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NORTHVIEW JUNIOR HIGH SOLAR ENERGY DEMONSTRATION PROJECT

Final Report, 16 May 1974—16 May 1975

G. Merrill
A. Dib

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May 1976

Work Performed Under Contract No. E(11-1)2624

Systems and Research Center
Honeywell, Incorporated
Minneapolis, Minnesota

ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
Division of Solar Energy

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HONEYWELL
SYSTEMS AND RESEARCH CENTER
2600 Ridgway Parkway
Minneapolis, Minnesota 55413

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ENERGY RESEARCH AND DEVELOPMENT
ADMINISTRATION
DIVISION OF SOLAR ENERGY
UNDER CONTRACT NO. E(11-1)-2624

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ABSTRACT

This report covers a one-year test and evaluation of the Northview Junior High School Solar Energy Demonstration Project. The system provided about 5 percent of the school's energy requirements for the year. This energy was used for space heating, domestic water heating and pool water heating for a total of 629,000,000 solar supplied Btu's. Average collector efficiency for the year was 44 percent. Operating costs were less than 5 percent of the value of the collected energy. Solar insolation data and system performance data are presented for the various operating modes. Results and conclusions indicate that the supplemental heating of large-scale buildings is feasible and economical. An optimum performance requires a careful matching of load, collectors and distribution system.

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SECTION I
SUMMARY

Following the installation and initial start-up of the solar system at Northview Junior High School, a one-year test program was initiated on the 5,000-square-foot solar collector system. The following specific tasks were completed:

- Determined the amount of solar energy collected
- Determined available solar flux values
- Determined use of available operating modes
- Evaluated the system for cooling applications
- Determined maintenance and operational requirements
- Collected and recorded solar and ambient conditions
- Installed a pool water heater
- Installed a domestic water recirculating loop

System performance was evaluated using the basic Hottel and Whillier equation for the performance of flat plate collectors. Results of these experiments showed that the system performance can be predicted from the empirically determined equation:

$$\text{Efficiency} = 0.72 - 0.93 \frac{T_{in} - T_{amb}}{Q_{inc}}$$

where

T_{in} = Collector inlet temperature, °F

T_{amb} = Ambient temperature °F

Q_{inc} = Incident energy, Btu/hr-ft^2

The use of energy collected over the test period is as follows:

- Space heating -- 54%
- Pool water heating -- 25%
- Domestic water heating -- 21%
- Solar contribution to building needs -- 5%

The total values during the test period (excluding September 1974) are as follows:

- Total incident energy -- 1,433,000,000 Btu
- Total collected energy -- 629,000,000 Btu
- Average efficiency -- 44%
- Energy consumed by school during test -- 12,500,000,000 Btu

Radiation data was obtained and compared against ASHRAE computed values and values modified by weather bureau tapes. Correlations were obtained with weather bureau sunshine data. Good agreement was found between predicted and actual values.

A cooling simulation was completed which has shown that the system is capable of sustaining the operating temperatures (200°F and higher) to drive an absorption air conditioner. Specific tests were simulated for a 25-ton water chiller, showing that the system could provide from 4 1/2 to 5 hours of cooling between 14 and 22 tons capacity.

Specific tests were conducted on each mode of operation to determine the operating characteristics of the system. Performance was as predicted with fresh air heating and domestic water heating providing the best load match for the solar system.

During the summer months the system provided enough energy to completely supply the school's need. This school is open during the summer for recreational needs. Operating costs based on a six-hour day are about 50¢/day for the single pump operating costs. Control system operating costs are negligible since the system is pneumatic and compatible with the school's pneumatic system.

Installation of the pool water heater and domestic water recirculating loop provided the loads necessary for efficient summertime operation. All rubber hoses in the system were replaced with steel tubes and "O" rings. The system is now leakproof. Snow accumulations during the winter months can decrease collector performance. Thus, removal by mechanical means may be necessary. Glass breakage was minimal with a total of four sheets replaced out of 256.

The system performed as expected. The school is continuing to use the system, and school officials are pleased with this performance and with the community's acceptance of the system.

SECTION II
INTRODUCTION

PROGRAM DESCRIPTION

This report covers the period from 16 May 1974 to 16 May 1975 on the operation and evaluation of the solar energy system installed at Northview Junior High School, 5869 69th Avenue North, Brooklyn Center, Minnesota. This system was designed and installed by the Systems and Research Center of Honeywell Inc. under contract to the National Science Foundation. Evaluation of the system from initial start-up in April 1974 was completed under the original design and installation contract. From 16 May 1974 to 16 May 1975, Honeywell undertook a one year test program for the Energy Research and Development Administration to evaluate the performance of the solar system.

The program described in this report was initiated to obtain engineering data on the performance of the 5000 ft^2 solar system installed at the school. The following specific tasks were completed:

- Determine the amount of effective solar energy collected
- Determine the utilization of the different solar system operating modes
- Evaluate cool weather heating performance
- Evaluate the system for cooling application potential
- Determine the nature and level of solar flux values available for the year
- Collect and record or compute the following data:
  1. Ambient temperature

2. Sky condition
3. Wind velocity
4. Solar insolation
5. Collector inlet and outlet temperatures
7. Storage temperature
8. Total energy collected
9. Total electrical energy required for operation

The report covers the results of these objectives with the detailed data presented in Appendix A.

SITE AND SYSTEM DESCRIPTION

The solar energy system is located in Minnesota Independent School District No. 279 at Northview Junior High School, 5869 69th Avenue North, Brooklyn Center, Minnesota, a suburb of Minneapolis. The building is a modern educational facility of about 165,000 square feet with swimming facilities, a gymnasium, a cafeteria, and an array of various classrooms.

The statistics for the Northview Junior High School building are:

• Building area	165,583 square feet
• Building volume	2,326,140 cubic feet
• Prime and equipment contracts awarded	$3,114,120.00
• Cost per square foot	$18.80
• Site area	Approximately 30 acres
• Construction period	1968-1969
• Architects	Matson and Wegleitner
• Student capacity	Approximately 1300

The present heating system is a low-pressure steam system driven by two gas-fired (with oil standby) boilers located in the mechanical equipment room on the first floor in the southeast corner of the building. Ventilation and heating is handled primarily through a central ventilating system housed in the equipment rooms: one located above a two-story classroom wing, and one located betweenthe gymnasium and the swimming pool on the roof of the locker room. The control system is pneumatic with the controls operating steam valves and/or outside air dampers.

The mechanical equipment located on the roof of the two-story classroom wing houses two central ventilating units through which all air moves via duct work in the ceilings of the first and second floors of the building. The ventilating units' steam coils are fed from the boilers to temper the mixed air to 60 degrees. Reheat coils thermostatically operate at the point of entry into the various spaces, thus providing the final air tempering for these spaces. Above the locker room are the heating and ventilation units for the pool, gymnasium stage area and several smaller athletic rooms. These units are similar to the classroom units and provide tempering of mixed air and a thermostatically operated final temperature modulating coil.

The school presently uses an average of 18,000 million Btu's annually, including the summer months. During off-school hours the facility is used as a community recreation center, particularly the swimming pool and gymnasium. This large consumption of energy in a building with such diverse usage enables a solar collector system to be used almost year-around.

Several factors influenced selecting Northview as the preferred site:

1) The heating/cooling demand was large enough to require several thousand square feet of collector surface. The facility's usage was diverse enough to require heated water during the summer, thus needing almost year-round use of solar energy.

2) The daily load for the school reasonably matched the availability of solar flux, so the system required a minimum of heat storage capacity.

3) Locating the collectors was relatively easy because of the abundance of open areas (ball diamonds, etc.) which assured unobstructed solar exposure. The Northview collectors are in full view of a major freeway, facilitating a high visibility for visitors.

4) The school system has strong educational and socio/political perspectives often not found in other institutions.

5) The school is a modern energy-conserving building, but nevertheless a large energy user. It demonstrates a critical need and has high visibility within the community.

6) The system does not block any views from the school, and is not attached to the building; therefore, it is not subject to restrictive building codes and may be enlarged if desired.

7) The school system was expected to be relatively independent and unbiased in assessing system performance.

8) The relative similarity of all community schools in their construction and use assured that the data collected would be applicable.

Minnesota was chosen as a good proving ground because:

1) It is representative of a low solar insolation area, particularly during the heating season.

2) The characteristically clear skies accompanying cold snaps promotes the use of solar heating.

3) The unusually long space heating season extends well into the spring, providing adequate test time.

4) Yearly fuel costs are high in Minnesota.

5) Minnesota has a wide variation in annual temperatures (-30 to +95°F) and many daily variations of 40 to 50°F, thus providing a wide range of technical data.

School personnel are especially cooperative and enthusiastic about a solar collector system for saving energy and for its educational benefits. Energy conservation is commonly practiced by the custodians in this school district.

Integrating the solar system components with the existing heating and ventilating system was a reasonable design goal. Ample space was available for storage: piping and heat exchangers were easily installed. (Figure 2-1 is an artist's isometric of the school and collector system.)

The solar system consists of 5000 square feet of flat-plate, liquid-cooled collectors which supply energy through exchangers to heat:

- Ventilation air for the swimming pool
- Swimming pool water
- Domestic water

Figure 2-2 is a schematic of the complete solar system as installed. The collector array is composed of six parallel rows of flat-plate collectors. The system pump moves heated fluid from the collectors to the system load. The 3000-gallon storage tank can be used to store the excess energy. The swimming pool water heater and the domestic water heater are tube-and-shell heat exchangers, while the air heaters are water-to-air heat exchangers. One air heater is used to temper outside ventilation to air, while the other reheats the mixed air. The system operates on a demand basis, with air heating having the first priority, pool water heating the second, and domestic water heating the third. All automatic control functions can also be operated manually.

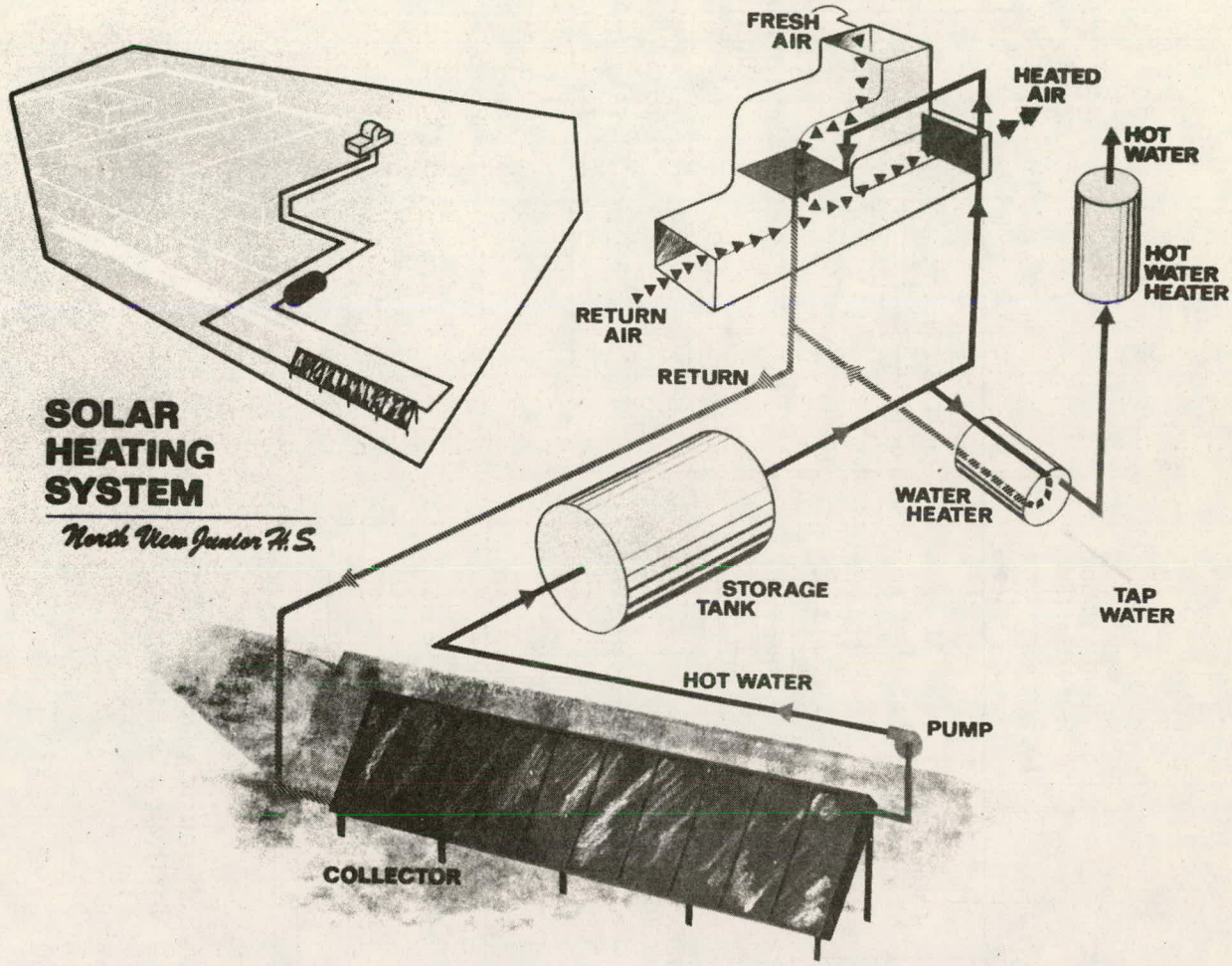


Figure 2-1. Solar Heating System - Northview Junior High School

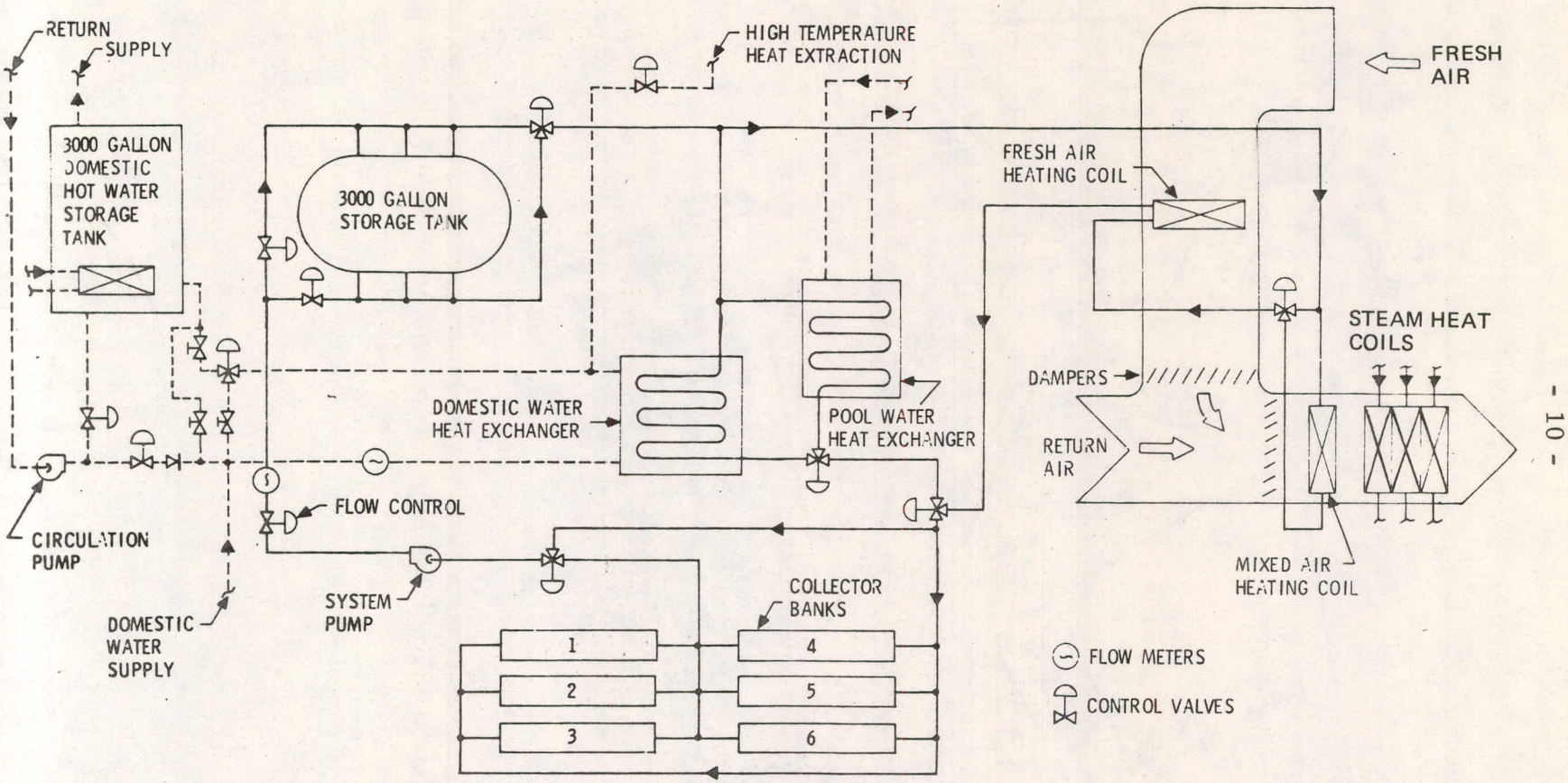


Figure 2-2. Schematic of Solar Heating System for Northview Junior High

SECTION III
SYSTEM DESIGN

SELECTION OF SOLAR HEATING AREAS

Upon finalization of the original NSF contract, Honeywell personnel along with representatives of Michaud, Cooley, Hallberg, Erickson and Associates (the consulting engineering firm who had designed the existing heating and ventilating system) visited Northview Junior High School for a preliminary survey of the heating and ventilation system.

Three possible locations for air heat exchangers were found. The first was the heating and ventilation units for the two-story classroom wing which consisted of two units moving 36,000 cfm of air, each with a minimum of 25 percent outside air. The second was the gymnasium unit which handles 20,000 cfm with a minimum of 25 percent outside air. The third was the pool unit which handles 12,000 cfm with the outside air intake controlled by a humidistat with no less than 25 percent fresh air.

The classroom units were attractive from a load standpoint, supplying 9000-cfm of fresh air each, but necessitated running about 300 feet of pipes to these units outside of the building. This would have required penetrating the building exterior three times and running pipes vertically up an outside wall. The gymnasium unit was complicated by a zone-controlled output and mechanical problems in installing heat exchangers. The pool unit provided the best choice because of ease of installation, and the fresh-air intake was rarely less than 6000 cfm. In addition, the pool air is heated to a temperature of 80 to 82°F. This represents a load almost equivalent to the classroom heat exchangers (360,000 Btu/hr with 22 degrees outside air). With 100 percent outside air, this unit alone would represent a reasonable winter load for the solar system.

In addition, 2000 to 3000 gallons of hot water are used each day. This water enters the building at 40 to 50°F and is heated to 140°F, representing an energy need of up to 2.5 million Btus. It was decided to install a water heat exchanger ahead of and in series with an existing hot water storage tank to preheat the incoming domestic water.

COLLECTOR SIZING AND DESIGN

The general design of the collectors consists of liquid-cooled steel plates coated with selective absorbing coatings and enclosed in an insulated steel housing which is covered by two transparent windows, one glass and one Tedlar. Figure 3-1 is a corner section of a typical collector. Shown are the glass cover, Tedlar sheet, absorber plate, insulation, and the steel housing with the various structural assemblies.

The outer housing is composed of 18-gauge, cold-rolled steel 36 inches wide, 96 inches long and 6 inches deep. The housing is formed from a single sheet of steel in a press brake and welded at the corners. Internal brackets are welded to the housing for absorber mounting supports. In addition, channels are spot welded to the housing sides to support the Tedlar sheet. Four access holes are provided for the plumbing, and six additional holes for maintenance and installation. Hat sections of steel are formed and welded to the back of the housing for stiffening and to suspend the collector on the support structure.

The absorber panel consists of two 25-gauge, 1020 cold-rolled steel sheets 31.75 inches wide by 46.5 inches long, with flow passages formed into the sheets. One sheet carries 0.250 inch x 0.050 inch deep grooves on 2-inch centers for basic heat transfer flow. The other sheet is formed to provide a 2.0 inch x 2.0 inch manifold at one end with a 0.50 inch x 0.50 inch manifold at the other end. The two sheets are assembled by spot-and-seam welding to form a parallel flow panel with large manifolds and small heat transfer

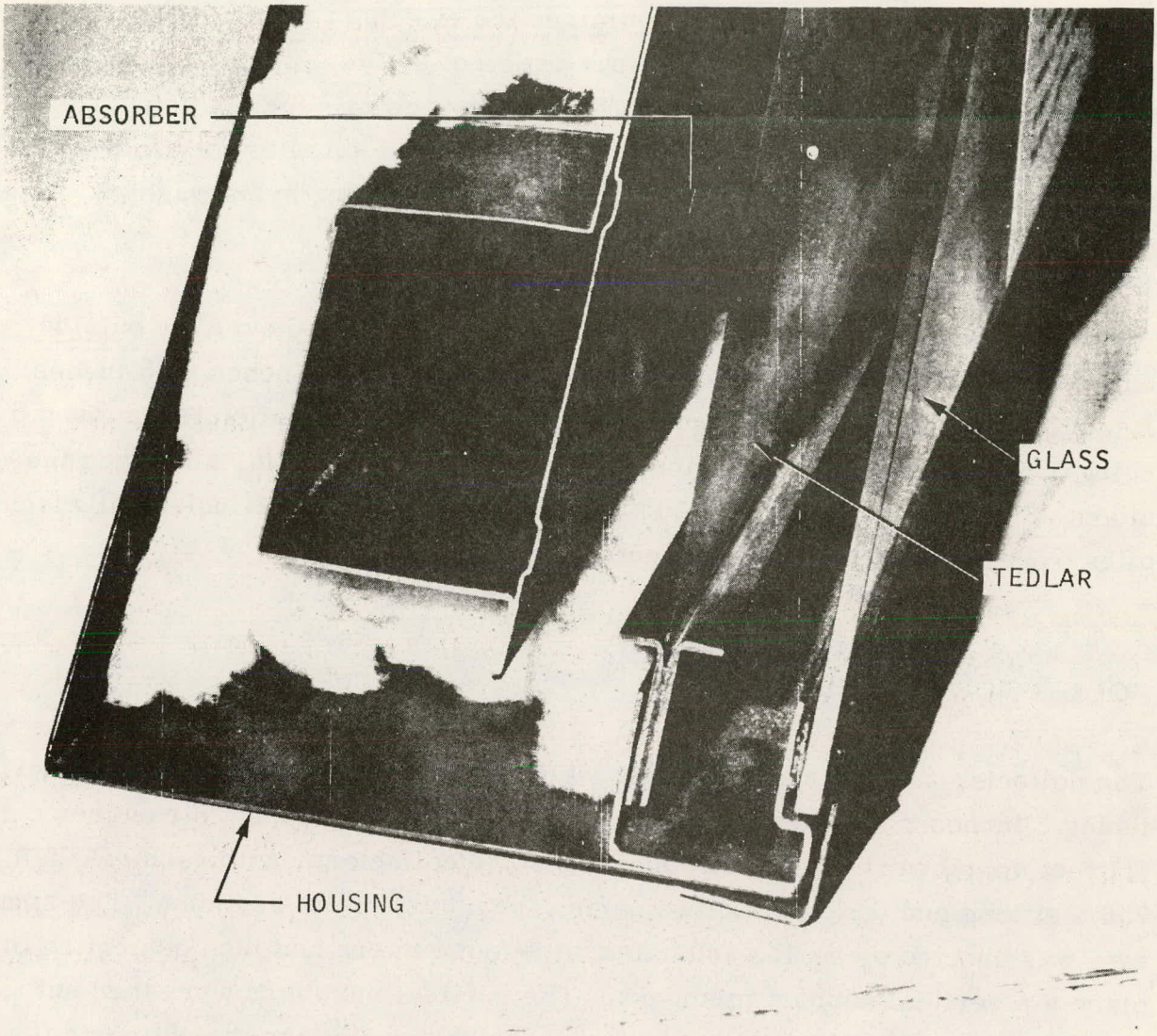


Figure 3-1. Collector Corner Section

channels. Formed steel tubulations on each corner permit connecting a series of panels to form an array of parallel collectors with small vertical heat transfer passages. The design minimizes the effects of nonuniform flow through the panel assembly. The final design of a complete collector used two absorber panels assembled within a unit to facilitate fabrication. The two panels are connected by small hoses between the smaller manifold tubulations and are attached to mounting brackets by insulating nylon washers. The completed assembly acts very much like a single panel.

Additional design features include a frame which is placed over the outside edges of the tempered glass cover (3/16 inch x 34-57/64 inches x 95 inches). A tape seals both sides of the cover near the edges. Insulation is achieved by using 3.5 inches of fiberglass across the back of the collector and along the sides. Since the collector has 5000 square feet of area, 246 individual assemblies were fabricated and then erected together on site.

COLLECTOR SUPPORT

The collector support structure was fabricated from square structural steel tubing 3 inches x 3 inches x 3/16 inch. Three rows of support structures (21 feet apart) were needed to support the 246 collectors, with each row being 256 feet long and divided into two parts, for a total of six sections. The structure was erected by boring 180 holes on 9-foot centers and then cementing in place the vertical support members. The vertical members were then cut to a 55-degree angle. Longitudinal tubes were then welded to the cut posts, forming a pair of rails upon which the collectors could be placed. Additional cross bracings (1-1/2 x 1-1/2 x 3/16 angles) were added to each pair of posts. (Figure 3-2 shows the structure with the panels mounted.)

The completed collectors were placed on the rails and moved into position on small rollers. Hoses were connected at the top and bottom manifolds to complete the assembly. The structure itself is designed to withstand 90-mph winds with the collectors in place. (Figure 3-3 shows the complete solar collector array.)

STORAGE TANK

The storage tank size was based on storing approximately one day's collection of heat. This was due to the limited amount of space available for storage. Final design size was 3000 gallons and the tank was erected within the building from separate 1/4-inch-thick steel sections. Design working pressure is 35 pounds per square inch, with the burst pressure being 90 pounds per square inch. The tank is supported on a separate concrete slab which was poured to accommodate the additional concentrated load. The tank is insulated with two inches of rigid fiberglass. (Figure 3-4 shows the storage tank installed in the system.)

HEAT EXCHANGERS

As previously mentioned, the system uses heat exchangers located in the pool air circulation loop and in the domestic water feedline. These heat exchangers were sized on the basis of a 10°F rise across the collectors at a flow rate of 80 gpm. The air circulation system has two heat exchangers: one for heating outside air, and the other for heating a combination of tempered outside air and pool-return air. These heat exchangers are of four rows, six fins per inch glycol-water to air with a face area of 42 x 111 inches. A subsequent computer calculation, assuming inlet glycol-water temperature of 95°F and outside air temperature of 40°F, showed a mixed air temperature of 68°F and a glycol-water return temperature of 85°F with an air flow of 12,000 cfm and

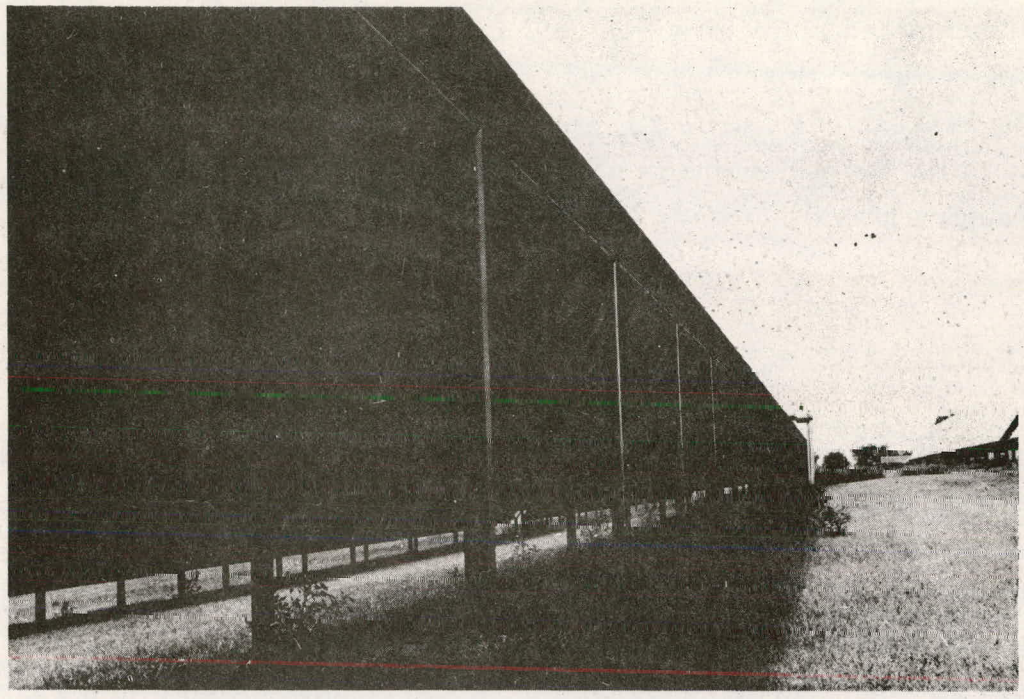


Figure 3-2. Collector Support Structure

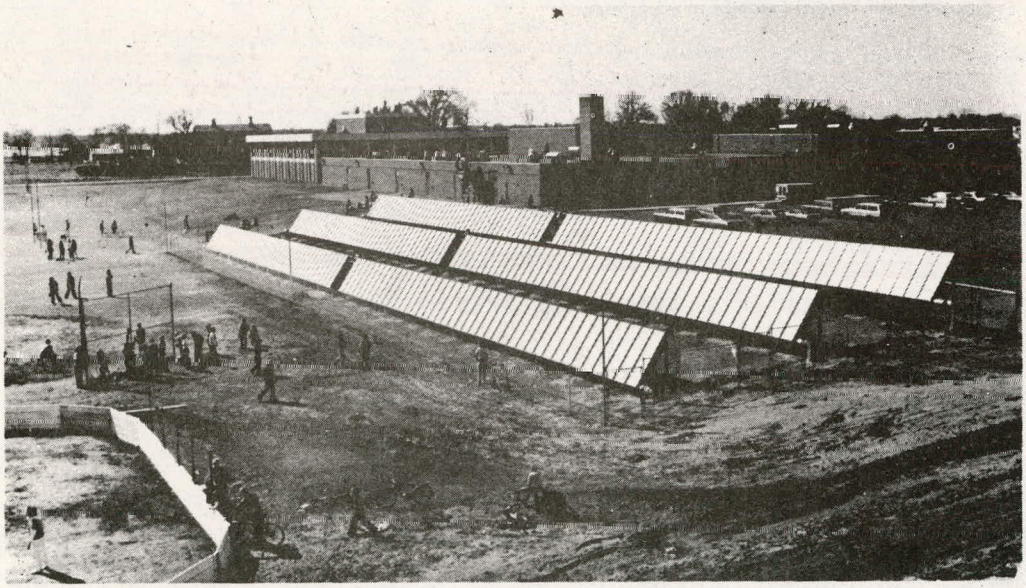


Figure 3-3. Installed Collector System

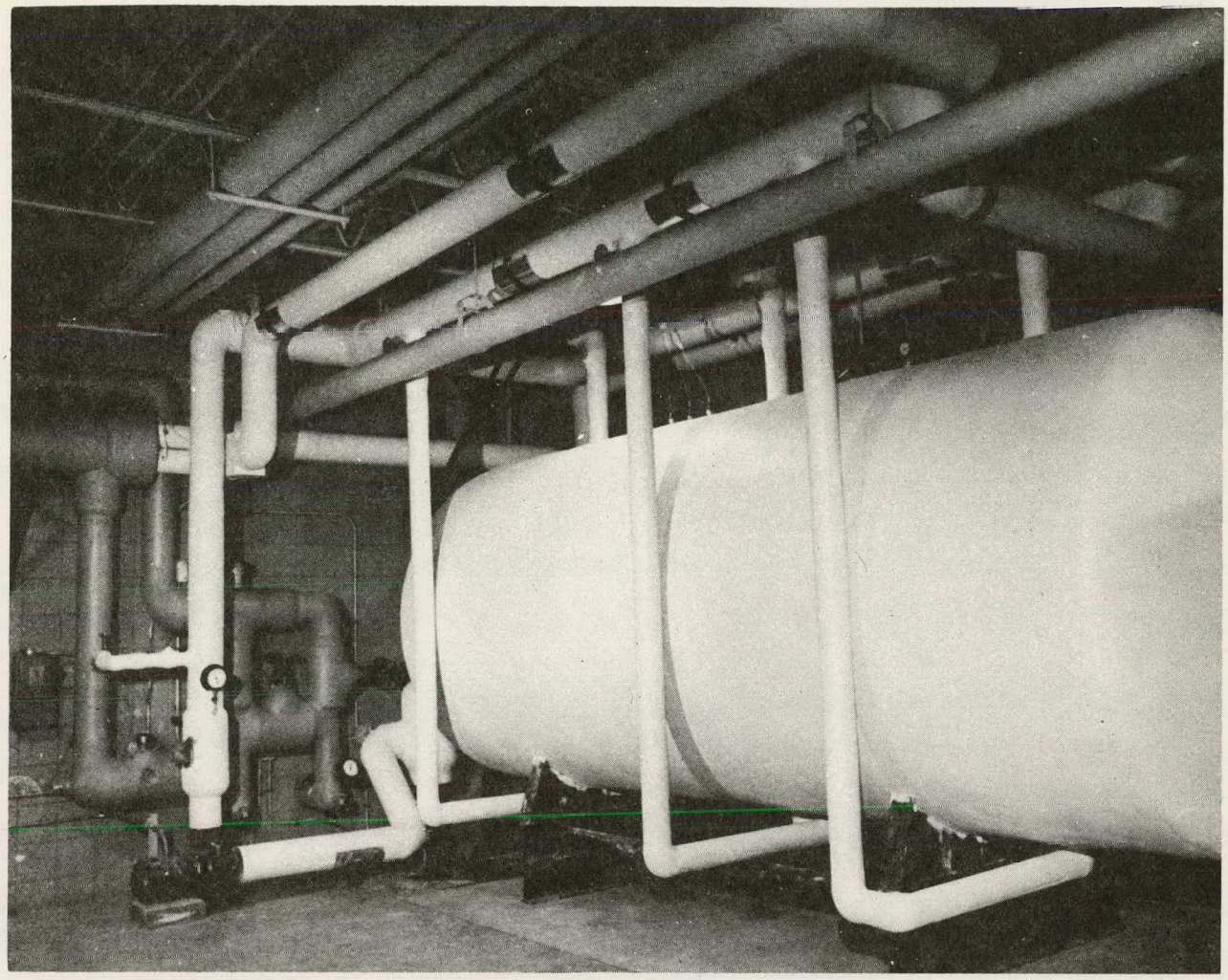


Figure 3-4. Storage Tank

glycol-water flow rate at 80 gpm. (This corresponds to a heat extraction rate of 360,000 Btus per hour.) The domestic water heater is a standard tube-and-shell heat exchanger and was sized on the basis of a water use which varies from 100 to 700 gph with a maximum outlet temperature of 140°F. Assuming an inlet water temperature of 40°F, this exchanger is capable of transferring up to 1,000,000 Btus per hour. Figure 3-5 shows the two air heat exchangers installed in the system, while Figure 3-6 is the domestic water heat exchanger.

PIPING AND PUMP SIZING

To minimize pressure losses in the system, a 3-inch pipe was chosen. Total pipe footage from the collectors through the air heat exchangers and then back to the collectors is about 1000 feet. Assuming a flow rate of 80 gpm, the pressure drop for the 3-inch schedule 40 steel pipe is 6.87 psi for the 1000 feet.

The approximately 60 elbows contribute about 1.25 psi. Five control valves at 0.7 psi/valve contribute a 3.5 psi loss. The two air heat exchangers in series amount to 10 psi loss, while the flow meter contributes 1 psi.

The collectors nominally contribute about 0.5 psi for a total calculated loss of about 23 psi. An 80 gpm flow of 50-50 glycol-water mixture with a specific gravity of about 1.1 would ideally require a pump of about 1.2 horsepower. However, a 5 horsepower pump was selected because the correct size was not available and would give a flow rate of 80 gpm at a 32 psi head. This is a centrifugal pump with the capability of machining the impeller to match the system flow and pressure drops. The subsequent operation of the system has shown a nominal pressure drop of 21 psi in the loop. (Figure 3-7 illustrates the pump and its location.)

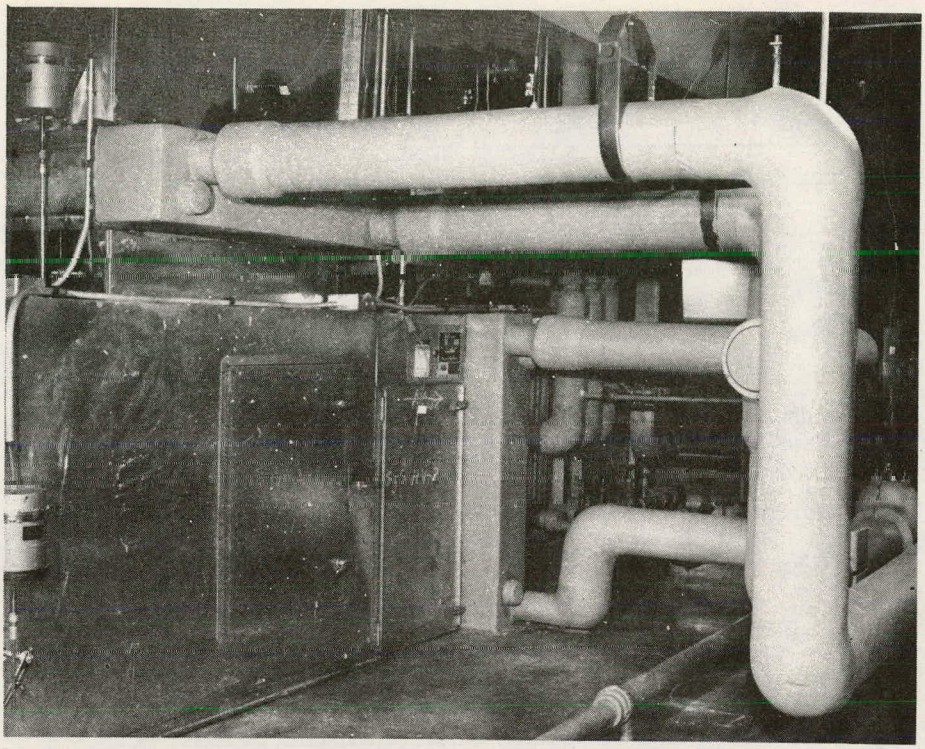


Figure 3-5. Air Heat Exchangers

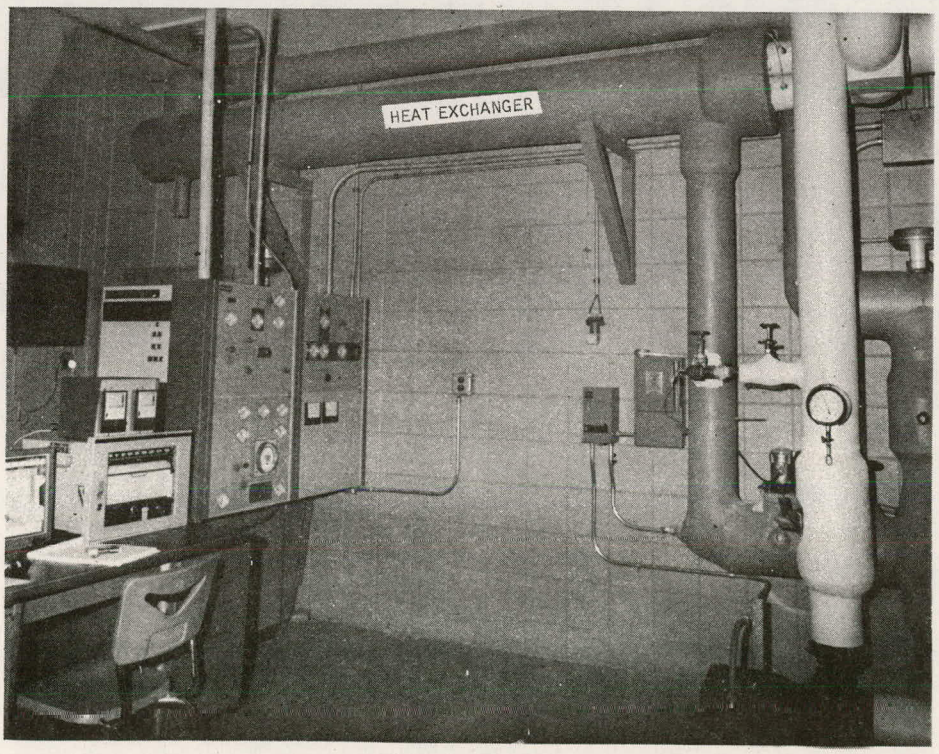


Figure 3-6. Water Heat Exchanger

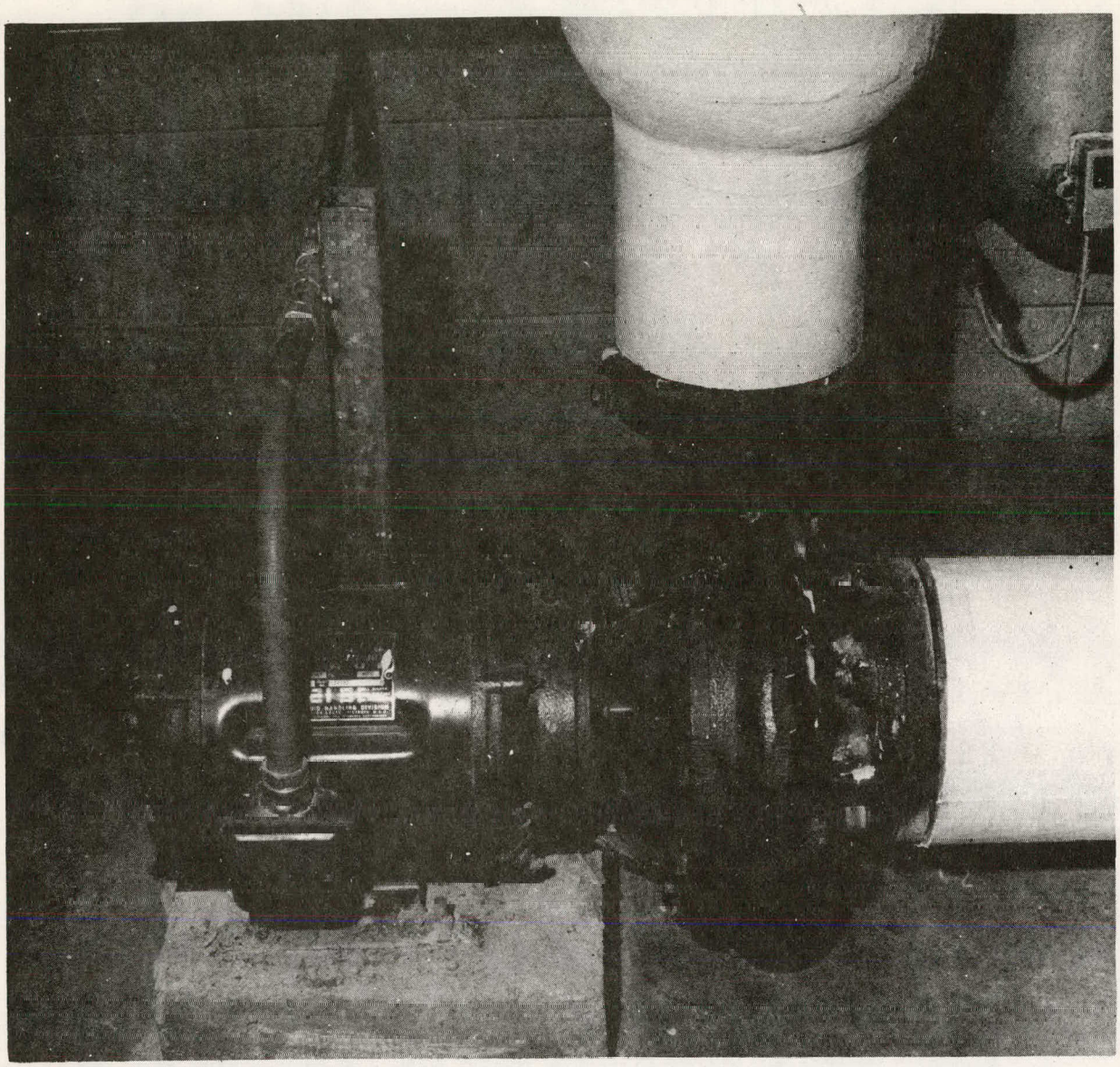


Figure 3-7. System Pump

SPECIAL FEATURES

To allow for system fluid expansion (estimated at 232 gallons for a 50-50 glycol/water mixture from 40°F to 200°F) four 120-gallon expansion tanks were connected in parallel and installed at the high point in the system. These expansion tanks are connected on the suction side of the pump at the collector's common outlet. The system's fluid capacities are broken down into 3000 gallons in storage, 312 gallons in the collectors, 400 gallons in the piping and 160 gallons in the expansion tanks.

An air separator was installed on the suction side of the pump. This is a vertical air separator and filter combination with the air leaving at the top center of the unit to an air-holding tank located about 10 feet above the separator. Periodic bleeding of air from this holding tank is required. Additional filters are installed at each collector row inlet and are of the commercial "Y" strainer type.

Balancing valves are installed at each collector row inlet as well as shutoff valves at each outlet. Pressure relief valves are installed immediately after each collector outlet and are set at a nominal 15 to 20 psi range. Figure 3-8 shows a typical pressure relief valve and shutoff valve.

System insulation other than in the collectors is 2-inch, semi-rigid fiberglass on all interior and above ground exterior pipe. The above ground exterior pipe is also covered by an aluminum protective cover. All underground piping insulation is 2 inches of urethane with a waterproof coating. Figure 3-9 shows the above ground pipe with its insulation and associated expansion loop.

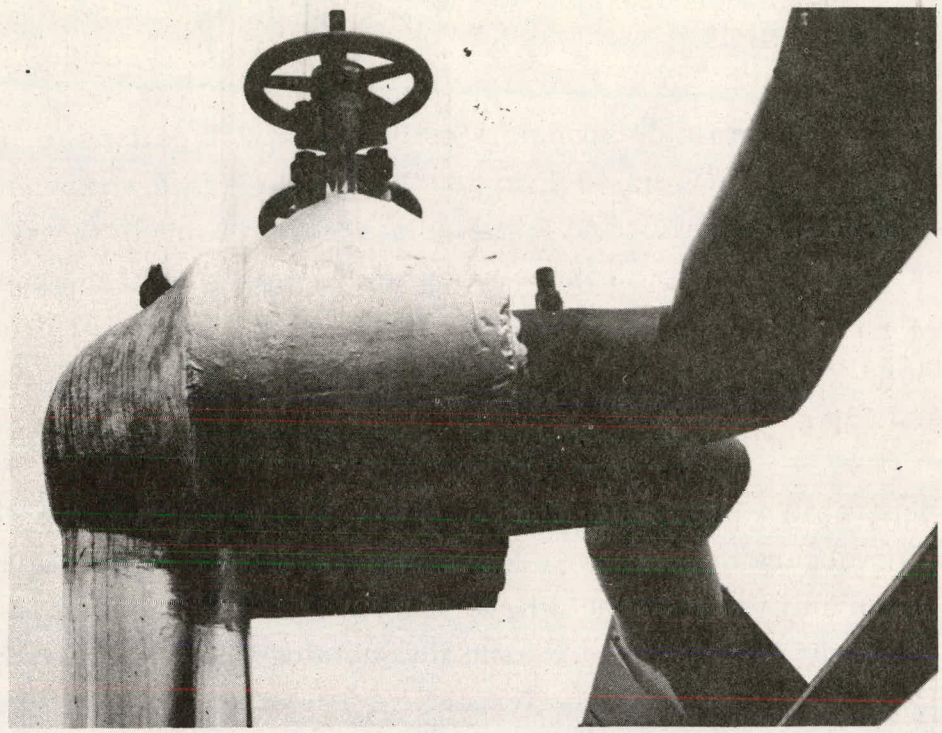


Figure 3-8. Collector Outlet

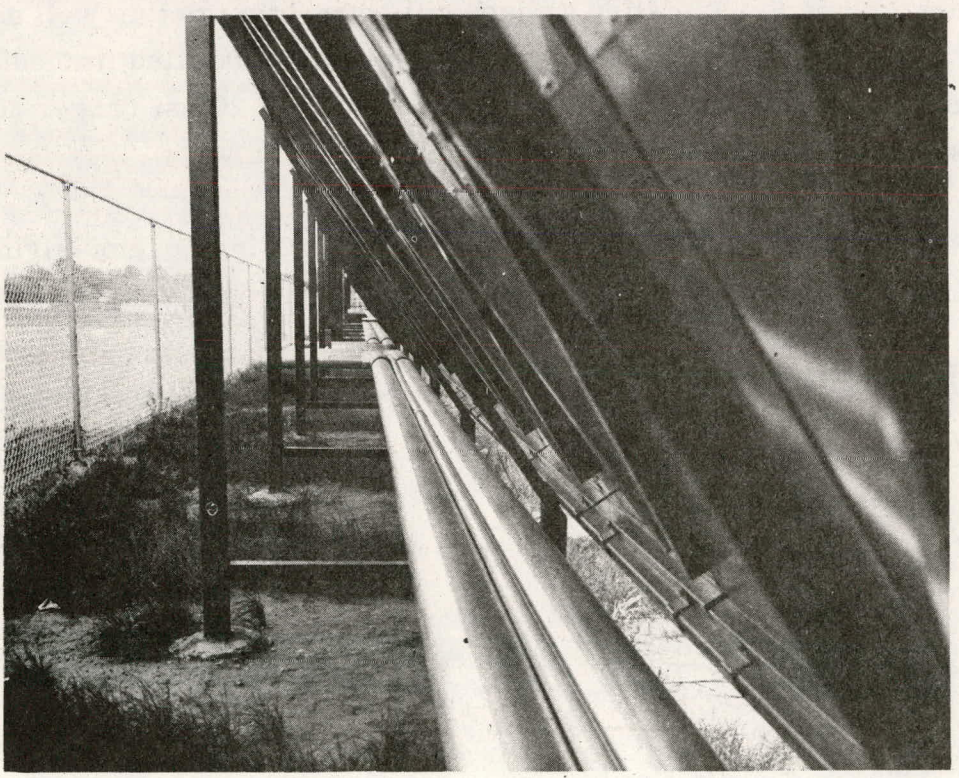


Figure 3-9. Supply and Return Piping

CONTROL SYSTEM

As previously described (Figure 2-2), the solar collectors are divided into six sections with parallel inputs and outputs. The common outputs go into the building to the air separator-filter combination then through the pump, flow control valve, and flow meter towards the storage tank. The flow can be directed into the top of the storage area and out the bottom, into the bottom and out the top, or bypassed around the tank by appropriately switching Valves 1, 2, and 3. After passing around or through the storage tank, the flow is directed to domestic water heating or to air heating, depending upon the position of Valve 5. When directed towards air heating, Valve 4 determines if the return air heating coil will be bypassed. After passing Valve 5, the flow is directed to or around the collectors, depending upon the position of Valve 6. The domestic water is directed around or through the heat exchanger, depending upon the position of Valve 7. An additional line from the heat exchanger output to the pool or drain is provided for emergency extraction of heat from the collectors. During the one-year test program, the pool water heater was installed. Whenever space heating is satisfied, the system switches to heat pool water through Valves V5 and V8. If this load is satisfied, the system then switches to heat domestic water.

Figure 3-10 is a schematic of the control system as initially installed. The system incorporates Honeywell's pneumatic controllers and valves. The valves are actuated either manually from control switches on the control panel, or automatically when the valve switches are so set. Pneumatic temperature readouts are provided on the panel so temperatures may be seen. The control panel itself is a schematic layout of the plumbing system with valve switches locations corresponding to actual valve locations. (Figures 3-11, 3-12, and 3-13 illustrate the control panel layout.)

An automatic controller is incorporated in the system and originally protected the collectors from high temperatures when the system was left unattended,

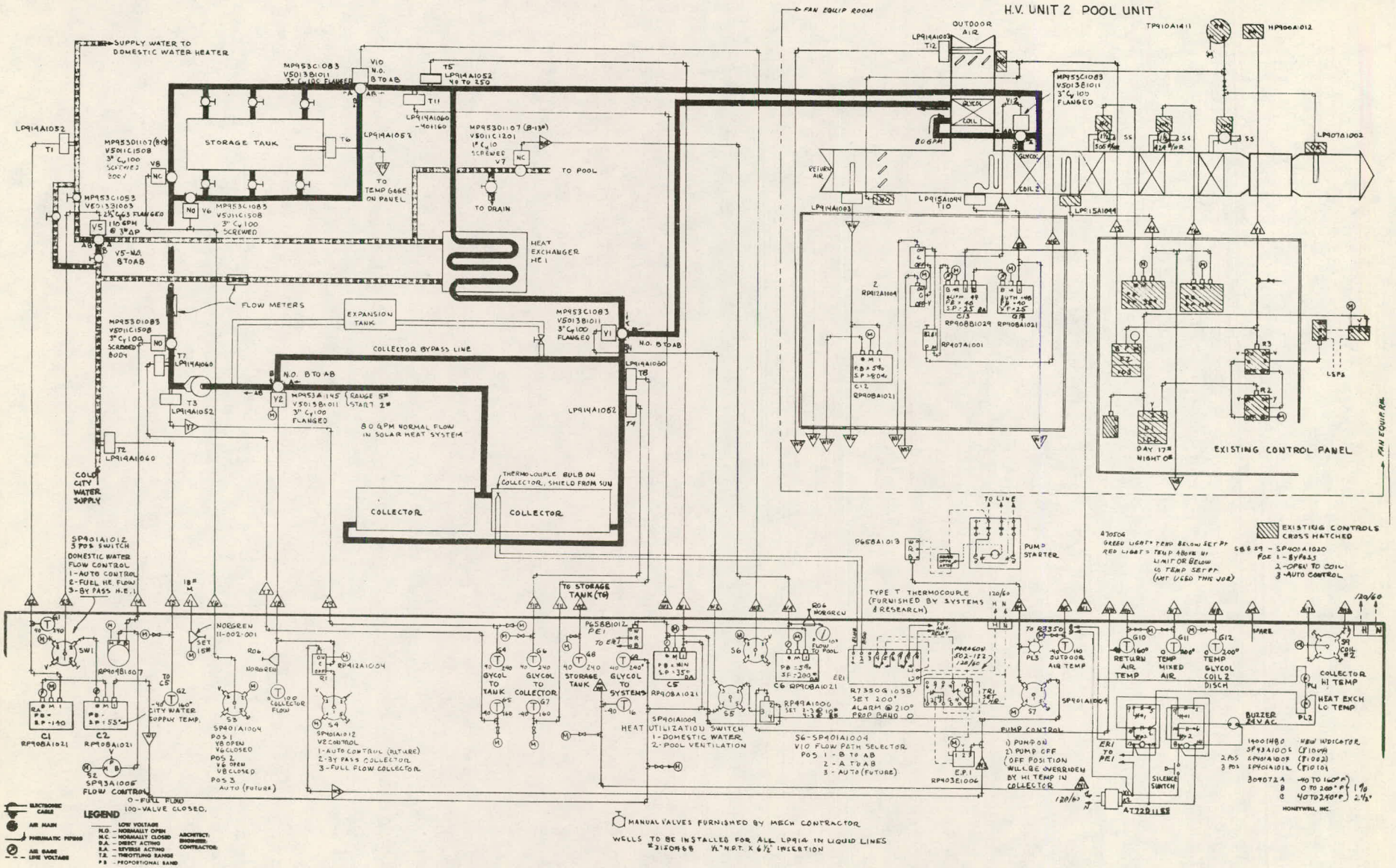


Figure 3-10. Control System Schematic

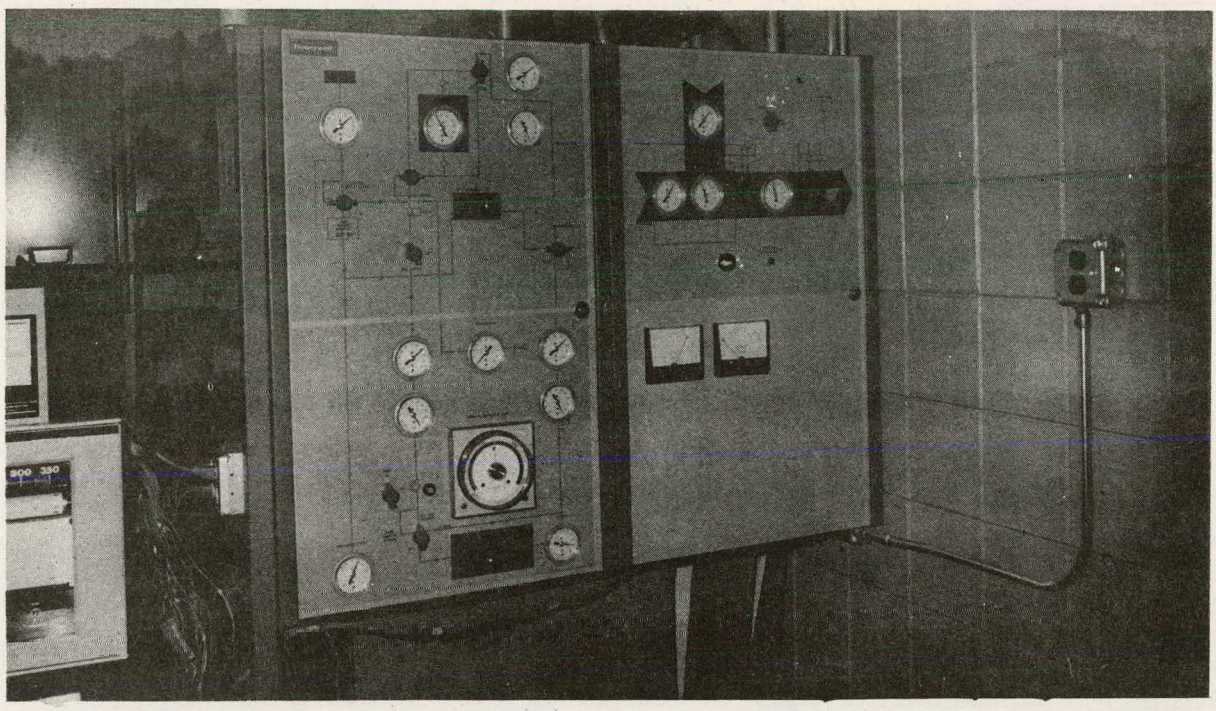


Figure 3-11. Control Panel

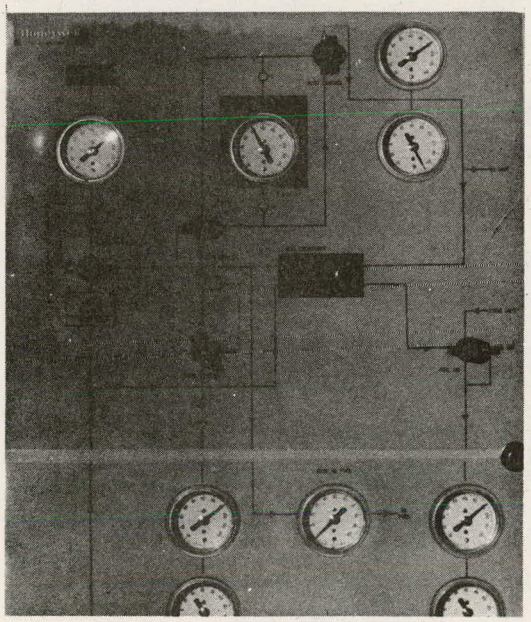


Figure 3-12. Control Panel Close-up

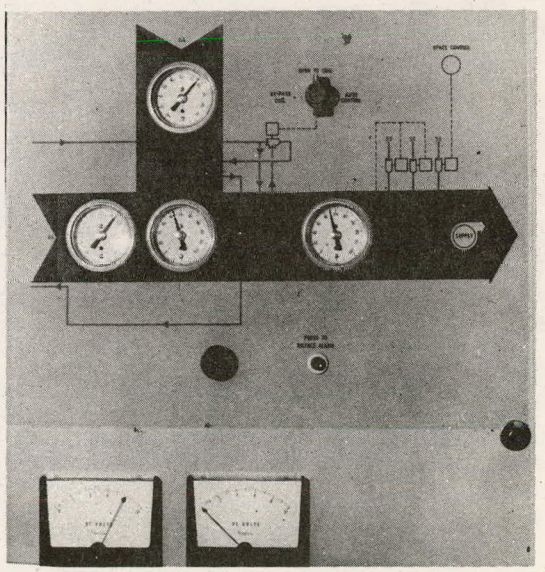


Figure 3-13. Control Panel Close-up

or when limited amounts of energy were collected during weekends or other periods of low energy consumption. (Figure 3-14 shows the automatic temperature controller installed on the panel.)

