

$Y_c = 28.7 - 0.36X_1$ control bale (B-6.1)

The coefficients of determination and the standard errors of estimate were 81.0 percent and 0.22, 96.9 percent and 0.07, and 36 percent and 0.18, respectively, for the solar bales, TES bales and control bale.

Figure 21 illustrates these drying rate relationships for the solar bales, TES bales and control bale. The slopes for the bales in the same order as above were determined to be -1.21, -0.98 and -0.36 percent w.b., per day, respectively. Thus it was concluded that the

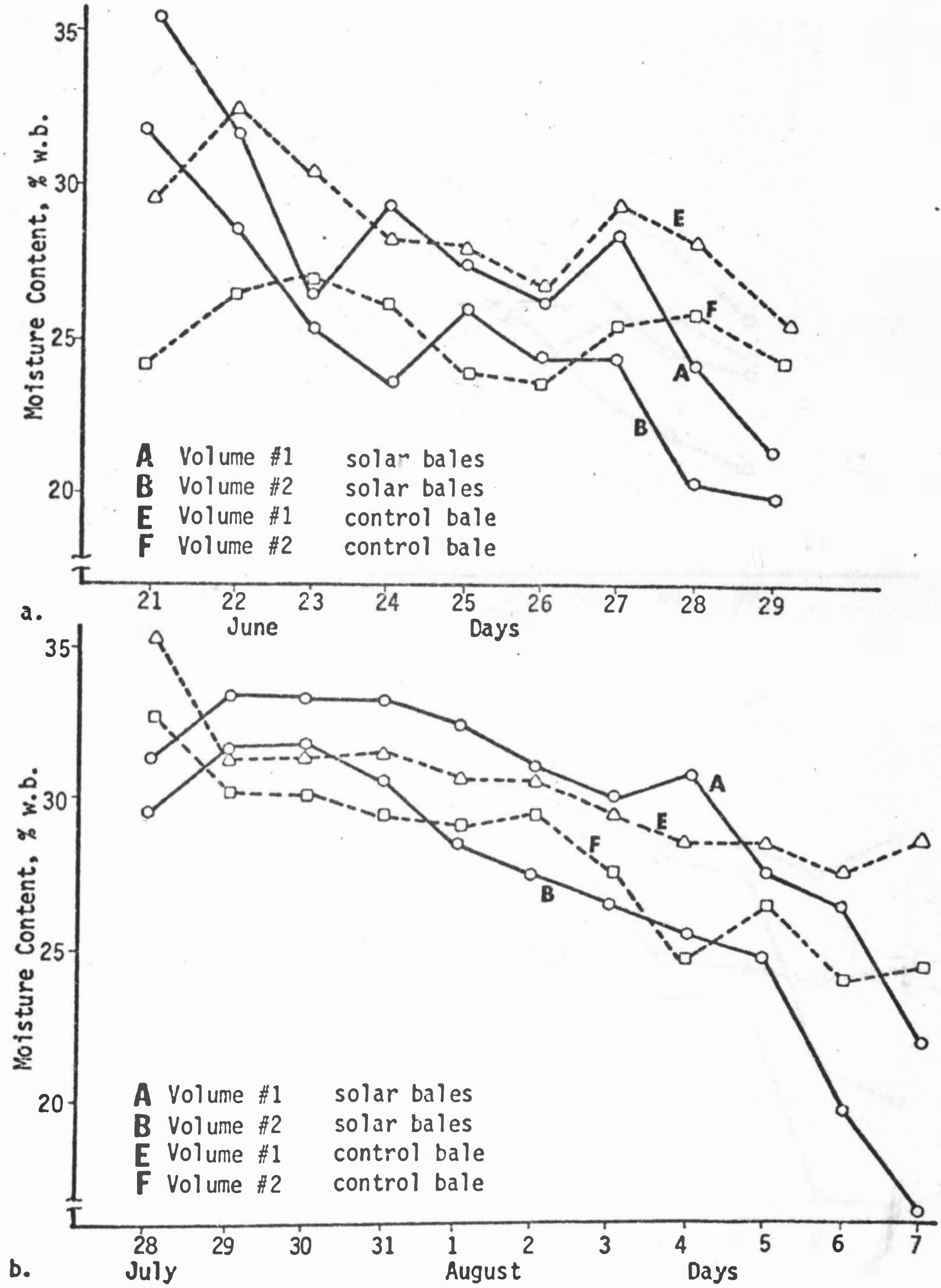

Figure 19. Solar bales moisture content compared to the moisture content of the control bale in Volumes #1 and #2: Drying test No. 2 (a), and Drying Test No. 3 (b), 1978.

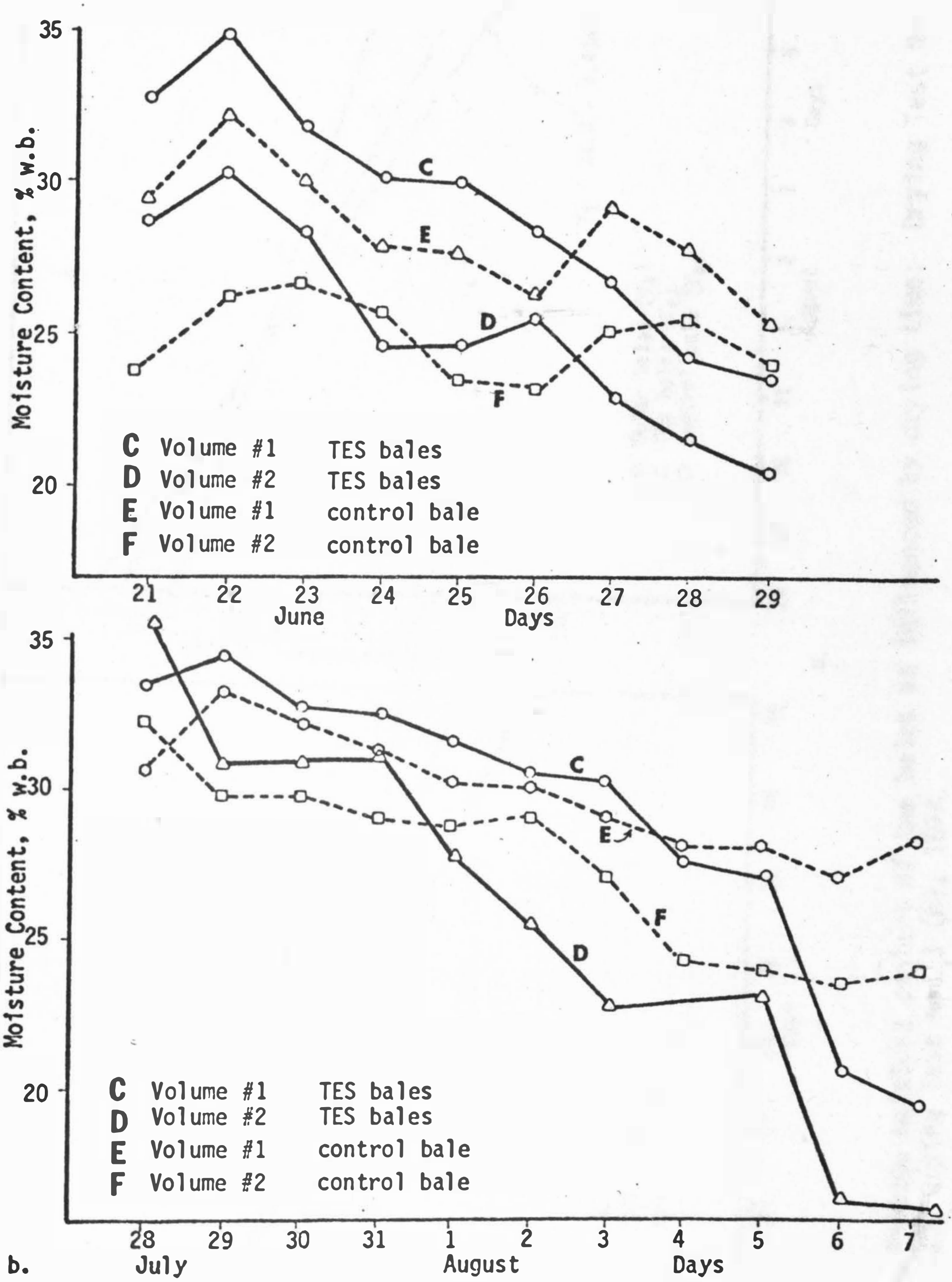

Figure 20. TES bales moisture content compared to the moisture content of the control bale in Volumes #1 and #2: Drying Test No. 2 (a), and Drying Test No. 3 (b), 1978.

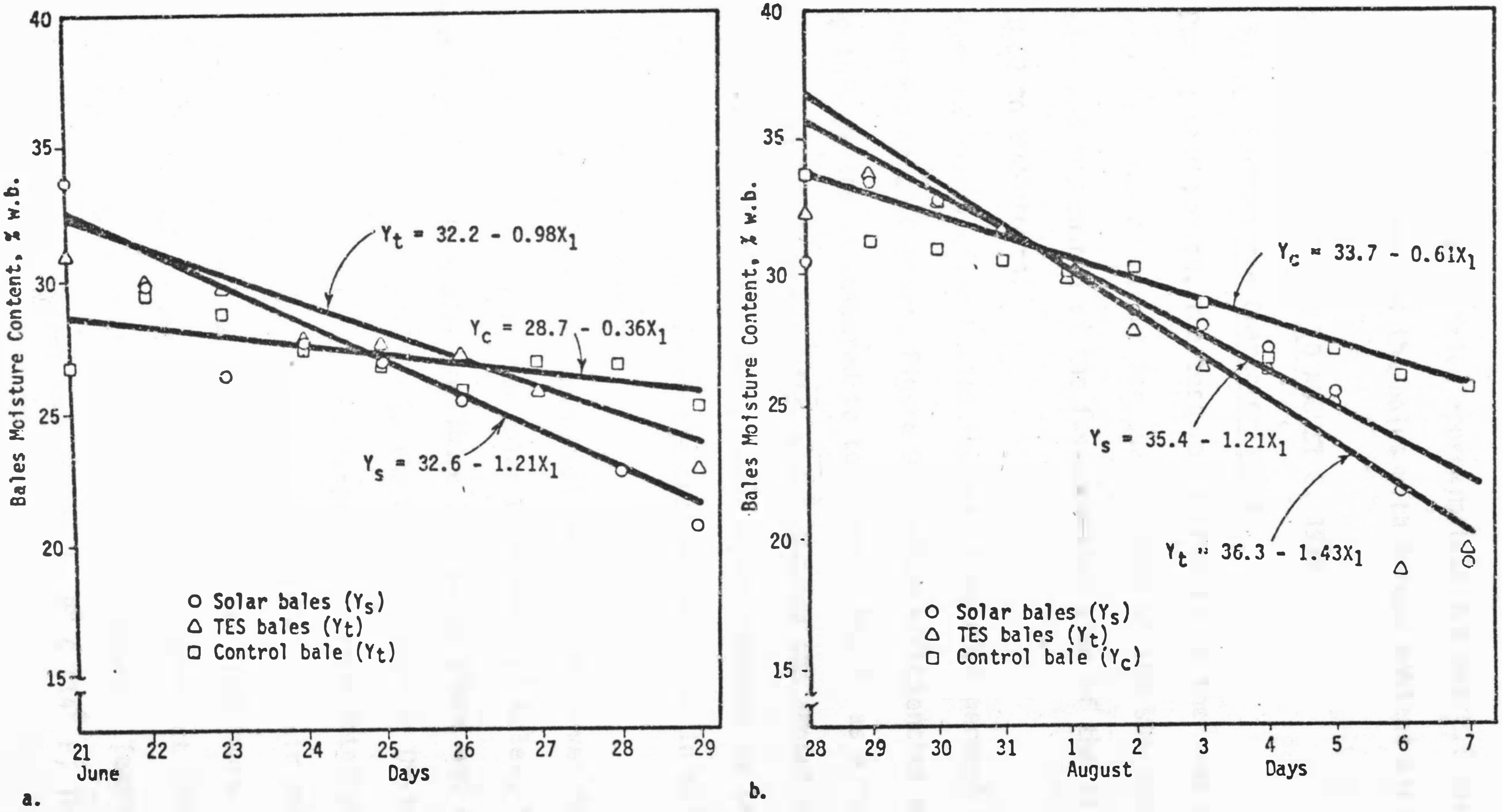

Figure 21. Average moisture content of the bales as influenced by drying time: Drying Test No. 2 (a), and Drying Test No. 3 (b), 1978.

solar bales and TES bales dried approximately 3.5 and 2.5 times as fast, respectively, as did the bales with forced ambient air.

## DRYING TEST NO. 3; JULY 28 TO AUGUST 8, 1978

### Solar System Performance Characteristics

During this period, the test was conducted in the same manner as in Drying Test No. 2, except for the addition of the sun-tracking mechanism and the change of the fan operation time of the solar bales from 1000 to 2000 hours.

Average hourly efficiencies increase from 20.0 percent at 1000 to 43.0 percent at 1900 hours, Figure 9. Better efficiencies were noted during this period as compared to test period No. 2, as a result of repairs in the air flow circuits, which reduced the amount of heat being lost, and lower efficiencies were noted compared to test period No. 1, due to the difference in the system conditions in which the last two tests were performed.

The average diurnal and nocturnal temperature curves for the collector outlet, air entering the solar bales and TES bales, TES, and ambient air are illustrated in Figure 15. Curve shape and distribution during this period are similar to the ones obtained in Drying Test No. 2, except that slightly lower temperatures were obtained. Temperature of the solar collector outlet and of the air entering the solar bales were maximum at 39.0° C (102° F) at 1300 hours. The highest TES temperature was 34°C(93° F) and occurred at 1800 hours, and the lowest was at 20.5° C (69° F) at 0800 hours. Temperature in the TES exceeded the ambient temperature by 8° C (14° F) for most of the day with the exception being that portion of the day when most solar energy was being collected. Temperature of the air entering the TES bales was the highest at $34^{\circ}$ C ($93^{\circ}$ F) at 1400 hours and the lowest at $20^{\circ}$ C ($68^{\circ}$ F) at 0600 hours. The reason for the differences in the temperature curves is the same as was presented in Drying Test No. 2.

The maximum average temperature differences between the air entering the solar bales and the ambient, collector outlet and inlet, TES outlet and inlet, and between the air entering the TES bales and the ambient air were $10.8^{\circ}$ C ($19.5^{\circ}$ F), $9.2^{\circ}$ C ($16.5^{\circ}$ F), $6.8^{\circ}$ C ($12.3^{\circ}$ F) and $6.2^{\circ}$ C ($11.2^{\circ}$ F), respectively, Figure 16. The maximum differences were observed at 1300 hours. The temperature differential curves for this period were lower than the ones obtained in Drying Test No. 2 except for the temperature difference curve of the air entering the TES bales and ambient air, which is explained as a probable consequence of less heat being lost along the air flow circuit leading to the TES bales.

The energy provided to the solar bales and TES bales, energy stored by the TES, and solar energy available on a horizontal surface are presented in Figure 17. The maximum energy provided to the solar bales averaged 12.5 MJ ($1.18 \times 10^{4}$ BTU's) and occurred at approximately 1300 hours. The energy stored by the TES was the highest at 6 MJ ($0.56 \times 10^{4}$ BTU's) and occurred at 1300 hours, and the energy provided to the TES bales was the highest at 5 MJ ($.47 \times 10^{4}$ BTU's) occurring at approximately the same time. During the night, from 2000 to 0500 hours, the energy provided to the TES bales averaged 4 MJ (0.38 x

$10^4$ BTU's). The corresponding maximum average solar energy was 100 MJ ($9.48 \times 10^4$ BTU's) and occurred at 1300 hours. The energy curves during this period were lower than the ones in Drying Test No. 2, except for the energy curve at the TES bales that was slightly higher. This may be attributed to what was previously discussed, less leakage in the TES unit and in the air flow circuit conducting to these bales. Figure 18 represents the cumulative totals of energy provided to the solar bales and TES bales, energy stored by the TES, and total energy collected by the system. During the 11-day drying test, the system provided 30.3 percent of the energy available on a horizontal surface to the bales. A total of 2,378 MJ ($2.25 \times 10^6$ BTU's) of solar energy, equivalent to 24.6 gallons of LP gas or 660 Kw-hr of electricity, was collected and used in the drying process.

The following linear and significant relationship were developed to predict the amount of energy provided to the solar bales based on the energy available on a horizontal surface, and the prediction of the amount of energy provided to the TES bales based on the average collector temperature differential and energy available on a horizontal surface:

$$E_s = 2771 + 0.8E_a \qquad \text{(B-7.2)}$$

$$E_t = 849 + 377X_2 - 0.01E_a \qquad \text{(B-8.2)}$$

The solar energy on a horizontal surface predicted 54 percent of the variation in the energy provided to the solar bales, and together with the average collector temperature differential 62 percent of the variation in the energy provided to the TES bales, with standard errors of estimate of 0.007 and 43.4, respectively. Equations that could explain more of the variation in energy provided by the system, could only be developed at the expense of containing many independent parameters, which could not be justified for practical use. In addition, these equations could only be developed by using groups of data within each data set, and not with the entire set of parameters.

Considering the solar insolation normally available to a horizontal surface from 0900 to 1900 hours on July 21 at Brookings, South Dakota, of 5817 watts/m$^2$ (1842 BTU's/ft$^2$), it is predicted that 483 watts/m$^2$ (152.6 BTU/ft$^2$) of energy will be provided by the system, which is approximately 0.64 gallons of LP gas per metric tonne of hay or 17.31 Kw-hr per metric tonne of hay.

## Hay Drying Characteristics

During the 11-day drying period moisture removal from the bales was the following: 30.4 percent to 19.2 percent from the solar bales was 32.1 percent to 19.9 percent from the TES bales and 33.9 percent to 26.5 percent from the control bale. Tabular data and daily energy and moisture content of the bales are presented in Appendix C-3.

The drying rates for the solar bales and TES bales are compared to the drying rate of the control bale, in Figures 19 and 20. These drying rates are illustrated for two volumes which are the same as the ones used in Drying Test No. 2. Moisture removed from the solar bales, TES bales and control bale in Volume #1 were 13, 16 and 8.5 percentage points, respectively and in Volume #2 were 9.3, 14 and 7.5 percentage pointes, respectively. The sudden drop in moisture content in the bales noted during days 5 through 7 indicates the drying front has been more of the variation in energy provided by the system, could only be developed at the expense of containing many independent parameters, which could not be justified for practical use. In addition, these equations could only be developed by using groups of data within each data set, and not with the entire set of parameters.

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Better drying rates were observed for the TES bales as compared to the solar bales and control bale, this may be attributed to less heat loss in the air flow circuit leading to these bales and better weather conditions, especially during the nights when lower relative humidities were recorded.

The following significant, direct and linear relationships were developed for the drying rates of the solar bales, TES bales and control bale, respectively:

$Y_s = 35.4 - 1.21X_1$ solar bales (B-4.2)

$Y_t = 36.3 - 1.43X_1$ TES bales (B-5.2)

$Y_c = 33.7 - 0.61X_1$ control bale (B-6.2)

The coefficients of determination and the standard errors of estimate were 81 percent and 0.18, 88.2 percent and 0.17 and 91.2 percent and 0.08, respectively, for the solar bales, TES bales and control bale.

Figure 21 illustrates the drying rate relationships for the solar bales, TES bales and control bale. The drying rate slopes for the bales in the same order as above were determined to be -1.21, -1.43 and -0.61 percent, w.b., per day, respectively. Thus, it was concluded that the solar bales and TES bales dried approximately 2.0 and 2.5 times as fast, respectively, as did the bales with forced ambient air.

The bales were weighed before and after the test period, and the following results were obtained; the total water removed from the solar bales was 119 kg/metric tonne of hay (240 lbs/U.S. ton) and the total water removed from the TES bales was 132 kg/metric tonne of hay (262 lbs/U.S. ton).

COMPARISON OF RESULTS OF THE DRYING TESTS

During the Drying Test No. 1, higher hourly efficiencies were noted as compared to Drying Tests No. 2 and 3, Figure 7. This may be attributed partially to the higher air flow rates and the larger collector area used during that period. The collector used during that test period was the one used by Saienga, Hellickson and Peterson (1977) in testing a system which was specifically designed as a non-tracking unit. Later Siegel, Hellickson and Verma (1978) reduced this collector to 62.5 percent of the original collector area but maintained the same reflector area and tested a sun-tracking mechanism for a grain drying application. Figure 22 illustrates that the largest amount of energy as compared to the energy available on a horizontal surface was provided during Drying Test No. 1. Little difference is noted in the cumulative amount of energy provided during the three drying periods, Figure 23.

Efficiencies during all test periods were lower than originally expected, but can be explained at least partially in that during all the drying periods high sun altitude angles were encountered, and that a gradual deterioration of the collector and thermal storage unit caused significant energy leakage. The aluminized reflective material attached to the steel sheet backing of the reflector deteriorated over time. This was apparently due to moisture causing the material to peel away from the steel, and to the expansion and contraction of the steel with changes in ambient temperature. Photographs were taken of two, one square foot sections of the reflectors that showed the wrinkles found on the reflective surface. The areas of the wrinkles, bubbles

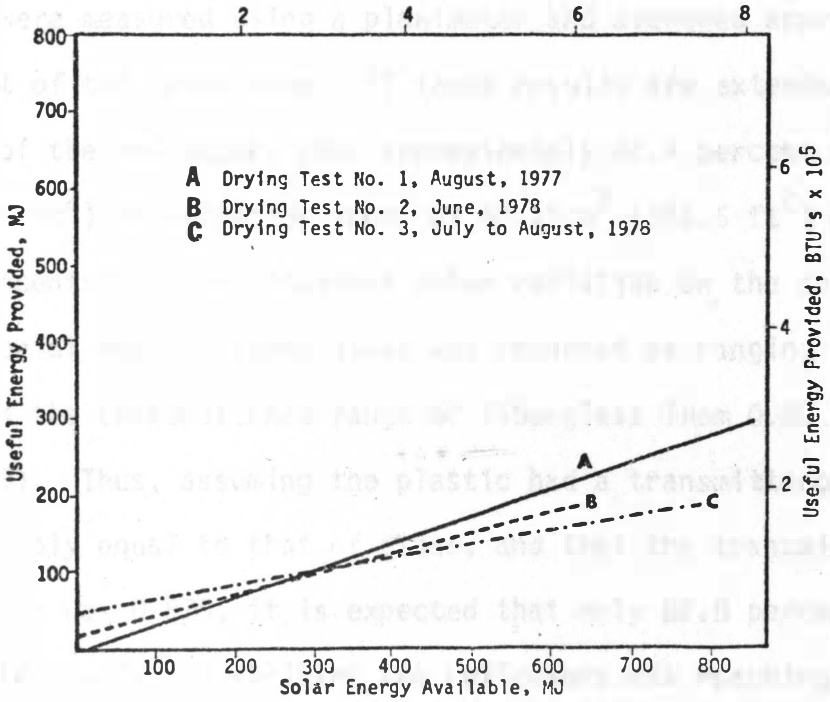


Figure 22. Useful energy provided by the system influenced by the solar energy available on a horizontal surface.

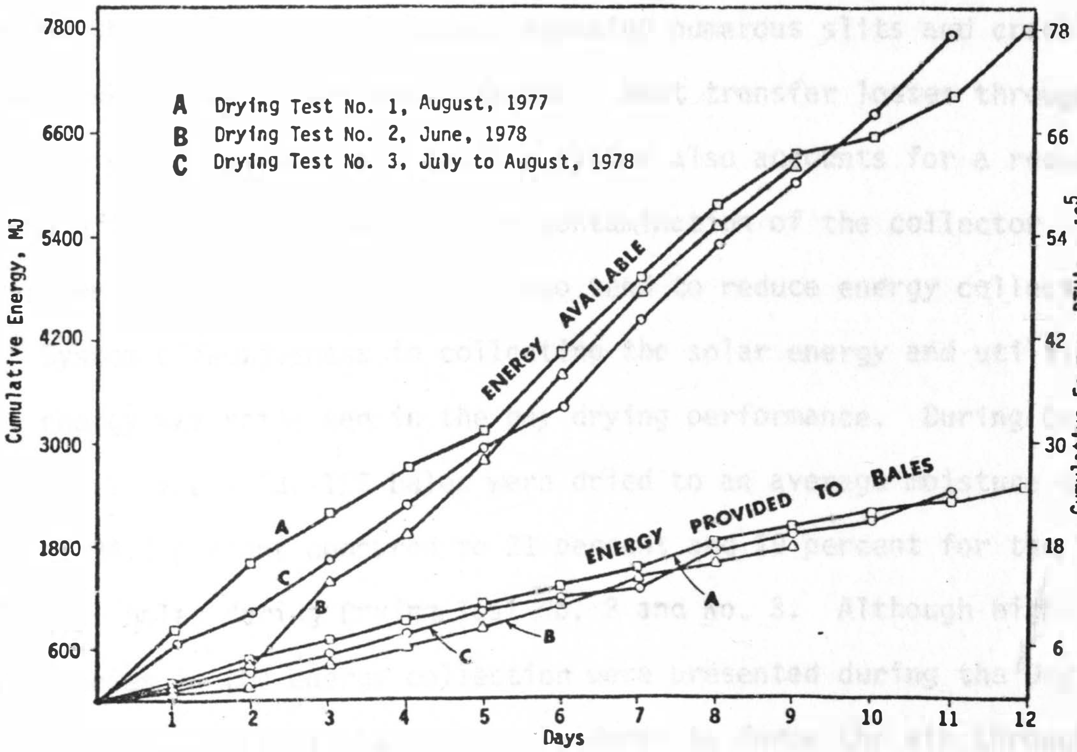


Figure 23. Useful energy provided by the system versus cumulative solar energy available on a horizontal surface.

and cracks were measured using a planimeter and averaged approximately 18.6 percent of the total area. If these results are extended to the total area of the reflector, then approximately 81.4 percent of the 45.7 $m^2$ (432 $ft^2$) of reflector area, or 40.10 $m^2$ (351.6 $ft^2$) was actually concentrating the incident solar radiation on the collector. Transmittance of regular sheet glass was reported as ranging from 0.86 to 0.91, and the transmittance range of fiberglass from 0.85 to 0.90, ASHRAE (1978). Thus, assuming the plastic had a transmittance of 0.88 or approximately equal to that of glass, and that the transmittance of the fiberglass was 0.875, it is expected that only 62.0 percent of the incident solar radiation striking the reflectors was reaching the north side of the absorber surface. The adverse weather conditions, especially rain, caused joints and seams to pull apart in the wooden framework of the collector and plenum, exposing numerous slits and cracks through which heated air could escape. Heat transfer losses through the fiberglass, plastic and ducting system also accounts for a reduction in the efficiency, and any dust or contamination of the collector covers or absorber surface would also tend to reduce energy collected.

System effectiveness in collecting the solar energy and utilizing this energy was reflected in the hay drying performance. During Drying Test No. 1, the solar-TES bales were dried to an average moisture content of 34.2 percent compared to 21 percent and 19 percent for the TES and solar bales during Drying Test No. 2 and No. 3. Although higher efficiencies in the energy collection were presented during the Drying Test No. 1, failure of the drying platforms to force the air through the bales was decisive in the drying performance. The energy provided to the bales was similar during Drying Tests No. 2 and No. 3, but more drying days were required for Drying Test No. 3 as a consequence of using higher density bales which offered more resistance to air flow. This effect is most noticeable during the first drying days, where the moisture content curves have a mild slope.

The relationships of the average moisture content of the solar bales and TES bales to the cumulative energy provided by the system are shown in Figure 24. In both cases the curves show a parallel trend, indicating that the amount of energy required to dry the bales to a safe moisture content not only depends on the amount of energy provided by the system but also on the initial moisture content of the bales.

Figure 25 shows the moisture distribution in the bales during a three-day interval (July 31 and August 3, 1978). A stationary drying front is noticed at the bottom and top of the bales, and removal of moisture is evident in the volume contained in more than 1/2 of the radius of the bale. This effect is more noticeable in the solar bales. As a consequence of the moisture distributions in the bales, a possible error in the sampling procedure may have occurred due to the fact that samples were taken at three levels; two of which were at the more humid points (top and bottom of the bale), and the other one was at the middle where it was much drier. As a result, the average moisture content in the bale was usually higher, while a sizable section of the bale was at a lower moisture content.

The drying rate relationships determined for the solar bales and TES bales during Drying Tests No. 2 and 3 showed similar slopes, which compared to the slopes of the control bale gave the following

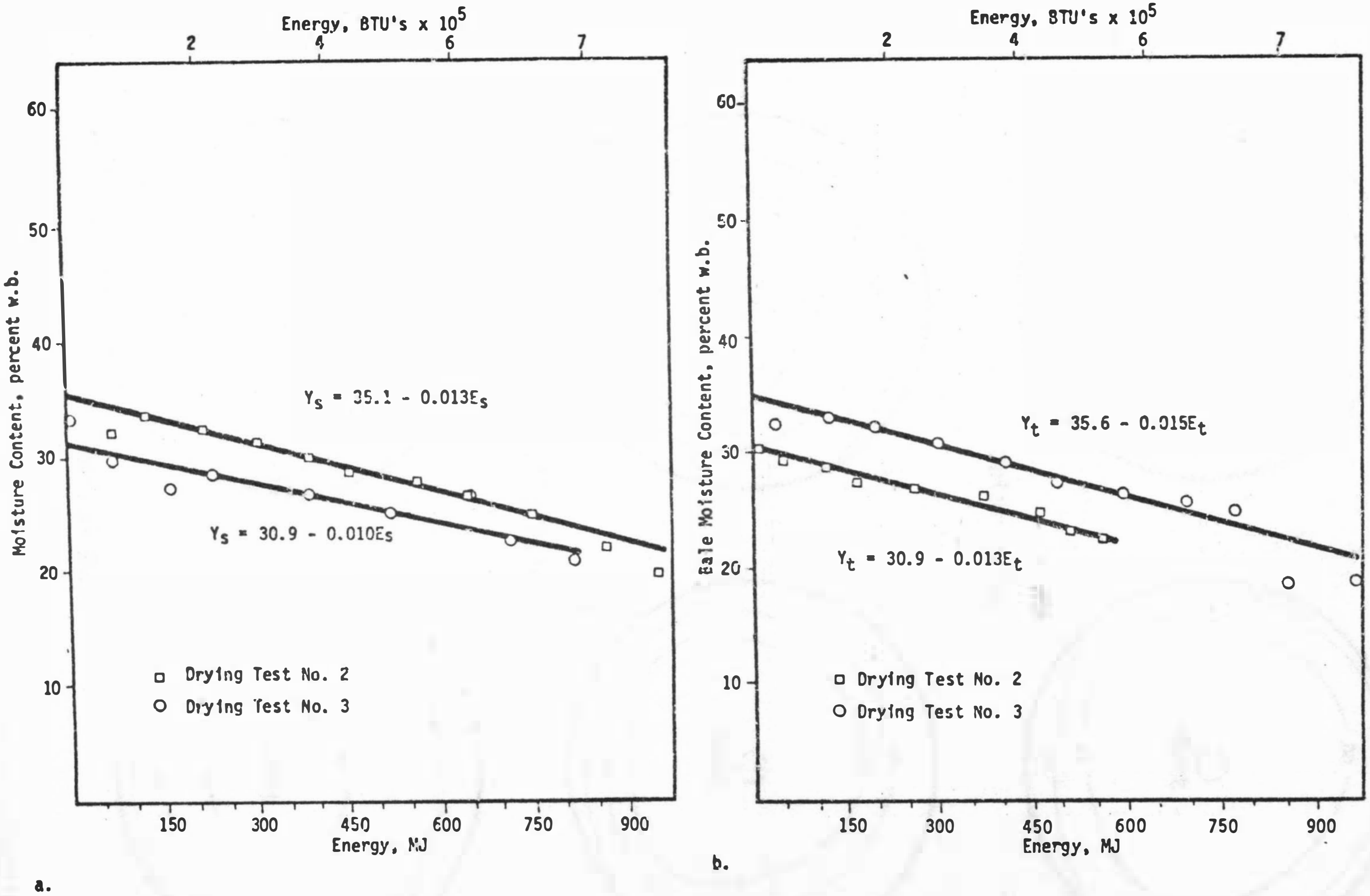
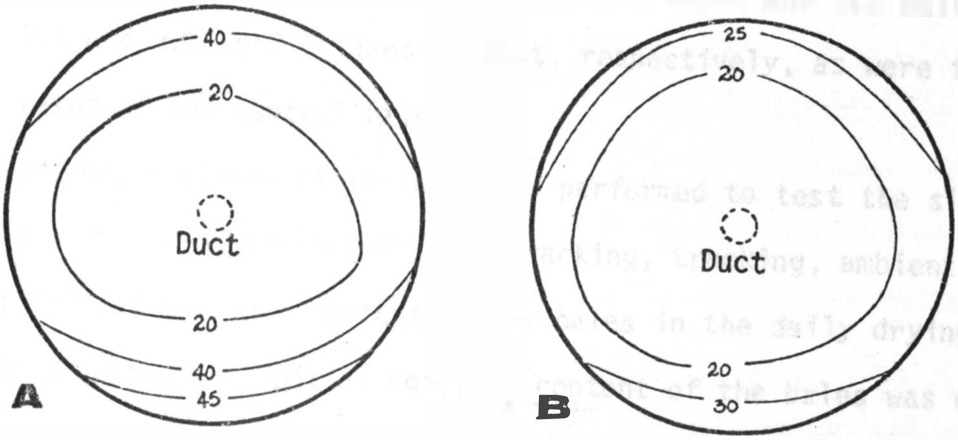
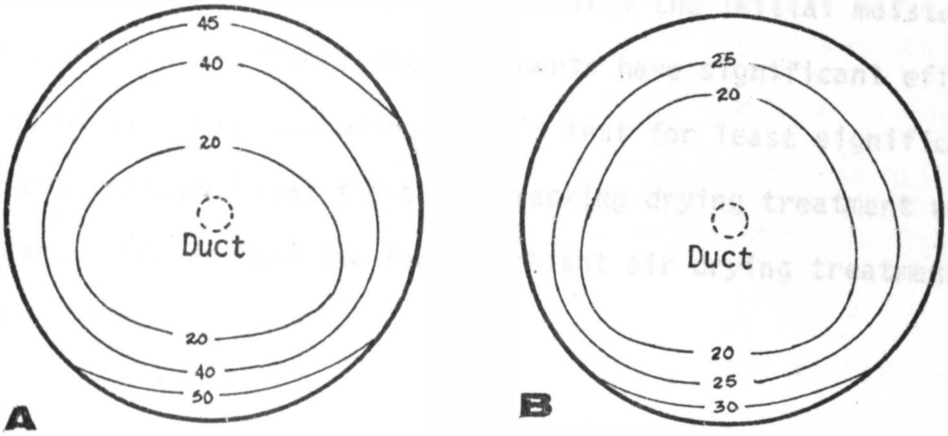


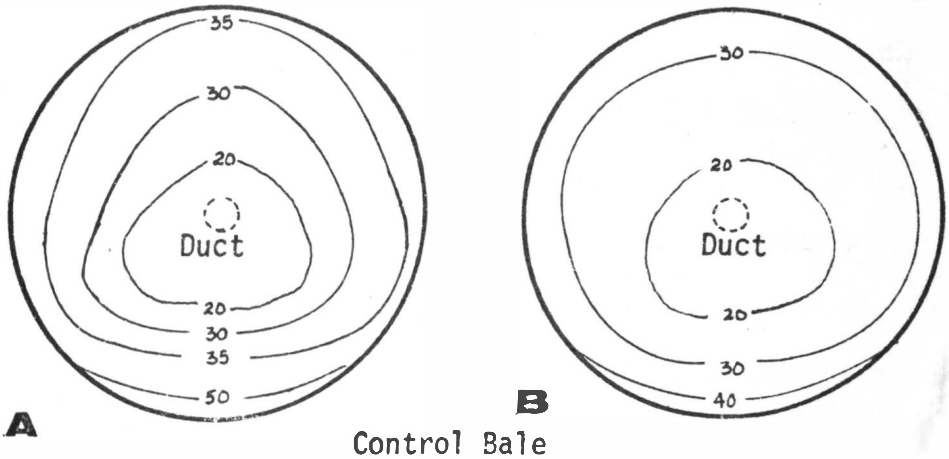
Figure 24. Average moisture content of the solar bales (a) and TES bales (b) as influenced by the cumulative solar energy provided: Drying Test No. 2, June, 1978, and Drying Test No. 3, July to August, 1978.