However, during the one-year test program, the control system was modified to use the adjustable set point provisions of the automatic controller as a system start controller. The set point is adjusted for summer and winter operation and the system shuts down when the collector plate temperature falls below the set point.

In addition, a recirculating loop to the domestic water heat exchanger was installed in the system (Figure 3-2). The basic loop already existed from the domestic water storage tank and was extended through the heat exchanger and controlled by Valves V9 and V10. This function is used during the summer when the school heating plant is shut down. The domestic water is heated through this recirculation loop.

INSTRUMENTATION

Temperatures are measured with the use of stainless steel sheathed copper-constantan thermocouples located at important points in the liquid and air loops, as well as at selected points on the collectors. There are additional access points throughout the system for additional temperature measurements should they be needed. For example, each bank of collectors has an access port at the inlet and outlet. All thermocouple access ports incorporate a special Viton sealed plug which permits the insertion and removal of thermocouples by simply pulling the thermocouple out of the port. The plugs are self-sealing upon removal of the probe. Thermocouple locations are shown in Figure 3-15. Temperatures are recorded with the use of a 24-channel recorder with selectable channels. During operation of a particular mode only those thermocouples needed to evaluate that mode are selected.

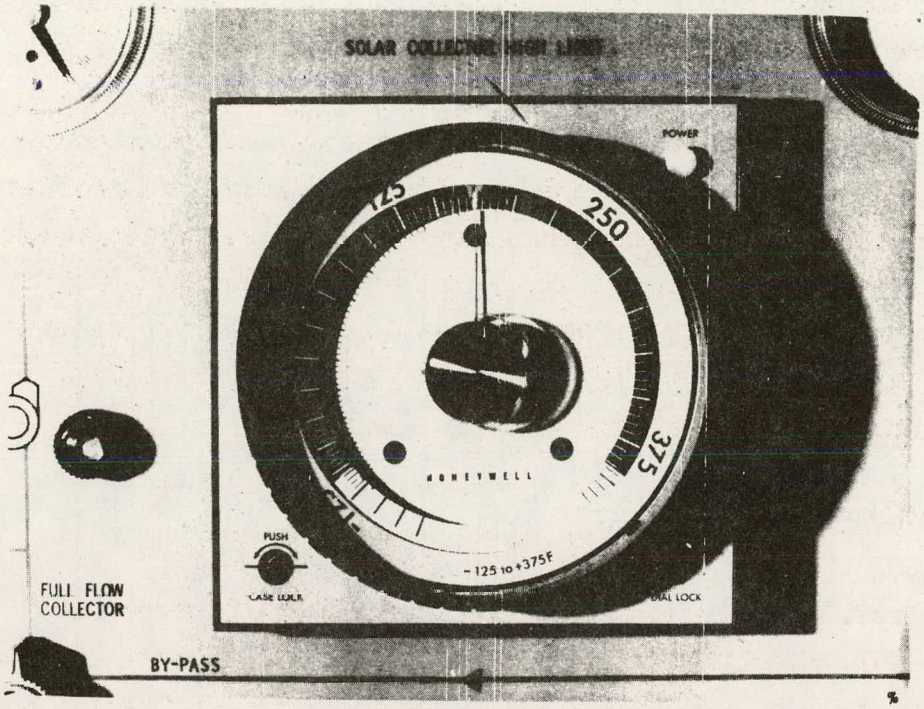


Figure 3-14. Automatic Set Point Controller

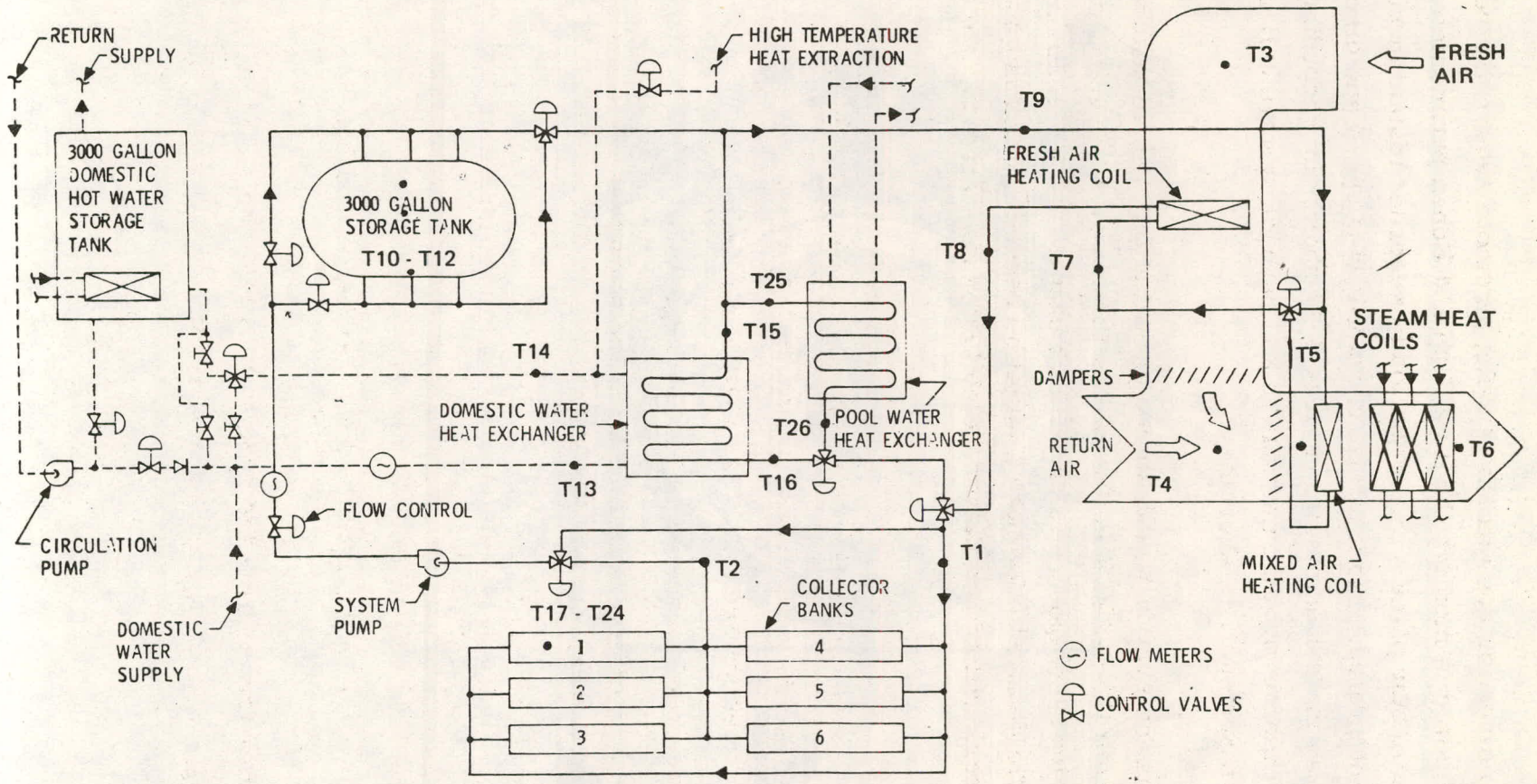


Figure 3-15. Sensor Locations

Wind speed and direction are measured using a remote sensor and recorder, while solar radiation is monitored with a Kipp and Zonen pyranometer installed in the collector plane. The radiation is recorded instantaneously and automatically integrated. Figure 3-16 shows the wind speed and direction sensor as well as the pyranometer. Figure 3-17 shows the recording instrumentation. All measuring instrumentation and recorders were calibrated at Honeywell's instrumentation laboratory.

The instrumentation system was designed to evaluate the performance of the system as a whole instead of specific to detailed analysis of each component. However, individual components such as heat exchangers are instrumented in case any specific detailed information might be needed. The design and location of the sensors will enable data to be collected for evaluating the hourly values of

- The amount of incident solar radiation on the collector plane
- The useful heat collected by the collector panels
- The efficiency variation of the collector panels
- The amount of heat stored in the storage mode
- The amount of heat extracted from the storage tank during any three discharge modes, namely:
  - Storage to fresh air
  - Storage to fresh air + reheat air
  - Storage to water heating
- Heat transferred in from the fresh air heating coil to the air stream
- Heat transferred from the reheat air coil to the air stream
- Heat used for heating domestic water both from collector and storage tank

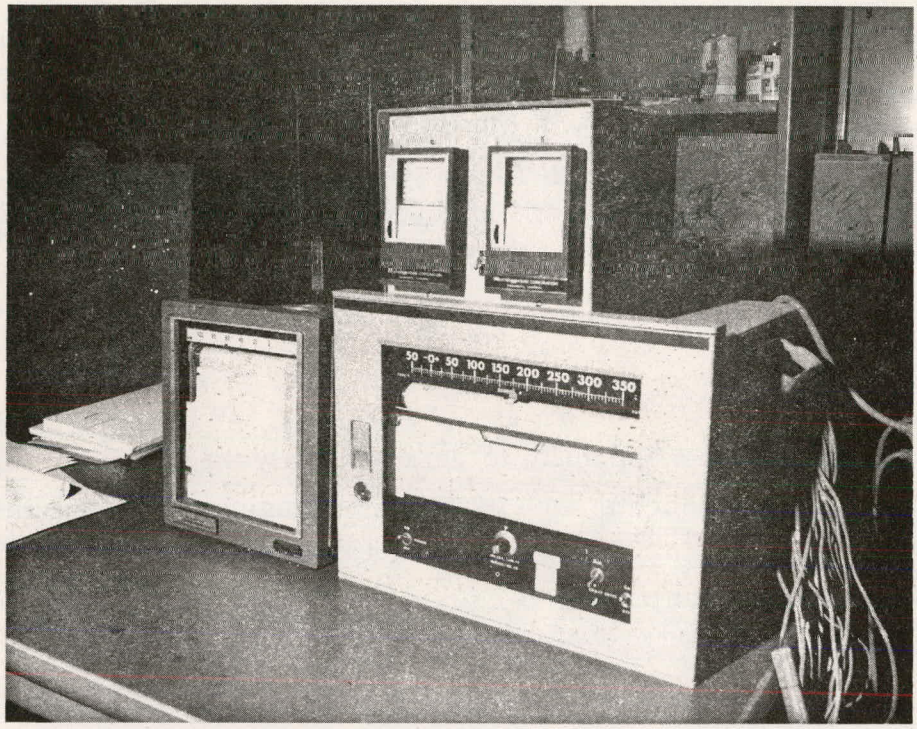


Figure 3-16. Recorders

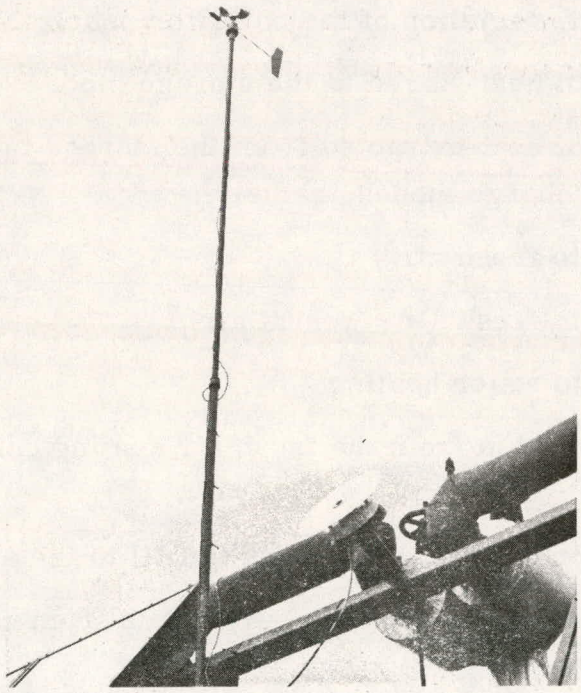


Figure 3-17. Wind and Solar Sensors

- Total daily useful heat quantities for the above modes and system components
- The contribution of solar energy to the heating requirements of the school

INSTALLATION COSTS

The costs of the solar system assembly subtasks are tabulated below. These costs do not include engineering labor. All work outside of the collector assembly work was completed under fixed-price contracts with outside vendors. Some of these vendors were other Honeywell divisions. The costs reflected below include materials and labor which are difficult to separate on fixed price contracts to outside vendors.

Under the time constraints imposed by the initial design and build contract and the usually higher costs of a prototype system, the costs listed below would not reflect the costs of a similar system installed using the knowledge gained from the installation of the Northview project and production techniques aimed at lowering system costs.

Item	Cost
Collectors (5000 square feet)	$98,600.00
Plumbing (includes manual valves, insulation, pipe, fittings and labor)	63,782.00
Structure (materials and labor)	8,000.00
Components (heat exchangers, pump, expansion tanks, air control)	4,500.00
Storage tank and pad	6,330.00
Control system (panel, valves and controls)	12,000.00
Instrumentation	4,878.00
Electrical	1,300.00
Antifreeze	3,520.00
Fencing, painting and air filters	4,100.00
Collector installation	4,200.00
Total	$211,210.00
Cost/ft^2	$42.25

SECTION IV
SYSTEM MODIFICATIONS AND MAINTENANCE

HOT WATER RECIRCULATION LOOP

A hot water recirculating loop was installed between the domestic water heat exchanger and the domestic hot water tank during the summer of 1974. This provides a continuous transfer of heat to the domestic hot water storage tank with no additional expenditure of energy since the circulating pump used is presently in continuous operation in a hot water circulating loop in the building. The water returning from the building's circulating loop is diverted through the solar system's hot water heat exchanger before returning to the domestic hot water storage (Figure 2-2). This loop provides for a continuous heating of hot water rather than having to heat hot water on a draw basis as was the previous case.

POOL WATER HEAT EXCHANGER

A heat exchanger was installed in the swimming pool's recirculating loop ahead of and in series with the existing steam-fired heat exchanger. This modification provided for heating the pool water directly from the collectors or storage. Both the hot water and pool water heating modifications permitted the school heating plant to be taken out of service for the late spring, summer and early fall months. The solar system was able to provide the essential heating energy needs during these months at a considerable savings in fossil fuel consumption.

Collector Repair

During the summer months of 1974, serious system leaks developed from rubber hoses which were used to interconnect the individual panels. The system was shut down a section at a time to a point where serious degradation of performance was apparent.

The leaks from around the rubber hose were caused by an effective "loosening" of the hose clamps. This "loosening" phenomena was due to the high temperatures to which the hose was exposed and the large diameter of the hose. The higher temperature caused permanent set in the rubber under the clamp, thereby reducing the sealing effect of the hose clamp.

On August 24, 1974, the entire system was shut down for a major modification of the absorber panel interconnections. This modification used a steel tube between panel headers with sealing provided by two silicone "O" rings (see Figures 4-1 and 4-2). Samples were tested in Honeywell's environmental chambers between -60°F and 220°F for two weeks and at 315°F for 56 hours. No leaks occurred in the samples, so several tubes were installed in the system for two weeks and checked for compression set and leaks. All checks proved satisfactory so the installation of the tubes was started at the end of August and completed by the first week in October. The total number of connections is approximately 1000 and the system has operated continuously since then without any leaks.

SYSTEM MAINTENANCE

Glass breakage of the 3/16 inch tempered glass used on the collectors was not a major problem. A total of four sheets were replaced out of 256. Two were broken by vandals, while two were broken during operation of the system by Honeywell personnel. No breakage has occurred during the winter

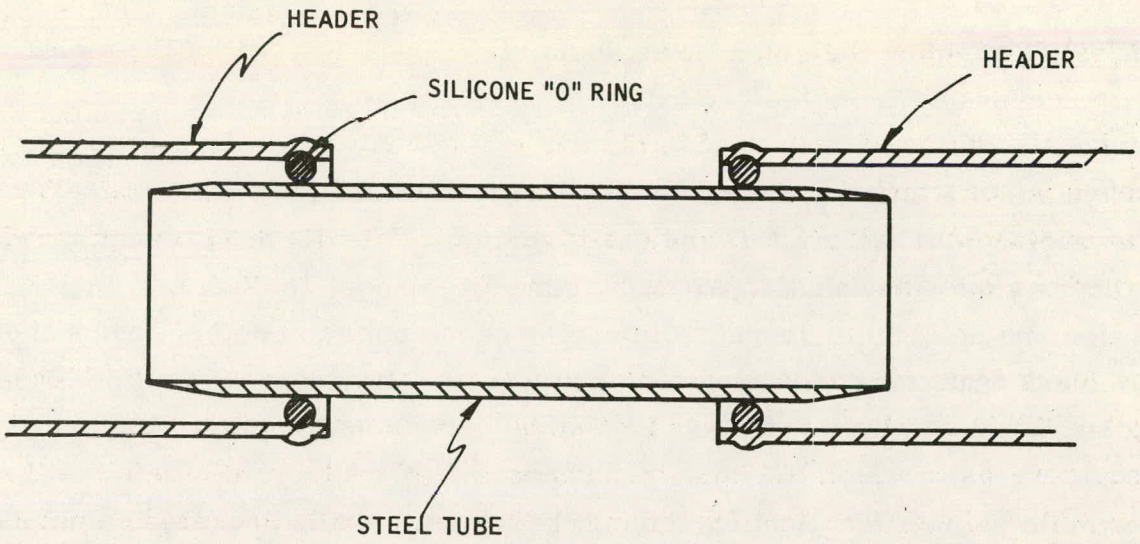


Figure 4-1. Collector Interconnector Schematic

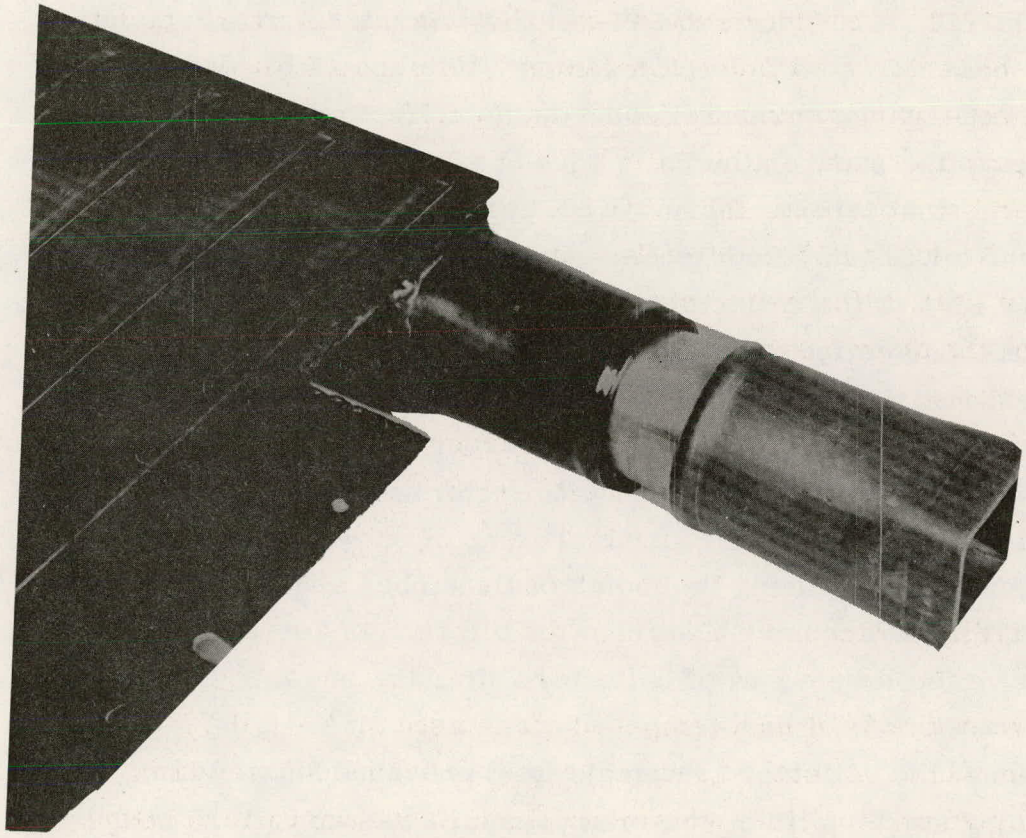


Figure 4-2. Collector Interconnector Photograph

months. Replacing the glass takes about six man-hours, with all panels easily accessable from the ground.

Condensation in small amounts could be noticed on the underside of the glass surface during late fall and early spring. This did not present any problem as the condensation would be gone after about 10:00 a. m. In addition, no detectable decrease in performance could be determined either from condensation or from dusty or dirty glass. Periodic rainfall does an acceptable job of glass cleaning.

Snow build up on the collectors during the winter months presented a unique but major problem on a majority of the collectors. During the month of January 1975, the efficiency of collection showed a marked drop from the previous months (45% - 50% down to 34%). This was due to an accumulation of snow on the collector's surface. On January 10th and 11th, a major blizzard deposited a large amount of snow on the collectors. A decision was made to leave the snow on the collectors to see if natural radiation would melt it, or, that failing, there were a possibility of melting the snow from the storage tank heat. Both techniques failed on the collector rows in which the lower edge of the collectors were less than two to three feet from the ground. On those collectors whose lower edges were higher than three feet, the natural radiation melted enough snow on the glass surface so that the remainder slid off the collectors. On the lower collectors, the snow would slide and form a bridge between the collectors and the ground. This would turn to ice and force further accumulations of snow. Figure 4-3 shows snow accumulation during the month of December and early January. Figure 4-4 is the snow accumulation from the blizzard of January 11, while Figure 4-5 shows the lowest row of collectors after the snow.

Periodic checks of the collector systems's inlet pressure showed that, at the early morning start-up time, the inlet pressure was up to 15. 5 pounds/ square inches at flow rates of 80 gallons/minute. The operating flow rate

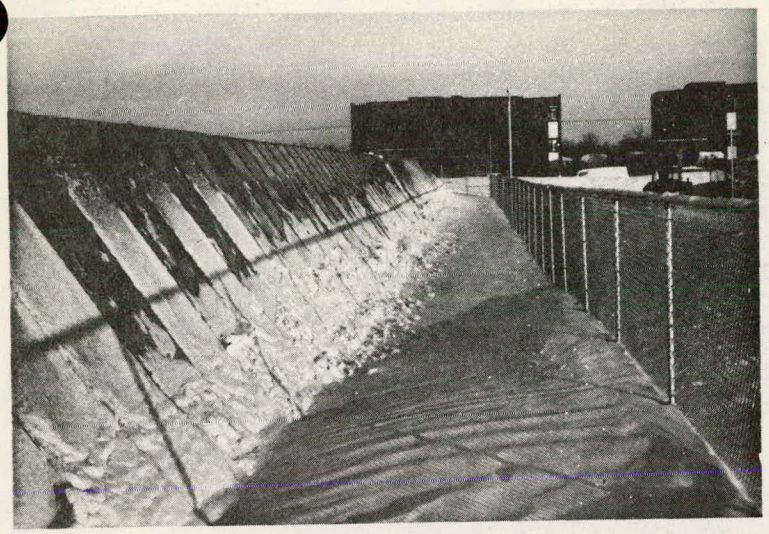


Figure 4-3. Snow Accumulations

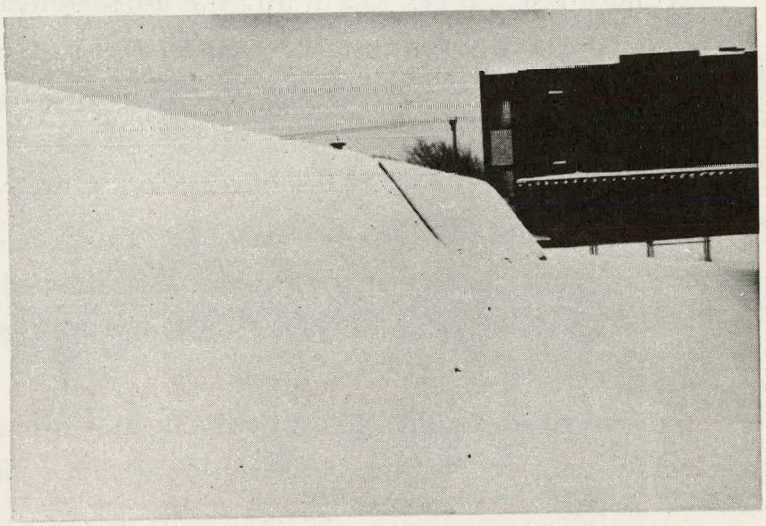


Figure 4-4. Snow After Blizzard

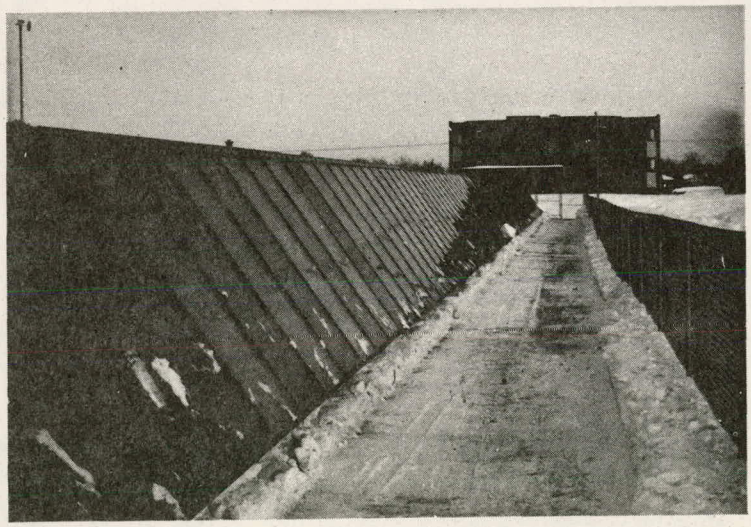


Figure 4-5. Collectors After Snow Removal

was lowered to 60 gallons/minute during the winter season, thus limiting the pressure build up. Available data for a 50% mixture of ethylene-glycol and water shows a viscosity increase from 4 to 22 Centipoise with a temperature drop from 70° to 0°F. This viscosity change is more than enough to cause the increase in inlet pressure. The 60 gallons/minute flow rate was maintained during the cold winter months. Data evaluation has shown no detectable decrease in efficiency due to the lower flow rate.

One minor problem was encountered with the control system operation. This problem was caused by the parallel operation of the system's conventional HVAC system and the solar heating system. When solar heating of fresh air occurred under high solar insolation, the space was momentarily overheated because the conventional HVAC system thermostat would not respond fast enough to shut off the heating coil in the conventional system. Thus, both systems supplied heat simultaneously in cases when the solar heating system could have handled the entire load. Adjustment of thermostat set points helped to alleviate, but did not completely solve the problem. Subsequent checks of the thermostat showed that the device had corroded badly from pool-humidity. Replacing the thermostat solved the problem.

System maintenance has been very low since the Fall of 1974. One additional section of glass was replaced and no system leaks have been detected.

SECTION V
SYSTEM OPERATION

CONTROL AND FLUID ROUTING

The system's operation is presently keyed to the collector plate temperature and the space heating demands, with provisions for manual as well as semi-automatic operation. A temperature-sensitive controller automatically starts the pump through a pneumatic-to-electric interface whenever the plate temperature reaches a preselected set point. This also activates Valve V6 which directs the flow to the collectors. When the plate temperature drops below its setpoint value, Valve V6 returns to its original position and the system is in the collector-bypass mode (see Figure 2-2).

From the discharge of the pump, flow is routed through a modulating flow control valve which is controlled from the flow controller on the panel. The flow rate can be varied manually and is measured by a digital flow meter with an analog output displayed on the control panel.

Flow around or through the storage tank is controlled by three tank switches (Valves V1, V2 and V3). The proper positioning of these switches allows the flow to be bypassed around the tank in one of two directions or through the tank entering at either the top or bottom of the tank. Selecting the routing is presently a manual function and depends on the operator's judgment. Normal operation would route flow from the tank bottom through the collector to the top of the tank during storage charging, while discharging would require flow taken from the top of the tank to be returned to the bottom. Overnight stratification is about 20°F between top and bottom sections and remains stratified for 20 minutes with a flow through the tank of 80 gpm. Lower flow rates would, of course, result in longer stratification periods.

OPERATING MODES

The present modes of operation provide for collected heat to be used directly in heating the pool's air and water, as well as heating the domestic water. Surplus heat is stored in the 3000-gallon tank for use during the night, or periods of overcast skies. The choice of tank charging in series with water or air heating is left to the operator. Valve V5 routes the flow from the tank through either the air heat exchanger or the water heat exchangers, depending on the space demands.

The basic criteria for the selection of operational modes are incorporated in the system control. During pool air heating the flow is directed through the reheat and fresh air coils or through the fresh air coil alone, depending upon the position of coil control Valve V4. When the valve control is in the automatic position, flow is routed through both coils if the pool thermostat is calling for heat. However, if the glycol-water temperature is less than the mixed-air temperature, an override controller will automatically bypass the reheat coil and route the flow through the fresh-air coil. If the pool-air space is satisfied, an override controller directs the flow to domestic or pool-water heating.

If the solar system does not provide enough heat to satisfy the pool space heating requirement, a sensor in the air leaving the reheat coil will act through two controllers to control two steam coil valves. If this air temperature is more than 35°F, both steam valves will be closed. When the air temperature falls to 35°F, one steam valve will open; below 20°F both will open. A modulating space thermostat will position a valve on a third steam coil to control the pool-air temperature. There is also a low-limit discharge controller which prevents discharge air from falling below 65°F.

The air circulation system is provided with dampers which operate in parallel across the return air and fresh air ducts. When one opens, the other closes a like amount, assuring a relatively constant air flow in the system. The relative position of the dampers is set by setting a minimum fresh air opening (25 percent by state law during occupied periods). A pool humidistat can override the minimum setting to increase the intake of fresh air and reduce the relative humidity in the pool area.

When the building is unoccupied (night setting), the fresh-air damper is closed and the space thermostat will cycle the supply fan to maintain the desired temperature. During this period, if the relative humidity increases above the humidistat set point the fan starts and the fresh air damper opens to control the humidity level.

When the space temperature is satisfied, the solar system pool water heating is initiated. This heat exchanger is in series and ahead of the previously installed steam-fed heat exchanger. Pool water heating continues until space heating demand occurs or the pool water temperature increases beyond the pool water control set point temperature. If the pool water is heated beyond its control temperature, flow is then directed toward domestic water heating.

During the operation of domestic water heating, incoming water is preheated by the system heat exchanger before entering the domestic hot water storage tank. The water heating control valve has an automatic position which will modulate the water temperature from the exchanger around a predetermined 140°F set point. An additional automatic function prevents glycol from flowing through the heat exchanger when the glycol temperature is less than the incoming domestic water temperature and also if it is below the freezing point of water. When there is insufficient solar heat, a conventional steam heat exchanger will supply the additional heat required in the domestic hot water storage tanks.

Low and intermittent demand of domestic hot water during off heating season could result in excessive operational temperatures. A circulation loop is then initiated for continuous heat addition to the domestic hot water storage tank. It is independent of the collector operational mode and can be used to transfer surplus heat from the system's storage tank. If the collector outlet exceeds 220°F, a controller will automatically route fluid to the domestic water heat exchanger. A control valve, V9, will modulate the domestic water flow rate through the heat exchanger to maintain the outlet temperature at the prescribed set point. This heated water is directed to the swimming pool filter tank.

SECTION VI
SYSTEM PERFORMANCE

OPERATIONAL AND SYSTEM ANALYSIS

The performance of the solar heating system was determined by two types of analysis. In the first consideration, primary attention was given to the conditions of the various system elements in determining the corresponding operational mode. This experimental evaluation required the manual selection and testing of each of the following possible modes:

- Fresh air heating from collector
- Fresh air heating from storage
- Fresh air and mixed air heating from collector
- Domestic water heating from collector
- Pool water heating from collector
- Storage charging
- Domestic water heating from storage
- Pool water heating from storage
- Storage charging and domestic water heating from collector
- Storage charging and pool water heating from collector
- Domestic water heating from storage with a recirculating loop

In the second consideration, observations made during these tests yielded insights into the operation and performance of individual components and helped evaluate the total system. Also, based on this experimental data, additional adjustments were made, such as varying the flow rates to assure a satisfactory

operation of the components and optimize their heating effectiveness. By carefully monitoring the system's response to various thermostatic settings, additional changes and improvements were noted for future modifications to ensure an optimal match between the school heating demand and the mode of operation.

Results of these preliminary performance tests showed the following:

1) Operator-selection of heating modes is adequate for specialized testing but not adequate for maximizing the amount of energy distributed to the school. For example, if collector to air heating is sufficient for early morning hours the operator cannot adequately determine when such an operation should cease and another begin due to steadily increasing solar radiation along with a decreasing heat load.

2) Coupling storage charging with space heating resulted in a smooth and steady operation but this was offset by the longer periods required to shut off the school conventional heating system.

3) The domestic water heat exchanger capabilities were not being maximized because of intermittent domestic hot water demand. Hence, going to a domestic water heating mode would not provide an adequate load for the system during low-usage periods.

4) For an ambient temperature of 70°F with high incident radiation, the system's load was not sufficient, except for random periods of domestic water use.

Varying heat demands from space and domestic water necessitated updating the system. Installing the pool water heat exchanger and domestic water

recirculating loop provided the needed matching load. The automatic control system was also modified to heat areas on a priority basis. Hence, space heating is first. If this is satisfied, then pool water is heated and finally domestic water is heated. The control system was not designed to be operated on a two- or three-mode simultaneous operation, but all control valves necessary for this operation are installed.

After these changes and improvements were made complete data on day-to-day system performance was compiled and analyzed to determine the effects of system variables on the performance of the combined solar collector and storage unit when subjected to various climatic and operational conditions. Operation of the system in the various modes showed that no single mode could provide a load large enough to permit operating the collectors at the most efficient temperature range over the operating period, except for a few exceptionally cold days. Seasonal as well as daily variations in load and insolation necessitated the use of the automatic control in limiting the use of domestic and pool water heating during winter months. For example, during the winter season the load was sufficiently large so that only space and some pool water heating was utilized and very little use was made of storage or domestic water heating. During the spring, summer and fall, the predominant use was for water heating.

Space heating provided the dominant load for the solar system. Heating ventilation air proved to be the best matching load since energy could be added as long as the fluid temperature from the collectors was above ambient. This enabled the operation to start earlier, last longer into the daylight hours, and permit operations during partly cloudy and overcast days.

SYSTEM PERFORMANCE CURVE

Under steady-state conditions, the useful heat output of a solar collector represents the difference between the solar radiation absorbed in the collector and the outward heat losses that occur because the collector is hotter than the surroundings:

$$\frac{Q_u}{A_c} = H\tau_e\alpha - U_1 (T_{c,\,av} - T_a)$$

Hottel and Whillier showed that this equation could be rewritten in terms of the average water temperature in the collector, or, more importantly, in terms of the entering water temperature. This resulted in a simple formulation of collector performance:

$$Q_u = A_c F_r [H\tau_e\alpha - U_1 (T_{fi} - T_a)]$$

where Q_u is the useful energy from the collector, A_c is the collector area, F_r is a collector efficiency factor accounting for the fact that not all of the plate is at the entering fluid temperature T_{fi}, and is a function of collector geometry and fluid flow rate. H is the insolation rate in the plane of the collector, τ_e is the effective transmittance of the collector covers, α is the absorptivity of the plate, U_1 is a linearized overall loss coefficient, and T_a is the ambient air temperature.

Figure 6-1 shows a performance curve experimentally determined during the test period. This is a curve for the collector array performance and includes all piping losses to and from the building, as well as collector and header connection heat losses. The curve shows that for air conditioning at a fluid inlet temperature of 200°F and ambient of 90°F with incident flux of 200 Btu/ft^2/hr, the efficiency is about 20 percent. For fresh air heating when the difference between the fluid inlet and ambient is 50 deg (that is with fluid inlet at 100°F

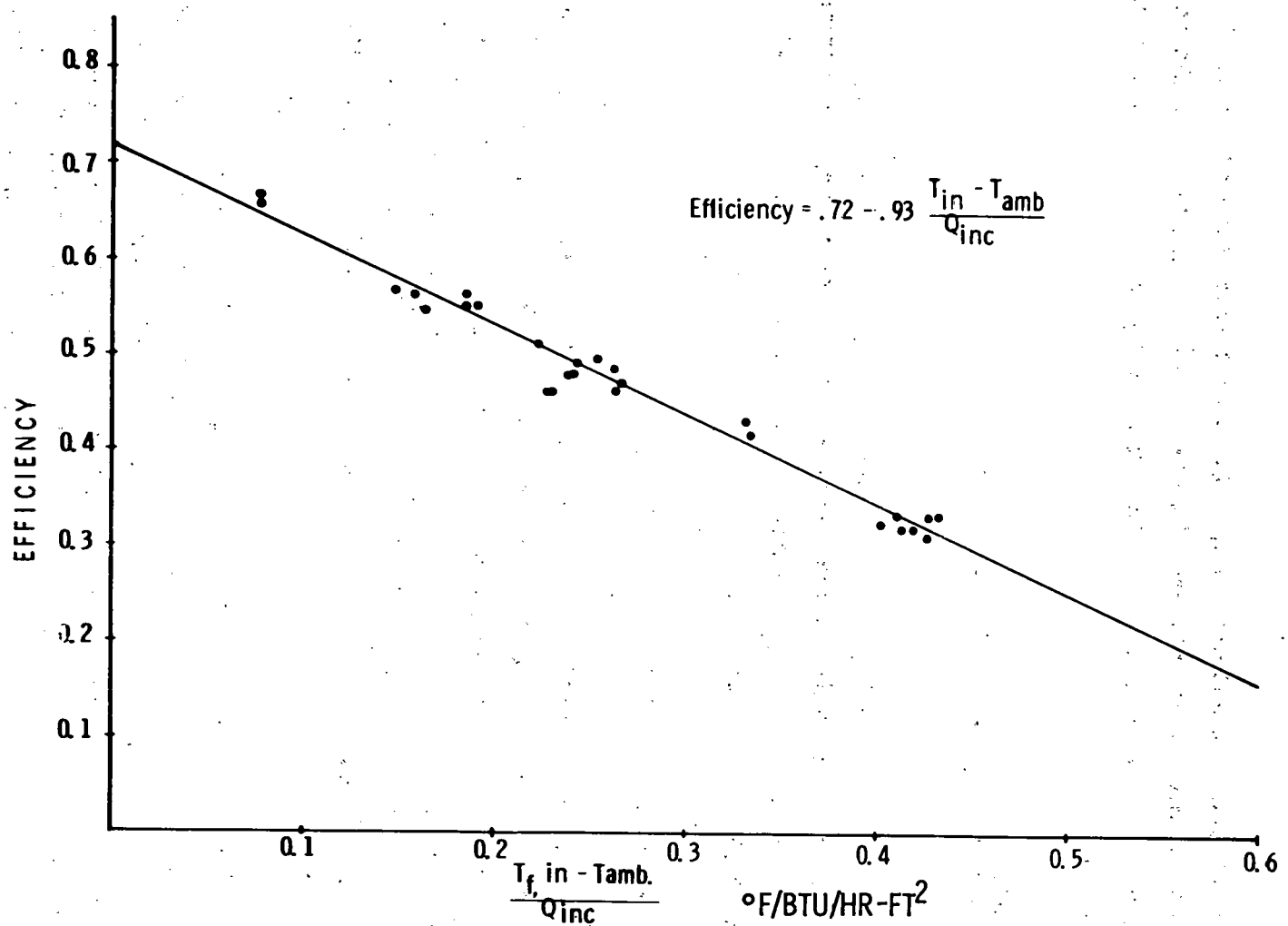


Figure 6-1. System Performance Curve

and a 50°F ambient, and the incident is 200 Btu/ft^2/hr) then the efficiency is around 48 percent. This is typical of many efficiencies obtained during the early morning hours of the winter months.

The main heat losses in the system are the collector modules due to the condition of the insulation both on the back of the absorber panel and around the edges, particularly the top edges. This insulation has settled and compacted some on the backs and insufficient quantities were placed around the edges.

ENERGY AVAILABLE, COLLECTED AND USAGE

The results of the heating system performance during the testing period (May 1974 - May 1975) were based on the analysis of the following three cycles of system operation:

- Space heating (fresh and/or return air)
- Pool water heating
- Domestic water heating

Each of these modes can be supplied from the solar collectors or from storage. The most frequent mode of operation was from the collectors directly to the various system loads by passing the storage tank. If storage charging were used along with one of the operating modes, such as space heating, the accumulated energy was discharged during the night-time or early morning hours and is included in the corresponding cycle rather than strictly storage charging.

Evaluation of solar system involves determining its output on a monthly or seasonal basis. Figure 6-2 is a plot of the total energy in Btu/ft^2 from June 1974 to April 1975 on a monthly basis and includes total incident energy from sunrise to sunset, total incident energy during collection hours and total collected energy.

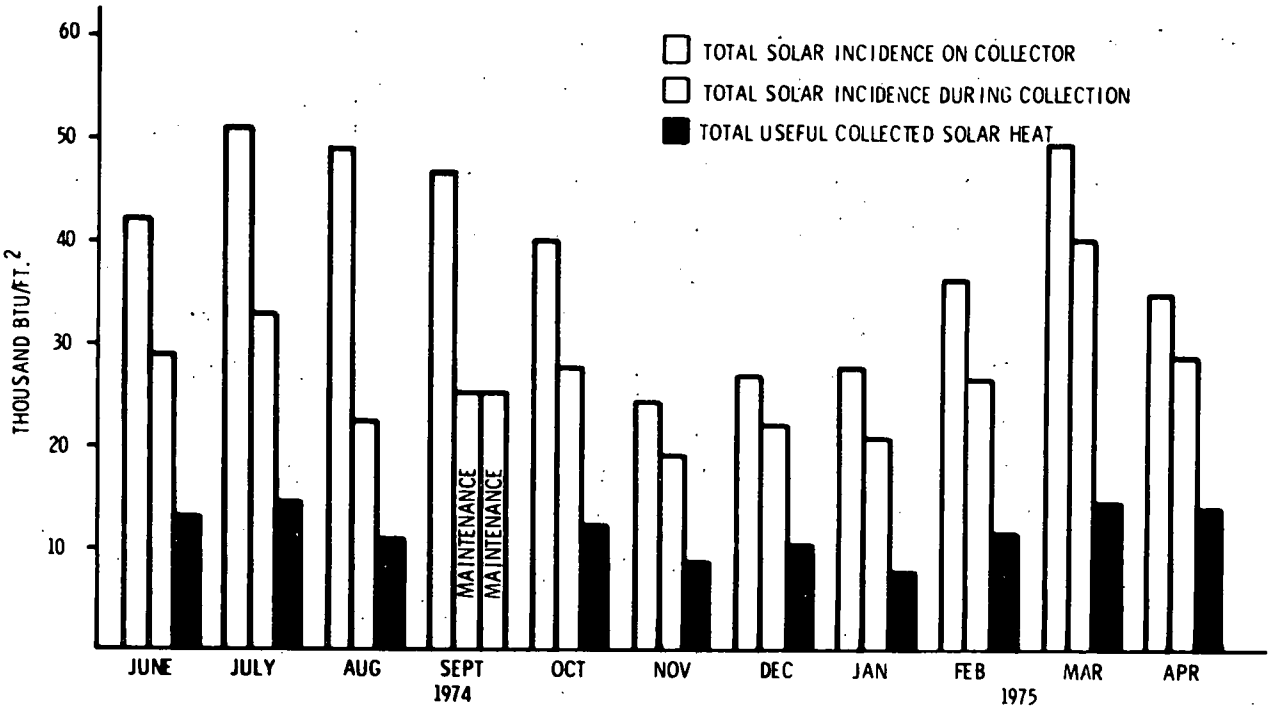


Figure 6-2. Yearly Total Energy Available and Collected

Table 6-1 lists the values shown in the plots as well as the computed efficiencies based on sunrise-to-sunset radiation. Net collector efficiencies were also computed based on the incident radiation during operational periods. All calculations were based on integrated rather than instantaneous values for a total surface area of 5000 square feet. However, prior to October 1974, the actual number of square feet of collectors that were operational varied due to the previously mentioned leakage problem. Appropriate adjustments for the area and the flow rates were made and the corresponding efficiencies are valid. On the other hand, no corrections were attempted for the month of January to account for the snow covered area, hence the drop in efficiency during January.

Table 6-1. Energy and Efficiency Values by Month

Month	Integrated Energy Btu/Ft^2			Efficiency (%)		Comments
	Incident Sunrise to Sunset	Incident Collection Hours	Collected	Sunrise to Sunset	During Collection Hours	
May 1974		10,733	4,607	---	43	May 16 to May 31
June	32,796	28,765	12,905	39	45	
July	50,975	32,765	14,342	28	44	
Aug.	48,874	11,191	5,396	11	48	2500 ft^2 shut down
Sept.	46,545	---	---	0	---	Maintenance shut down
Oct.	40,060	27,394	12,289	31	45	
Nov.	24,236	18,181	8,331	34	46	
Dec.	26,864	22,010	10,047	37	46	
Jan. 1975	27,442	20,776	7,079	26	34	Partially snow covered collectors
Feb.	35,938	26,033	10,921	30	42	
Mar.	49,079	39,859	18,254	37	46	
Apr.	34,612	28,274	13,474	39	48	
May	25,275	20,647	8,130	32	39	May 1 to May 16

Appraisal of the system performance on a yearly basis can be summarized as follows:

- Total incident radiation on operational collectors for the 11 months period (excluding the month of September 1974): 1,433,000,000 Btu.
- Total collected energy for this same period: 629,000,000 Btu.
- Average efficiency: 44 percent.

A consumption breakdown on the solar energy supplied to the school on a monthly basis for each of the three operational cycles is shown in Table 6-2. As can be seen, the use of domestic water heating is nonexistent during the winter months, but represents more than 50 percent of the load during the

Table 6-2. Solar Energy Usage

	Percent Space Heating	Percent Pool Water Heating	Percent Domestic Water Heating
May 1974	18	41	41
June	3	40	57
July	0	40	60
August	19	21	60
September	---	---	---
October	63	20	17
November	84	16	0
December	93	7	0
January 1975	73	27	0
February	85	15	0
March	74	26	0
April	82	10	8
May	36	40	24

summer months. Figure 6-3 is an overall energy breakdown for the testing period. This is not indicative of the school's overall energy consumption and should be interpreted only as an attempt at the best match between the solar system output and the load on a seasonal scale.

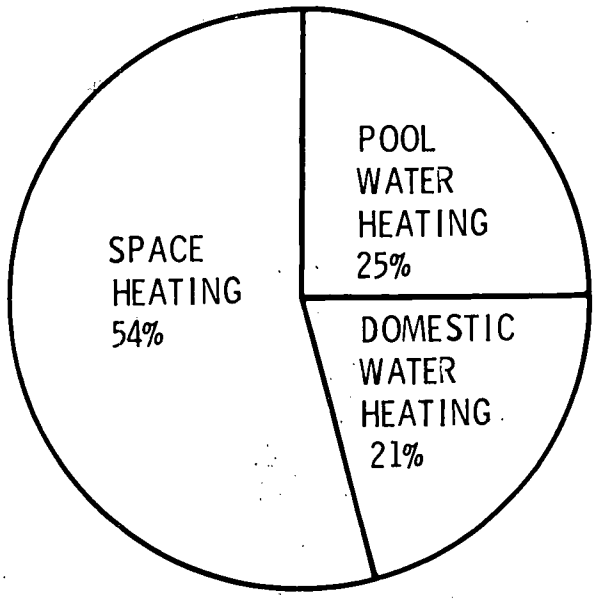


Figure 6-3. Yearly Solar Energy Usage

RADIATION DATA

Solar radiation was compiled on a daily basis using a Kipp and Zonen pyranometer mounted in the plane of the collectors. The instantaneous radiation values were recorded on a Leeds and Northrop recorder with an integrator option. Integrated values of the radiation are obtained by counting the number of traverses recorded by the integrator during a specified period multiplied by a calibration constant. Appendix A contains the instantaneous values on a daily basis as well as bar graphs showing the total daily radiation during hours of operation for each month.

Comparisons of predicted and actual recorded sunrise-to-sunset radiation values were made with the calculation following the procedures outlined in the ASHRAE Handbook of Fundamentals for a surface inclined at an angle of 55 deg from the horizontal for a latitude of 45 deg. Figure 6-4 shows the results on a monthly scale. The upper-most curve is the ASHRAE values for a clear sky, often referred to as the maximum possible radiation. These values were then reduced by a cloud cover modifier used with a weather tape from the U.S. Weather Bureau to give the predicted monthly values. This tape was for the year 1956 and is considered to be a typical year. The curve plotted with plate points is the actual sunrise-to-sunset integrated values

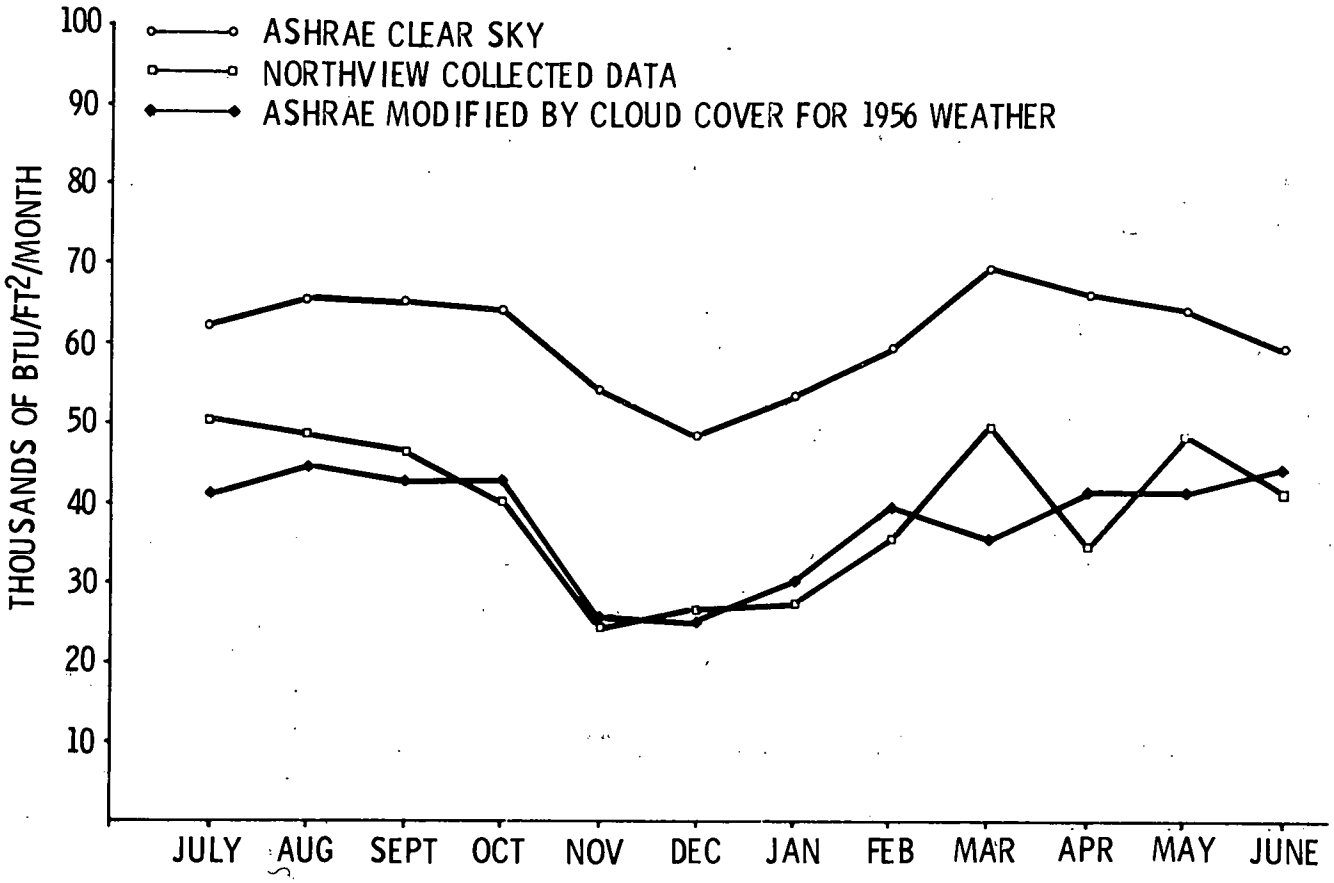


Figure 6-4. Minneapolis Radiation Data

obtained at the solar system site. Integrated values for May 1974 were not available due to a delay in recorder delivery. Some deviations exist, but the correlations during the winter months are very good.

Various methods of obtaining radiation data are available. One such method is to use the sunshine data given in the Local Climatological Data sheets from the National Climatic Center, Ashville, North Carolina 28801. For the Minneapolis area, the data was correlated with the recorded values from the solar site. The solar site data was normalized by the maximum amount of insolation possible for a given day. This was then expressed as a percent of possible insolation from sunrise to sunset. The climatological data is also expressed as a percent of possible sunshine, thus the data can be plotted for possible correlations. Daily variations are sometimes quite large due primarily to the recording of both direct and diffuse radiation at the school site in the plane of the collectors. This cannot be seen on those days where the sunshine data is close to zero. Calculations of monthly values show less than an average 10 percent variation between recorded and climatological data. It appears that the use of the ASHRAE calculations in conjunction with sunshine data for a typical year could yield a first approximation to the amount of sunshine available on a monthly basis for this location. Appendix A contains the monthly plots of recorded and sunshine data.

Figure 6-5 is a plot of a clear day's recorded values of insolation in the plane of the collectors (solid line) and calculated values from the ASHRAE guidelines (dashed line). The measured values are 4 percent less than predicted. Figure 6-6 is a plot of a day in April following an overnight snowfall of several inches. The measured values show a 20 percent increase over the calculated value. The amount of radiation is significantly higher with a reflective snow cover. This was noticed periodically throughout the winter season.

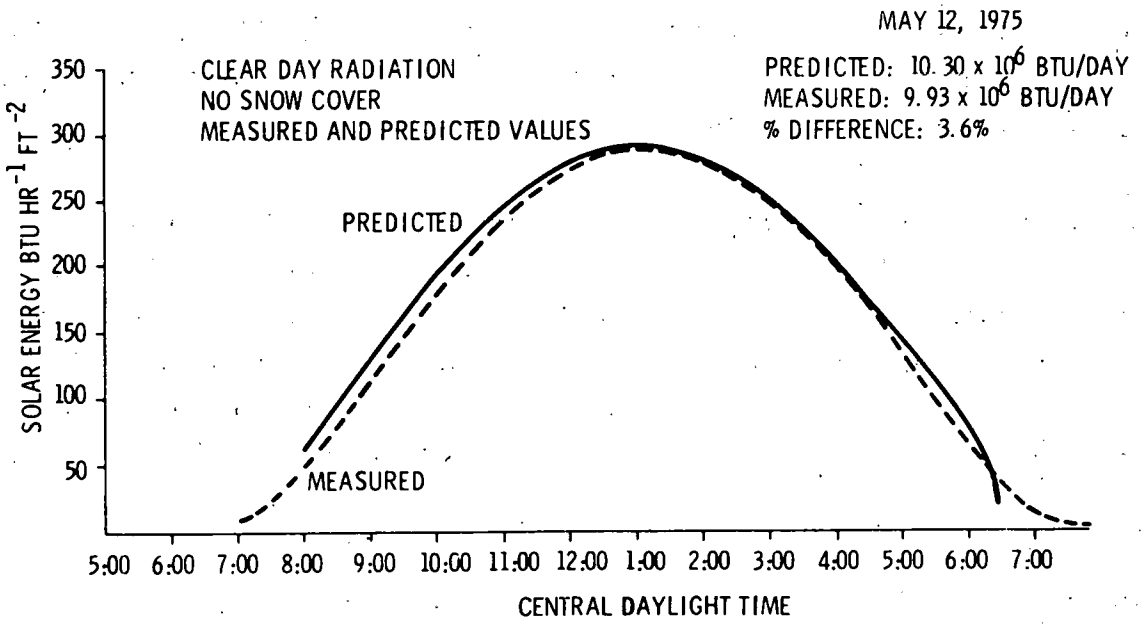


Figure 6-5. Predicted and Actual Radiation (no snow cover)

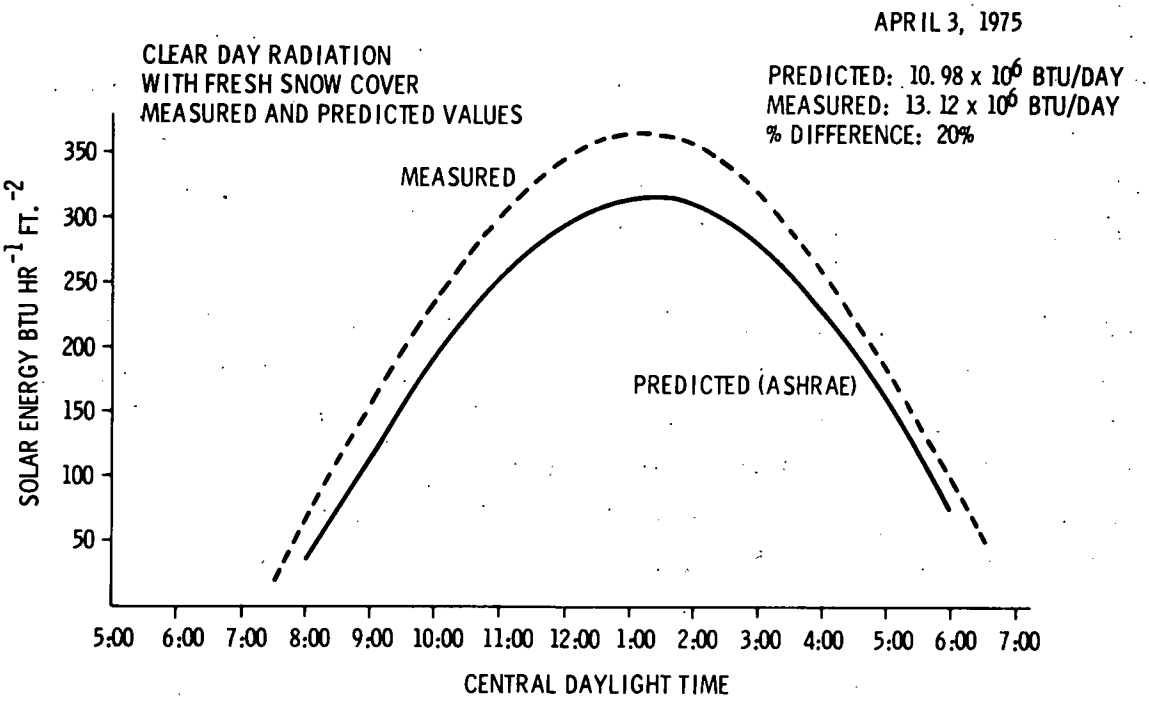


Figure 6-6. Predicted and Actual Radiation (with snow cover)

SPACE HEATING

As previously mentioned in Figure 6-3, about 54 percent of the collected energy was used for space heating. During the winter months, space heating provided the largest load and is a function of the ambient temperature and the amount of ventilation air used in space conditioning and would be the only load for some winter days. On warmer days, or those days when there was good solar collection, the space would be satisfied and the system would automatically switch from space heating to pool water heating. There are several graphs in Appendix A which show the results of space and domestic water heating. Figures 6-7 and 6-8 are the results of space heating only for 23 December 1974. Figure 6-7 shows the amount of solar and auxiliary heat supplied as well as the cumulative total for the day. Figure 6-8 illustrates the percentage of load supplied by solar as a function of time. Solar was supplying 100 percent of the load between 11:30 a.m. and 3:30 p.m. on this day. Figures 6-9 and 6-10 show collector inlet, outlet, and ambient temperatures, and the incident energy, collected energy and the system's efficiency.