Solar Bales



TES Bales



Control Bale

Figure 25. Bales profile showing the moisture distribution on July 31 (A) and August 3 (B): Drying Test No. 3, July to August, 1978.

results; the daily drying rates for the solar bales and TES bales were 3.5 to 2.5 and 2.0 to 2.5 times as fast, respectively, as were the daily drying rates of the control bales.

A two-way analysis of variance was performed to test the significance between drying treatments (non-tracking, tracking, ambient air) and the initial moisture content of the bales in the daily drying rates. For this purpose, the initial moisture content of the bales was divided in two groups; bales with moisture content over 30 percent and below 30 percent. Results of this test showed that the initial moisture content of the bales and the drying treatments have significant effects on drying rates. Results, using Tukey's test for least significance difference, indicated that the solar-tracking drying treatment was significantly better than the forced ambient air drying treatment and the non-tracking system.

# CONCLUSIONS

The following conclusions were reached as a result of this study:

1. After two years of operation on drying cylindrical bales, the use of a solar energy intensifier-thermal energy storage system has been demonstrated to be feasible and can function satisfactorily for a low temperature hay drying application.
2. During the daytime operation of the system (10 hours), the energy provided to the direct solar dried bales was sufficient to more than double the drying rate as compared to a continuous ambient air drying system. During the day and night operation using a thermal energy storage unit, the energy provided to the TES bales was sufficient to double the drying rate as compared to a continuous ambient air drying system.
3. The thermal efficiency of the system was evaluated in terms of useful energy collected as compared to the energy available on the horizontal surface. Although the efficiencies obtained during the test periods were lower than expected, the system provided 30 percent of the solar energy, which was sufficient to dry the bales to a safe moisture content.
4. Although in some cases results showed that the drying rates for the solar bales were similar to the TES bales, the use of the thermal storage unit doesn't justify the continuous fan operation compared to the 10-hour fan operation of the direct solar system. Thus, the direct solar system was more efficient in electrical usage.
5. Statistical analysis showed the highly significant effect of

initial moisture content of the bales and the significant effect of the drying treatment on the drying rates. Thus, the amount of energy required to dry the bale is highly dependent on the initial moisture content of the bales, resulting in longer days of drying when higher density bales were used.

6. Bales with initial moisture content of 32 percent w.b. require a total of 702.3 MJ per metric tonne of hay (6.07 x $10^5$ BTU's/U.S. ton) of solar energy and 10 days to be dried to a safe moisture content. The total amount of water removed per tonne of hay was 125.5 kg (251 lb/U.S. ton).

## SUMMARY

Agricultural crop drying provides numerous applications where low to moderate solar temperature rises can provide a large percentage of the drying requirements, especially if the system characteristics allow energy to be stored and utilized during periods of limited insolation. Information on performance of solar energy concentrators and thermal energy storage systems for agricultural uses is limited for most climatic areas. Therefore, a study was conducted to test and evaluate the drying characteristics of a solar energy intensifier-thermal energy storage system for a low temperature hay drying application.

Three drying tests were performed under actual climatic conditions during the summers of 1977 and 1978 in Brookings, South Dakota. During each drying test three drying methods were evaluated: the first using directly solar heated air from the collector in a diurnal operation, the second used a thermal energy storage unit to offset the effects of periods without sunshine, and the third a continuous ambient air drying method.

Temperatures within the system and at points before the air was forced into the bales were monitored and the hay was sampled at different levels, so that an evaluation of the energy provided to the bales and drying rates could be determined and compared to the continuous ambient air drying system. Thermal efficiency of the solar system was evaluated in terms of useful energy collected as compared to the energy available on the horizontal surface. Although the system efficiencies were lower than expected, the overall efficiency obtained

during the test periods was 30 percent, which was sufficient to dry the bales to a safe moisture content.

Analysis of data indicated that the 10 hours diurnal operation of the direct solar drying method and the continuous operation with the thermal energy storage unit, could provide sufficient energy to the bales to triple and double the drying rates, respectively, as compared to a continuous ambient air drying system. The system provided sufficient energy, 702.3 MJ per metric tonne of hay ($6.03 \times 10^5$ BTU's/U.S. ton) to dry the bale to a safe moisture content in an average of 10 days, removing an average of 125.5 Kg of water per metric tonne of hay (251 lbs/U.S. ton).

Significant, linear and direct relationships were developed to predict the energy provided to the bales based on the energy available on the horizontal surface. Statistical analyses were performed to evaluate the difference in the drying rates between each drying system, and relationships were developed for each of the drying methods to predict the moisture removal in a period of time. Additional analyses indicated that the initial moisture content in the bales and the drying treatment used had a significant effect on the daily drying rates, resulting in longer days of drying when high density bales were used.

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# APPENDIX A

# LIST OF SYMBOLS

# LIST OF SYMBOLS

$E_a$ = Solar energy available on the horizontal surface, KJ

$E_s$ = Energy provided to the solar bales, KJ

$E_{st}$ = Energy provided to the solar-TES bales, KJ

$E_t$ = Energy provided to the TES bales, KJ

$t_a$ = Ambient temperature, $^oC$

$t_e$ = Collector exit temperature, $^oC$

$t_i$ = Collector inlet temperature, $^oC$

R = Thermal resistance, $m^2 \cdot {}^oC$/watt

$X_1$ = Time, days

$X_2$ = $(t_i + t_e)/2 - t_a$, $^oC$

$Y_c$ = Moisture content of the control bale, percent

$Y_s$ = Moisture content of the solar bale, percent

$Y_{st}$ = Moisture content of the solar-TES bale, percent

$Y_t$ = Moisture content of the TES bale, percent

# APPENDIX B

# ANALYSIS OF VARIANCE TABLES

Table B-1. Analysis of Variance for the Energy Provided to the Solar-TES Bales: Drying Test No. 1, August, 1977.

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due to Energy Available | 1 | 11258208665.00 | 11258208665.00 | 209.9** |
| Error | 118 | 6451666597.00 | 54675140.00 | |
| Total | 119 | 17709875262.00 | | |

** Significant at 1 percent level.

Table B-2. Analysis of Variance for Moisture Content of Solar-TES Bales: Drying Test No. 1, August, 1977.

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due To Time Drying | 1 | 576.91 | 576.91 | 217.2** |
| Error | 10 | 26.56 | 2.65 | |
| Total | 11 | 603.47 | | |

** Significant at 1 percent level.

Table B-3. Analysis of Variance for Moisture Content of Control Bale: Drying Test No. 1, August, 1977.

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due To Time Drying | 1 | 322.54 | 322.43 | 43.23** |
| Error | 10 | 74.60 | 7.46 | |
| Total | 11 | 397.15 | | |

** Significant at 1 percent level.

Table B-4. Analysis of Variance for Moisture Content of Solar Bales

B-4.1. Drying Test No. 2, June, 1978

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due To Time Drying | 1 | 89.27 | 89.27 | 30.34** |
| Error | 7 | 20.59 | 2.94 | |
| Total | 8 | 109.87 | | |

** Significant at 1 percent level.

B-4.2. Drying Test No. 3, July to August, 1978

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due To Time Drying | 1 | 161.72 | 161.72 | 40.86** |
| Error | 9 | 35.61 | 3.95 | |
| Total | 10 | 197.34 | | |

** Significant at 1 percent level.

Table B-5. Analysis of Variance for Moisture Content of TES Bales.

B-5.1. Drying Test No. 2, June, 1978

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due To Time Drying | 1 | 58.01 | 58.01 | 219.1** |
| Error | 7 | 1.85 | 0.26 | |
| Total | 8 | 59.87 | | |

** Significant at 1 percent level.

B-5.2. Drying Test No. 3, July to August, 1978

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due To Time Drying | 1 | 225.28 | 225.28 | 67.32** |
| Error | 9 | 30.11 | 3.34 | |
| Total | 10 | 255.40 | | |

** Significant at 1 percent level.

Table B-6. Analysis of Variance for Moisture Content of Control Bales

B-6.1. Drying Test No. 2, June, 1978

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due To Time Drying | 1 | 8.00 | 8.00 | 3.94* |
| Error | 7 | 14.23 | 2.03 | |
| Total | 8 | 22.23 | | |

* Significant at 5 percent level.

B-6.2. Drying Test No. 3, July to August, 1978

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due To Time Drying | 1 | 69.04 | 69.04 | 93.01** |
| Error | 9 | 6.68 | 0.74 | |
| Total | 10 | 75.72 | | |

** Significant at 1 percent level.

Table B-7. Analysis of Variance for the Energy Provided to the Solar Bales.

B-7.1. Drying Test No. 2, June, 1978

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due To Energy Available | 1 | 1399612888.00 | 1399612888.00 | 170.5** |
| Error | 76 | 623677703.00 | 8206285.00 | |
| Total | 77 | 2023290591.00 | | |

** Significant at 1 percent level.

B-7.2. Drying Test No. 3, July to August, 1978

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due To Energy Available | 1 | 899145020.00 | 899145020.00 | 135.8** |
| Error | 116 | 767597502.00 | 6617219.00 | |
| Total | 117 | 1666742523.00 | | |

** Significant at 1 percent level

Table B-8. Analysis of Variance for the Energy Provided to the TES Bales.

B-8.1. Drying Test No. 2, June, 1978

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due To Energy Available | 1 | 195992504.00 | 195992504.00 | 157.18** |
| Due To $\frac{t_i + t_e}{2} - T_a$ | 1 | 321374.00 | 321374.00 | 0.25 |
| Error | 75 | 93515786.00 | 1246877.00 | |
| Total | 77 | 289829664.00 | | |

** Significant at 1 percent level.

B-8.2. Drying Test No. 3, July to August, 1978

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due To Energy Available | 1 | 83450238.00 | 83450238.00 | 125.26** |
| Due To $\frac{t_i + t_e}{2} - T_a$ | 1 | 39150141.00 | 39150141.00 | 58.76** |
| Error | 115 | 76613279.00 | 666202.00 | |
| Total | 117 | 199213659.00 | | |

** Significant at 1 percent level.

Table B-9. Analysis of Variance Table to Test the Difference in Slopes of the Moisture Content Lines Between the Solar-TES Bales and Control Bale: Drying Test No. 1, August, 1977.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| Source of Variation | d.f. | $\Sigma X^2$ | $\Sigma XY$ | $\Sigma Y^2$ | $\frac{(\Sigma XY)^2}{\Sigma X^2}$ | d.f. | Residual | d.f. |
| Within Solar-TES Bales | 11 | 650 | 3,315.15 | 24,979.01 | 16,908.0 | 1 | 8,070.9 | 10 |
| Within Control Bale | 25 | 1,638 | 7,400.25 | 34,255.60 | 33,433.2 | 1 | 20,822.4 | 24 |
| (Two Regressions) | | | | | 50,341.2 | 2 | 28,893.3 | 32 |
| Within Solar-TES + Control Bales. | 36 | 2,288 | 10,715.4 | 79,234.60 | 50,183.4 | 1 | 29,051.21 | 33 |
| Regression Coefficients | | | | | 157.6 | | | |

$$F = \frac{157.6 \times 32}{28.893.3} = 0.17$$

Table B-10. Two-Way Analysis of Variance to Test the Effects of Drying Treatments and Initial Moisture Content of the Bales on the Drying Rates: Drying Test No. 2, June, 1978, and Drying Test No. 3, July to August, 1978.

| Source | DF | SS | MS | F |
|---|---|---|---|---|
| Due to Treatments (non-tracking, tracking, and ambient air) | 2 | 14.82 | 7.41 | 4.98* |
| Due To Initial Moisture Content (> 30%, < 30%) | 1 | 55.17 | 55.17 | 37.97** |
| Error | 6 | 8.93 | 1.48 | |
| Corrected Total | 9 | 78.93 | | |

* Significant at 5 percent level.
** Significant at 1 percent level.

# APPENDIX C

## DAILY ENERGY AND MOISTURE CONTENT DATA

Table C-1. Cumulative Totals for Energy Provided to the Bales, Stored in the TES and Energy Available, and Moisture Content of the Bales: August, 1977, Drying Test.

| Date | Energy Available (Pyranometer) KJ | Energy Released at Solar-TES Bales KJ | Energy Stored at TES KJ | Moisture Content (Solar-TES Bales) % w.b. | Moisture Content (Control Bale) % w.b. | Efficiency (Day) % |
|---|---|---|---|---|---|---|
| 06-08-77 | 807,666.69 | 76,804.37 | 182,728.69 | 56.46 | 57.08 | 32.13 |
| 07-08-77 | 1,572,884.32 | 145,046.06 | 344,855.63 | 53.75 | 54.36 | 30.10 |
| 08-08-77 | 2,163,719.63 | 194,174.18 | 476,527.76 | 50.28 | 49.99 | 30.60 |
| 09-08-77 | 2,724,726.44 | 258,468.81 | 601,034.07 | 49.23 | 47.93 | 33.65 |
| 10-08-77 | 3,204,278.19 | 417,138.05 | 609,606.95 | 46.25 | 47.45 | 34.87 |
| 11-08-77 | 4,119,786,32 | 424,541.74 | 849,150.95 | 43.53 | 41.38 | 26.97 |
| 12-08-77 | 5,012,349.38 | 469,837.12 | 1,047,107.01 | 41.51 | 41.54 | 30.28 |
| 13-08-77 | 5,881,967.38 | 608,590.18 | 1,202,068.01 | 41.14 | 40.21 | 30.67 |
| 14-08-77 | 6,594,411.57 | 672,383.14 | 1,359,716.20 | 36.46 | 42.64 | 31.08 |
| 15-08-77 | 6,704,547.82 | 712,190.42 | 1,384,796.61 | 40.09 | 39.47 | 58.92 |
| 16-08-77 | 7,454,851.45 | 787,658.80 | 1,541,549.17 | 34.04 | 41.31 | 30.95 |
| 17-08-77 | 8,327,911.20 | 880,191.74 | 1,697,405.92 | 34.23 | 39.76 | 28.45 |

Table C-2. Cumulative Totals for Energy Provided to the Bales, Stored in the TES and Energy Available, and Moisture Content of the Bales: June, 1978, Drying Test.

| Date | Energy Available (Pyranometer) KJ | Energy Released at Solar Bales KJ | Energy Released at TES Bales KJ | Energy Stored at TES KJ | Moisture Content (Solar Bales) % w.b. | Moisture Content (TES Bales) % w.b. | Moisture Content (Control Bale) % w.b. | Efficiency (Day) % |
|---|---|---|---|---|---|---|---|---|
| 21-06-78 | 9,178.03 | 615.95 | 11,483.48 | 459.34 | 33.78 | 30.90 | 26.60 | |
| 22-06-78 | 471,521.03 | 61,595.07 | 52,823.98 | 30,316.39 | 29.89 | 29.91 | 29.68 | 28.59 |
| 23-06-78 | 1,364,083.91 | 170,002.38 | 119,887.41 | 102,891.95 | 26.02 | 29.63 | 38.99 | 27.79 |
| 24-06-78 | 1,892.967.66 | 237,756.94 | 170,874.11 | 134,127.00 | 27.34 | 27.91 | 27.44 | 28.36 |
| 25-06-78 | 2,858,954.85 | 386,200.94 | 262,741.74 | 190,625.72 | 26.61 | 27.75 | 26.48 | 30.73 |
| 26-06-78 | 3,847,887.10 | 520,478.19 | 372,064.12 | 242,531.05 | 25.09 | 27.09 | 25.02 | 29.88 |
| 27-06-78 | 4,854,028.16 | 646,747.94 | 462,094.37 | 314,187.86 | 26.49 | 25.50 | 26.97 | 28.62 |
| 28-06-78 | 5,642,190.97 | 721,277.94 | 512,511.75 | 352,772.35 | 22.53 | 23.67 | 26.86 | 21.64 |
| 29-06-78 | 6,375,285.72 | 816,750.25 | 556,258.88 | 419,835.79 | 21.33 | 23.10 | 24.52 | 27.18 |

Table C-3. Cumulative Totals for Energy Provided to the Bales, Stored in the TES and Energy Available, and Moisture Content of the Bales: July 28 to August 8, 1978, Drying Test.

| Date | Energy Available (Pyranometer) KJ | Energy Released at Solar Bales KJ | Energy Released at TES Bales KJ | Energy Stored at TES KJ | Moisture Content (Solar Bales) % w.b. | Moisture Content (TES Bales) % w.b. | Moisture Content (Control Bale) % w.b. | Efficiency (Day) % |
|---|---|---|---|---|---|---|---|---|
| 28-07-78 | 665,406.74 | 80,689.44 | 47,311.93 | 50,527.32 | 30.44 | 32.09 | 33.98 | 26.83 |
| 29-07-78 | 954,514.63 | 146,596.13 | 132,289.62 | 65,685.50 | 33.10 | 33.88 | 30.84 | 57.43 |
| 30-07-78 | 1,686,462.13 | 237,756.76 | 225,535.25 | 108,863.39 | 32.54 | 32.72 | 30.65 | 31.09 |
| 31-07-78 | 2,292,211.82 | 307,975.14 | 315,565.50 | 139,639.11 | 31.87 | 31.57 | 30.45 | 31.54 |
| 01-08-78 | 2,829,126.26 | 388,048.64 | 406,055.13 | 180,520.30 | 30.82 | 29.79 | 30.13 | 39.38 |
| 02-08-78 | 3,468,146.32 | 462,578.64 | 500,219.51 | 212,674.03 | 28.70 | 27.84 | 30.37 | 31.43 |
| 03-08-78 | 4,407,746.63 | 572,833.70 | 608,623.26 | 253,095.88 | 28.20 | 26.83 | 29.50 | 27.57 |
| 03-08-78 | 5,332,432.69 | 671,385.70 | 700,950.20 | 293,058.39 | 27.46 | 26.37 | 28.20 | 24.96 |
| 05-08-78 | 6,103,386.75 | 766,858.01 | 787,765.20 | 328,427.51 | 25.72 | 25.59 | 27.45 | 28.23 |
| 06-08-78 | 6,961,532.13 | 855,554.82 | 881,010.83 | 370,227.38 | 21.78 | 18.45 | 26.78 | 26.07 |
| 07-08-78 | 7,884,917.01 | 976,897.01 | 979,309.14 | 422,132.71 | 19.20 | 19.90 | 26.50 | 30.74 |

# APPENDIX D

# INCIDENT SOLAR RADIATION AND TEMPERATURE DATA

Table D. Incident solar radiation on a horizontal surface and temperature data, numbers indicate the monitoring locations, Figure 3.

PYRANOMETER (PRY) READINGS, CAL/SQ-CM-MIN ,AND TEMPERATURES (T), F, AT POINT NUMBER

| DATE | HOUR | PYR | T(1) | T(2) | T(3) | T(4) | T(5) | T(6) | T(7) | T(8) | T(9) | T(10) | T(11) | T(12) | T(13) | T(14) | T(15) | T(16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80577 | 19 | 0.31 | 77.0 | 73.0 | 76.0 | 73.0 | 73.0 | 74.0 | 73.0 | 77.0 | 73.0 | 77.0 | 83.0 | 87.0 | 87.0 | 89.0 | 60.0 | 68.0 |
| 80577 | 20 | 0.02 | 77.0 | 73.0 | 76.0 | 75.0 | 75.0 | 77.0 | 75.0 | 77.0 | 74.0 | 77.0 | 82.0 | 87.0 | 86.0 | 85.0 | 64.0 | 67.0 |
| 80577 | 21 | 0.0 | 76.0 | 70.0 | 71.0 | 70.0 | 73.0 | 73.0 | 74.0 | 80.0 | 75.0 | 77.0 | 82.0 | 89.0 | 85.0 | 87.0 | 68.0 | 65.0 |
| 80577 | 22 | 0.0 | 72.0 | 71.0 | 72.0 | 71.0 | 69.0 | 69.0 | 71.0 | 77.0 | 71.0 | 72.0 | 72.0 | 81.0 | 74.0 | 77.0 | 64.0 | 61.0 |
| 80577 | 23 | 0.0 | 69.0 | 69.0 | 65.0 | 69.0 | 67.0 | 67.0 | 67.0 | 74.0 | 69.0 | 71.0 | 72.0 | 80.0 | 74.0 | 76.0 | 63.0 | 59.0 |
| 80677 | 24 | 0.0 | 67.0 | 67.0 | 62.0 | 67.0 | 63.0 | 63.0 | 64.0 | 69.0 | 66.0 | 67.0 | 67.0 | 70.0 | 67.0 | 68.0 | 61.0 | 55.0 |
| 80677 | 1 | 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 64.0 | 64.0 | 64.0 | 69.0 | 65.0 | 65.0 | 65.0 | 67.0 | 65.0 | 66.0 | 57.0 | 55.0 |
| 80677 | 2 | 0.0 | 60.0 | 61.0 | 61.0 | 60.0 | 59.0 | 59.0 | 59.0 | 69.0 | 61.0 | 62.0 | 63.0 | 65.0 | 63.0 | 64.0 | 57.0 | 53.0 |
| 80677 | 3 | 0.0 | 60.0 | 61.0 | 58.0 | 58.0 | 57.0 | 57.0 | 57.0 | 62.0 | 59.0 | 61.0 | 61.0 | 69.0 | 61.0 | 61.0 | 55.0 | 52.0 |
| 80677 | 4 | 0.0 | 57.0 | 58.0 | 57.0 | 57.0 | 57.0 | 58.0 | 56.0 | 61.0 | 58.0 | 59.0 | 59.0 | 62.0 | 59.0 | 60.0 | 54.0 | 52.0 |
| 80677 | 5 | 0.0 | 55.0 | 53.0 | 52.0 | 52.0 | 51.0 | 51.0 | 52.0 | 60.0 | 57.0 | 58.0 | 59.0 | 60.0 | 58.0 | 58.0 | 59.0 | 50.0 |
| 80677 | 6 | 0.0 | 55.0 | 57.0 | 57.0 | 57.0 | 56.0 | 56.0 | 56.0 | 60.0 | 57.0 | 58.0 | 59.0 | 59.0 | 57.0 | 59.0 | 54.0 | 50.0 |
| 80677 | 7 | 0.04 | 55.0 | 57.0 | 57.0 | 57.0 | 56.0 | 56.0 | 56.0 | 60.0 | 57.0 | 58.0 | 59.0 | 54.0 | 57.0 | 58.0 | 54.0 | 50.0 |
| 80677 | 8 | 0.25 | 55.0 | 57.0 | 56.0 | 60.0 | 59.0 | 59.0 | 59.0 | 60.0 | 57.0 | 58.0 | 57.0 | 56.0 | 54.0 | 54.0 | 54.0 | 54.0 |
| 80677 | 9 | 0.48 | 61.0 | 63.0 | 61.0 | 67.0 | 69.0 | 69.0 | 69.0 | 66.0 | 63.0 | 64.0 | 61.0 | 57.0 | 58.0 | 57.0 | 60.0 | 64.0 |
| 80677 | 10 | 0.62 | 64.0 | 67.0 | 66.0 | 83.0 | 77.0 | 76.0 | 76.0 | 71.0 | 64.0 | 69.0 | 66.0 | 59.0 | 60.0 | 59.0 | 65.0 | 70.0 |
| 80677 | 11 | 0.74 | 73.0 | 73.0 | 73.0 | 101.0 | 96.0 | 85.0 | 89.0 | 80.0 | 71.0 | 76.0 | 75.0 | 61.0 | 65.0 | 62.0 | 69.0 | 74.0 |
| 80677 | 12 | 0.92 | 73.0 | 76.0 | 77.0 | 103.0 | 98.0 | 104.0 | 104.0 | 84.0 | 74.0 | 81.0 | 84.0 | 64.0 | 73.0 | 69.0 | 71.0 | 77.0 |
| 80677 | 13 | 1.00 | 84.0 | 80.0 | 84.0 | 120.0 | 110.0 | 117.0 | 112.0 | 91.0 | 78.0 | 87.0 | 97.0 | 72.0 | 84.0 | 80.0 | 74.0 | 78.0 |
| 80677 | 14 | 0.75 | 87.0 | 83.0 | 82.0 | 119.0 | 110.0 | 114.0 | 117.0 | 94.0 | 82.0 | 90.0 | 109.0 | 81.0 | 94.0 | 90.0 | 76.0 | 79.0 |
| 80677 | 15 | 0.89 | 89.0 | 83.0 | 87.0 | 117.0 | 110.0 | 119.0 | 113.0 | 94.0 | 82.0 | 92.0 | 113.0 | 91.0 | 103.0 | 100.0 | 77.0 | 77.0 |
| 80677 | 16 | 0.58 | 91.0 | 87.0 | 90.0 | 119.0 | 111.0 | 114.0 | 118.0 | 96.0 | 85.0 | 93.0 | 113.0 | 93.0 | 105.0 | 102.0 | 78.0 | 83.0 |
| 80677 | 17 | 0.61 | 92.0 | 90.0 | 91.0 | 108.0 | 107.0 | 116.0 | 117.0 | 98.0 | 84.0 | 94.0 | 105.0 | 102.0 | 107.0 | 107.0 | 76.0 | 78.0 |
| 80677 | 18 | 0.28 | 91.0 | 88.0 | 86.0 | 92.0 | 93.0 | 90.0 | 92.0 | 92.0 | 89.0 | 88.0 | 108.0 | 109.0 | 110.0 | 111.0 | 79.0 | 77.0 |
| 80677 | 19 | 0.26 | 85.0 | 87.0 | 86.0 | 93.0 | 91.0 | 92.0 | 94.0 | 92.0 | 86.0 | 86.0 | 96.0 | 106.0 | 102.0 | 105.0 | 78.0 | 76.0 |
| 80677 | 20 | 0.05 | 85.0 | 85.0 | 85.0 | 91.0 | 89.0 | 89.0 | 90.0 | 90.0 | 85.0 | 87.0 | 95.0 | 106.0 | 100.0 | 104.0 | 75.0 | 75.0 |
| 80677 | 21 | 0.0 | 83.0 | 78.0 | 85.0 | 84.0 | 79.0 | 70.0 | 72.0 | 86.0 | 77.0 | [illegible] | 95.0 | 100.0 | 103.0 | 107.0 | 77.0 | 71.0 |
| 80677 | 22 | 0.0 | 81.0 | 73.0 | 80.0 | 74.0 | 72.0 | 71.0 | 72.0 | 84.0 | 71.0 | 83.0 | 94.0 | 94.0 | 99.0 | 97.0 | 75.0 | 69.0 |
| 80677 | 23 | 0.0 | 76.0 | 69.0 | 76.0 | 70.0 | 69.0 | 64.0 | 70.0 | 82.0 | 69.0 | 77.0 | 94.0 | 87.0 | 95.0 | 81.0 | 73.0 | 68.0 |
| 80777 | 24 | 0.0 | 77.0 | 70.0 | 77.0 | 71.0 | 69.0 | 68.0 | 70.0 | 80.0 | 70.0 | 78.0 | 93.0 | 83.0 | 91.0 | 82.0 | 84.0 | 65.0 |
| 80777 | 1 | 0.0 | 75.0 | 71.0 | 75.0 | 72.0 | 71.0 | 71.0 | 71.0 | 80.0 | 71.0 | 78.0 | 92.0 | 77.0 | 86.0 | 79.0 | 70.0 | 66.0 |
| 80777 | 2 | 0.0 | 72.0 | 67.0 | 65.0 | 64.0 | 65.0 | 66.0 | 67.0 | 77.0 | 68.0 | 74.0 | 93.0 | 76.0 | 86.0 | 77.0 | 70.0 | 64.0 |
| 80777 | 3 | 0.0 | 69.0 | 64.0 | 63.0 | 64.0 | 66.0 | 64.0 | 64.0 | 72.0 | 64.0 | 70.0 | 90.0 | 75.0 | 79.0 | 74.0 | 67.0 | 62.0 |
| 80777 | 4 | 0.0 | 68.0 | 60.0 | 63.0 | 65.0 | 64.0 | 64.0 | 54.0 | 64.0 | 62.0 | 68.0 | 86.0 | 72.0 | 75.0 | 70.0 | 56.0 | 64.0 |
| 80777 | 5 | 0.0 | 67.0 | 64.0 | 67.0 | 64.0 | 63.0 | 62.0 | 63.0 | 70.0 | 63.0 | 69.0 | 87.0 | 71.0 | 75.0 | 70.0 | 64.0 | 64.0 |
| 80777 | 6 | 0.0 | 65.0 | 61.0 | 65.0 | 62.0 | 62.0 | 62.0 | 61.0 | 69.0 | 62.0 | 67.0 | 85.0 | 70.0 | 72.0 | 67.0 | 65.0 | 62.0 |
| 80777 | 7 | 0.04 | 66.0 | 61.0 | 66.0 | 64.0 | 62.0 | 62.0 | 64.0 | 69.0 | 63.0 | 68.0 | 83.0 | 69.0 | 72.0 | 68.0 | 65.0 | 64.0 |
| 80777 | 8 | 0.24 | 65.0 | 64.0 | 66.0 | 65.0 | 64.0 | 67.0 | 69.0 | 70.0 | 65.0 | 69.0 | 82.0 | 69.0 | 70.0 | 67.0 | 66.0 | 66.0 |
| 80777 | 9 | 0.42 | 64.0 | 69.0 | 70.0 | 72.0 | 69.0 | 71.0 | 72.0 | 72.0 | 68.0 | 70.0 | 75.0 | 70.0 | 73.0 | 69.0 | 69.0 | 69.0 |
| 80777 | 10 | 0.68 | 67.0 | 73.0 | 72.0 | 82.0 | 77.0 | 79.0 | 80.0 | 77.0 | 74.0 | 75.0 | 73.0 | 75.0 | 75.0 | 74.0 | 72.0 | 72.0 |
| 80777 | 11 | 0.40 | 76.0 | 77.0 | 77.0 | 85.0 | 82.0 | 83.0 | 84.0 | 82.0 | 77.0 | 79.0 | 77.0 | 75.0 | 75.0 | 74.0 | 75.0 | 75.0 |
| 80777 | 12 | 0.93 | 84.0 | 81.0 | 83.0 | 106.0 | 100.0 | 111.0 | 112.0 | 91.0 | 80.0 | 87.0 | 86.0 | 76.0 | 76.0 | 76.0 | 77.0 | 81.0 |
| 80777 | 13 | 0.86 | 88.0 | 84.0 | 87.0 | 119.0 | 106.0 | 120.0 | 116.0 | 95.0 | 83.0 | 91.0 | 95.0 | 77.0 | 83.0 | 80.0 | 78.0 | 93.0 |
| 80777 | 14 | 0.98 | 90.0 | 86.0 | 88.0 | 119.0 | 105.0 | 120.0 | 120.0 | 96.0 | 85.0 | 92.0 | 105.0 | 82.0 | 95.0 | 91.0 | 80.0 | 82.0 |
| 80777 | 15 | 0.86 | 94.0 | 90.0 | 92.0 | 121.0 | 112.0 | 117.0 | 121.0 | 100.0 | 87.0 | 96.0 | 113.0 | 91.0 | 102.0 | 100.0 | 82.0 | 87.0 |
| 80777 | 16 | 0.75 | 102.0 | 93.0 | 94.0 | 114.0 | 112.0 | 120.0 | 121.0 | 101.0 | 91.0 | 97.0 | 115.0 | 98.0 | 107.0 | 106.0 | 83.0 | 85.0 |
| 80777 | 17 | 0.54 | 94.0 | 92.0 | 93.0 | 108.0 | 104.0 | 116.0 | 117.0 | 100.0 | 97.0 | 91.0 | 110.0 | 101.0 | 109.0 | 108.0 | 82.0 | 86.0 |
| 80777 | 18 | 0.32 | 91.0 | 92.0 | 91.0 | 96.0 | 95.0 | 97.0 | 98.0 | 95.0 | 91.0 | 92.0 | 110.0 | 107.0 | 111.0 | 112.0 | 83.0 | 84.0 |
| 80777 | 19 | 0.11 | 85.0 | 90.0 | 90.0 | 93.0 | 94.0 | 94.0 | 95.0 | 95.0 | 89.0 | 90.0 | 109.0 | 107.0 | 111.0 | 112.0 | 83.0 | 84.0 |
| 80777 | 20 | 0.03 | 89.0 | 83.0 | 88.0 | 90.0 | 87.0 | 87.0 | 90.0 | 93.0 | 89.0 | 91.0 | 111.0 | 100.0 | 109.0 | 106.0 | 82.0 | 82.0 |
| 80777 | 21 | 0.0 | 86.0 | 79.0 | 86.0 | 84.0 | 80.0 | 79.0 | 82.0 | 97.0 | 76.0 | 87.0 | 109.0 | 94.0 | 104.0 | 97.0 | 81.0 | 78.0 |
| 80777 | 22 | 0.0 | 82.0 | 77.0 | 82.0 | 75.0 | 72.0 | 71.0 | 72.0 | 87.0 | 70.0 | 84.0 | 110.0 | 90.0 | 100.0 | 91.0 | 78.0 | 73.0 |
| 80777 | 23 | 0.0 | 73.0 | 69.0 | 79.0 | 71.0 | 69.0 | 69.0 | 70.0 | 84.0 | 68.0 | 81.0 | 108.0 | 87.0 | 96.0 | 86.0 | 74.0 | 70.0 |
| 80877 | 24 | 0.0 | 78.0 | 67.0 | 77.0 | 70.0 | 68.0 | 68.0 | 69.0 | 82.0 | 61.0 | 79.0 | 109.0 | 84.0 | 92.0 | 83.0 | 73.0 | 69.0 |
| 80877 | 1 | 0.0 | 75.0 | 68.0 | 75.0 | 69.0 | 67.0 | 67.0 | 68.0 | [illegible] | 65.0 | 77.0 | 105.0 | 82.0 | 85.0 | 80.0 | 71.0 | 68.0 |
| 80877 | 2 | 0.0 | 73.0 | 66.0 | 75.0 | 67.0 | 60.0 | 60.0 | 62.0 | 73.0 | 60.0 | 74.0 | 103.0 | 78.0 | 84.0 | 76.0 | 59.0 | 61.0 |
| 80877 | 3 | 0.0 | 71.0 | 60.0 | 71.0 | 67.0 | 64.0 | 65.0 | 67.0 | 77.0 | 64.0 | 74.0 | 102.0 | 77.0 | 83.0 | 75.0 | 69.0 | 66.0 |
| 80877 | 4 | 0.0 | 70.0 | 65.0 | 70.0 | 66.0 | 64.0 | 64.0 | 65.0 | 75.0 | 64.0 | 73.0 | 99.0 | 75.0 | 81.0 | 73.0 | 67.0 | 61.0 |
| 80877 | 5 | 0.0 | 69.0 | 64.0 | 69.0 | 65.0 | 63.0 | 63.0 | 64.0 | 74.0 | 62.0 | 71.0 | 96.0 | 73.0 | 78.0 | 72.0 | 67.0 | 62.0 |
| 80877 | 6 | 0.0 | 67.0 | 63.0 | 67.0 | 65.0 | 63.0 | 63.0 | 64.0 | 73.0 | 62.0 | 70.0 | 97.0 | 69.0 | 74.0 | 69.0 | 67.0 | 65.0 |
| 80877 | 7 | 0.0 | 67.0 | 66.0 | 67.0 | 68.0 | 66.0 | 67.0 | 69.0 | 73.0 | 65.0 | 70.0 | 87.0 | 70.0 | 73.0 | 69.0 | 67.0 | 60.0 |
| 80877 | 8 | 0.27 | 67.0 | 67.0 | 68.0 | 69.0 | 67.0 | 67.0 | 70.0 | 72.0 | 66.0 | 70.0 | 84.0 | 69.0 | 72.0 | 68.0 | 68.0 | 67.0 |
| 80877 | 9 | 0.42 | 73.0 | 73.0 | 71.0 | 79.0 | 77.0 | 78.0 | 77.0 | 77.0 | 73.0 | 75.0 | 73.0 | 77.0 | 77.0 | 75.0 | 70.0 | [illegible] |
| 80877 | 10 | 0.76 | 71.0 | 76.0 | 75.0 | 89.0 | 85.0 | 84.0 | 86.0 | 82.0 | 70.0 | 79.0 | 76.0 | 75.0 | 74.0 | 74.0 | 74.0 | 75.0 |
| 80877 | 11 | 0.50 | 78.0 | 79.0 | 78.0 | 91.0 | 88.0 | 86.0 | 87.0 | 94.0 | 77.0 | 81.0 | 83.0 | 74.0 | 75.0 | 74.0 | 75.0 | [illegible] |
| 80877 | 12 | 0.82 | 81.0 | 80.0 | 80.0 | 97.0 | 95.0 | 97.0 | 100.0 | 88.0 | 81.0 | 85.0 | 90.0 | 95.0 | 81.0 | 79.0 | 77.0 | 79.0 |
| 80877 | 13 | 0.46 | 83.0 | 81.0 | 93.0 | 104.0 | 100.0 | 104.0 | 106.0 | 81.0 | 83.0 | 87.0 | 95.0 | 80.0 | 87.0 | 88.0 | 80.0 | 82.0 |
| 80877 | 14 | 0.36 | 92.0 | 85.0 | 82.0 | 93.0 | 92.0 | 92.0 | 94.0 | [illegible] | 84.0 | 86.0 | 98.0 | 86.0 | 93.0 | 91.0 | 80.0 | 81.0 |
| 80877 | 15 | 0.28 | 82.0 | 83.0 | 81.0 | 92.0 | 90.0 | 90.0 | 92.0 | 83.0 | 83.0 | 85.0 | 96.0 | 86.0 | 92.0 | 91.0 | 79.0 | 83.0 |
| 80877 | 16 | 0.32 | 94.0 | 64.0 | 85.0 | 93.0 | 98.0 | 104.0 | 104.0 | 89.0 | 80.0 | 89.0 | 86.0 | 86.0 | 86.0 | 85.0 | 76.0 | 52.0 |
| 80877 | 17 | 0.64 | 84.0 | 82.0 | 85.0 | 96.0 | 101.0 | 112.0 | 119.0 | 95.0 | 87.0 | 91.0 | 104.0 | 90.0 | 93.0 | 92.0 | 82.0 | [illegible] |
| 80877 | 18 | 0.42 | 87.0 | 89.0 | 87.0 | 94.0 | 93.0 | 95.0 | 98.0 | 93.0 | 88.0 | 89.0 | 104.0 | 93.0 | 100.0 | 97.0 | 83.0 | 86.0 |
| 80877 | 19 | 0.22 | 67.0 | 90.0 | 88.0 | 94.0 | 90.0 | 91.0 | 93.0 | 92.0 | 89.0 | 90.0 | 100.0 | 98.0 | 100.0 | 100.0 | 82.0 | 82.0 |
| 80877 | 20 | 0.03 | 86.0 | 86.0 | 86.0 | 91.0 | 90.0 | 93.0 | 91.0 | 91.0 | 88.0 | 86.0 | [illegible] | 97.0 | 95.0 | 97.0 | [illegible] | [illegible] |
| 80877 | 21 | 0.0 | 85.0 | 81.0 | 85.0 | 84.0 | 82.0 | 80.0 | 82.0 | 90.0 | 78.0 | 87.0 | 95.0 | 95.0 | 95.0 | 100.0 | 87.0 | 76.0 |
| 80877 | 22 | 0.0 | 81.0 | 72.0 | 81.0 | 74.0 | 71.0 | 71.0 | 72.0 | 85.0 | 71.0 | 84.0 | 95.0 | 95.0 | 94.0 | 97.0 | 77.0 | 71.0 |
| 80877 | 23 | 0.0 | 74.0 | 70.0 | 74.0 | 71.0 | 70.0 | 69.0 | 70.0 | 84.0 | 65.0 | 82.0 | 94.0 | 91.0 | 94.0 | 91.0 | 75.0 | 73.0 |
| 80977 | 24 | 0.0 | 76.0 | 70.0 | 76.0 | 71.0 | 70.0 | 70.0 | 71.0 | 87.0 | 67.0 | 79.0 | 94.0 | 86.0 | 92.0 | 85.0 | 74.0 | 69.0 |
| 80977 | 1 | 0.0 | 75.0 | 73.0 | 75.0 | 72.0 | 70.0 | 70.0 | 71.0 | 80.0 | 69.0 | 77.0 | 93.0 | 82.0 | 88.0 | 61.0 | 73.0 | 64.0 |
| 80977 | 2 | 0.0 | 74.0 | 70.0 | 71.0 | 71.0 | 69.0 | 69.0 | 69.0 | 78.0 | 69.0 | 76.0 | 92.0 | 78.0 | 82.0 | 77.0 | 71.0 | 67.0 |
| 80977 | 3 | 0.0 | 72.0 | 69.0 | 70.0 | 70.0 | 69.0 | 69.0 | 69.0 | 77.0 | 69.0 | 75.0 | 92.0 | 78.0 | 82.0 | 74.0 | 71.0 | 66.0 |
| 80977 | 4 | 0.0 | 71.0 | 68.0 | 64.0 | 70.0 | 68.0 | 68.0 | 69.0 | 75.0 | 69.0 | 73.0 | 90.0 | 75.0 | 77.0 | 75.0 | 70.0 | 67.0 |
| 80977 | 5 | 0.0 | 70.0 | 68.0 | 68.0 | 68.0 | 67.0 | 66.0 | 67.0 | 73.0 | 67.0 | 71.0 | 87.0 | 70.0 | 75.0 | 72.0 | 69.0 | 66.0 |
| 80977 | 6 | 0.0 | 69.0 | 67.0 | 70.0 | 68.0 | 67.0 | 67.0 | 63.0 | 74.0 | 67.0 | 70.0 | 86.0 | 70.0 | 74.0 | 70.0 | 65.0 | 61.0 |
| 80977 | 7 | 0.0 | 67.0 | 60.0 | 69.0 | 64.0 | 65.0 | 65.0 | 65.0 | 72.0 | 65.0 | 70.0 | 84.0 | 71.0 | 73.0 | 70.0 | 67.0 | 64.0 |
| 80977 | 8 | 0.08 | 67.0 | 65.0 | 69.0 | 70.0 | 68.0 | 69.0 | 71.0 | 73.0 | 67.0 | 71.0 | 82.0 | 71.0 | 71.0 | 69.0 | 67.0 | 66.0 |
| 80977 | 9 | 0.11 | 69.0 | 69.0 | 70.0 | 71.0 | 69.0 | 70.0 | 71.0 | 72.0 | 71.0 | 71.0 | 73.0 | 72.0 | 75.0 | 72.0 | 69.0 | 64.0 |
| 80977 | 10 | 0.13 | 70.0 | 73.0 | 71.0 | 75.0 | 74.0 | 75.0 | 76.0 | 75.0 | 73.0 | 73.0 | 73.0 | 75.0 | 75.0 | 74.0 | 71.0 | 70.0 |