The amount of ventilation air on this particular day was 92 percent. From 9:30 a.m. to 4:30 p.m., 4,820,931 Btu were needed to maintain the space at 80°F for an average outdoor temperature of 24°F. This is equivalent to 642,790 Btu/hr and would have required an average of 131.18 Btu/hr-ft^2 of solar collection. Obviously, if the amount of ventilation air is reduced, the load would also be reduced. Analysis has shown that, for this space, 78 percent of the heat required is due to ventilation losses. The maximum collector outlet temperature required for the operation was 125°F, resulting in an efficient operation of the system and illustrating the large amount of energy which can be extracted from the solar system with the above ambient temperatures, such as shown in the figures. The increase in efficiency toward the end of operation is mainly due to the extraction of the heat stored in the thermal mass of the collectors.

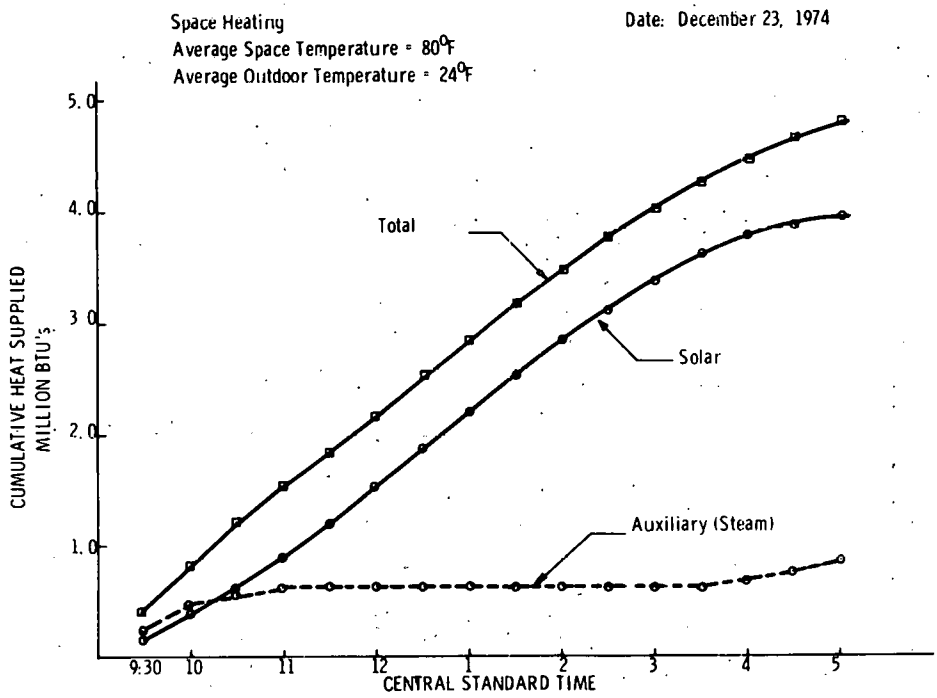


Figure 6-7. Space Heating - Cumulative Btu's

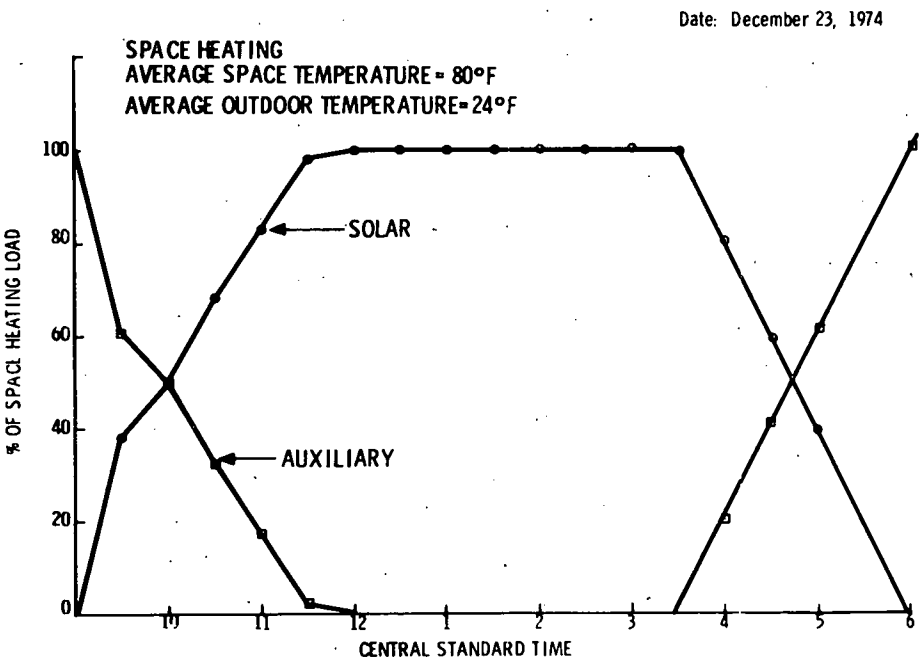


Figure 6-8. Percent Space Heating Load

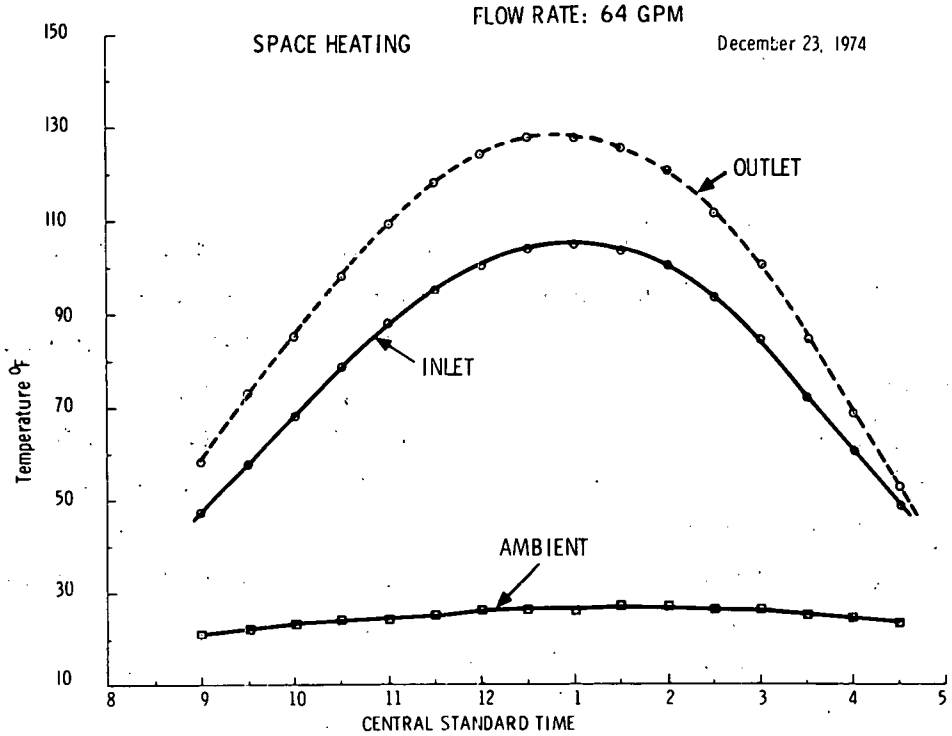


Figure 6-9. Collector Inlet, Outlet, Ambient Temperature for Space Heating

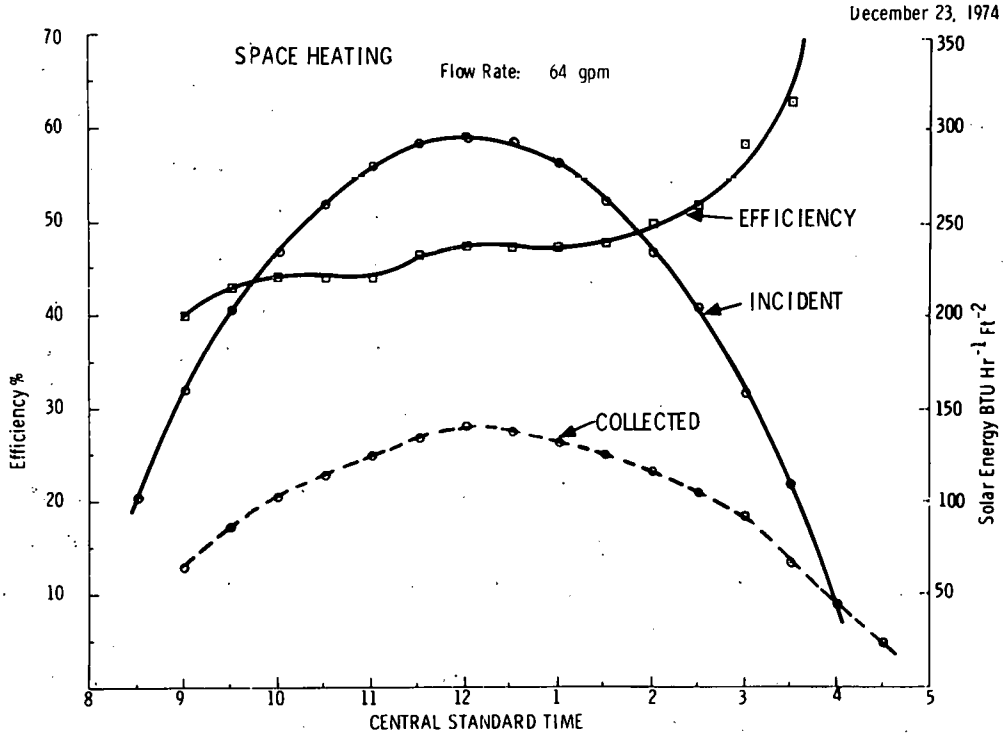


Figure 6-10. Energy and Efficiency for Space Heating

STORAGE OPERATION

Charging

Storage tank charging was normally in conjunction with some operating mode. During the winter, the load was usually large enough so that all collected energy could be used, therefore, very little storage charging was done during these months. However, during the fall, spring, and summer periods, storage charging was done in series with any of the operating modes. Figures 6-11 and 6-12 illustrate simple storage charging. Figure 6-11 shows incident and collected energy as well as the efficiency. Figure 6-12 shows the inlet, outlet and ambient temperatures. The average storage tank temperature closely follows the inlet temperature at the beginning of the operation, but remains closer to the average between the inlet and outlet temperatures for the remaining of the operation. This is due to the small volume of the tank relative to the collectors area. The 3000-gallon tank was raised from 133°F to 208°F during the collection period adding 1,775,000 Btu to the capacity of the tank.

The integrated amount of energy collected was calculated at 2,630,000 Btu, resulting in system losses of 875,000 Btu. Of the total losses, 350,000 of the Btus can be accounted for in piping and transport fluid thermal capacity. The remaining losses are heat losses from the storage tank and system piping, all well insulated with two inches of fiberglass. The wisdom of bypassing the storage tank and using the energy directly is apparent when the losses from the tank are a significant amount of the energy available.

The disadvantages of the storage-charging operation are evident from the plot of the energy collected. Because of the small tank volume, a rapid drop in system efficiency occurs in the early afternoon due to high operational temperatures. This also forced the operation to cease by 4:00 p.m., while the incident radiation is still significant (200 Btu/hr-ft^2). Also a large irrecoverable amount of energy was left stored in the plates in addition to the uncollected incident energy on the collectors between 4:00 to 6:00 p.m.

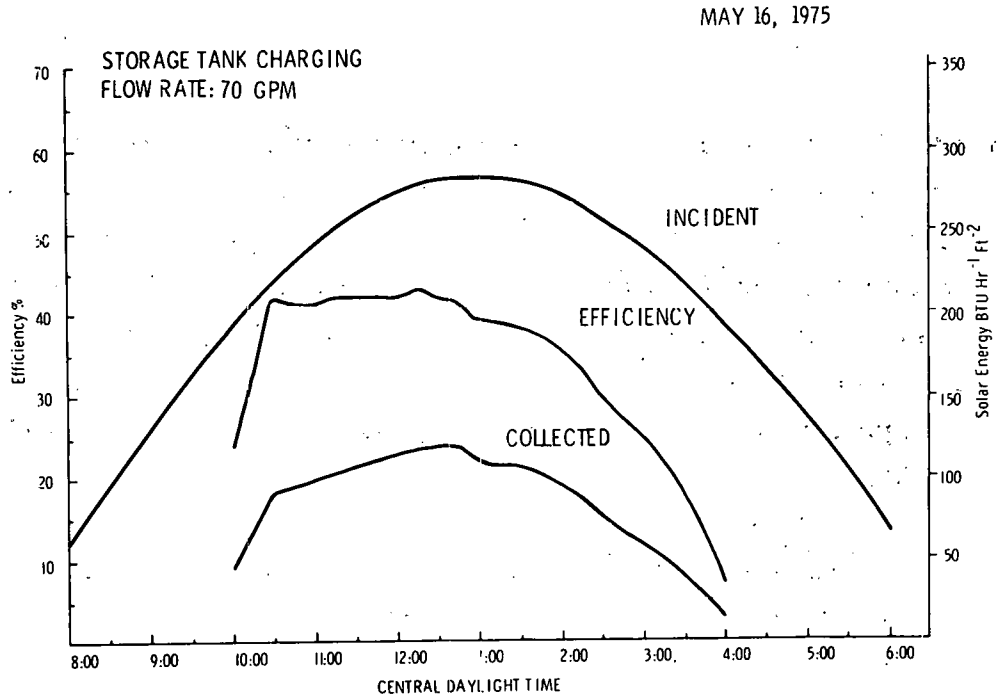


Figure 6-11. Energy and Efficiency for Storage Charging

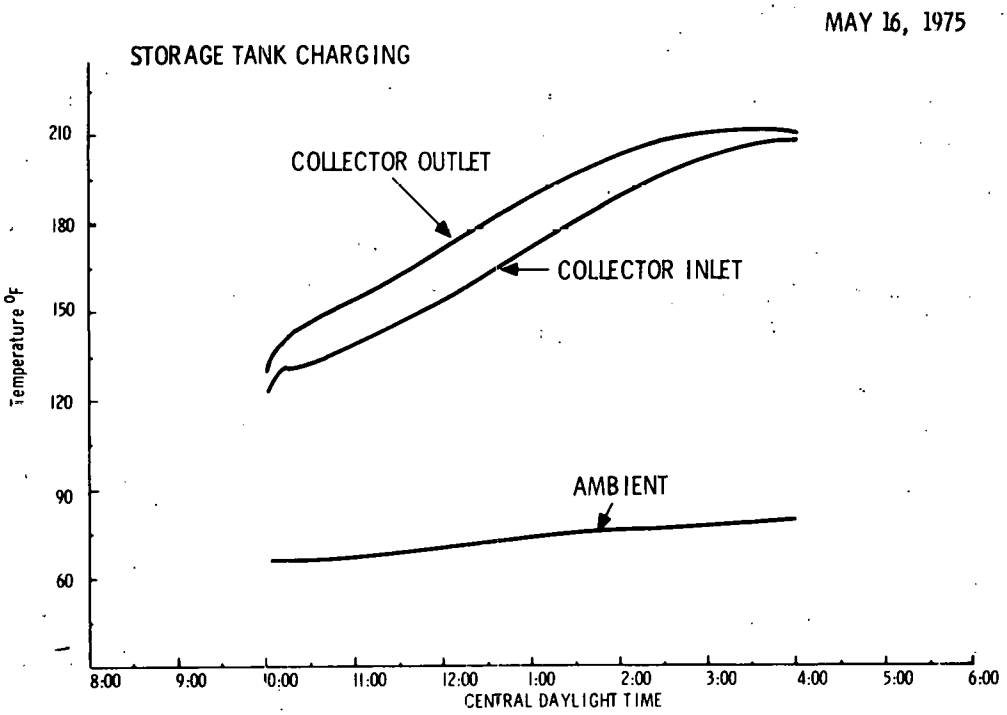


Figure 6-12. Collector Inlet, Outlet and Ambient Temperature for Storage Charging

Discharging

Figure 6-13 shows the storage tank discharge and return temperature for discharging the storage tank to the pool water heat exchanger. The flow of pool water was about 38 gpm, while the flow from the storage tank was 70 gpm. The pool water inlet temperature to the heat exchanger was about 80 deg. The curves show a large temperature difference initially, but this difference is quite small as the tank temperature approaches the pool water inlet temperature. It appears that a difference in approach temperature of about 20°F for the heat exchanger is necessary to effect any worthwhile transfer of heat. Over 50 percent of the discharged storage tank's energy was used during the first four hours, while the other 50 percent took an additional ten hours. Similar results were obtained from storage tank discharging to fresh air heating.

DOMESTIC WATER HEATING

The data presented in Figures 6-14 through 6-16 are typical of domestic water heating modes. To prevent excessive collector outlet temperatures and to provide for a more efficient operation, domestic water heating from the collectors is done in series with storage tank charging. The storage tank can then act as a buffer load for the domestic water load. The figures show that the system supplied the school with incoming domestic water at a minimum of 100°F between 10:00 a.m. and 1:00 p.m. The storage tank temperature increased from 110°F to 158°F during the day. This stored energy was generally used during evening hours for space or pool water heating.

Preheating domestic water on partly cloudy days such as shown here is quite feasible when coupled with a storage tank. But is is recommended that the recirculating system be used during the summer months when domestic water heating becomes a major load.

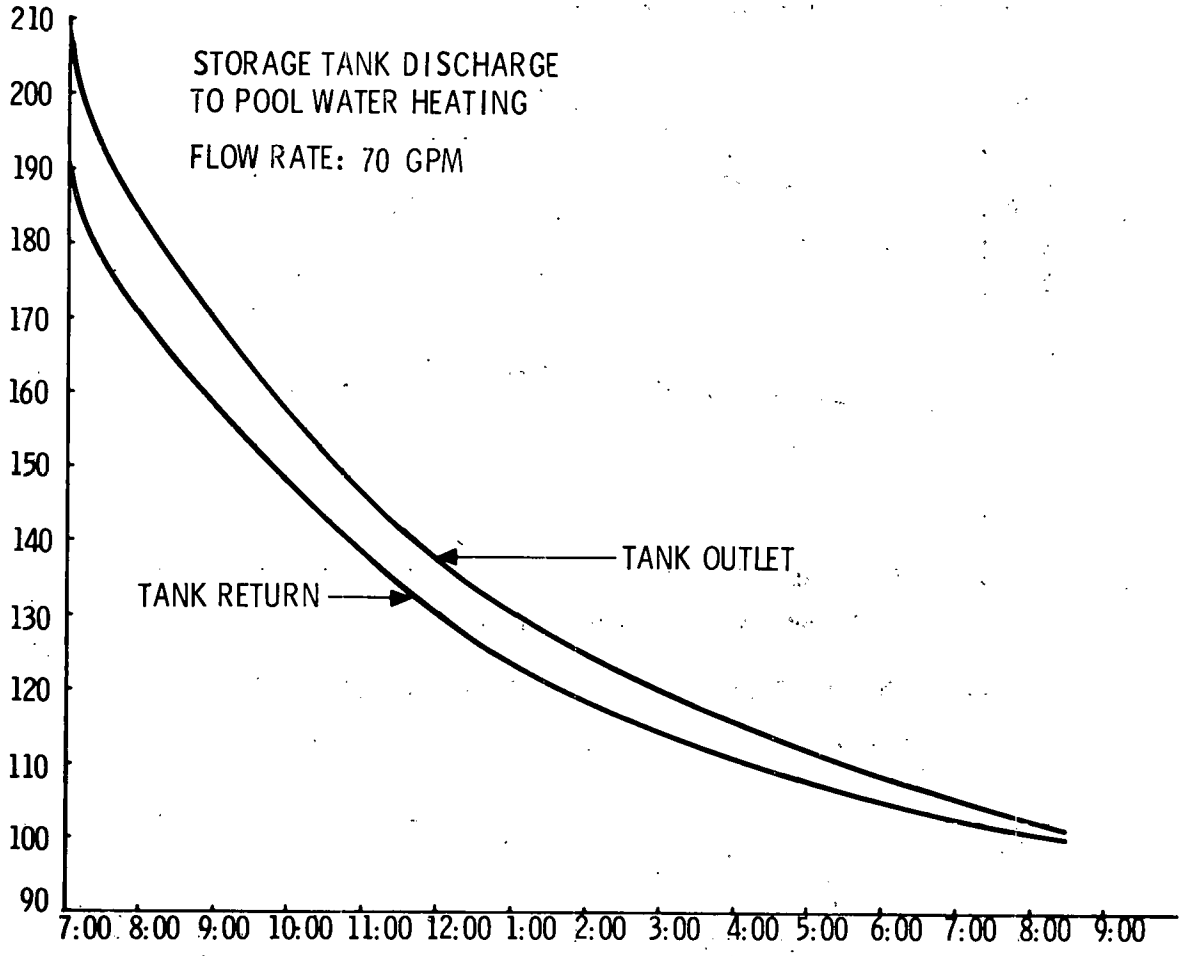


Figure 6-13. Storage Tank Discharge Temperature

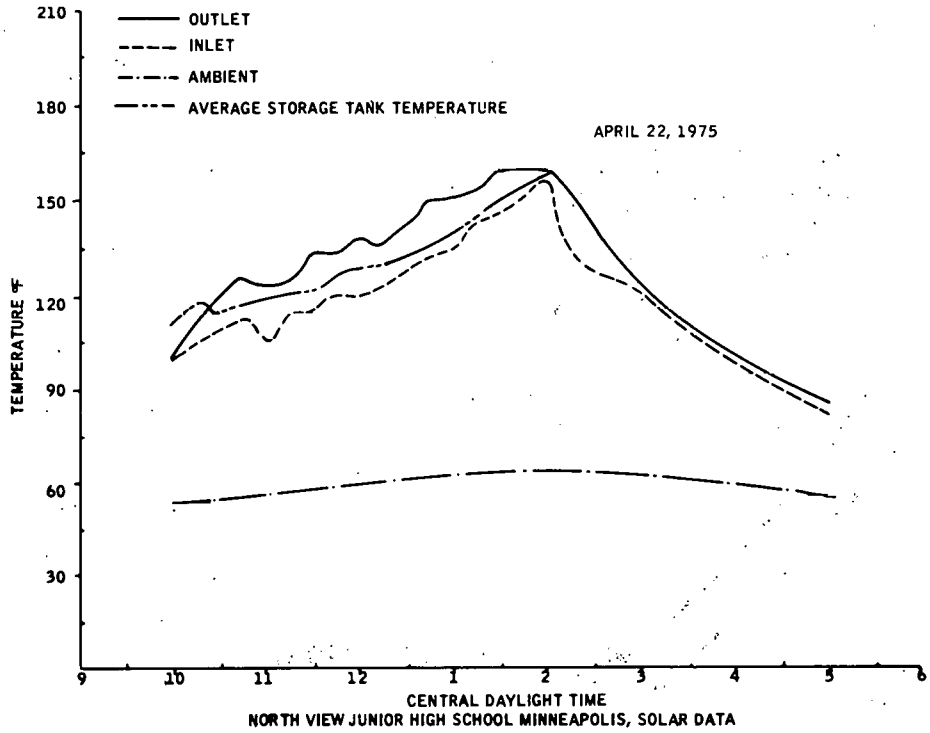


Figure 6-14. Domestic Water Heating: Chart 1

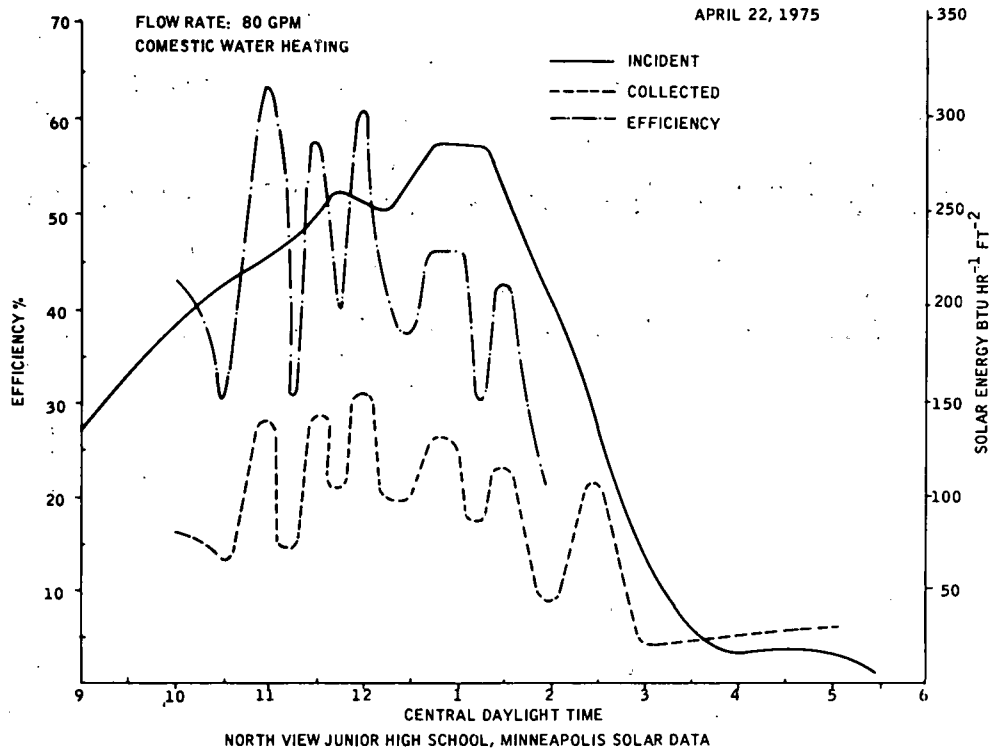


Figure 6-15. Domestic Water Heating: Chart 2

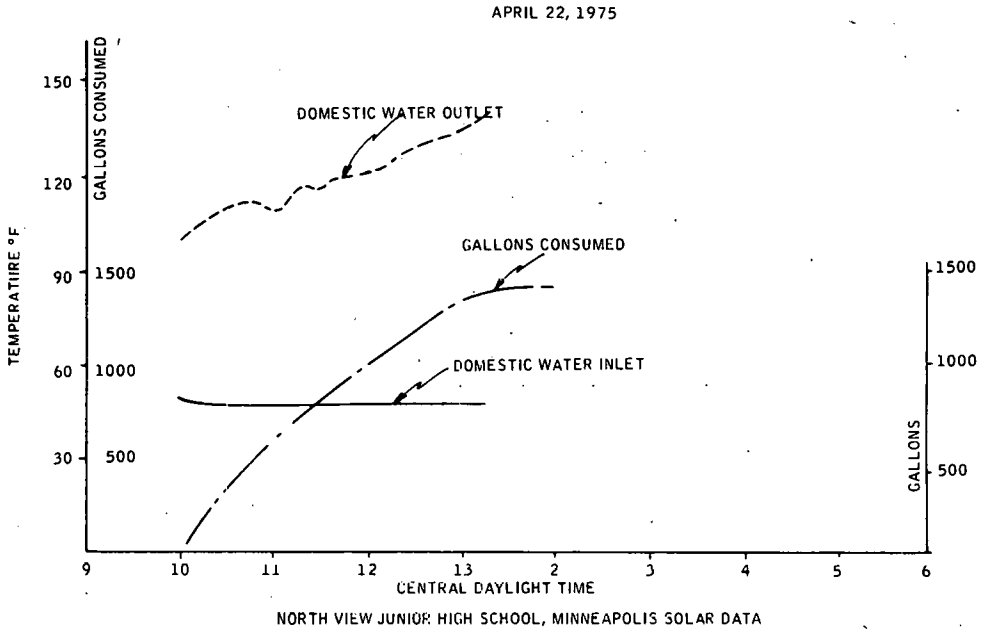


Figure 6-16. Domestic Water Heating: Chart 3

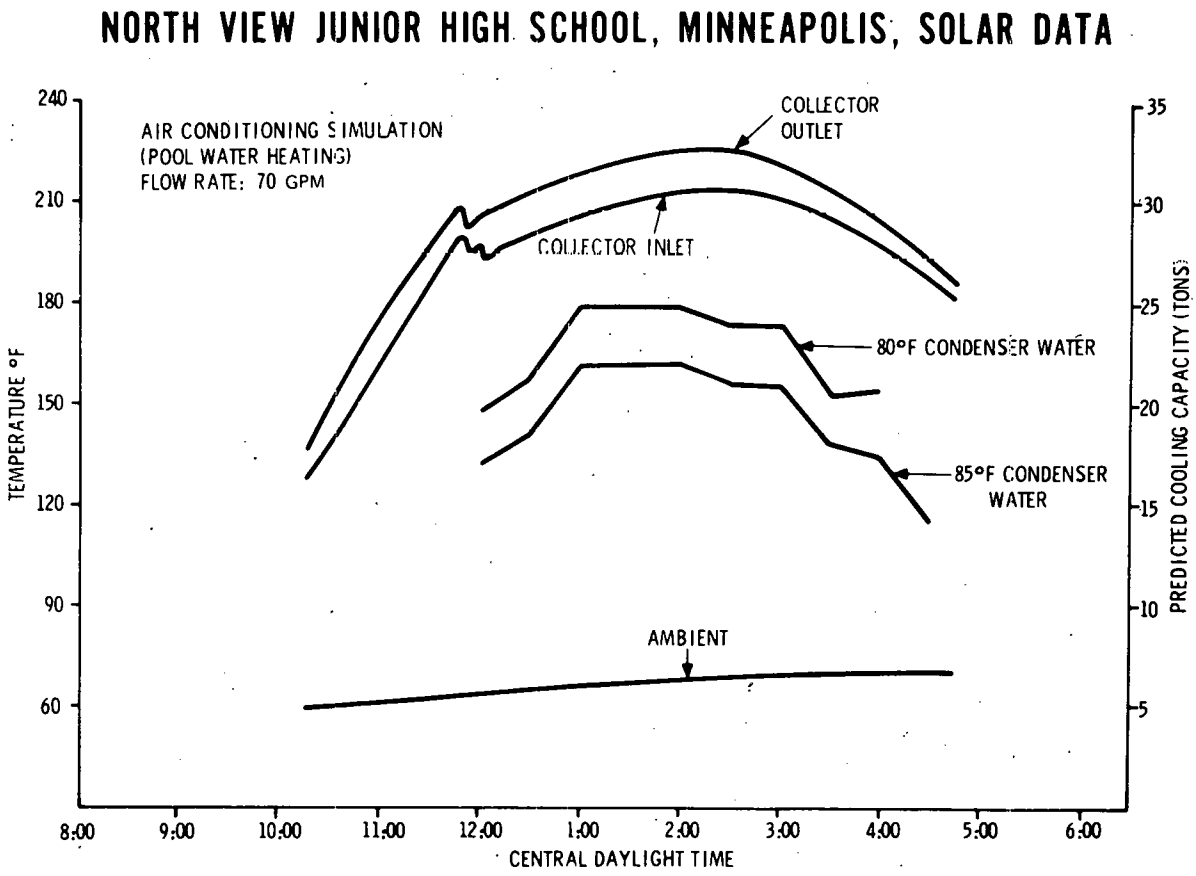


Figure 6-17. Pool Water Heating and Air Conditioning Simulation

POOL WATER HEATING FROM COLLECTORS AND AIR CONDITIONING SIMULATION

On May 12, the system was operated to obtain data on an air conditioning simulation by using the pool water heat exchanger as a simulated air conditioning load. This enabled data to be acquired at the higher operating temperatures necessary for absorption air conditioning operation as well as provide data on pool water heating at elevated temperatures.

The system was set to start the pump when the absorber plates reached 200°F. The system was set to bypass all loads and simply circulate until start-stop cycling had ceased and the outlet had stabilized at about 210°F. Figure 6-17 shows the inlet and outlet temperatures from start up until about 11:50 a.m. Total incident energy from sunrise to 10:15 a.m. was 1,875,000 Btu and from 10:15 a.m. to 11:50 a.m. the incident energy was 2,019,584 Btu. Thus, from sunrise to 11:50 a.m. it took a total of 3,894,584 Btu of incident energy to reach the 210°F operating temperature at a flow rate of 70 gpm.

At 11:50 a.m. the system was switched to the load and a corresponding drop in collector inlet temperature is seen from Figure 6-17. It took another 18 minutes before the outlet reached the initial 210°F. This was due to the heat capacity of the fluid and piping to the pool heat exchanger.

For a solar absorption unit of the type used in estimating the cooling capacity of the solar system to operate, it must have a minimum inlet temperature of at least 190°F at a flow rate of 70 gpm. With the solar system flow rate at 70 gpm and a collector outlet of 206°F, the simulation could be initiated by 12:00 a.m.

Table 6-3 shows the cooling rates for the period from 12:00 to 4:00 p.m. for two different condenser inlet temperatures. Figure 6-17 shows the curves for the cooling capacities. The actual temperature difference across the heat

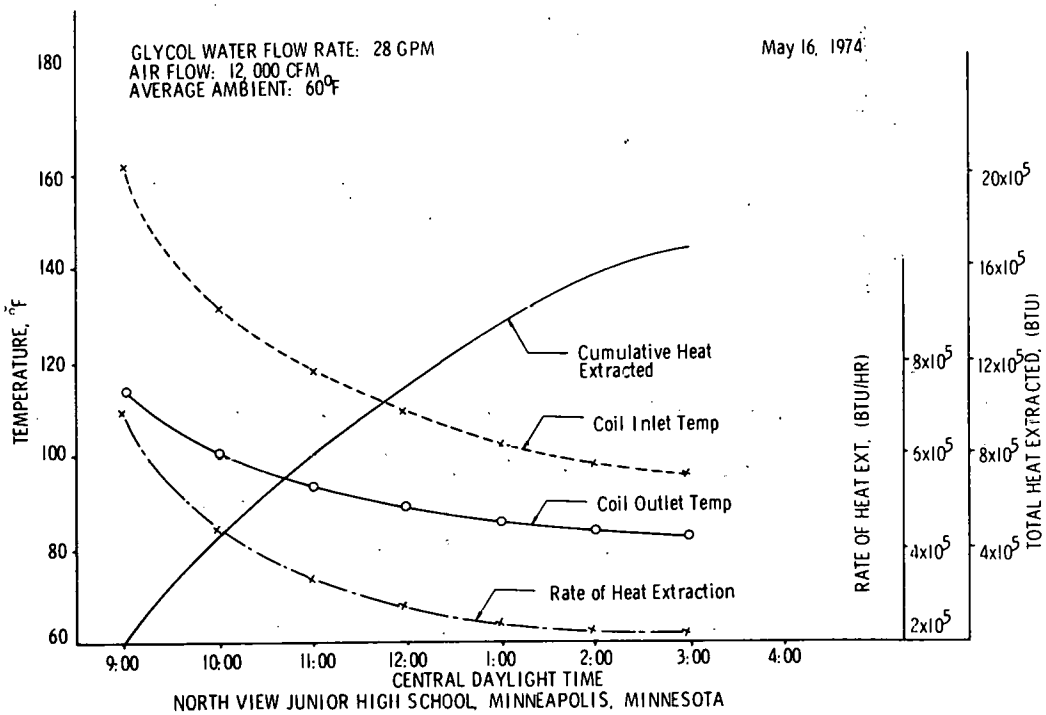
Table 6-3. Cooling Rates for Two Different Condenser Outlet Temperatures

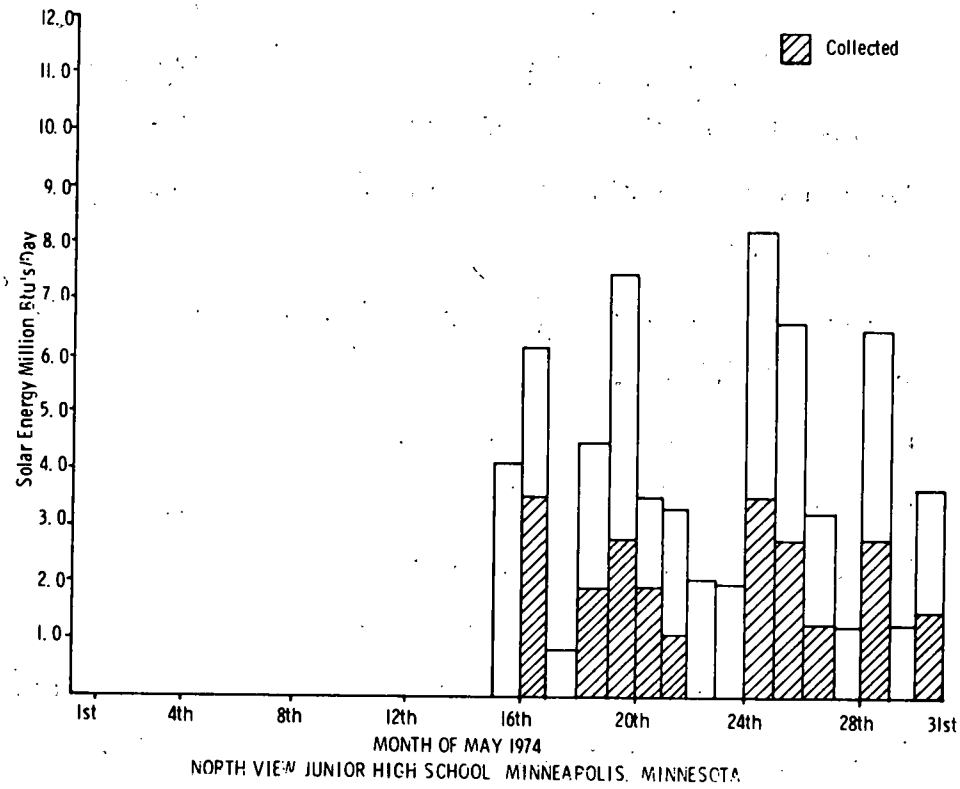
Flow Rate: 72 gpm					May 12, 1975	
Time	T_{in} °F	T_{out} °F	ΔT	Input/Btuh	Cooling Capacity (Tons) (1)	(2)
12:00	206.5	196.00	10.5	352,000	17.14	19.73
12:30	213.5	202.00	11.5	385,000	18.6	21.26
1:00	218.5	206.5	12.00	402,000	22.06	25.00
1:30	222.5	210.5	12.00	402,000	22.0	25.00
2:00	224.00	212.00	12.00	402,000	22.0	25.00
2:30	222.00	210.5	11.5	385,500	21.15	24.00
3:00	218.00	206.50	11.5	385,500	21.15	24.00
3:30	210.00	199.00	11.00	368,500	18.02	20.46
4:00	190.00	200.00	10.00	335,000	17.54	20.80
4:30	190.00	182.00	8:00	268,000	14.00	NA

45°F = Delivered chilled water

(1) Based on 85°F Condenser Water Inlet

(2) Based on 80°F Condenser Water Inlet


GLYCOL WATER FLOW RATE: 28 GPM
AIR FLOW: 12,000 CFM
AVERAGE AMBIENT: 60°F
May 16, 1974
TEMPERATURE, °F
180
160
140
120
100
80
60
Cumulative Heat Extracted
Coil Inlet Temp
Coil Outlet Temp
Rate of Heat Extraction
RATE OF HEAT EXT. (BTU/HR)
8x10^5
5x10^5
4x10^5
2x10^5
TOTAL HEAT EXTRACTED, (BTU)
20x10^5
16x10^5
12x10^5
8x10^5
4x10^5
9:00
10:00
11:00
12:00
1:00
2:00
3:00
4:00
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, MINNESOTA


Collected
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
Solar Energy Million Btu's/Day
1st
4th
8th
12th
16th
20th
24th
28th
31st
MONTH OF MAY 1974
NORTH VIEW JUNIOR HIGH SCHOOL MINNEAPOLIS, MINNESOTA

North View Junior High

Month of May 1974

Date	Mode of Operation	Eff. = $\frac{Q_{collected}}{Q_{incident}}$
May 16	Cloudy, Air Heating from Storage	----
May 17	Air and Water Heating from Collector	56%
May 18	Weekend, Cloudy	----
May 19	Weekend, Water Heating from Collector	41%(estimated)
May 20	Storage from Collector	39%
May 21	Pool Water Heating from Collector	52%
May 22	Storage from Collector	34%
May 23	Cloudy, Water Heating from Storage	----
May 24	Cloudy, Chart Recorder Calibration	----
May 25	Weekend, Storage from Collector	42%(estimated)
May 26	Weekend, Storage from Collector	43%(estimated)
May 27	Holiday, Storage from Collector	38%(estimated)
May 28	Cloudy, Water Heating from Storage	----
May 29	Storage from Collector	43%
May 30	Cloudy, Water Heating from Storage	----
May 31	Storage from Collector	37%

MAY
1974

APPENDIX A
SOLAR DATA

ABSTRACT

This appendix contains data covering the period from 16 May 1974 to 16 May 1975. The data includes plots of integrated solar radiation, collected energy, system efficiency, inlet and outlet temperatures and ambient temperatures for each day the system was in operation. These plots are arranged by month. Each month is preceded by tables of operational modes, monthly summary bar graphs of incident and collected energy and weather bureau data sheets for each month of the testyear.

For most months, the data is arranged as follows:

- Operating Mode
- Bar Graph
- Local Climatological Data
- Sunshine Data
- Daily Plots
  - Solar Data (Incident, etc.)
  - Temperature (Inlet, out etc.)

APPENDIX A
SOLAR DATA

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- Solar system designs should incorporate provisions for directly using solar energy. Storage systems should be capable of being bypassed due to the greater efficiency of using energy directly, and due to storage heat losses.

- Simultaneous load distribution should be used for multiple-load systems.

- Storage sizing should be bound on energy availability and usage. Storage losses should be minimized through adequate insulation.

- Collector designs should incorporate as few interconnections as possible to minimize installation costs and leak points. For the high-temperature operation necessary for absorption-type air conditioners, the collectors should be designed under moderate pressures in a closed system. Design features should also include a high-temperature control in the event of low usage of incident energy or collector circulation failure.

- Solar control system designs should be fully automated and as consistent with present day HVAC control systems as possible.

- Community acceptance and interest is very good. Student organization, industry representatives and visiting dignitaries were continuously visiting the solar system.

- System operating costs of this single pump system are very low (5% of the value of the collected energy).

- The system was installed without any special problems which could not be solved with current construction practices.

- Ventilation air and domestic water preheating are particularly attractive loads for flat plate collector systems.

- System maintenance and operation can readily be performed with the custodial staff after a limited amount of familiarization with the system.

- Plate temperature sensing for system on-off control is adequate.

RECOMMENDATIONS

The following recommendations are submitted for future system design operations and evaluations:

- In northern climates, where there is little need for ventilated air, solar systems should be used to preheat this air whenever possible.

SECTION VII
CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Several conclusions were reached after approximately two years of experience with the Solar Energy System at Northview Junior High School:

- Supplemental heating of large commercial buildings using solar energy is feasible. The system is capable of supplying up to 4 million Btus per day, depending upon ambient conditions and building demand.

- Optimum system performance can only be realized if the building's heat demand matches the optimum operating conditions of the collector array. If demand is low, system efficiency decreases due to higher collector inlet temperatures.

- High operating temperatures in solar systems must be avoided if system pressurization is low. Boiling and inherent vapor locks and "steam hammering" are the results with this continuing until sundown.

- Condensation on the underside of the glass surfaces is most prominent in fall and spring in this climate. Condensation and leaks can deteriorate some absorber plate coatings and streak the glass.

- Snow covering collector surfaces in northern climates can be a serious problem. Collectors should be mounted to permit natural or mechanical snow removal.

Table 6-4. Fossil Fuel Energy Consumption at N. V. J. H.

Year (May-June)	Energy (Millions Btu)
1971-72	33,900
1972-73	28,500
1973-74	18,800
1974-75	19,400

Table 6-5. Natural Gas Costs at N. V. J. H.

Year	Natural Gas Costs/1000 ft^3
1971-72	0.57
1972-73	0.65
1973-74	0.90
1974-75	1.03

Table 6-6. Energy Consumption over Summer Months at Northview Junior High (Cubic Feet Nat. Gas)

	Average 1971-1974	1975
June	607,000	137,000
July	606,000	15,000
August	562,000	73,000

Based on available records from January 1971 to June 1975, the energy consumed at the school is presented in Table 6-4. Energy conservation seems to account for the drop from 34×10^9 Btu in 1971-1972 to a more realistic 19×10^9 Btu for the 1975-1975 school year. Table 6-5 shows the accompanying increase in natural gas prices during the same period. The school energy consumption is increased over the more traditional school due to the availability of the school facilities to the public for various activities after school hours, on weekends and during summer vacation. Also, the presence of a swimming pool on a year-around basis adds an average of 1.5×10^6 Btu/day to the energy consumption.

An average of 2×10^9 Btu is required to maintain these recreational facilities during the summer months (Table 6-6). With boiler efficiencies known to drop rapidly at below 50 percent of input rating, the solar system is very attractive for the present application. In fact, with the boilers on a standby basis, the solar system proved to be capable of supplying most of the heating demands of the school during the summer season. This is shown in Table 6-6 where one boiler was put on standby during the summer of 1975 and the solar system provided most of the energy. The savings over the summer alone amounted to an equivalent of $1500 in natural gas costs.

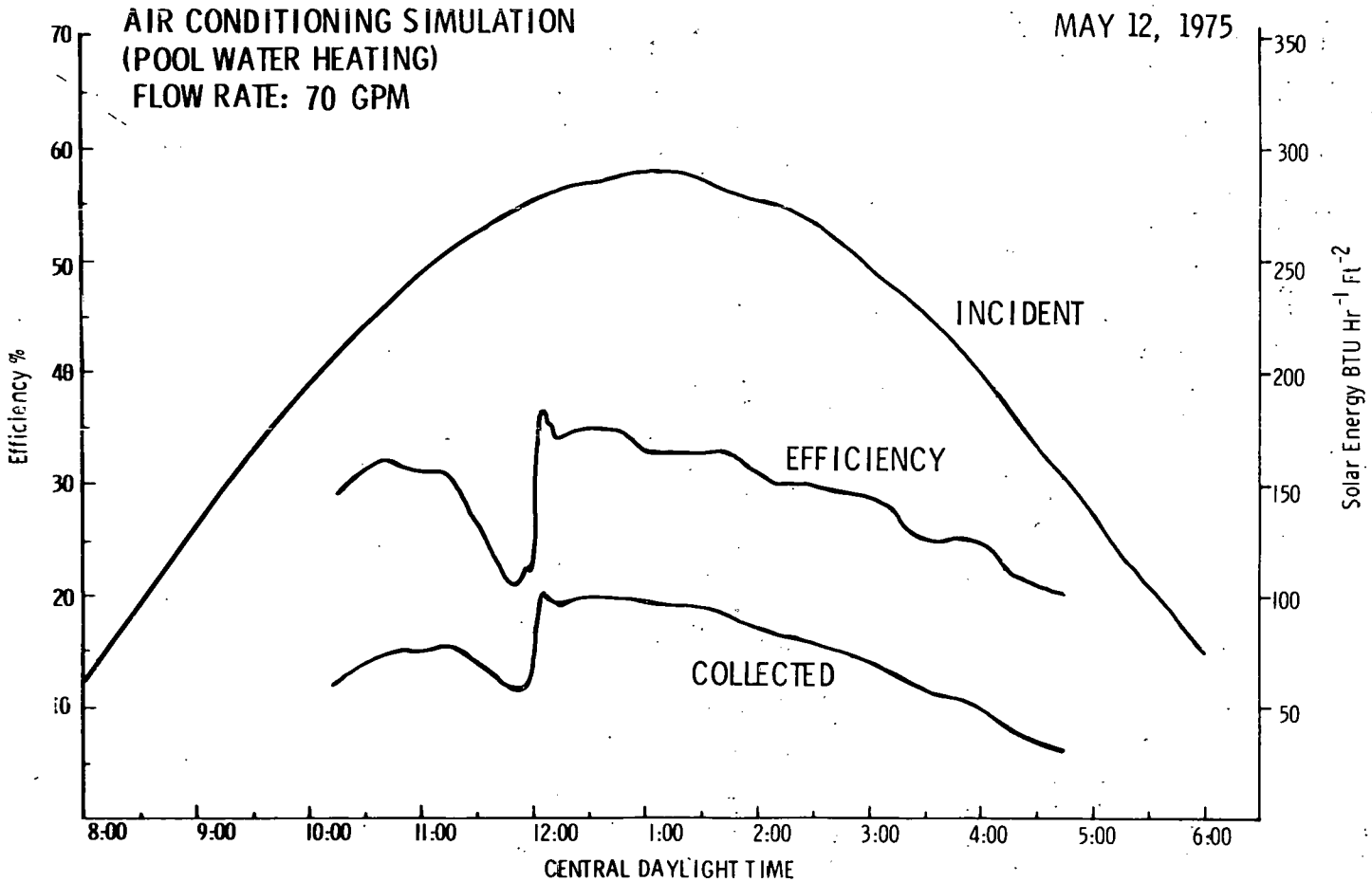


Figure 6-18. Energy and Efficiency for Pool Water Heating

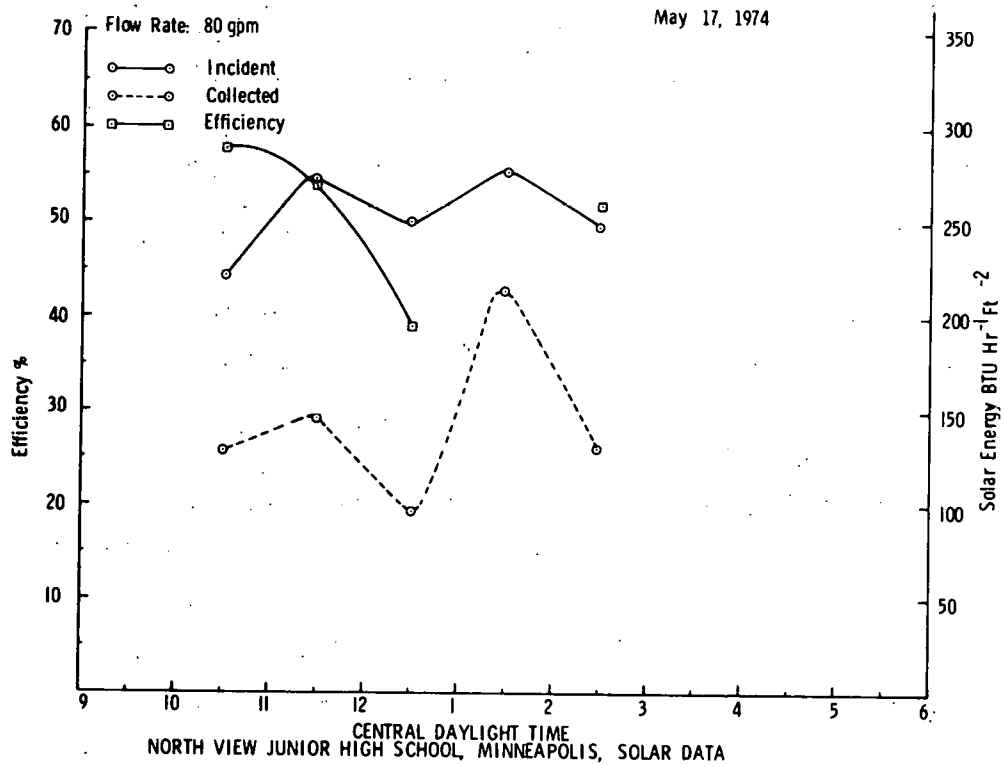
exchanger matched very closely the expected temperature differences across the absorption air conditioner. The outlet temperature of the collector would reach 190° (minimum inlet for the air conditioner) at about 4:30 p.m. Thus, the simulation shows that minimal air conditioning could be expected before 12:00 a.m. due to the large thermal mass of the system, even though incident energy is sufficient to sustain air conditioning by 10:30 a.m. if the fluid temperature were at 190°F to 200°F. The large thermal mass of the system does not significantly benefit the operation of the air conditioner in the late afternoon hours since it cannot operate later than 4:30 p.m. at which time the incident energy is not sufficient to sustain the minimum air conditioning temperature for the absorption unit. (Figure 6-1.8 shows the resulting efficiency for this operational mode.)

ELECTRICAL CONSUMPTION

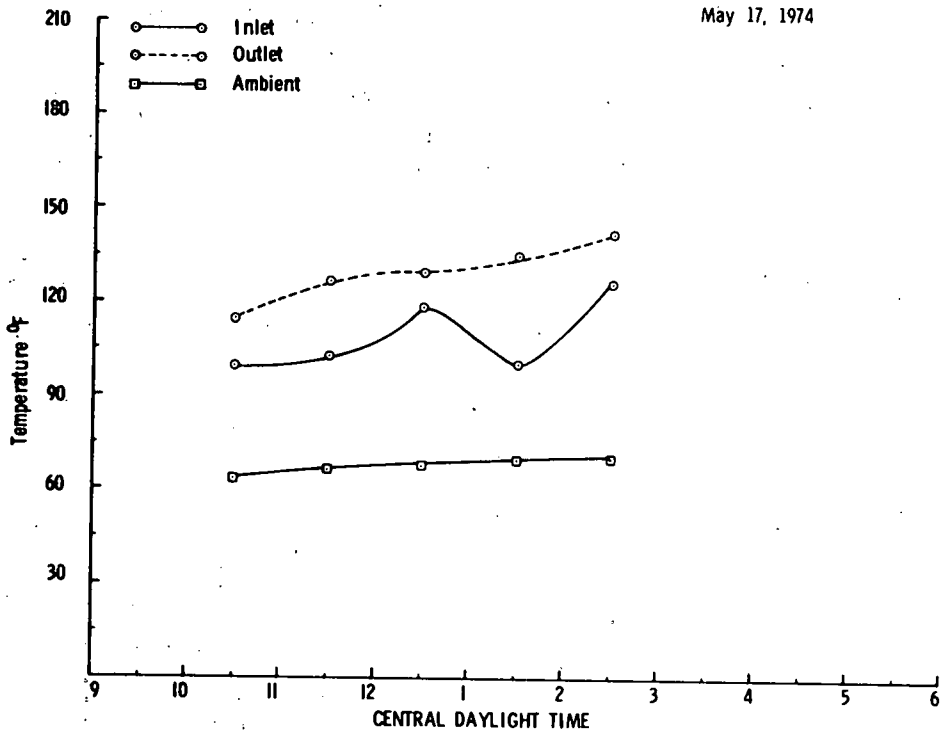
During the one-year test period, the system pump operated a total of 1250 hours in about 210 days for an average of 5.95, or about 6 hours/day. Measured power consumed by the pump was 2.6 KW. At a cost of $0.03/KWH, the daily pump costs are $0.468 or about 50¢/day. Energy collected/day averages 3,000,000 Btu at an equivalent cost of $4.00/million Btu, for an average savings of $12.00/day. The cost of operating the pump is about 5 percent of the collected energy's worth.

SCHOOL ENERGY CONSUMPTION

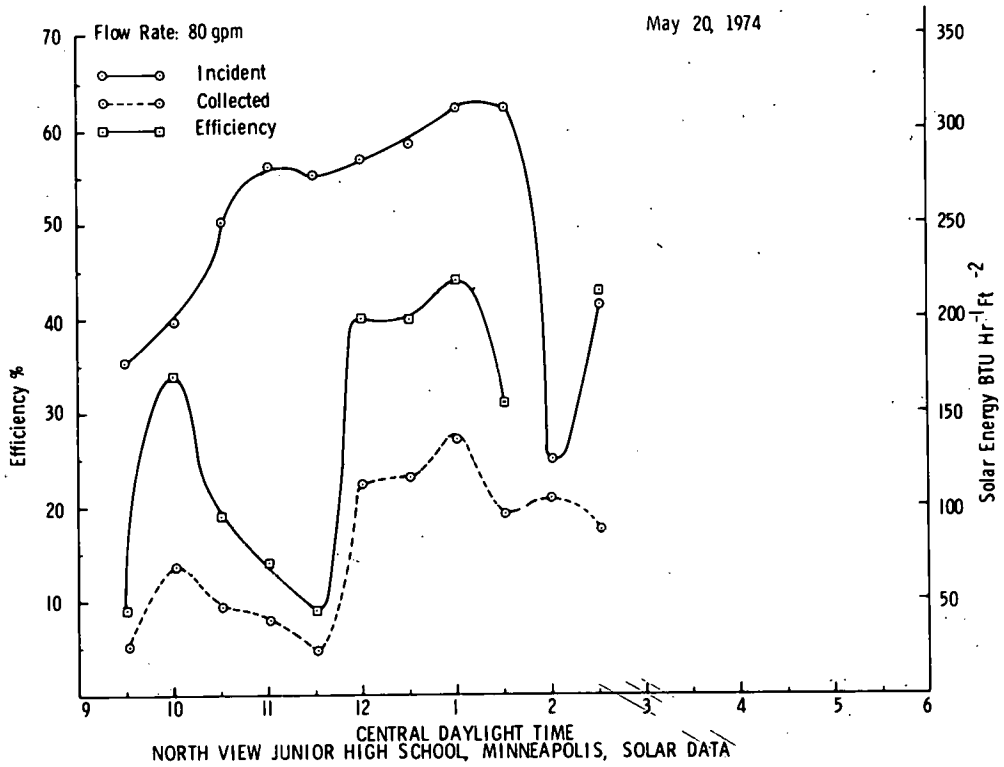
Criteria for solar system evaluation and feasibility often require an assessment of its impact on the energy consumption and its potential for future energy savings. Several factors such as present fuel prices, and engineering costs for a prototype design would present some drawbacks and make such an analysis unrealistic. However, a look at the energy consumption pattern might yield some insights useful for future tradeoffs in system design and optimization.