Table D. Continued

PYRANOMETER (PRY) READINGS, CAL/SQ-CM-MIN ,AND TEMPERATURES (T),°F, AT POINT NUMBER

| DATE | HOUR | PYR | T(1) | T(2) | T(3) | T(4) | T(5) | T(6) | T(7) | T(8) | T(9) | T(10) | T(11) | T(12) | T(13) | T(14) | T(15) | T(16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60577 | 19 | 0.31 | 77.0 | 71.0 | 76.0 | 71.0 | 73.0 | 74.0 | 71.0 | 77.0 | 73.0 | 77.0 | 83.0 | 87.0 | 87.0 | [illegible] | [illegible] | [illegible] |
| 60577 | 20 | 0.07 | 77.0 | 73.0 | 76.0 | 75.0 | 75.0 | 77.0 | 75.0 | 73.0 | 74.0 | 77.0 | 67.0 | 87.0 | 86.0 | 81.0 | 68.0 | 67.0 |
| 60577 | 21 | 0.0 | 74.0 | 70.0 | 71.0 | 70.0 | 73.0 | 73.0 | 74.0 | 80.0 | 75.0 | 77.0 | 82.0 | 89.0 | 85.0 | 87.0 | 69.0 | 64.0 |
| 60577 | 22 | 0.0 | 72.0 | 71.0 | 72.0 | 71.0 | 69.0 | 69.0 | 71.0 | 77.0 | 71.0 | 72.0 | 72.0 | 81.0 | 74.0 | 77.0 | 64.0 | 61.0 |
| 60577 | 23 | 0.0 | 69.0 | 67.0 | 69.0 | 68.0 | 67.0 | 67.0 | 67.0 | 74.0 | 67.0 | 71.0 | 77.0 | 80.0 | 74.0 | 76.0 | 63.0 | 59.0 |
| 60577 | 24 | 0.0 | 67.0 | 67.0 | 68.0 | 67.0 | 63.0 | 63.0 | 64.0 | 69.0 | 66.0 | 67.0 | 67.0 | 70.0 | 67.0 | 68.0 | 61.0 | 55.0 |
| 60677 | 1 | 0.0 | 65.0 | 65.0 | 65.0 | 65.0 | 64.0 | 64.0 | 64.0 | 69.0 | 65.0 | 65.0 | 65.0 | 67.0 | 65.0 | 66.0 | 59.0 | 55.0 |
| 60677 | 2 | 0.0 | 60.0 | 61.0 | 61.0 | 60.0 | 59.0 | 59.0 | 59.0 | 67.0 | 61.0 | 62.0 | 63.0 | 65.0 | 63.0 | 64.0 | 57.0 | 53.0 |
| 60677 | 3 | 0.0 | 60.0 | 61.0 | 56.0 | 58.0 | 57.0 | 51.0 | 57.0 | 62.0 | 59.0 | 61.0 | 61.0 | 69.0 | 61.0 | 61.0 | 55.0 | 52.0 |
| 60677 | 4 | 0.0 | 57.0 | 58.0 | 57.0 | 57.0 | 57.0 | 56.0 | 56.0 | 61.0 | 58.0 | 59.0 | 59.0 | 62.0 | 59.0 | 58.0 | 54.0 | 52.0 |
| 60677 | 5 | 0.0 | 55.0 | 53.0 | 52.0 | 52.0 | 51.0 | 51.0 | 52.0 | 60.0 | 57.0 | 58.0 | 59.0 | 60.0 | 58.0 | 58.0 | 59.0 | 53.0 |
| 60677 | 6 | 0.0 | 55.0 | 57.0 | 57.0 | 57.0 | 54.0 | 56.0 | 56.0 | 60.0 | 57.0 | 50.0 | 59.0 | 59.0 | 57.0 | 59.0 | 54.0 | 50.0 |
| 60677 | 7 | 0.04 | 54.0 | 57.0 | 57.0 | 57.0 | 56.0 | 56.0 | 56.0 | 60.0 | 57.0 | 58.0 | 59.0 | 59.0 | 57.0 | 58.0 | 54.0 | 50.0 |
| 60677 | 8 | 0.25 | 55.0 | 57.0 | 56.0 | 60.0 | 59.0 | 59.0 | 59.0 | 60.0 | 57.0 | 58.0 | 57.0 | 56.0 | 54.0 | 54.0 | 55.0 | 54.0 |
| 60677 | 9 | 0.48 | 61.0 | 63.0 | 61.0 | 69.0 | 68.0 | 69.0 | 69.0 | 66.0 | 63.0 | 64.0 | 61.0 | 57.0 | 58.0 | 57.0 | 63.0 | 64.0 |
| 60677 | 10 | 0.67 | 66.0 | 67.0 | 66.0 | 85.0 | 71.0 | 76.0 | 76.0 | 71.0 | 65.0 | 69.0 | 66.0 | 59.0 | 60.0 | 59.0 | 65.0 | 73.0 |
| 60677 | 11 | 0.76 | 73.0 | 73.0 | 73.0 | 101.0 | 96.0 | 85.0 | 89.0 | 80.0 | 71.0 | 76.0 | 75.0 | 61.0 | 65.0 | 62.0 | 67.0 | 74.0 |
| 60677 | 12 | 0.92 | 73.0 | 76.0 | 77.0 | 101.0 | 98.0 | 104.0 | 104.0 | 84.0 | 74.0 | 81.0 | 85.0 | 64.0 | 73.0 | 69.0 | 71.0 | 77.0 |
| 60677 | 13 | 1.03 | 84.0 | 90.0 | 84.0 | 120.0 | 110.0 | 117.0 | 112.0 | 91.0 | 78.0 | 87.0 | 97.0 | 72.0 | 84.0 | 83.0 | 74.0 | 74.0 |
| 60677 | 14 | 0.95 | 87.0 | 83.0 | 82.0 | 119.0 | 110.0 | 114.0 | 117.0 | 94.0 | 82.0 | 90.0 | 108.0 | 81.0 | 94.0 | 90.0 | 76.0 | 79.0 |
| 60677 | 15 | 0.93 | 89.0 | 83.0 | 87.0 | 117.0 | 110.0 | 119.0 | 113.0 | 94.0 | 82.0 | 92.0 | 113.0 | 91.0 | 103.0 | 102.0 | 77.0 | 77.0 |
| 60677 | 16 | 0.58 | 91.0 | 87.0 | 90.0 | 119.0 | 121.0 | 114.0 | 119.0 | 96.0 | 86.0 | 93.0 | 113.0 | 93.0 | 105.0 | 102.0 | 79.0 | 79.0 |
| 60677 | 17 | 0.61 | 92.0 | 90.0 | 91.0 | 107.0 | 107.0 | 116.0 | 117.0 | 98.0 | 89.0 | 94.0 | 105.0 | 102.0 | 107.0 | [illegible] | 76.0 | 73.0 |
| 60677 | 18 | 0.74 | 97.0 | 88.0 | 86.0 | 92.0 | 90.0 | 90.0 | 92.0 | 92.0 | 89.0 | 88.0 | 108.0 | 109.0 | 110.0 | 111.0 | 79.0 | 72.0 |
| 60677 | 19 | 0.26 | 85.0 | 87.0 | 86.0 | 93.0 | 91.0 | 92.0 | 94.0 | 92.0 | 86.0 | 86.0 | 96.0 | 106.0 | 102.0 | 105.0 | 78.0 | 73.0 |
| 60677 | 20 | 0.05 | 85.0 | 85.0 | 85.0 | 71.0 | 89.0 | 89.0 | 90.0 | 90.0 | 86.0 | 87.0 | 95.0 | 106.0 | 100.0 | 104.0 | 75.0 | 74.0 |
| 60677 | 21 | 0.0 | 84.0 | 78.0 | 85.0 | 81.0 | 79.0 | 70.0 | 72.0 | 86.0 | 77.0 | 84.0 | 95.0 | 103.0 | 103.0 | 107.0 | 77.0 | 71.0 |
| 60677 | 22 | 0.0 | 81.0 | 73.0 | 80.0 | 74.0 | 72.0 | 71.0 | 72.0 | 86.0 | 71.0 | 83.0 | 94.0 | 94.0 | 99.0 | 92.0 | 73.0 | 69.0 |
| 60677 | 23 | 0.0 | 76.0 | 69.0 | 74.0 | 70.0 | 69.0 | 69.0 | 70.0 | 82.0 | 69.0 | 79.0 | 94.0 | 89.0 | 95.0 | 81.0 | 73.0 | 65.0 |
| 60677 | 24 | 0.0 | 77.0 | 70.0 | 77.0 | 71.0 | 69.0 | 69.0 | 70.0 | 80.0 | 70.0 | 74.0 | 93.0 | 83.0 | 91.0 | 82.0 | 84.0 | 69.0 |
| 60777 | 1 | 0.0 | 75.0 | 71.0 | 75.0 | 72.0 | 71.0 | 71.0 | 71.0 | 80.0 | 71.0 | 78.0 | 92.0 | 77.0 | 86.0 | 74.0 | 70.0 | 65.0 |
| 60777 | 2 | 0.0 | 72.0 | 67.0 | 65.0 | 64.0 | 64.0 | 66.0 | 67.0 | 77.0 | 69.0 | 74.0 | 91.0 | 76.0 | 86.0 | 79.0 | 70.0 | 69.0 |
| 60777 | 3 | 0.0 | 69.0 | 64.0 | 67.0 | 64.0 | 64.0 | 64.0 | 64.0 | 72.0 | 64.0 | 70.0 | 90.0 | 75.0 | 79.0 | 74.0 | 67.0 | 62.0 |
| 60777 | 4 | 0.0 | 68.0 | 60.0 | 65.0 | [illegible] | 66.0 | 64.0 | 64.0 | 66.0 | 62.0 | 59.0 | 86.0 | 72.0 | 75.0 | 70.0 | 66.0 | 61.0 |
| 60777 | 5 | 0.0 | 67.0 | [illegible] | 57.0 | 65.0 | 61.0 | 62.0 | 63.0 | 70.0 | 63.0 | 69.0 | 87.0 | 71.0 | 75.0 | 70.0 | 66.0 | 64.0 |
| 60777 | 6 | 0.0 | 63.0 | 61.0 | 65.0 | [illegible] | 62.0 | 62.0 | 61.0 | 69.0 | 62.0 | 67.0 | 85.0 | 70.0 | 72.0 | 67.0 | 65.0 | 62.0 |
| 60777 | 7 | 0.04 | 66.0 | 63.0 | 66.0 | 65.0 | 67.0 | 67.0 | 54.0 | 59.0 | 63.0 | 62.0 | 83.0 | 69.0 | 72.0 | 68.0 | 65.0 | 64.0 |
| 60777 | 8 | 0.23 | 65.0 | 64.0 | 66.0 | 65.0 | 64.0 | 67.0 | 65.0 | 70.0 | 65.0 | 67.0 | 82.0 | 67.0 | 70.0 | 67.0 | 65.0 | 66.0 |
| 60777 | 9 | 0.42 | 69.0 | 69.0 | 70.0 | 71.0 | 64.0 | 71.0 | 72.0 | 72.0 | 69.0 | 70.0 | 75.0 | 70.0 | 73.0 | 69.0 | 69.0 | 69.0 |
| 60777 | 10 | 0.68 | 69.0 | 73.0 | 72.0 | 82.0 | 77.0 | 79.0 | 80.0 | 77.0 | 74.0 | 75.0 | 73.0 | 75.0 | 75.0 | 74.0 | 72.0 | 72.0 |
| 60777 | 11 | 0.41 | 76.0 | 77.0 | 77.0 | 83.0 | 82.0 | 83.0 | 84.0 | 82.0 | 77.0 | 79.0 | 77.0 | 75.0 | 75.0 | 74.0 | 75.0 | 75.0 |
| 60777 | 12 | 0.53 | 84.0 | 81.0 | 84.0 | 108.0 | 100.0 | 111.0 | 112.0 | 91.0 | 60.0 | 87.0 | 66.0 | 76.0 | 79.0 | 76.0 | 77.0 | 81.0 |
| 60777 | 13 | 0.96 | 88.0 | 64.0 | 87.0 | 119.0 | 106.0 | 120.0 | 116.0 | 95.0 | 83.0 | 91.0 | 95.0 | 77.0 | 83.0 | 80.0 | 78.0 | 84.0 |
| 60777 | 14 | 0.93 | 90.0 | 86.0 | 89.0 | 117.0 | 105.0 | 120.0 | 120.0 | 96.0 | 85.0 | 92.0 | 105.0 | 82.0 | 95.0 | 94.0 | 80.0 | 82.0 |
| 60777 | 15 | 0.96 | 94.0 | 76.0 | 97.0 | 121.0 | 112.0 | [illegible] | 121.0 | 100.0 | 97.0 | 96.0 | 110.0 | 91.0 | 101.0 | 100.0 | 82.0 | 87.0 |
| 60777 | 16 | 0.75 | 102.0 | 93.0 | 94.0 | 114.0 | 112.0 | 120.0 | 121.0 | 101.0 | 91.0 | 97.0 | 115.0 | 98.0 | 107.0 | 106.0 | 83.0 | 84.0 |
| 60777 | 17 | 0.54 | 96.0 | 92.0 | 91.0 | 100.0 | 104.0 | 116.0 | 117.0 | 100.0 | 87.0 | 91.0 | 110.0 | 101.0 | 109.0 | 109.0 | 82.0 | 86.0 |
| 60777 | 18 | 0.38 | 91.0 | 92.0 | 91.0 | 96.0 | 94.0 | 97.0 | 98.0 | 95.0 | 71.0 | 92.0 | 110.0 | 107.0 | 111.0 | 112.0 | 83.0 | 86.0 |
| 60777 | 19 | 0.11 | 85.0 | 90.0 | 90.0 | 93.0 | 94.0 | 94.0 | 95.0 | 95.0 | 80.0 | 90.0 | 105.0 | 107.0 | 111.0 | 112.0 | 83.0 | 84.0 |
| 60777 | 20 | 0.03 | 85.0 | 83.0 | 88.0 | 90.0 | 87.0 | 77.0 | 90.0 | 93.0 | 80.0 | 91.0 | 111.0 | 100.0 | 109.0 | 106.0 | 82.0 | 82.0 |
| 60777 | 21 | 0.0 | 86.0 | 74.0 | 86.0 | 82.0 | 80.0 | 79.0 | 82.0 | 92.0 | 76.0 | 87.0 | 109.0 | 94.0 | 104.0 | 97.0 | 81.0 | 79.0 |
| 60777 | 22 | 0.0 | 82.0 | 77.0 | 87.0 | 75.0 | 72.0 | 71.0 | 72.0 | 87.0 | 70.0 | 84.0 | 110.0 | 99.0 | 100.0 | 91.0 | 78.0 | 73.0 |
| 60777 | 23 | 0.0 | 79.0 | 69.0 | 79.0 | 71.0 | 69.0 | 67.0 | 70.0 | 85.0 | 68.0 | 81.0 | 108.0 | 87.0 | 95.0 | 84.0 | 74.0 | [illegible] |
| 60777 | 24 | 0.0 | 78.0 | 67.0 | 77.0 | 70.0 | 68.0 | 68.0 | 69.0 | 82.0 | 61.0 | 79.0 | 106.0 | 85.0 | 92.0 | 83.0 | 73.0 | 69.0 |
| 60877 | 1 | 0.0 | 75.0 | 66.0 | 75.0 | 69.0 | 67.0 | 67.0 | 68.0 | 80.0 | 65.0 | 77.0 | 106.0 | 82.0 | 85.0 | 80.0 | 71.0 | [illegible] |
| 60877 | 2 | 0.0 | 73.0 | 66.0 | 74.0 | 67.0 | 60.0 | 60.0 | 62.0 | 73.0 | 60.0 | 74.0 | 103.0 | 79.0 | 84.0 | 76.0 | 69.0 | 61.0 |
| 60877 | 3 | 0.0 | 71.0 | 60.0 | 71.0 | 67.0 | 64.0 | 65.0 | 67.0 | 77.0 | 64.0 | 74.0 | 107.0 | 77.0 | 81.0 | 75.0 | 69.0 | [illegible] |
| 60877 | 4 | 0.0 | 70.0 | 65.0 | 70.0 | 66.0 | 65.0 | 64.0 | 65.0 | 75.0 | 64.0 | 73.0 | 96.0 | 75.0 | 81.0 | 71.0 | 59.0 | 61.0 |
| 60877 | 5 | 0.0 | 69.0 | 64.0 | 69.0 | 65.0 | 61.0 | 63.0 | 54.0 | 74.0 | 62.0 | 71.0 | 96.0 | 73.0 | 74.0 | 72.0 | 67.0 | 62.0 |
| 60877 | 6 | 0.0 | 67.0 | 63.0 | 67.0 | 65.0 | 63.0 | 63.0 | 54.0 | 71.0 | 62.0 | 70.0 | 72.0 | 69.0 | 74.0 | 69.0 | 67.0 | 65.0 |
| 60877 | 7 | 0.0 | 67.0 | 66.0 | 61.0 | 64.0 | 65.0 | 67.0 | 63.0 | 73.0 | 65.0 | 70.0 | 87.0 | 70.0 | 73.0 | 69.0 | 67.0 | 60.0 |
| 60877 | 8 | 0.07 | 67.0 | 61.0 | 49.0 | 69.0 | 67.0 | 67.0 | 70.0 | 72.0 | 66.0 | 70.0 | 84.0 | 69.0 | 72.0 | 68.0 | 68.0 | 67.0 |
| 60877 | 9 | 0.42 | 70.0 | 73.0 | 71.0 | 79.0 | 77.0 | 78.0 | 79.0 | 77.0 | 73.0 | 75.0 | 73.0 | 77.0 | 77.0 | 76.0 | 70.0 | 71.0 |
| 60877 | 10 | 0.76 | 73.0 | 76.0 | 75.0 | 87.0 | 85.0 | 84.0 | 95.0 | 82.0 | 76.0 | 79.0 | 75.0 | 75.0 | 74.0 | 74.0 | 74.0 | 75.0 |
| 60877 | 11 | 0.50 | 78.0 | 79.0 | 78.0 | 91.0 | 89.0 | 80.0 | 89.0 | 84.0 | 77.0 | 81.0 | 83.0 | 74.0 | 75.0 | 74.0 | 75.0 | 76.0 |
| 60877 | 12 | 0.82 | 81.0 | 90.0 | 80.0 | 97.0 | 95.0 | 97.0 | 100.0 | 88.0 | 81.0 | 85.0 | 90.0 | 95.0 | 81.0 | 79.0 | 77.0 | 79.0 |
| 60877 | 13 | 0.46 | 83.0 | 83.0 | 93.0 | 104.0 | 100.0 | 104.0 | 106.0 | 91.0 | 81.0 | 83.0 | 95.0 | 90.0 | 87.0 | 84.0 | 80.0 | 87.0 |
| 60877 | 14 | 0.38 | 82.0 | 85.0 | 82.0 | 93.0 | 92.0 | 93.0 | 94.0 | 90.0 | 84.0 | 86.0 | 98.0 | 86.0 | 92.0 | 91.0 | 80.0 | 81.0 |
| 60877 | 15 | 0.20 | 82.0 | 83.0 | 81.0 | 92.0 | 90.0 | 90.0 | 92.0 | 88.0 | 83.0 | 85.0 | 96.0 | 86.0 | 92.0 | 91.0 | 79.0 | 80.0 |
| 60877 | 16 | 0.52 | 93.0 | 84.0 | 85.0 | 98.0 | 93.0 | 101.0 | 104.0 | 93.0 | 80.0 | 89.0 | 100.0 | 86.0 | 86.0 | 86.0 | 76.0 | 82.0 |
| 60877 | 17 | 0.44 | 86.0 | 82.0 | 85.0 | 93.0 | 101.0 | 112.0 | 119.0 | 95.0 | 87.0 | 91.0 | 104.0 | 90.0 | 93.0 | 92.0 | 82.0 | 95.0 |
| 60877 | 18 | 0.42 | 87.0 | 87.0 | 87.0 | 94.0 | 91.0 | 95.0 | 99.0 | 93.0 | 68.0 | 69.0 | 106.0 | 93.0 | 100.0 | 97.0 | 83.0 | 90.0 |
| 60877 | 19 | 0.22 | 87.0 | 90.0 | 80.0 | 94.0 | 90.0 | 91.0 | 93.0 | 92.0 | 89.0 | 93.0 | 100.0 | 96.0 | 100.0 | 100.0 | 82.0 | 87.0 |
| 60877 | 20 | 0.01 | 80.0 | 81.0 | 84.0 | 91.0 | 70.0 | 90.0 | 91.0 | 91.0 | 83.0 | 84.0 | 98.0 | 97.0 | 95.0 | 97.0 | 80.0 | 74.0 |
| 60877 | 21 | 0.0 | 85.0 | 81.0 | 85.0 | 84.0 | 62.0 | 80.0 | 87.0 | 90.0 | 78.0 | 87.0 | 95.0 | 94.0 | 95.0 | 100.0 | 82.0 | 75.0 |
| 60877 | 22 | 0.0 | 81.0 | 72.0 | 81.0 | 74.0 | 71.0 | 71.0 | 72.0 | 86.0 | 71.0 | 84.0 | 95.0 | 96.0 | 99.0 | 97.0 | 77.0 | 71.0 |
| 60877 | 23 | 0.0 | 79.0 | 70.0 | 79.0 | 71.0 | 70.0 | 69.0 | 70.0 | 90.0 | 68.0 | 82.0 | 94.0 | 91.0 | 95.0 | 91.0 | 75.0 | 70.0 |
| 60877 | 24 | 0.0 | 76.0 | 70.0 | 76.0 | 71.0 | 70.0 | 70.0 | 71.0 | 82.0 | 69.0 | 79.0 | 96.0 | 86.0 | 97.0 | 85.0 | 74.0 | 69.0 |
| 60977 | 1 | 0.0 | 75.0 | [illegible] | 75.0 | 77.0 | 70.0 | 70.0 | 69.0 | 80.0 | 64.0 | 77.0 | 93.0 | 82.0 | 88.0 | 81.0 | 73.0 | 69.0 |
| 60977 | 2 | 0.0 | 74.0 | 70.0 | 71.0 | 71.0 | 67.0 | 69.0 | 69.0 | 78.0 | 69.0 | 76.0 | 92.0 | 71.0 | 82.0 | 77.0 | 71.0 | 67.0 |
| 60977 | 3 | 0.0 | 72.0 | 69.0 | 70.0 | 70.0 | 68.0 | 68.0 | 69.0 | 77.0 | 67.0 | 75.0 | 92.0 | 73.0 | 82.0 | 74.0 | 71.0 | 67.0 |
| 60977 | 4 | 0.0 | 71.0 | 68.0 | 69.0 | 70.0 | 68.0 | 66.0 | 67.0 | 75.0 | 69.0 | 73.0 | 90.0 | 75.0 | 79.0 | 75.0 | 70.0 | 67.0 |
| 60977 | 5 | 0.0 | 70.0 | 60.0 | 68.0 | 68.0 | 67.0 | 67.0 | 68.0 | 73.0 | 67.0 | 71.0 | 87.0 | 73.0 | 75.0 | 72.0 | 69.0 | 66.0 |
| 60977 | 6 | 0.0 | 69.0 | 67.0 | 70.0 | 60.0 | 65.0 | 65.0 | 65.0 | 74.0 | 67.0 | 70.0 | 85.0 | 70.0 | 74.0 | 70.0 | 66.0 | 61.0 |
| 60977 | 7 | 0.0 | 67.0 | 60.0 | 65.0 | 68.0 | 65.0 | 59.0 | 71.0 | 72.0 | 65.0 | 70.0 | 84.0 | 71.0 | 73.0 | 70.0 | 67.0 | 60.0 |
| 60977 | 8 | 0.08 | 67.0 | 65.0 | 69.0 | 70.0 | 68.0 | 70.0 | 72.0 | 73.0 | 67.0 | 71.0 | 82.0 | 71.0 | 71.0 | 69.0 | 67.0 | 66.0 |
| 60977 | 9 | 0.11 | 59.0 | 69.0 | 73.0 | 71.0 | 69.0 | 70.0 | 76.0 | 72.0 | 71.0 | 71.0 | 73.0 | 72.0 | 75.0 | 77.0 | 59.0 | 63.0 |
| 60977 | 16 | 0.18 | 70.0 | 73.0 | 71.0 | 75.0 | 74.0 | 75.0 | 76.0 | 76.0 | 73.0 | 73.0 | 73.0 | 75.0 | 75.0 | 75.0 | 71.0 | 70.0 |

Table D. Continued

PYRANOMETER (DRY) READINGS, CAL/SQ-CM-MIN ,AND TEMPERATURES (T),°F, AT POINT NUMBER

| DATE | HOUR | PYR | T(1) | T(2) | T(3) | T(4) | T(5) | T(6) | T(7) | T(8) | T(9) | T(10) | T(11) | T(12) | T(13) | T(14) | T(15) | T(16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80977 | 11 | 0.51 | 71.0 | 73.0 | 72.0 | 76.0 | 75.0 | 75.0 | 76.0 | 76.0 | 74.0 | 76.0 | 75.0 | 74.0 | 73.0 | 72.0 | 72.0 | 71.0 |
| 80977 | 12 | 0.73 | 76.0 | 78.0 | 76.0 | 93.0 | 88.0 | 93.0 | 93.0 | 65.0 | 78.0 | 82.0 | 80.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 80977 | 13 | 0.78 | 81.0 | 80.0 | 81.0 | 106.0 | 96.0 | 107.0 | 105.0 | 88.0 | 80.0 | 85.0 | 86.0 | 76.0 | 78.0 | 77.0 | 77.0 | 77.0 |
| 80977 | 14 | 0.90 | 84.0 | 83.0 | 87.0 | 112.0 | 102.0 | 111.0 | 104.0 | 95.0 | 82.0 | 91.0 | [illegible] | 78.0 | 84.0 | 82.0 | 79.0 | 79.0 |
| 80977 | 15 | 0.84 | 91.0 | 86.0 | 91.0 | 117.0 | 106.0 | 115.0 | 120.0 | 97.0 | 86.0 | 93.0 | 105.0 | 83.0 | 93.0 | 89.0 | 81.0 | 82.0 |
| 80977 | 16 | 0.58 | 87.0 | 87.0 | 87.0 | 103.0 | 96.0 | 101.0 | 102.0 | 93.0 | 87.0 | 90.0 | 109.0 | 70.0 | 100.0 | 97.0 | 81.0 | 84.0 |
| 80977 | 17 | 0.38 | 82.0 | 81.0 | 81.0 | 84.0 | 85.0 | 102.0 | 105.0 | 84.0 | 76.0 | 83.0 | 101.0 | 85.0 | 96.0 | 93.0 | 76.0 | 91.0 |
| 80977 | 18 | 0.42 | 86.0 | 85.0 | 85.0 | 93.0 | 89.0 | 99.0 | 109.0 | 91.0 | 80.0 | 87.0 | 106.0 | 86.0 | 95.0 | 91.0 | 81.0 | [illegible] |
| 80977 | 19 | 0.22 | 82.0 | 80.0 | 82.0 | 89.0 | 84.0 | 88.0 | 93.0 | 89.0 | 78.0 | 85.0 | 104.0 | 81.0 | 89.0 | 89.0 | 81.0 | 67.0 |
| 80977 | 20 | 0.04 | 81.0 | 76.0 | 91.0 | 83.0 | 79.0 | 80.0 | 84.0 | 87.0 | 75.0 | 83.0 | 104.0 | 82.0 | 87.0 | 92.0 | 80.0 | 79.0 |
| 80977 | 21 | 0.0 | 78.0 | 72.0 | 72.0 | 74.0 | 72.0 | 72.0 | 73.0 | 84.0 | 71.0 | 82.0 | 103.0 | 82.0 | 85.0 | 82.0 | 77.0 | 75.0 |
| 80977 | 22 | 0.0 | 79.0 | 72.0 | 75.0 | 75.0 | 73.0 | 72.0 | 73.0 | 84.0 | 71.0 | 82.0 | 103.0 | 82.0 | 86.0 | 82.0 | 78.0 | 74.0 |
| 80977 | 23 | 0.0 | 77.0 | 70.0 | 77.0 | 71.0 | 70.0 | 69.0 | 70.0 | 87.0 | 69.0 | 80.0 | 102.0 | 81.0 | 84.0 | 80.0 | 75.0 | 76.0 |
| 81077 | 24 | 0.0 | 75.0 | 69.0 | 75.0 | 71.0 | 69.0 | 69.0 | 70.0 | 80.0 | 68.0 | 78.0 | 100.0 | 80.0 | 83.0 | 79.0 | 73.0 | 79.0 |
| 81077 | 1 | 0.0 | 74.0 | 67.0 | 73.0 | 69.0 | 67.0 | 67.0 | 69.0 | 79.0 | 67.0 | 76.0 | 98.0 | 76.0 | 81.0 | 77.0 | 71.0 | [illegible] |
| 81077 | 2 | 0.0 | 71.0 | 66.0 | 71.0 | 68.0 | 60.0 | 61.0 | 62.0 | 76.0 | 66.0 | 73.0 | 92.0 | 74.0 | 76.0 | 72.0 | 70.0 | [illegible] |
| 81077 | 3 | 0.0 | 71.0 | 70.0 | 71.0 | 71.0 | 69.0 | 69.0 | 71.0 | 76.0 | 69.0 | 74.0 | 94.0 | 75.0 | 77.0 | 73.0 | 64.0 | [illegible] |
| 81077 | 4 | 0.0 | 71.0 | 68.0 | 69.0 | 66.0 | 64.0 | 65.0 | 66.0 | 74.0 | 65.0 | 71.0 | 90.0 | 72.0 | 74.0 | 70.0 | 67.0 | 67.0 |
| 81077 | 5 | 0.0 | 68.0 | 65.0 | 68.0 | 66.0 | 59.0 | 60.0 | 62.0 | 71.0 | 61.0 | 69.0 | 84.0 | 71.0 | 71.0 | 69.0 | 65.0 | 58.0 |
| 81077 | 6 | 0.0 | 66.0 | 61.0 | 66.0 | 63.0 | 59.0 | 60.0 | 61.0 | 70.0 | 53.0 | 61.0 | 85.0 | 69.0 | 71.0 | 66.0 | 62.0 | 57.0 |
| 81077 | 7 | 0.0 | 62.0 | 57.0 | 62.0 | 60.0 | 56.0 | 57.0 | 59.0 | 68.0 | 57.0 | 65.0 | 83.0 | 67.0 | 69.0 | 65.0 | 63.0 | 57.0 |
| 81077 | 8 | 0.25 | 61.0 | 59.0 | 61.0 | 63.0 | 58.0 | 58.0 | 61.0 | 65.0 | 57.0 | 64.0 | 80.0 | 65.0 | 68.0 | 65.0 | 59.0 | [illegible] |
| 81077 | 9 | 0.49 | 61.0 | 60.0 | 61.0 | 64.0 | 62.0 | 62.0 | 64.0 | 69.0 | 64.0 | 66.0 | 67.0 | 71.0 | 72.0 | 70.0 | 62.0 | [illegible] |
| 81077 | 10 | 0.67 | 66.0 | 67.0 | 67.0 | 82.0 | 75.0 | 75.0 | 76.0 | 74.0 | 67.0 | 70.0 | 69.0 | 70.0 | 67.0 | 67.0 | 64.0 | 65.0 |
| 81077 | 11 | 0.90 | 72.0 | 70.0 | 72.0 | 97.0 | 89.0 | 83.0 | 86.0 | 80.0 | 69.0 | 76.0 | 75.0 | 67.0 | 67.0 | 67.0 | 66.0 | [illegible] |
| 81077 | 12 | 0.65 | 73.0 | 70.0 | 75.0 | 65.0 | 92.0 | 86.0 | 82.0 | 79.0 | 70.0 | 76.0 | 83.0 | 67.0 | 73.0 | 71.0 | 67.0 | [illegible] |
| 81077 | 13 | 0.31 | 72.0 | 70.0 | 73.0 | 86.0 | 76.0 | 78.0 | 81.0 | 78.0 | 71.0 | 75.0 | 87.0 | 73.0 | 80.0 | 80.0 | 67.0 | [illegible] |
| 81077 | 14 | 0.26 | 71.0 | 72.0 | 72.0 | 79.0 | 78.0 | 76.0 | 78.0 | 77.0 | 71.0 | 73.0 | 87.0 | 74.0 | 77.0 | 78.0 | [illegible] | [illegible] |
| 81077 | 15 | 0.25 | 67.0 | 65.0 | 65.0 | 66.0 | 72.0 | 75.0 | 85.0 | 76.0 | 67.0 | 72.0 | 79.0 | 77.0 | 79.0 | 80.0 | 65.0 | 65.0 |
| 81077 | 16 | 0.30 | 74.0 | 70.0 | 70.0 | 81.0 | 75.0 | 77.0 | 84.0 | 77.0 | 63.0 | 71.0 | 80.0 | 77.0 | 80.0 | 75.0 | 64.0 | [illegible] |
| 81077 | 17 | 0.14 | 70.0 | 71.0 | 71.0 | 82.0 | 76.0 | 74.0 | 85.0 | 77.0 | 67.0 | 73.0 | 80.0 | 73.0 | 78.0 | 75.0 | 56.0 | [illegible] |
| 81077 | 18 | 0.24 | 69.0 | 70.0 | 70.0 | 77.0 | 73.0 | 73.0 | 74.0 | 75.0 | 66.0 | 71.0 | 80.0 | 71.0 | 75.0 | 71.0 | 65.0 | [illegible] |
| 81077 | 19 | 0.12 | [illegible] | 69.0 | 69.0 | 78.0 | 74.0 | 75.0 | 87.0 | 79.0 | [illegible] | 70.0 | 79.0 | 69.0 | 72.0 | 69.0 | 66.0 | [illegible] |
| 81077 | 20 | 0.04 | 64.0 | 68.0 | 69.0 | 70.0 | 72.0 | 72.0 | 76.0 | 75.0 | 66.0 | 70.0 | 79.0 | 69.0 | 71.0 | 68.0 | 67.0 | [illegible] |
| 81077 | 21 | 0.0 | 67.0 | [illegible] | 66.0 | 67.0 | 65.0 | 65.0 | 67.0 | 71.0 | 69.0 | 69.0 | 79.0 | 69.0 | 71.0 | 67.0 | 65.0 | [illegible] |
| 81077 | 22 | 0.0 | 64.0 | 60.0 | 64.0 | 62.0 | 60.0 | 59.0 | 60.0 | [illegible] | 60.0 | 66.0 | 78.0 | 67.0 | 69.0 | 60.0 | 64.0 | [illegible] |
| 81077 | 23 | 0.0 | 63.0 | 59.0 | 63.0 | 60.0 | 57.0 | 57.0 | 57.0 | 58.0 | 53.0 | 61.0 | 77.0 | 67.0 | 65.0 | 60.0 | 62.0 | [illegible] |
| 81177 | 24 | 0.0 | 60.0 | 56.0 | 60.0 | 57.0 | 55.0 | 55.0 | 55.0 | 65.0 | 55.0 | 63.0 | 75.0 | 64.0 | 67.0 | 66.0 | 59.0 | 55.0 |
| 81177 | 1 | 0.0 | 60.0 | 56.0 | 59.0 | 57.0 | 55.0 | 55.0 | 55.0 | 64.0 | 55.0 | 62.0 | 75.0 | 64.0 | 55.0 | 67.0 | 55.0 | 55.0 |
| 81177 | 2 | 0.0 | 59.0 | 57.0 | 59.0 | 57.0 | 55.0 | 55.0 | 57.0 | 64.0 | 56.0 | 62.0 | 75.0 | 64.0 | 65.0 | 62.0 | 58.0 | 55.0 |
| 81177 | 3 | 0.0 | 59.0 | 55.0 | 58.0 | 57.0 | 54.0 | 54.0 | 55.0 | 63.0 | 55.0 | 41.0 | 74.0 | 62.0 | 65.0 | 61.0 | 56.0 | 53.0 |
| 81177 | 4 | 0.0 | 55.0 | 54.0 | 57.0 | 55.0 | 52.0 | 53.0 | 54.0 | 61.0 | 53.0 | 59.0 | 71.0 | 61.0 | 63.0 | 60.0 | 56.0 | 52.0 |
| 81177 | 5 | 0.0 | 55.0 | 52.0 | 56.0 | 55.0 | 51.0 | 49.0 | 49.0 | 58.0 | 52.0 | 57.0 | 69.0 | 59.0 | 60.0 | 58.0 | 53.0 | 49.0 |
| 81177 | 6 | 0.0 | 54.0 | 51.0 | 54.0 | 52.0 | 50.0 | 50.0 | 51.0 | 59.0 | 50.0 | 55.0 | 67.0 | 57.0 | 59.0 | 57.0 | 52.0 | 48.0 |
| 81177 | 7 | 0.0 | 52.0 | 49.0 | 52.0 | 53.0 | 47.0 | 49.0 | 50.0 | 56.0 | 49.0 | 55.0 | 66.0 | 57.0 | 58.0 | 56.0 | 51.0 | 49.0 |
| 81177 | 8 | 0.27 | 52.0 | 50.0 | 57.0 | 54.0 | 57.0 | 52.0 | 54.0 | 56.0 | 50.0 | 54.0 | 56.0 | 56.0 | 57.0 | 55.0 | 52.0 | 52.0 |
| 81177 | 9 | 0.47 | 54.0 | 58.0 | 56.0 | 63.0 | 60.0 | 62.0 | 62.0 | 61.0 | 57.0 | 58.0 | 55.0 | 59.0 | 54.0 | 59.0 | 56.0 | 55.0 |
| 81177 | 10 | 0.72 | 61.0 | 62.0 | 61.0 | 77.0 | 69.0 | 68.0 | 69.0 | 65.0 | 62.0 | 64.0 | 60.0 | 54.0 | 57.0 | 57.0 | 50.0 | 62.0 |
| 81177 | 11 | 0.84 | 63.0 | 64.0 | 63.0 | 82.0 | 72.0 | 73.0 | 75.0 | 67.0 | 62.0 | 67.0 | 61.0 | 55.0 | 56.0 | 55.0 | 60.0 | 63.0 |
| 81177 | 12 | 1.00 | 65.0 | 64.0 | 65.0 | 90.0 | 86.0 | 78.0 | 78.0 | 79.0 | 65.0 | 69.0 | 63.0 | 66.0 | 57.0 | 56.0 | 62.0 | 66.0 |
| 81177 | 13 | 1.06 | 74.0 | 74.0 | 75.0 | 103.0 | 99.0 | 105.0 | 108.0 | 85.0 | 71.0 | 80.0 | 93.0 | 62.0 | 70.0 | 67.0 | 58.0 | 69.0 |
| 81177 | 14 | 1.03 | 82.0 | 78.0 | 82.0 | 116.0 | 106.0 | 112.0 | 109.0 | 89.0 | 76.0 | 85.0 | 97.0 | 69.0 | 83.0 | 74.0 | 71.0 | 72.0 |
| 81177 | 15 | 0.98 | 85.0 | 82.0 | 85.0 | 119.0 | 112.0 | 118.0 | 116.0 | 92.0 | 80.0 | 87.0 | 105.0 | 79.0 | 94.0 | 90.0 | 73.0 | 75.0 |
| 81177 | 16 | 0.84 | 90.0 | 85.0 | 88.0 | 119.0 | 111.0 | 115.0 | 121.0 | 96.0 | 83.0 | 92.0 | 112.0 | 90.0 | 102.0 | 100.0 | 75.0 | 77.0 |
| 81177 | 17 | 0.67 | 90.0 | 87.0 | 89.0 | 106. | 107.0 | 108.0 | 108.0 | 95.0 | 85.0 | 97.0 | 114.0 | 98.0 | 107.0 | 106.0 | 75.0 | 73.0 |
| 81177 | 18 | 0.45 | 87.0 | 86.0 | 86.0 | 91.0 | 96.0 | 102.0 | 105.0 | 91.0 | 85.0 | 88.0 | 111.0 | 103.0 | 109.0 | 110.0 | 75.0 | 77.0 |
| 81177 | 19 | 0.24 | 84.0 | 88.0 | 84.0 | 87.0 | 87.0 | 91.0 | 92.0 | 89.0 | 84.0 | 85.0 | 103.0 | 105.0 | 106.0 | 108.0 | 75.0 | 76.0 |
| 81177 | 20 | 0.05 | 82.0 | 83.0 | 82.0 | 86.0 | 85.0 | 86.0 | 87.0 | 87.0 | 83.0 | [illegible] | 95.0 | 104.0 | 100.0 | 102.0 | 75.0 | 75.0 |
| 81177 | 21 | 0.0 | 78.0 | 79.0 | 79.0 | 91.0 | 79.0 | 79.0 | 81.0 | 82.0 | 79.0 | 80.0 | 87.0 | 94.0 | 91.0 | 96.0 | 72.0 | 73.0 |
| 81177 | 22 | 0.0 | 76.0 | 77.0 | 76.0 | 76.0 | 74.0 | 75.0 | 76.0 | 80.0 | 76.0 | 77.0 | 84.0 | 93.0 | 86.0 | [illegible] | 70.0 | [illegible] |
| 81177 | 23 | 0.0 | 73.0 | 74.0 | 74.0 | 74.0 | 71.0 | 72.0 | 74.0 | 78.0 | 74.0 | 75.0 | 78.0 | 86.0 | 90.0 | 92.0 | 67.0 | 64.0 |
| 81277 | 24 | 0.0 | 70.0 | 71.0 | 71.0 | 70.0 | 68.0 | 68.0 | 70.0 | 74.0 | 70.0 | 77.0 | 74.0 | [illegible] | 74.0 | 76.0 | 65.0 | 61.0 |
| 81277 | 1 | 0.0 | 67.0 | 64.0 | 64.0 | 69.0 | 66.0 | 66.0 | 67.0 | 72.0 | 64.0 | 64.0 | 73.0 | 75.0 | 70.0 | 72.0 | 62.0 | [illegible] |
| 81277 | 2 | 0.0 | 65.0 | 60.0 | 65.0 | 61.0 | 59.0 | 59.0 | 60.0 | 70.0 | 59.0 | 68.0 | 71.0 | 80.0 | 75.0 | 76.0 | 62.0 | 59.0 |
| 81277 | 3 | 0.0 | 64.0 | 60.0 | 64.0 | 61.0 | 53.0 | 59.0 | 60.0 | 69.0 | 50.0 | 66.0 | 70.0 | 77.0 | 75.0 | 74.0 | 61.0 | 58.0 |
| 81277 | 4 | 0.0 | 62.0 | 60.0 | 62.0 | 62.0 | 59.0 | 59.0 | 61.0 | 67.0 | 59.0 | 65.0 | 70.0 | 71.0 | 73.0 | 69.0 | 61.0 | 61.0 |
| 81277 | 5 | 0.0 | 61.0 | 59.0 | 61.0 | 61.0 | 58.0 | 57.0 | 57.0 | 64.0 | 57.0 | 62.0 | 68.0 | 69.0 | 68.0 | 64.0 | 60.0 | [illegible] |
| 81277 | 6 | 0.0 | 60.0 | 58.0 | 60.0 | 60.0 | 57.0 | 57.0 | 56.0 | 65.0 | 57.0 | 62.0 | 67.0 | 63.0 | 65.0 | 61.0 | 60.0 | 57.0 |
| 81277 | 7 | 0.02 | 60.0 | 59.0 | 63.0 | 60.0 | 58.0 | 53.0 | 55.0 | 65.0 | 57.0 | 63.0 | 69.0 | 64.0 | 67.0 | 62.0 | 59.0 | 59.0 |
| 81277 | 8 | 0.18 | 60.0 | 59.0 | 59.0 | 63.0 | 61.0 | 62.0 | 65.0 | 65.0 | 59.0 | 62.0 | 68.0 | 61.0 | 64.0 | 61.0 | 61.0 | 61.0 |
| 81277 | 9 | 0.50 | 64.0 | 67.0 | 65.0 | 73.0 | 70.0 | 71.0 | 73.0 | 71.0 | 67.0 | 65.0 | 65.0 | 65.0 | 66.0 | 63.0 | 65.0 | 63.0 |
| 81277 | 10 | 0.71 | 70.0 | 71.0 | 71.0 | 84.0 | 82.0 | 80.0 | 81.0 | 77.0 | 71.0 | 74.0 | 71.0 | 65.0 | 55.0 | 65.0 | 70.0 | 73.0 |
| 81277 | 11 | 0.87 | 72.0 | 74.0 | 72.0 | 93.0 | 85.0 | 81.0 | 91.0 | 84.0 | 75.0 | 61.0 | 80.0 | 61.0 | 69.0 | 67.0 | 74.0 | 77.0 |
| 81277 | 12 | 0.77 | 74.0 | 74.0 | 80.0 | 104.0 | 100.0 | 91.0 | 97.0 | 86.0 | 77.0 | 83.0 | 83.0 | 76.0 | 71.0 | 69.0 | 77.0 | [illegible] |
| 81277 | 13 | 1.04 | 87.0 | 85.0 | 87.0 | 115.0 | 110.0 | 121.0 | 121.0 | 99.0 | 87.0 | 95.0 | 106.0 | 78.0 | 92.0 | 87.0 | 83.0 | [illegible] |
| 81277 | 14 | 1.02 | 92.0 | 89.0 | 91.0 | 127.0 | 110.0 | 122.0 | 121.0 | 100.0 | 87.0 | 94.0 | 109.0 | 86.0 | 102.0 | 97.0 | 84.0 | 87.0 |
| 81277 | 15 | 0.74 | 96.0 | 93.0 | 95.0 | 123.0 | 121.0 | 125.0 | 127.0 | 103.0 | 92.0 | 100.0 | 118.0 | 97.0 | 119.0 | 107.0 | 85.0 | 87.0 |
| 81277 | 16 | 0.82 | 99.0 | 95.0 | 93.0 | 128.0 | 122.0 | 127.0 | 132.0 | 105.0 | 94.0 | 102.0 | 122.0 | 130.0 | 113.0 | 110.0 | 84.0 | [illegible] |
| 81277 | 17 | 0.65 | 97.0 | [illegible] | 100.0 | 115.0 | 117.0 | 128.0 | 129.0 | 106.0 | 97.0 | 107.0 | 124.0 | 107.0 | 118.0 | 108.0 | 89.0 | 91.0 |
| 81277 | 18 | 0.44 | 99.0 | 99.0 | 98.0 | 105.0 | 110.0 | 115.0 | 118.0 | 104.0 | 97.0 | 101.0 | 125.0 | 113.0 | 121.0 | 117.0 | 50.0 | [illegible] |
| 81277 | 19 | 0.22 | 96.0 | 98.0 | 96.0 | 101.0 | 100.0 | 103.0 | 105.0 | 101.0 | 97.0 | 98.0 | 107.0 | 104.0 | 108.0 | 120.0 | 57.0 | [illegible] |
| 81277 | 20 | 0.04 | 93.0 | 95.0 | 94.0 | 99.0 | 97.0 | 97.0 | 100.0 | 100.0 | 95.0 | 96.0 | 107.0 | 117.0 | 113.0 | 116.0 | 87.0 | 85.0 |
| 81277 | 21 | 0.0 | 91.0 | 89.0 | 91.0 | 92.0 | 89.0 | 88.0 | 90.0 | 95.0 | 85.0 | 93.0 | 109.0 | 113.0 | 107.0 | 110.0 | 83.0 | 81.0 |
| 81277 | 22 | 0.0 | 87.0 | 76.0 | 87.0 | 79.0 | 76.0 | 75.0 | 77.0 | 92.0 | 74.0 | 90.0 | 100.0 | 112.0 | 111.0 | 112.0 | 82.0 | 75.0 |
| 81277 | 23 | 0.0 | 85.0 | 75.0 | 84.0 | 77.0 | 74.0 | 73.0 | 75.0 | 90.0 | 72.0 | 87.0 | 100.0 | 98.0 | 103.0 | 96.0 | 76.0 | 71.0 |
| 81377 | 24 | 0.0 | [illegible] | 72.0 | 81.0 | 74.0 | 71.0 | 71.0 | 73.0 | 86.0 | 70.0 | 83.0 | 98.0 | 97.0 | 104.0 | 93.0 | 77.0 | 71.0 |
| 81377 | 1 | 0.0 | 79.0 | 71.0 | 79.0 | 75.0 | 72.0 | 72.0 | 74.0 | 85.0 | 70.0 | 82.0 | 98.0 | 91.0 | 99.0 | 89.0 | 76.0 | 72.0 |
| 81377 | 2 | 0.0 | 77.0 | 69.0 | 76.0 | 70.0 | 67.0 | 67.0 | 70.0 | 82.0 | 67.0 | 79.0 | 96.0 | 86.0 | 94.0 | 84.0 | 73.0 | 67.0 |

Table D. Continued

PYRANOMETER (PRY) READINGS, CAL/SQ-CM-MIN ,AND TEMPERATURES (T),°F, AT POINT NUMBER

| DATE | HOUR | PYR | T(1) | T(2) | T(3) | T(4) | T(5) | T(6) | T(7) | T(8) | T(9) | T(10) | T(11) | T(12) | T(13) | T(14) | T(15) | T(16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 81377 | 3 | 0.0 | 74.0 | 65.0 | 73.0 | 67.0 | 65.0 | 65.0 | 66.0 | 78.0 | 64.0 | 66.0 | 91.0 | 82.0 | 90.0 | 80.0 | 68.0 | 62.0 |
| 81377 | 4 | 0.0 | 71.0 | 63.0 | 71.0 | 66.0 | 63.0 | 53.0 | 65.0 | 76.0 | 62.0 | 74.0 | 91.0 | 79.0 | 81.0 | 77.0 | 64.0 | 62.0 |
| 81377 | 5 | 0.0 | 70.0 | 64.0 | 69.0 | 65.0 | 62.0 | 60.0 | 61.0 | 71.0 | 60.0 | 69.0 | 86.0 | 72.0 | 81.0 | 72.0 | 65.0 | 63.0 |
| 81377 | 6 | 0.0 | 67.0 | 62.0 | 67.0 | 65.0 | 62.0 | 62.0 | 64.0 | 72.0 | 61.0 | 56.0 | 82.0 | 70.0 | 77.0 | 70.0 | 63.0 | 57.0 |
| 81377 | 7 | 0.02 | 65.0 | 60.0 | 65.0 | 61.0 | 59.0 | 59.0 | 60.0 | 70.0 | 59.0 | 68.0 | 83.0 | 71.0 | 72.0 | 59.0 | 62.0 | 56.0 |
| 81377 | 8 | 0.22 | 64.0 | 59.0 | 63.0 | 65.0 | 60.0 | 61.0 | 63.0 | 60.0 | 57.0 | 66.0 | 79.0 | 68.0 | 74.0 | 67.0 | 61.0 | 57.0 |
| 81377 | 9 | 0.39 | 64.0 | 60.0 | 63.0 | 66.0 | 62.0 | 62.0 | 65.0 | 68.0 | 65.0 | 68.0 | 70.0 | 71.0 | 71.0 | 70.0 | 63.0 | 51.0 |
| 81377 | 10 | 0.62 | 67.0 | 73.0 | 65.0 | 87.0 | 83.0 | 77.0 | 85.0 | 75.0 | 67.0 | 72.0 | 67.0 | 73.0 | 73.0 | 70.0 | 66.0 | 66.0 |
| 81377 | 11 | 0.87 | 75.0 | 75.0 | 76.0 | 104.0 | 96.0 | 85.0 | 91.0 | 83.0 | 73.0 | 79.0 | 79.0 | 70.0 | 70.0 | 69.0 | 69.0 | 70.0 |
| 81377 | 12 | 0.90 | 79.0 | 77.0 | 75.0 | 107.0 | 102.0 | 107.0 | 109.0 | 87.0 | 75.0 | 84.0 | 89.0 | 69.0 | 77.0 | 74.0 | 72.0 | 74.0 |
| 81377 | 13 | 1.04 | 99.0 | 84.0 | 88.0 | 122. | 114.0 | 118.0 | 117.0 | 94.0 | 82.0 | 92.0 | 109.0 | 86.0 | 96.0 | 92.0 | 75.0 | 76.0 |
| 81377 | 14 | 1.02 | 94.0 | 98.0 | 99.0 | 121.0 | 117.0 | 116.0 | 122.0 | 97.0 | 86.0 | 94.0 | 113.0 | 94.0 | 104.0 | 102.0 | 77.0 | 79.0 |
| 81377 | 15 | 0.96 | 92.0 | 90.0 | 91.0 | 108.0 | 108.0 | 116.0 | 114.0 | 97.0 | 88.0 | 94.0 | 116.0 | 101.0 | 109.0 | 103.0 | 73.0 | 79.0 |
| 81377 | 16 | 0.81 | 99.0 | 99.0 | 90.0 | 99.0 | 102.0 | 108.0 | 110.0 | 96.0 | 88.0 | 92.0 | 113.0 | 105.0 | 111.0 | 111.0 | 79.0 | 82.0 |
| 81377 | 17 | 0.65 | 89.0 | 88.0 | 89.0 | 95.0 | 96.0 | 97.0 | 99.0 | 94.0 | 87.0 | 90.0 | 103.0 | 107.0 | 109.0 | 107.0 | 76.0 | 77.0 |
| 81377 | 18 | 0.43 | 83.0 | 89.0 | 85.0 | 94.0 | 95.0 | 97.0 | 93.0 | 94.0 | 87.0 | 90.0 | 103.0 | 107.0 | 107.0 | 103.0 | 76.0 | 77.0 |
| 81377 | 19 | 0.21 | 86.0 | 87.0 | 77.0 | 77.0 | 77.0 | 77.0 | 77.0 | 77.0 | 76.0 | 77.0 | 86.0 | 100.0 | 95.0 | 99.0 | 67.0 | 67.0 |
| 81377 | 20 | 0.02 | 77.0 | 81.0 | 82.0 | 83.0 | 81.0 | 82.0 | 82.0 | 87.0 | 78.0 | 84.0 | 93.0 | 106.0 | 101.0 | 105.0 | 74.0 | 71.0 |
| 81377 | 21 | 0.0 | 80.0 | 69.0 | 79.0 | 74.0 | 69.0 | 69.0 | 70.0 | 84.0 | 66.0 | 82.0 | 93.0 | 103.0 | 101.0 | 104.0 | 72.0 | 61.0 |
| 81377 | 22 | 0.0 | 75.0 | 64.0 | 75.0 | 66.0 | 63.0 | 62.0 | 63.0 | 81.0 | 61.0 | 77.0 | 92.0 | 96.0 | 101.0 | 95.0 | 69.0 | 62.0 |
| 81377 | 23 | 0.0 | 72.0 | 62.0 | 72.0 | 65.0 | 61.0 | 61.0 | 62.0 | 77.0 | 59.0 | 75.0 | 91.0 | 89.0 | 96.0 | 86.0 | 66.0 | 60.0 |
| 81477 | 24 | 0.0 | 69.0 | 60.0 | 69.0 | 62.0 | 59.0 | 59.0 | 61.0 | 74.0 | 57.0 | 71.0 | 90.0 | 82.0 | 91.0 | 80.0 | 65.0 | 65.0 |
| 81477 | 1 | 0.0 | 64.0 | 57.0 | 66.0 | 59.0 | 57.0 | 57.0 | 58.0 | 71.0 | 55.0 | 69.0 | 87.0 | 77.0 | 86.0 | 75.0 | 63.0 | 57.0 |
| 81477 | 2 | 0.0 | 65.0 | 59.0 | 65.0 | 60.0 | 58.0 | 58.0 | 60.0 | 70.0 | 57.0 | 68.0 | 84.0 | 73.0 | 82.0 | 70.0 | 62.0 | 57.0 |
| 81477 | 3 | 0.0 | 64.0 | 60.0 | 64.0 | 67.0 | 60.0 | 60.0 | 62.0 | 69.0 | 57.0 | 67.0 | 82.0 | 69.0 | 70.0 | 68.0 | 62.0 | 57.0 |
| 81477 | 4 | 0.0 | 63.0 | 61.0 | 63.0 | 63.0 | 60.0 | 60.0 | 61.0 | 68.0 | 59.0 | 66.0 | 79.0 | 68.0 | 75.0 | 66.0 | 62.0 | 57.0 |
| 81477 | 5 | 0.0 | 62.0 | 59.0 | 62.0 | 63.0 | 57.0 | 58.0 | 60.0 | 67.0 | 57.0 | 65.0 | 76.0 | 67.0 | 74.0 | 66.0 | 62.0 | 57.0 |
| 81477 | 6 | 0.0 | 61.0 | 55.0 | 61.0 | 57.0 | 54.0 | 54.0 | 53.0 | 64.0 | 51.0 | 62.0 | 71.0 | 65.0 | 70.0 | 64.0 | 58.0 | 52.0 |
| 81477 | 7 | 0.05 | 59.0 | 54.0 | 55.0 | 55.0 | 53.0 | 53.0 | 54.0 | 63.0 | 52.0 | 61.0 | 69.0 | 62.0 | 67.0 | 62.0 | 56.0 | 52.0 |
| 81477 | 8 | 0.11 | 56.0 | 54.0 | 57.0 | 57.0 | 55.0 | 55.0 | 57.0 | 63.0 | 53.0 | 60.0 | 68.0 | 63.0 | 67.0 | 62.0 | 58.0 | 57.0 |
| 81477 | 9 | 0.35 | 57.0 | 59.0 | 59.0 | 65.0 | 62.0 | 62.0 | 64.0 | 63.0 | 55.0 | 61.0 | 66.0 | 60.0 | 66.0 | 60.0 | 59.0 | 57.0 |
| 81477 | 10 | 0.66 | 64.0 | 68.0 | 67.0 | 84.0 | 85.0 | 78.0 | 80.0 | 73.0 | 69.0 | 73.0 | 66.0 | 61.0 | 65.0 | 65.0 | 65.0 | 63.0 |
| 81477 | 11 | 0.57 | 70.0 | 71.0 | 70.0 | 94.0 | 87.0 | 81.0 | 83.0 | 76.0 | 71.0 | 73.0 | 75.0 | 64.0 | 66.0 | 66.0 | 65.0 | 71.0 |
| 81477 | 12 | 0.64 | 74.0 | 75.0 | 74.0 | 93.0 | 87.0 | 88.0 | 89.0 | 80.0 | 73.0 | 77.0 | 83.0 | [illegible] | 72.0 | 70.0 | 76.0 | 74.0 |
| 81477 | 13 | 0.60 | 74.0 | [illegible] | 76.0 | 93.0 | 92.0 | 92.0 | 92.0 | 81.0 | 76.0 | 80.0 | 86.0 | 71.0 | 78.0 | 76.0 | 73.0 | 74.0 |
| 81477 | 14 | 1.02 | 81.0 | 83.0 | 85.0 | 121.0 | 112.0 | 115.0 | 115.0 | 93.0 | 81.0 | 89.0 | 93.0 | 78.0 | 85.0 | 83.0 | 77.0 | 81.0 |
| 81477 | 15 | 0.93 | 87.0 | 85.0 | 84.0 | 117.0 | 112.0 | 114.0 | 118.0 | 96.0 | 83.0 | 92.0 | 106.0 | 84.0 | 97.0 | 85.0 | 75.0 | 81.0 |
| 81477 | 16 | 0.90 | 90.0 | 97.0 | 90.0 | 120.0 | 114.0 | 119.0 | 121.0 | 97.0 | 86.0 | 93.0 | 113.0 | 89.0 | 101.0 | 93.0 | 78.0 | 82.0 |
| 81477 | 17 | 0.64 | 96.0 | 87.0 | 90.0 | 98.0 | 104.0 | 108.0 | 110.0 | 96.0 | 89.0 | 92.0 | 115.0 | 100.0 | 104.0 | 107.0 | 81.0 | 87.0 |
| 81477 | 18 | 0.46 | 96.0 | 91.0 | 90.0 | 97.0 | 102.0 | 107.0 | 110.0 | 97.0 | 87.0 | 91.0 | 109.0 | 104.0 | 109.0 | 109.0 | 81.0 | 82.0 |
| 81477 | 19 | 0.21 | 87.0 | 89.0 | 83.0 | 94.0 | 92.0 | 97.0 | 101.0 | 93.0 | 84.0 | 90.0 | 109.0 | 104.0 | 109.0 | 108.0 | 80.0 | 82.0 |
| 81477 | 20 | 0.04 | 86.0 | 81.0 | 86.0 | 88.0 | 84.0 | 85.0 | 87.0 | 91.0 | 79.0 | 88.0 | 109.0 | 96.0 | 106.0 | 101.0 | 80.0 | 79.0 |
| 81477 | 21 | 0.0 | 83.0 | 75.0 | 83.0 | 82.0 | 78.0 | 78.0 | 79.0 | 89.0 | 73.0 | 85.0 | 107.0 | 92.0 | 102.0 | 94.0 | 78.0 | 75.0 |
| 81477 | 22 | 0.0 | 78.0 | 69.0 | 78.0 | 71.0 | 69.0 | 69.0 | 69.0 | 83.0 | 67.0 | 81.0 | 105.0 | 87.0 | 96.0 | 87.0 | 75.0 | 70.0 |
| 81477 | 23 | 0.0 | 77.0 | 59.0 | 77.0 | 71.0 | 69.0 | 69.0 | 69.0 | 82.0 | 67.0 | 79.0 | 102.0 | 84.0 | 93.0 | 83.0 | 73.0 | [illegible] |
| 81577 | 24 | 0.0 | 75.0 | 68.0 | 75.0 | 70.0 | 68.0 | 69.0 | 68.0 | 80.0 | 67.0 | 78.0 | 100.0 | 81.0 | 90.0 | 80.0 | 72.0 | 68.0 |
| 81577 | 1 | 0.0 | 73.0 | 67.0 | 73.0 | 69.0 | 66.0 | 66.0 | 57.0 | 76.0 | 60.0 | 75.0 | 96.0 | 78.0 | 87.0 | 78.0 | 70.0 | [illegible] |
| 81577 | 2 | 0.0 | 72.0 | 62.0 | 72.0 | 71.0 | 67.0 | 67.0 | 60.0 | 77.0 | 66.0 | 74.0 | 93.0 | 77.0 | 85.0 | 76.0 | 70.0 | 66.0 |
| 81577 | 3 | 0.0 | 70.0 | 67.0 | 71.0 | 69.0 | 66.0 | 66.0 | 57.0 | 76.0 | 66.0 | 74.0 | 90.0 | 75.0 | 83.0 | 74.0 | 69.0 | 66.0 |
| 81577 | 4 | 0.0 | 70.0 | 66.0 | 70.0 | 68.0 | 66.0 | 66.0 | 57.0 | 75.0 | 65.0 | 72.0 | 86.0 | 77.0 | 81.0 | 72.0 | 69.0 | 65.0 |
| 81577 | 5 | 0.0 | 67.0 | 65.0 | 69.0 | 68.0 | 65.0 | 66.0 | 67.0 | 64.0 | 65.0 | 71.0 | 82.0 | 71.0 | 79.0 | 72.0 | 67.0 | 65.0 |
| 81577 | 6 | 0.0 | 68.0 | 67.0 | 68.0 | 69.0 | 66.0 | 66.0 | 67.0 | 74.0 | 65.0 | 71.0 | 79.0 | 71.0 | 77.0 | 71.0 | 67.0 | 65.0 |
| 81577 | 7 | 0.02 | 69.0 | 67.0 | 68.0 | 69.0 | 67.0 | 67.0 | 67.0 | 72.0 | 65.0 | 70.0 | 75.0 | 70.0 | 75.0 | 69.0 | 68.0 | 65.0 |
| 81577 | 8 | 0.0 | 68.0 | 67.0 | 68.0 | 69.0 | 67.0 | 67.0 | 67.0 | 72.0 | 55.0 | 70.0 | 74.0 | 70.0 | 75.0 | 69.0 | 68.0 | 65.0 |
| 81577 | 9 | 0.0 | 68.0 | 67.0 | 69.0 | 69.0 | 67.0 | 68.0 | 69.0 | 70.0 | 70.0 | 70.0 | 71.0 | 72.0 | 77.0 | 73.0 | 67.0 | 64.0 |
| 81577 | 10 | 0.0 | 66.0 | 68.0 | 68.0 | 69.0 | 67.0 | 68.0 | 67.0 | 70.0 | 69.0 | 70.0 | 70.0 | 69.0 | 69.0 | 69.0 | 66.0 | [illegible] |
| 81577 | 11 | 0.14 | 65.0 | 66.0 | 65.0 | 69.0 | 67.0 | 69.0 | 69.0 | 70.0 | 68.0 | 69.0 | 69.0 | 68.0 | 66.0 | 67.0 | 67.0 | 65.0 |
| 81577 | 12 | 0.13 | 66.0 | 69.0 | 70.0 | 71.0 | 68.0 | 69.0 | 69.0 | 70.0 | 70.0 | 73.0 | 70.0 | 67.0 | 69.0 | 57.0 | 67.0 | 56.0 |
| 81577 | 13 | 0.10 | 65.0 | 69.0 | 70.0 | 71.0 | 68.0 | 69.0 | 69.0 | 70.0 | 70.0 | 70.0 | 70.0 | 67.0 | 68.0 | 67.0 | 67.0 | 65.0 |
| 81577 | 14 | 0.21 | 66.0 | 67.0 | 70.0 | 72.0 | 70.0 | 72.0 | 71.0 | 71.0 | 70.0 | 71.0 | 71.0 | [illegible] | 69.0 | 69.0 | 69.0 | 68.0 |
| 81577 | 15 | 0.29 | 70.0 | 71.0 | 70.0 | 76.0 | 73.0 | 77.0 | 77.0 | 75.0 | 72.0 | 73.0 | 73.0 | 70.0 | 71.0 | 70.0 | 70.0 | 70.0 |
| 81577 | 16 | 0.14 | 67.0 | 71.0 | 70.0 | 74.0 | 72.0 | 71.0 | 71.0 | 72.0 | 70.0 | 71.0 | 73.0 | 70.0 | 71.0 | 70.0 | 70.0 | 69.0 |
| 81577 | 17 | 0.04 | 67.0 | 71.0 | 70.0 | 74.0 | 72.0 | 71.0 | 71.0 | 72.0 | 70.0 | 71.0 | 73.0 | 70.0 | 71.0 | 70.0 | 70.0 | 69.0 |
| 81577 | 18 | 0.05 | 67.0 | 73.0 | 71.0 | 74.0 | 72.0 | 72.0 | 74.0 | 73.0 | 69.0 | 71.0 | 73.0 | 69.0 | 70.0 | 70.0 | 70.0 | 69.0 |
| 81577 | 19 | 0.02 | 68.0 | 68.0 | 69.0 | 71.0 | 70.0 | 71.0 | 73.0 | 73.0 | 70.0 | 71.0 | 73.0 | 64.0 | 70.0 | 70.0 | 70.0 | 69.0 |
| 81577 | 20 | 0.0 | 68.0 | 60.0 | 69.0 | 71.0 | 70.0 | 71.0 | 73.0 | 73.0 | 70.0 | 71.0 | 73.0 | 69.0 | 70.0 | 70.0 | 70.0 | 69.0 |
| 81577 | 21 | 0.0 | 69.0 | 70.0 | 70.0 | 71.0 | 70.0 | 70.0 | 71.0 | 72.0 | 69.0 | 71.0 | 72.0 | 70.0 | 70.0 | 70.0 | 70.0 | 69.0 |
| 81577 | 22 | 0.0 | 69.0 | 70.0 | 70.0 | 71.0 | 70.0 | 70.0 | 71.0 | 72.0 | 69.0 | 71.0 | 72.0 | 70.0 | 70.0 | 71.0 | 70.0 | 67.0 |
| 81577 | 23 | 0.0 | 66.0 | 66.0 | 68.0 | 57.0 | 65.0 | 65.0 | 65.0 | 70.0 | 66.0 | 69.0 | 71.0 | 69.0 | 69.0 | 68.0 | 69.0 | [illegible] |
| 81677 | 24 | 0.0 | 65.0 | 65.0 | 68.0 | 66.0 | 65.0 | 65.0 | 65.0 | 70.0 | 65.0 | 68.0 | 71.0 | 69.0 | 68.0 | 67.0 | 67.0 | 65.0 |
| 81677 | 1 | 0.0 | 63.0 | 65.0 | 66.0 | 65.0 | 64.0 | 64.0 | 64.0 | 67.0 | 64.0 | 68.0 | 71.0 | 68.0 | 68.0 | 64.0 | 66.0 | 64.0 |
| 81677 | 2 | 0.0 | 65.0 | 65.0 | 66.0 | 60.0 | 64.0 | 64.0 | 64.0 | 69.0 | 64.0 | 68.0 | 71.0 | 68.0 | 60.0 | 66.0 | 66.0 | 63.0 |
| 81677 | 3 | 0.0 | 64.0 | 64.0 | 65.0 | 64.0 | 63.0 | 63.0 | [illegible] | 68.0 | 59.0 | 56.0 | 70.0 | 67.0 | 67.0 | 65.0 | 65.0 | 62.0 |
| 81677 | 4 | 0.0 | 63.0 | 61.0 | 64.0 | 64.0 | 62.0 | 62.0 | 62.0 | 66.0 | 62.0 | 65.0 | 69.0 | [illegible] | 66.0 | 61.0 | 51.0 | 62.0 |
| 81677 | 5 | 0.0 | 62.0 | 63.0 | 63.0 | 64.0 | 62.0 | 62.0 | 63.0 | 66.0 | 63.0 | 65.0 | 69.0 | 66.0 | 65.0 | 63.0 | 53.0 | 62.0 |
| 81677 | 6 | 0.0 | 62.0 | 63.0 | 61.0 | 64.0 | 62.0 | 62.0 | 63.0 | 66.0 | 63.0 | 65.0 | 67.0 | 66.0 | 65.0 | 63.0 | 63.0 | 62.0 |
| 81677 | 7 | 0.0 | 62.0 | 62.0 | 61.0 | 63.0 | 62.0 | 67.0 | 61.0 | 56.0 | 62.0 | 64.0 | 67.0 | 65.0 | 65.0 | 62.0 | 63.0 | 61.0 |
| 81677 | 8 | 0.05 | 59.0 | 60.0 | 60.0 | 60.0 | 60.0 | 61.0 | 42.0 | 62.0 | 61.0 | 62.0 | 64.0 | 63.0 | 67.0 | 60.0 | 61.0 | 61.0 |
| 81677 | 9 | 0.20 | 62.0 | 63.0 | 61.0 | 55.0 | 62.0 | 63.0 | 64.0 | 65.0 | 61.0 | 63.0 | 63.0 | 62.0 | 62.0 | 60.0 | 60.0 | 63.0 |
| 81677 | 10 | 0.50 | 64.0 | 64.0 | 65.0 | 70.0 | 66.0 | 68.0 | 70.0 | 69.0 | 60.0 | 67.0 | 66.0 | 66.0 | 66.0 | 65.0 | 64.0 | 65.0 |
| 81677 | 11 | 0.73 | 71.0 | 71.0 | 71.0 | 100.0 | 89.0 | 86.0 | 89.0 | 79.0 | 63.0 | 75.0 | 70.0 | 61.0 | 67.0 | 61.0 | 62.0 | 63.0 |
| 81677 | 12 | 0.83 | 70.0 | 71.0 | 75.0 | 98.0 | 90.0 | 96.0 | 93.0 | 81.0 | 71.0 | 77.0 | 77.0 | 69.0 | 70.0 | 64.0 | 69.0 | 69.0 |
| 81677 | 13 | 0.91 | 80.0 | 75.0 | 79.0 | 109.0 | 97.0 | 102.0 | 102.0 | 86.0 | 74.0 | 82.0 | 85.0 | 71.0 | [illegible] | 75.0 | 71.0 | 73.0 |
| 81677 | 14 | 0.93 | 79.0 | 76.0 | 78.0 | 100.0 | 92.0 | 98.0 | 101.0 | 84.0 | 77.0 | 85.0 | 97.0 | 96.0 | 87.0 | 82.0 | 79.0 | 76.0 |
| 81677 | 15 | 0.94 | 84.0 | 80.0 | 83.0 | 113.0 | 103.0 | 111.0 | 109.0 | 92.0 | 82.0 | 90.0 | 104.0 | 86.0 | 94.0 | 90.0 | 76.0 | 83.0 |
| 81677 | 16 | 0.84 | 87.0 | 82.0 | 85.0 | 102.0 | 100.0 | 112.0 | 113.0 | 92.0 | 82.0 | 89.0 | 106.0 | 90.0 | 97.0 | 94.0 | 76.0 | 80.0 |
| 81677 | 17 | 0.62 | 87.0 | 85.0 | 86.0 | 101.0 | 101.0 | 111.0 | 114.0 | 94.0 | 84.0 | 89.0 | 104.0 | 91.0 | 99.0 | 96.0 | 77.0 | 82.0 |
| 81677 | 18 | 0.42 | 85.0 | 86.0 | 85.0 | 92.0 | 94.0 | 102.0 | 105.0 | 91.0 | 84.0 | 87.0 | 87.0 | 96.0 | 102.0 | 101.6 | 76.0 | 77.0 |