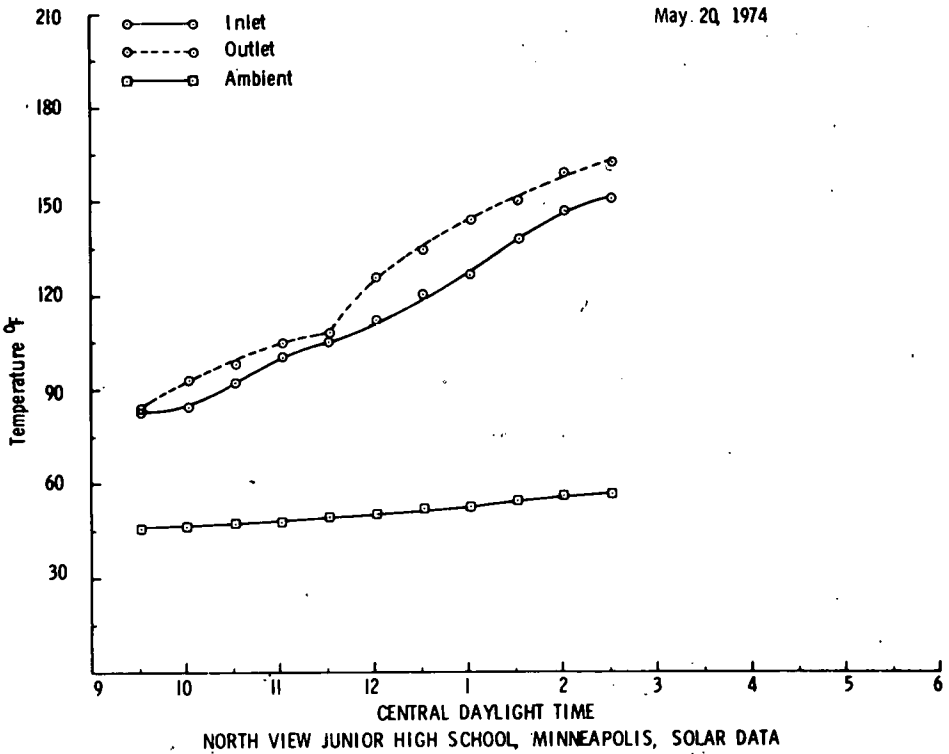
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



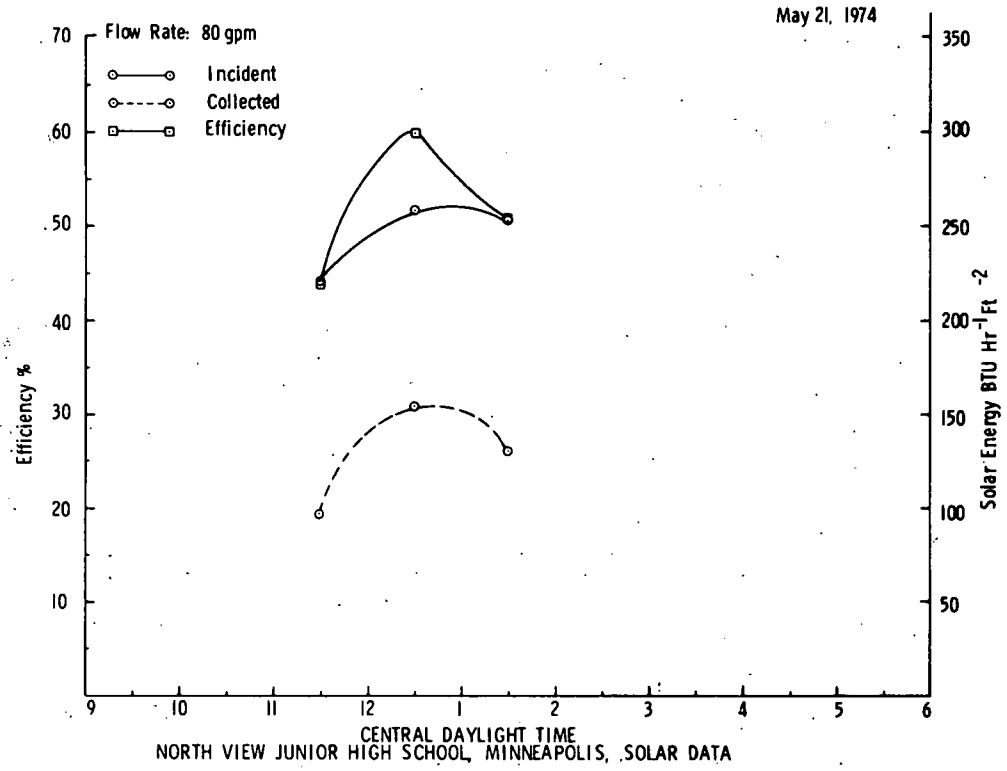
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



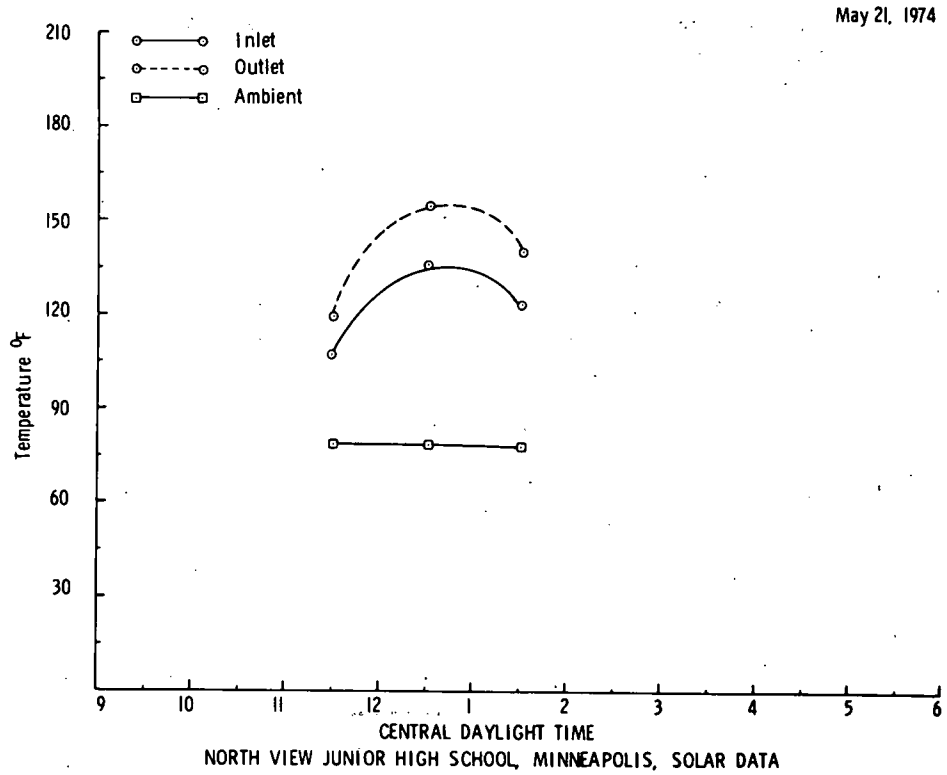
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



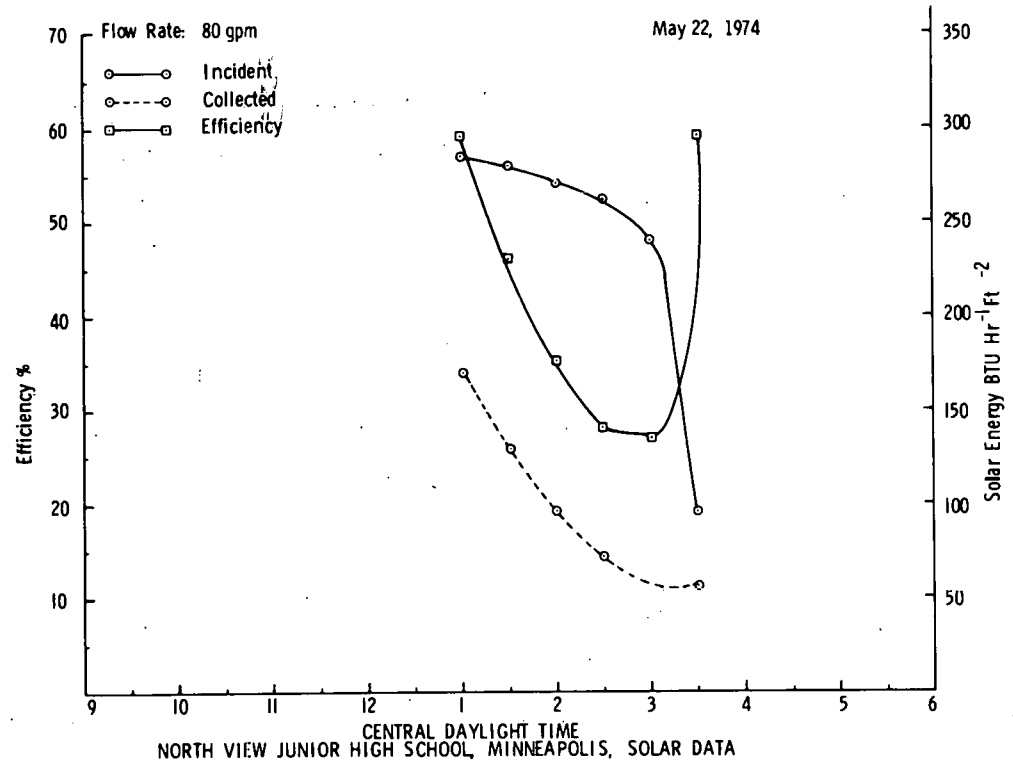
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



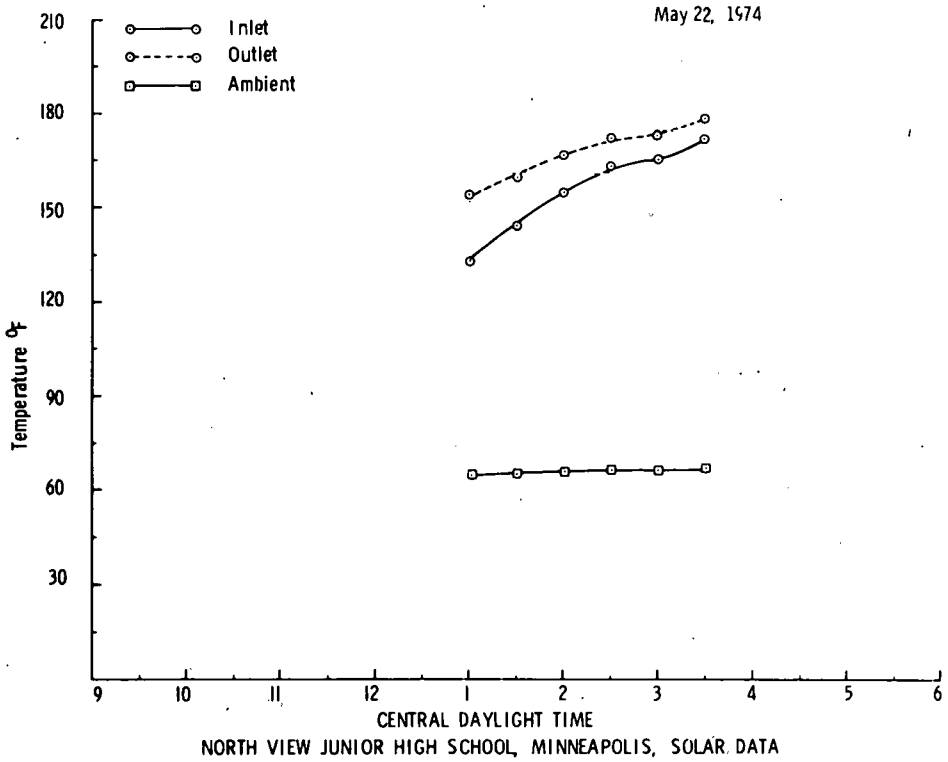
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



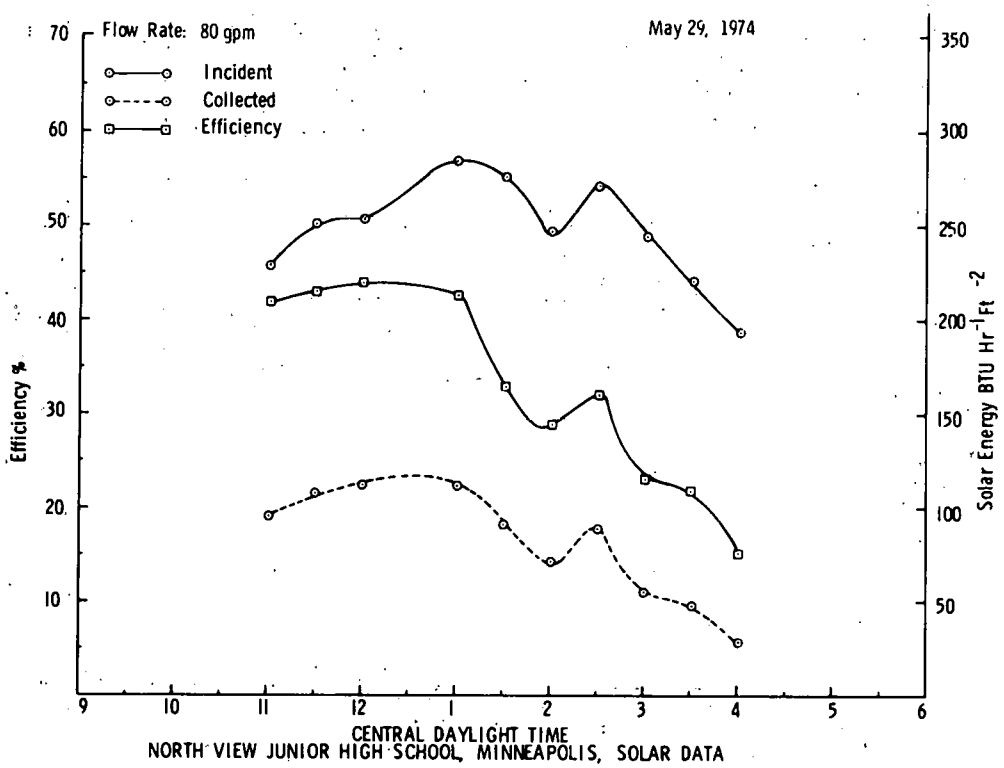
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



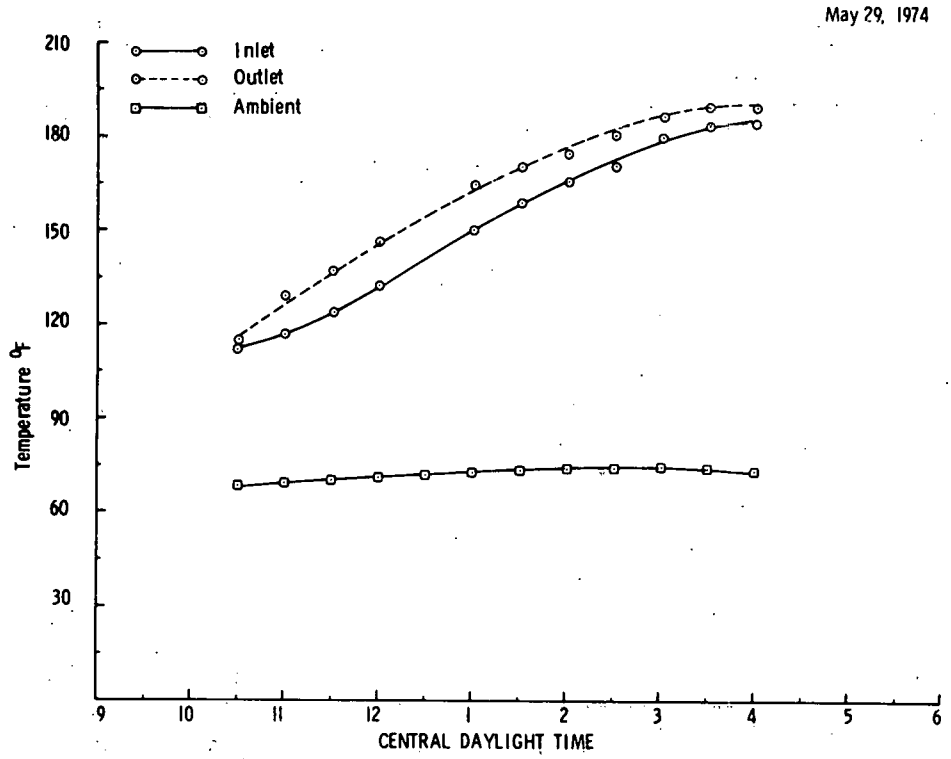
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



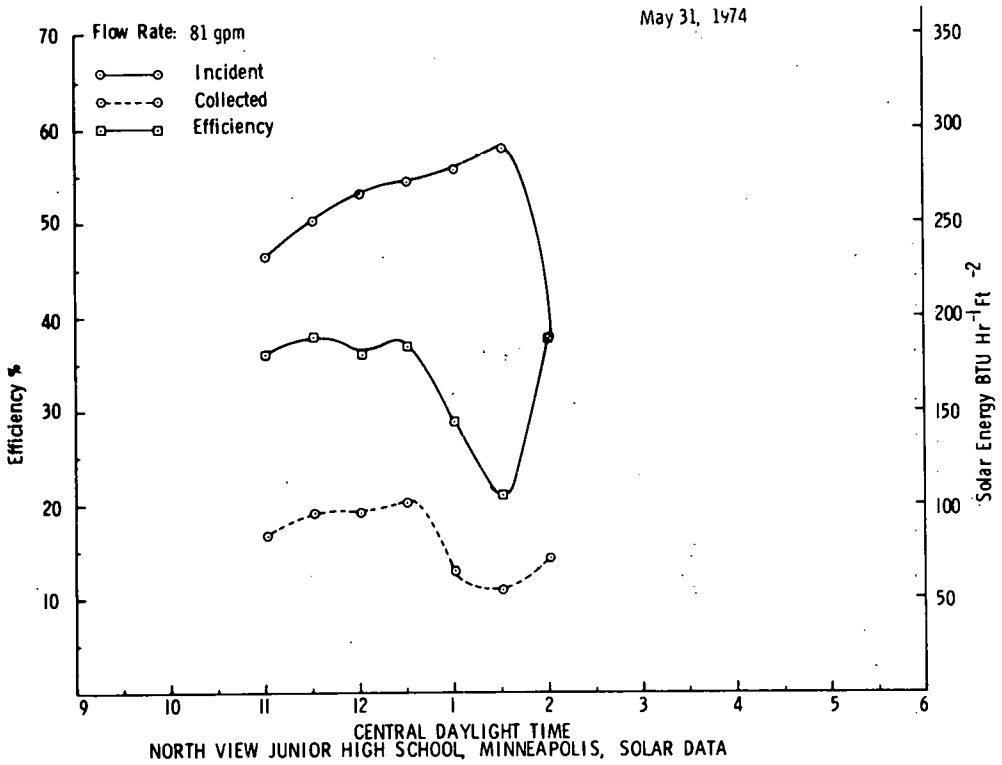
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



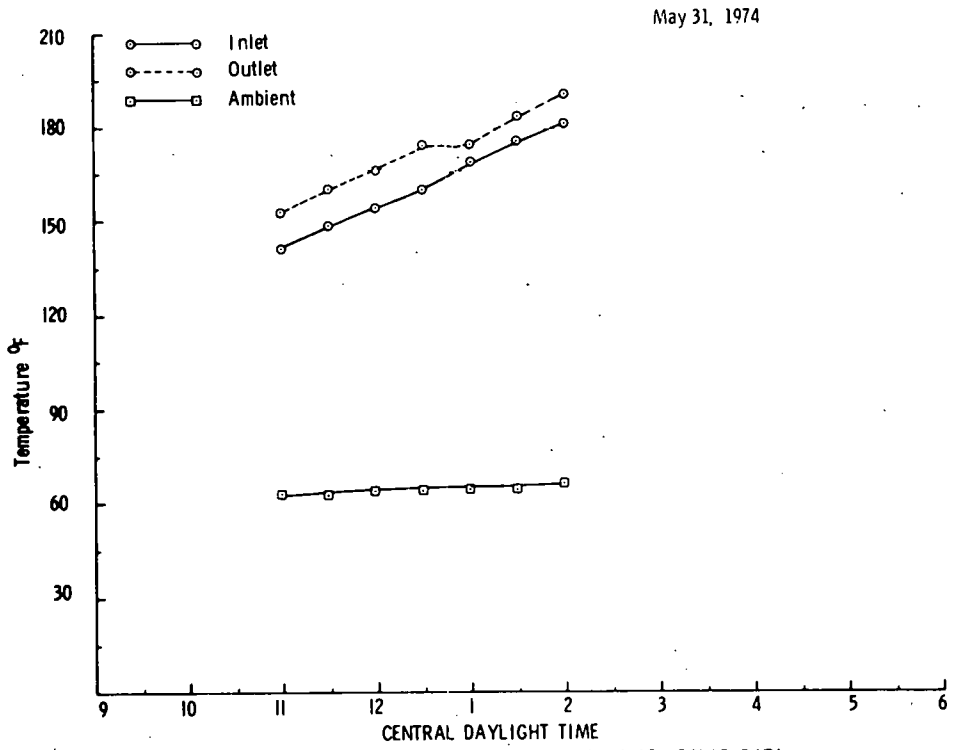
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

JUNE

1974

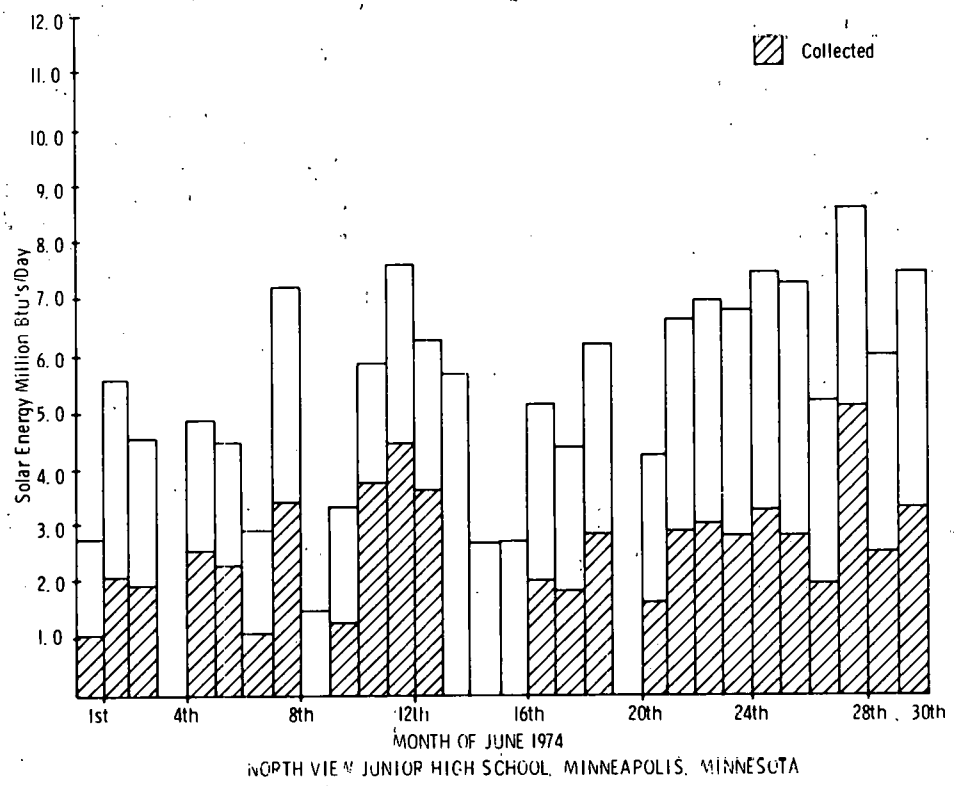
North View Junior High

Month of June 1974

Date	Mode of Operation	Eff. = $\frac{Q_{collected}}{Q_{incident}}$
June 1	Weekend, Storage from Collector	36 %(estimated)
June 2	Weekend, Storage from Collector	39 %(estimated)
June 3	Storage from Collector	41 %
June 4	Cloudy, Water Heating from Storage	---
June 5	Storage from Collector	42 %
June 6	Storage from Collector	44 %
June 7	Storage from Collector	39 %
June 8	Storage from Collector	46 %
June 9	Weekend, Cloudy	---
June 10	Cloudy, Water Heating from Collector	36 %
June 11	Pool Water Heating from Collector	65 %
June 12	Pool Water Heating from Collector	57 %
June 13	Pool Water Heating from Collector	59 %
June 14	Storage and Water Heating from Cells	40 %
June 15	Weekend, Cloudy	---
June 16	Weekend, Cloudy	---
June 17	Storage and Water Heating from Collector	38 %
June 18	Storage and Water Heating from Collector	41 %
June 19	Storage from Collector	45 %
June 20	Cloudy, Power Failure due to Storm	---
June 21	Storage from Collector	36 %
June 22	Weekend, Storage from Collector	41 %(estimated)
June 23	Weekend, Storage from Collector	42 %(estimated)
June 24	Instruments Calibration, Water Heating	43 %(estimate
June 25	Instruments Calibration, Water Heating	44 %(estimated)
June 26	Storage from Collector	39 %

North View Junior High
Month of June 1974 (continued)

Date	Mode of Operation	Eff. = $\frac{Q_{collected}}{Q_{incident}}$
June 27	Storage from Collector	35%
June 28	Storage and Water Heating from Collector	59%
June 29	Weekend Storage from Collector	42% (estimated)
June 30	Weekend Storage from Collector	43% (estimated)



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, MINNESOTA

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

MINNEAPOLIS-ST.PAUL, MINNESOTA
NAT WEATHER SERVICE FCST OFC
INTERNATIONAL AIRPORT
JUNE 1974

LATITUDE 44° 53' N LONGITUDE 93° 13' W ELEVATION (GROUND) 834 FT. STANDARD TIME USED: CENTRAL WBAN #14922

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING	COOLING	WEATHER TYPES ON DATES OF OCCURRENCE (1 FOG, 2 HEAVY FOG, 3 THUNDERSTORM, 4 ICE PELLETS, 5 HAIL, 6 GLAZE, 7 DUSTSTORM, 8 SMOKE, HAZE, 9 BLOWING SNOW)	SNOW, ICE PELLETS OR ICE ON GROUND AT 0830AM IN.	PRECIPITATION WATER EQUIVALENT IN.	SNOW, ICE PELLETS IN.	AVG. STATION PRESS. IN. ELEV. 838 FEET, M.S.L.	WIND RESULTANT DIRECTION	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE HOURS AND TENTHS	SUNSHINE PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DATE
1	64	44	54*	-8	47	11	0		0	.12	0	29.22	29	2.6	3.8	21	N	5.6	36	8	5	1
2	74	41*	58	-5	45	7	0	2	0	0	0	29.19	18	4.8	5.5	10	SW	11.5	75	3	4	2
3	87	59	73	10	58	0	8	3 5	0	1.26	0	28.97	18	9.6	11.1	28	S	10.5	68	7	8	3
4	83	63	73	9	61	0	8	3	0	.17	0	28.83	17	12.7	12.8	38	SW	9.8	63	10	10	4
5	83	65	74	10	60	0	8		0	0	0	28.82	18	14.5	15.0	25	S	12.3	79	4	5	5
6	68	52	60	-4	59	5	0	1 3 8	0	1.59	0	28.66	14	3.0	9.8	25	NNE	1.8	12	9	8	6
7	65	53	59	-5	53	6	0		0	0	0	28.75	12	3.6	4.2	10	SE	3.7	24	10	8	7
8	78	64	66	1	54	0	1		0	0	0	28.91	15	2.8	5.2	9	SE	9.3	60	7	7	8
9	68	53	61	-4	54	4	0	1	0	.76	0	28.67	06	14.0	16.1	28	NE	1.4	9	10	10	9
10	68	54	61	-5	50	4	0		0	.38	0	28.79	33	14.8	16.3	28	N	6.9	44	8	8	10
11	69	51	60	-6	42	5	0		0	T	0	29.03	32	10.2	11.4	22	NW	13.5	87	3	3	11
12	75	46	60	-6	47	5	0		0	.05	0	29.05	28	6.8	8.6	19	NW	9.6	62	8	5	12
13	78	47	63	-3	50	2	0		0	0	0	29.02	32	2.9	3.2	9	NW	13.3	85	4	3	13
14	80	57	69	2	53	0	4		0	T	0	28.94	31	8.0	9.4	19	NW	11.4	73	5	5	14
15	65	51	58	-9	42	7	0		0	T	0	28.98	33	16.6	17.1	25	NW	5.5	35	9	7	15
16	63	47	55	-12	41	10	0		0	0	0	29.02	34	13.6	13.8	21	N	5.6	36	9	8	16
17	73	51	62	-6	46	3	0		0	0	0	28.88	31	9.8	10.2	17	NW	11.9	76	5	3	17
18	81	50	66	-2	48	0	1	3	0	.06	0	28.83	15	4.8	6.8	24	NE	9.2	59	7	7	18
19	84	59	72	4	56	0	7		0	0	0	28.95	02	2.3	5.6	9	NE	15.0	96	4	4	19
20	82	61	72	4	59	0	7	3 5	0	.81	0	28.90	09	3.6	9.4	40	N	7.1	46	7	6	20
21	81	63	72	4	60	0	7	1 8	0	0	0	28.83	07	7.7	9.5	18	E	14.3	92	8	7	21
22	74	60	67	-2	50	0	2		0	0	0	29.02	04	11.4	12.4	19	NE	14.4	92	6	5	22
23	73	51	62	-7	47	3	0		0	0	0	29.29	06	7.6	8.8	15	E	15.1	97	2	1	23
24	76	58	66	-3	51	0	1		0	0	0	29.32	15	1.8	3.3	9	SE	14.7	94	3	3	24
25	78	56	67	-2	50	0	2		0	0	0	29.26	12	4.0	5.5	11	SE	15.6	100	0	0	25
26	80	54	67	-3	47	0	2		0	0	0	29.22	18	5.7	6.0	12	SW	15.6	100	0	0	26
27	82	61	72	2	51	0	7		0	0	0	29.17	18	11.3	11.9	18	SW	15.0	96	7	6	27
28	88	63	76	6	53	0	11		0	0	0	29.08	18	12.4	12.7	21	SW	15.2	97	1	2	28
29	88*	63	76*	6	57	0	11		0	0	0	28.88	25	5.6	11.4	28	NE	12.5	80	8	7	29
30	82	58	70	0	46	0	5		0	0	0	28.93	28	8.7	10.6	20	NW	15.5	99	0	1	30
	SUM	SUM				TOTAL	TOTAL			TOTAL	TOTAL		FOR	THE	MONTH:			TOTAL	%	SUM	SUM	
	2290	1642				72	130	NUMBER OF DAYS		5.21	0	28.98	28	.5	9.5	40	N	322.8	FOR	172	158	
	AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.	PRECIPITATION		DEP.						DATE:	20	POSSIBLE	MONTH	AVG.	AVG.	
	76.3	54.7	65.5	-1.4	51	7	8	.01 INCH	9	1.27								466.6	69	5.7	5.3	

NUMBER OF DAYS				SEASON TO DATE	
MAXIMUM TEMP.		MINIMUM TEMP.		TOTAL	TOTAL
≥ 90	≤ 32	≤ 32	≤ 0	7070	153
				DEP.	DEP.
0	0	0	0	-189	5

SNOW, ICE PELLETS	
≥ 1.0 INCH	0
THUNDERSTORMS	5
HEAVY FOG	1
CLEAR 8	PARTLY CLOUDY 11

GREATEST IN 24 HOURS AND DATES			
PRECIPITATION		SNOW, ICE PELLETS	
1.59	6	0	
CLOUDY 11			

GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE
0

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1							T	T	.02	.03	.01	.02	.04	T					T						1
2																									2
3		T	.12	.18	.02	.07																	.17	.70	3
4	T	T	.04	T	T	.01	.10	.01	.01																4
5																									5
6							T	T	.02	.08	.51	.42	.38	.18											6
7																									7
8																									8
9			T	.05	.04	T	T	T	.01	T					T	T	T	T	.19	.01	.23	.06	.08	.11	9
10	.14	.02	.04	.12	.03	.03	.01	T																	10
11		T	T																						11
12															T	.01	.01	T	T	.03	T				12
13																									13
14										T															14
15									T	T															15
16																									16
17																									17
18																.04	.02								18
19																									19
20												T	.57										.24		20
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28																									28
29																									29
30																									30

MINNEAPOLIS-ST.PAUL, MINNESOTA

* EXTREME TEMPERATURES FOR THE MONTH MAY BE THE LAST OF MORE THAN ONE OCCURRENCE.
- BELOW ZERO TEMPERATURE OR NEGATIVE DEPARTURE FROM NORMAL.
3 30-YR NORMALS STATIONS.
R: ALSO ON AN EARLIER DATE OR DATES.
F HEAVY FOG RESTRICTS VISIBILITY TO 1/4 MILE OR LESS.
T: IN THE HOURLY PRECIPITATION TABLE AND IN COLUMNS 9, 10, AND 11 INDICATES AN AMOUNT TOO SMALL TO MEASURE

THE SEASON FOR DEGREE DAYS BEGINS WITH JULY FOR HEATING AND JANUARY FOR COOLING.
DATA IN COLUMNS 5, 12, 13, 14, AND 15 ARE BASED ON 4 OBSERVATIONS PER DAY AT 3 HOUR INTERVALS.
WIND DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. RESULTANT WIND IS THE VECTOR SUM OF WIND DIRECTIONS AND SPEEDS CLASSED BY THE NUMBER OF OBSERVATIONS. FIGURES FOR DIRECTIONS ARE TENS OF DEGREES FROM TRUE NORTH; I.E., 09=EAST, 18=SOUTH, 27=WEST, 36=NORTH, AND 00=CALM. WHEN DIRECTIONS ARE IN TENS OF DEGREES IN COLUMN 17, ENTRIES IN COLUMN 16 ARE FASTEST OBSERVED 1-MINUTE SPEEDS. IF TWO OR MORE APPEAR IN COL. 17, SPEEDS ARE TIED.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE INCORPORATED IN THE ANNUAL SUMMARY.

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DIRECTOR, NATIONAL CLIMATIC CENTER

SUMMARY BY HOURS

HOUR (LST)	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE AIR °F	WET BULB °F	DEW PT. °F	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
00	4	28.99	61	55	50	68	7.2	17	1.2
03	5	28.99	58	53	48	74	7.2	36	.1
06	6	29.00	59	54	51	77	7.1	02	.5
09	5	29.01	67	59	53	62	10.2	23	1.6
12	6	28.98	72	61	53	52	12.7	33	1.8
15	6	28.97	74	61	52	48	12.8	27	2.0
18	5	28.95	73	60	51	48	11.8	34	1.4
21	4	28.96	65	57	50	59	7.9	13	.7

USCOMM - NOAA - ASHEVILLE 750

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	SKY COVER TENTHS	CEILING HUNDREDS OF FEET	VISIBILITY WHOLE MILES	VISIBILITY TENTHS MILES	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	TEMPERATURE REL. HUM. %	WIND DIR	WIND SPEED KNOTS
DAY 01											
00	0	UNL	25			52	47	41	66	23	3
03	0	UNL	25			48	46	43	83	00	0
06	8	80	20			52	48	47	83	00	0
09	10	60	7		RW	54	51	48	83	29	7
12	10	50	7		RW	55	53	51	88	35	4
15	8	42	12			61	55	51	70	20	4
18	9	34	15			63	55	48	60	32	9
21	0	UNL	20			51	47	44	77	00	0
DAY 02											
00	0	UNL	25			46	44	42	89	23	4
03	0	UNL	12			44	43	42	93	13	4
06	9	UNL	0	1	F	46	44	44	96	00	0
09	10	60	12			62	56	51	67	17	9
12	10	50	7			70	58	48	46	18	5
15	9	42	12			73	57	43	34	14	9
18	9	34	15			72	57	44	37	17	5
21	5	UNL	25			63	53	46	52	13	6
DAY 03											
00	10	UNL	20			60	52	46	58	13	7
03	10	55	10		TRW	58	54	48	70	24	5
06	10	50	12			58	56	54	84	14	11
09	10	50	12			71	64	60	80	18	16
12	10	45	7			78	67	61	58	20	10
15	9	40	7			85	70	63	48	20	13
18	9	40	7			82	68	60	47	14	5
21	10	150	15			70	61	55	58	18	10
DAY 04											
00	10	50	7		TRW	63	58	57	81	18	18
03	10	60	12		TRW	63	59	58	78	17	7
06	10	80	20		TRW	63	59	57	81	19	6
09	10	80	10		T	67	63	60	78	19	7
12	10	24	10			76	68	64	66	17	14
15	10	250	10			81	70	64	56	18	15
18	10	UNL	10			80	70	65	60	18	13
21	10	UNL	10			74	68	64	71	17	10
DAY 05											
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03	10	150	20			69	62	57	66	18	12
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09	2	UNL	20			74	66	60	62	20	15
12	4	UNL	15			78	67	61	58	17	18
15	3	UNL	10			82	68	62	51	18	19
18	2	UNL	10			80	68	61	52	18	14
21	2	UNL	12			72	65	60	66	15	10
DAY 06											
00	10	70	10			68	63	60	76	15	8
03	10	30	7			66	63	61	84	15	8
06	10	10	5		H	67	63	61	81	15	9
09	10	8	3		RW	67	64	62	84	12	7
12	10	3	0	12	RW	67	64	62	84	11	11
15	10	15	15		RW	83	60	58	84	34	14
18	9	33	25			64	59	55	73	29	8
21	7	UNL	20			58	55	52	81	23	4
DAY 07											
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03	10	130	12			56	54	52	87	00	0
06	10	80	20			58	55	53	84	08	3
09	10	130	10			63	58	56	83	00	0
12	10	130	10			63	59	58	78	07	6
15	10	26	15			64	58	55	88	12	5
18	9	UNL	15			65	58	53	85	14	9
21	8	250	15			59	55	52	78	19	6
DAY 08											
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03	10	130	20			54	52	50	86	21	4
06	4	UNL	25			58	56	54	87	00	0
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DAY 09											
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06	10	75	10			58	56	53	81	07	15
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DAY 10											
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18	6	65	25			66	56	48	62	31	9
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DAY 11											
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DAY 12											
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03	0	UNL	25			48	46	41	77	21	4
06	0	UNL	25			51	48	46	80	22	5
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DAY 13											
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DAY 14											
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18	1	UNL	25			76	61	50	40	32	15
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DAY 15											
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06	2	UNL	25			56	48	43	82	31	15
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DAY 16											
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DAY 17											
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DAY 18											
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18	10	60	20			67	58	51	57	08	11
21	7	UNL	25			66	60	55	68	12	12
DAY 19											
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DAY 20											
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18	8	110	25			73	64	59	62	12	8
21	0	75	15			70	64	60	71	15	5
DAY 21											
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DAY 22											
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DAY 24											
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DAY 26											
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18	0	UNL	20			80	61	48	33	18	7
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DAY 27											
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21	8	UNL	15			74	61	51	46	17	8
DAY 28											
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21	1	UNL	15			77	63	54	46	17	10
DAY 29											
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03	8	130	15			72	62	55	55	18	9
06	10	130	10			70	62	56	61	18	3
09	9	130	10			76	65	59	56	22	10
12	10	UNL	12			83	68	61	48	25	7
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21	2	UNL	15			75	60	48	40	34	18
DAY 30											
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06	0	UNL	25			61	54	48	63	26	4
09	0	UNL	25			74	58	45	38	28	11
12	0	UNL	25			78	60	45	30	30	15
15	0	UNL	25			81	61	45	28	27	15
18	0	UNL	25			82	60	43	25	30	14
21	3	UNL	25			72	57	46	38	20	3

NOTES

CEILING COLUMN-
UNL INDICATES AN UNLIMITED CEILING

WEATHER COLUMN-

- + TORNADO
- T THUNDERSTORM
- Q SQUALL
- R RAIN
- RW RAIN SHOWERS
- ZR FREEZING RAIN
- L DRIZZLE
- ZL FREEZING DRIZZLE
- S SNOW
- SP SNOW PELLETS
- IC ICE CRYSTALS
- SW SNOW SHOWERS
- SG SNOW GRAINS
- IP ICE PELLETS
- A HAIL
- F FOG
- IF ICE FOG
- GF GROUND FOG
- BD BLOWING DUST
- BN BLOWING SAND
- BS BLOWING SNOW
- BY BLOWING SPRAY
- K SMOKE
- H HAZE
- D DUST

WIND COLUMNS

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH: I.E., 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS; MULTIPLY BY 1.15 TO CONVERT TO MILES PER HOUR.

ADDITIONAL DATA

OTHER OBSERVATIONAL DATA CONTAINED IN RECORDS ON FILE CAN BE FURNISHED AT COST VIA MICROFILM, MICROFICHE, OR PAPER COPIES OF THE ORIGINAL RECORDS. INQUIRIES AS TO AVAILABILITY AND COSTS SHOULD BE ADDRESSED TO: DIRECTOR, NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

STATION: MINNEAPOLIS MINN YEAR & MONTH: 74 06

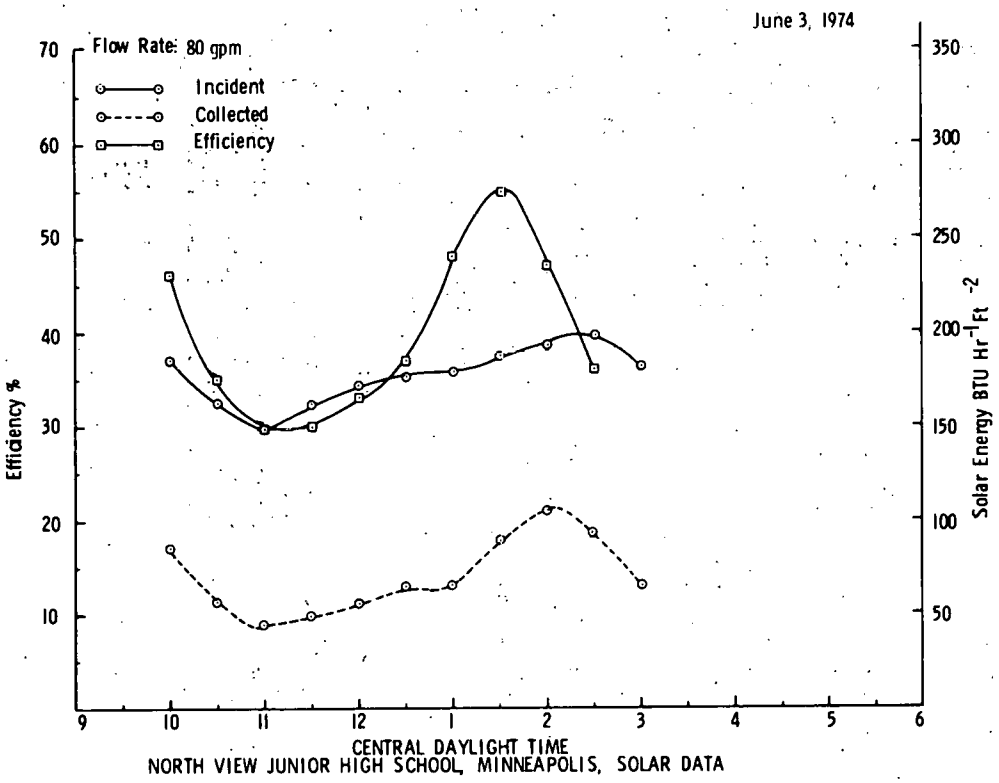
U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

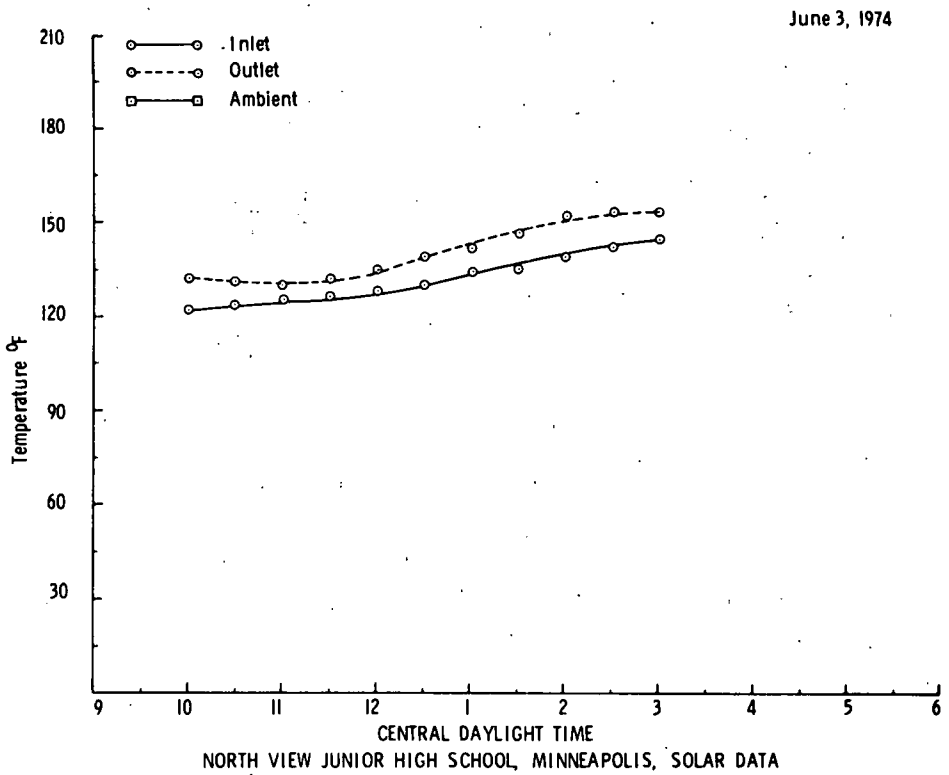
POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
210

U.S. MAIL
FIRST CLASS

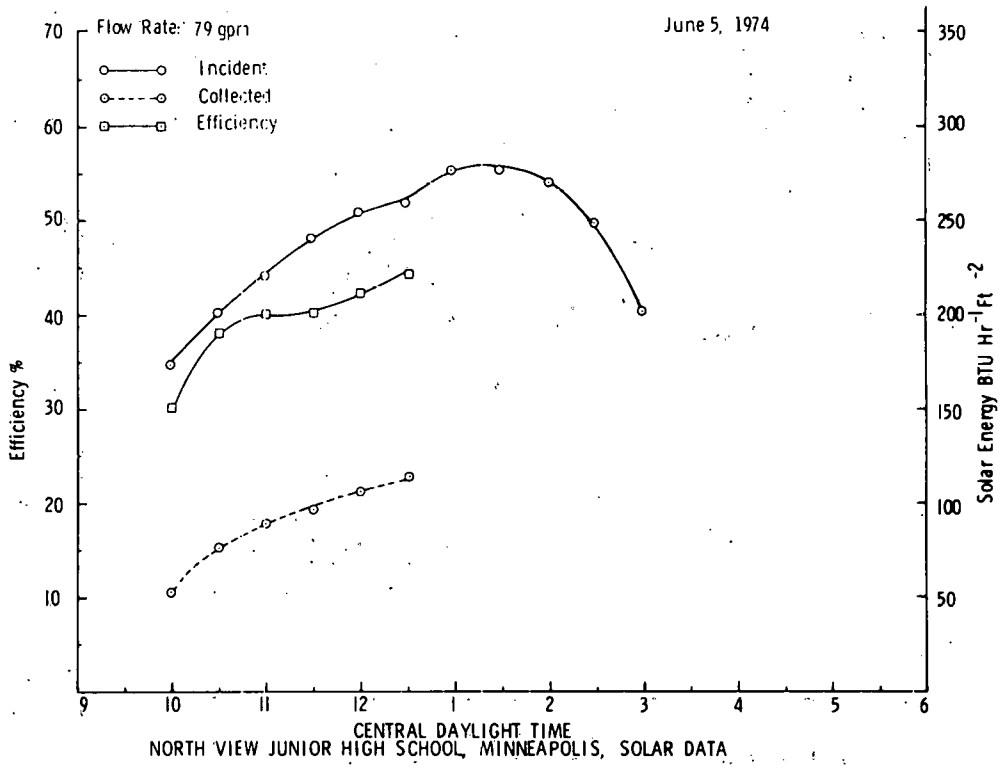
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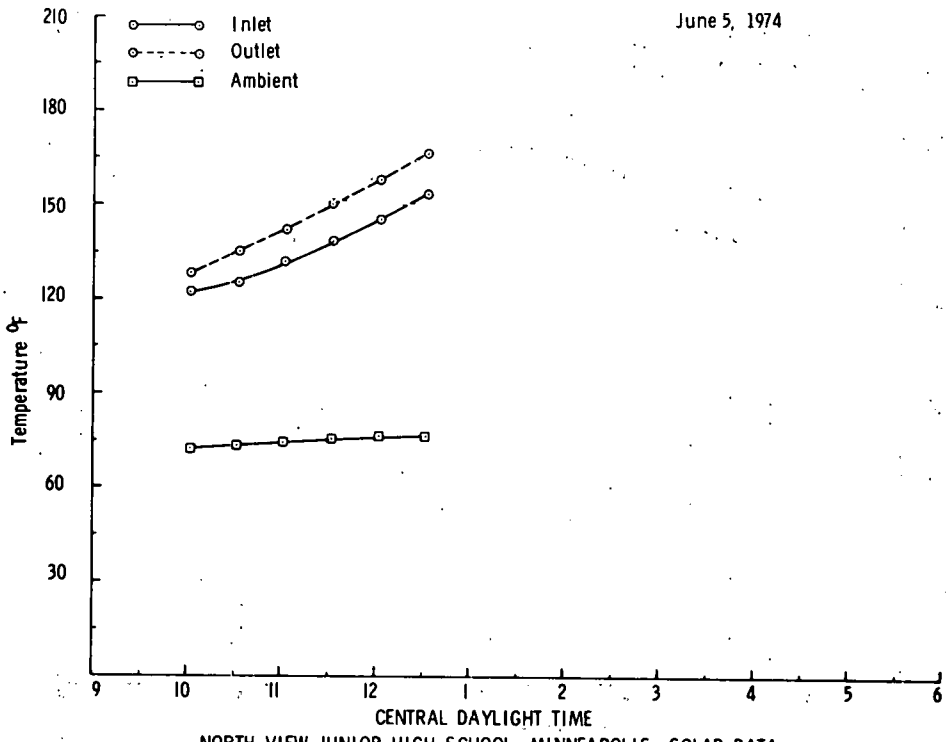
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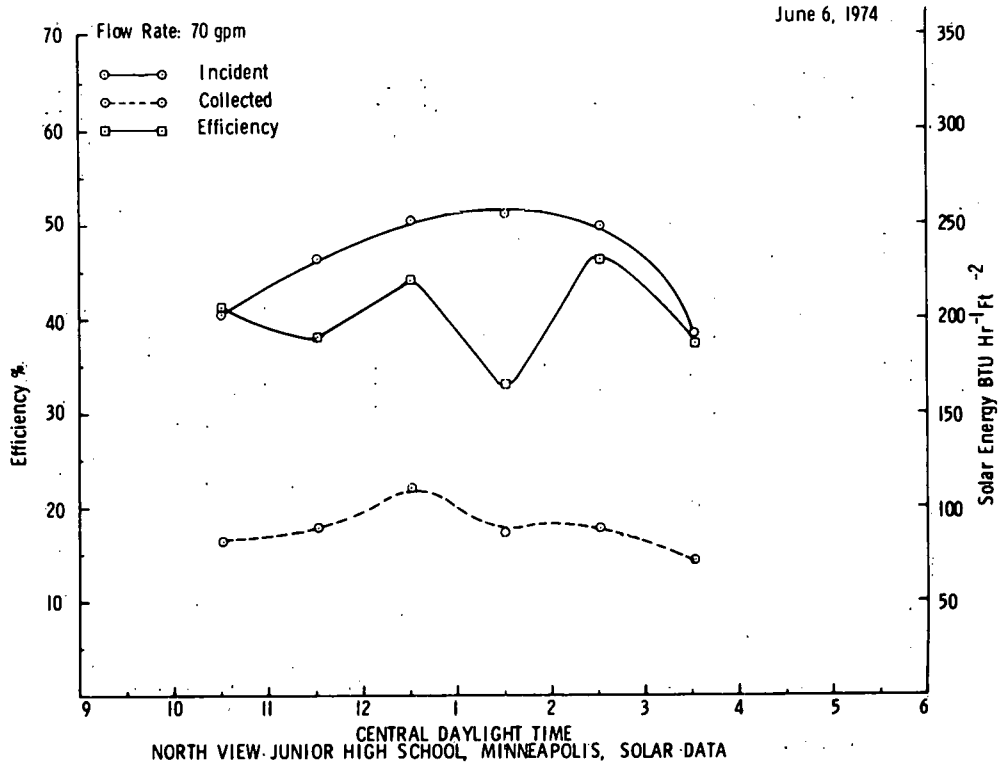
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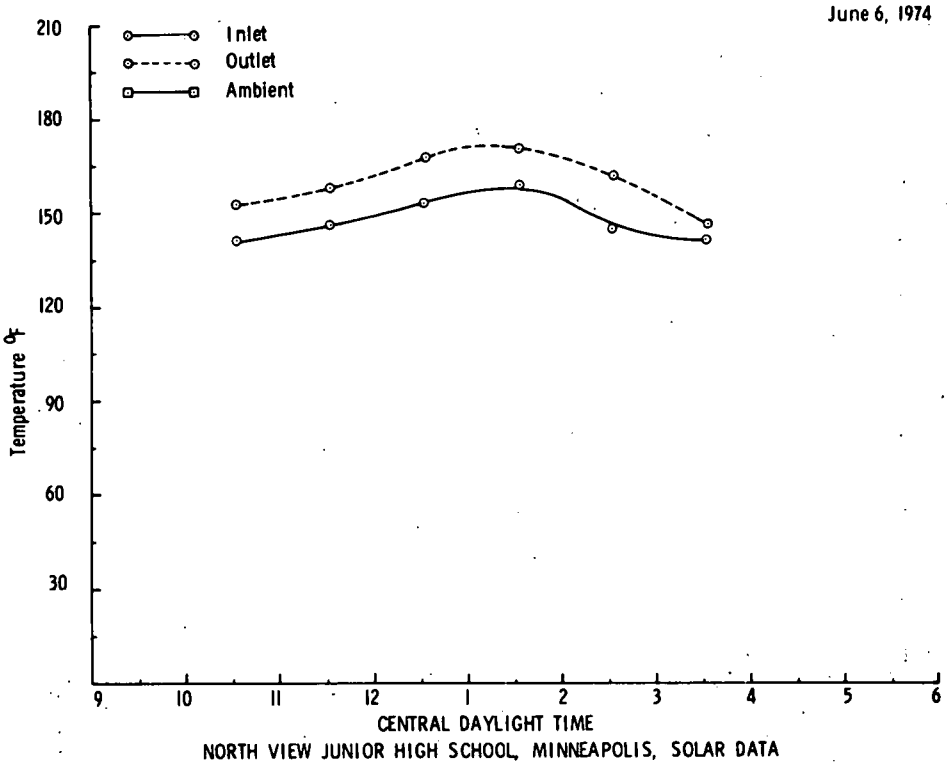
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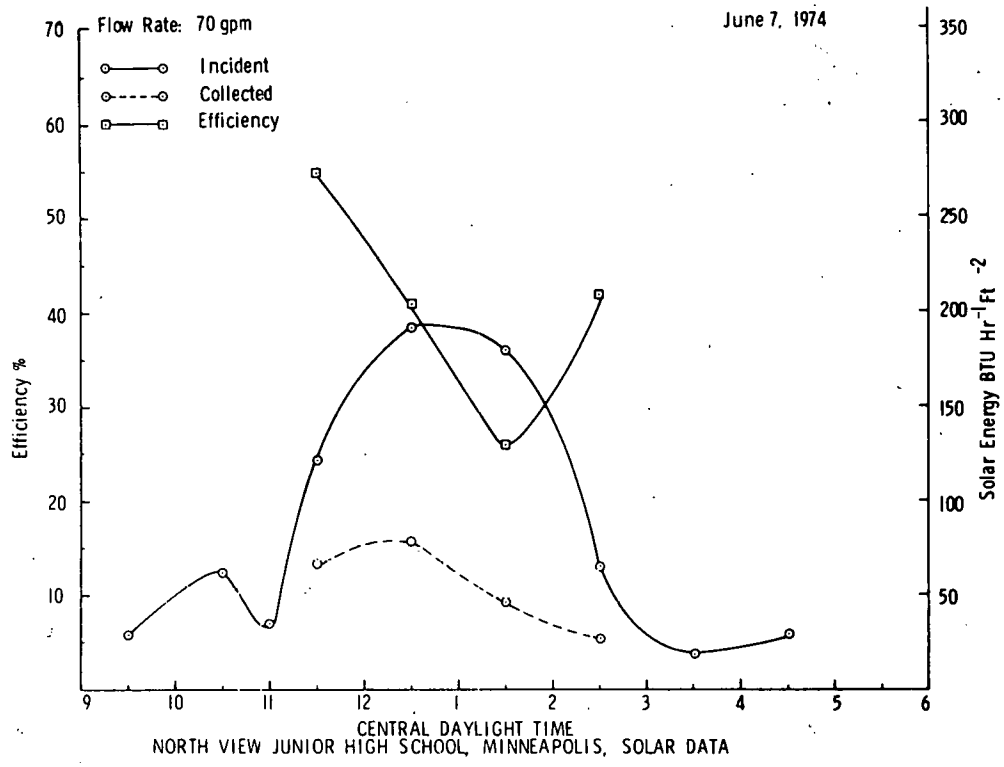
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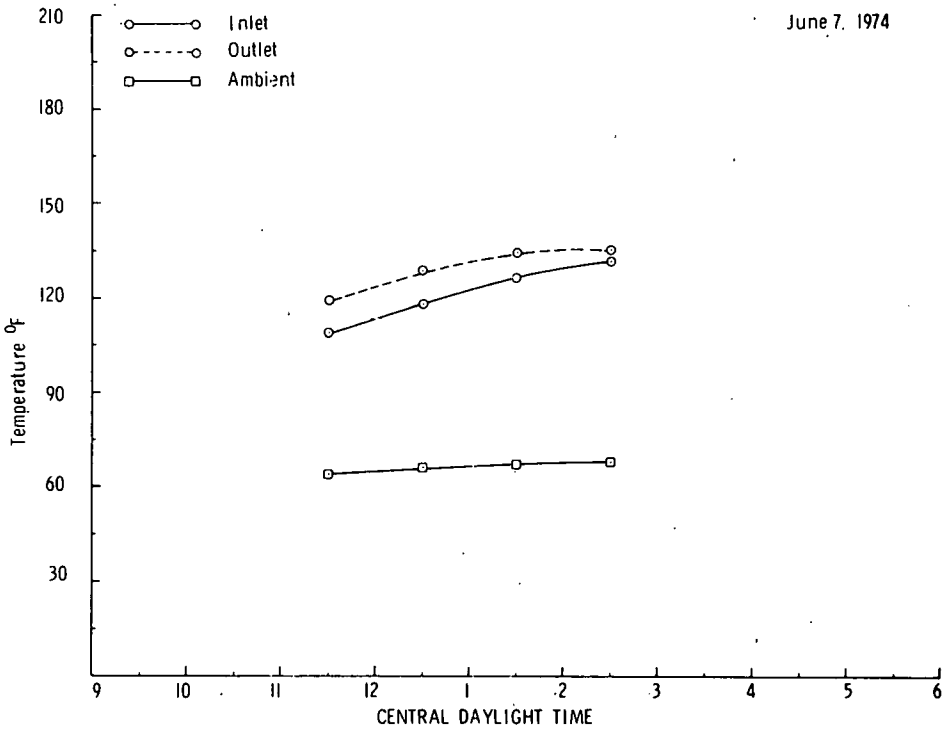
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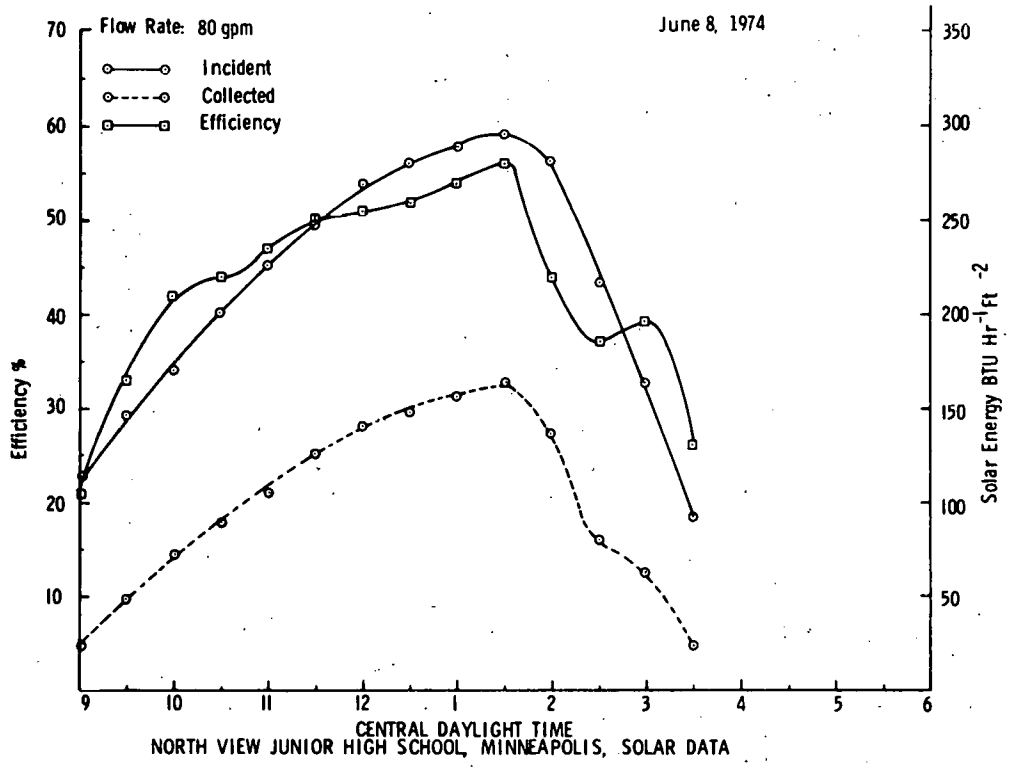
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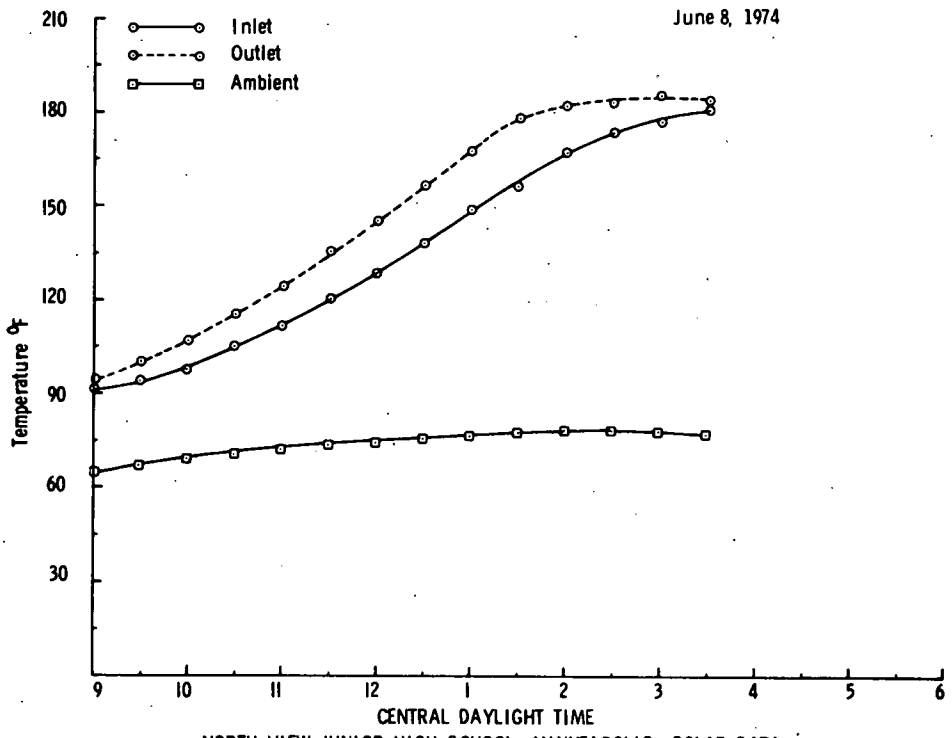
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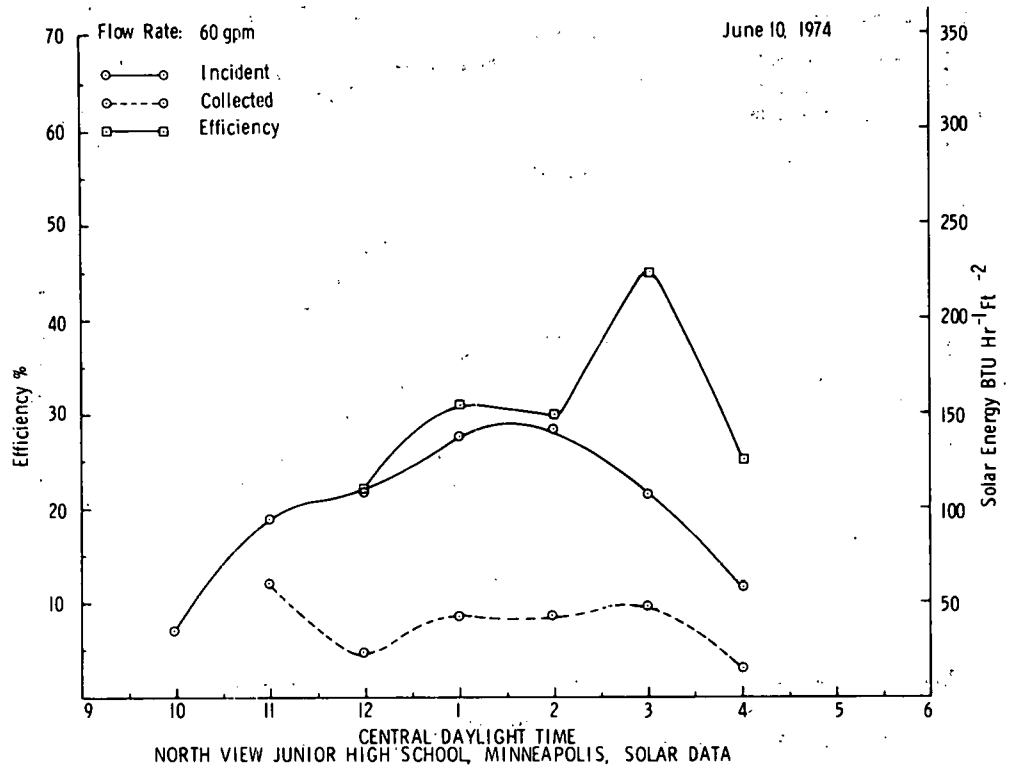
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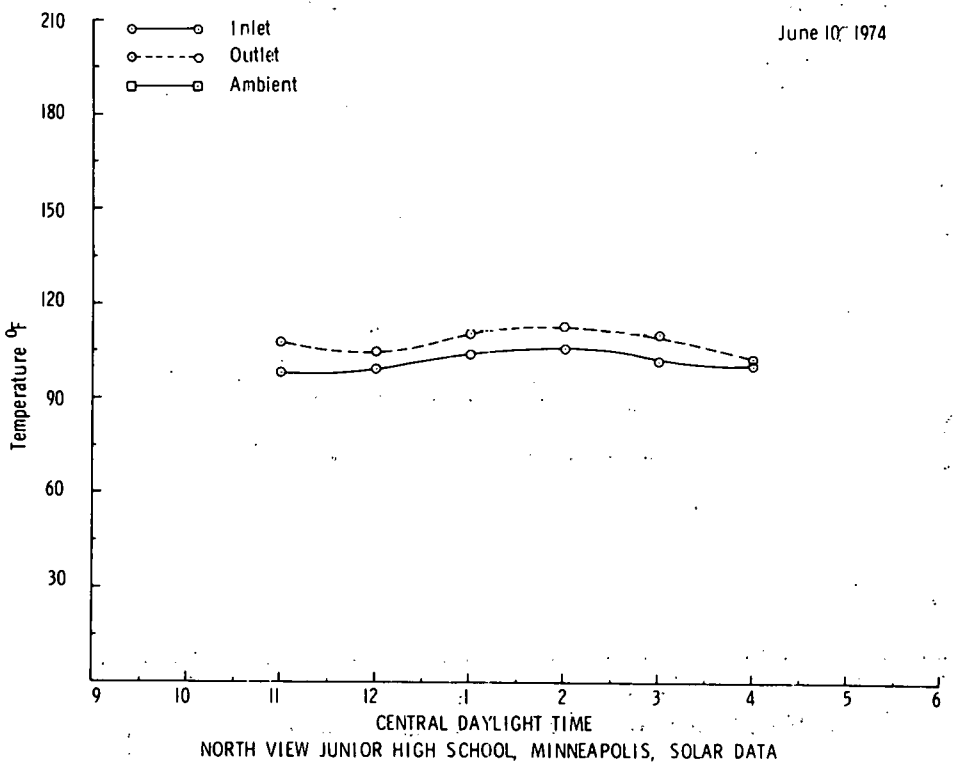
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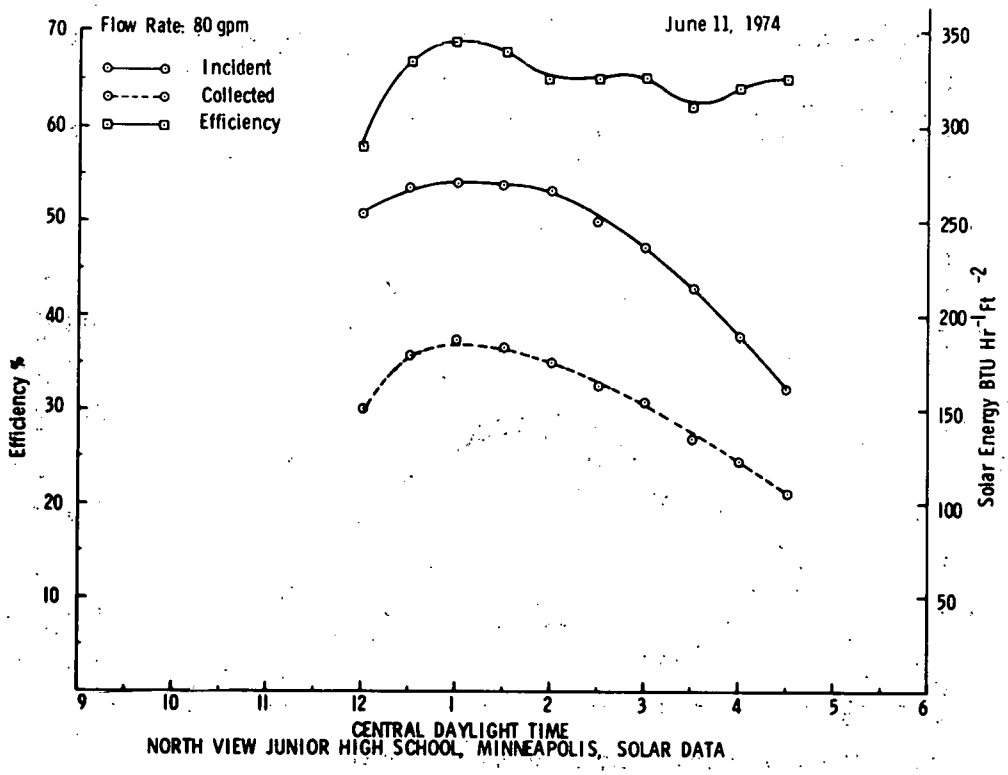
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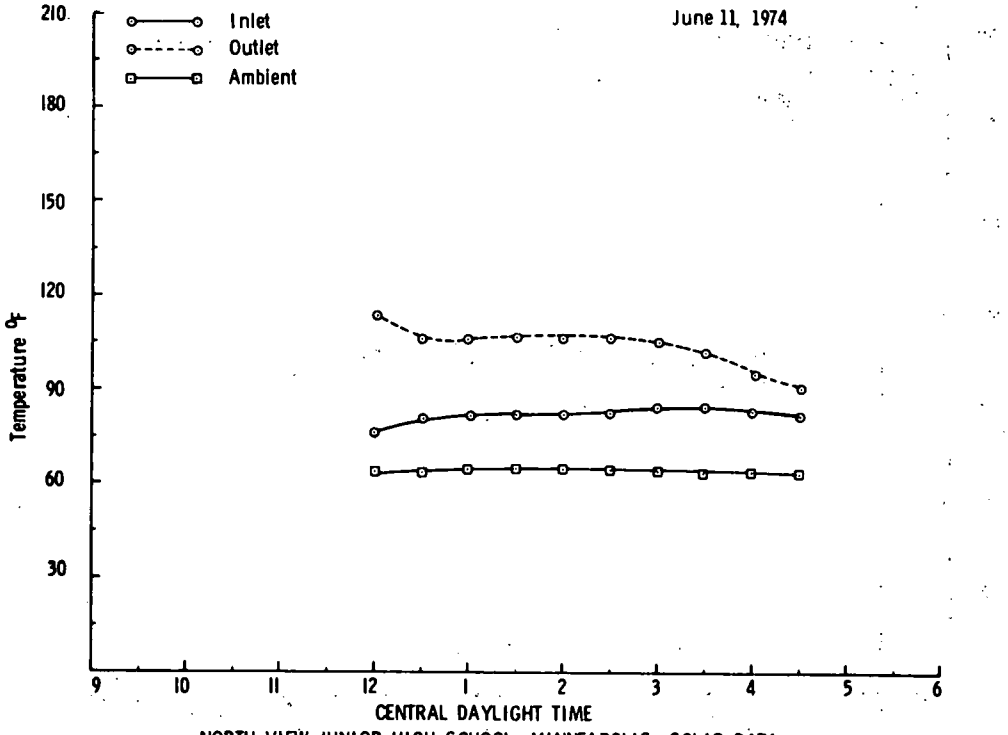
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



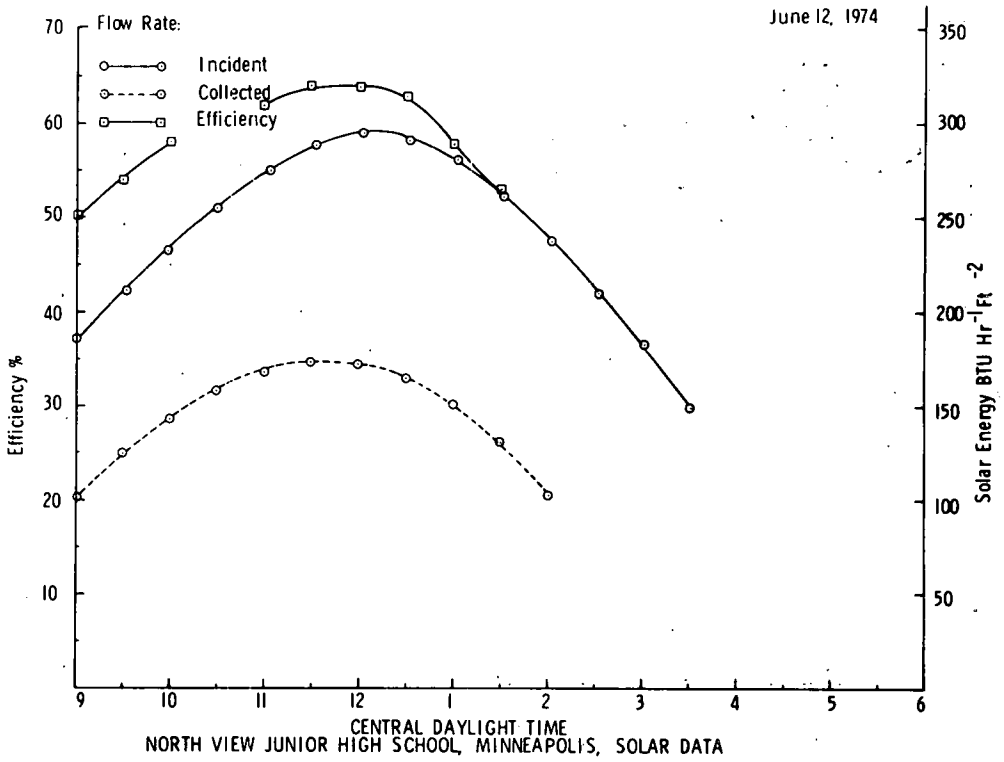
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



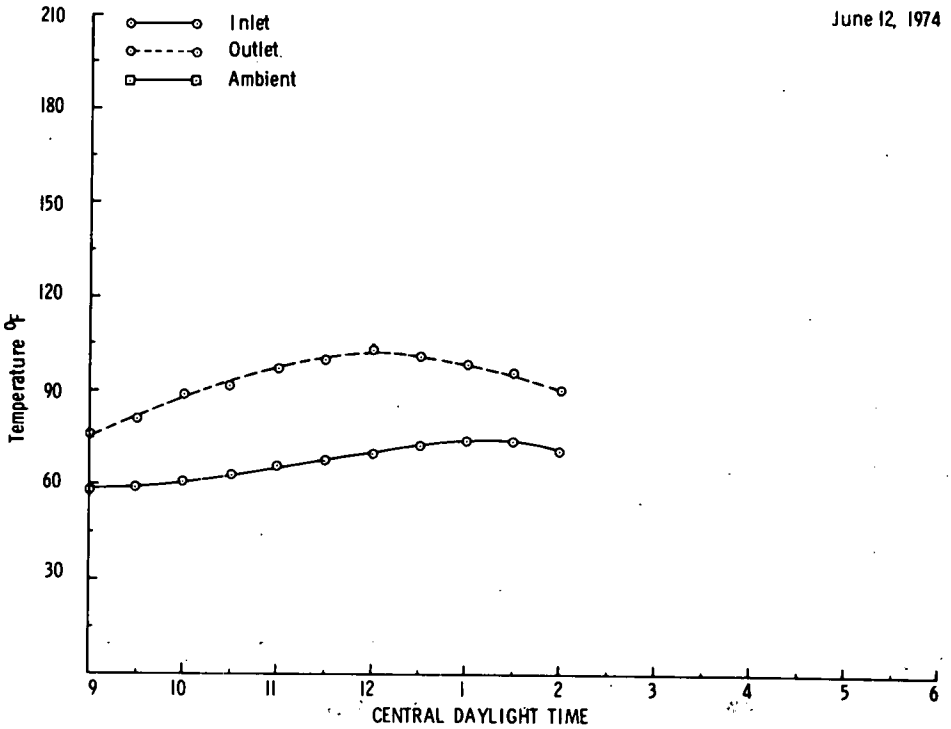
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



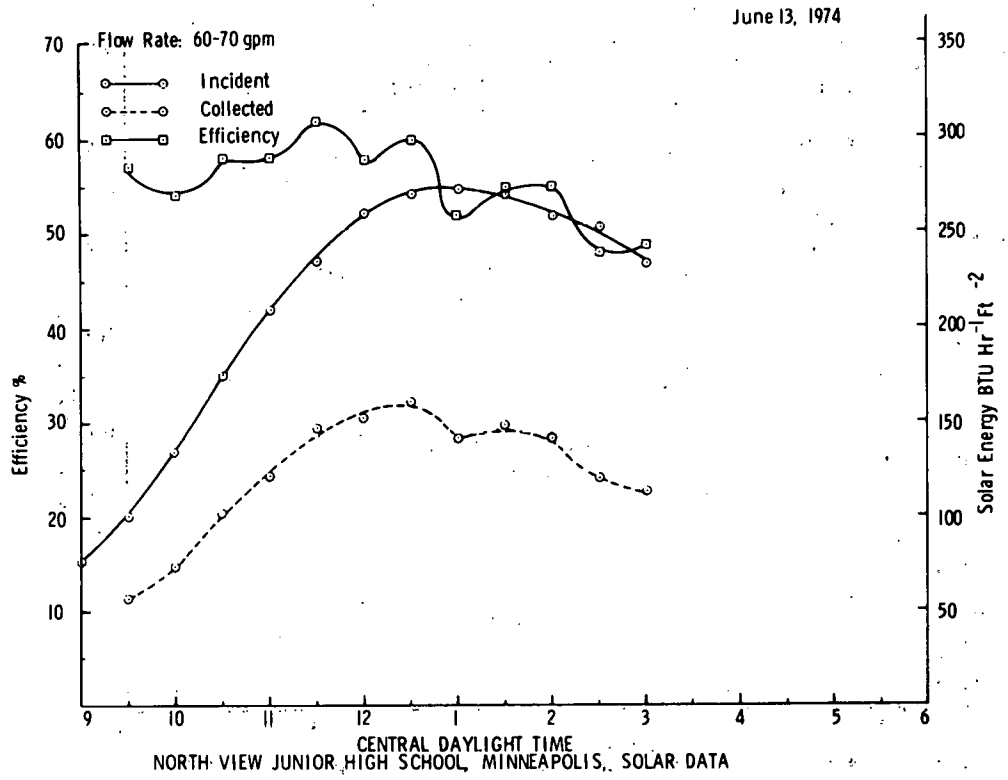
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

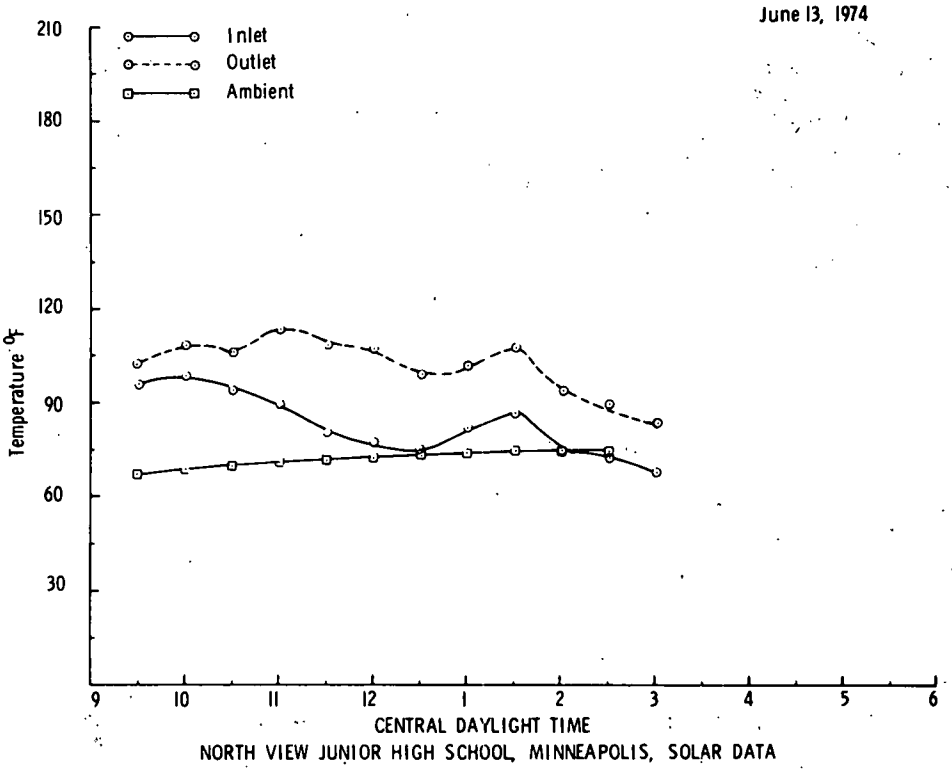


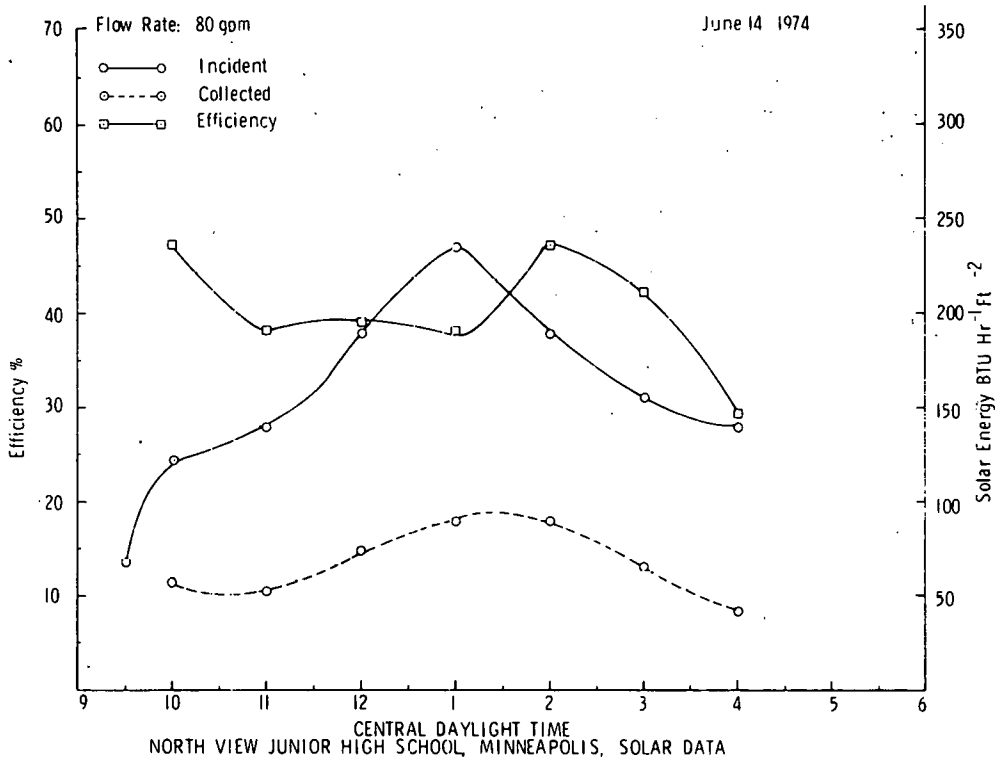
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



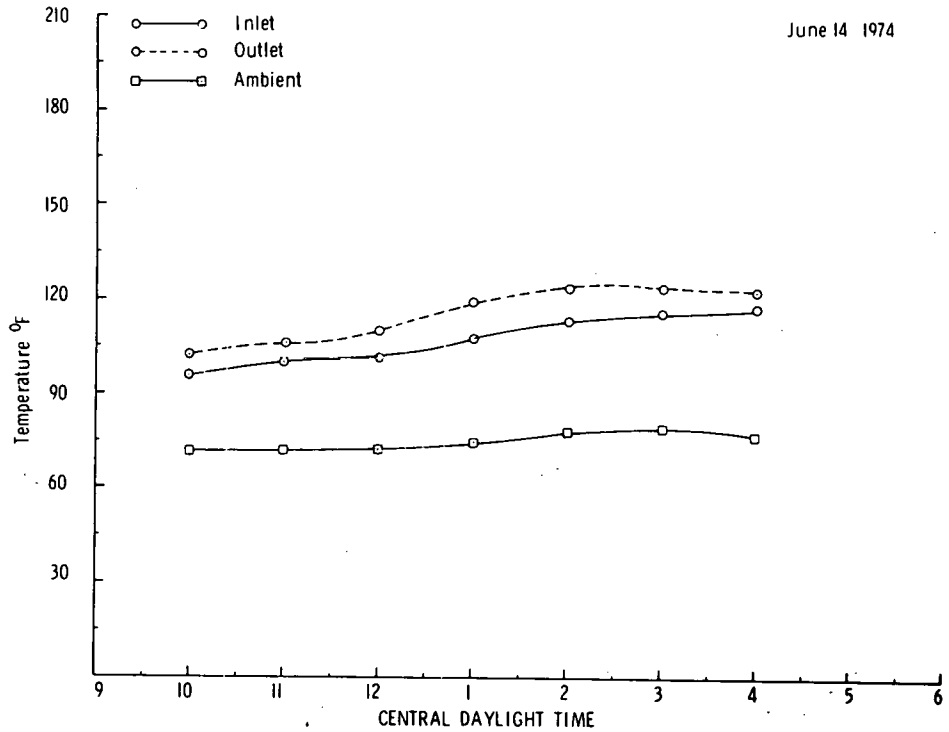
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA


June 13, 1974
Flow Rate: 60-70 gpm
Incident
Collected
Efficiency
Efficiency %
Solar Energy BTU Hr^{-1}Ft^{-2}
70
60
50
40
30
20
10
350
300
250
200
150
100
50
9
10
11
12
1
2
3
4
5
6
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

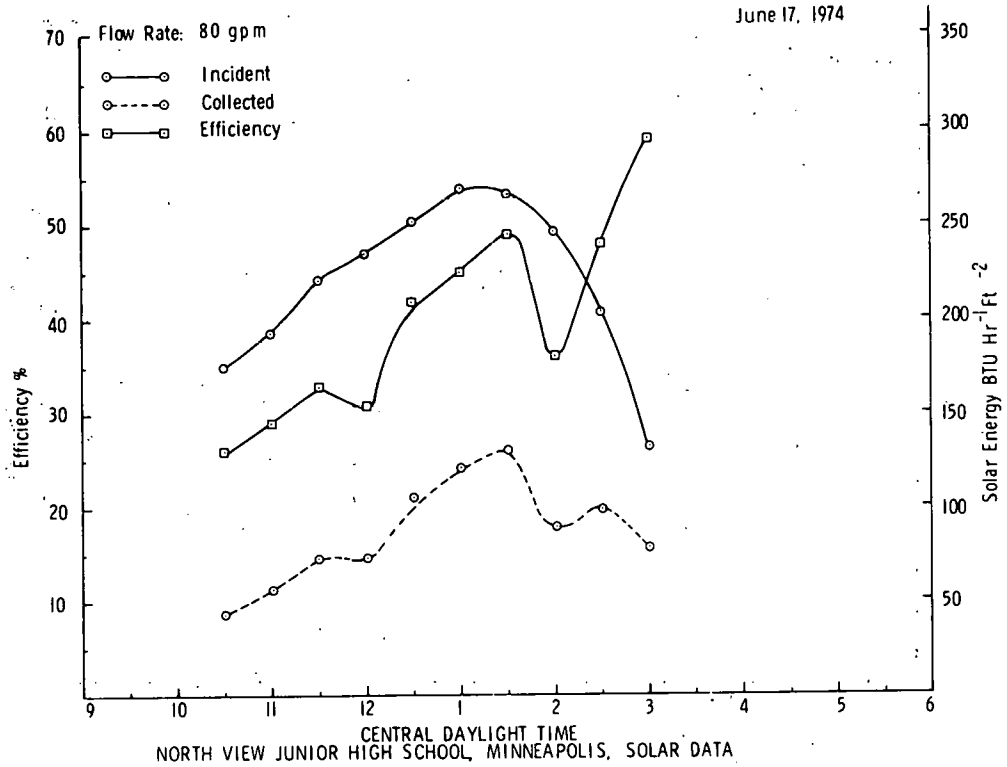

June 13, 1974
Inlet
Outlet
Ambient
Temperature °F
210
180
150
120
90
60
30
9
10
11
12
1
2
3
4
5
6
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

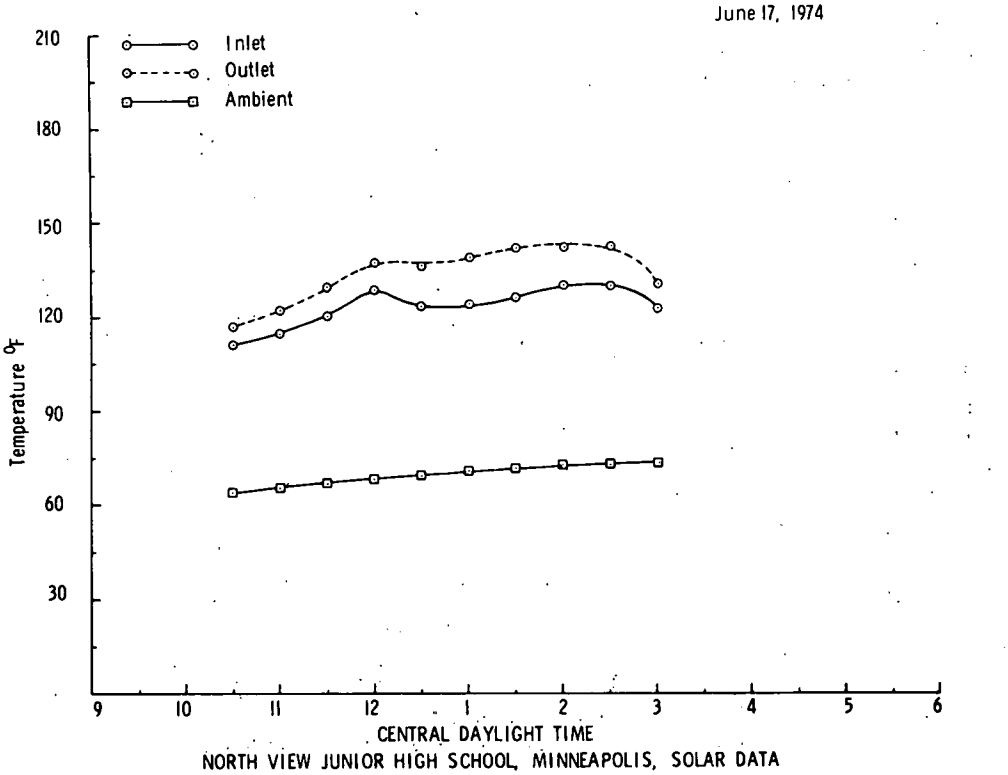


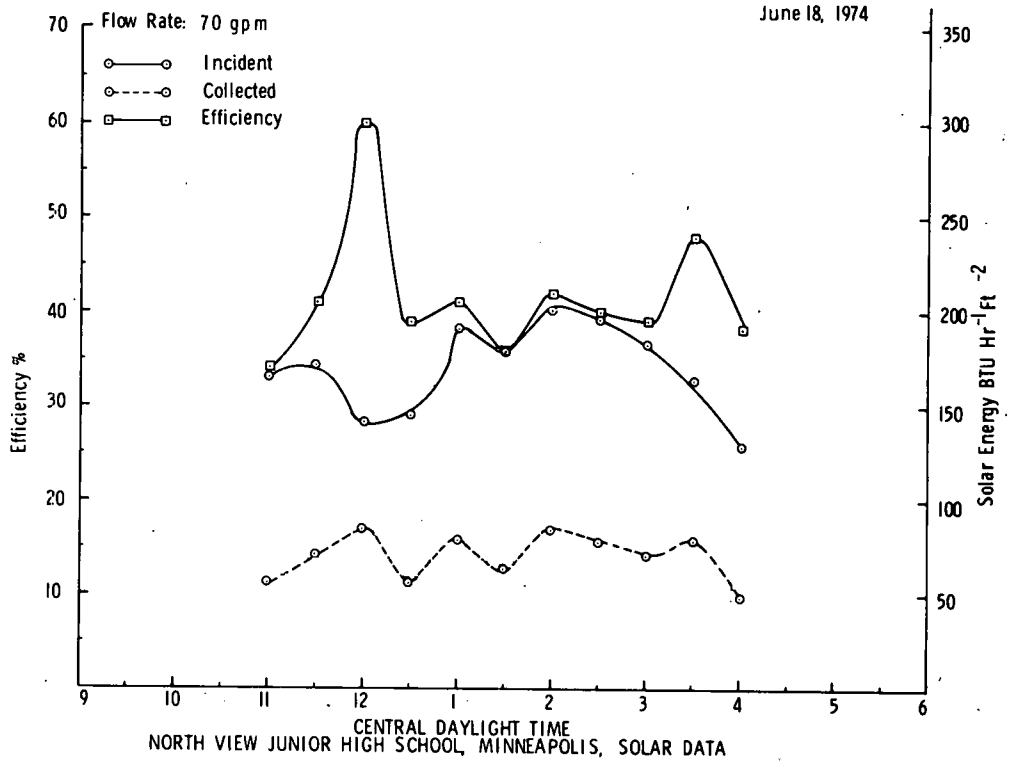
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



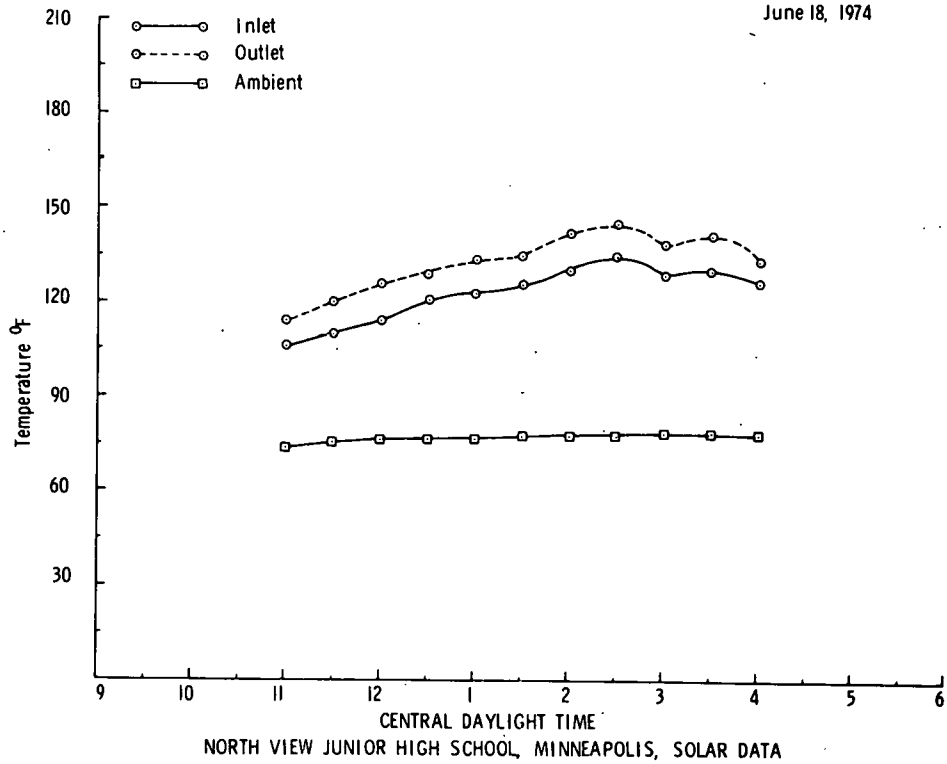
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA


June 17, 1974
Flow Rate: 80 gpm
Incident
Collected
Efficiency
Efficiency %
Solar Energy BTU Hr^{-1}Ft^{-2}
70
60
50
40
30
20
10
350
300
250
200
150
100
50
9
10
11
12
1
2
3
4
5
6
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

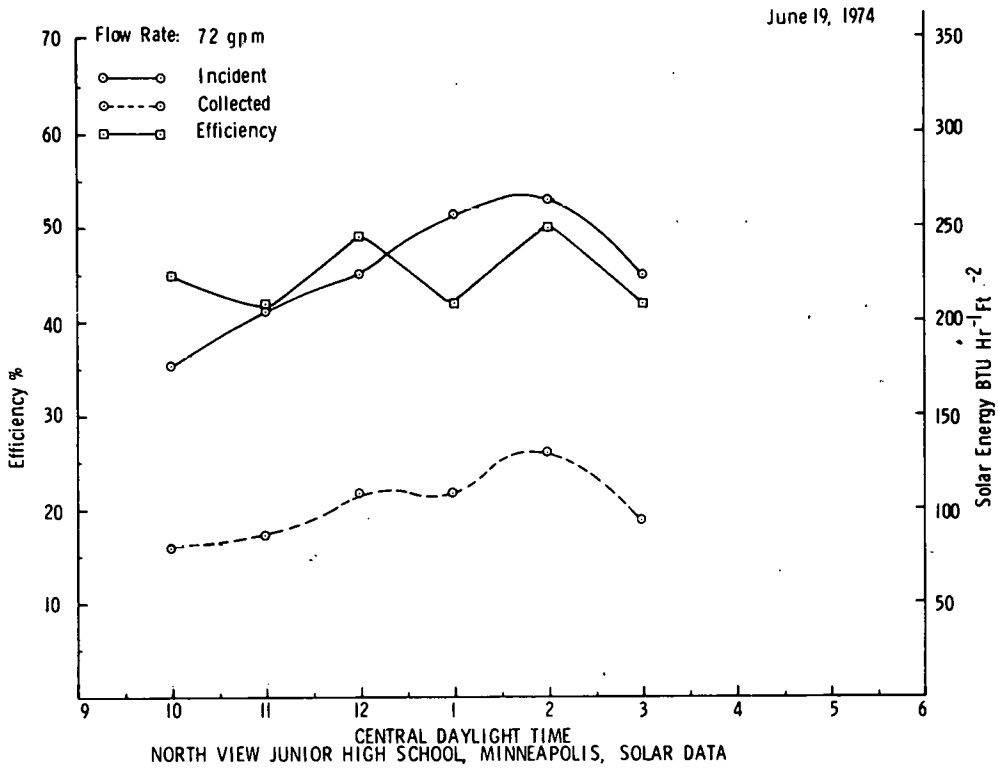

June 17, 1974
Inlet
Outlet
Ambient
Temperature °F
210
180
150
120
90
60
30
9
10
11
12
1
2
3
4
5
6
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



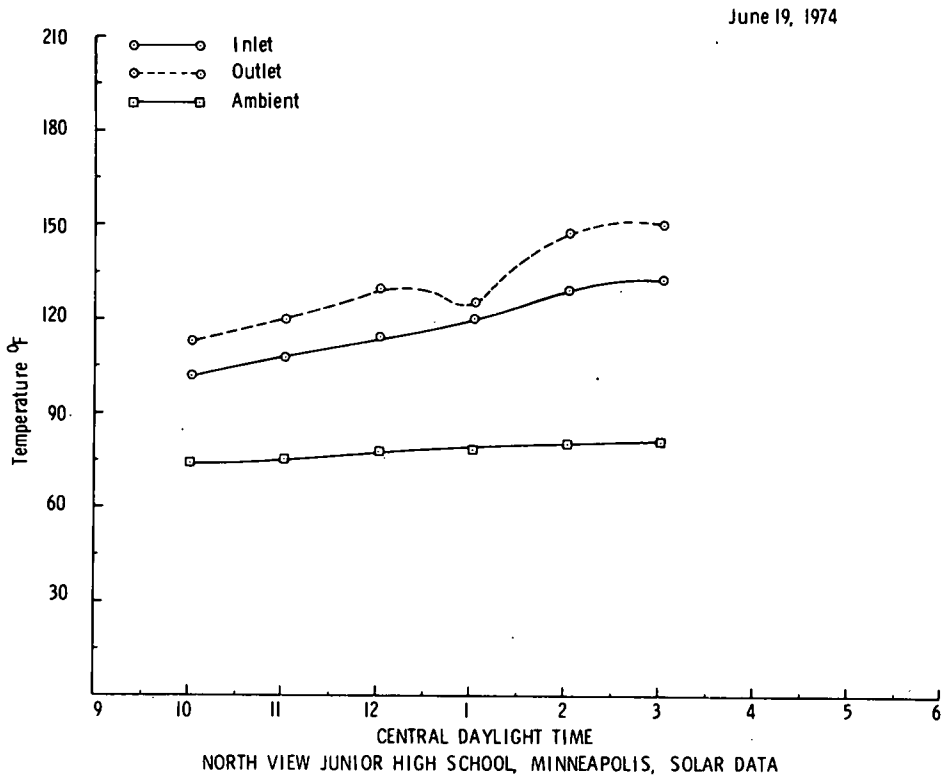
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



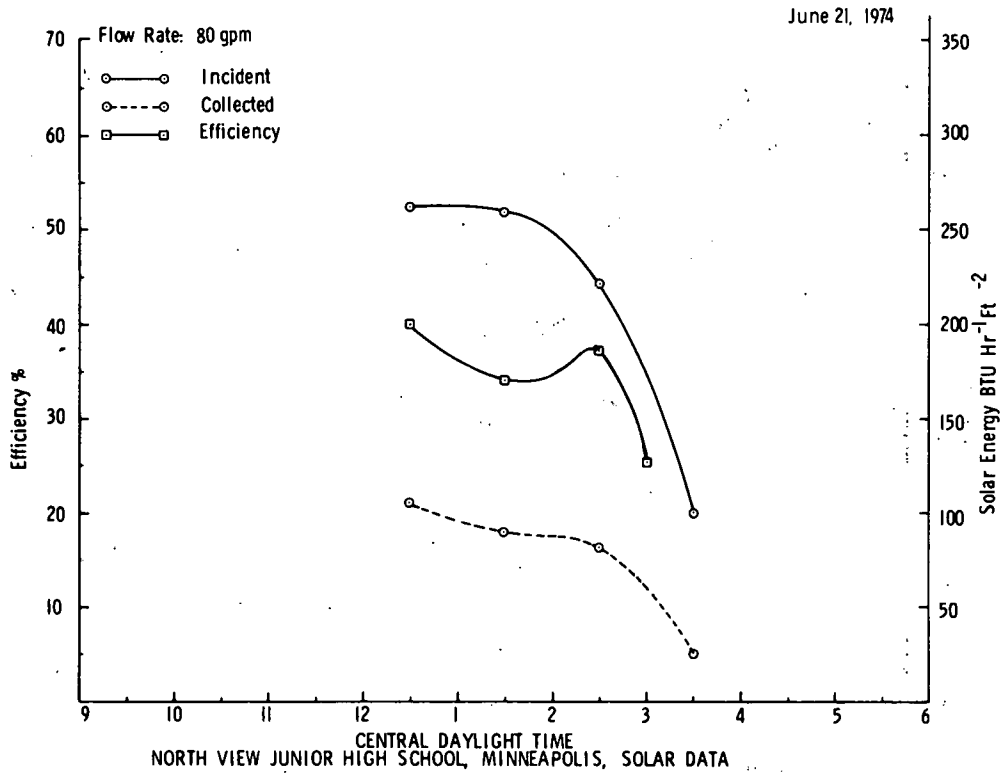
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

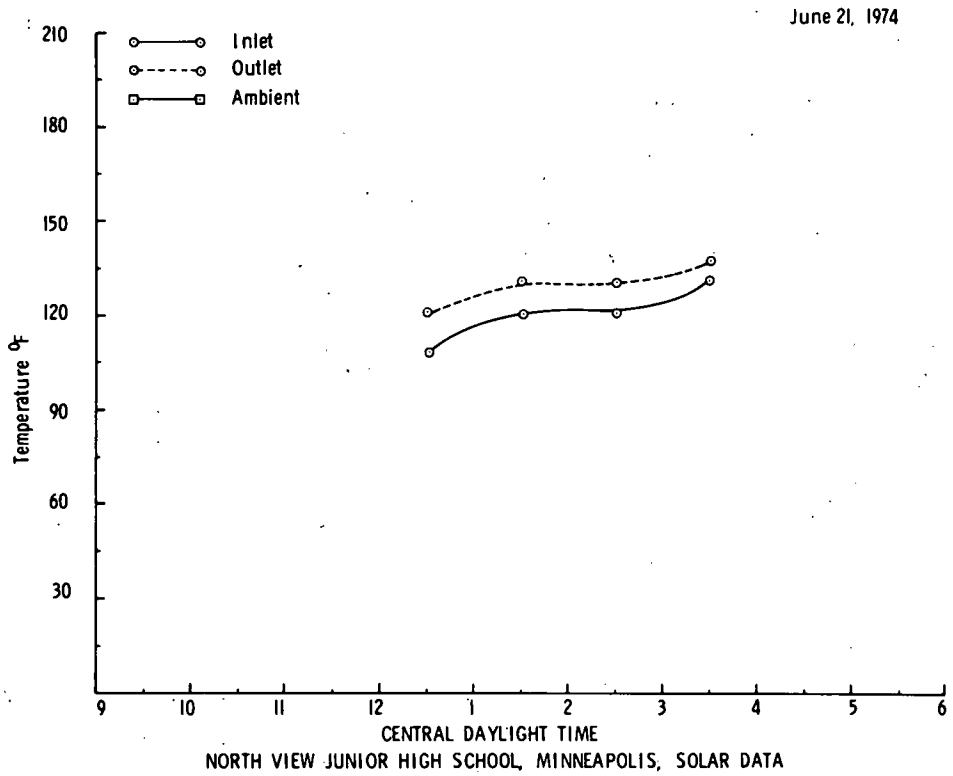


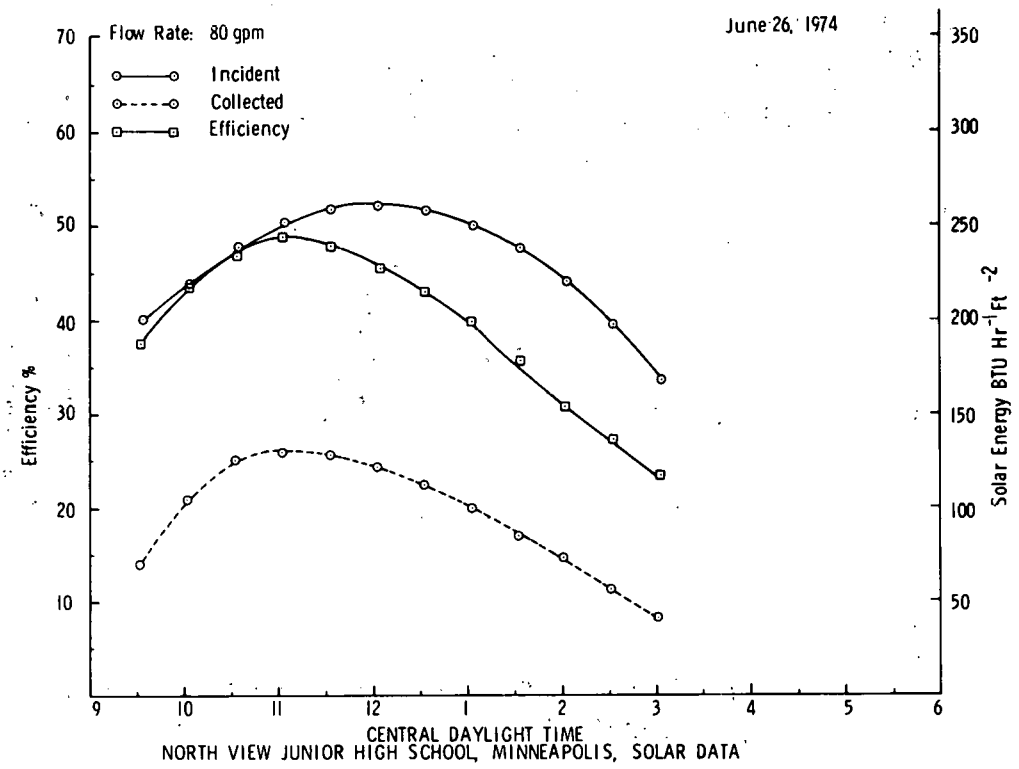
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



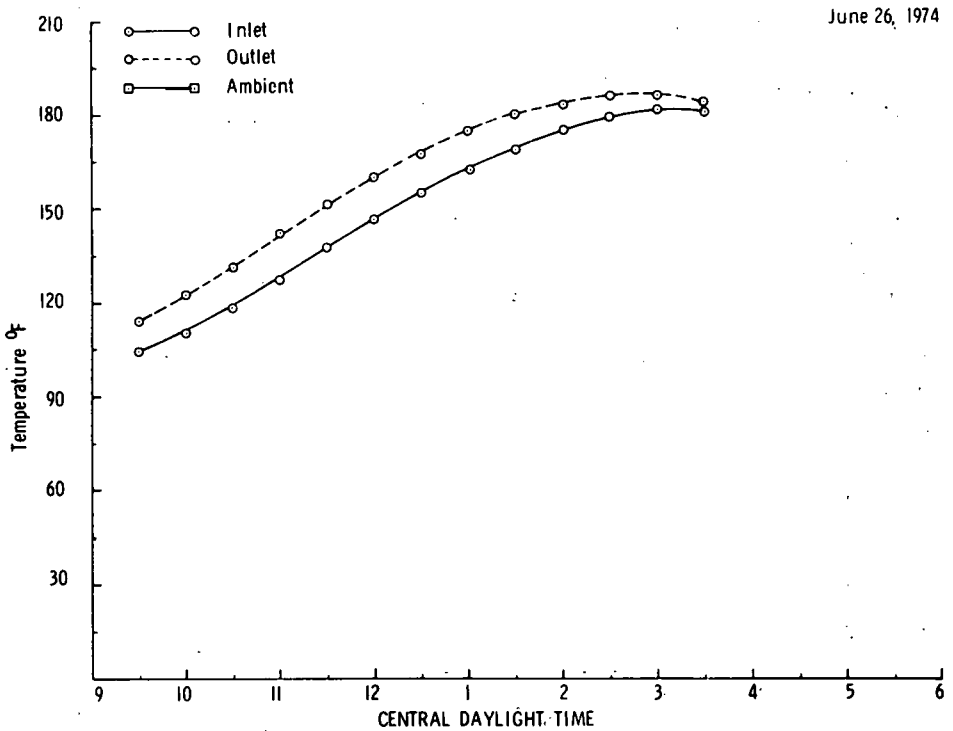
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA


June 21, 1974
Flow Rate: 80 gpm
Incident
Collected
Efficiency
Efficiency %
Solar Energy BTU Hr^{-1}Ft^{-2}
70
60
50
40
30
20
10
350
300
250
200
150
100
50
9
10
11
12
1
2
3
4
5
6
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

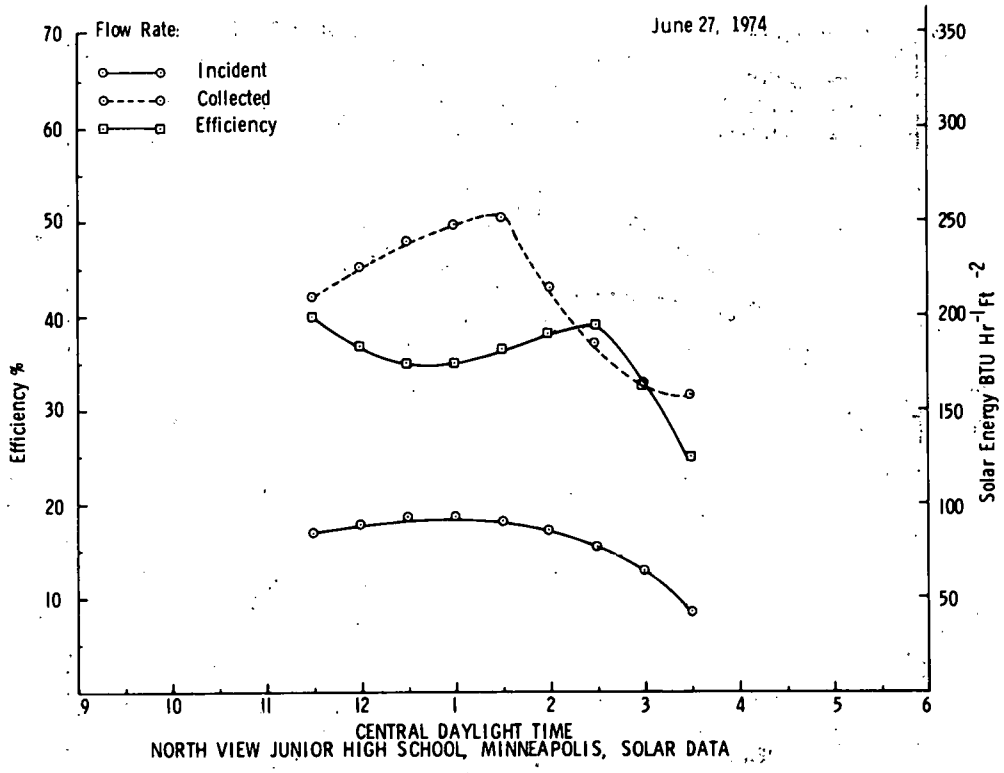

June 21, 1974
Inlet
Outlet
Ambient
Temperature °F
210
180
150
120
90
60
30
9
10
11
12
1
2
3
4
5
6
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