Table D. Continued

PYRANOMETER (PYR) READINGS, CAL/SQ-CM-MIN ,AND TEMPERATURES (T),°F, AT POINT NUMBER

| DATE | HOUR | PYR | T(1) | T(2) | T(3) | T(4) | T(5) | T(6) | T(7) | T(8) | T(9) | T(10) | T(11) | T(12) | T(13) | T(14) | T(15) | T(16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 81677 | 19 | 0.15 | 87.0 | 85.0 | 83.0 | 87.0 | 87.0 | 90.0 | 92.0 | 88.0 | 84.0 | 85.0 | 100.0 | 101.0 | 102.0 | 103.0 | 77.0 | 78.0 |
| 81677 | 20 | 0.32 | 83.0 | 82.0 | 81.0 | 83.0 | 82.0 | 83.0 | 84.0 | 85.0 | 82.0 | 83.0 | 91.0 | 99.0 | 95.0 | 97.0 | 76.0 | 75.0 |
| 81677 | 21 | 0.0 | 77.0 | 79.0 | 79.0 | 80.0 | 79.0 | 77.0 | 80.0 | 82.0 | 80.0 | 81.0 | 86.0 | 95.0 | 89.0 | 91.0 | 73.0 | 71.0 |
| 81677 | 22 | 0.0 | 76.0 | 70.0 | 76.0 | 76.0 | 70.0 | 70.0 | 71.0 | 81.0 | 69.0 | 78.0 | 86.0 | 94.0 | 93.0 | 94.0 | 72.0 | 70.0 |
| 81677 | 23 | 0.0 | 74.0 | 69.0 | 75.0 | 70.0 | 69.0 | 69.0 | 70.0 | 73.0 | 68.0 | 76.0 | 86.0 | 90.0 | 92.0 | 88.0 | 71.0 | 67.0 |
| 81777 | 24 | 0.0 | 72.0 | 66.0 | 73.0 | 67.0 | 66.0 | 66.0 | 67.0 | 76.0 | 66.0 | 74.0 | 85.0 | 84.0 | 89.0 | 81.0 | 69.0 | 66.0 |
| 81777 | 1 | 0.0 | 70.0 | 65.0 | 70.0 | 64.0 | 65.0 | 65.0 | 65.0 | 74.0 | 65.0 | 72.0 | 84.0 | 80.0 | 81.0 | 75.0 | 67.0 | 65.0 |
| 81777 | 2 | 0.0 | 69.0 | 65.0 | 69.0 | 65.0 | 64.0 | 64.0 | 65.0 | 72.0 | 64.0 | 70.0 | 84.0 | 77.0 | 80.0 | 73.0 | 65.0 | 62.0 |
| 81777 | 3 | 0.0 | 67.0 | 63.0 | 68.0 | 64.0 | 63.0 | 62.0 | 64.0 | 71.0 | 62.0 | 69.0 | 81.0 | 74.0 | 77.0 | 71.0 | 65.0 | 62.0 |
| 81777 | 4 | 0.0 | 66.0 | 61.0 | 66.0 | 62.0 | 60.0 | 60.0 | 62.0 | 69.0 | 61.0 | 67.0 | 82.0 | 71.0 | 74.0 | 69.0 | 65.0 | 60.0 |
| 81777 | 5 | 0.0 | 65.0 | 61.0 | 65.0 | 62.0 | 61.0 | 57.0 | 59.0 | 68.0 | 59.0 | 65.0 | 81.0 | 69.0 | 72.0 | 67.0 | 62.0 | 57.0 |
| 81777 | 6 | 0.0 | 62.0 | 57.0 | 67.0 | 57.0 | 55.0 | 55.0 | 56.0 | 66.0 | 55.0 | 64.0 | 79.0 | 67.0 | 70.0 | 66.0 | 53.0 | 55.0 |
| 81777 | 7 | 0.02 | 59.0 | 54.0 | 58.0 | 55.0 | 53.0 | 53.0 | 54.0 | 62.0 | 54.0 | 60.0 | 76.0 | 63.0 | 61.0 | 61.0 | 53.0 | 52.0 |
| 81777 | 8 | 0.12 | 57.0 | 55.0 | 58.0 | 55.0 | 53.0 | 53.0 | 54.0 | 62.0 | 53.0 | 60.0 | 75.0 | 63.0 | 65.0 | 61.0 | 56.0 | 52.0 |
| 81777 | 9 | 0.47 | 60.0 | 61.0 | 61.0 | 66.0 | 64.0 | 65.0 | 66.0 | 66.0 | 62.0 | 63.0 | 62.0 | 69.0 | 69.0 | 67.0 | 59.0 | 57.0 |
| 81777 | 10 | 0.70 | 60.0 | 61.0 | 73.0 | 79.0 | 72.0 | 71.0 | 72.0 | 70.0 | 65.0 | 67.0 | 64.0 | 66.0 | 64.0 | 64.0 | 63.0 | 63.0 |
| 81777 | 11 | 0.87 | 69.0 | 67.0 | 69.0 | 95.0 | 89.0 | 77.0 | 82.0 | 76.0 | 67.0 | 72.0 | 72.0 | 64.0 | 65.0 | 64.0 | 64.0 | 61.0 |
| 81777 | 12 | 0.98 | 74.0 | 71.0 | 74.0 | 98.0 | 94.0 | 97.0 | 99.0 | 81.0 | 69.0 | 77.0 | 81.0 | 64.0 | 71.0 | 63.0 | 65.0 | 67.0 |
| 81777 | 13 | 1.03 | 79.0 | 76.0 | 78.0 | 107.0 | 101.0 | 101.0 | 101.0 | 86.0 | 73.0 | 82.0 | 93.0 | 71.0 | 82.0 | 79.0 | 69.0 | 79.0 |
| 81777 | 14 | 1.04 | 83.0 | 80.0 | 82.0 | 111.0 | 106.0 | 107.0 | 108.0 | 90.0 | 77.0 | 86.0 | 100.0 | 81.0 | 91.0 | 89.0 | 71.0 | 72.0 |
| 81777 | 15 | 0.94 | 85.0 | 81.0 | 84.0 | 110.0 | 105.0 | 106.0 | 113.0 | 91.0 | 80.0 | 88.0 | 104.0 | 87.0 | 96.0 | 95.0 | 71.0 | 75.0 |
| 81777 | 16 | 0.82 | 81.0 | 77.0 | 80.0 | 91.0 | 94.0 | 103.0 | 103.0 | 82.0 | 75.0 | 81.0 | 97.0 | 89.0 | 93.0 | 94.0 | 67.0 | 71.0 |
| 81777 | 17 | 0.64 | 81.0 | 75.0 | 79.0 | 76.0 | 92.0 | 100.0 | 102.0 | 81.0 | 75.0 | 86.0 | 107.0 | 98.0 | 102.0 | 102.0 | 73.0 | 76.0 |
| 81777 | 18 | 0.42 | 84.0 | 83.0 | 83.0 | 85.0 | 92.0 | 98.0 | 102.0 | 91.0 | 82.0 | 85.0 | 106.0 | 99.0 | 103.0 | 103.0 | 73.0 | 76.0 |
| 62178 | 18 | 0.09 | 76.0 | 78.0 | 78.0 | 79.0 | 79.0 | 78.0 | 80.0 | 77.0 | 78.0 | 75.0 | 76.0 | 0.0 | 89.0 | 91.0 | 75.0 | 75.0 |
| 62178 | 19 | 0.31 | 78.0 | 79.0 | 78.0 | 79.0 | 79.0 | 76.0 | 86.0 | 77.0 | 77.0 | 76.0 | 76.0 | 0.0 | 88.0 | 91.0 | 73.0 | 75.0 |
| 62178 | 20 | 0.11 | 77.0 | 77.0 | 77.0 | 78.0 | 78.0 | 84.0 | 86.0 | 80.0 | 80.0 | 82.0 | 86.0 | 0.0 | 88.0 | 90.0 | 75.0 | 75.0 |
| 62178 | 21 | 0.0 | 79.0 | 79.0 | 80.0 | 83.0 | 83.0 | 83.0 | 65.0 | 80.0 | 80.0 | 82.0 | 84.0 | 0.0 | 85.0 | 90.0 | 75.0 | 75.0 |
| 62178 | 22 | 0.0 | 79.0 | 79.0 | 80.0 | 82.0 | 83.0 | 83.0 | 85.0 | 80.0 | 80.0 | 82.0 | 82.0 | 0.0 | 85.0 | 87.0 | 77.0 | 72.0 |
| 62178 | 23 | 0.0 | 80.0 | 81.0 | 81.0 | 80.0 | 80.0 | 80.0 | 82.0 | 69.0 | 80.0 | 68.0 | 67.0 | 0.0 | 94.0 | 85.0 | 81.0 | 68.0 |
| 62278 | 24 | 0.0 | 77.0 | 78.0 | 76.0 | 77.0 | 78.0 | 78.0 | 87.0 | 66.0 | 79.0 | 66.0 | 64.0 | 0.0 | 82.0 | 83.0 | 83.0 | 65.0 |
| 62278 | 1 | 0.0 | 77.0 | 77.0 | 77.0 | 76.0 | 77.0 | 77.0 | 79.0 | 65.0 | 77.0 | 66.0 | 64.0 | 0.0 | 80.0 | 81.0 | 83.0 | 55.0 |
| 62278 | 2 | 0.0 | 74.0 | 74.0 | 75.0 | 73.0 | 73.0 | 73.0 | 76.0 | 61.0 | 74.0 | 64.0 | 61.0 | 0.0 | 77.0 | 76.0 | 80.0 | 61.0 |
| 62278 | 3 | 0.0 | 72.0 | 73.0 | 73.0 | 71.0 | 72.0 | 72.0 | 74.0 | 62.0 | 72.0 | 63.0 | 61.0 | 0.0 | 75.0 | 75.0 | 77.0 | 60.0 |
| 62278 | 4 | 0.0 | 71.0 | [illegible] | 72.0 | 70.0 | 71.0 | 71.0 | 74.0 | 63.0 | 71.0 | 64.0 | 61.0 | 0.0 | 73.0 | 73.0 | 75.0 | 62.0 |
| 62278 | 5 | 0.0 | 69.0 | 70.0 | 70.0 | 69.0 | 70.0 | 70.0 | 71.0 | 63.0 | 70.0 | 64.0 | 62.0 | 0.0 | 67.0 | 73.0 | 71.0 | 61.0 |
| 62278 | 6 | 0.03 | 69.0 | 70.0 | 70.0 | 64.0 | 67.0 | 64.0 | 70.0 | 63.0 | 69.0 | 65.0 | 62.0 | 0.0 | 70.0 | 70.0 | 70.0 | 61.0 |
| 62278 | 7 | 0.07 | 68.0 | 69.0 | 65.0 | 67.0 | 69.0 | 69.0 | 69.0 | 65.0 | 68.0 | 66.0 | 64.0 | 0.0 | 69.0 | 69.0 | 68.0 | 61.0 |
| 62278 | 8 | 0.18 | 64.0 | 64.0 | 70.0 | 73.0 | 73.0 | 72.0 | 60.0 | 71.0 | 70.0 | 72.0 | 75.0 | 0.0 | 68.0 | 68.0 | 68.0 | 62.0 |
| 62278 | 9 | 0.36 | 72.0 | 72.0 | 72.0 | 76.0 | 76.0 | 75.0 | 68.0 | 71.0 | 72.0 | 75.0 | 80.0 | 0.0 | 69.0 | 68.0 | 68.0 | 71.0 |
| 62278 | 10 | 0.10 | 74.0 | 74.0 | 74.0 | 75.0 | 75.0 | 75.0 | 70.0 | 71.0 | 73.0 | 75.0 | 76.0 | 0.0 | 70.0 | 70.0 | 71.0 | 71.0 |
| 62278 | 11 | 0.0 | 73.0 | 73.0 | 73.0 | 75.0 | 75.0 | 75.0 | 70.0 | 71.0 | 73.0 | 74.0 | 77.0 | 0.0 | 71.0 | 70.0 | 71.0 | 71.0 |
| 62278 | 12 | 0.23 | 73.0 | 73.0 | 73.0 | 75.0 | 75.0 | 73.0 | 72.0 | 69.0 | 71.0 | 71.0 | 75.0 | 0.0 | 73.0 | 73.0 | 70.0 | 69.0 |
| 62278 | 13 | 0.55 | 73.0 | 70.0 | 72.0 | 75.0 | 75.0 | 76.0 | 72.0 | 69.0 | 72.0 | 72.0 | 78.0 | 0.0 | 73.0 | 74.0 | 70.0 | 69.0 |
| 62278 | 14 | 0.70 | 76.0 | 75.0 | 76.0 | 95.0 | 90.0 | 90.0 | 73.0 | 76.0 | 76.0 | 82.0 | 96.0 | 0.0 | 74.0 | 74.0 | 74.0 | 75.0 |
| 62278 | 15 | 0.85 | 77.0 | 77.0 | 77.0 | 88.0 | 86.0 | 87.0 | 74.0 | 77.0 | 77.0 | 81.0 | 91.0 | 0.0 | 74.0 | 73.0 | 74.0 | 73.0 |
| 62278 | 16 | 0.58 | 79.0 | 79.0 | 76.0 | 84.0 | 84.0 | 84.0 | 77.0 | 78.0 | 79.0 | 81.0 | 86.0 | 0.0 | 79.0 | 77.0 | 77.0 | 74.0 |
| 62278 | 17 | 0.32 | 80.0 | 80.0 | 86.0 | 85.0 | 86.0 | 86.0 | 77.0 | 78.0 | 79.0 | 82.0 | 87.0 | 0.0 | 79.0 | 77.0 | 73.0 | 75.0 |
| 62278 | 18 | 0.34 | 80.0 | 80.0 | 80.0 | 81.0 | 81.0 | 81.0 | 81.0 | 77.0 | 79.0 | 80.0 | 83.0 | 0.0 | 83.0 | 82.0 | 78.0 | 76.0 |
| 62278 | 19 | 0.30 | 79.0 | 80.0 | 80.0 | 81.0 | 82.0 | 81.0 | 81.0 | 77.0 | 79.0 | 80.0 | 84.0 | 0.0 | 84.0 | 82.0 | 81.0 | 76.0 |
| 62278 | 20 | 0.05 | 79.0 | 79.0 | 76.0 | 80.0 | 81.0 | 81.0 | 80.0 | 76.0 | 78.0 | 79.0 | 83.0 | 0.0 | 82.0 | 81.0 | 77.0 | 76.0 |
| 62278 | 21 | 0.0 | 73.0 | 74.0 | 74.0 | 75.0 | 75.0 | 74.0 | 76.0 | 71.0 | 73.0 | 73.0 | 77.0 | 0.0 | 77.0 | 77.0 | 72.0 | 73.0 |
| 62278 | 22 | 0.0 | 73.0 | 74.0 | 74.0 | 74.0 | 75.0 | 75.0 | 75.0 | 71.0 | 73.0 | 73.0 | 77.0 | 0.0 | 77.0 | 77.0 | 72.0 | 70.0 |
| 62278 | 23 | 0.0 | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 75.0 | 71.0 | 73.0 | 73.0 | 76.0 | 0.0 | 75.0 | 75.0 | 73.0 | 65.0 |
| 62378 | 24 | 0.0 | 71.0 | 71.0 | 70.0 | 72.0 | 72.0 | 71.0 | 79.0 | 74.0 | 71.0 | 76.0 | 71.0 | 0.0 | 81.0 | 81.0 | 75.0 | 70.0 |
| 62378 | 1 | 0.0 | 72.0 | 71.0 | 71.0 | 72.0 | 72.0 | 72.0 | 79.0 | 74.0 | 71.0 | 75.0 | 71.0 | 0.0 | 82.0 | 82.0 | 75.0 | 71.0 |
| 62378 | 2 | 0.0 | 70.0 | 70.0 | 67.0 | 70.0 | 70.0 | 69.0 | 77.0 | 73.0 | 69.0 | 74.0 | 70.0 | 0.0 | 80.0 | 79.0 | 73.0 | 69.0 |
| 62378 | 3 | 0.0 | 70.0 | 70.0 | 69.0 | 70.0 | 70.0 | 68.0 | 75.0 | 72.0 | 65.0 | 73.0 | 69.0 | 0.0 | 79.0 | 77.0 | 71.0 | 67.0 |
| 62378 | 4 | 0.0 | 69.0 | 69.0 | 68.0 | 69.0 | 69.0 | 69.0 | 76.0 | 73.0 | 68.0 | 73.0 | 69.0 | 0.0 | 78.0 | 77.0 | 72.0 | 67.0 |
| 62378 | 5 | 0.0 | 65.0 | 67.0 | 66.0 | [illegible] | 67.0 | 67.0 | 76.0 | 73.0 | 66.0 | 73.0 | 68.0 | 0.0 | 79.0 | 77.0 | 72.0 | 64.0 |
| 62378 | 6 | 0.0 | 66.0 | 67.0 | 67.0 | 63.0 | 68.0 | 68.0 | 75.0 | 72.0 | 67.0 | 73.0 | 69.0 | 0.0 | 78.0 | 76.0 | 70.0 | 67.0 |
| 62378 | 7 | 0.02 | 67.0 | 69.0 | 67.0 | 69.0 | 67.0 | 68.0 | 75.0 | 73.0 | 69.0 | 78.0 | 70.0 | 0.0 | 78.0 | 76.0 | 71.0 | 67.0 |
| 62378 | 8 | 0.16 | 72.0 | 72.0 | 72.0 | 73.0 | 77.0 | 77.0 | 74.0 | 72.0 | 72.0 | 75.0 | 75.0 | 0.0 | 76.0 | 74.0 | 72.0 | [illegible] |
| 62378 | 9 | 0.10 | 73.0 | 73.0 | [illegible] | 75.0 | 79.0 | 79.0 | 74.0 | 73.0 | 73.0 | 75.0 | 76.0 | 0.0 | 76.0 | 76.0 | 72.0 | [illegible] |
| 62378 | 10 | 0.52 | 70.0 | 78.0 | [illegible] | 83.0 | 84.0 | 84.0 | 77.0 | 77.0 | 78.0 | 80.0 | 86.0 | 0.0 | 77.0 | 76.0 | 76.0 | 77.0 |
| 62378 | 11 | 0.90 | 85.0 | 85.0 | 85.0 | 111.0 | 104.0 | 102.0 | 77.0 | 83.0 | 84.0 | 88.0 | 99.0 | 0.0 | 77.0 | 77.0 | 79.0 | 81.0 |
| 62378 | 12 | 0.60 | 84.0 | 84.0 | 84.0 | 102.0 | 101.0 | 101.0 | 77.0 | 84.0 | 84.0 | 89.0 | 101.0 | 0.0 | 77.0 | 77.0 | 73.0 | [illegible] |
| 62378 | 13 | 1.15 | 85.0 | 89.0 | 87.0 | 103.0 | 110.0 | 115.0 | 81.0 | 91.0 | 88.0 | 97.0 | 115.0 | 0.0 | 83.0 | 81.0 | 81.0 | 87.0 |
| 62378 | 14 | 1.16 | 90.0 | 90.0 | 89.0 | 105.0 | 112.0 | 112.0 | 81.0 | 91.0 | 87.0 | 91.0 | 114.0 | 0.0 | 84.0 | 87.0 | 83.0 | [illegible] |
| 62378 | 15 | 1.05 | 90.0 | 90.0 | 89.0 | 106.0 | 111.0 | 114.0 | 81.0 | 91.0 | 89.0 | 97.0 | 115.0 | 0.0 | 84.0 | [illegible] | 83.0 | [illegible] |
| 62378 | 16 | 1.35 | 91.0 | 93.0 | 93.0 | 112.0 | 114.0 | 115.0 | 89.0 | 92.0 | 92.0 | 94.0 | [illegible] | 0.0 | 94.0 | 91.0 | 87.0 | [illegible] |
| 62378 | 17 | 0.75 | 94.0 | 93.0 | 91.0 | 109.0 | 97.0 | 59.0 | 97.0 | 89.0 | 92.0 | 93.0 | 101.0 | 0.0 | 102.0 | 100.0 | 89.0 | 91.0 |
| 62378 | 18 | 0.56 | 93.0 | 93.0 | 93.0 | 96.0 | 97.0 | 98.0 | 97.0 | 90.0 | 92.0 | 93.0 | 101.0 | 0.0 | 103.0 | 100.0 | 81.0 | 91.0 |
| 62378 | 19 | [illegible] | 83.0 | 90.0 | 90.0 | 91.0 | 91.0 | 90.0 | 100.0 | 86.0 | 89.0 | 87.0 | 91.0 | 0.0 | 102.0 | 103.0 | 86.0 | 91.0 |
| 62378 | 20 | 0.06 | 89.0 | 84.0 | 90.0 | 90.0 | 90.0 | 94.0 | 100.0 | 85.0 | 89.0 | 87.0 | 91.0 | 0.0 | 102.0 | 102.0 | [illegible] | [illegible] |
| 62378 | 21 | 0.0 | 84.0 | 89.0 | 85.0 | 90.0 | 86.0 | 84.0 | 97.0 | 82.0 | 85.0 | 84.0 | 76.0 | 0.0 | 99.0 | 97.0 | [illegible] | 76.0 |
| 62378 | 22 | 0.0 | 87.0 | [illegible] | 86.0 | 80.0 | 86.0 | 86.0 | 97.0 | 81.0 | 87.0 | 84.0 | 77.0 | 0.0 | 95.0 | 97.0 | 84.0 | 76.0 |
| 62378 | 23 | 0.0 | 85.0 | 97.0 | 85.0 | 81.0 | 83.0 | 83.0 | 84.0 | 82.0 | 86.0 | 82.0 | 75.0 | 0.0 | 88.0 | [illegible] | 83.0 | [illegible] |
| 62478 | 24 | 0.0 | 81.0 | [illegible] | 81.0 | 82.0 | 81.0 | 83.0 | 87.0 | 81.0 | 93.0 | 82.0 | 74.0 | 0.0 | 87.0 | 81.0 | 63.0 | [illegible] |
| 62478 | 1 | 0.0 | 79.0 | 80.0 | 80.0 | 74.0 | 80.0 | 80.0 | 82.0 | 80.0 | 80.0 | 80.0 | 71.0 | 0.0 | 82.0 | [illegible] | [illegible] | [illegible] |
| 62478 | 2 | 0.0 | 79.0 | 80.0 | 81.0 | 79.0 | 79.0 | 79.0 | 82.0 | 80.0 | 80.0 | 80.0 | 72.0 | 0.0 | [illegible] | [illegible] | [illegible] | [illegible] |
| 62478 | 3 | 0.0 | 77.0 | 77.0 | 77.0 | 77.0 | 77.0 | 77.0 | 76.0 | 78.0 | 78.0 | 78.0 | 78.0 | 0.0 | 72.0 | 75.0 | 74.0 | 70.0 |
| 62478 | 4 | 0.0 | 77.0 | 78.0 | 78.0 | 77.0 | 77.0 | 77.0 | 77.0 | 78.0 | 78.0 | 78.0 | 72.0 | 0.0 | 80.0 | 74.0 | 79.0 | 78.0 |
| 62478 | 5 | 0.0 | 77.0 | 77.0 | 76.0 | 76.0 | [illegible] | 76.0 | 76.0 | 76.0 | 76.0 | 76.0 | 72.0 | 0.0 | 77.0 | 77.0 | 77.0 | [illegible] |
| 62478 | 6 | 0.0 | 71.0 | 72.0 | 71.0 | 71.0 | 72.0 | 72.0 | 72.0 | 72.0 | 72.0 | 73.0 | 73.0 | 0.0 | 76.0 | 78.0 | 75.0 | [illegible] |
| 62478 | 7 | 0.02 | 77.0 | 77.0 | 77.0 | 78.0 | 73.0 | 78.0 | 78.0 | 76.0 | 76.0 | 77.0 | 78.0 | 0.0 | 79.0 | 76.0 | 77.0 | 74.0 |
| 62478 | 8 | 0.07 | 77.0 | 77.0 | 78.0 | 78.0 | 79.0 | 78.0 | 77.0 | 78.0 | 78.0 | 77.0 | 77.0 | 0.0 | 78.0 | 76.0 | 76.0 | [illegible] |
| 62478 | 9 | 0.33 | 75.0 | 74.0 | 76.0 | 78.0 | 79.0 | 79.0 | 75.0 | 77.0 | 75.0 | 78.0 | 71.0 | 0.0 | 75.0 | 75.0 | 75.0 | 76.0 |