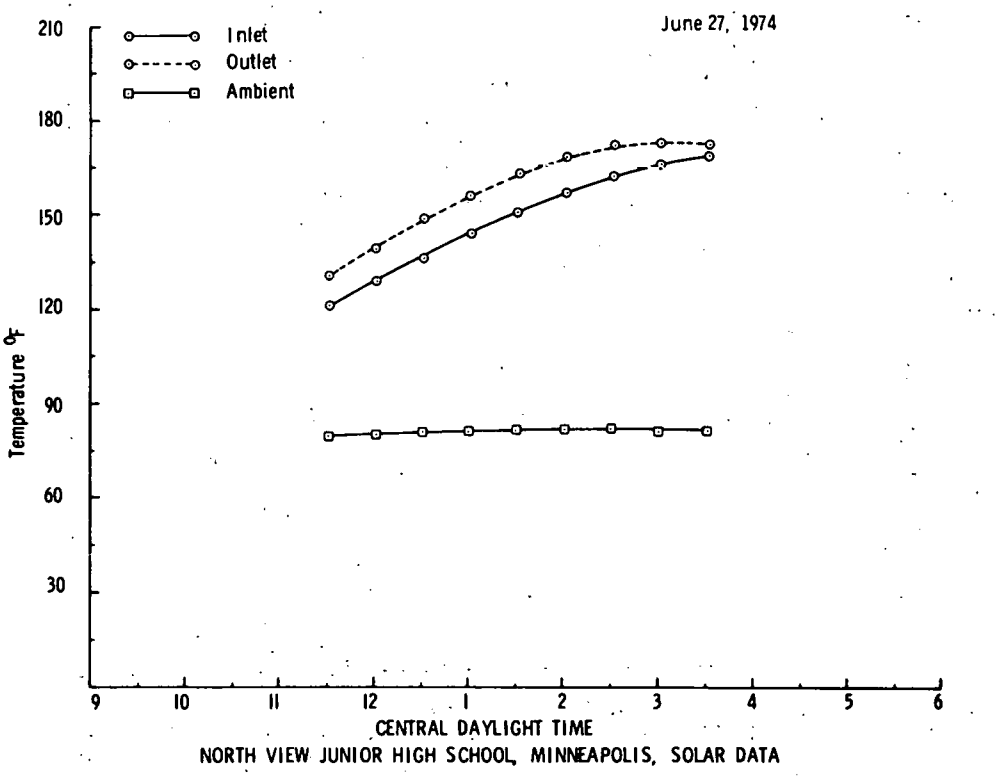


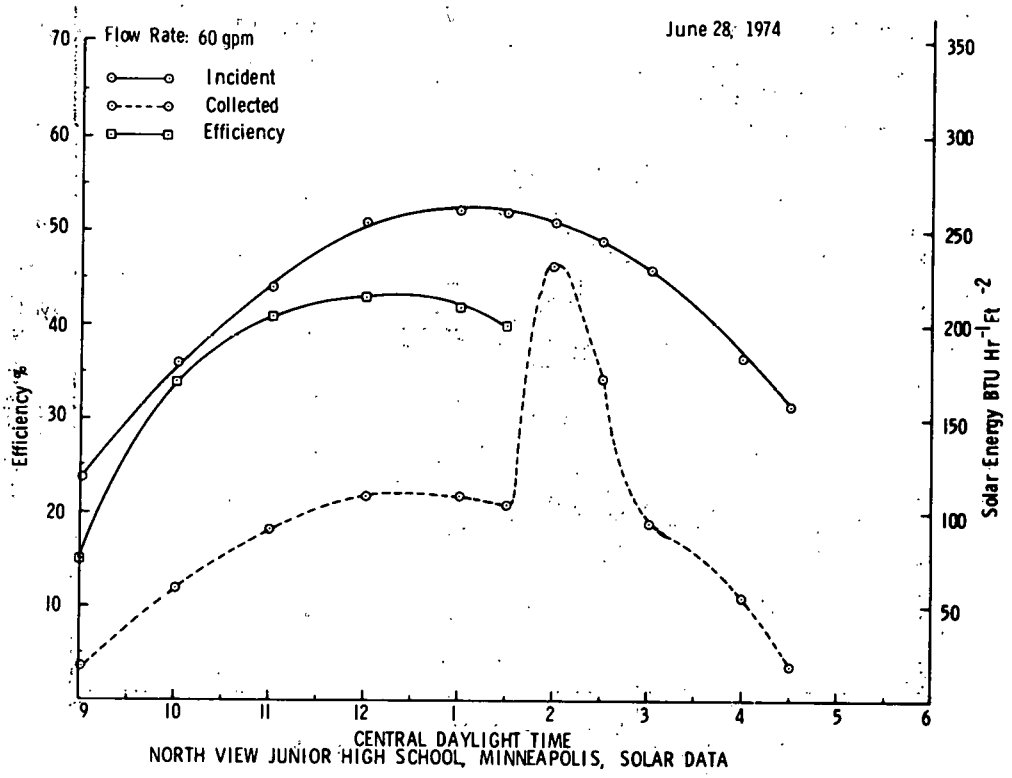
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



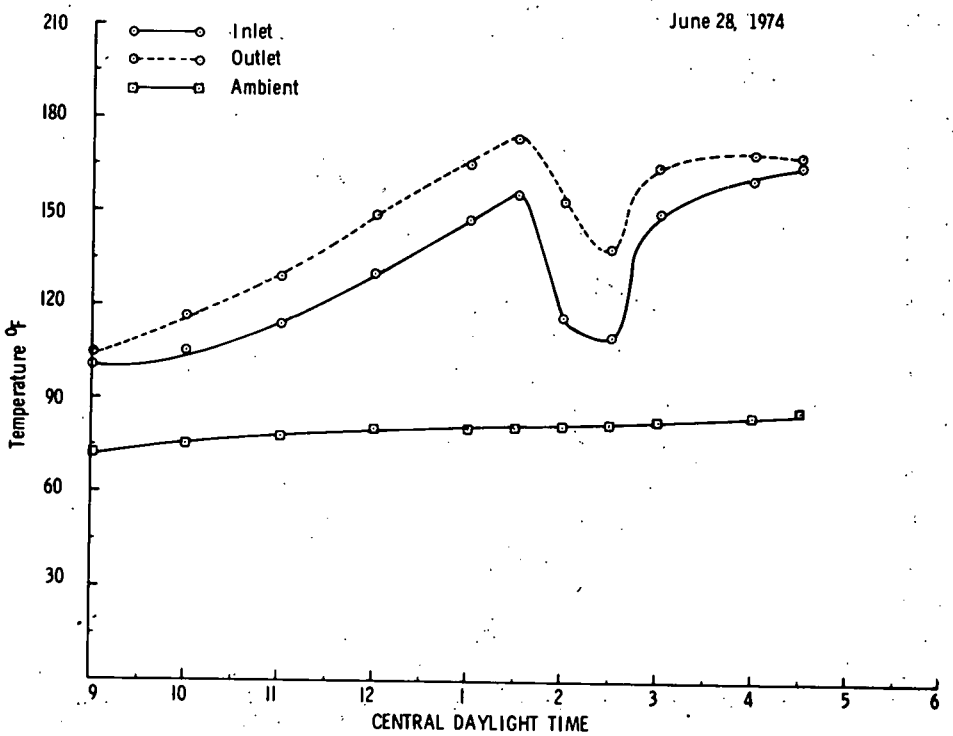
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA


Flow Rate:
Incident
Collected
Efficiency
June 27, 1974
Efficiency %
Solar Energy BTU Hr^{-1}Ft^{-2}
70
60
50
40
30
20
10
350
300
250
200
150
100
50
9
10
11
12
1
2
3
4
5
6
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA


Inlet
Outlet
Ambient
June 27, 1974
Temperature °F
210
180
150
120
90
60
30
9
10
11
12
1
2
3
4
5
6
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



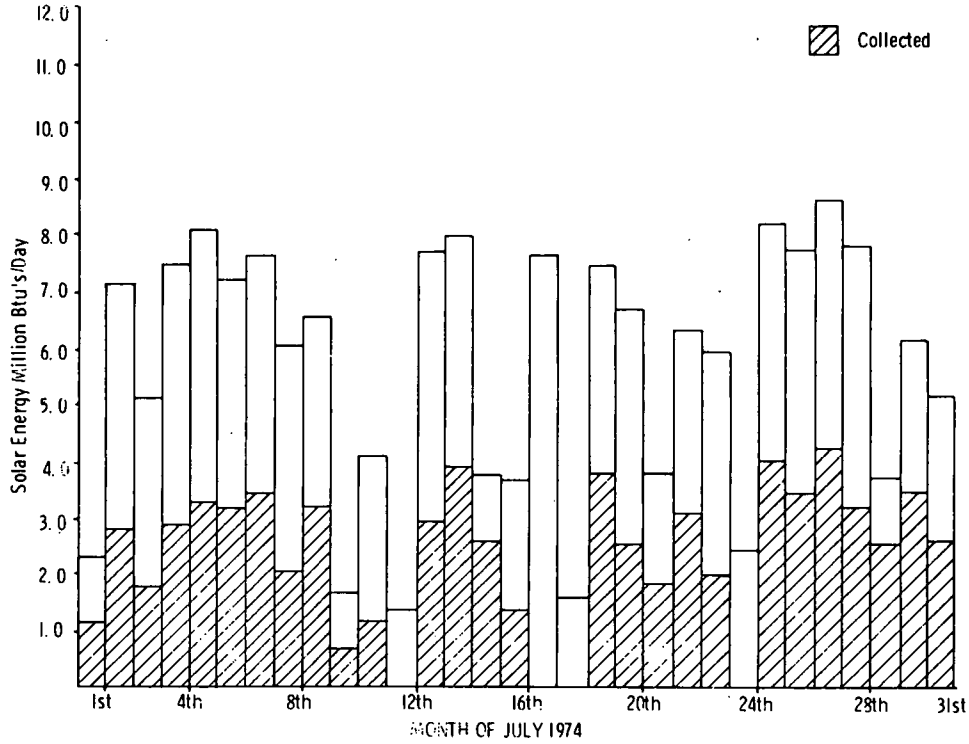
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

JULY
1974

North View Junior High

Month of July 1974

Date	Mode of Operation	Eff. = $\frac{Q_{collected}}{Q_{incident}}$
July 1	Storage from Collector	50% (2 Hours)
July 2	Storage from Collector	36%
July 3	Water Heating from Collector	34%
July 4	Holiday, Storage from Collector	39.5% (est.)
July 5	Holiday, Storage from Collector	41% (est.)
July 6	Weekend, Storage from Collector	43% (est.)
July 7	Weekend, Storage from Collector	45% (est.)
July 8	Water Heating from Collector	32%
July 9	Storage from Collector	48%
July 10	Storage from Collector	46%
July 11	Storage from Collector	27%
July 12	Cloudy, Water Heating from Storage	---
July 13	Weekend, Storage from Collector	38% (est.)
July 14	Weekend, Storage from Collector	48% (est.)
July 15	Storage + Pool Water Heating from Collector	63%
July 16	Storage from Collector	33%
July 17	Shutdown, Piping Hookup	No data collection
July 18	Cloudy, Water Heating from Storage	---
July 19	Storage and Water Heating from Collector	50.6%
July 20	Weekend, Storage from Collector	36% (est.)
July 21	Weekend, Storage from Collector	41% (est.)
July 22	Water Heating from Collector	50%
July 23	Water Heating from Collector	35%
July 24	Water Heating from Storage	---
July 25	Water Heating from Collector	50%
July 26	Water Heating from Collector	46%
July 27	Weekend, Storage from Collector	47% (est.)
July 28	Weekend, Storage from Collector	41% (est.)
July 29	Pool Water Heating from Collector	60.6%
July 30	Water Heating from Collector	58%
July 31	Storage from Collector	50.7%



NORTHVIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, MINNESOTA

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

MINNEAPOLIS-ST.PAUL, MINNESOTA
NWS WEATHER SERVICE FCST OFC
INTERNATIONAL AIRPORT
JULY 1974

LATITUDE 44° 53′ N LONGITUDE 93° 13′ W ELEVATION (GROUND) 834 FT. STANDARD TIME USED: CENTRAL WBAN 94922

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING	COOLING	WEATHER TYPES ON DATES OF OCCURRENCE (1 FOG, 2 HEAVY FOG *, 3 THUNDERSTORM, 4 ICE PELLETS, 5 HAIL, 6 GLAZE, 7 DUSTSTORM, 8 SMOKE, HAZE, 9 BLOWING SNOW)	SNOW, ICE PELLETS OR ICE ON GROUND AT 0GAM IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. ELEV. 838 FEET M.S.L.	WIND RESULTANT DIRECTION	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE HOURS AND TENTHS	PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT (LST)	DATE
1	92	63	78	8	56	0	13	3	0	.04	0	28.76	19	7.9	9.9	17	SW	11.2	72	5	6	1
2	92	71	82	12	64	0	17	3	0	T	0	28.69	21	4.3	8.3	40	NW	11.9	77	9	9	2
3	85	69	77	6	63	0	12	3	0	.08	0	28.68	27	9.6	15.4	34	SW	12.1	91	4	5	3
4	83	62	73	2	54	0	8		0	0	0	29.00	34	10.8	12.8	19	N	14.8	96	1	1	4
5	90	62	76	6	57	0	11		0	0	0	29.08	20	8.7	10.2	22	SW	15.5	100	0	1	5
6	91	71	81	10	60	0	16	3	0	0	0	29.05	18	15.5	15.8	27	SW	13.0	84	4	4	6
7	97	70	84	13	63	0	19		0	0	0	29.09	17	10.7	10.8	17	S	15.5	100	9	4	7
8	101*	73	87*	16	63	0	22		0	0	0	29.01	19	11.2	12.5	24	SW	14.1	92	5	5	8
9	92	78	85	14	65	0	20	3	0	T	0	28.98	21	8.5	8.8	17	SW	8.7	57	9	9	9
10	85	73	79	7	68	0	14	3	0	.07	0	29.05	12	7.8	9.6	26	SE	7.4	48	9	9	10
11	79	70	75	3	63	0	10		0	0	0	29.13	12	14.3	14.7	23	SE	4.9	32	10	10	11
12	89	70	80	8	66	0	15	1 3 6	0	.30	0	29.12	17	7.8	10.6	30	SW	4.9	32	7	7	12
13	99	70	85	13	69	0	20	3	0	.34	0	29.12	17	3.4	8.9	27	N	13.4	88	6	6	13
14	86	65	76	4	60	0	11	1	0	0	0	29.16	34	8.5	8.9	20	NW	13.7	90	4	4	14
15	84	60	72	0	55	0	7		0	0	0	29.23	35	9.6	8.1	12	NW	15.0	98	2	1	15
16	90	64	77	5	59	0	12		0	0	0	29.14	17	9.0	9.8	21	SW	10.3	67	7	6	16
17	82	71	82	10	64	0	17	3	0	.11	0	29.02	20	10.2	11.4	20	SW	11.0	73	4	4	17
18	81	69	75	3	69	0	10		0	.03	0	29.16	28	2.3	6.2	13	E	2.8	18	10	7	18
19	86	65	81	9	64	0	16		0	0	0	29.22	07	2.5	5.8	16	E	14.8	97	2	2	19
20	87	69	78	8	64	0	13		0	0	0	29.21	10	11.2	12.1	15	SE	14.4	95	3	2	20
21	87	64	76	4	65	0	11	3 6	0	.04	0	29.07	13	4.2	11.1	20	NE	6.8	44	7	7	21
22	89	61	75	3	57	0	10	1	0	0	0	29.13	35	8.1	9.5	13	N	11.7	77	4	4	22
23	86	62	74	2	58	0	9	3	0	.13	0	29.15	10	5.3	7.8	28	S	10.2	65	7	6	23
24	87	68	78	5	64	0	13	3	0	T	0	29.07	16	6.1	8.3	26	SW	6.4	43	10	10	24
25	89	68	79	6	60	0	14		0	0	0	29.01	27	3.8	7.1	11	W	12.1	81	4	4	25
26	86	61	74	1	53	0	9		0	0	0	29.08	30	5.9	9.4	23	W	13.6	91	2	1	26
27	86	55	71	-2	51	0	6		0	0	0	29.15	25	6.1	6.5	15	SW	13.4	90	2	2	27
28	84	57	71	-2	50	0	6		0	T	0	29.07	30	8.2	9.8	21	N	11.8	80	4	3	28
29	76	61	69	-4	48	0	4		0	0	0	29.08	31	14.3	14.7	23	NW	12.8	86	9	4	29
30	78	56	67	-6	50	0	2		0	0	0	29.13	33	8.8	9.2	15	NW	13.2	89	3	3	30
31	81	53*	67*	-6	53	0	2		0	0	0	29.20	29	5.0	6.6	10	NE	14.7	100	5	4	31
SUM	2720	2031				TOTAL 0	389			1.14	0	29.07	21	2.3	10.0	40	NW	396.0	FOR	159	150	
AVG.	87.7	65.5	76.6	4.7	60	DEP. -11	DEP. 144	NUMBER OF DAYS PRECIPITATION .01 INCH	9	DEP. -2.55							DATE: 02	POSSIBLE	MONTH	471.7	75	AVG. 5.1	AVG. 4.8

NUMBER OF DAYS MAXIMUM TEMP. ≥ 90°	≤ 32°	MINIMUM TEMP. ≤ 32°	≤ 0°	SEASON TO DATE TOTAL	DEP.
11	0	0	0	0	485
				-11	112

SNOW, ICE PELLETS .1.0 INCH 0; THUNDERSTORMS 12; HEAVY FOG 0; CLEAR 8; PARTLY CLOUDY 17; CLOUDY 6

GREATEST IN 24 HOURS AND DATES PRECIPITATION	SNOW, ICE PELLETS
.34	13
	0

GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE: 0

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

DATE	A.M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P.M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1											.04	T	T												1
2			T	T																					2
3			T	T	.04	.04	T																		3
4																									4
5																									5
6																									6
7																									7
8																									8
9																					T	T			9
10	T	.02																	T	T		.05	T		10
11																									11
12			T	.01	.07	.14	.02	T	T	T	.04	.02	T		T										12
13																					.32	.02		T	13
14																									14
15																									15
16																									16
17		.01	.04	.03	.01	T	T	.01	.01																17
18										T	T	.01	.02	T				T	T						18
19																									19
20																									20
21														.04											21
22																									22
23																		.06	.07	T				T	23
24	T			T	T	T	T				T		T		T										24
25																									25
26																									26
27																									27
28									T																28
29																									29
30																									30
31																									31

MINNEAPOLIS-ST.PAUL, MINNESOTA

* EXTREME TEMPERATURES FOR THE MONTH MAY BE THE LAST OF MORE THAN ONE OCCURRENCE.
- BELOW ZERO TEMPERATURE OR NEGATIVE DEPARTURE FROM NORMAL.
: 70° AT ALASKAN STATIONS.
+ ALSO ON AN EARLIER DATE OR DATES.
X HEAVY FOG RESTRICTS VISIBILITY TO 1/4 MILE OR LESS.
T IN THE HOURLY PRECIPITATION TABLE AND IN COLUMNS 9, 10, AND 11 INDICATES AN AMOUNT TOO SMALL TO MEASURE

THE SEASON FOR DEGREE DAYS BEGINS WITH JULY FOR HEATING AND JANUARY FOR COOLING.
DATA IN COLUMNS 9, 12, 13, 14, AND 15 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
WIND DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. RESULTANT WIND IS THE VECTOR SUM OF WIND DIRECTIONS AND SPEEDS DIVIDED BY THE NUMBER OF OBSERVATIONS. FIGURES FOR DIRECTIONS ARE TENS OF DEGREES FROM TRUE NORTH: 1-E., 09-EAST, 18-SOUTH, 27-WEST, 36-NORTH, AND 00-CALM. WHEN DIRECTIONS ARE IN TENS OF DEGREES IN COL. 17, ENTRIES IN COL. 16 ARE FASTEST OBSERVED 1-MINUTE SPEEDS. IF THE / APPEARS IN COL. 17, SPEEDS ARE GUSTS.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

SUBSCRIPTION PRICE: LOCAL CLIMATOLOGICAL DATA $2.00 PER YEAR INCLUDING ANNUAL ISSUE IF PUBLISHED. FOREIGN MAILING 75¢ EXTRA. SINGLE COPY: 20¢ FOR MONTHLY ISSUE; 15¢ FOR ANNUAL SUMMARY. MAKE CHECKS PAYABLE TO DEPARTMENT OF COMMERCE, NOAA. SEND PAYMENTS AND ORDERS TO NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC CENTER, ASHEVILLE, NORTH CAROLINA, 28801

William H. Haggard

DIRECTOR, NATIONAL CLIMATIC CENTER

SUMMARY BY HOURS

HOUR LOCAL TIME	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE °F AIR	WET BULB	DEW PT.	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
00	4	29.07	71	64	58	67	7.8	16	2.8
03	4	29.07	69	63	58	73	7.0	24	1.7
06	6	29.08	68	63	60	77	8.3	18	3.2
09	6	29.09	78	67	61	61	10.6	19	3.1
12	4	29.08	83	69	61	48	12.2	23	4.6
15	3	29.08	87	69	59	41	13.6	23	3.8
18	4	29.06	85	68	58	43	12.1	24	2.8
21	4	29.07	76	66	58	57	8.9	13	1.0

USCOMM - NOAA - ASHEVILLE 750
8/16/74

NOTICE- JUNE 1974 COOLING DEGREE DAYS SHOULD READ: TOTAL 93, DEP. -29, SEASON TOTAL 116, DEP. -32

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	SKY COVER (TENTHS)	CEILING (HUNDREDS OF FEET)	VISIBILITY (MILES)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	TEMPERATURE REL. HUM. %	WIND DIR	WIND SPEED KNOTS
DAY 01										
00	4	UNL	25		64	56	47	54	21	4
03	6	100	25		66	58	48	52	20	5
06	1	UNL	25		80	66	52	41	20	7
09	1	UNL	25		80	65	55	44	23	14
12	10	80	20	RW	78	66	56	52	18	8
15	6	300	20		68	71	63	85	13	15
18	2	UNL	30		81	70	63	65	18	8
21	8	UNL	15		81	68	61	51	17	8
DAY 02										
00	10	300	12		78	68	64	60	17	8
03	10	100	7	TRW-	79	66	60	50	31	14
06	10	110	20		72	69	60	68	18	8
09	8	UNL	20		83	70	64	56	24	5
12	10	UNL	18		80	74	67	67	24	8
15	10	150	12		82	78	68	48	19	8
18	10	300	10		82	74	66	58	19	7
21	7	UNL	12		84	71	68	53	12	4
DAY 03										
00	10	UNL	12		77	68	66	67	12	6
03	10	150	12	TRW	78	68	64	62	27	28
06	10	100	10	RW	70	68	63	78	17	13
09	2	UNL	25		80	70	65	60	24	18
12	0	UNL	25		83	72	66	57	23	19
15	0	UNL	30		82	70	65	53	20	11
18	0	UNL	25		80	68	61	52	31	11
21	0	UNL	25		78	68	59	58	34	11
DAY 04										
00	1	UNL	12		68	62	57	66	31	8
03	0	UNL	20		68	62	56	73	32	10
06	0	UNL	20		82	68	66	78	34	13
09	0	UNL	25		73	61	54	63	36	15
12	1	UNL	25		80	63	52	38	36	14
15	4	UNL	25		81	64	52	38	36	14
18	1	UNL	25		82	63	50	33	30	12
21	3	UNL	25		73	60	51	48	14	3
DAY 05										
00	0	UNL	25		67	58	54	83	00	0
03	0	UNL	25		64	58	53	88	00	0
06	1	UNL	25		68	58	54	88	12	3
09	0	UNL	25		78	66	58	58	21	15
12	1	UNL	25		87	68	58	38	20	14
15	0	UNL	25		88	68	58	54	21	18
18	0	UNL	25		88	69	58	48	18	14
21	1	UNL	25		80	68	57	48	18	11
DAY 06										
00	0	UNL	25		78	66	60	64	18	9
03	0	UNL	15		70	68	64	86	18	8
06	0	UNL	12		78	68	64	71	14	8
09	0	UNL	12		87	74	68	63	21	11
12	0	UNL	18		86	78	68	36	22	14
15	0	UNL	15		101	74	60	26	20	18
18	0	UNL	20		97	71	57	26	21	15
21	0	UNL	25		89	69	58	35	18	10
DAY 07										
00	1	UNL	20		74	64	58	58	17	9
03	3	UNL	20		71	64	60	86	18	8
06	3	UNL	12		72	66	62	71	18	8
09	4	UNL	10		83	72	67	61	18	10
12	9	UNL	10		81	74	67	68	18	12
15	6	UNL	15		88	74	64	55	18	14
18	8	UNL	25		86	73	62	54	18	12
21	0	UNL	25		84	70	63	68	16	7
DAY 08										
00	0	UNL	20		78	68	66	84	18	9
03	0	UNL	15		70	68	64	86	18	8
06	0	UNL	12		78	68	66	71	14	8
09	7	UNL	12		87	74	68	63	21	11
12	8	UNL	18		86	78	68	36	22	14
15	5	UNL	15		101	74	60	26	20	18
18	3	UNL	20		97	71	57	26	21	15
21	0	UNL	25		89	69	58	35	18	10
DAY 09										
00	10	130	20		84	70	62	48	25	8
03	10	130	15		83	68	62	48	25	8
06	10	100	15		78	68	64	80	18	8
09	10	100	15		82	71	66	58	18	7
12	9	120	10		80	72	64	62	20	10
15	9	150	15		81	75	68	67	20	11
18	9	120	10		80	75	68	65	21	9
21	9	100	12		83	73	68	61	21	9
DAY 10										
00	10	40	12		76	72	68	74	12	10
03	8	250	12	TRW	78	71	68	82	20	8
06	9	250	15		74	71	68	84	15	5
09	9	110	20		77	70	66	68	15	7
12	8	110	20		80	71	67	66	08	8
15	10	150	15		84	73	68	58	09	11
18	8	100	12		81	71	66	60	10	12
21	10	40	12		79	69	66	74	13	8
DAY 11										
00	10	42	7		73	66	66	78	11	14
03	10	110	12		71	65	61	71	12	8
06	10	27	15		70	63	58	66	11	10
09	10	20	12		74	65	60	62	12	17
12	10	23	7		78	68	62	60	15	13
15	10	22	8	H	78	69	64	64	12	17
18	10	23	6	H	76	69	65	68	13	12
21	10	19	8		74	68	64	71	13	11
DAY 12										
00	10	18	8	H	73	68	65	78	15	10
03	10	12	4	RW	71	68	66	84	13	8
06	10	14	1	RW	70	68	67	90	14	10
09	9	90	3	F	74	71	68	84	19	13
12	9	50	7	RW	78	72	68	74	22	17
15	8	80	25		88	68	58	40	25	8
18	1	UNL	25		88	71	62	41	14	4
21	0	UNL	25		80	73	70	72	12	4
DAY 13										
00	0	UNL	15		77	73	71	82	12	7
03	0	UNL	10		74	71	68	84	14	4
06	0	UNL	15		78	71	68	78	17	5
09	0	UNL	20		88	74	68	68	22	4
12	7	UNL	20		82	78	73	84	17	7
15	0	UNL	25		88	78	71	62	18	8
18	0	150	20		86	76	67	38	22	11
21	10	80	12	TRW	71	68	66	84	36	15
DAY 14										
00	7	130	12		70	67	65	84	18	7
03	10	110	12	TRW	72	68	63	73	22	5
06	10	110	10		72	65	60	66	18	14
09	10	80	12	T	72	66	62	71	14	7
12	2	UNL	12		84	70	62	48	21	15
15	1	UNL	15		92	74	68	41	23	12
18	0	UNL	15		90	75	69	50	22	9
21	0	UNL	15		81	73	68	67	22	6
DAY 15										
00	0	UNL	25		68	59	55	70	32	5
03	0	UNL	20		61	57	54	78	33	6
06	1	UNL	25		66	61	57	73	36	6
09	1	UNL	25		74	62	55	62	03	9
12	2	UNL	25		61	55	51	61	31	8
15	2	UNL	25		64	57	50	58	31	10
18	2	UNL	25		84	65	53	34	02	8
21	1	UNL	25		74	63	56	64	10	7
DAY 16										
00	1	UNL	25		68	61	57	68	00	0
03	6	250	20		66	62	58	78	10	5
06	8	UNL	15		64	60	57	78	16	4
09	7	250	20		72	64	58	64	17	6
12	2	UNL	20		82	70	63	58	20	13
15	8	80	20		80	68	58	54	18	18
18	9	110	20		85	69	60	45	18	12
21	9	110	15		80	67	60	61	16	10
DAY 17										
00	7	130	12		77	66	58	54	18	11
03	10	110	12	TRW	72	66	63	73	22	5
06	10	110	10		72	65	60	66	18	14
09	10	80	12	T	72	66	62	71	14	7
12	2	UNL	12		84	70	62	48	21	15
15	1	UNL	15		92	74	68	41	23	12
18	0	UNL	15		90	75	69	50	22	9
21	0	UNL	15		81	73	68	67	22	6
DAY 18										
00	0	UNL	15		78	72	68	74	25	4
03	0	UNL	15		74	70	68	82	01	2
06	0	UNL	15		74	69	67	78	26	9
09	0	UNL	25		80	72	68	68	03	7
12	2	UNL	25	RW	79	74	72	84	32	3
15	0	UNL	25		81	74	71	72	24	9
18	0	UNL	25	RW	78	71	68	71	23	7
21	0	UNL	25		75	70	67	78	06	5
DAY 19										
00	0	UNL	12		68	66	64	84	21	5
03	0	UNL	12		68	66	65	90	00	0
06	4	UNL	7		68	66	65	87	08	6
09	2	UNL	10		82	70	64	63	11	4
12	0	UNL	15		80	72	63	41	25	6
15	1	UNL	15		84	74	64	37	05	9
18	0	UNL	15		83	73	63	37	03	9
21	4	UNL	15		82	72	67	61	07	9
DAY 20										
00	0	UNL	15		74	68	64	71	08	12
03	0	UNL	15		71	65	62	73	06	8
06	1	UNL	8		71	66	63	78	09	10
09	0	UNL	8		75	68	64	68	14	10
12	0	UNL	8		82	71	63	51	11	10
15	0	UNL	10		86	72	68	51	11	12
18	0	UNL	10		85	72	68	53	11	12
21	1	UNL	10		79	70	66	62	12	10
DAY 21										
00	0	UNL	10		75	68	64	68	14	9
03	0	UNL	10		72	67	64	78	14	8
06	0	UNL	7		71	66	63	78	14	10
09	0	UNL	7		74	68	64	70	16	16
12	0	UNL	7		86	72	66	61	18	8
15	0	UNL	7		84	74	70	63	34	4
18	0	UNL	7		84	74	70	63	02	8
21	0	UNL	7		73	66	63	73	36	14
DAY 22										
00	10	11	7		64	60	58	81	36	13
03	10	11	10		63	60	58	84	01	10
06	10	4	5	F	61	58	56	90	06	7
09	6	6	6	F	68	63	59	71	32	4
12	10	UNL	6		77	66	58	54	36	6
15	0	UNL	25		87	67	55	34	30	10
18	1	UNL	25		88	67	55	33	33	10
21	0	UNL	20		78	65	55	48	02	6
DAY 23										
00	0	UNL	20		72	62	56	67	06	5
03	0	UNL	15		68	61	56	83	00	0
06	0	UNL	15		68	63	60	78	09	5
09	2	UNL	12		78	66	58	50	19	7
12	0	250	20		88	67	56	37	14	10
15	0	UNL	20		88	67	56	36	12	14
18	0	150	15	TRW	71	66	63	78	03	13
21	10	110	15		70	65	62	76	00	0
DAY 24										
00	10	80	10	RW	68	66	63	81	15	6
03	10	100	10		68	64	62	81	15	3
06	10	100	15	RW	69	65	63	81	12	7
09	10	100	7		72	67	65	78	13	8
12	6	250	12		81	72	67	63	00	6
15	6	250	12		86	74	68	57	18	10
18	10	130	15		82	67	58	46	22	12
21	10	130	15		77	67	61	58	18	8
DAY 25										
00	10	UNL	15		73	65	60	64	24	8
03	7	250	15		71	65	61	71	24	7
06	8	250	12		68	65	63	84	22	9
09	8	250	15		78	68	66	71	27	4
12	5	UNL	20		84	70	62	48	12	6
15	3	UNL	25		87	68	57	36	33	10
18	0	UNL	25		87	67	55	34	31	8
21	0	UNL	20		78	66	58	52	24	4
DAY 26										
00	0	UNL	25		69	63	58	71	22	4
03	0	UNL	09		65	62	60	84	18	4
06	0	130	20		68	64	61	78	14	5
09	4	UNL	15		78	68	63	58	27	8
12	0	UNL	25		85	68	58	40	33	15
15	0	UNL	25		84	68	57	38	31	15
18	0	UNL	25		82	66	56	41	33	13
21	0	UNL	25		78	67	58	48	29	8
DAY 27										
00	0	UNL	25		64	56	48	58	00	0
03	0	UNL	25		60	54	50	70	00	0
06	0	90	25		58	54	50	81	21	3
09	0	110	25		71	58	51	48	27	5
12	0	UNL	25		82	62	47	30	24	8
15	0	UNL	25		85	64	51	31	27	13
18	1	UNL	25		84	66	52	33	25	10
21	0	UNL	25		80	60	54	58	32	8
DAY 28										
00	0	UNL	25		64	56	53	68	20	3
03	1	UNL	25		62	56	56	81	24	2
06	7	110	20		61	58	57	87	21	3
09	8	90	15		72	62	55	56	38	9
12	0	UNL	25		82	61	46	28	30	12
15	8	UNL	25		84	62	46	28	28	15
18	1	UNL	25		78	58	42	27	31	10
21	0	UNL	25		80	56	46	42	31	10
DAY 29										
00	0	UNL	25		66	56	47	51	28	8
03	0	UNL	25		63	56	50	63	30	10
06	2	UNL	25		61	56	50	67	31	11
09	2	20	25		68	58	52	57	33	15
12	6	35	25		74	61	51	46	31	17
15	3	UNL	25		78	58	46	35	30	18
18	3	UNL	25		75	58	46	36	33	15
21	4	UNL	25		68	57	48	51	31	7
DAY 30										
00	0	70	25		65	57	50	58	30	7
03	1	UNL	25		58	54	50	72	31	8
06	0	UNL	25		58	55	52	81	31	8
09	0	UNL	25		68	60	53	57	34	10
12	5	UNL	25		73	60	51	48	33	11
15	4	UNL	25		78	58	46	35	32	12
18	4	UNL	25		76	60	49	40	38	7
21	0	UNL	25		68	58	51	55	35	9

NOTES

CEILING COLUMN-
UNL INDICATES AN UNLIMITED CEILING

WEATHER COLUMN-

+	TORNADO
T	THUNDERSTORM
Q	SQUALL
R	RAIN
RW	RAIN SHOWERS
ZR	FREEZING RAIN
L	DRIZZLE
ZL	FREEZING DRIZZLE
S	SNOW
SP	SNOW PELLETS
IC	ICE CRYSTALS
SW	SNOW SHOWERS
SG	SNOW GRAINS
IP	ICE PELLETS
A	HAIL
F	FOG
IF	ICE FOG
GF	GROUND FOG
BD	BLOWING DUST
BN	BLOWING SAND
BS	BLOWING SNOW
BY	BLOWING SPRAY
K	SMOKE
H	HAZE
D	DUST

WIND COLUMNS-

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH: I.E., 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS; MULTIPLY BY 1.15 TO CONVERT TO MILES PER HOUR.

ADDITIONAL DATA

OTHER OBSERVATIONAL DATA CONTAINED IN RECORDS ON FILE CAN BE FURNISHED AT COST VIA MICROFILM, MICROFICHE, OR PAPER COPIES OF THE ORIGINAL RECORDS. INQUIRIES AS TO AVAILABILITY AND COSTS SHOULD BE ADDRESSED TO: DIRECTOR, NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

STATION: MINNEAPOLIS MINN YEAR & MONTH: 74 07

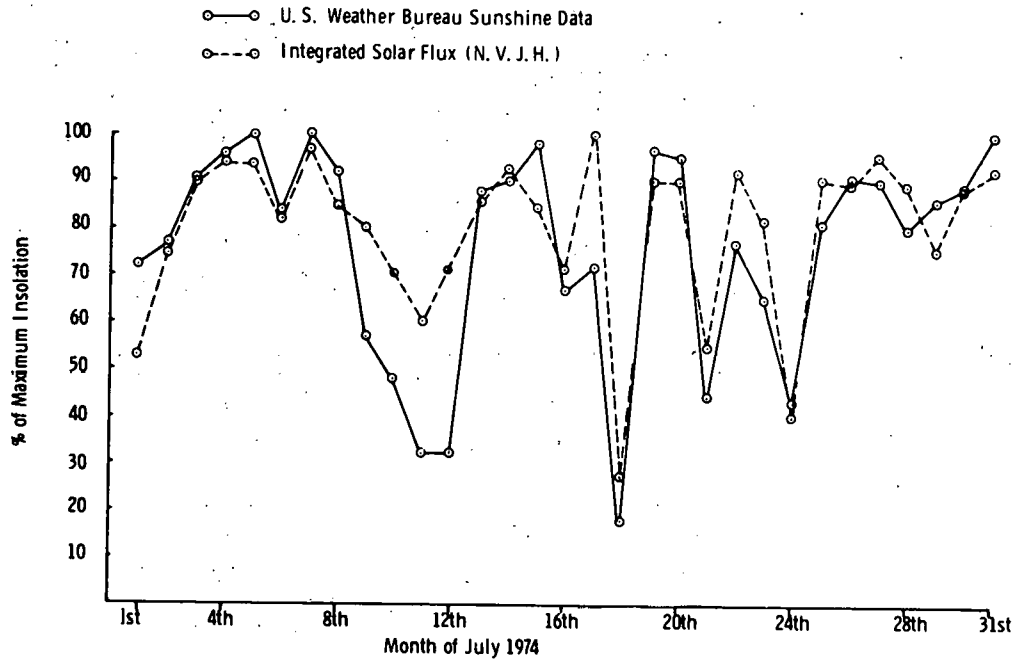
U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

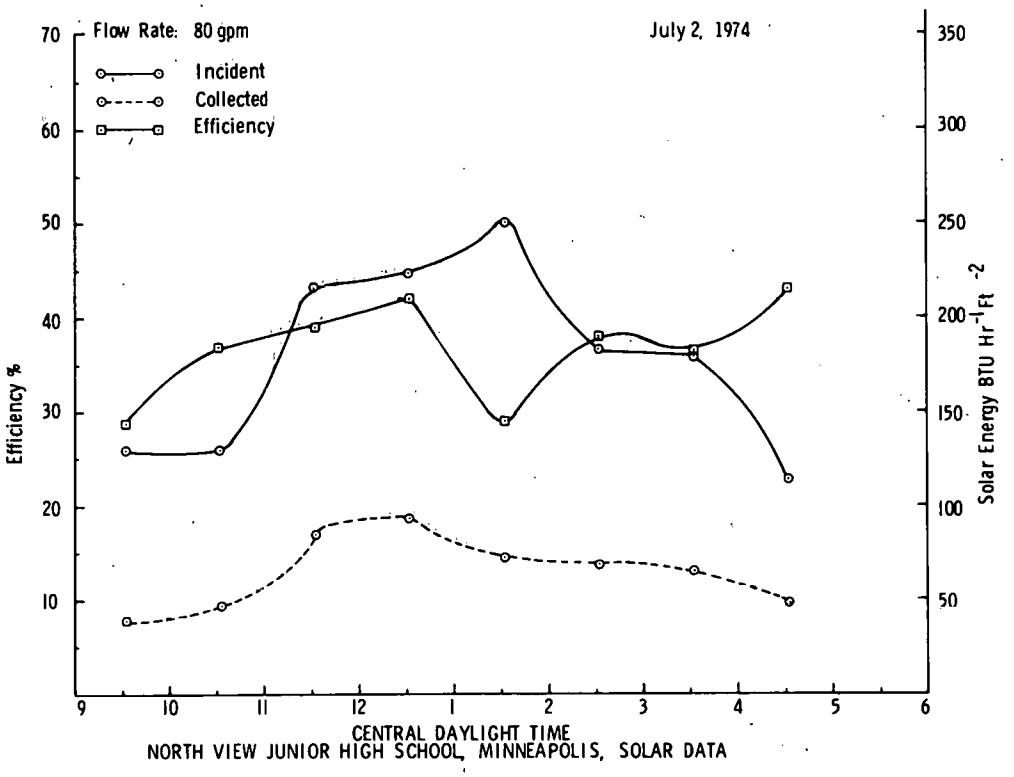
AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
210

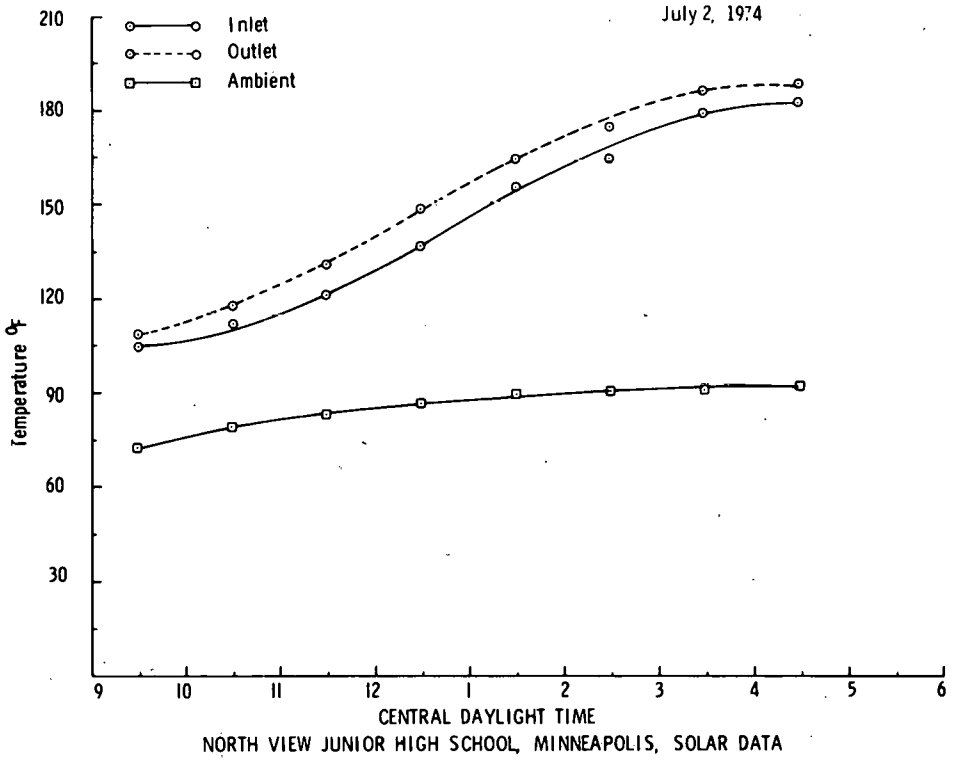
FIRST CLASS

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

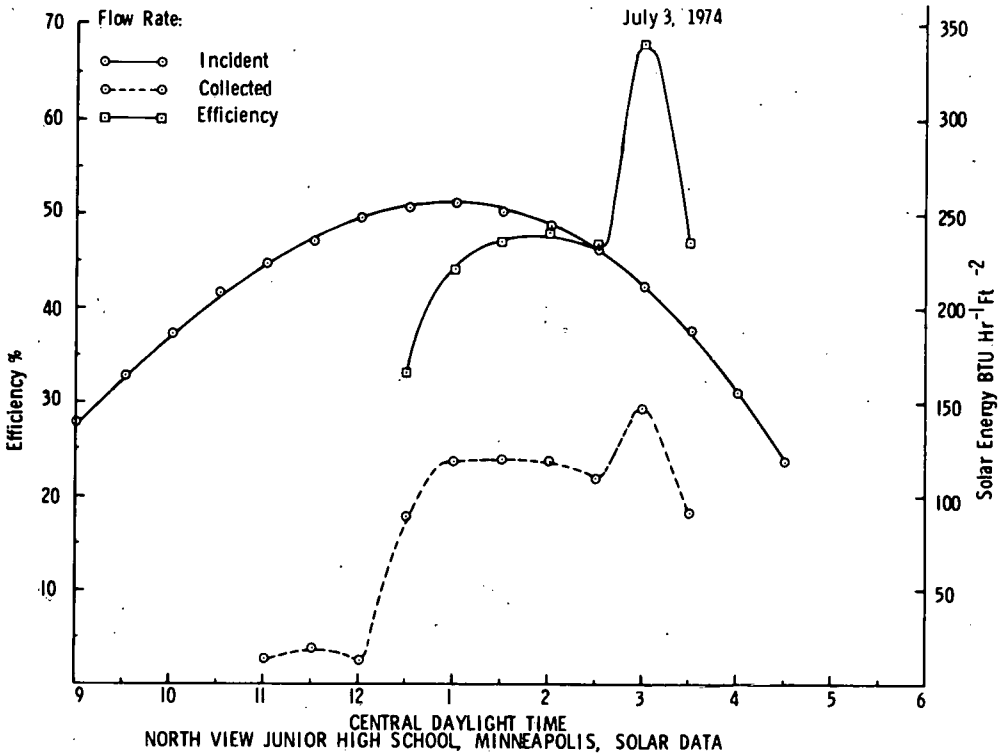

U. S. Weather Bureau Sunshine Data
Integrated Solar Flux (N. V. J. H.)
% of Maximum Insolation
100
90
80
70
60
50
40
30
20
10
1st
4th
8th
12th
16th
20th
24th
28th
31st
Month of July 1974



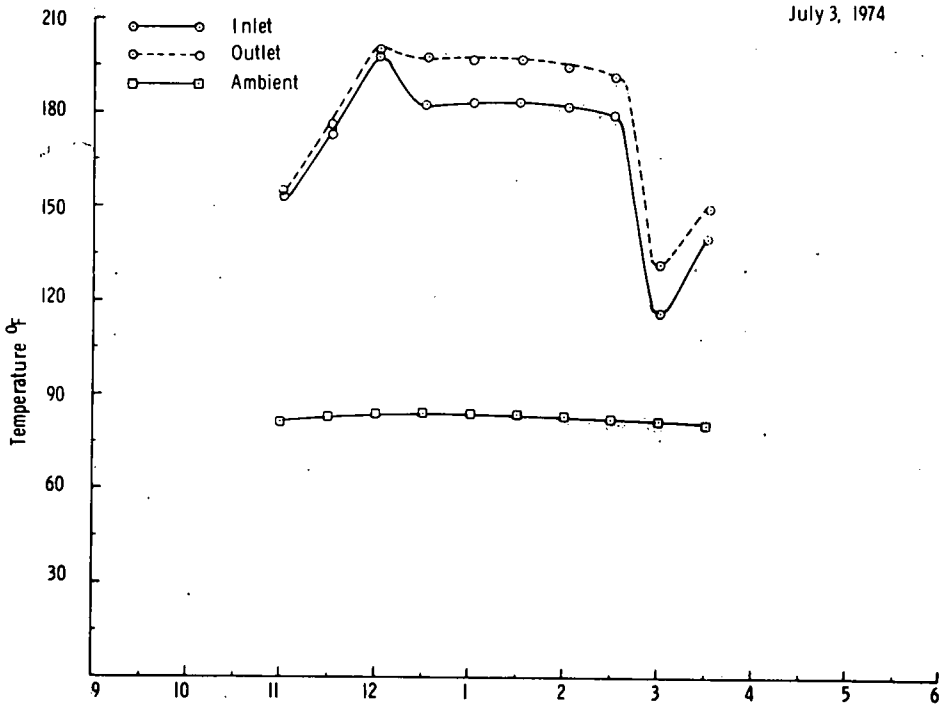
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



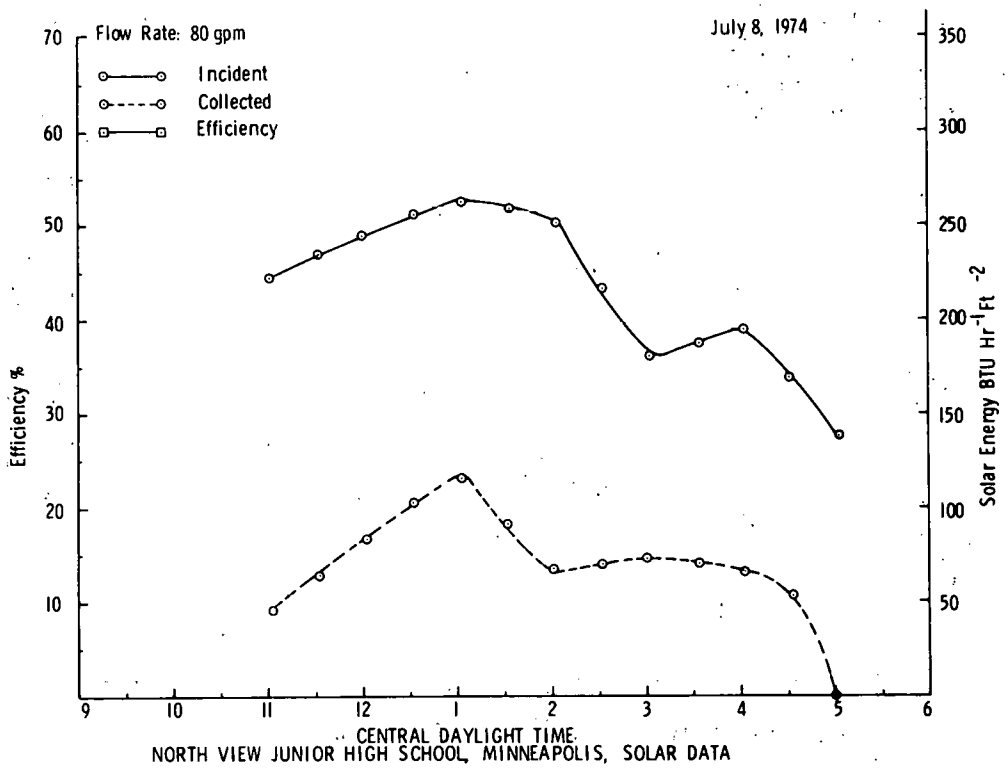
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



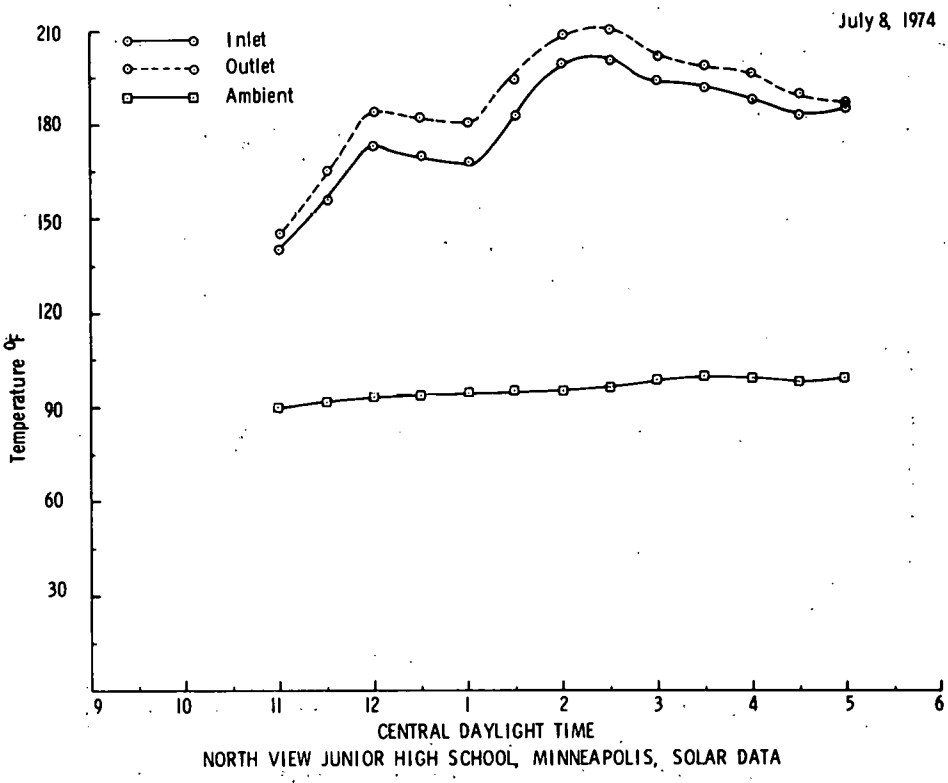
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



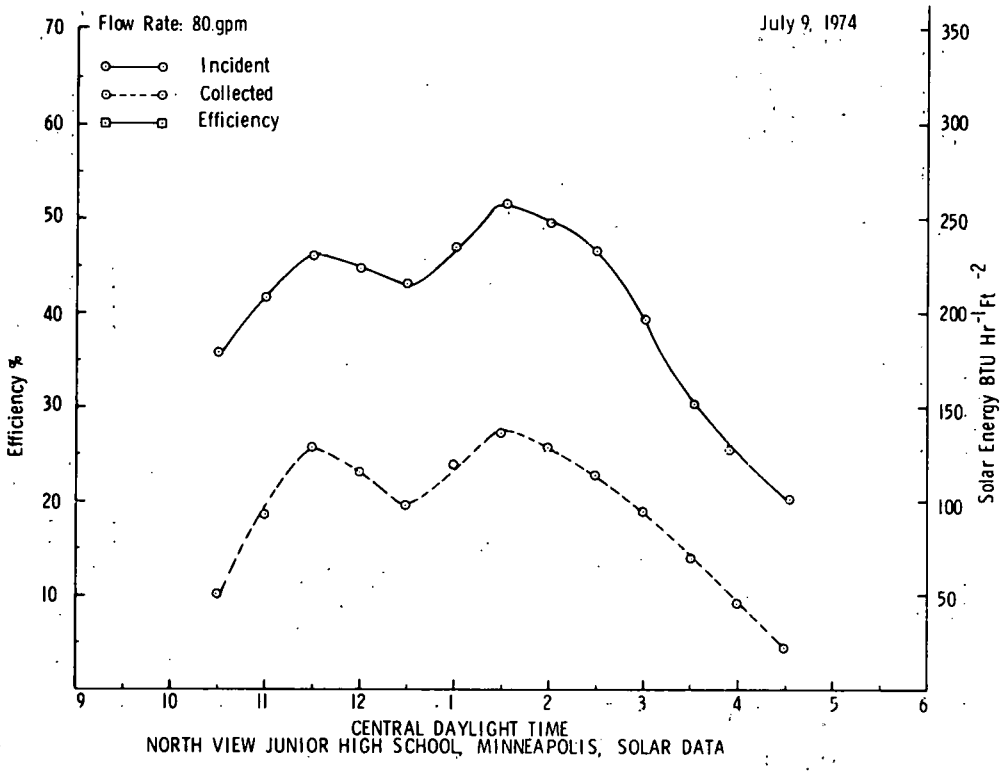
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



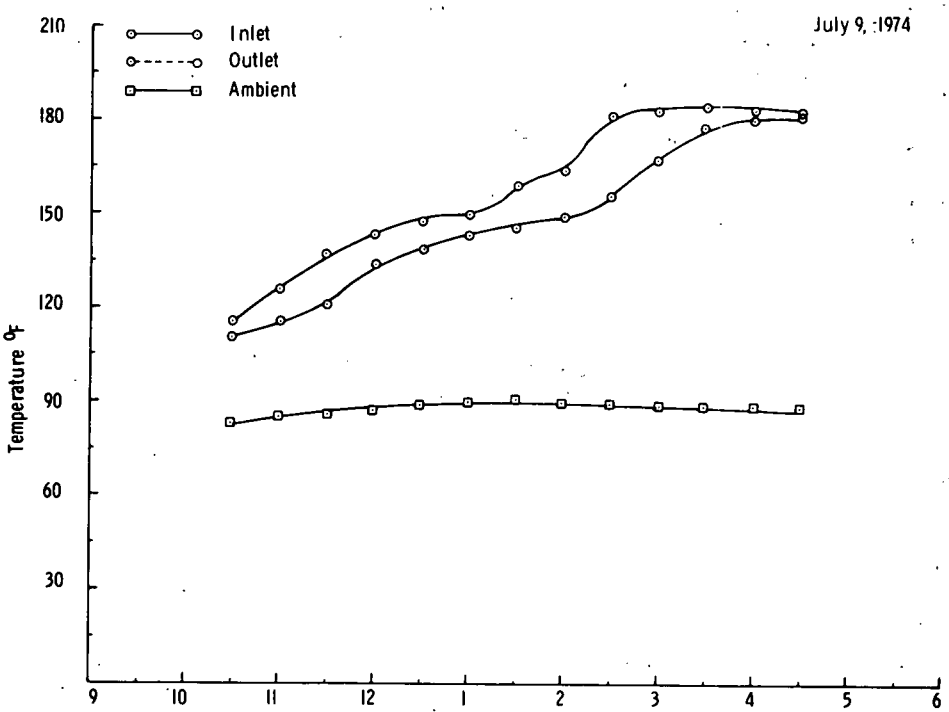
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



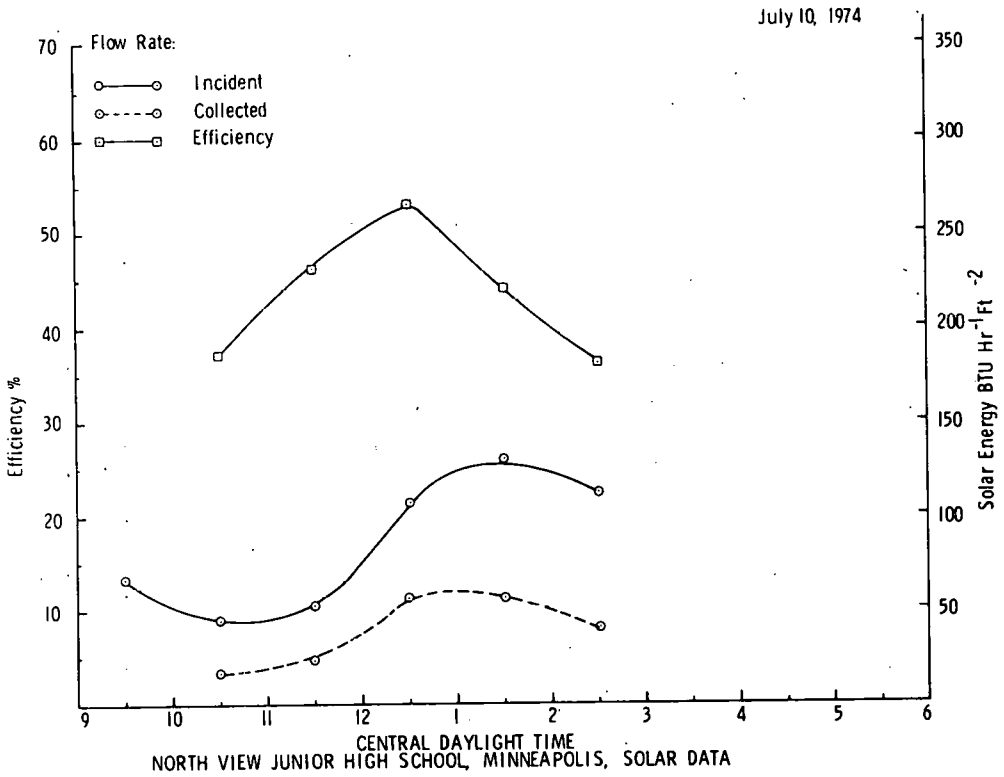
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



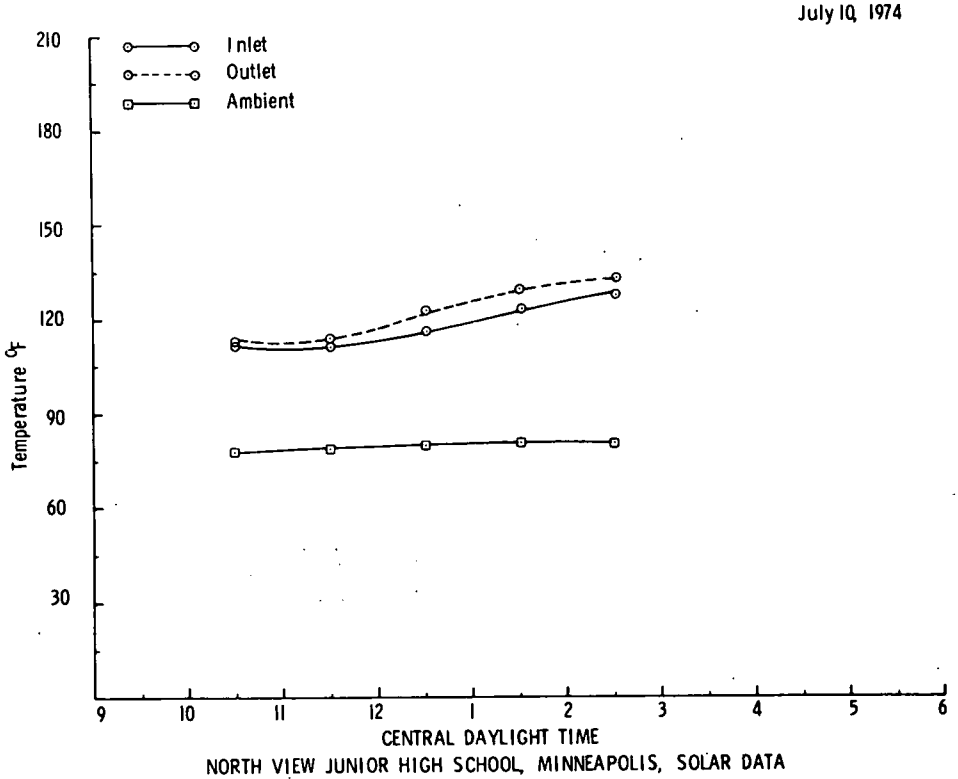
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



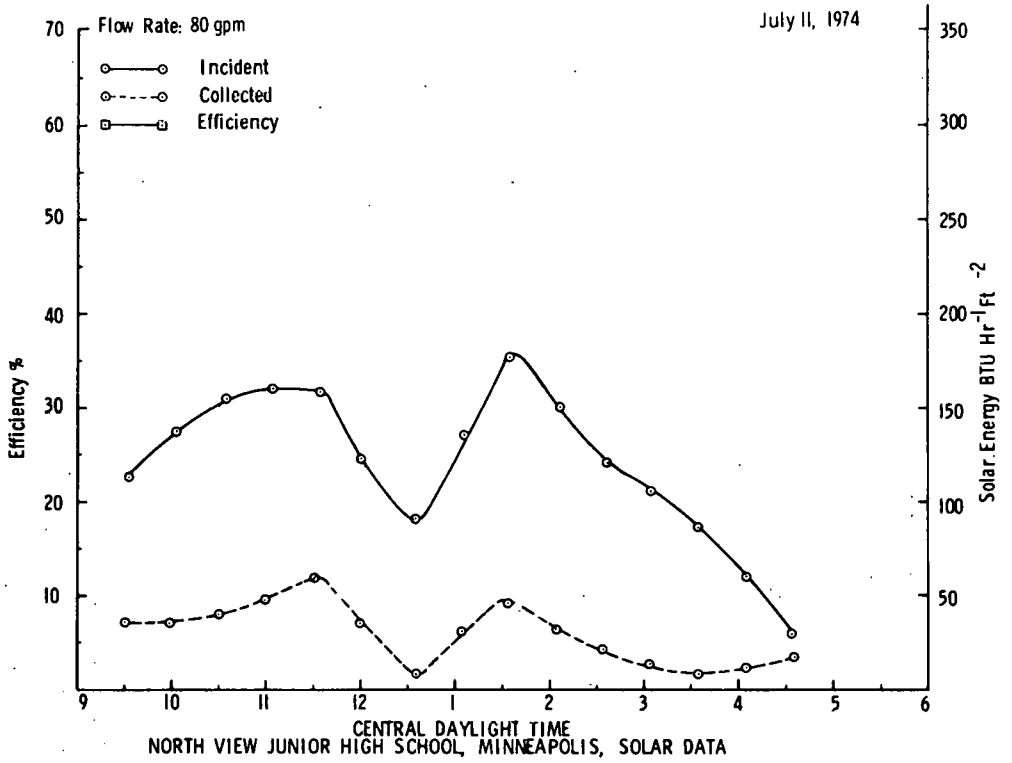
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



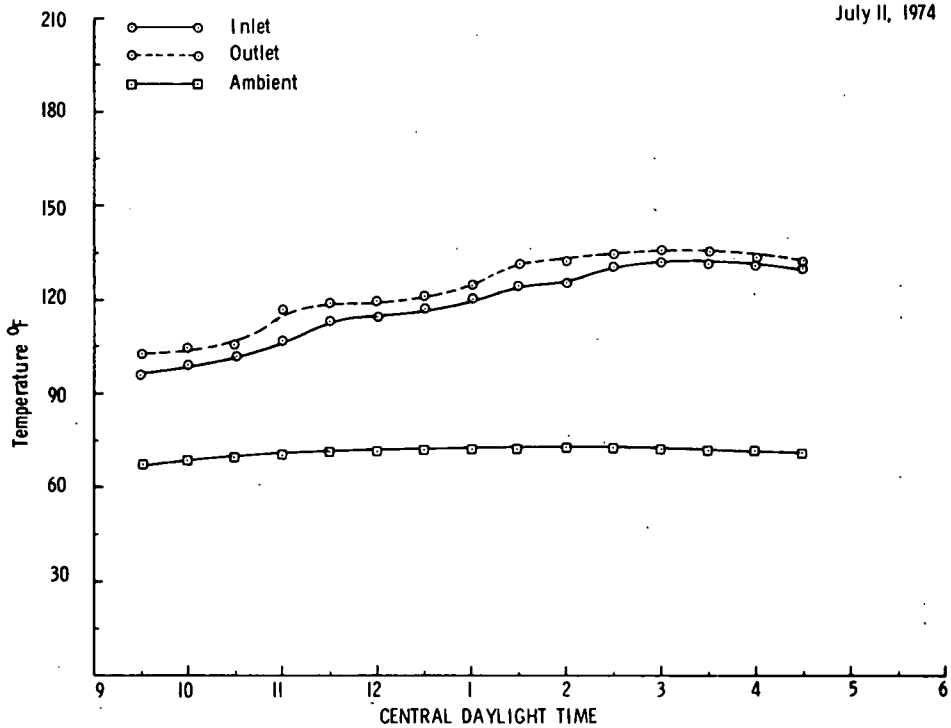
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



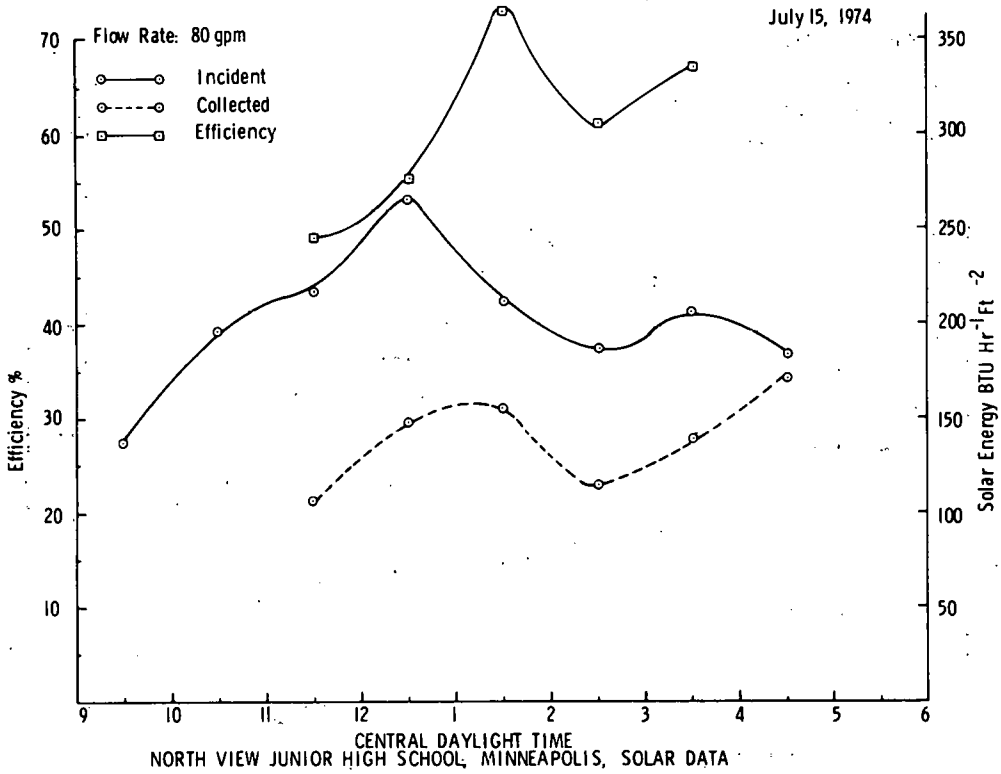
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



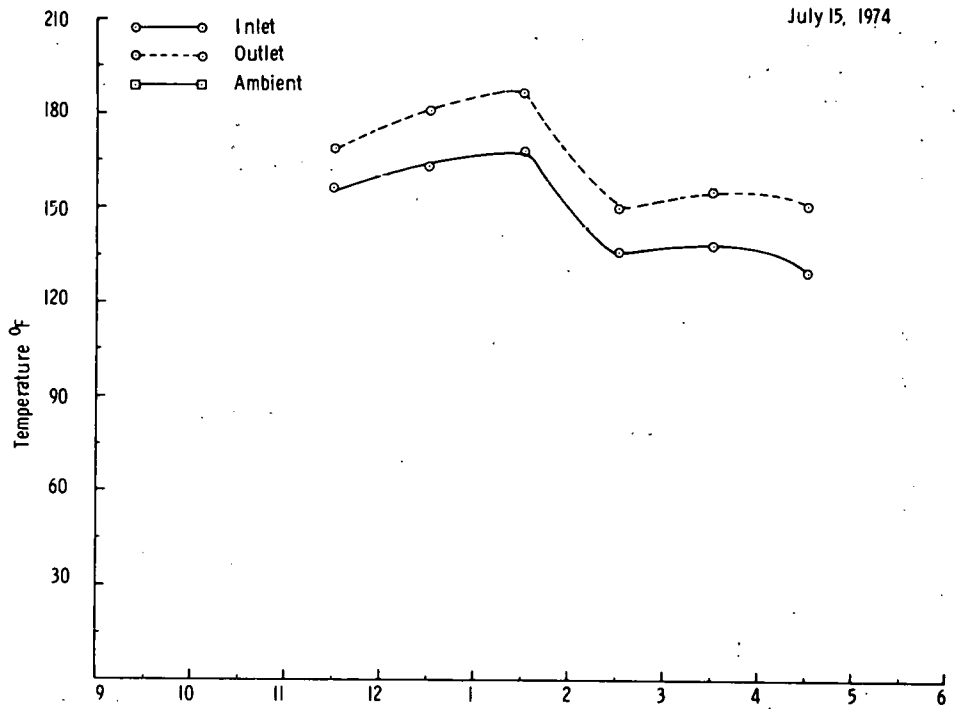
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



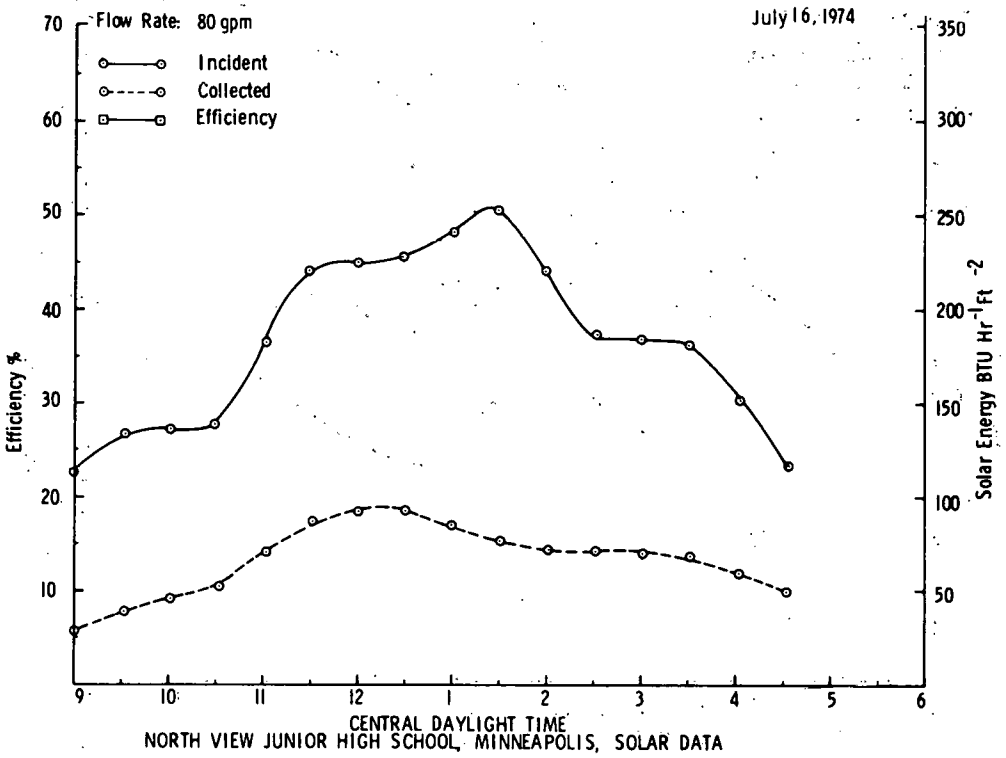
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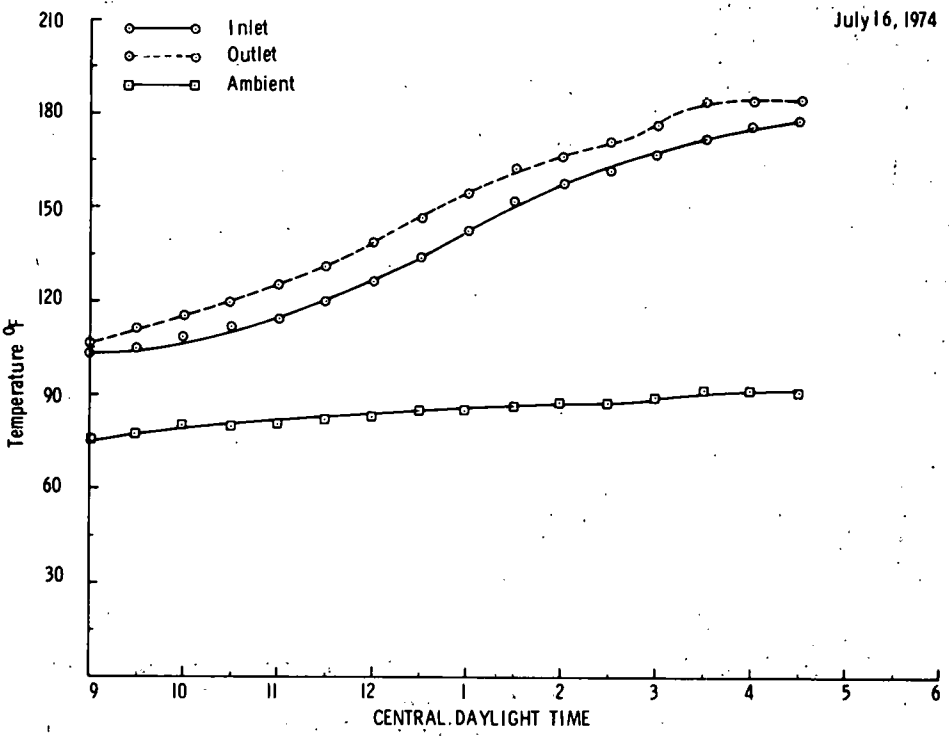
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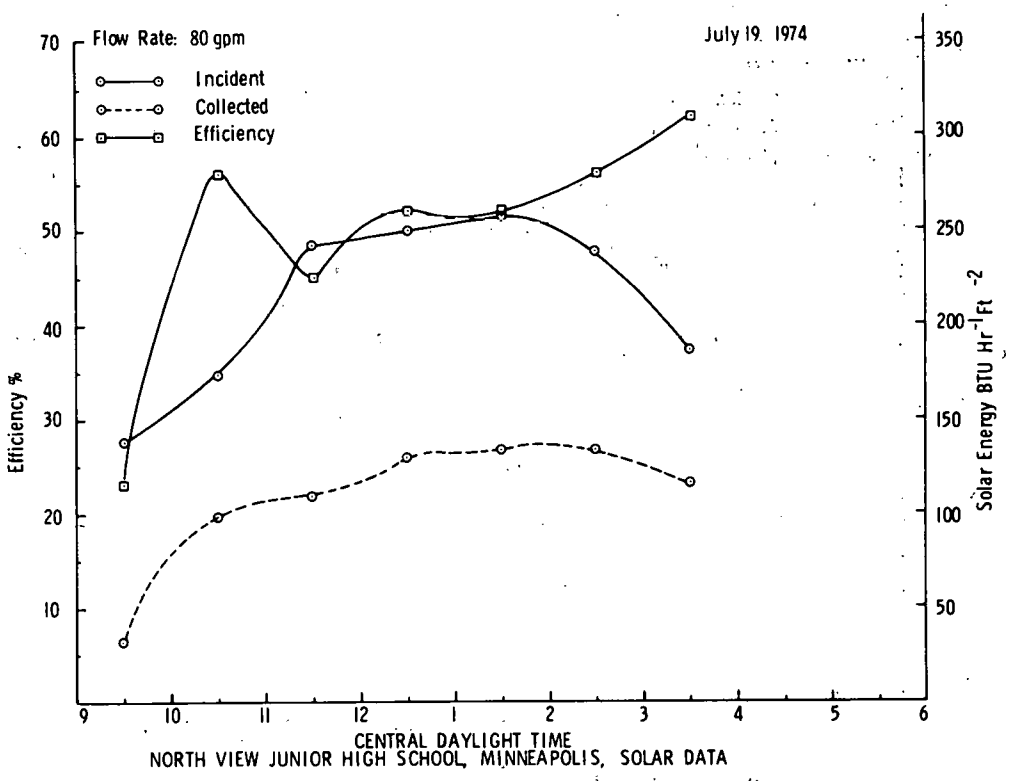
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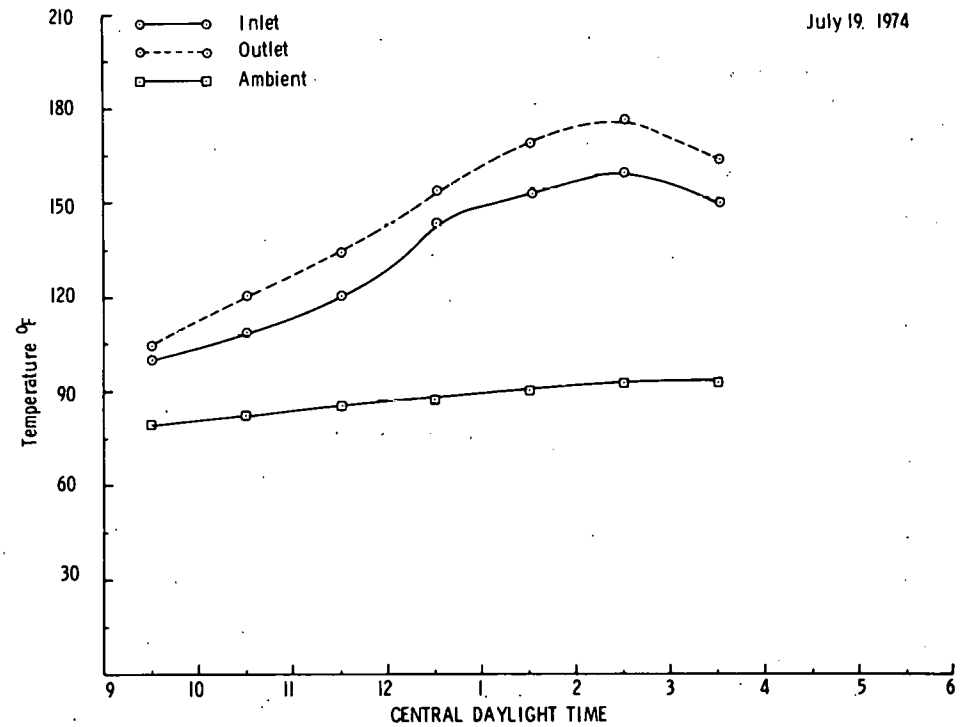
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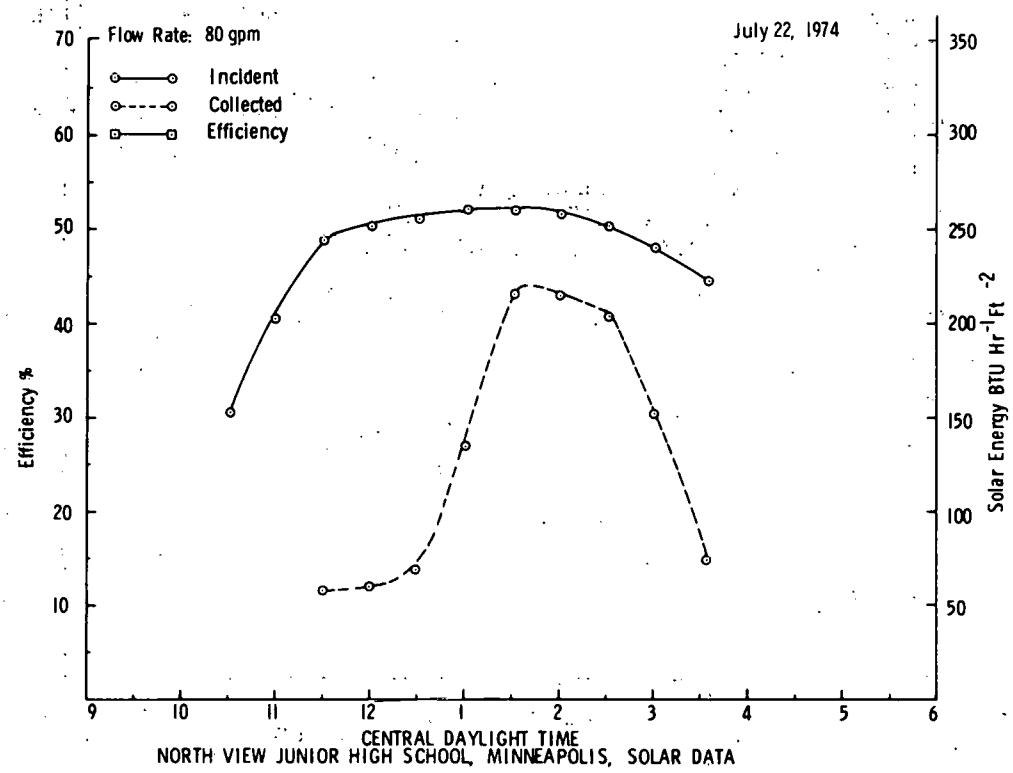
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



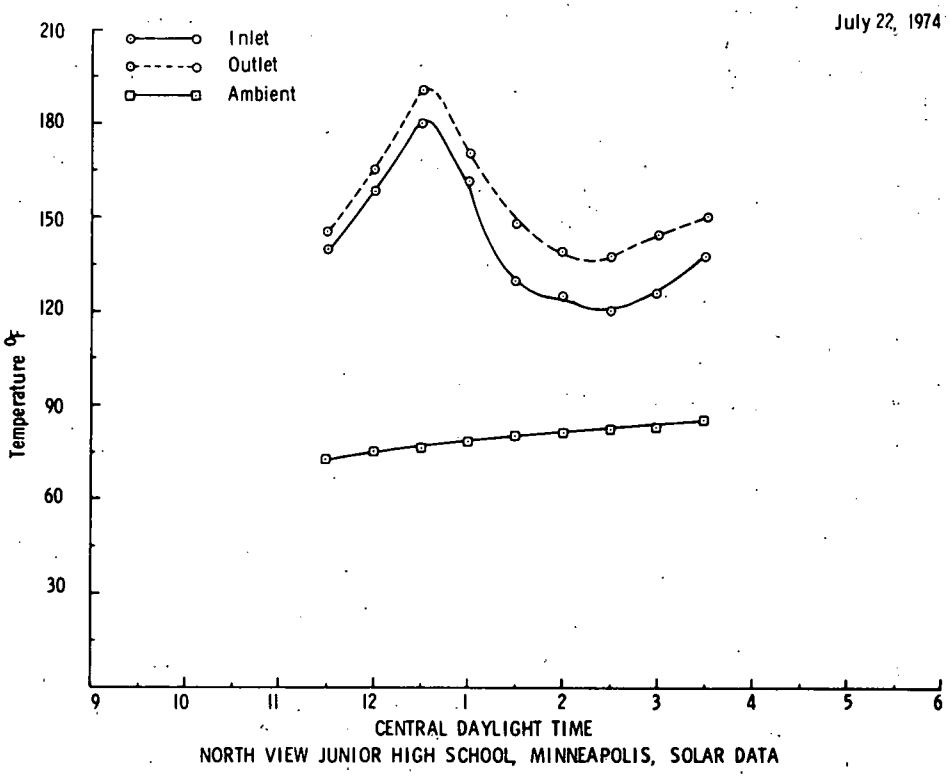
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



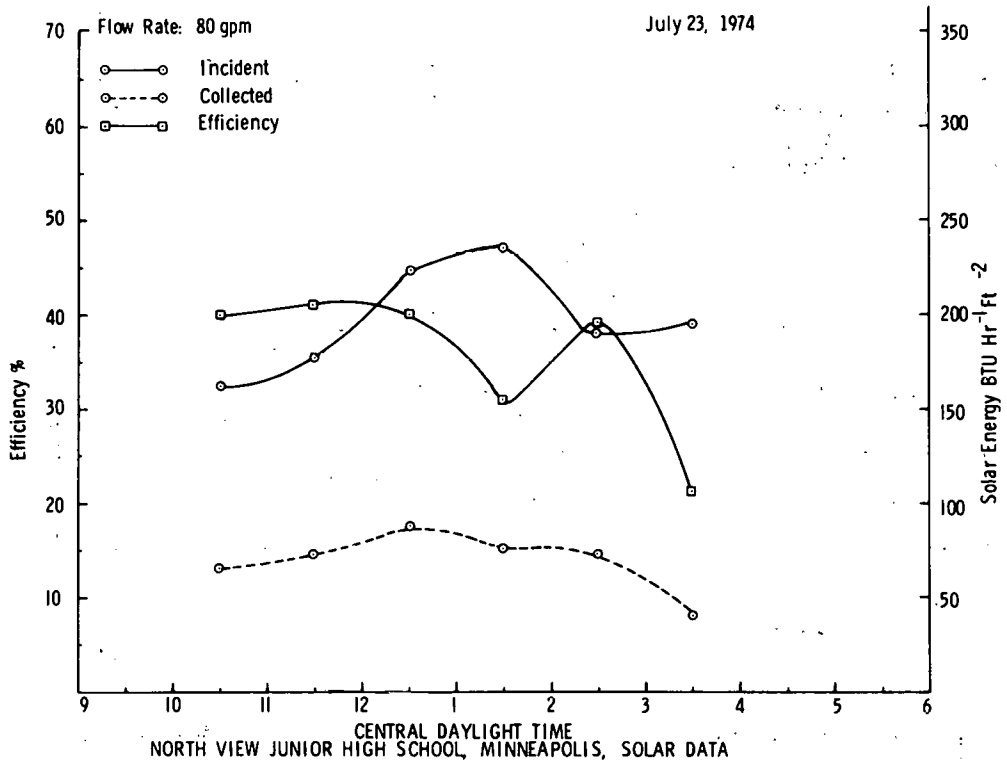
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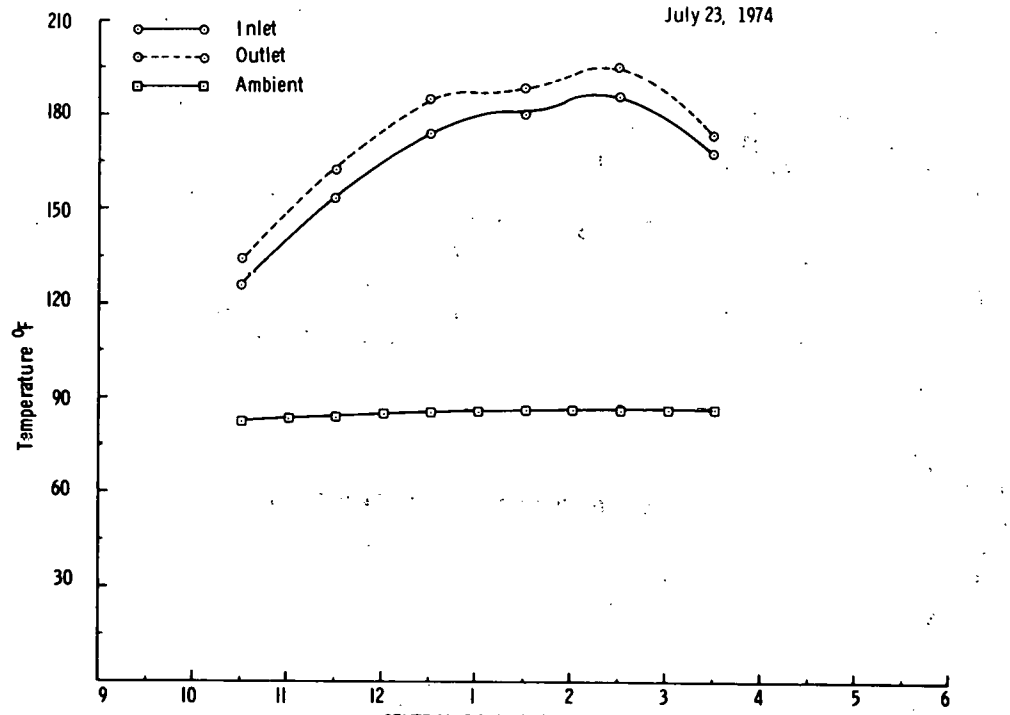
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



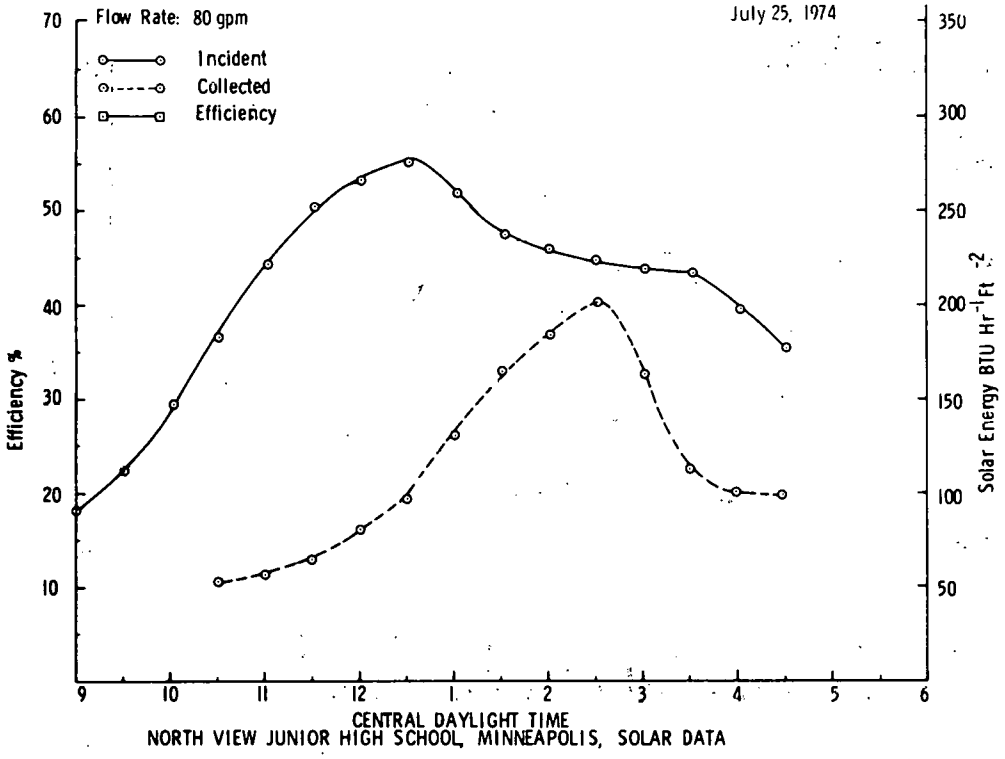
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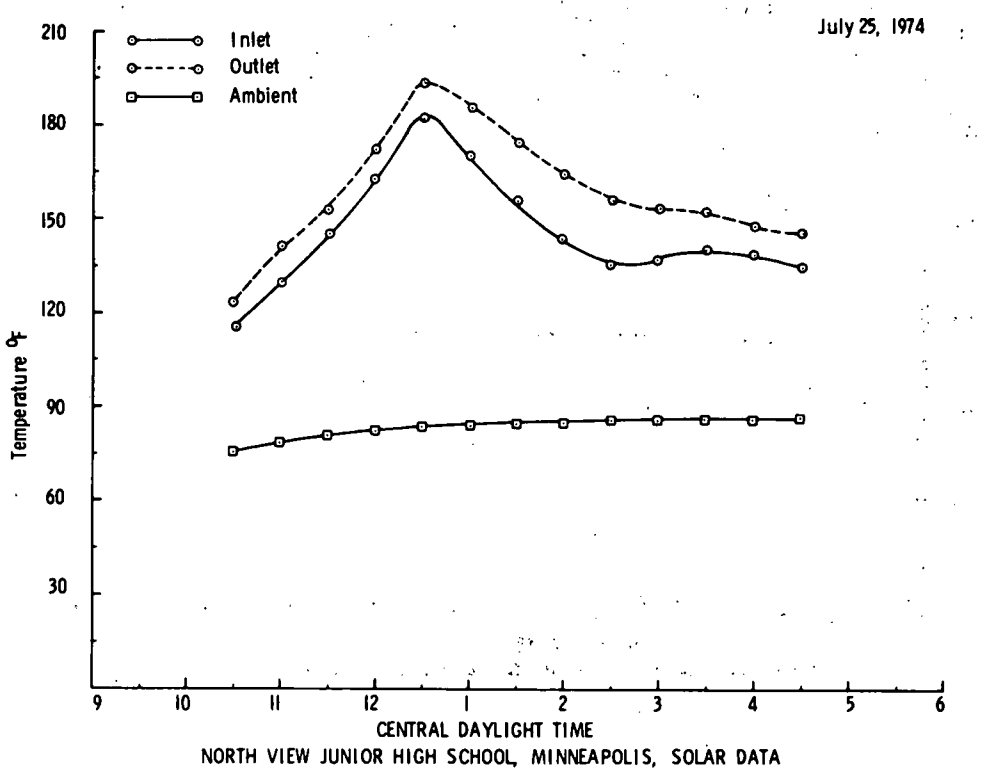
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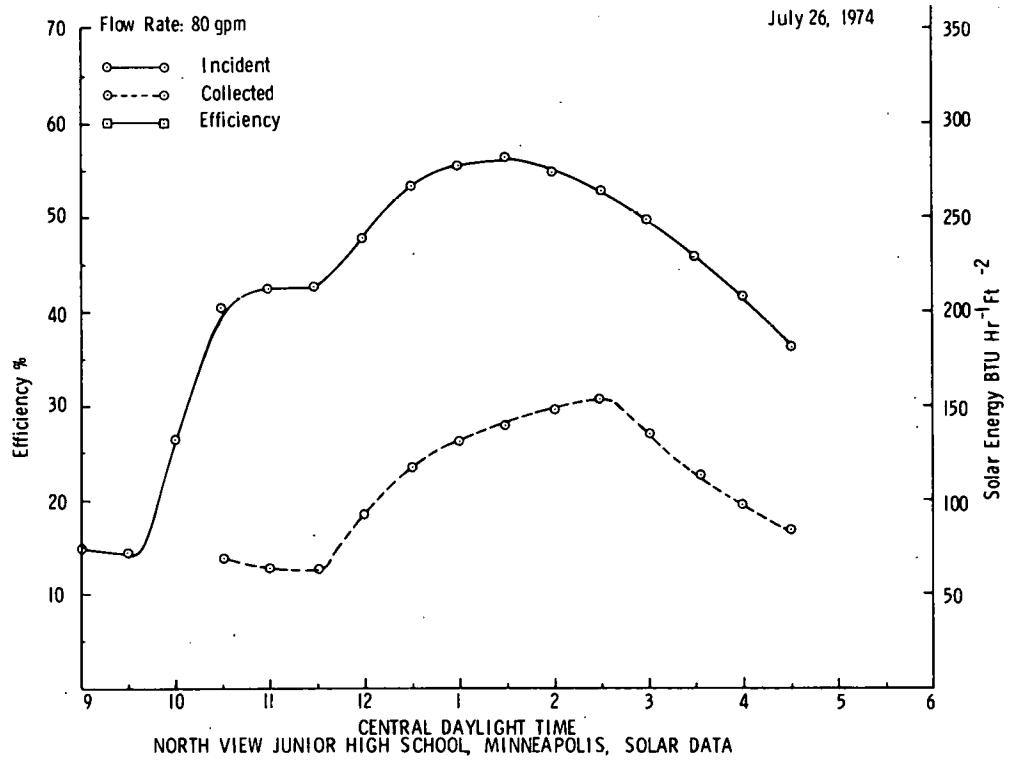
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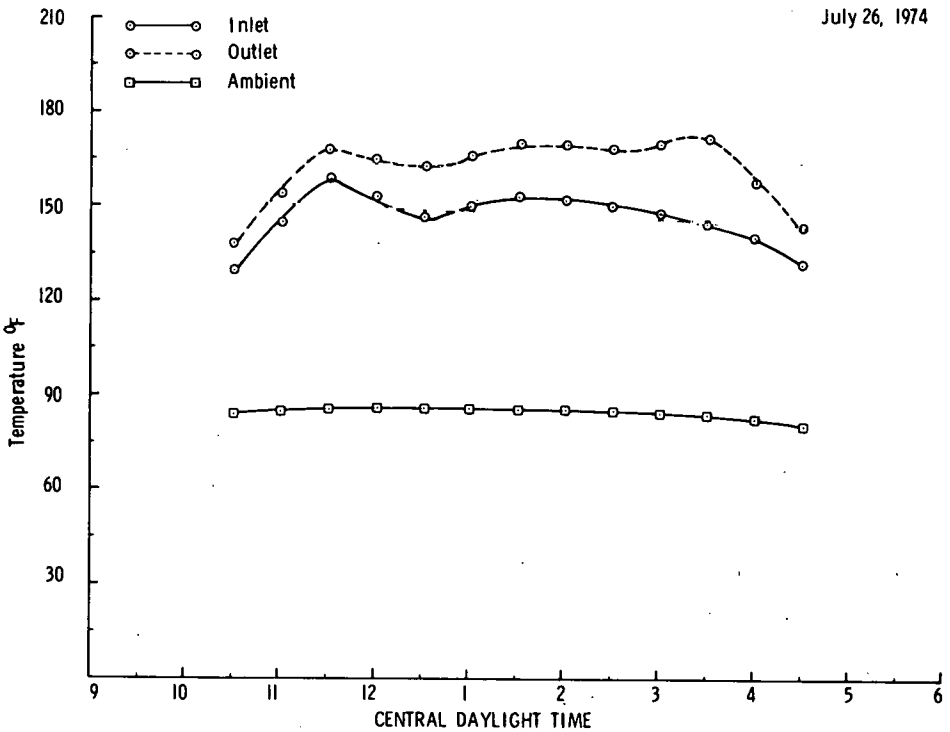
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



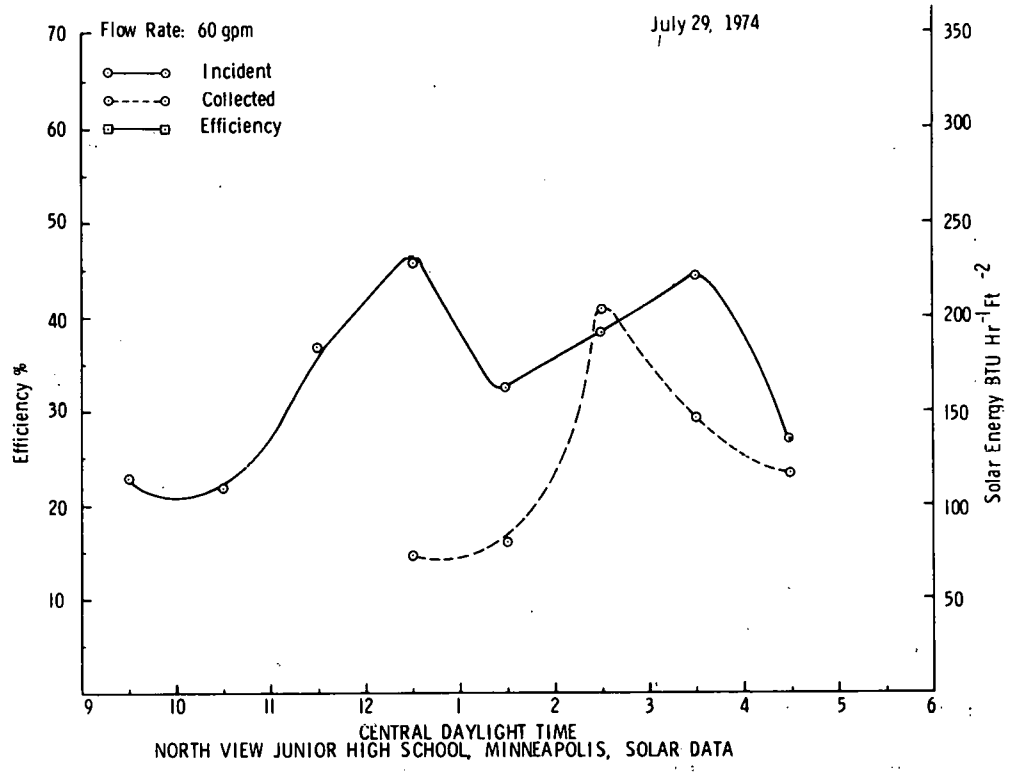
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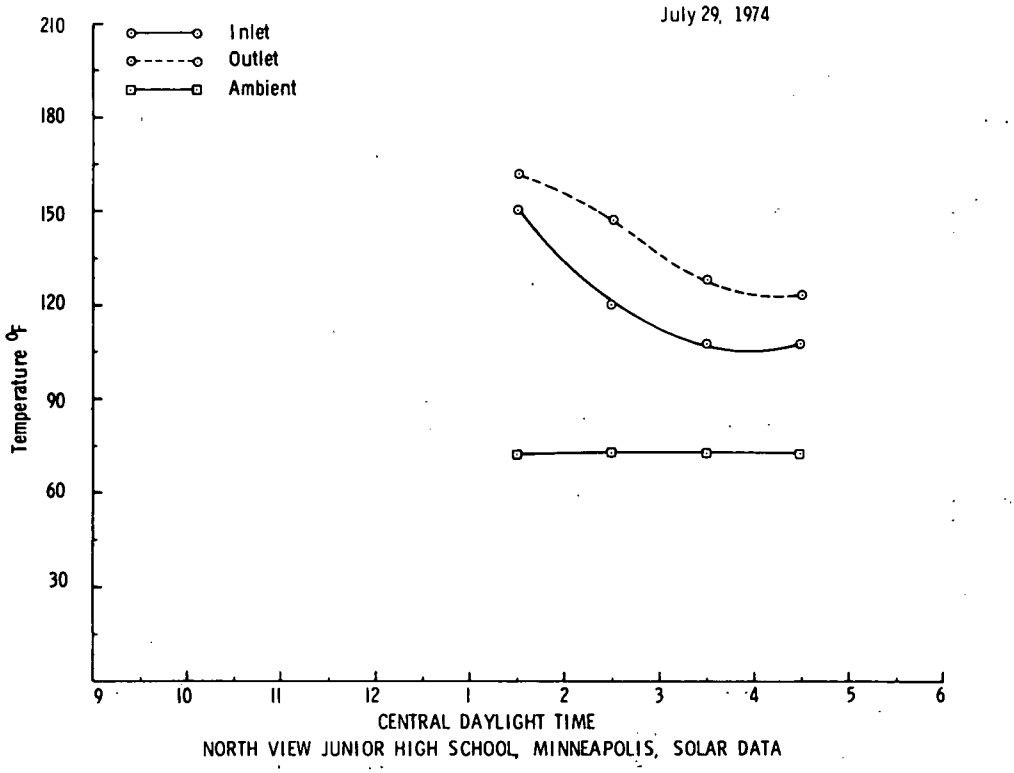
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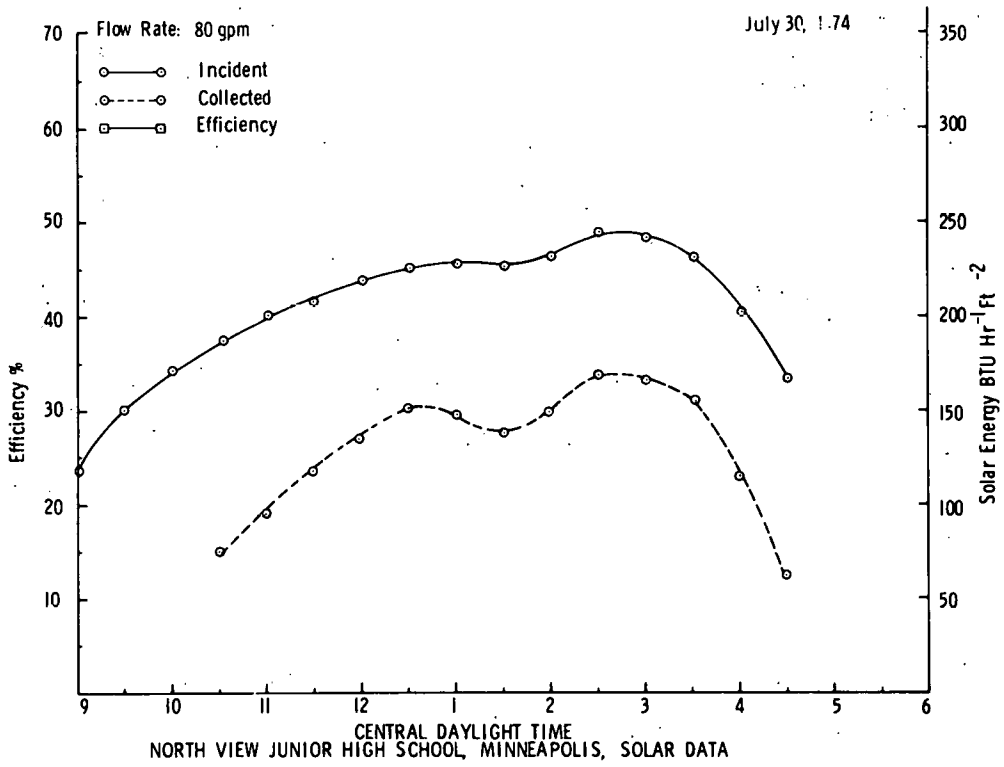
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



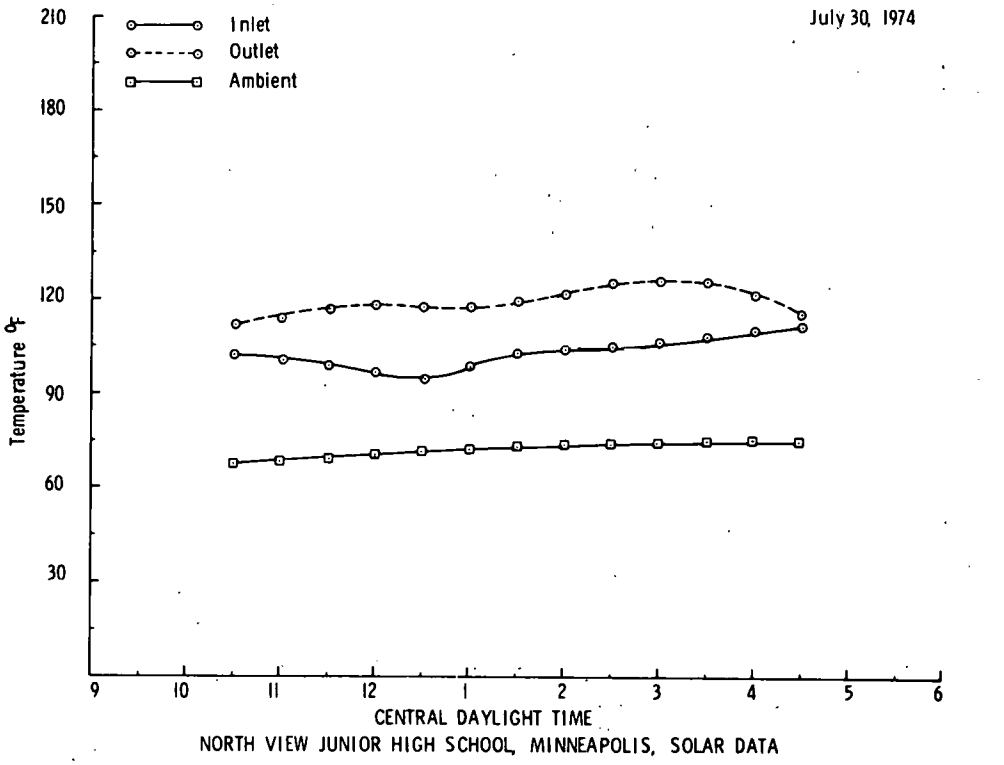
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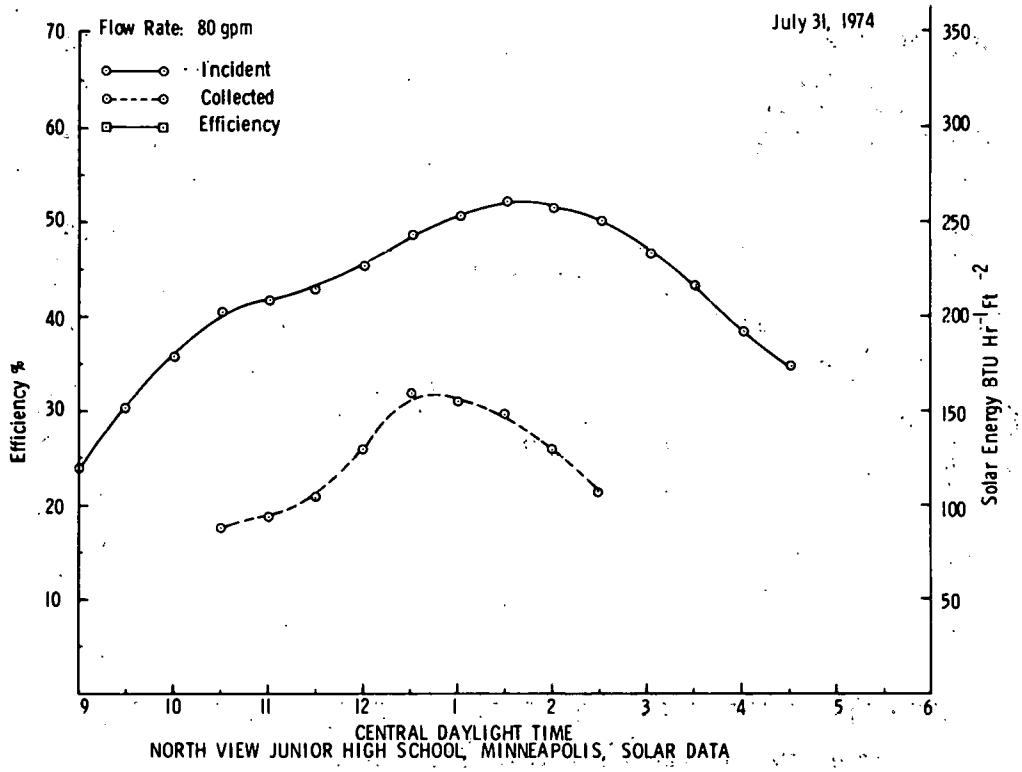
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



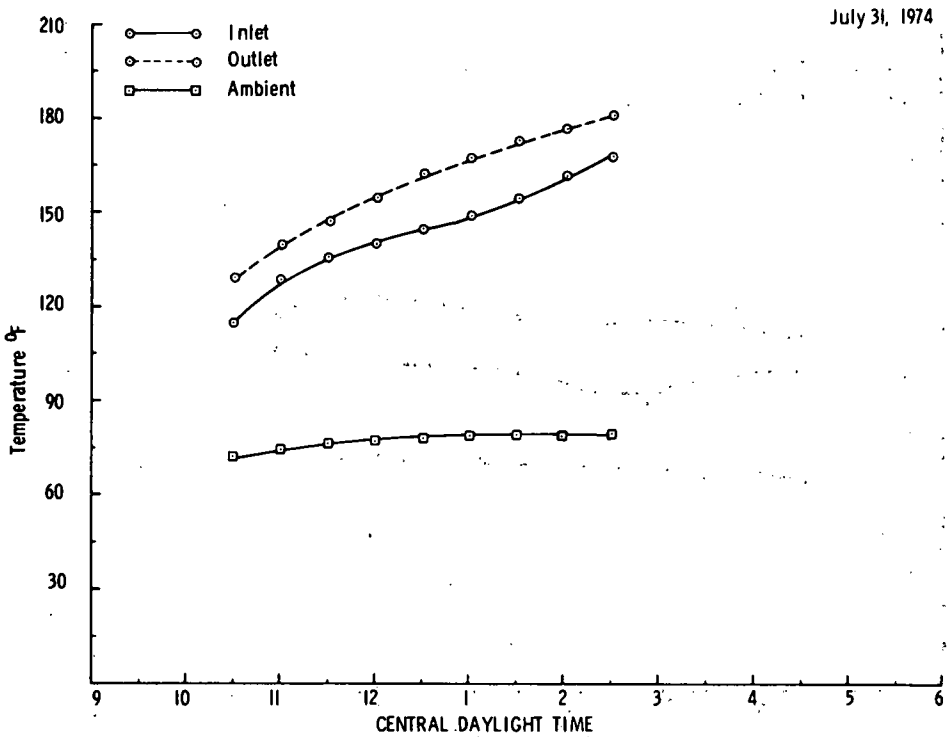
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



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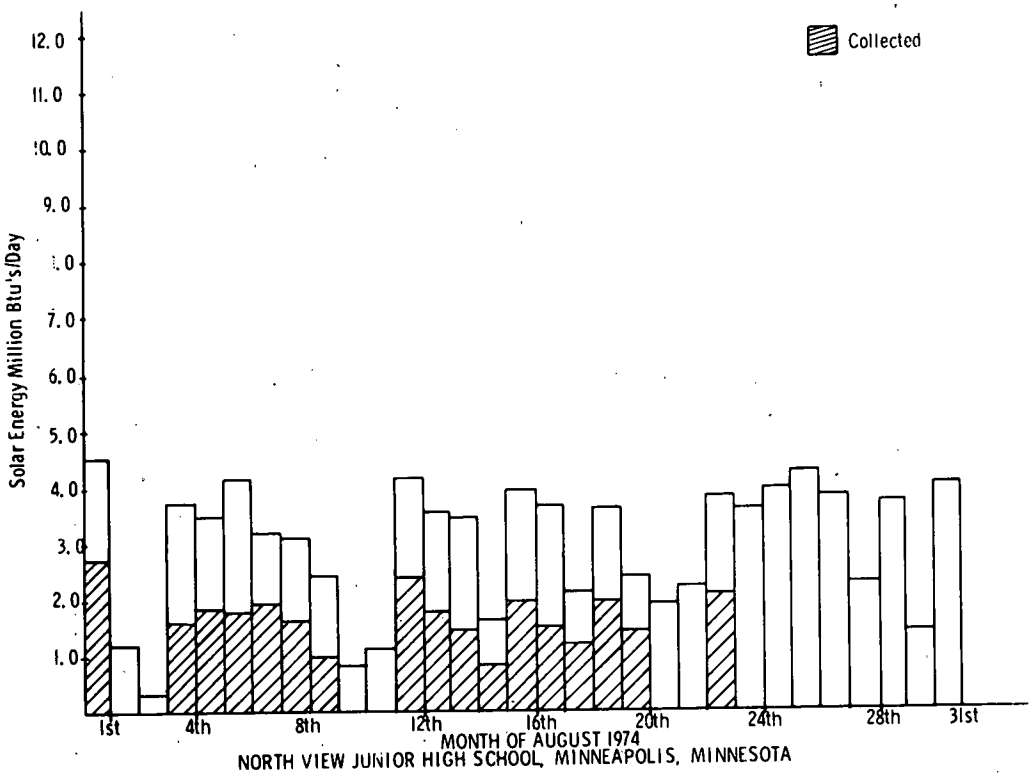
North View Junior High

Month of August 1974

Date	Mode of Operation	Eff = $\frac{Q_{collected}}{Q_{incident}}$
August 1	Pool Water Heating from Collector	61%
August 2	Cloudy, Air and Water Heating from Storage	---
August 3	Weekend, Cloudy	---
August 4	Weekend, Storage from Collector	42% (est.)
August 5	Storage from Collector	48%
August 6	Water Heating from Collector	41%
August 7	Pool Water Heating from Collector	61%
August 8	Storage and Water Heating from Collector	51.4%
August 9	Water Heating from Collector	42%
August 10	Weekend, Cloudy	---
August 11	Weekend, Cloudy	---
August 12	Storage from Collector	50%
August 13	Storage from Collector	50%
August 14	Storage from Collector	42%
August 15	Water Heating from Collector	54%
August 16	Water Heating from Collector	47%
August 17	Weekend. Storage from Collector	43% (est.)
August 18	Weekend. Storage from Collector	40% (est.)
August 19	Water Heating from Collector	48%
August 20	Water Heating and Storage from Collector	53%
August 21	Cloudy, Air Heating from Storage	---
August 22	Cloudy, No Operation	---
August 23	Storage from Collector	47%
August 24	No Operation	---
August 25	No Operation	---
August 26	No Operation	---
August 27	No Operation	---
August 28	No Operation	---

North View Junior High
Month of August 1974

Date	Mode of Operation	Eff. = $\frac{Q_{collected}}{Q_{incident}}$
August 29	No Operation	---
August 30	No Operation	---
August 31	No Operation	---