## Table D. Continued

PYRANOMETER (PRY) READINGS, CAL/SQ-CM-MIN ,AND TEMPERATURES (T),°F, AT POINT NUMBER

| DATE | HOUR | PYR | T(1) | T(2) | T(3) | T(4) | T(5) | T(6) | T(7) | T(8) | T(9) | T(10) | T(11) | T(12) | T(13) | T(14) | T(15) | T(16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 62478 | 10 | 0.22 | 79.0 | 79.0 | 79.0 | 82.0 | 86.0 | 86.0 | 76.0 | 77.0 | 79.0 | 81.0 | 84.0 | 77.0 | 76.0 | 77.0 | 77.0 | 78.0 |
| 62478 | 11 | 0.26 | 77.0 | 78.0 | 79.0 | 82.0 | 85.0 | 86.0 | 76.0 | 77.0 | 79.0 | 83.0 | 84.0 | 77.0 | 74.0 | 76.0 | 76.0 | 77.0 |
| 62478 | 12 | 0.40 | 77.0 | 78.0 | 79.0 | 81.0 | 84.0 | 86.0 | 76.0 | 77.0 | 79.0 | 81.0 | 84.0 | 77.0 | 76.0 | 77.0 | 77.0 | 78.0 |
| 62478 | 13 | 0.72 | 85.0 | 96.0 | 86.0 | 100.0 | 100.0 | 100.0 | 79.0 | 83.0 | 85.0 | 93.0 | 110.0 | 80.0 | 79.0 | 79.0 | 81.0 | 85.0 |
| 62478 | 14 | 0.89 | 86.0 | 86.0 | 86.0 | 109.0 | 104.0 | 100.0 | 80.0 | 89.0 | 85.0 | 92.0 | 106.0 | 88.0 | 80.0 | 80.0 | 82.0 | 90.0 |
| 62478 | 15 | 0.66 | 85.0 | 84.0 | 84.0 | 85.0 | 86.0 | 96.0 | 86.0 | 86.0 | 84.0 | 85.0 | 98.0 | 79.0 | 88.0 | 89.0 | 87.0 | 88.0 |
| 62478 | 16 | 0.54 | 89.0 | 86.0 | 87.0 | 90.0 | 91.0 | 92.0 | 89.0 | 86.0 | 87.0 | 90.0 | 100.0 | 85.0 | 89.0 | 90.0 | 83.0 | 89.0 |
| 62478 | 17 | 0.55 | 89.0 | 87.0 | 87.0 | 90.0 | 91.0 | 92.0 | 89.0 | 86.0 | 87.0 | 89.0 | 109.0 | 86.0 | 88.0 | 90.0 | 84.0 | 85.0 |
| 62478 | 18 | 0.34 | 89.0 | 97.0 | 68.0 | 92.0 | 93.0 | 88.0 | 88.0 | 85.0 | 96.0 | 86.0 | 94.0 | 79.0 | 87.0 | 90.0 | 93.0 | 82.0 |
| 62478 | 19 | 0.20 | 83.0 | 87.0 | 87.0 | 87.0 | 87.0 | 87.0 | 89.0 | 84.0 | 86.0 | 86.0 | 94.0 | 79.0 | 89.0 | 89.0 | 84.0 | 87.0 |
| 62478 | 20 | 0.02 | 86.0 | 86.0 | 86.0 | 86.0 | 86.0 | 86.0 | 86.0 | 80.0 | 85.0 | 85.0 | 85.0 | 80.0 | 89.0 | 89.0 | 90.0 | 82.0 |
| 62478 | 21 | 0.0 | 87.0 | 87.0 | 87.0 | 87.0 | 87.0 | 87.0 | 88.0 | 84.0 | 87.0 | 85.0 | 82.0 | 79.0 | 88.0 | 90.0 | 85.0 | 82.0 |
| 62478 | 22 | 0.0 | 85.0 | 87.0 | 87.0 | 87.0 | 87.0 | 87.0 | 87.0 | 85.0 | 87.0 | 87.0 | 80.0 | 79.0 | 87.0 | 88.0 | 86.0 | 81.0 |
| 62478 | 23 | 0.0 | 86.0 | 87.0 | 87.0 | 87.0 | 87.0 | 87.0 | 87.0 | 85.0 | 87.0 | 87.0 | 80.0 | 79.0 | 87.0 | 83.0 | 86.0 | 81.0 |
| 62478 | 24 | 0.0 | 86.0 | 87.0 | 87.0 | 87.0 | 87.0 | 87.0 | 87.0 | 85.0 | 87.0 | 87.0 | 80.0 | 79.0 | 87.0 | 88.0 | 86.0 | 81.0 |
| 62578 | 1 | 0.0 | 84.0 | 85.0 | 85.0 | 84.0 | 84.0 | 84.0 | 84.0 | 86.0 | 83.0 | 85.0 | 77.0 | 77.0 | 85.0 | 85.0 | 90.0 | 77.0 |
| 62578 | 2 | 0.0 | 82.0 | 83.0 | 83.0 | 83.0 | 83.0 | 85.0 | 81.0 | 81.0 | 83.0 | 83.0 | 80.0 | 75.0 | 83.0 | 83.0 | 83.0 | 78.0 |
| 62578 | 3 | 0.0 | 83.0 | 82.0 | 82.0 | 83.0 | 82.0 | 82.0 | 82.0 | 84.0 | 82.0 | 82.0 | 77.0 | 77.0 | 80.0 | 81.0 | 81.0 | 77.0 |
| 62578 | 4 | 0.0 | 82.0 | 82.0 | 82.0 | 82.0 | 82.0 | 82.0 | 80.0 | 80.0 | 82.0 | 82.0 | 79.0 | 81.0 | 81.0 | 81.0 | 81.0 | 77.0 |
| 62578 | 5 | 0.0 | 82.0 | 82.0 | 81.0 | 81.0 | 81.0 | 79.0 | 81.0 | 81.0 | 81.0 | 83.0 | 78.0 | 78.0 | 79.0 | 80.0 | 80.0 | 77.0 |
| 62578 | 6 | 0.0 | 80.0 | 81.0 | 80.0 | 80.0 | 80.0 | 82.0 | 82.0 | 78.0 | 79.0 | 80.0 | 86.0 | 74.0 | 80.0 | 81.0 | 79.0 | 77.0 |
| 62578 | 7 | 0.0 | 81.0 | 81.0 | 81.0 | 87.0 | 87.0 | 87.0 | 78.0 | 81.0 | 81.0 | 86.0 | 98.0 | 77.0 | 77.0 | 77.0 | 77.0 | 77.0 |
| 62578 | 8 | 0.33 | 81.0 | 81.0 | 81.0 | 86.0 | 86.0 | 86.0 | 78.0 | 87.0 | 91.0 | 86.0 | 99.0 | 78.0 | 78.0 | 78.0 | 78.0 | 79.0 |
| 62578 | 9 | 0.21 | 82.0 | 82.0 | 82.0 | 88.0 | 88.0 | 86.0 | 79.0 | 82.0 | 82.0 | 88.0 | 99.0 | 79.0 | 78.0 | 75.0 | 73.0 | 81.0 |
| 62578 | 10 | 0.55 | 81.0 | 83.0 | 83.0 | 88.0 | 87.0 | 87.0 | 76.0 | 87.0 | 82.0 | 87.0 | 98.0 | 79.0 | 78.0 | 79.0 | 81.0 | 81.0 |
| 62578 | 11 | 0.99 | 91.0 | 88.0 | 88.0 | 121.0 | 116.0 | 114.0 | 81.0 | 95.0 | 83.0 | 109.0 | 115.0 | 93.0 | 83.0 | 81.0 | 83.0 | 87.0 |
| 62578 | 12 | 0.95 | 90.0 | 89.0 | 89.0 | 121.0 | 117.0 | 114.0 | 87.0 | 96.0 | 88.0 | 101.0 | 115.0 | 85.0 | 83.0 | 82.0 | 82.0 | 85.0 |
| 62578 | 13 | 1.01 | 95.0 | 94.0 | 94.0 | 131.0 | 128.0 | 120.0 | 93.0 | 103.0 | 93.0 | 106.0 | 121.0 | 94.0 | 98.0 | 96.0 | 85.0 | 92.0 |
| 62578 | 14 | 1.04 | 95.0 | 95.0 | 95.0 | 133.0 | 127.0 | 121.0 | 96.0 | 104.0 | 94.0 | 107.0 | 123.0 | 100.0 | 112.0 | 112.0 | 89.0 | 94.0 |
| 62578 | 15 | 1.06 | 100.0 | 100.0 | 100.0 | 114.0 | 117.0 | 121.0 | 109.0 | 104.0 | 99.0 | 106.0 | 121.0 | 99.0 | 113.0 | 111.0 | 84.0 | 94.0 |
| 62578 | 16 | 0.94 | 100.0 | 100.0 | 100.0 | 112.0 | 115.0 | 120.0 | 107.0 | 104.0 | 97.0 | 106.0 | 121.0 | 99.0 | 114.0 | 112.0 | 89.0 | 94.0 |
| 62578 | 17 | 0.80 | 95.0 | 95.0 | 95.0 | 100.0 | 101.0 | 101.0 | 114.0 | 99.0 | 99.0 | 99.0 | 106.0 | 86.0 | 117.0 | 119.0 | 91.0 | 92.0 |
| 62578 | 18 | 0.72 | 97.0 | 100.0 | 100.0 | 102.0 | 102.0 | 102.0 | 114.0 | 97.0 | 98.0 | 99.0 | 108.0 | 91.0 | 115.0 | 111.0 | 89.0 | 95.0 |
| 62578 | 19 | 0.40 | 96.0 | 94.0 | 96.0 | 96.0 | 95.0 | 96.0 | 109.0 | 92.0 | 94.0 | 93.0 | 101.0 | 81.0 | 107.0 | 100.0 | 89.0 | 85.0 |
| 62578 | 20 | 0.08 | 94.0 | 95.0 | 95.0 | 95.0 | 95.0 | 95.0 | 108.0 | 91.0 | 94.0 | 92.0 | 101.0 | 83.0 | 110.0 | 114.0 | 91.0 | 90.0 |
| 62578 | 21 | 0.0 | 92.0 | 92.0 | 90.0 | 90.0 | 90.0 | 90.0 | 101.0 | 88.0 | 91.0 | 88.0 | 82.0 | 77.0 | 97.0 | 99.0 | 85.0 | 82.0 |
| 62578 | 22 | 0.0 | 93.0 | 91.0 | 91.0 | 87.0 | 90.0 | 90.0 | 100.0 | 87.0 | 90.0 | 88.0 | 81.0 | 79.0 | 96.0 | 98.0 | 93.0 | 81.0 |
| 62578 | 23 | 0.0 | 87.0 | 87.0 | 89.0 | 87.0 | 88.0 | 88.0 | 91.0 | 85.0 | 87.0 | 87.0 | 80.0 | 77.0 | 89.0 | 91.0 | 85.0 | 79.0 |
| 62578 | 24 | 0.0 | 87.0 | 88.0 | 88.0 | 87.0 | 97.0 | 97.0 | 91.0 | 86.0 | 87.0 | 86.0 | 91.0 | 73.0 | 89.0 | 91.0 | 85.0 | 78.0 |
| 62678 | 1 | 0.0 | 81.0 | 82.0 | 83.0 | 83.0 | 82.0 | 82.0 | 87.0 | 86.0 | 81.0 | 82.0 | 73.0 | 71.0 | 85.0 | 87.0 | 82.0 | 71.0 |
| 62678 | 2 | 0.0 | 82.0 | 83.0 | 83.0 | 81.0 | 81.0 | 81.0 | 86.0 | 81.0 | 83.0 | 81.0 | 73.0 | 71.0 | 85.0 | 96.0 | 81.0 | 72.0 |
| 62678 | 3 | 0.0 | 76.0 | 77.0 | 77.0 | 77.0 | 76.0 | 77.0 | 77.0 | 81.0 | 77.0 | 77.0 | 68.0 | 67.0 | 80.0 | 81.0 | 78.0 | 66.0 |
| 62678 | 4 | 0.0 | 76.0 | 77.0 | 77.0 | 76.0 | 77.0 | 77.0 | 81.0 | 77.0 | 77.0 | 77.0 | 69.0 | 67.0 | 60.0 | 81.0 | 76.0 | 65.0 |
| 62678 | 5 | 0.0 | 73.0 | 74.0 | 74.0 | 73.0 | 73.0 | 73.0 | 76.0 | 75.0 | 74.0 | 75.0 | 68.0 | 65.0 | 75.0 | 75.0 | 75.0 | 65.0 |
| 62678 | 6 | 0.03 | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 75.0 | 74.0 | 76.0 | 74.0 | 75.0 | 68.0 | 66.0 | 75.0 | 76.0 | 75.0 | 65.0 |
| 62678 | 7 | 0.20 | 73.0 | 74.0 | 74.0 | 75.0 | 75.0 | 75.0 | 72.0 | 74.0 | 74.0 | 75.0 | 91.0 | 73.0 | 71.0 | 72.0 | 72.0 | 70.0 |
| 62678 | 8 | 0.15 | 74.0 | 78.0 | 78.0 | 84.0 | 87.0 | 84.0 | 71.0 | 81.0 | 78.0 | 84.0 | 93.0 | 76.0 | 74.0 | 73.0 | 74.0 | 77.0 |
| 62678 | 9 | 0.78 | 74.0 | 74.0 | 78.0 | 90.0 | 91.0 | 84.0 | 74.0 | 81.0 | 78.0 | 85.0 | 94.0 | 76.0 | 74.0 | 74.0 | 75.0 | 77.0 |
| 62678 | 10 | 0.86 | 82.0 | 87.0 | 82.0 | 115.0 | 109.0 | 104.0 | 79.0 | 90.0 | 82.0 | 93.0 | 105.0 | 78.0 | 80.0 | 77.0 | 79.0 | 77.0 |
| 62678 | 11 | 1.03 | 82.0 | 92.0 | 87.0 | 115.0 | 107.0 | 104.0 | 77.0 | 90.0 | 82.0 | 93.0 | 105.0 | 73.0 | 80.0 | 79.0 | 76.0 | 77.0 |
| 62678 | 12 | 1.06 | 81.0 | 84.0 | 84.0 | 115.0 | 110.0 | 105.0 | 77.0 | 91.0 | 86.0 | 96.0 | 110.0 | 79.0 | 95.0 | 94.0 | 76.0 | 77.0 |
| 62678 | 13 | 1.10 | 87.0 | 87.0 | 87.0 | 114.0 | 114.0 | 109.0 | 99.0 | 94.0 | 86.0 | 95.0 | 108.0 | 84.0 | 96.0 | 95.0 | 79.0 | 81.0 |
| 62678 | 14 | 1.06 | 88.0 | 88.0 | 87.0 | 114.0 | 114.0 | 111.0 | 91.0 | 94.0 | 86.0 | 96.0 | 106.0 | 83.0 | 96.0 | 95.0 | 79.0 | 84.0 |
| 62678 | 15 | 0.95 | 93.0 | 90.0 | 90.0 | 95.0 | 99.0 | 103.0 | 97.0 | 92.0 | 89.0 | 93.0 | 104.0 | 84.0 | 102.0 | 102.0 | 81.0 | 84.0 |
| 62678 | 16 | 0.82 | 87.0 | 90.0 | 90.0 | 95.0 | 93.0 | 102.0 | 97.0 | 92.0 | 87.0 | 94.0 | 97.0 | 82.0 | 101.0 | 101.0 | 81.0 | 83.0 |
| 62678 | 17 | 0.54 | 87.0 | 88.0 | 86.0 | 90.0 | 91.0 | 92.0 | 100.0 | 87.0 | 88.0 | 89.0 | 97.0 | 83.0 | 102.0 | 104.0 | 82.0 | 81.0 |
| 62678 | 18 | 0.42 | 87.0 | 88.0 | 88.0 | 90.0 | 91.0 | 92.0 | 101.0 | 82.0 | 88.0 | 89.0 | 98.0 | 83.0 | 100.0 | 104.0 | 82.0 | 83.0 |
| 62678 | 19 | 0.21 | 84.0 | 84.0 | 85.0 | 86.0 | 86.0 | 84.0 | 95.0 | 84.0 | 84.0 | 84.0 | 76.0 | 77.0 | 97.0 | 94.0 | 80.0 | 77.0 |
| 62678 | 20 | 0.04 | 84.0 | 84.0 | 84.0 | 85.0 | 84.0 | 84.0 | 94.0 | 83.0 | 79.0 | 78.0 | 64.0 | 64.0 | 86.0 | 88.0 | 77.0 | 67.0 |
| 62678 | 21 | 0.0 | 79.0 | 80.0 | 80.0 | 79.0 | 79.0 | 79.0 | 88.0 | 73.0 | 79.0 | 73.0 | 63.0 | 64.0 | 84.0 | 88.0 | 72.0 | 69.0 |
| 62678 | 22 | 0.0 | 77.0 | 80.0 | 80.0 | 79.0 | 78.0 | 79.0 | 87.0 | 77.0 | 79.0 | 78.0 | 59.0 | 69.0 | 85.0 | 87.0 | 74.0 | 67.0 |
| 62678 | 23 | 0.0 | 75.0 | 75.0 | 76.0 | 75.0 | 75.0 | 75.0 | 80.0 | 75.0 | 76.0 | 76.0 | 67.0 | 67.0 | 78.0 | 80.0 | 74.0 | 65.0 |
| 62678 | 24 | 0.0 | 75.0 | 76.0 | 76.0 | 75.0 | 75.0 | 75.0 | 90.0 | 74.0 | 75.0 | 75.0 | 67.0 | 66.0 | 73.0 | 80.0 | 74.0 | 65.0 |
| 62778 | 1 | 0.0 | 71.0 | 72.0 | 72.0 | 71.0 | 71.0 | 71.0 | 75.0 | 72.0 | 72.0 | 72.0 | 64.0 | 62.0 | 74.0 | 75.0 | 72.0 | 62.0 |
| 62778 | 2 | 0.0 | 71.0 | 72.0 | 72.0 | 70.0 | 69.0 | 69.0 | 72.0 | 70.0 | 70.0 | 70.0 | 63.0 | 61.0 | 71.0 | 72.0 | 70.0 | 61.0 |
| 62778 | 3 | 0.0 | 69.0 | 70.0 | 70.0 | 68.0 | 69.0 | 69.0 | 71.0 | 70.0 | 70.0 | 70.0 | 63.0 | 61.0 | 70.0 | 71.0 | 70.0 | 61.0 |
| 62778 | 4 | 0.0 | 69.0 | 69.0 | 65.0 | 68.0 | 68.0 | 68.0 | 69.0 | 67.0 | 69.0 | 69.0 | 61.0 | 61.0 | 68.0 | 69.0 | 63.0 | 60.0 |
| 62778 | 5 | 0.0 | 67.0 | 67.0 | 67.0 | 67.0 | 67.0 | 67.0 | 58.0 | 68.0 | 68.0 | 69.0 | 63.0 | 61.0 | 60.0 | 64.0 | 58.0 | 60.0 |
| 62778 | 6 | 0.05 | 67.0 | 67.0 | 67.0 | 67.0 | 67.0 | 67.0 | 68.0 | 68.0 | 67.0 | 65.0 | 64.0 | 61.0 | 65.0 | 69.0 | 69.0 | 65.0 |
| 62778 | 7 | 0.16 | 67.0 | 67.0 | 67.0 | 67.0 | 67.0 | 67.0 | 68.0 | 68.0 | 67.0 | 74.0 | 69.0 | 56.0 | 79.0 | 74.0 | 78.0 | 65.0 |
| 62778 | 8 | 0.52 | 68.0 | 69.0 | 69.0 | 74.0 | 74.0 | 74.0 | 66.0 | 70.0 | 67.0 | 75.0 | 83.0 | 65.0 | 67.0 | 67.0 | 68.0 | 74.0 |
| 62778 | 9 | 0.64 | 75.0 | 75.0 | 74.0 | 82.0 | 80.0 | 80.0 | 68.0 | 75.0 | 77.0 | 81.0 | 96.0 | 72.0 | 69.0 | 67.0 | 64.0 | 73.0 |
| 62778 | 10 | 0.91 | 75.0 | 75.0 | 79.0 | 114.0 | 113.0 | 101.0 | 74.0 | 88.0 | 79.0 | 92.0 | 102.0 | 78.0 | 76.0 | 75.0 | 72.0 | 49.0 |
| 62778 | 11 | 1.00 | 81.0 | 81.0 | 80.0 | 116.0 | 104.0 | 103.0 | 75.0 | 88.0 | 79.0 | 93.0 | 101.0 | 79.0 | 77.0 | 75.0 | 73.0 | 73.0 |
| 62778 | 12 | 1.08 | 82.0 | 87.0 | 81.0 | 117.0 | 105.0 | 105.0 | 75.0 | 89.0 | 80.0 | 95.0 | 107.0 | 94.0 | 87.0 | 86.0 | 82.0 | 91.0 |
| 62778 | 13 | 1.10 | 89.0 | 89.0 | 85.0 | 126.0 | 118.0 | 116.0 | 94.0 | 91.0 | 88.0 | 97.0 | 116.0 | 85.0 | 89.0 | 87.0 | 82.0 | 85.0 |
| 62778 | 14 | 1.08 | 89.0 | 89.0 | 89.0 | 127.0 | 119.0 | 113.0 | 92.0 | 91.0 | 90.0 | 96.0 | 110.0 | 88.0 | 97.0 | 96.0 | 83.0 | 81.0 |
| 62778 | 15 | 0.93 | 91.0 | 92.0 | 92.0 | 104.0 | 110.0 | 112.0 | 91.0 | 91.0 | 91.0 | 95.0 | 109.0 | 93.0 | 99.0 | 99.0 | 86.0 | 81.0 |
| 62778 | 16 | 0.84 | 92.0 | [illegible] | 92.0 | 106.0 | 109.0 | 112.0 | 91.0 | 91.0 | 90.0 | 94.0 | 108.0 | 91.0 | 97.0 | 94.0 | 84.0 | 80.0 |
| 62778 | 17 | 0.68 | 91.0 | 91.0 | 91.0 | 95.0 | 95.0 | 96.0 | 98.0 | 87.0 | 90.0 | 91.0 | 97.0 | 89.0 | 102.0 | 102.0 | 85.0 | 85.0 |
| 62778 | 18 | 0.46 | 91.0 | 91.0 | 91.0 | 94.0 | 95.0 | 96.0 | 90.0 | 87.0 | 90.0 | 91.0 | 97.0 | 89.0 | 102.0 | 102.0 | 85.0 | 87.0 |
| 62778 | 19 | 0.27 | 87.0 | 81.0 | 88.0 | 91.0 | 91.0 | 91.0 | 98.0 | 86.0 | 88.0 | 87.0 | 84.0 | 77.0 | 96.0 | 100.0 | 84.0 | 81.0 |
| 62778 | 20 | 0.05 | 87.0 | 80.0 | 88.0 | 91.0 | 91.0 | 91.0 | 98.0 | 86.0 | 87.0 | 85.0 | 85.0 | 76.0 | 97.0 | 99.0 | 80.0 | 75.0 |
| 62778 | 21 | 0.0 | 82.0 | 83.0 | 84.0 | 82.0 | 82.0 | 82.0 | 90.0 | 80.0 | 83.0 | 80.0 | 74.0 | 70.0 | 84.0 | 91.0 | 80.0 | 74.0 |
| 62778 | 22 | 0.0 | 82.0 | 83.0 | 83.0 | 81.0 | 82.0 | 82.0 | 71.0 | 80.0 | 82.0 | 80.0 | 74.0 | 70.0 | 69.0 | 91.0 | 81.0 | 74.0 |
| 62778 | 23 | 0.0 | 78.0 | 79.0 | 79.0 | 77.0 | 78.0 | 78.0 | 84.0 | 77.0 | 74.0 | 77.0 | 70.0 | 65.0 | 82.0 | 84.0 | 77.0 | 70.0 |
| 62778 | 24 | 0.0 | 77.0 | 79.0 | 79.0 | 77.0 | 78.0 | 79.0 | 84.0 | 77.0 | 79.0 | 74.0 | 69.0 | 64.0 | 77.0 | 79.0 | 75.0 | 67.0 |
| 62878 | 1 | 0.0 | 76.0 | 75.0 | 75.0 | 74.0 | 75.0 | 74.0 | 78.0 | 74.0 | 75.0 | 75.0 | 68.0 | 64.0 | 77.0 | 78.0 | 74.0 | 66.0 |

Table D. Continued

PYRANOMETER (DRY) READINGS, CAL/SQ-CM-MIN ,AND TEMPERATURES (T(I),°F, AT POINT NUMBER

| DATE | HOUR | PYR | T(1) | T(2) | T(3) | T(4) | T(5) | T(6) | T(7) | T(8) | T(9) | T(10) | T(11) | T(12) | T(13) | T(14) | T(15) | T(16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 62878 | 2 | 0.0 | 74.0 | 75.0 | [illegible] | 78.0 | 77.0 | 77.0 | 75.0 | 74.0 | 74.0 | 74.0 | 70.0 | 65.0 | 74.0 | 75.0 | 73.0 | 69.0 |
| 62878 | 3 | 0.0 | 73.0 | 75.0 | 75.0 | 73.0 | 74.0 | 74.0 | 75.0 | 73.0 | 74.0 | 75.0 | 71.0 | 66.0 | 74.0 | 75.0 | 73.0 | 70.0 |
| 62878 | 4 | 0.0 | 74.0 | 69.0 | 72.0 | 72.0 | 70.0 | 72.0 | 72.0 | 73.0 | 73.0 | 74.0 | 70.0 | 67.0 | 72.0 | 74.0 | 73.0 | 68.0 |
| 62878 | 5 | 0.0 | 73.0 | 70.0 | 72.0 | 72.0 | 71.0 | 72.0 | 72.0 | 79.0 | 79.0 | 79.0 | 70.0 | 67.0 | 72.0 | 73.0 | 74.0 | 69.0 |
| 62878 | 6 | 0.0 | 74.0 | 71.0 | 73.0 | 73.0 | 72.0 | 74.0 | 73.0 | 74.0 | 74.0 | 75.0 | 74.0 | 69.0 | 71.0 | 72.0 | 74.0 | 70.0 |
| 62878 | 7 | 0.12 | 71.0 | 71.0 | 73.0 | 73.0 | 72.0 | 73.0 | 72.0 | 74.0 | 74.0 | 75.0 | 74.0 | 69.0 | 72.0 | 73.0 | 74.0 | 69.0 |
| 62878 | 8 | 0.09 | 67.0 | 68.0 | 69.0 | 68.0 | 68.0 | 68.0 | 68.0 | 69.0 | 67.0 | 69.0 | 66.0 | 66.0 | 67.0 | 71.0 | 71.0 | 65.0 |
| 62878 | 9 | 0.0 | 67.0 | 67.0 | 69.0 | 68.0 | 68.0 | 68.0 | 68.0 | 69.0 | 67.0 | 69.0 | 66.0 | 66.0 | 67.0 | 71.0 | 72.0 | 66.0 |
| 62878 | 10 | 0.04 | 67.0 | 67.0 | 69.0 | 68.0 | 63.0 | 68.0 | 68.0 | 69.0 | 67.0 | 69.0 | 66.0 | 66.0 | 67.0 | 71.0 | 72.0 | 66.0 |
| 62878 | 11 | 0.89 | 77.0 | 74.0 | 76.0 | 85.0 | 81.0 | 89.0 | 74.0 | 81.0 | 76.0 | 83.0 | 91.0 | 72.0 | 73.0 | 73.0 | 73.0 | 77.0 |
| 62878 | 12 | 1.03 | 78.0 | 75.0 | 76.0 | 88. | 87.0 | 91.0 | 75.0 | 87.0 | 77.0 | 84.0 | 105.0 | 84.0 | 81.0 | 80.0 | 80.0 | 82.0 |
| 62878 | 13 | 1.07 | 86.0 | 84.0 | 85.0 | 109.0 | 103.0 | 107.0 | 82.0 | 88.0 | 86.0 | 92.0 | 104.0 | 67.0 | 82.0 | 80.0 | 80.0 | 86.0 |
| 62878 | 14 | 1.01 | 66.0 | 94.0 | 85.0 | 103.0 | 104.0 | 104.0 | 85.0 | 50.0 | 89.0 | 94.0 | 104.0 | 90.0 | 86.0 | 87.0 | 85.0 | 89.0 |
| 62878 | 15 | 0.94 | 89.0 | 87.0 | 89.0 | 101.0 | 102.0 | 102.0 | 85.0 | 90.0 | 89.0 | 94.0 | 104.0 | 91.0 | 86.0 | 87.0 | 85.0 | 89.0 |
| 62878 | 16 | 0.84 | 89.0 | 83.0 | 87.0 | 100.0 | 101.0 | 102.0 | 86.0 | 90.0 | 90.0 | 94.0 | 104.0 | 90.0 | 90.0 | 93.0 | 83.0 | 89.0 |
| 62878 | 17 | 0.62 | 91.0 | 91.0 | 91.0 | 95.0 | 96.0 | 97.0 | 87.0 | 90.0 | 91.0 | 93.0 | 106.0 | 91.0 | 91.0 | 94.0 | 88.0 | 90.0 |
| 62878 | 18 | 0.44 | 91.0 | 92.0 | 92.0 | [illegible] | 91.0 | 91.0 | 92.0 | 88.0 | 69.0 | 81.0 | 71.0 | 81.0 | 93.0 | 95.0 | 87.0 | 86.0 |
| 62878 | 19 | 0.22 | 83.0 | 93.0 | 90.0 | 91.0 | 91.0 | 91.0 | 92.0 | 68.0 | 89.0 | 89.0 | 90.0 | 81.0 | 93.0 | 94.0 | 87.0 | 87.0 |
| 62878 | 20 | 0.08 | 87.0 | 90.0 | 90.0 | 91.0 | 91.0 | 91.0 | 92.0 | 88.0 | 87.0 | 89.0 | 88.0 | 77.0 | 90.0 | 91.0 | 85.0 | 81.0 |
| 62878 | 21 | 0.0 | 86.0 | 87.0 | 87.0 | 86.0 | 87.0 | 87.0 | 91.0 | 85.0 | 86.0 | 86.0 | 80.0 | 77.0 | 90.0 | 91.0 | 86.0 | 81.0 |
| 62878 | 22 | 0.0 | 86.0 | 87.0 | 87.0 | 86.0 | 86.0 | 86.0 | 91.0 | 85.0 | 86.0 | 86.0 | 79.0 | 77.0 | 90.0 | 91.0 | 86.0 | 80.0 |
| 62878 | 23 | 0.0 | 53.0 | 84.0 | 85.0 | 83.0 | 83.0 | 84.0 | 87.0 | 83.0 | 84.0 | 84.0 | 78.0 | 77.0 | 65.0 | 87.0 | 84.0 | 78.0 |
| 62878 | 24 | 0.0 | 83.0 | 84.0 | 85.0 | 83.0 | 83.0 | 83.0 | 84.0 | 81.0 | 81.0 | 81.0 | 75.0 | 75.0 | 82.0 | 83.0 | 82.0 | 75.0 |
| 62978 | 1 | 0.0 | 80.0 | 81.0 | 81.0 | 80.0 | 80.0 | 80.0 | 83.0 | 89.0 | 81.0 | 81.0 | 75.0 | 75.0 | 92.0 | 83.0 | 82.0 | 79.0 |
| 62978 | 2 | 0.0 | 80.0 | 81.0 | 81.0 | 80.0 | 80.0 | 80.0 | 83.0 | 80.0 | 80.0 | 81.0 | 72.0 | 72.0 | 79.0 | 90.0 | 80.0 | 75.0 |
| 62978 | 3 | 0.0 | 77.0 | 78.0 | 78.0 | 77.0 | 77.0 | 77.0 | 80.0 | 78.0 | 76.0 | 79.0 | 74.0 | 72.0 | 79.0 | 80.0 | 80.0 | 73.0 |
| 62978 | 4 | 0.0 | 77.0 | 78.0 | 78.0 | 77.0 | 77.0 | 77.0 | 80.0 | 78.0 | 78.0 | 79.0 | 72.0 | 71.0 | 79.0 | 81.0 | 74.0 | 71.0 |
| 62978 | 5 | 0.0 | 75.0 | 76.0 | 76.0 | 75.0 | 76.0 | 76.0 | 77.0 | 76.0 | 75.0 | 77.0 | 71.0 | 70.0 | 74.0 | 75.0 | 78.0 | 71.0 |
| 62978 | 6 | 0.0 | 75.0 | 76.0 | 76.0 | 50.0 | 80.0 | 79.0 | 77.0 | 78.0 | 77.0 | 80.0 | 81.0 | 71.0 | 75.0 | 75.0 | 77.0 | 76.0 |
| 62978 | 7 | 0.03 | 77.0 | 77.0 | 73.0 | 76.0 | 76.0 | 75.0 | 77.0 | 78.0 | 77.0 | 80.0 | 84.0 | 73.0 | 75.0 | 77.0 | 77.0 | 75.0 |
| 62978 | 8 | 0.26 | 77.0 | 78.0 | 78.0 | 79.0 | 75.0 | 75.0 | 77.0 | 78.0 | 78.0 | 80.0 | 82.0 | 77.0 | 77.0 | 77.0 | 81.0 | 86.0 |
| 62978 | 9 | 0.44 | 85.0 | 85.0 | 85.0 | 93.0 | 88.0 | 79.0 | 79.0 | 83.0 | 84.0 | 88.0 | 92.0 | 77.0 | 78.0 | 78.0 | 81.0 | 85.0 |
| 62978 | 10 | 0.65 | 86.0 | 86.0 | 89.0 | 118.0 | 114.0 | 113.0 | 81.0 | 90.0 | 91.0 | 96.0 | 113.0 | 84.0 | 81.0 | 81.0 | 87.0 | 92.0 |
| 62978 | 11 | 0.82 | 92.0 | 91.0 | 91.0 | 119.0 | 114.0 | 114.0 | 81.0 | 91.0 | 91.0 | 97.0 | 114.0 | 84.0 | 81.0 | 81.0 | 87.0 | 93.0 |
| 62978 | 12 | 0.95 | 92.0 | [illegible] | 91.0 | 120.0 | 116.0 | 115.0 | 82.0 | 92.0 | 92.0 | 97.0 | 120.0 | 93.0 | 87.0 | 85.0 | 91.0 | 94.0 |
| 62978 | 13 | 1.03 | 97.0 | 96.0 | 96.0 | 128.0 | 123.0 | 123.0 | 87.0 | 97.0 | 95.0 | 101.0 | 121.0 | 95.0 | 87.0 | 86.0 | 91.0 | 96.0 |
| 62978 | 14 | 1.06 | 91.0 | 96.0 | 96.0 | 127.0 | 122.0 | 122.0 | 87.0 | 97.0 | 96.0 | 101.0 | 120.0 | 96.0 | 88.0 | 86.0 | 91.0 | 95.0 |
| 62978 | 15 | 0.70 | 94.0 | 96.0 | 96.0 | 110.0 | 111.0 | 112.0 | 90.0 | 94.0 | 95.0 | 99.0 | 112.0 | 93.0 | 97.0 | 94.0 | 93.0 | 93.0 |
| 62978 | 16 | 0.74 | 95.0 | 96.0 | 95.0 | 101.0 | 101.0 | 101.0 | 91.0 | 99.0 | 95.0 | 96.0 | 102.0 | 88.0 | 98.0 | 94.0 | 93.0 | 93.0 |
| 72478 | 12 | 0.90 | 80.0 | 80.0 | 80.0 | 84.0 | 64.0 | 83.0 | 77.0 | 79.0 | 80.0 | 82.0 | 86.0 | 77.0 | 77.0 | 76.0 | 73.0 | 77.0 |
| 72478 | 13 | 0.94 | 86.0 | 35.0 | 85.0 | 110.0 | 105.0 | 105.0 | 84.0 | 88.0 | 87.0 | 96.0 | 104.0 | 87.0 | 82.0 | 79.0 | 79.0 | 86.0 |
| 72478 | 14 | 0.94 | 94.0 | 94.0 | 93.0 | 127.0 | 121.0 | 117.0 | 86.0 | 100.0 | 92.0 | 105.0 | 120.0 | 97.0 | 88.0 | 86.0 | 93.0 | 93.0 |
| 72478 | 15 | 0.86 | 97.0 | 97.0 | 95.0 | 110.0 | 107.0 | 107.0 | 93.0 | 100.0 | 95.0 | 102.0 | 108.0 | 93.0 | 96.0 | 96.0 | 87.0 | 93.0 |
| 72478 | 16 | 0.76 | 100.0 | 100.0 | 100.0 | 121.0 | 118.0 | 118.0 | 101.0 | 98.0 | 99.0 | 105.0 | 118.0 | 99.0 | 105.0 | 102.0 | 90.0 | 94.0 |
| 72478 | 17 | 0.60 | [illegible] | [illegible] | 101.0 | [illegible] | [illegible] | 113.0 | 106.0 | [illegible] | [illegible] | [illegible] | 114.0 | [illegible] | [illegible] | [illegible] | [illegible] | 97.0 |
| 72478 | 18 | 0.50 | 101.0 | 102.0 | 102.0 | 103.0 | 104.0 | 106.0 | 107.0 | 92.0 | 100.0 | 101.0 | 108.0 | 99.0 | 109.0 | 110.0 | 93.0 | 93.0 |
| 72478 | 19 | 0.30 | [illegible] | 101.0 | 101.0 | 102.0 | 103.0 | 104.0 | 108.0 | 89.0 | 100.0 | 101.0 | 104.0 | 98.0 | 108.0 | 101.0 | 94.0 | 94.0 |
| 72478 | 20 | 0.10 | [illegible] | 101.0 | 101.0 | 102.0 | 103.0 | 99.0 | 106.0 | 87.0 | 97.0 | 96.0 | 96.0 | 89.0 | 105.0 | 104.0 | 97.0 | 91.0 |
| 72478 | 21 | 0.0 | 96.0 | 97.0 | 98.0 | 94.0 | 99.0 | 97.0 | 105.0 | 87.0 | 96.0 | 96.0 | 91.0 | 88.0 | 103.0 | 103.0 | 90.0 | 82.0 |
| 72478 | 22 | 0.0 | 92.0 | 95.0 | 94.0 | 94.0 | 94.0 | 94.0 | 101.0 | 86.0 | 97.0 | 91.0 | 81.0 | 79.0 | 101.0 | 100.0 | [illegible] | 81.0 |
| 72478 | 23 | 0.0 | 91.0 | 92.0 | 92.0 | 91.0 | 91.0 | 92.0 | 99.0 | 87.0 | 91.0 | 88.0 | 77.0 | 77.0 | 98.0 | 95.0 | 96.0 | 74.0 |
| 72478 | 24 | 0.0 | 89.0 | 90.0 | 90.0 | 89.0 | 89.0 | 89.0 | 95.0 | 79.0 | 88.0 | 85.0 | 78.0 | 77.0 | 77.0 | 95.0 | 86.0 | 74.0 |
| 72978 | 1 | 0.0 | 83.0 | 87.0 | 88.0 | 88.0 | 88.0 | 88.0 | 91.0 | 84.0 | 87.0 | 84.0 | 77.0 | 76.0 | 90.0 | 89.0 | 85.0 | 75.0 |
| 72978 | 2 | 0.0 | 85.0 | 86.0 | 86.0 | 85.0 | 86.0 | 84.0 | 88.0 | 82.0 | 85.0 | 83.0 | 74.0 | 74.0 | 85.0 | 87.0 | 83.0 | 76.0 |
| 72978 | 3 | 0.0 | 84.0 | 85.0 | 85.0 | 84.0 | 84.0 | 84.0 | 86.0 | 81.0 | 84.0 | 87.0 | 76.0 | 74.0 | 85.0 | 95.0 | 83.0 | 77.0 |
| 72978 | 4 | 0.0 | 83.0 | 84.0 | 84.0 | 81.0 | 82.0 | 82.0 | 93.0 | 79.0 | 81.0 | 79.0 | 74.0 | 73.0 | 82.0 | 84.0 | 92.0 | 73.0 |
| 72978 | 5 | 0.0 | 82.0 | 82.0 | 92.0 | 82.0 | 82.0 | 82.0 | 83.0 | 79.0 | 82.0 | 79.0 | 74.0 | 72.0 | 82.0 | 83.0 | 83.0 | 74.0 |
| 72978 | 6 | 0.0 | 80.0 | 81.0 | 81.0 | 80.0 | 81.0 | 80.0 | 81.0 | 77.0 | 80.0 | 79.0 | 73.0 | 68.0 | 74.0 | 81.0 | 83.0 | 63.0 |
| 72978 | 7 | 0.0 | 79.0 | 80.0 | 80.0 | 79.0 | 80.0 | 80.0 | 80.0 | 76.0 | 78.0 | 72.0 | 70.0 | 68.0 | 79.0 | 81.0 | 81.0 | [illegible] |
| 72978 | 8 | 0.02 | 79.0 | 79.0 | 79.0 | 78.0 | 73.0 | 78.0 | 77.0 | 75.0 | 78.0 | 76.0 | 72.0 | 69.0 | 78.0 | 78.0 | 80.0 | 64.0 |
| 72978 | 9 | 0.12 | 75.0 | 79.0 | 79.0 | 75.0 | 77.0 | 79.0 | 73.0 | 75.0 | 78.0 | 77.0 | 75.0 | 70.0 | 71.0 | 73.0 | 78.0 | [illegible] |
| 72978 | 10 | 0.18 | 77.0 | 78.0 | 78.0 | 79.0 | 81.0 | 79.0 | 78.0 | 76.0 | 78.0 | 78.0 | 81.0 | 71.0 | 77.0 | 77.0 | 77.0 | [illegible] |
| 72978 | 11 | 0.21 | 77.0 | 78.0 | 78.0 | 79.0 | 77.0 | 77.0 | 78.0 | 76.0 | 76.0 | 78.0 | 81.0 | 71.0 | 76.0 | 77.0 | [illegible] | [illegible] |
| 72978 | 12 | 0.44 | 78.0 | 78.0 | 78.0 | 74.0 | 80.0 | 80.0 | 73.0 | 78.0 | 78.0 | 79.0 | 82.0 | 72.0 | 76.0 | 77.0 | 75.0 | 71.0 |
| 72978 | 13 | 0.50 | 78.0 | 76.0 | 78.0 | 82.0 | 82.0 | 82.0 | 77.0 | 78.0 | 78.0 | 80.0 | 84.0 | 72.0 | 76.0 | 77.0 | 74.0 | 71.0 |
| 72978 | 14 | 0.40 | 80.0 | 80.0 | 79.0 | 84.0 | 85.0 | 85.0 | 77.0 | 77.0 | 79.0 | 83.0 | 85.0 | 75.0 | 77.0 | 77.0 | 75.0 | 71.0 |
| 72978 | 15 | [illegible] | 80.0 | 80.0 | 80.0 | 84.0 | 84.0 | 84.0 | 79.0 | 80.0 | 80.0 | 82.0 | 86.0 | 75.0 | 77.0 | 79.0 | 75.0 | 74.0 |
| 72978 | 16 | 0.19 | 80.0 | 80.0 | 80.0 | 81.0 | 82.0 | 82.0 | 81.0 | 79.0 | 83.0 | 81.0 | 84.0 | 74.0 | 80.0 | 80.0 | 75.0 | 72.0 |
| 72978 | 17 | 0.16 | 79.0 | 79.0 | 74.0 | 80.0 | 80.0 | 80.0 | 81.0 | 78.0 | 80.0 | 80.0 | 87.0 | 73.0 | 81.0 | 82.0 | 75.0 | 72.0 |
| 72978 | 18 | 0.14 | 75.0 | 83.0 | 80.0 | 80.0 | 81.0 | 81.0 | 81.0 | 78.0 | 80.0 | 80.0 | 82.0 | 74.0 | 81.0 | 81.0 | 75.0 | [illegible] |
| 72978 | 19 | 0.04 | 79.0 | 80.0 | 80.0 | 83.0 | 80.0 | 80.0 | 81.0 | 77.0 | 79.0 | 79.0 | 77.0 | 72.0 | 80.0 | 81.0 | 75.0 | [illegible] |
| 72978 | 20 | 0.04 | 74.0 | 80.0 | 80.0 | 80.0 | 80.0 | 80.0 | 60.0 | 77.0 | 79.0 | 79.0 | 76.0 | 72.0 | 73.0 | 80.0 | 75.0 | 72.0 |
| 72978 | 21 | 0.0 | 75.0 | 75.0 | 79.0 | 78.0 | 79.0 | 74.0 | 79.0 | 76.0 | 77.0 | 77.0 | 78.0 | 70.0 | 79.0 | 80.0 | 75.0 | [illegible] |
| 72978 | 22 | 0.0 | 77.0 | 76.0 | 78.0 | 78.0 | 78.0 | 78.0 | 79.0 | 75.0 | 77.0 | 76.0 | 70.0 | 69.0 | 78.0 | 77.0 | 75.0 | [illegible] |
| 72978 | 23 | 0.0 | 76.0 | 77.0 | 77.0 | 76.0 | 77.0 | 77.0 | 78.0 | 74.0 | 76.0 | 75.0 | 70.0 | [illegible] | 76.0 | 73.0 | 75.0 | [illegible] |
| 72978 | 24 | 0.0 | 76.0 | 77.0 | 77.0 | 77.0 | 77.0 | 77.0 | 78.0 | 74.0 | 76.0 | 76.0 | 73.0 | 69.0 | 75.0 | 71.0 | 75.0 | [illegible] |
| 73078 | 1 | 0.0 | 75.0 | 77.0 | 77.0 | 76.0 | 77.0 | 76.0 | 77.0 | 74.0 | 76.0 | 75.0 | 72.0 | 69.0 | 75.0 | 74.0 | 75.0 | [illegible] |
| 73078 | 2 | 0.0 | 74.0 | 77.0 | 77.0 | 77.0 | 77.0 | 77.0 | 77.0 | 73.0 | 76.0 | 75.0 | 71.0 | 69.0 | 77.0 | 76.0 | 74.0 | [illegible] |
| 73078 | 3 | 0.0 | 75.0 | [illegible] | 76.0 | 75.0 | 76.0 | 75.0 | 76.0 | 73.0 | 75.0 | 75.0 | 70.0 | 68.0 | 75.0 | 73.0 | 75.0 | [illegible] |
| 73078 | 4 | 0.0 | 75.0 | 76.0 | 76.0 | 75.0 | 76.0 | 75.0 | 76.0 | 72.0 | 72.0 | 75.0 | 74.0 | 67.0 | 74.0 | 75.0 | 74.0 | [illegible] |
| 73078 | 5 | 0.0 | 75.0 | 75.0 | 76.0 | 75.0 | 75.0 | 75.0 | 75.0 | 72.0 | 75.0 | 74.0 | 67.0 | 67.0 | 73.0 | 75.0 | 74.0 | [illegible] |
| 73078 | 6 | 0.0 | 74.0 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 72.0 | 74.0 | 74.0 | 71.0 | 69.0 | 73.0 | 74.0 | 74.0 | 67.0 |
| 73078 | 7 | 0.0 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 72.0 | 75.0 | 75.0 | 76.0 | 69.0 | 72.0 | 74.0 | 73.0 | 68.0 |
| 73078 | 8 | 0.20 | 75.0 | 76.0 | 74.0 | 77.0 | 76.0 | 77.0 | 75.0 | 74.0 | 75.0 | 76.0 | 83.0 | 70.0 | 72.0 | 73.0 | 74.0 | 71.0 |
| 73078 | 9 | 0.42 | 77.0 | 77.0 | 77.0 | 80.0 | 80.0 | 80.0 | 75.0 | 76.0 | 77.0 | 80.0 | 81.0 | 71.0 | 74.0 | 75.0 | 73.0 | [illegible] |
| 73078 | 10 | 0.52 | 81.0 | 81.0 | 80.0 | 93.0 | 90.0 | 84.0 | 73.0 | 79.0 | 80.0 | 86.0 | 91.0 | 75.0 | 75.0 | 75.0 | 74.0 | [illegible] |
| 73078 | 11 | 0.64 | 89.0 | 90.0 | 80.0 | 83.0 | 84.0 | 83.0 | 76.0 | 79.0 | 74.0 | 32.0 | 86.0 | 75.0 | 76.0 | 76.0 | 75.0 | 76.0 |
| 73078 | 12 | 0.76 | 64.0 | 84.0 | 82.0 | 105.0 | 99.0 | 97.0 | 79.0 | 84.0 | 82.0 | 88.0 | 95.0 | 78.0 | 81.0 | 75.0 | 77.0 | 70.0 |

Table D. Continued

PYRANOMETER (PYR) READINGS, CAL/SQ-CM-MIN, AND TEMPERATURES (T), °F, AT POINT NUMBER

| DATE | HOUR | PYR | T(1) | T(2) | T(3) | T(4) | T(5) | T(6) | T(7) | T(8) | T(9) | T(10) | T(11) | T(12) | T(13) | T(14) | T(15) | T(16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 73078 | 13 | 0.47 | 84.0 | 84.0 | 83.0 | 104.0 | 100.0 | 100.0 | 80.0 | 85.0 | 83.0 | 90.0 | 99.0 | 79.0 | 91.0 | 89.0 | 77.0 | 79.0 |
| 73078 | 14 | 0.84 | 83.0 | 88.0 | 87.0 | 121.0 | 117.0 | 114.0 | 83.0 | 92.0 | 87.0 | 97.0 | 110.0 | 84.0 | 95.0 | 83.0 | 78.0 | 81.0 |
| 73078 | 15 | 0.82 | 83.0 | 88.0 | 87.0 | 111.0 | 106.0 | 97.0 | 91.0 | 91.0 | 88.0 | 93.0 | 97.0 | 82.0 | 93.0 | 87.0 | 81.0 | 83.0 |
| 73078 | 16 | 0.72 | 83.0 | 89.0 | 89.0 | 95.0 | 95.0 | 95.0 | 92.0 | 89.0 | 88.0 | 94.0 | 100.0 | 85.0 | 94.0 | 92.0 | 81.0 | 83.0 |
| 73078 | 17 | 0.56 | 83.0 | 89.0 | 89.0 | 91.0 | 92.0 | 92.0 | 95.0 | 88.0 | 88.0 | 89.0 | 92.0 | 87.0 | 97.0 | 96.0 | 62.0 | 84.0 |
| 73078 | 18 | 0.42 | 84.0 | 87.0 | 89.0 | 91.0 | 92.0 | 92.0 | 96.0 | 84.0 | 87.0 | 90.0 | 95.0 | 86.0 | 97.0 | 99.0 | 82.0 | 84.0 |
| 73078 | 19 | 0.30 | 87.0 | 89.0 | 89.0 | 90.0 | 91.0 | 91.0 | 95.0 | 78.0 | 86.0 | 86.0 | 86.0 | 80.0 | 92.0 | 93.0 | 81.0 | 80.0 |
| 73078 | 20 | 0.10 | 86.0 | 87.0 | 87.0 | 88.0 | 89.0 | 89.0 | 93.0 | 81.0 | 85.0 | 86.0 | 82.0 | 79.0 | 91.0 | 93.0 | 87.0 | 74.0 |
| 73078 | 21 | 0.0 | 84.0 | 85.0 | 85.0 | 84.0 | 85.0 | 84.0 | 90.0 | 78.0 | 86.0 | 82.0 | 74.0 | 71.0 | 84.0 | 91.0 | 81.0 | 72.0 |
| 73078 | 22 | 0.0 | 84.0 | 85.0 | 85.0 | 84.0 | 84.0 | 84.0 | 88.0 | 80.0 | 84.0 | 81.0 | 75.0 | 72.0 | 84.0 | 85.0 | 80.0 | 72.0 |
| 73078 | 23 | 0.0 | 82.0 | 83.0 | 83.0 | 82.0 | 83.0 | 82.0 | 86.0 | 73.0 | 82.0 | 79.0 | 72.0 | 71.0 | 84.0 | 84.0 | 79.0 | 71.0 |
| 73178 | 24 | 0.0 | 81.0 | 81.0 | 81.0 | 80.0 | 81.0 | 81.0 | 83.0 | 77.0 | 81.0 | 78.0 | 72.0 | 71.0 | 81.0 | 82.0 | 79.0 | 70.0 |
| 73178 | 1 | 0.0 | 79.0 | 80.0 | 80.0 | 79.0 | 79.0 | 79.0 | 81.0 | 75.0 | 79.0 | 76.0 | 70.0 | 67.0 | 79.0 | 80.0 | 77.0 | 66.0 |
| 73178 | 2 | 0.0 | 77.0 | 77.0 | 77.0 | 71.0 | 72.0 | 72.0 | 73.0 | 74.0 | 76.0 | 74.0 | 69.0 | 66.0 | 77.0 | 80.0 | 77.0 | 65.0 |
| 73178 | 3 | 0.0 | 76.0 | 77.0 | 77.0 | 76.0 | 75.0 | 75.0 | 77.0 | 72.0 | 75.0 | 73.0 | 65.0 | 65.0 | 76.0 | 76.0 | 76.0 | 61.0 |
| 73178 | 4 | 0.0 | 74.0 | 75.0 | 75.0 | 74.0 | 75.0 | 74.0 | 77.0 | 72.0 | 73.0 | 71.0 | 64.0 | 64.0 | 74.0 | 75.0 | 76.0 | 61.0 |
| 73178 | 5 | 0.0 | 71.0 | 72.0 | 72.0 | 70.0 | 71.0 | 71.0 | 74.0 | 69.0 | 71.0 | 69.0 | 62.0 | 61.0 | 72.0 | 74.0 | 75.0 | 59.0 |
| 73178 | 6 | 0.0 | 71.0 | 72.0 | 71.0 | 70.0 | 70.0 | 70.0 | 73.0 | 68.0 | 70.0 | 69.0 | 64.0 | 62.0 | 71.0 | 72.0 | 73.0 | 60.0 |
| 73178 | 7 | 0.02 | 70.0 | 71.0 | 71.0 | 71.0 | 71.0 | 71.0 | 73.0 | 66.0 | 71.0 | 71.0 | 68.0 | 65.0 | 70.0 | 71.0 | 73.0 | 64.0 |
| 73178 | 8 | 0.15 | 74.0 | 74.0 | 74.0 | 75.0 | 77.0 | 76.0 | 71.0 | 72.0 | 74.0 | 74.0 | 74.0 | 70.0 | 70.0 | 70.0 | 72.0 | 67.0 |
| 73178 | 9 | 0.40 | 75.0 | 75.0 | 75.0 | 77.0 | 78.0 | 77.0 | 71.0 | 75.0 | 76.0 | 79.0 | 82.0 | 74.0 | 71.0 | 73.0 | 73.0 | 72.0 |
| 73178 | 10 | 0.42 | 77.0 | 77.0 | 79.0 | 84.0 | 84.0 | 84.0 | 73.0 | 77.0 | 78.0 | 82.0 | 86.0 | 76.0 | 74.0 | 73.0 | 74.0 | 76.0 |
| 73178 | 11 | 0.36 | 80.0 | 80.0 | 79.0 | 90.0 | 88.0 | 86.0 | 74.0 | 79.0 | 79.0 | 83.0 | 86.0 | 77.0 | 75.0 | 75.0 | 75.0 | 77.0 |
| 73178 | 12 | 0.58 | 82.0 | 82.0 | 81.0 | 89.0 | 89.0 | 89.0 | 77.0 | 82.0 | 82.0 | 88.0 | 92.0 | 80.0 | 79.0 | 77.0 | 76.0 | 79.0 |
| 73178 | 13 | 0.66 | 82.0 | 82.0 | 82.0 | 87.0 | 89.0 | 88.0 | 80.0 | 85.0 | 84.0 | 90.0 | 92.0 | 84.0 | 82.0 | 81.0 | 78.0 | 81.0 |
| 73178 | 14 | 0.56 | 85.0 | 85.0 | 85.0 | 90.0 | 90.0 | 89.0 | 81.0 | 84.0 | 84.0 | 88.0 | 91.0 | 81.0 | 82.0 | 81.0 | 78.0 | 81.0 |
| 73178 | 15 | 0.71 | 85.0 | 85.0 | 84.0 | 87.0 | 90.0 | 89.0 | 84.0 | 84.0 | 85.0 | 87.0 | 92.0 | 82.0 | 85.0 | 85.0 | 79.0 | 83.0 |
| 73178 | 16 | 0.79 | 90.0 | 90.0 | 89.0 | 106.0 | 104.0 | 105.0 | 86.0 | 90.0 | 89.0 | 94.0 | 107.0 | 89.0 | 87.0 | 86.0 | 82.0 | 87.0 |
| 73178 | 17 | 0.54 | 84.0 | 87.0 | 89.0 | 91.0 | 93.0 | 92.0 | 88.0 | 89.0 | 88.0 | 93.0 | 93.0 | 83.0 | 89.0 | 88.0 | 83.0 | 84.0 |
| 73178 | 18 | 0.42 | 87.0 | 89.0 | 89.0 | 92.0 | 94.0 | 96.0 | 91.0 | 86.0 | 87.0 | 90.0 | 94.0 | 84.0 | 92.0 | 91.0 | 83.0 | 84.0 |
| 73178 | 19 | 0.26 | 88.0 | 89.0 | 88.0 | 91.0 | 92.0 | 91.0 | 93.0 | 85.0 | 88.0 | 89.0 | 94.0 | 85.0 | 94.0 | 94.0 | 82.0 | 83.0 |
| 73178 | 20 | 0.05 | 80.0 | 87.0 | 87.0 | 87.0 | 88.0 | 87.0 | 92.0 | 84.0 | 86.0 | 85.0 | 80.0 | 74.0 | 97.0 | 91.0 | 82.0 | 73.0 |
| 73178 | 21 | 0.0 | 85.0 | 86.0 | 85.0 | 85.0 | 85.0 | 85.0 | 91.0 | 82.0 | 85.0 | 83.0 | 77.0 | 74.0 | 99.0 | 91.0 | 82.0 | 75.0 |
| 73178 | 22 | 0.0 | 82.0 | 84.0 | 84.0 | 82.0 | 84.0 | 84.0 | 88.0 | 79.0 | 83.0 | 80.0 | 72.0 | 69.0 | 86.0 | 84.0 | 82.0 | 70.0 |
| 73178 | 23 | 0.0 | 81.0 | 81.0 | 81.0 | 80.0 | 81.0 | 80.0 | 85.0 | 78.0 | 80.0 | 77.0 | 69.0 | 67.0 | 88.0 | 85.0 | 79.0 | 65.0 |
| 80178 | 24 | 0.0 | 79.0 | 80.0 | 80.0 | 78.0 | 79.0 | 78.0 | 82.0 | 75.0 | 79.0 | 76.0 | 69.0 | 66.0 | 81.0 | 83.0 | 77.0 | 67.0 |
| 80178 | 1 | 0.0 | 76.0 | 77.0 | 77.0 | 76.0 | 76.0 | 75.0 | 80.0 | 74.0 | 76.0 | 74.0 | 66.0 | 64.0 | 76.0 | 80.0 | 77.0 | 65.0 |
| 80178 | 2 | 0.0 | 75.0 | 76.0 | 76.0 | 74.0 | 75.0 | 75.0 | 78.0 | 72.0 | 75.0 | 72.0 | 65.0 | 63.0 | 77.0 | 78.0 | 76.0 | 63.0 |
| 80178 | 3 | 0.0 | 74.0 | 74.0 | 74.0 | 73.0 | 74.0 | 73.0 | 76.0 | 70.0 | 74.0 | 71.0 | 64.0 | 63.0 | 75.0 | 76.0 | 75.0 | 62.0 |
| 80178 | 4 | 0.0 | 72.0 | 73.0 | 73.0 | 71.0 | 72.0 | 71.0 | 74.0 | 69.0 | 72.0 | 70.0 | 63.0 | 62.0 | 73.0 | 74.0 | 74.0 | 60.0 |
| 80178 | 5 | 0.0 | 71.0 | 72.0 | 72.0 | 70.0 | 71.0 | 70.0 | 73.0 | 68.0 | 71.0 | 69.0 | 63.0 | 62.0 | 71.0 | 71.0 | 73.0 | 61.0 |
| 80178 | 6 | 0.0 | 70.0 | 71.0 | 71.0 | 70.0 | 70.0 | 70.0 | 72.0 | 68.0 | 70.0 | 69.0 | 63.0 | 62.0 | 70.0 | 71.0 | 73.0 | 60.0 |
| 80178 | 7 | 0.0 | 70.0 | 70.0 | 70.0 | 69.0 | 70.0 | 69.0 | 71.0 | 68.0 | 70.0 | 69.0 | 64.0 | 62.0 | 69.0 | 70.0 | 71.0 | 60.0 |
| 80178 | 8 | 0.24 | 71.0 | 71.0 | 71.0 | 74.0 | 74.0 | 73.0 | 71.0 | 70.0 | 71.0 | 72.0 | 71.0 | 67.0 | 69.0 | 69.0 | 71.0 | 66.0 |
| 80178 | 9 | 0.44 | 75.0 | 75.0 | 75.0 | 78.0 | 79.0 | 79.0 | 71.0 | 73.0 | 75.0 | 79.0 | 82.0 | 72.0 | 73.0 | 70.0 | 71.0 | 73.0 |
| 80178 | 10 | 0.60 | 84.0 | 83.0 | 82.0 | 99.0 | 97.0 | 90.0 | 73.0 | 84.0 | 82.0 | 90.0 | 96.0 | 82.0 | 74.0 | 71.0 | 76.0 | 82.0 |
| 80178 | 11 | 0.72 | 85.0 | 86.0 | 82.0 | 102.0 | 99.0 | 102.0 | 76.0 | 87.0 | 84.0 | 95.0 | 105.0 | 85.0 | 77.0 | 72.0 | 78.0 | 84.0 |
| 80178 | 12 | 0.44 | 86.0 | 85.0 | 84.0 | 100.0 | 98.0 | 97.0 | 77.0 | 89.0 | 84.0 | 93.0 | 99.0 | 81.0 | 76.0 | 76.0 | 81.0 | 87.0 |
| 80178 | 13 | 0.79 | 89.0 | 83.0 | 87.0 | 113.0 | 114.0 | 111.0 | 81.0 | 94.0 | 87.0 | 99.0 | 110.0 | 88.0 | 84.0 | 82.0 | 81.0 | 86.0 |
| 80178 | 14 | 0.66 | 87.0 | 87.0 | 87.0 | 91.0 | 91.0 | 90.0 | 87.0 | 88.0 | 87.0 | 91.0 | 93.0 | 84.0 | 90.0 | 89.0 | 82.0 | 83.0 |
| 80178 | 15 | 0.30 | 88.0 | 88.0 | 88.0 | 92.0 | 92.0 | 92.0 | 92.0 | 80.0 | 88.0 | 91.0 | 97.0 | 86.0 | 95.0 | 95.0 | 81.0 | 85.0 |
| 80178 | 16 | 0.35 | 89.0 | 99.0 | 89.0 | 94.0 | 94.0 | 94.0 | 94.0 | 86.0 | 89.0 | 87.0 | 90.0 | 81.0 | 96.0 | 98.0 | 83.0 | 82.0 |
| 80178 | 17 | 0.26 | 83.0 | 85.0 | 88.0 | 88.0 | 84.0 | 86.0 | 96.0 | 84.0 | 87.0 | 85.0 | 88.0 | 76.0 | 87.0 | 96.0 | 81.0 | 78.0 |
| 80178 | 18 | 0.01 | 84.0 | 82.0 | 87.0 | 86.0 | 85.0 | 87.0 | 95.0 | 81.0 | 85.0 | 82.0 | 85.0 | 75.0 | 67.0 | 93.0 | 82.0 | 75.0 |
| 80178 | 19 | 0.04 | 85.0 | 77.0 | 84.0 | 83.0 | 83.0 | 84.0 | 91.0 | 73.0 | 83.0 | 79.0 | 79.0 | 70.0 | 66.0 | 89.0 | 80.0 | 70.0 |
| 80178 | 20 | 0.18 | 79.0 | 78.0 | 83.0 | 85.0 | 84.0 | 86.0 | 87.0 | 78.0 | 82.0 | 80.0 | 82.0 | 74.0 | 63.0 | 86.0 | 79.0 | 72.0 |
| 80178 | 21 | 0.0 | 81.0 | 74.0 | 82.0 | 80.0 | 81.0 | 81.0 | 81.0 | 76.0 | 80.0 | 78.0 | 72.0 | 69.0 | 81.0 | 83.0 | 79.0 | 69.0 |
| 80178 | 22 | 0.0 | 80.0 | 77.0 | 80.0 | 82.0 | 80.0 | 81.0 | 82.0 | 75.0 | 79.0 | 76.0 | 70.0 | 69.0 | 80.0 | 81.0 | 78.0 | 69.0 |
| 80178 | 23 | 0.0 | 78.0 | 76.0 | 79.0 | 77.0 | 79.0 | 78.0 | 81.0 | 74.0 | 78.0 | 76.0 | 70.0 | 68.0 | 79.0 | 80.0 | 78.0 | 64.0 |
| 80278 | 24 | 0.0 | 77.0 | 76.0 | 79.0 | 76.0 | 77.0 | 77.0 | 79.0 | 74.0 | 77.0 | 75.0 | 68.0 | 62.0 | 77.0 | 79.0 | 78.0 | 66.0 |
| 80278 | 1 | 0.0 | 75.0 | 74.0 | 77.0 | 75.0 | 75.0 | 75.0 | 77.0 | 72.0 | 76.0 | 74.0 | 68.0 | 67.0 | 75.0 | 76.0 | 77.0 | 65.0 |
| 80278 | 2 | 0.0 | 71.0 | 71.0 | 75.0 | 73.0 | 74.0 | 74.0 | 76.0 | 70.0 | 74.0 | 71.0 | 64.0 | 64.0 | 74.0 | 75.0 | 76.0 | 62.0 |
| 80278 | 3 | 0.0 | 75.0 | 69.0 | 73.0 | 72.0 | 71.0 | 71.0 | 75.0 | 63.0 | 72.0 | 70.0 | 62.0 | 61.0 | 73.0 | 76.0 | 75.0 | 55.0 |
| 80278 | 4 | 0.0 | 71.0 | 67.0 | 73.0 | 71.0 | 71.0 | 71.0 | 73.0 | 62.0 | 73.0 | 69.0 | 61.0 | 61.0 | 71.0 | 72.0 | 74.0 | 57.0 |
| 80278 | 5 | 0.0 | 69.0 | 67.0 | 71.0 | 69.0 | 69.0 | 69.0 | 71.0 | 66.0 | 69.0 | 67.0 | 61.0 | 61.0 | 69.0 | 70.0 | 73.0 | 59.0 |
| 80278 | 6 | 0.0 | 69.0 | 66.0 | 70.0 | 67.0 | 68.0 | 68.0 | 70.0 | 65.0 | 67.0 | 66.0 | 58.0 | 59.0 | 67.0 | 68.0 | 71.0 | 57.0 |
| 80278 | 7 | 0.0 | 66.0 | 65.0 | 69.0 | 67.0 | 67.0 | 67.0 | 68.0 | 66.0 | 68.0 | 66.0 | 60.0 | 60.0 | 66.0 | 57.0 | 71.0 | 57.0 |
| 80278 | 8 | 0.20 | 67.0 | 66.0 | 69.0 | 70.0 | 69.0 | 69.0 | 68.0 | 66.0 | 72.0 | 68.0 | 65.0 | 64.0 | 65.0 | 57.0 | 70.0 | 61.0 |
| 80278 | 9 | 0.44 | 72.0 | 71.0 | 74.0 | 75.0 | 75.0 | 75.0 | 66.0 | 72.0 | 75.0 | 76.0 | 78.0 | 69.0 | 68.0 | 59.0 | 73.0 | 69.0 |
| 80278 | 10 | 0.50 | 75.0 | 74.0 | 76.0 | 82.0 | 81.0 | 79.0 | 71.0 | 74.0 | 74.0 | 80.0 | 84.0 | 72.0 | 70.0 | 69.0 | 77.0 | 71.0 |
| 80278 | 11 | 0.73 | 80.0 | 79.0 | 75.0 | 71.0 | 94.0 | 93.0 | 84.0 | 71.0 | 77.0 | 73.0 | 84.0 | 91.0 | 72.0 | 71.0 | 72.0 | 73.0 |
| 80278 | 12 | 0.41 | 77.0 | 77.0 | 74.0 | 84.0 | 84.0 | 81.0 | 73.0 | 70.0 | 77.0 | 82.0 | 86.0 | 71.0 | 75.0 | 73.0 | 72.0 | 73.0 |
| 80278 | 13 | 0.60 | 77.0 | 77.0 | 78.0 | 79.0 | 80.0 | 79.0 | 77.0 | 77.0 | 77.0 | 79.0 | 81.0 | 71.0 | 78.0 | 77.0 | 72.0 | 70.0 |
| 80278 | 14 | 0.62 | 77.0 | 77.0 | 77.0 | 78.0 | 79.0 | 78.0 | 77.0 | 76.0 | 77.0 | 71.0 | 84.0 | 72.0 | 79.0 | 80.0 | 72.0 | 71.0 |
| 80278 | 15 | 0.58 | 79.0 | 78.0 | 74.0 | 91.0 | 90.0 | 89.0 | 80.0 | 82.0 | 79.0 | 83.0 | 94.0 | 75.0 | 80.0 | 81.0 | 72.0 | 73.0 |
| 80278 | 16 | 0.52 | 79.0 | 79.0 | 74.0 | 88.0 | 88.0 | 87.0 | 81.0 | 78.0 | 78.0 | 91.0 | 87.0 | 75.0 | 81.0 | 82.0 | 72.0 | 74.0 |
| 80278 | 17 | 0.64 | 75.0 | 75.0 | 75.0 | 78.0 | 85.0 | 87.0 | 77.0 | 75.0 | 74.0 | 77.0 | 87.0 | 71.0 | 77.0 | 82.0 | 68.0 | 70.0 |
| 80278 | 18 | 0.37 | 78.0 | 74.0 | 78.0 | 80.0 | 80.0 | 80.0 | 81.0 | 77.0 | 78.0 | 79.0 | 83.0 | 72.0 | 83.0 | 81.0 | 74.0 | 72.0 |
| 80278 | 19 | 0.20 | 77.0 | [illegible] | 77.0 | 78.0 | 79.0 | 76.0 | 83.0 | 75.0 | 77.0 | 77.0 | 75.0 | 70.0 | 83.0 | 83.0 | 72.0 | 70.0 |
| 80278 | 20 | 0.12 | 76.0 | 76.0 | 77.0 | 78.0 | 86.0 | 78.0 | 84.0 | 74.0 | 72.0 | 75.0 | 71.0 | 69.0 | 80.0 | 82.0 | 72.0 | 63.0 |
| 80278 | 21 | 0.0 | 74.0 | 75.0 | 74.0 | 77.0 | 76.0 | 74.0 | 79.0 | 70.0 | 74.0 | 70.0 | 62.0 | 61.0 | 73.0 | 85.0 | 71.0 | 61.0 |
| 80278 | 22 | 0.0 | 71.0 | 71.0 | 72.0 | 70.0 | 71.0 | 70.0 | 77.0 | 67.0 | 71.0 | 67.0 | 54.0 | 57.0 | 75.0 | 77.0 | 70.0 | 57.0 |
| 80278 | 23 | 0.0 | 68.0 | 69.0 | 69.0 | 68.0 | 68.0 | 69.0 | 74.0 | 64.0 | 69.0 | 65.0 | 57.0 | 56.0 | 72.0 | 74.0 | 69.0 | 54.0 |
| 80378 | 24 | 0.0 | 66.0 | 67.0 | 67.0 | 65.0 | 66.0 | 66.0 | 71.0 | 62.0 | 66.0 | 63.0 | 55.0 | 53.0 | 69.0 | 70.0 | 67.0 | 52.0 |
| 80378 | 1 | 0.0 | 64.0 | 65.0 | 65.0 | 61.0 | 64.0 | 64.0 | 68.0 | 61.0 | 64.0 | 62.0 | 54.0 | 53.0 | 64.0 | 67.0 | 66.0 | 51.0 |
| 80378 | 2 | 0.0 | 61.0 | 61.0 | 63.0 | 62.0 | 63.0 | 62.0 | 65.0 | 59.0 | 63.0 | 61.0 | 53.0 | 52.0 | 64.0 | 65.0 | 65.0 | 50.0 |
| 80378 | 3 | 0.0 | 61.0 | 62.0 | 62.0 | 60.0 | 61.0 | 61.0 | 64.0 | 58.0 | 62.0 | 60.0 | 52.0 | 52.0 | 62.0 | 63.0 | 64.0 | 50.0 |
| 80378 | 4 | 0.0 | 56.0 | 60.0 | 60.0 | 59.0 | 59.0 | 59.0 | 62.0 | 56.0 | 60.0 | 58.0 | 50.0 | 50.0 | 60.0 | 60.0 | 62.0 | 47.0 |

Table D. Continued

PYRANOMETER (PRY) READINGS, CAL/SQ-CM-MIN ,AND TEMPERATURES (T),°F, AT POINT NUMBER

| DATE | HOUR | PYR | T(1) | T(2) | T(3) | T(4) | T(5) | T(6) | T(7) | T(8) | T(9) | T(10) | T(11) | T(12) | T(13) | T(14) | T(15) | T(16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80378 | 5 | 0.0 | 57.0 | 58.0 | 58.0 | 57.0 | 55.0 | 58.0 | 60.0 | 55.0 | 58.0 | 56.0 | 44.0 | 48.0 | 58.0 | 60.0 | 57.0 | 46.0 |
| 80378 | 6 | 0.0 | 57.0 | 58.0 | 59.0 | 56.0 | 57.0 | 57.0 | 59.0 | 54.0 | 57.0 | 56.0 | 51.0 | 49.0 | 57.0 | 59.0 | 61.0 | 47.0 |
| 80378 | 7 | 0.02 | 56.0 | 57.0 | 57.0 | 56.0 | 57.0 | 56.0 | 58.0 | 56.0 | 57.0 | 56.0 | 51.0 | 49.0 | 56.0 | 57.0 | 60.0 | 46.0 |
| 80378 | 8 | 0.22 | 58.0 | 59.0 | 55.0 | 60.0 | 60.0 | 58.0 | 57.0 | 56.0 | 58.0 | 57.0 | 57.0 | 55.0 | 56.0 | 56.0 | 59.0 | 53.0 |
| 80378 | 9 | 0.46 | 62.0 | 63.0 | 62.0 | 65.0 | 65.0 | 65.0 | 57.0 | 60.0 | 62.0 | 66.0 | 67.0 | 57.0 | 56.0 | 57.0 | 59.0 | 60.0 |
| 80378 | 10 | 0.68 | 64.0 | 67.0 | 66.0 | 78.0 | 72.0 | 70.0 | 59.0 | 66.0 | 66.0 | 72.0 | 75.0 | 65.0 | 59.0 | 58.0 | 61.0 | 66.0 |
| 80378 | 11 | 0.84 | 72.0 | 71.0 | 76.0 | 86.0 | 87.0 | 77.0 | 61.0 | 73.0 | 70.0 | 79.0 | 85.0 | 68.0 | 61.0 | 60.0 | 65.0 | 70.0 |
| 80378 | 12 | 1.01 | 75.0 | 74.0 | 75.0 | 102.0 | 95.0 | 94.0 | 64.0 | 84.0 | 71.0 | 85.0 | 95.0 | 70.0 | 65.0 | 64.0 | 67.0 | 72.0 |
| 80378 | 13 | 1.06 | 77.0 | 76.0 | 75.0 | 102.0 | 98.0 | 99.0 | 70.0 | 83.0 | 75.0 | 87.0 | 98.0 | 73.0 | 73.0 | 70.0 | 69.0 | 74.0 |
| 80378 | 14 | 1.06 | 80.0 | 79.0 | 78.0 | 111.0 | 102.0 | 98.0 | 76.0 | 85.0 | 77.0 | 89.0 | 101.0 | 78.0 | 87.0 | 78.0 | 71.0 | 75.0 |
| 80378 | 15 | 1.10 | 83.0 | 81.0 | 80.0 | 100.0 | 94.0 | 92.0 | 83.0 | 85.0 | 80.0 | 89.0 | 95.0 | 81.0 | 87.0 | 86.0 | 72.0 | 74.0 |
| 80378 | 16 | 0.90 | 84.0 | 83.0 | 82.0 | 99.0 | 71.0 | 91.0 | 89.0 | 82.0 | 82.0 | 87.0 | 95.0 | 82.0 | 92.0 | 92.0 | 75.0 | 77.0 |
| 80378 | 17 | 0.75 | 84.0 | 84.0 | 83.0 | 96.0 | 94.0 | 96.0 | 92.0 | 82.0 | 82.0 | 86.0 | 96.0 | 83.0 | 94.0 | 94.0 | 75.0 | 77.0 |
| 80378 | 18 | 0.54 | 82.0 | 82.0 | 82.0 | 83.0 | 84.0 | 86.0 | 91.0 | 80.0 | 82.0 | 83.0 | 85.0 | 81.0 | 92.0 | 73.0 | 75.0 | 76.0 |
| 80378 | 19 | 0.31 | 81.0 | 81.0 | 81.0 | 83.0 | 83.0 | 83.0 | 97.0 | 78.0 | 81.0 | 81.0 | 85.0 | 80.0 | 90.0 | 91.0 | 74.0 | 73.0 |
| 80378 | 20 | 0.11 | 79.0 | 79.0 | 79.0 | 80.0 | 80.0 | 80.0 | 87.0 | 76.0 | 74.0 | 77.0 | 76.0 | 70.0 | 85.0 | 87.0 | 73.0 | 69.0 |
| 80378 | 21 | 0.0 | 76.0 | 77.0 | 77.0 | 75.0 | 76.0 | 76.0 | 84.0 | 72.0 | 77.0 | 72.0 | 62.0 | 62.0 | 82.0 | 84.0 | 72.0 | 64.0 |
| 80378 | 22 | 0.0 | 73.0 | 74.0 | 74.0 | 72.0 | 73.0 | 73.0 | 82.0 | 68.0 | 73.0 | 69.0 | 59.0 | 57.0 | 79.0 | 81.0 | 71.0 | 59.0 |
| 80378 | 23 | 0.0 | 71.0 | 71.0 | 71.0 | 69.0 | 70.0 | 70.0 | 77.0 | 66.0 | 70.0 | 66.0 | 57.0 | 55.0 | 75.0 | 77.0 | 69.0 | 55.0 |
| 80378 | 24 | 0.0 | 68.0 | 69.0 | 69.0 | 67.0 | 69.0 | 68.0 | 74.0 | 64.0 | 68.0 | 64.0 | 56.0 | 54.0 | 71.0 | 73.0 | 68.0 | 53.0 |
| 80478 | 1 | 0.0 | 65.0 | 66.0 | 66.0 | 64.0 | 65.0 | 65.0 | 70.0 | 62.0 | 65.0 | 62.0 | 54.0 | 52.0 | 67.0 | 69.0 | 67.0 | 51.0 |
| 80478 | 2 | 0.0 | 63.0 | 64.0 | 64.0 | 62.0 | 63.0 | 63.0 | 67.0 | 60.0 | 63.0 | 61.0 | 52.0 | 51.0 | 66.0 | 66.0 | 65.0 | 51.0 |
| 80478 | 3 | 0.0 | 61.0 | 62.0 | 62.0 | 61.0 | 62.0 | 62.0 | 65.0 | 59.0 | 62.0 | 59.0 | 51.0 | 51.0 | 63.0 | 64.0 | 64.0 | 50.0 |
| 80478 | 4 | 0.0 | 60.0 | 61.0 | 61.0 | 59.0 | 60.0 | 60.0 | 63.0 | 57.0 | 60.0 | 57.0 | 50.0 | 49.0 | 61.0 | 60.0 | 62.0 | 50.0 |
| 80478 | 5 | 0.0 | 59.0 | 60.0 | 60.0 | 59.0 | 57.0 | 54.0 | 61.0 | 57.0 | 59.0 | 58.0 | 51.0 | 52.0 | 59.0 | 60.0 | 62.0 | 50.0 |
| 80478 | 6 | 0.0 | 57.0 | 58.0 | 58.0 | 57.0 | 56.0 | 57.0 | 59.0 | 55.0 | 59.0 | 57.0 | 52.0 | 50.0 | 57.0 | 59.0 | 61.0 | 49.0 |
| 80478 | 7 | 0.02 | 59.0 | 60.0 | 59.0 | 61.0 | 60.0 | 59.0 | 58.0 | 57.0 | 59.0 | 57.0 | 55.0 | 55.0 | 57.0 | 59.0 | 60.0 | 54.0 |
| 80478 | 8 | 0.22 | 59.0 | 60.0 | 60.0 | 62.0 | 62.0 | 60.0 | 59.0 | 58.0 | 60.0 | 60.0 | 59.0 | 55.0 | 57.0 | 58.0 | 60.0 | 56.0 |
| 80478 | 9 | 0.46 | 64.0 | 66.0 | 65.0 | 68.0 | 68.0 | 68.0 | 59.0 | 63.0 | 64.0 | 69.0 | 72.0 | 66.0 | 58.0 | 58.0 | 63.0 | 65.0 |
| 80478 | 10 | 0.69 | 72.0 | 71.0 | 70.0 | 79.0 | 75.0 | 75.0 | 59.0 | 70.0 | 70.0 | 77.0 | 80.0 | 74.0 | 59.0 | 59.0 | 64.0 | 72.0 |
| 80478 | 11 | 0.86 | 76.0 | 75.0 | 74.0 | 92.0 | 91.0 | 82.0 | 62.0 | 77.0 | 74.0 | 84.0 | 89.0 | 76.0 | 63.0 | 62.0 | 67.0 | 76.0 |
| 80478 | 12 | 0.94 | 80.0 | 79.0 | 77.0 | 109.0 | 99.0 | 99.0 | 65.0 | 84.0 | 76.0 | 91.0 | 100.0 | 79.0 | 69.0 | 67.0 | 71.0 | 79.0 |
| 80478 | 13 | 1.05 | 83.0 | 82.0 | 81.0 | 103.0 | 99.0 | 104.0 | 73.0 | 87.0 | 80.0 | 93.0 | 102.0 | 80.0 | 77.0 | 74.0 | 74.0 | 81.0 |
| 80478 | 14 | 1.05 | 85.0 | 85.0 | 84.0 | 109.0 | 101.0 | 104.0 | 81.0 | 89.0 | 84.0 | 95.0 | 105.0 | 85.0 | 86.0 | 82.0 | 77.0 | 82.0 |
| 80478 | 15 | 1.00 | 87.0 | 87.0 | 86.0 | 100.0 | 97.0 | 97.0 | 87.0 | 90.0 | 87.0 | 95.0 | 102.0 | 86.0 | 92.0 | 90.0 | 79.0 | 84.0 |
| 80478 | 16 | 0.88 | 89.0 | 89.0 | 87.0 | 95.0 | 97.0 | 98.0 | 93.0 | 80.0 | 86.0 | 93.0 | 101.0 | 85.0 | 96.0 | 95.0 | 80.0 | 85.0 |
| 80478 | 17 | 0.73 | 90.0 | 90.0 | 90.0 | 94.0 | 81.0 | 82.0 | 95.0 | 86.0 | 87.0 | 91.0 | 103.0 | 87.0 | 97.0 | 97.0 | 82.0 | 85.0 |
| 80478 | 18 | 0.52 | 85.0 | 89.0 | 88.0 | 90.0 | 91.0 | 92.0 | 95.0 | 85.0 | 88.0 | 89.0 | 95.0 | 87.0 | 97.0 | 97.0 | 82.0 | 83.0 |
| 80478 | 19 | 0.30 | 87.0 | 87.0 | 87.0 | 89.0 | 90.0 | 90.0 | 95.0 | 84.0 | 87.0 | 86.0 | 90.0 | 82.0 | 95.0 | 97.0 | 81.0 | 80.0 |
| 80478 | 20 | 0.10 | 85.0 | 85.0 | 86.0 | 87.0 | 87.0 | 87.0 | 94.0 | 81.0 | 85.0 | 83.0 | 80.0 | 75.0 | 92.0 | 94.0 | 81.0 | 75.0 |
| 80478 | 21 | 0.0 | 82.0 | 83.0 | 83.0 | 81.0 | 82.0 | 82.0 | 91.0 | 77.0 | 82.0 | 77.0 | 68.0 | 68.0 | 89.0 | 91.0 | 79.0 | 68.0 |
| 80478 | 22 | 0.0 | 77.0 | 80.0 | 80.0 | 78.0 | 79.0 | 79.0 | 97.0 | 74.0 | 80.0 | 75.0 | 65.0 | 64.0 | 85.0 | 87.0 | 77.0 | 65.0 |
| 80478 | 23 | 0.0 | 77.0 | 78.0 | 78.0 | 76.0 | 77.0 | 77.0 | 83.0 | 72.0 | 77.0 | 72.0 | 65.0 | 65.0 | 81.0 | 83.0 | 76.0 | 64.0 |
| 80578 | 24 | 0.0 | 75.0 | 76.0 | 76.0 | 74.0 | 75.0 | 75.0 | 79.0 | 71.0 | 75.0 | 71.0 | 64.0 | 63.0 | 77.0 | 79.0 | 75.0 | 65.0 |
| 80578 | 1 | 0.0 | 74.0 | 75.0 | 75.0 | 73.0 | 74.0 | 74.0 | 76.0 | 70.0 | 76.0 | 71.0 | 64.0 | 63.0 | 75.0 | 76.0 | 73.0 | 62.0 |
| 80578 | 2 | 0.0 | 73.0 | 74.0 | 74.0 | 72.0 | 73.0 | 73.0 | 75.0 | 69.0 | 73.0 | 70.0 | 65.0 | 64.0 | 73.0 | 73.0 | 73.0 | 63.0 |
| 80578 | 3 | 0.0 | 72.0 | 73.0 | 73.0 | 71.0 | 72.0 | 72.0 | 74.0 | 68.0 | 72.0 | 69.0 | 64.0 | 63.0 | 72.0 | 71.0 | 72.0 | 61.0 |
| 80578 | 4 | 0.0 | 70.0 | 71.0 | 71.0 | 70.0 | 70.0 | 70.0 | 72.0 | 67.0 | 70.0 | 68.0 | 62.0 | 61.0 | 70.0 | 70.0 | 71.0 | 61.0 |
| 80578 | 5 | 0.0 | 69.0 | 69.0 | 70.0 | 69.0 | 69.0 | 69.0 | 71.0 | 66.0 | 69.0 | 67.0 | 62.0 | 61.0 | 68.0 | 70.0 | 70.0 | 60.0 |
| 80578 | 6 | 0.0 | 69.0 | 70.0 | 70.0 | 69.0 | 69.0 | 69.0 | 69.0 | 65.0 | 69.0 | 67.0 | 61.0 | 60.0 | 67.0 | 69.0 | 70.0 | 59.0 |
| 80578 | 7 | 0.02 | 69.0 | 72.0 | 70.0 | 71.0 | 71.0 | 70.0 | 69.0 | 66.0 | 69.0 | 67.0 | 67.0 | 65.0 | 67.0 | 67.0 | 67.0 | 64.0 |
| 80578 | 8 | 0.25 | 73.0 | 70.0 | 70.0 | 72.0 | 72.0 | 74.0 | 58.0 | 71.0 | 72.0 | 76.0 | 85.0 | 71.0 | 68.0 | 68.0 | 70.0 | 71.0 |
| 80578 | 9 | 0.47 | 77.0 | 79.0 | 77.0 | 84.0 | 82.0 | 82.0 | 70.0 | 77.0 | 77.0 | 81.0 | 86.0 | 77.0 | 70.0 | 70.0 | 72.0 | 77.0 |
| 80578 | 10 | 0.67 | 80.0 | 90.0 | 90.0 | 91.0 | 91.0 | 67.0 | 72.0 | 82.0 | 81.0 | 68.0 | 97.0 | 81.0 | 72.0 | 72.0 | 75.0 | 81.0 |
| 80578 | 11 | 0.82 | 91.0 | 83.0 | 82.0 | 95.0 | 95.0 | 87.0 | 72.0 | 83.0 | 82.0 | 90.0 | 95.0 | 82.0 | 75.0 | 75.0 | 77.0 | 84.0 |
| 80578 | 12 | 0.86 | 86.0 | 85.0 | 84.0 | 114.0 | 109.0 | 109.0 | 79.0 | 92.0 | 86.0 | 98.0 | 110.0 | 86.0 | 81.0 | 79.0 | 80.0 | [illegible] |
| 80578 | 13 | 0.80 | 91.0 | 90.0 | 89.0 | 126.0 | 116.0 | 111.0 | 85.0 | 96.0 | 89.0 | 101.0 | 115.0 | 98.0 | 88.0 | 85.0 | 82.0 | 87.0 |
| 80578 | 14 | 0.86 | 90.0 | 90.0 | 89.0 | 102.0 | 101.0 | 98.0 | 91.0 | 92.0 | 90.0 | 95.0 | 100.0 | 96.0 | 94.0 | 92.0 | 84.0 | 95.0 |
| 80578 | 15 | 0.77 | 90.0 | 90.0 | 90.0 | 98.0 | 96.0 | 95.0 | 92.0 | 91.0 | 90.0 | 96.0 | 104.0 | 89.0 | 95.0 | 93.0 | 84.0 | 88.0 |
| 80578 | 16 | 0.66 | 92.0 | 92.0 | 91.0 | 91.0 | 97.0 | 98.0 | 96.0 | 96.0 | 91.0 | 91.0 | 92.0 | 97.0 | 85.0 | 94.0 | 85.0 | 84.0 |
| 80578 | 17 | 0.65 | 93.0 | 93.0 | 93.0 | 93.0 | 104.0 | 105.0 | 100.0 | 92.0 | 93.0 | 96.0 | 107.0 | 96.0 | 100.0 | 101.0 | 85.0 | [illegible] |
| 80578 | 18 | 0.52 | 94.0 | 94.0 | 94.0 | 95.0 | 96.0 | 96.0 | 99.0 | 91.0 | 93.0 | 94.0 | 99.0 | 91.0 | 100.0 | 101.0 | 84.0 | 87.0 |
| 80578 | 19 | 0.24 | 93.0 | 93.0 | 93.0 | 94.0 | 95.0 | 94.0 | 99.0 | 89.0 | 92.0 | 92.0 | 96.0 | 88.0 | 96.0 | 100.0 | 86.0 | 85.0 |
| 80578 | 20 | 0.03 | 90.0 | 91.0 | 91.0 | 92.0 | 92.0 | 92.0 | 97.0 | 87.0 | 90.0 | 88.0 | 83.0 | 79.0 | 96.0 | 91.0 | 85.0 | 80.0 |
| 80578 | 21 | 0.0 | 87.0 | 89.0 | 88.0 | 87.0 | 83.0 | 80.0 | 95.0 | 84.0 | 89.0 | 84.0 | 75.0 | 75.0 | 93.0 | 95.0 | 84.0 | 76.0 |
| 80578 | 22 | 0.0 | 86.0 | 87.0 | 87.0 | 85.0 | 86.0 | 86.0 | 92.0 | 82.0 | 86.0 | 57.0 | 75.0 | 73.0 | 90.0 | 92.0 | 83.0 | 74.0 |
| 80578 | 23 | 0.0 | 84.0 | 85.0 | 85.0 | 81.0 | 84.0 | 84.0 | 81.0 | 80.0 | 84.0 | 80.0 | 73.0 | 71.0 | 86.0 | 89.0 | 82.0 | 72.0 |
| 80578 | 24 | 0.0 | 82.0 | 83.0 | 83.0 | 81.0 | 82.0 | 82.0 | 86.0 | 79.0 | 82.0 | 79.0 | 71.0 | 71.0 | 84.0 | 85.0 | 81.0 | 70.0 |
| 80678 | 1 | 0.0 | 80.0 | 81.0 | 81.0 | 80.0 | 81.0 | 80.0 | 84.0 | 77.0 | 80.0 | 77.0 | 70.0 | 63.0 | 82.0 | 86.0 | 80.0 | 65.0 |
| 80678 | 2 | 0.0 | 80.0 | 80.0 | 80.0 | 77.0 | 78.0 | 78.0 | 82.0 | 75.0 | 78.0 | 75.0 | 67.0 | 65.0 | 80.0 | 82.0 | 79.0 | 65.0 |
| 80678 | 3 | 0.0 | 76.0 | 77.0 | 77.0 | 75.0 | 75.0 | 76.0 | 80.0 | 76.0 | 76.0 | 74.0 | 65.0 | 64.0 | 78.0 | 80.0 | 79.0 | 64.0 |
| 80678 | 4 | 0.0 | 74.0 | 75.0 | 75.0 | 73.0 | 74.0 | 74.0 | 78.0 | 71.0 | 75.0 | 72.0 | 64.0 | 62.0 | 75.0 | 76.0 | 76.0 | 62.0 |
| 80678 | 5 | 0.0 | 76.0 | 74.0 | 74.0 | 73.0 | 74.0 | 74.0 | 76.0 | 71.0 | 74.0 | 72.0 | 64.0 | 62.0 | 74.0 | 75.0 | 76.0 | 62.0 |
| 80678 | 6 | 0.0 | 77.0 | 71.0 | 73.0 | 71.0 | 72.0 | 72.0 | 75.0 | 70.0 | 72.0 | 70.0 | 64.0 | 62.0 | 72.0 | 72.0 | 75.0 | 61.0 |
| 80678 | 7 | 0.03 | 71.0 | 72.0 | 72.0 | 71.0 | 72.0 | 72.0 | 74.0 | 70.0 | 72.0 | 71.0 | 65.0 | 64.0 | 71.0 | 71.0 | 74.0 | 62.0 |
| 80678 | 8 | 0.18 | 72.0 | 71.0 | 73.0 | 75.0 | 75.0 | 74.0 | 72.0 | 71.0 | 73.0 | 74.0 | 71.0 | 62.0 | 70.0 | 71.0 | 74.0 | 63.0 |
| 80678 | 9 | 0.22 | 75.0 | 75.0 | 75.0 | 77.0 | 77.0 | 77.0 | 74.0 | 73.0 | 75.0 | 76.0 | 83.0 | 70.0 | 71.0 | 71.0 | 72.0 | 73.0 |
| 80678 | 10 | 0.40 | 73.0 | 78.0 | 77.0 | 82.0 | 82.0 | 81.0 | 73.0 | 76.0 | 77.0 | 80.0 | 84.0 | 75.0 | 72.0 | 72.0 | 74.0 | 74.0 |
| 80678 | 11 | 0.62 | 83.0 | 82.0 | 81.0 | 95.0 | 95.0 | 88.0 | 74.0 | 87.0 | 81.0 | 89.0 | 95.0 | 79.0 | 74.0 | 76.0 | 75.0 | 81.0 |
| 80678 | 12 | 0.96 | 87.0 | 85.0 | 85.0 | 117.0 | 104.0 | 104.0 | 76.0 | 90.0 | 84.0 | 97.0 | 105.0 | 84.0 | 77.0 | 76.0 | 78.0 | 87.0 |
| 80678 | 13 | 1.02 | 90.0 | 90.0 | 88.0 | 112.0 | 108.0 | 104.0 | [illegible] | 94.0 | 91.0 | 102.0 | 111.0 | 100.0 | 89.0 | 83.0 | 83.0 | 92.0 |
| 80678 | 14 | 1.08 | 94.0 | 92.0 | 91.0 | 117.0 | 107.0 | 107.0 | 86.0 | 97.0 | 92.0 | 102.0 | 111.0 | 100.0 | 90.0 | 87.0 | 84.0 | 92.0 |
| 80678 | 15 | 0.94 | 94.0 | 94.0 | 93.0 | 110.0 | 107.0 | 105.0 | 91.0 | 96.0 | 95.0 | 102.0 | 112.0 | 101.0 | 101.0 | 94.0 | 82.0 | 92.0 |
| 80678 | 16 | 0.85 | 96.0 | 96.0 | 95.0 | 110.0 | 112.0 | 112.0 | 98.0 | 78.0 | 75.0 | 101.0 | 113.0 | 96.0 | 101.0 | 100.0 | 87.0 | 92.0 |
| 80678 | 17 | 0.69 | 96.0 | 95.0 | 96.0 | 100.0 | 104.0 | 105.0 | 102.0 | 97.0 | 96.0 | 97.0 | 101.0 | 98.0 | 104.0 | 103.0 | 89.0 | [illegible] |
| 80678 | 18 | 0.43 | 96.0 | 95.0 | 96.0 | 98.0 | 99.0 | 99.0 | 103.0 | 94.0 | 96.0 | 97.0 | 101.0 | 95.0 | 105.0 | 104.0 | 94.0 | 95.0 |
| 80678 | 19 | 0.25 | 94.0 | 95.0 | 95.0 | 96.0 | [illegible] | 97.0 | 103.0 | 92.0 | 95.0 | 94.0 | 96.0 | 90.0 | 104.0 | 105.0 | 86.0 | 87.0 |
| 80678 | 20 | 0.04 | 92.0 | 92.0 | 92.0 | 93.0 | 91.0 | 93.0 | 102.0 | 90.0 | 92.0 | 91.0 | 86.0 | 87.0 | 100.0 | 102.0 | 89.0 | 83.0 |

Table D. Continued

PYRANOMETER (PYR) READINGS, CAL/SQ-CM-MIN ,AND TEMPERATURES (T),°F, AT POINT NUMBER

| DATE | HOUR | PYR | T(1) | T(2) | T(3) | T(4) | T(5) | T(6) | T(7) | T(8) | T(9) | T(10) | T(11) | T(12) | T(13) | T(14) | T(15) | T(16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80678 | 21 | 0.0 | 91.0 | 92.0 | 92.0 | 87.0 | 91.0 | 91.0 | 98.0 | 87.0 | 90.0 | 87.0 | 74.0 | 79.0 | 97.0 | 98.0 | 86.0 | 74.0 |
| 80678 | 22 | 0.0 | 89.0 | 90.0 | 90.0 | 87.0 | 89.0 | 89.0 | 95.0 | 84.0 | 89.0 | 85.0 | 77.0 | 77.0 | 93.0 | 95.0 | 86.0 | 77.0 |
| 80678 | 23 | 0.0 | 86.0 | 87.0 | 87.0 | 86.0 | 87.0 | 86.0 | 92.0 | 83.0 | 86.0 | 88.0 | 75.0 | 75.0 | 90.0 | 92.0 | 85.0 | 74.0 |
| 80778 | 24 | 0.0 | 85.0 | 86.0 | 86.0 | 84.0 | 85.0 | 85.0 | 88.0 | 81.0 | 85.0 | 81.0 | 75.0 | 74.0 | 87.0 | 88.0 | 84.0 | 75.0 |
| 80778 | 1 | 0.0 | 83.0 | 84.0 | 84.0 | 83.0 | 84.0 | 83.0 | 86.0 | 80.0 | 84.0 | 80.0 | 74.0 | 73.0 | 84.0 | 86.0 | 83.0 | 72.0 |
| 80778 | 2 | 0.0 | 82.0 | 82.0 | 82.0 | 81.0 | 82.0 | 82.0 | 84.0 | 79.0 | 82.0 | 79.0 | 72.0 | 71.0 | 82.0 | 84.0 | 82.0 | 71.0 |
| 80778 | 3 | 0.0 | 80.0 | 81.0 | 81.0 | 80.0 | 80.0 | 80.0 | 83.0 | 77.0 | 81.0 | 78.0 | 71.0 | 70.0 | 81.0 | 82.0 | 81.0 | 69.0 |
| 80778 | 4 | 0.0 | 79.0 | 80.0 | 80.0 | 79.0 | 80.0 | 80.0 | 81.0 | 75.0 | 79.0 | 77.0 | 70.0 | 70.0 | 80.0 | 81.0 | 80.0 | 69.0 |
| 80778 | 5 | 0.0 | 78.0 | 79.0 | 79.0 | 78.0 | 78.0 | 78.0 | 80.0 | 78.0 | 78.0 | 76.0 | 70.0 | 70.0 | 79.0 | 80.0 | 80.0 | 68.0 |
| 80778 | 6 | 0.0 | 77.0 | 78.0 | 78.0 | 76.0 | 77.0 | 77.0 | 79.0 | 75.0 | 77.0 | 75.0 | 69.0 | 69.0 | 78.0 | 78.0 | 77.0 | 67.0 |
| 80778 | 7 | 0.03 | 76.0 | 77.0 | 77.0 | 76.0 | 77.0 | 77.0 | 79.0 | 75.0 | 76.0 | 75.0 | 70.0 | 69.0 | 76.0 | 77.0 | 74.0 | 67.0 |
| 80778 | 8 | 0.24 | 77.0 | 76.0 | 78.0 | 78.0 | 78.0 | 77.0 | 74.0 | 77.0 | 76.0 | 74.0 | 70.0 | 75.0 | 78.0 | 76.0 | 73.0 | 70.0 |
| 80778 | 9 | 0.44 | 83.0 | 80.0 | 80.0 | 82.0 | 93.0 | 82.0 | 76.0 | 79.0 | 79.0 | 82.0 | 85.0 | 76.0 | 75.0 | 76.0 | 77.0 | 76.0 |
| 80778 | 10 | 0.66 | 94.0 | 84.0 | 82.0 | 91.0 | 88.0 | 86.0 | 77.0 | 82.0 | 82.0 | 98.0 | 92.0 | 81.0 | 74.0 | 76.0 | 77.0 | 81.0 |
| 80778 | 11 | 0.84 | 87.0 | 86.0 | 85.0 | 105.0 | 93.0 | 94.0 | 78.0 | 88.0 | 85.0 | 94.0 | 100.0 | 95.0 | 78.0 | 77.0 | 80.0 | 85.0 |
| 80778 | 12 | 0.97 | 91.0 | 90.0 | 89.0 | 117.0 | 110.0 | 108.0 | 91.0 | 95.0 | 88.0 | 101.0 | 111.0 | 89.0 | 82.0 | 89.0 | 87.0 | 90.0 |
| 80778 | 13 | 1.07 | 95.0 | 94.0 | 93.0 | 125.0 | 120.0 | 119.0 | 85.0 | 101.0 | 93.0 | 106.0 | 120.0 | 94.0 | 85.0 | 91.0 | 85.0 | 93.0 |
| 80778 | 14 | 1.03 | 95.0 | 95.0 | 94.0 | 120.0 | 122.0 | 123.0 | 91.0 | 105.0 | 96.0 | 109.0 | 125.0 | 100.0 | 95.0 | 92.0 | 89.0 | 95.0 |
| 80778 | 15 | 0.92 | 93.0 | 97.0 | 96.0 | 131.0 | 125.0 | 124.0 | 93.0 | 105.0 | 97.0 | 109.0 | 125.0 | 100.0 | 98.0 | 101.0 | 90.0 | 96.0 |
| 80778 | 16 | 0.84 | 103.0 | 101.0 | 100.0 | 127.0 | 117.0 | 114.0 | 106.0 | 104.0 | 101.0 | 107.0 | 118.0 | 101.0 | 111.0 | 107.0 | 93.0 | 96.0 |
| 80778 | 17 | 0.70 | 102.0 | 102.0 | 102.0 | 106.0 | 114.0 | 116.0 | 111.0 | 102.0 | 102.0 | 105.0 | 116.0 | 100.0 | 115.0 | 114.0 | 94.0 | 96.0 |
| 80778 | 18 | 0.46 | 101.0 | 101.0 | 104.0 | 103.0 | 104.0 | 104.0 | 112.0 | 98.0 | 101.0 | 102.0 | 107.0 | 96.0 | 116.0 | 117.0 | 94.0 | 95.0 |
| 80778 | 19 | 0.25 | 100.0 | 100.0 | 100.0 | 101.0 | 101.0 | 101.0 | 113.0 | 98.0 | 100.0 | 98.0 | 96.0 | 92.0 | 113.0 | 115.0 | 91.0 | 91.0 |
| 80778 | 20 | 0.08 | 99.0 | 99.0 | 95.0 | 99.0 | 99.0 | 99.0 | 110.0 | 95.0 | 97.0 | 96.0 | 90.0 | 85.0 | 104.0 | 110.0 | 93.0 | 87.0 |
| 80778 | 21 | 0.0 | 96.0 | 96.0 | 96.0 | 95.0 | 95.0 | 95.0 | 105.0 | 91.0 | 95.0 | 91.0 | 81.0 | 81.0 | 103.0 | 105.0 | 91.0 | 82.0 |
| 80778 | 22 | 0.0 | 95.0 | 95.0 | 95.0 | 94.0 | 94.0 | 94.0 | 101.0 | 89.0 | 94.0 | 89.0 | 80.0 | 79.0 | 100.0 | 101.0 | 91.0 | 80.0 |
| 80778 | 23 | 0.0 | 92.0 | 93.0 | 93.0 | 91.0 | 92.0 | 92.0 | 97.0 | 87.0 | 92.0 | 88.0 | 81.0 | 79.0 | 95.0 | 98.0 | 89.0 | 80.0 |
| 80878 | 24 | 0.0 | 91.0 | 91.0 | 91.0 | 90.0 | 90.0 | 90.0 | 94.0 | 86.0 | 90.0 | 87.0 | 79.0 | 77.0 | 92.0 | 94.0 | 87.0 | 79.0 |
| 80878 | 1 | 0.0 | 89.0 | 90.0 | 90.0 | 89.0 | 88.0 | 88.0 | 92.0 | 85.0 | 89.0 | 85.0 | 76.0 | 76.0 | 90.0 | 92.0 | 88.0 | 76.0 |
| 80878 | 2 | 0.0 | 88.0 | 87.0 | 87.0 | 88.0 | 86.0 | 86.0 | 90.0 | 83.0 | 86.0 | 84.0 | 74.0 | 73.0 | 88.0 | 90.0 | 87.0 | 74.0 |
| 80878 | 3 | 0.0 | 84.0 | 85.0 | 85.0 | 83.0 | 84.0 | 84.0 | 88.0 | 81.0 | 83.0 | 82.0 | 73.0 | 72.0 | 86.0 | 88.0 | 86.0 | 70.0 |
| 80878 | 4 | 0.0 | 82.0 | 82.0 | 82.0 | 82.0 | 83.0 | 83.0 | 76.0 | 79.0 | 82.0 | 80.0 | 71.0 | 70.0 | 84.0 | 85.0 | 85.0 | 70.0 |
| 80878 | 5 | 0.0 | 81.0 | 82.0 | 82.0 | 80.0 | 81.0 | 81.0 | 84.0 | 79.0 | 81.0 | 80.0 | 70.0 | 70.0 | 87.0 | 83.0 | 84.0 | 68.0 |
| 80878 | 6 | 0.0 | 78.0 | 79.0 | 79.0 | 77.0 | 78.0 | 78.0 | 82.0 | 76.0 | 78.0 | 77.0 | 67.0 | 67.0 | 80.0 | 81.0 | 83.0 | 65.0 |
| 80878 | 7 | 0.02 | 76.0 | 77.0 | 77.0 | 75.0 | 77.0 | 77.0 | 80.0 | 75.0 | 77.0 | 75.0 | 67.0 | 67.0 | 78.0 | 80.0 | 81.0 | 65.0 |
| 80878 | 8 | 0.20 | 76.0 | 77.0 | 77.0 | 79.0 | 79.0 | 78.0 | 79.0 | 76.0 | 78.0 | 79.0 | 75.0 | 70.0 | 76.0 | 77.0 | 80.0 | 73.0 |
| 80878 | 9 | 0.44 | 80.0 | 80.0 | 80.0 | 87.0 | 87.0 | 82.0 | 77.0 | 79.0 | 80.0 | 83.0 | 86.0 | 73.0 | 75.0 | 76.0 | 73.0 | 75.0 |
| 80878 | 10 | 0.65 | 85.0 | 85.0 | 83.0 | 93.0 | 90.0 | 87.0 | 77.0 | 82.0 | 83.0 | 90.0 | 93.0 | 80.0 | 77.0 | 76.0 | 78.0 | 81.0 |
| 80878 | 11 | 0.84 | 95.0 | 89.0 | 87.0 | 103.0 | 104.0 | 95.0 | 78.0 | 90.0 | 86.0 | 97.0 | 104.0 | 84.0 | 78.0 | 77.0 | 80.0 | 87.0 |
| 80878 | 12 | 0.90 | 97.0 | 91.0 | 90.0 | 115.0 | 110.0 | 111.0 | 80.0 | 95.0 | 88.0 | 100.0 | 109.0 | 88.0 | 82.0 | 80.0 | 83.0 | 89.0 |
| 80878 | 13 | 1.01 | 95.0 | 94.0 | 92.0 | 125.0 | 120.0 | 118.0 | 85.0 | 100.0 | 92.0 | 105.0 | 120.0 | 92.0 | 87.0 | 81.0 | 85.0 | 91.0 |
| 80878 | 14 | 1.00 | 96.0 | 96.0 | 95.0 | 132.0 | 124.0 | 121.0 | 91.0 | 102.0 | 95.0 | 107.0 | 124.0 | 100.0 | 95.0 | 91.0 | 87.0 | 92.0 |
| 80878 | 15 | 0.94 | 96.0 | 98.0 | 97.0 | 127.0 | 120.0 | 115.0 | 96.0 | 103.0 | 96.0 | 109.0 | 118.0 | 98.0 | 101.0 | 98.0 | 89.0 | 93.0 |
| 80878 | 16 | 0.84 | 97.0 | 99.0 | 98.0 | 110.0 | 108.0 | 108.0 | 104.0 | 100.0 | 90.0 | 103.0 | 117.0 | 98.0 | 109.0 | 106.0 | 90.0 | 93.0 |