Collected
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
Solar Energy Million Btu's/Day
1st
4th
8th
12th
16th
20th
24th
28th
31st
MONTH OF AUGUST 1974
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, MINNESOTA

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

MINNEAPOLIS-ST.PAUL, MINNESOTA
NAT WEATHER SERVICE FCST OFC
INTERNATIONAL AIRPORT
AUGUST 1974

LATITUDE 44° 53′ N LONGITUDE 93° 13′ W ELEVATION (GROUND) 834 FT. STANDARD TIME USED: CENTRAL WBAN #14922

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING	COOLING	WEATHER TYPES ON DATES OF OCCURRENCE (1 FOG, 2 HEAVY FOG *, 3 THUNDERSTORM, 4 ICE PELLETS, 5 HAIL, 6 GLAZE, 7 DUSTSTORM, 8 SMOKE, HAZE, 9 BLOWING SNOW)	SNOW, ICE PELLETS OR ICE ON GROUND AT 0BAM IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. - - - ELEV. 838 FEET M.S.L.	WIND RESULTANT DIRECTION	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE HOURS AND TENTHS	PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DATE
1	84	60	72	-1	56	0	7		0	.15	0	29.10	27	4.4	6.5	21	NW	12.2	83	5	6	1
2	68	56	62	-11	56	3	0	1	0	1.07	0	28.88	20	6.7	14.0	26	N	4.3	22	10	10	2
3	67	54	56	-16	53	0	0	1	0	.85	0	29.00	36	18.1	18.3	27	NE	0.0	0	10	10	3
4	79	53	66	-6	51	0	1		0	0	0	29.15	32	6.5	7.3	12	NE	13.5	92	4	4	4
5	83	57	70	-2	55	0	5		0	T	0	29.20	25	4.1	5.8	15	SW	12.2	84	6	9	5
6	80	58	69	-3	56	0	4		0	0	0	29.23	18	5.7	8.8	15	S	14.3	98	1	1	6
7	80	58	69	-3	56	0	4		0	0	0	29.22	14	6.9	8.5	14	SE	12.7	88	3	2	7
8	79	58	69	-3	59	0	4	1 6	0	0	0	29.19	12	8.6	8.8	16	SE	9.6	67	4	4	8
9	81	64	73	1	63	0	8	1 6	0	.20	0	29.13	13	9.7	10.8	18	SE	7.5	52	10	9	9
10	73	65	69	-3	63	0	4	1 6	0	.10	0	28.94	13	12.4	13.2	19	SE	1.6	11	10	10	10
11	74	61	68	-4	56	0	3		0	T	0	28.90	24	15.1	16.4	22	W	5.5	39	8	7	11
12	78	61	70	-2	57	0	5		0	0	0	29.00	27	9.2	11.7	20	SW	12.2	86	3	4	12
13	80	56	68	-3	56	0	3	1	0	0	0	29.19	14	3.6	3.7	9	S	12.2	88	5	3	13
14	83	63	73	2	62	0	8		0	0	0	29.19	15	11.0	11.4	19	SE	13.6	96	0	7	14
15	82	68	75	4	65	0	10		0	.12	0	29.13	20	11.4	12.7	22	SW	8.6	61	9	8	15
16	80	61	71	0	59	0	6		0	T	0	29.11	29	6.8	7.5	14	NW	14.0	100	5	4	16
17	80	55	68	-3	57	0	3	3	0	.02	0	29.06	24	8.8	9.8	22	W	12.3	88	6	4	17
18	81	56	69	-1	58	0	4		0	0	0	29.01	25	7.1	7.9	17	SW	13.0	93	5	3	18
19	88	58	73	3	62	0	8		0	0	0	29.03	17	6.1	8.3	20	S	12.8	92	2	3	19
20	90*	70	80*	10	66	0	15	3	0	0	0	28.93	17	15.0	15.5	28	S	9.5	68	6	6	20
21	82	63	73	4	66	0	8	3	0	.24	0	29.06	24	7.6	10.8	24	SW	5.8	43	8	7	21
22	68	56	62	-7	52	3	0		0	0	0	29.29	33	8.7	9.5	18	NW	10.6	77	6	5	22
23	73	49	61	-8	49	4	0		0	0	0	29.35	31	2.5	5.3	9	N	13.1	96	3	2	23
24	80	55	68	0	55	0	3		0	0	0	29.26	17	9.2	9.8	17	SW	13.2	98	5	4	24
25	86	63	75	7	64	0	10		0	0	0	29.05	19	15.6	15.8	29	SW	10.5	77	7	8	25
26	81	57	69	1	55	0	4		0	0	0	29.00	32	7.8	11.4	20	N	11.5	86	3	4	26
27	75	50	63	-4	46	2	0		0	0	0	29.17	31	7.0	8.9	14	NW	12.6	93	4	4	27
28	70	49	60	-7	48	5	0	1	0	0	0	29.13	18	5.3	9.6	12	SW	8.6	65	6	8	28
29	71	49	60	-7	46	5	0		0	0	0	29.05	29	9.4	10.8	17	NW	11.3	84	6	6	29
30	73	45	59	-7	46	6	0		0	T	0	28.91	25	9.5	13.4	30	W	5.4	40	8	8	30
31	68	40*	54*	-12	41	11	0		0	0	0	29.05	28	8.8	8.8	18	NW	12.0	90	7	5	31
	SUM	SUM				TOTAL	TOTAL			TOTAL	TOTAL		FOR THE MONTH:					TOTAL	%	SUM	SUM	
	2407	1768				48	127	NUMBER OF DAYS		2.75	0	29.09	23	5.4	10.1	30	W	316.9	FOR	183	165	
	AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.	PRECIPITATION		DEP.						DATE: 30		POSSIBLE	MONTH	AVG.	AVG.	
	77.6	57.0	67.3	-2.9	56	27	-55	.01 INCH	8	-0.30								439.1	73	5.8	5.3	
						SEASON TO DATE		SNOW, ICE PELLETS														
	NUMBER OF DAYS					TOTAL	TOTAL	.1.0 INCH	0	GREATEST IN 24 HOURS AND DATES								GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE				
	MAXIMUM TEMP.		MINIMUM TEMP.			DEP.	DEP.	THUNDERSTORMS	4	PRECIPITATION		SNOW, ICE PELLETS										
	≥ 90 °F	≤ 32 °F	≤ 32 °F	≤ 0 °F				HEAVY FOG <	0	1.39	2- 3	0						0				
	1	0	0	0		16	57	CLEAR 6	PARTLY CLOUDY 16	CLOUDY 9												

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1																		.13	.02			T	T		1
2	.06	.27	.05	T							.08	.03	T	.02	.07	T	T	T	.01	.01	.09	.27	.10	.01	2
3	T	.03	.06	.08	.10	.02	.15	.08	.15	T	.03	.03	.08	.02	.01	T	.01	T	T				T	T	3
4																									4
5																		T							5
6																									6
7																									7
8																									8
9																	.19	.01							9
10					T	.08	.09	.04	.04	.02	.01	01	T				T	T	T							10
11							T	T																	11
12																									12
13																									13
14																									14
15										T	T		T								T	.03	.02	.07	15
16	T																								16
17						.01	.01																		17
18																									18
19																									19
20																									20
21	.01	.04	.02	.12	T	T	.01	.01	T	.02	.01					T									21
22																									22
23																									23
24																									24
25																									25
26																									26
27																									27
28																									28
29																									29
30													T	T	T	T									30
31																									31

MINNEAPOLIS-ST.PAUL, MINNESOTA

* EXTREME TEMPERATURES FOR THE MONTH. MAY BE THE LAST OF MORE THAN ONE OCCURRENCE.
- BELOW ZERO TEMPERATURE OR NEGATIVE DEPARTURE FROM NORMAL.
+ 70° AT ALASKAN STATIONS.
* ALSO ON AN EARLIER DATE, OR DATES.
X HEAVY FOG RESTRICTS VISIBILITY TO 1/4 MILE OR LESS.
T IN THE HOURLY PRECIPITATION TABLE AND IN COLUMNS 9, 10, AND 11 INDICATES AN AMOUNT TOO SMALL TO MEASURE

THE SEASON FOR DEGREE DAYS BEGINS WITH JULY FOR HEATING AND JANUARY FOR COOLING.
DATA IN COLUMNS 6, 12, 13, 14, AND 15 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
WIND DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. RESULTANT WIND IS THE VECTOR SUM OF WIND DIRECTIONS AND SPEEDS DIVIDED BY THE NUMBER OF OBSERVATIONS. FIGURES FOR DIRECTIONS ARE TENS OF DEGREES FROM TRUE NORTH: I.E., 09=EAST, 18=SOUTH, 27=WEST, 36=NORTH, AND 00=CALM. WHEN DIRECTIONS ARE IN TENS OF DEGREES IN COL. 17, ENTRIES IN COL. 16 ARE FASTEST OBSERVED 1-MINUTE SPEEDS. IF THE / APPEARS IN COL. 17, SPEEDS ARE GUSTS.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

SUBSCRIPTION PRICE: LOCAL CLIMATOLOGICAL DATA $2.00 PER YEAR INCLUDING ANNUAL ISSUE IF PUBLISHED. FOREIGN MAILING 75¢ EXTRA. SINGLE COPY: 20¢ FOR MONTHLY ISSUE; 15¢ FOR ANNUAL SUMMARY. MAKE CHECKS PAYABLE TO DEPARTMENT OF COMMERCE. NOAA. SEND PAYMENTS AND ORDERS TO NATIONAL CLIMATIC CENTER. FEDERAL BUILDING. ASHEVILLE. NORTH CAROLINA 28801.

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC CENTER, ASHEVILLE, NORTH CAROLINA 28801

William H. Haggard

DIRECTOR, NATIONAL CLIMATIC CENTER

SUMMARY BY HOURS

HOUR LOCAL TIME	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE °F AIR	TEMPERATURE °F WET BULB	TEMPERATURE °F DEW PT.	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
00	4	29.11	64	58	56	77	7.9	21	3.0
03	5	29.10	61	56	55	85	6.5	21	1.7
06	6	29.10	59	56	55	87	6.9	20	2.5
09	8	29.11	68	61	56	66	11.1	22	4.9
12	7	29.10	74	63	56	55	13.2	24	6.4
15	6	29.08	76	64	56	51	14.7	23	5.3
18	6	29.07	73	63	58	57	11.9	24	3.3
21	5	29.09	67	61	57	69	8.9	19	1.6

USCOMM - NOAA - ASHEVILLE 750
9/19/74

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	SKY COVER (TENTHS)	CEILING (HUNDREDS OF FT.)	VISIBILITY (STATUTE MILES)	WEATHER	TEMPERATURE DIR F	WET BULB F	DEW PT. F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
DAY 01										
00	6	UNL	25		66	60	55	68	36	3
03	7	UNL	25		61	57	50	61	00	0
06	7	250	10		60	57	50	63	23	3
09	3	UNL	10		76	62	54	48	22	8
12	3	UNL	12		82	64	54	41	27	12
15	4	UNL	12		84	66	54	36	20	10
18	10	35	15	TRW	68	63	60	73	36	9
21	10	80	35		65	62	60	84	18	4
DAY 02										
00	10	70	12	RW	66	62	60	81	23	14
03	10	90	15	RW	61	60	58	93	20	6
06	10	8	12		63	61	60	90	23	13
09	8	25	20		65	60	55	70	24	15
12	10	11	4	RW	64	62	60	87	32	7
15	10	12	7	RW	62	60	58	90	36	10
18	10	11	8	RW	58	56	55	90	36	13
21	10	5	7	RW	57	55	54	90	36	17
DAY 03										
00	10	11	8	RW	56	55	54	93	36	18
03	10	12	10	RW	55	53	52	90	36	18
06	10	10	7	RW	55	53	52	90	36	14
09	10	13	5	RW	55	53	52	90	36	15
12	10	12	6	R	56	54	53	90	35	16
15	10	10	8	R	55	54	53	93	36	17
18	10	18	7	R	56	54	53	90	01	15
21	10	18	20	RW	56	54	52	87	02	15
DAY 04										
00	10	90	10		55	54	53	90	36	7
03	9	80	15		55	54	53	90	32	8
06	0	UNL	25		54	52	51	90	28	5
09	1	UNL	25		67	58	51	57	32	7
12	7	UNL	25		76	60	48	39	33	11
15	8	250	25		76	62	50	38	35	8
18	9	UNL	25		77	62	51	40	29	6
21	2	UNL	25		67	58	52	90	26	3
DAY 05										
00	0	UNL	25		60	54	50	70	18	3
03	0	250	25		57	55	54	90	00	0
06	0	UNL	25		57	55	54	90	21	3
09	0	UNL	25		71	62	57	61	28	6
12	4	UNL	25		80	66	57	46	26	8
15	4	UNL	25		82	66	57	43	23	14
18	9	250	25		74	63	58	64	36	5
21	9	UNL	20		66	61	58	78	00	0
DAY 06										
00	1	UNL	20		64	60	57	78	20	5
03	0	UNL	20		61	58	56	84	13	3
06	0	UNL	19		58	57	56	90	18	3
09	0	UNL	15		72	63	57	69	28	4
12	4	UNL	25		77	66	58	52	18	7
15	1	UNL	25		80	65	56	44	18	10
18	1	UNL	25		77	63	54	48	18	10
21	1	UNL	20		66	61	56	86	18	4
DAY 07										
00	0	UNL	20		64	58	56	75	18	5
03	0	UNL	10		62	58	56	81	11	3
06	0	UNL	7		58	57	56	87	12	5
09	1	UNL	10		71	62	57	61	23	6
12	4	UNL	15		77	64	56	47	18	9
15	2	UNL	20		80	66	57	46	14	9
18	4	UNL	15		77	65	57	50	12	12
21	4	UNL	15		68	62	57	86	11	9
DAY 08										
00	1	UNL	15		65	60	56	73	10	6
03	0	UNL	7		61	58	56	84	12	4
06	0	UNL	9	GFR	58	58	57	93	12	5
09	0	UNL	6	R	70	64	60	71	15	7
12	4	UNL	10		77	66	60	56	14	11
15	7	UNL	19		78	67	60	54	11	11
18	6	120	10		76	66	61	60	13	8
21	10	260	8		72	65	60	66	12	9
DAY 09										
00	3	UNL	7		67	63	60	78	13	5
03	3	UNL	5	GF	65	62	61	87	11	8
06	10	UNL	4	GF	64	62	60	87	12	10
09	10	UNL	3	R	72	66	62	71	13	13
12	10	UNL	4	R	78	69	62	58	16	13
15	10	35	2	RW	80	69	64	58	13	13
18	10	90	3	RW	70	67	66	87	04	4
21	10	70	4	R	73	67	64	74	12	8
DAY 10										
00	10	150	7		72	65	60	66	12	10
03	10	80	7		70	63	58	66	10	9
06	10	100	3	R	65	62	60	84	10	10
09	10	10	2	RF	66	64	63	90	12	16
12	10	8	2	LF	67	66	66	97	15	11
15	10	11	2	LF	72	68	66	78	12	17
18	10	10	2	RW	72	66	66	82	13	10
21	8	70	7		71	68	66	84	17	9
DAY 11										
00	10	16	15		68	63	60	76	23	12
03	10	15	15		64	60	57	78	24	12
06	10	16	15		62	58	56	81	23	15
09	10	18	25		62	58	56	78	25	13
12	10	24	25		65	59	55	70	25	16
15	10	110	25		71	61	54	55	23	14
18	1	UNL	25		74	64	57	55	23	10
21	1	UNL	25		68	61	57	68	22	12
DAY 12										
00	1	UNL	20		66	61	57	73	21	8
03	10	110	20		67	62	58	73	21	10
06	6	110	20		68	62	58	71	27	8
09	7	100	25		71	64	60	68	25	10
12	2	UNL	25		78	69	62	46	28	14
15	4	UNL	25		77	68	58	54	32	15
18	1	UNL	25		73	62	55	53	30	12
21	0	UNL	25		66	60	56	70	24	4
DAY 13										
00	0	UNL	25		61	59	57	87	00	0
03	0	UNL	20		58	57	57	96	00	0
06	1	UNL	9	GF	57	56	56	96	00	0
09	1	UNL	12		71	65	61	71	13	4
12	8	150	20		78	66	58	50	13	4
15	10	250	15		80	67	59	49	16	7
18	4	UNL	15		77	65	58	52	14	5
21	0	UNL	15		70	63	58	66	13	6
DAY 14										
00	3	UNL	15		66	61	58	78	18	4
03	4	UNL	15		64	61	59	84	11	6
06	9	UNL	10		63	61	60	90	15	5
09	5	UNL	12		72	67	64	78	15	12
12	10	UNL	25		80	68	61	52	15	12
15	10	UNL	25		83	70	64	53	16	15
18	10	UNL	20		81	70	64	58	17	16
21	0	UNL	15		74	68	62	66	16	9
DAY 15										
00	6	UNL	15		71	66	62	73	15	8
03	7	250	20		68	64	62	81	14	8
06	9	130	15		68	66	63	84	16	9
09	7	90	10		78	71	67	69	21	14
12	10	90	10		78	71	68	71	22	17
15	9	250	15		81	72	67	63	21	15
18	10	28	15		79	71	67	67	20	15
21	9	23	15	RW	76	70	67	74	22	8
DAY 16										
00	10	10	10	RW	73	70	69	87	27	8
03	9	31	25		70	67	66	84	34	4
06	10	UNL	25		64	63	62	93	00	0
09	10	200	15		74	66	64	71	28	3
12	7	UNL	25		77	63	54	45	29	10
15	1	UNL	25		80	65	55	42	30	10
18	0	UNL	25		76	62	52	43	31	12
21	0	UNL	20		67	59	53	61	24	5
DAY 17										
00	0	UNL	20		61	56	53	79	00	0
03	0	UNL	25		57	55	53	87	21	3
06	8	90	20	TRW	56	54	53	90	33	5
09	8	UNL	25		66	60	55	63	22	10
12	6	UNL	25		76	65	59	56	23	18
15	4	UNL	25		78	67	60	52	24	15
18	1	UNL	25		76	66	61	60	25	11
21	0	UNL	25		69	64	61	78	25	8
DAY 18										
00	0	UNL	20		61	59	58	90	20	3
03	0	UNL	15		58	57	56	93	22	3
06	2	UNL	25		57	56	55	93	22	4
09	7	80	25		73	64	58	59	25	10
12	9	80	25		78	65	57	49	26	13
15	2	UNL	25		81	67	58	48	25	12
18	0	UNL	25		80	67	60	51	30	8
21	0	UNL	25		70	69	62	76	30	4
DAY 19										
00	0	UNL	25		65	62	61	87	15	3
03	0	UNL	20		62	61	60	93	00	0
06	1	UNL	15		60	58	57	90	13	3
09	2	UNL	20		74	66	62	66	16	7
12	0	UNL	25		85	72	65	51	18	9
15	1	UNL	25		88	73	66	48	18	16
18	6	250	20		84	71	64	51	18	13
21	10	250	20		76	68	63	64	17	7
DAY 20										
00	3	UNL	20		73	67	63	71	16	9
03	0	UNL	20		70	66	63	78	10	4
06	5	150	15		72	65	60	66	17	10
09	10	UNL	20		78	69	63	58	17	17
12	7	UNL	20		86	72	66	51	17	20
15	7	UNL	20		89	74	68	50	18	20
18	7	120	12		87	75	70	57	18	14
21	9	130	12		83	75	71	67	18	14
DAY 21										
00	10	75	12		82	74	70	67	20	13
03	10	100	10	R	70	67	65	84	22	8
06	10	100	15	R	70	68	67	90	18	8
09	10	90	12	RW	70	66	64	81	21	9
12	9	100	20		75	70	67	78	28	10
15	8	100	20		80	71	67	65	24	8
18	3	UNL	20		78	70	66	67	31	10
21	2	UNL	20		71	65	61	71	33	8
DAY 22										
00	5	UNL	25		67	59	57	81	35	5
03	0	UNL	20		54	53	53	96	00	0
06	0	UNL	25		56	54	53	87	31	5
09	4	UNL	25		63	57	52	68	30	11
12	10	25	25		63	57	52	68	32	10
15	7	33	25		66	57	51	59	34	12
18	5	UNL	25		66	57	50	57	34	11
21	6	33	25		61	54	49	65	02	8
DAY 23										
00	1	UNL	25		56	52	48	75	02	4
03	0	UNL	25		48	48	47	93	24	4
06	0	UNL	25		48	48	48	96	00	0
09	0	UNL	25		62	55	50	65	32	7
12	0	UNL	25		68	58	50	53	32	8
15	7	33	25		72	59	48	44	28	5
18	5	UNL	25		72	58	48	43	24	3
21	0	UNL	25		62	56	51	67	12	5
DAY 24										
00	0	UNL	25		58	54	51	78	12	4
03	0	UNL	25		56	53	51	83	13	4
06	0	UNL	25		55	53	51	86	13	4
09	4	UNL	25		65	59	54	68	16	10
12	8	250	25		74	64	57	55	18	9
15	7	33	25		79	68	58	46	18	15
18	5	UNL	25		77	68	59	54	18	14
21	0	UNL	25		69	63	59	71	17	8
DAY 25										
00	1	UNL	15		65	61	58	78	18	11
03	0	UNL	15		64	60	58	81	18	10
06	0	UNL	12		63	58	57	81	18	12
09	10	UNL	12		71	65	61	71	18	12
12	0	UNL	12		83	72	67	59	18	17
15	9	34	12		84	74	68	61	20	18
18	10	31	10		83	73	69	63	21	17
21	6	UNL	7		76	72	70	82	18	13
DAY 26										
00	10	UNL	7		77	71	68	74	22	18
03	10	UNL	7		73	70	68	84	32	10
06	3	UNL	25		64	56	49	58	33	6
09	1	UNL	25		73	61	53	50	34	6
12	3	UNL	25		78	62	51	38	32	6
15	8	34	12		81	62	48	33	33	13
18	7	120	25		72	59	50	48	36	11
21	4	UNL	20		65	57	50	59	34	9
DAY 27										
00	7	250	20		58	52	47	67	31	8
03	3	UNL	20		52	49	47	83	21	6
06	7	UNL	25		51	50	49	93	20	4
09	6	UNL	25		67	56	48	51	31	7
12	3	UNL	25		73	56	42	33	32	10
15	4	UNL	25		74	57	43	33	30	13
18	2	UNL	25		74	58	44	38	32	11
21	4	UNL	20		63	54	48	54	36	4
DAY 28										
00	3	UNL	20		57	54	52	83	00	0
03	0	UNL	15		52	51	51	96	00	0
06	1	UNL	6	GF	52	50	48	86	00	0
09	2	UNL	15		64	55	48	56	17	7
12	10	120	20		68	55	43	39	23	6
15	10	100	20		70	56	45	41	18	8
18	8	80	15		68	57	47	48	18	9
21	6	100	15		64	56	49	58	18	9
DAY 29										
00	10	50	15		64	56	50	61	27	6
03	10	70	15		62	56	52	70	25	10
06	3	UNL	20		57	53	50	78	33	10
09	3	UNL	25		61	53	47	60	32	10
12	10	UNL	25		67	54	43	42	32	13
15	7	250	25		70	55	42	38	27	12
18	3	UNL	25		66	53	40	39	27	10
21	3	UNL	20		57	50	43	60	27	4
DAY 30										
00	1	UNL	20		51	47	44	77	20	4
03	1	UNL	20		46	44	41	83	19	4
06	8	UNL	20		46	44	43	89	20	8
09	10	UNL	25		64	56	47	54	21	15
12	10	250	25		71	60	53	53	24	15
15	10	90	25	RW	68	59	53	61	29	20
18	8	130	20	RW	63	56	51	65	25	12
21	6	130	25		59	52	46	60	32	14
DAY 31										
00	5	UNL	25		54	48	43	67	29	9
03	5	UNL	25		48	46	44	86	27	6
06	7	UNL	25		44	43	42	93	22	6
09	8	120	25		57	51	46	64	28	7
12	5	UNL	25		66	52	40	40	30	12
15	5	UNL	25		65	51	38	34	31	13
18	7	UNL	25		61	48	35	38	31	10
21	0	UNL	25		52	46	40	64	31	4

NOTES

CEILING COLUMN-
UNL INDICATES NO UNLIMITED CEILING

WEATHER COLUMN-

- T TORNADO
- T THUNDERSTORM
- Q SQUALL
- R RAIN
- RW RAIN SHOWERS
- ZR FREEZING RAIN
- L DRIZZLE
- ZL FREEZING DRIZZLE
- S SNOW
- SP SNOW PELLETS
- IC ICE CRYSTALS
- SW SNOW SHOWERS
- SG SNOW GRAINS
- IP ICE PELLETS
- H HAIL
- F FOG
- IF ICE FOG
- GF GROUND FOG
- BD BLOWING DUST
- BN BLOWING SAND
- BS BLOWING SNOW
- BY BLOWING SPRAY
- K SMOKE
- H HAZE
- D DUST

WIND COLUMNS-

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH: I.E., 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS; MULTIPLY BY 1.15 TO CONVERT TO MILES PER HOUR.

ADDITIONAL DATA

OTHER OBSERVATIONAL DATA CONTAINED IN RECORDS ON FILE CAN BE FURNISHED AT COST VIA MICROFILM, MICROFICHE, OR PAPER COPIES OF THE ORIGINAL RECORDS. INQUIRIES AS TO AVAILABILITY AND COSTS SHOULD BE ADDRESSED TO: DIRECTOR, NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

STATION: MINNEAPOLIS MINN YEAR & MONTH: 74 08

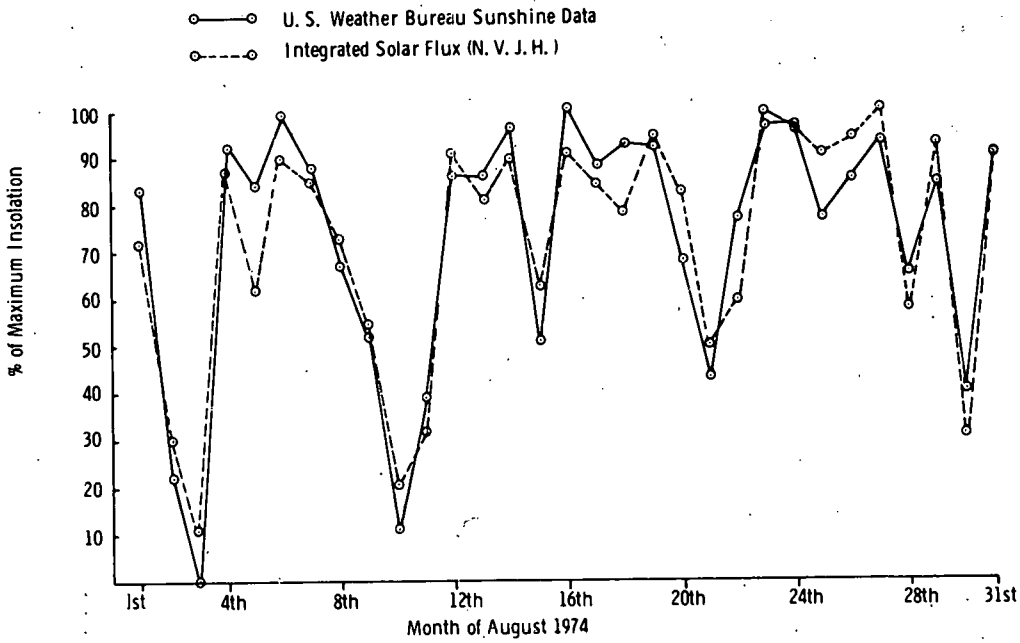
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NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

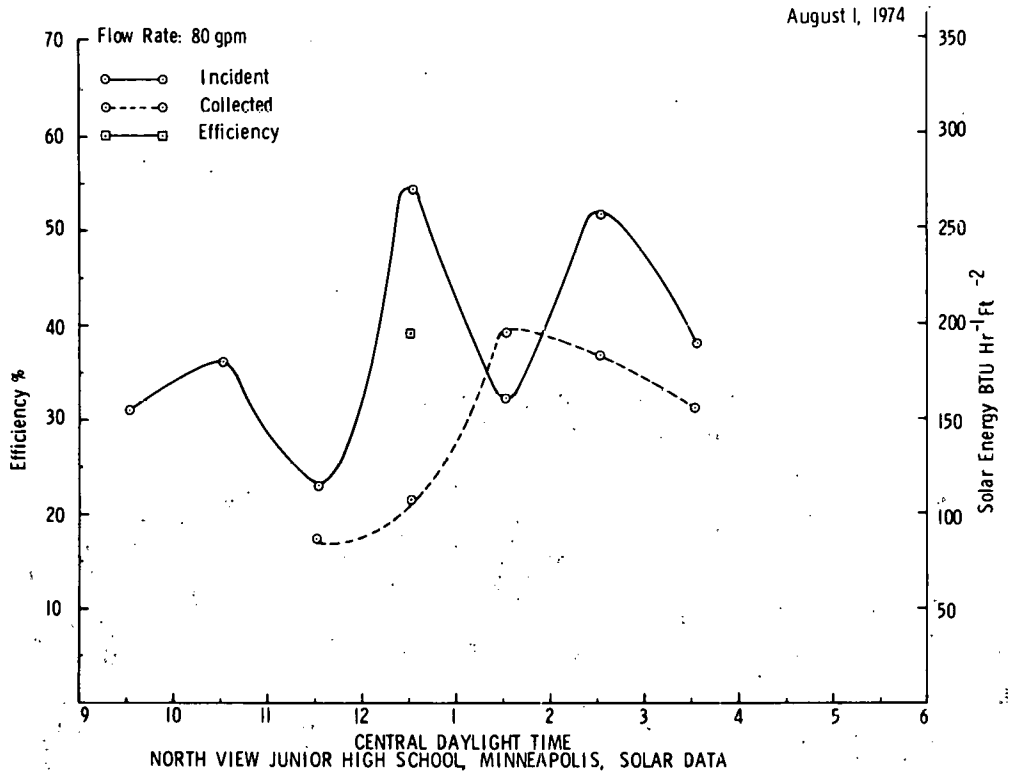
AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
210

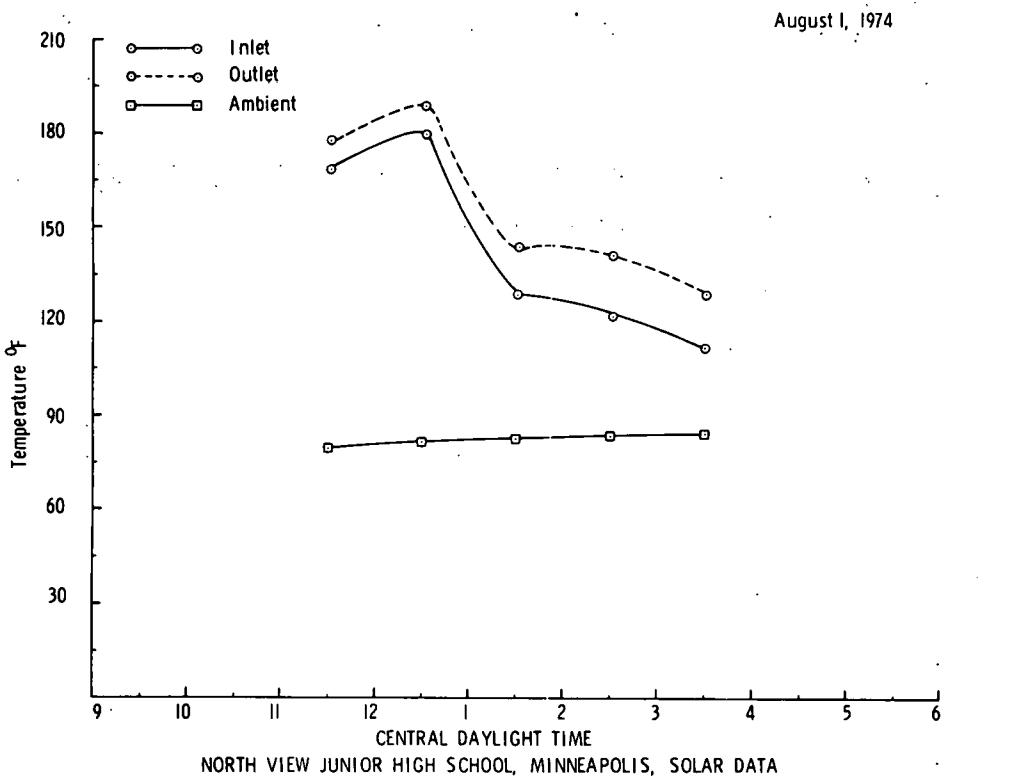
FIRST CLASS

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

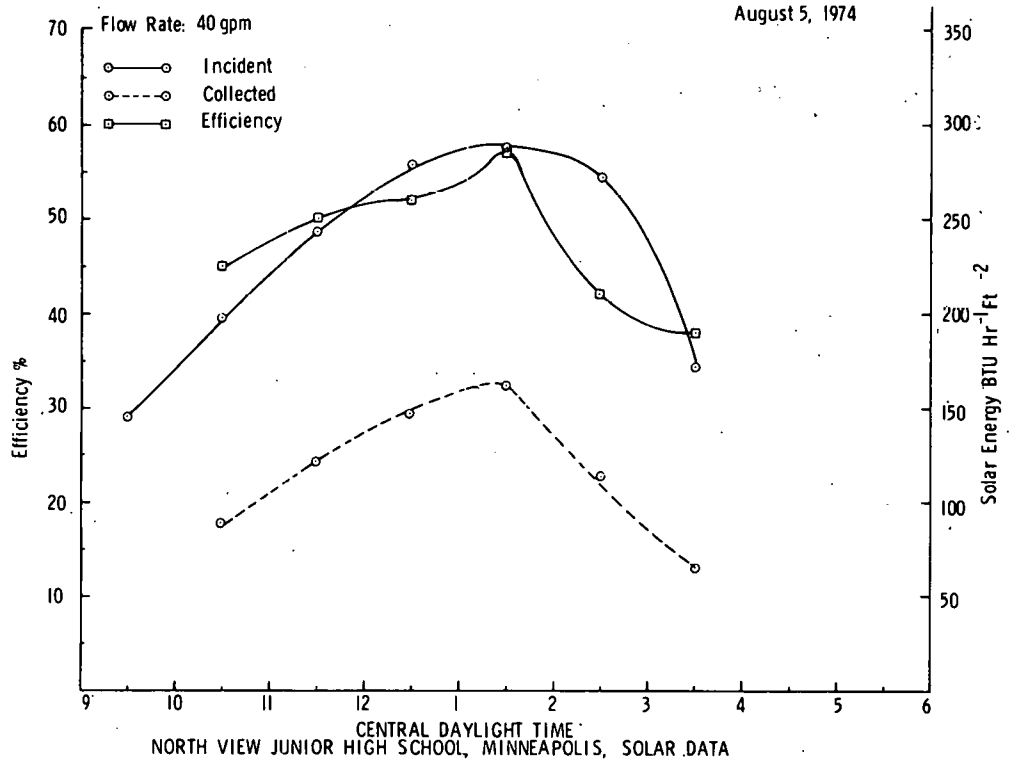

U. S. Weather Bureau Sunshine Data
Integrated Solar Flux (N. V. J. H.)
% of Maximum Insolation
100
90
80
70
60
50
40
30
20
10
1st
4th
8th
12th
16th
20th
24th
28th
31st
Month of August 1974



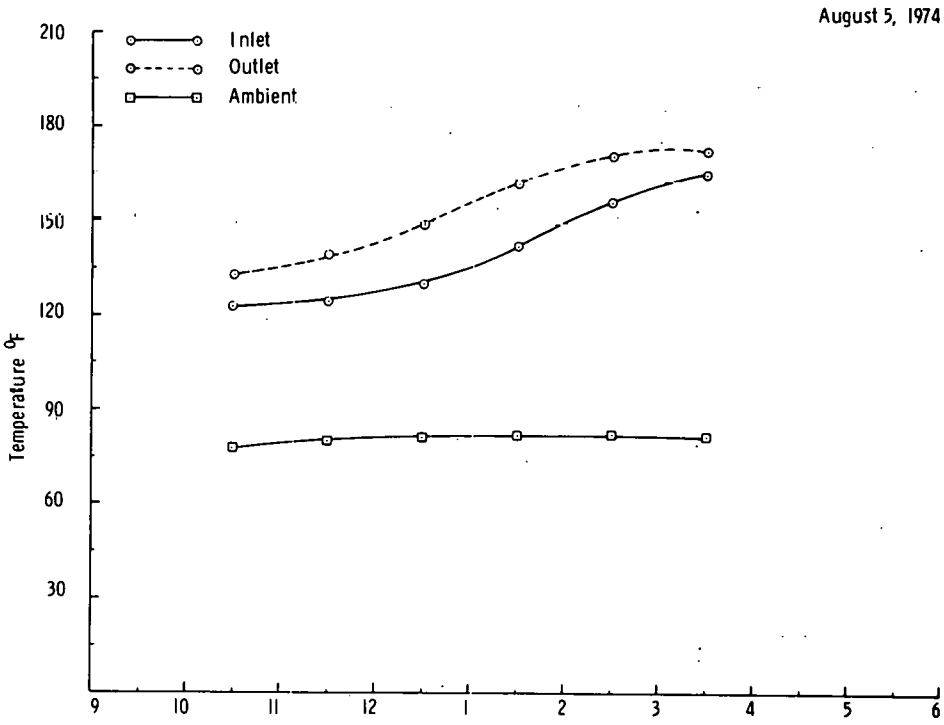
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



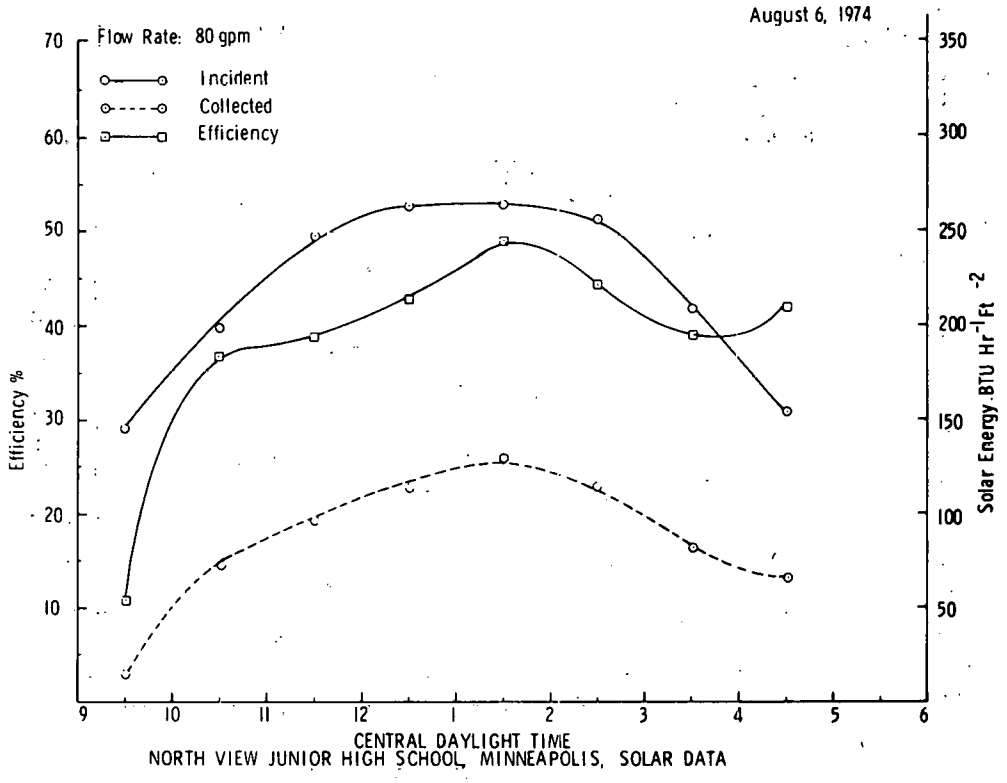
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



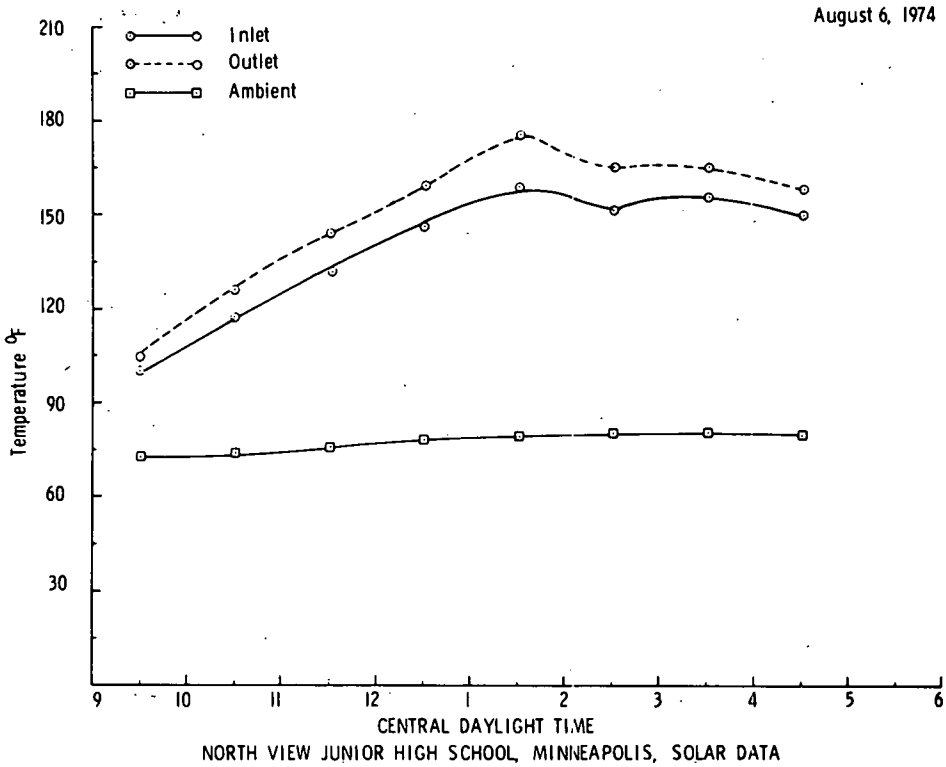
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



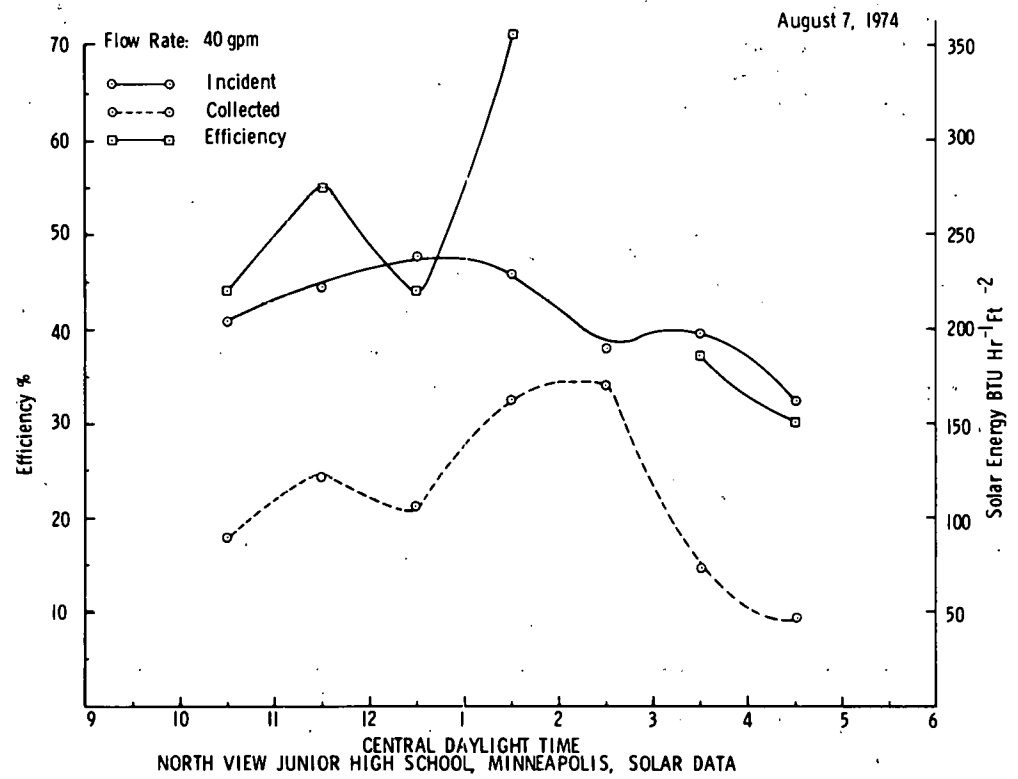
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



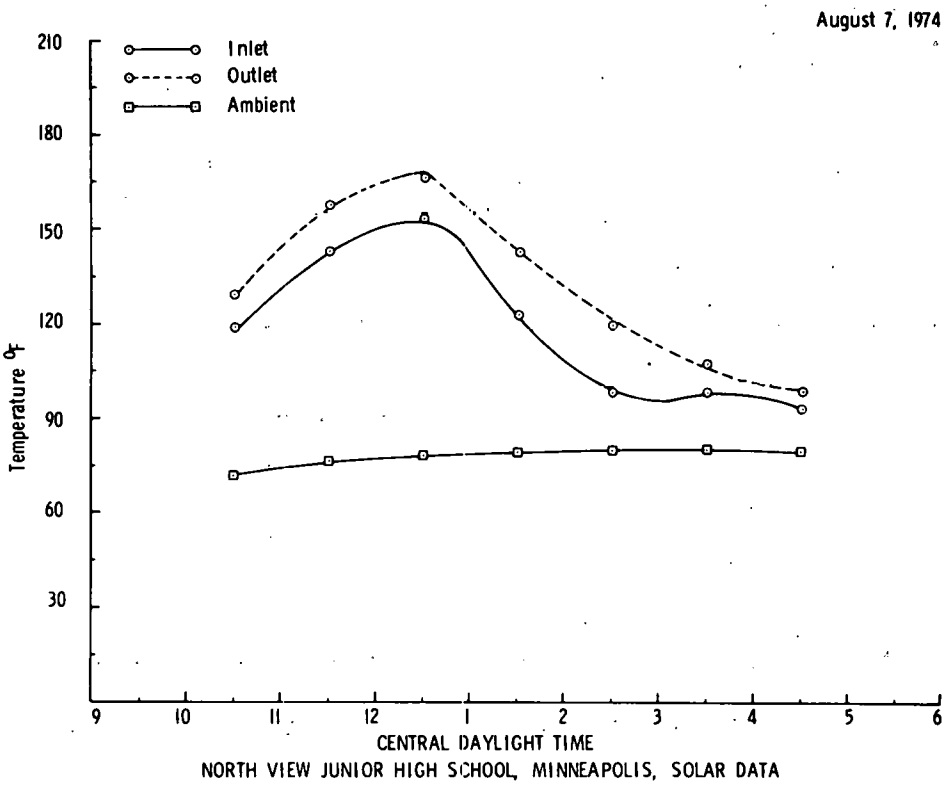
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



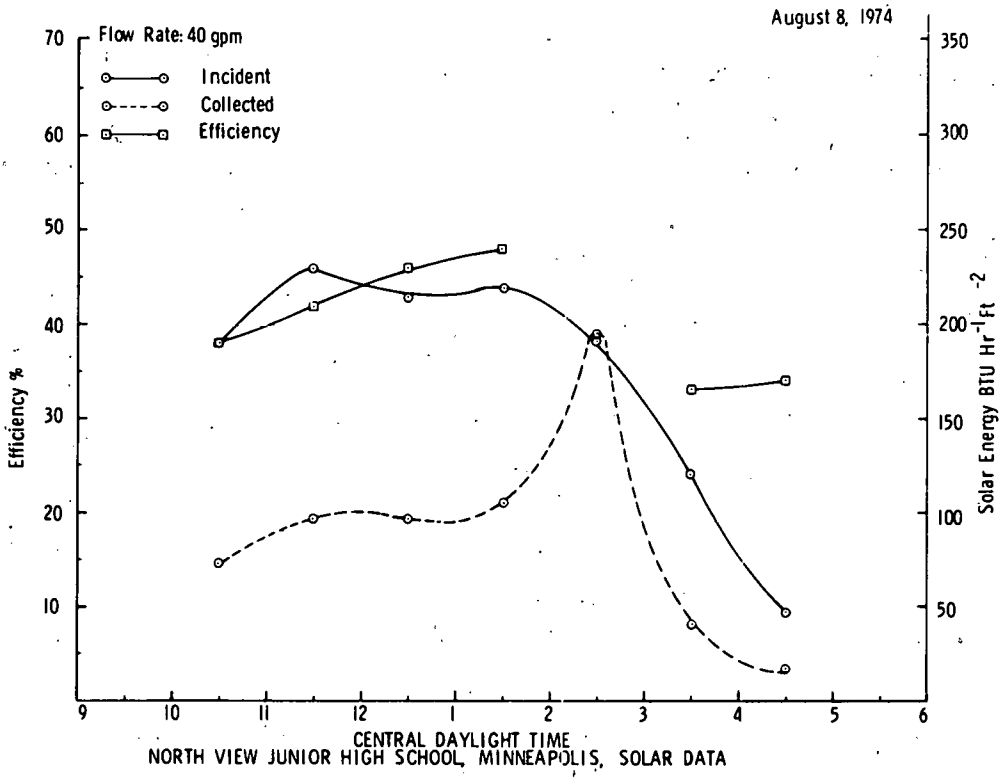
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



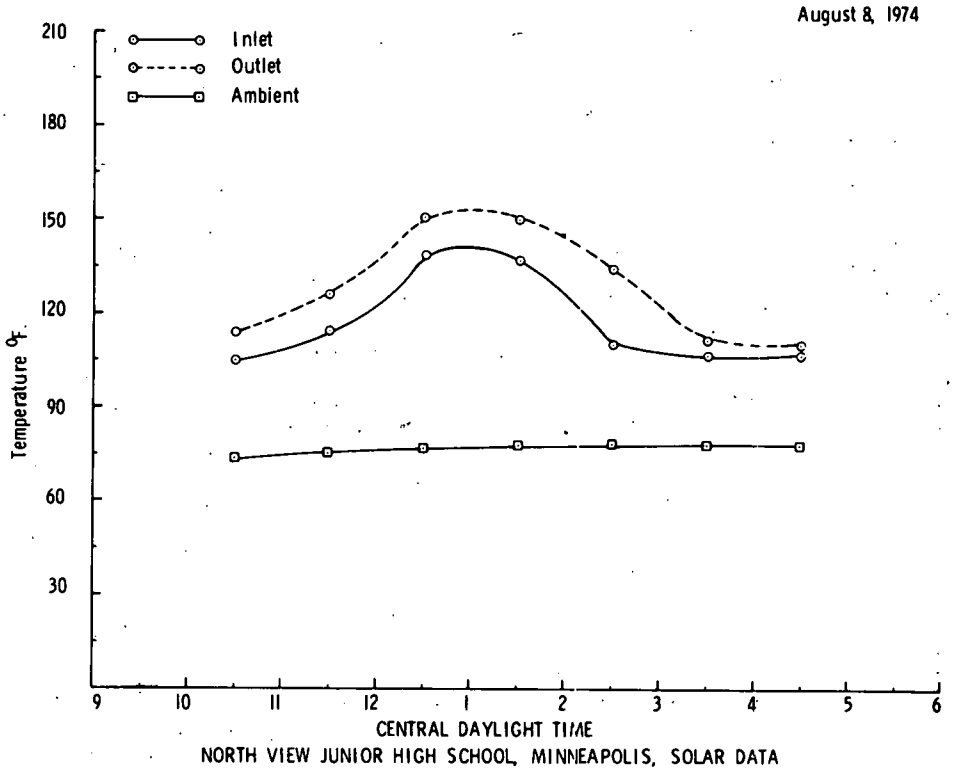
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



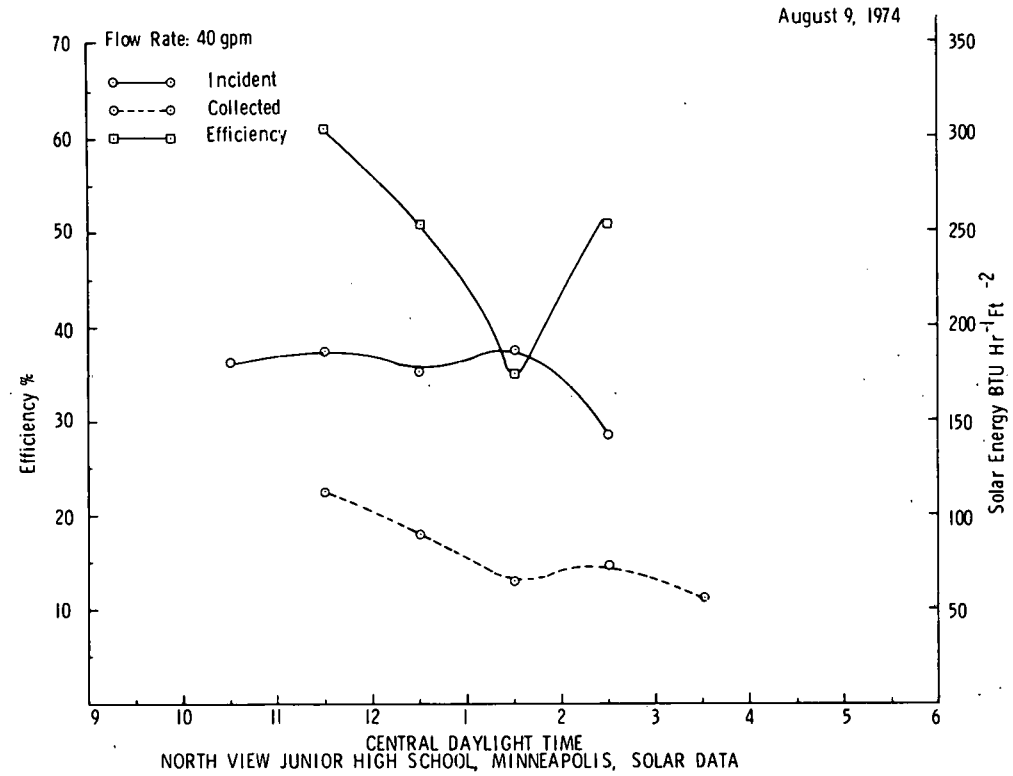
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



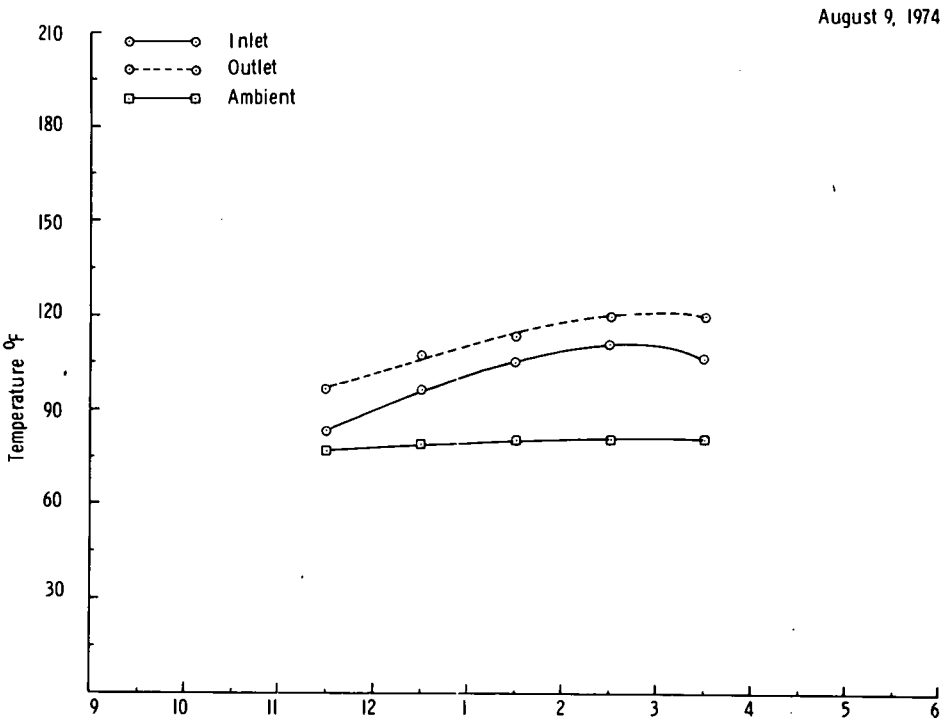
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



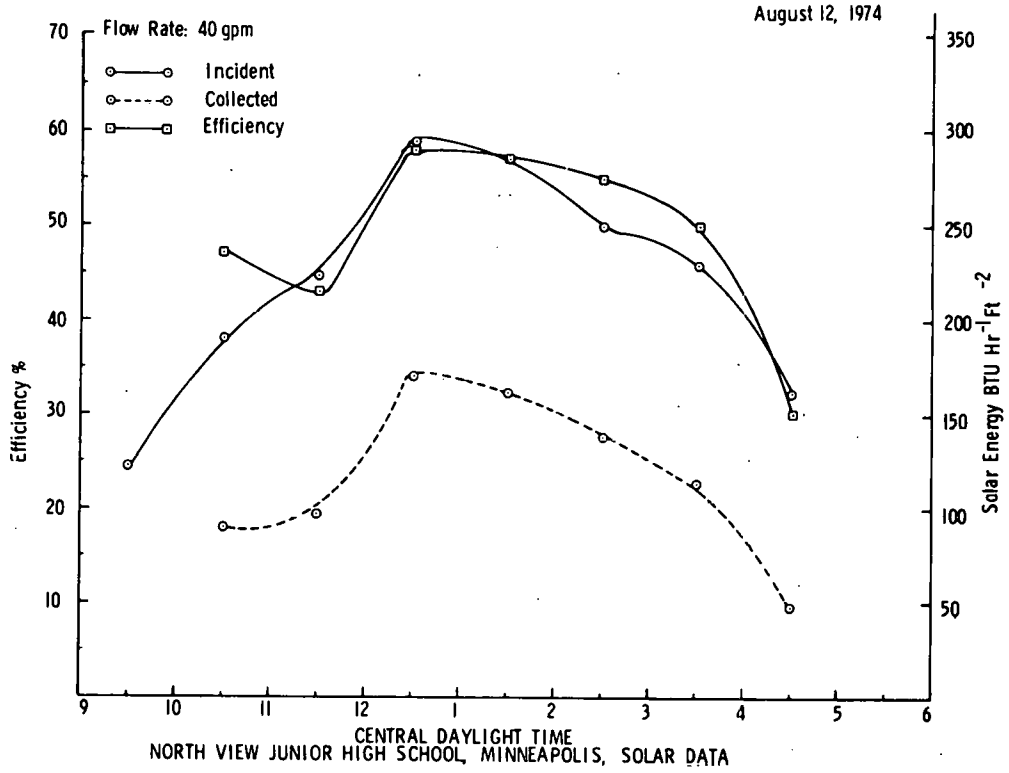
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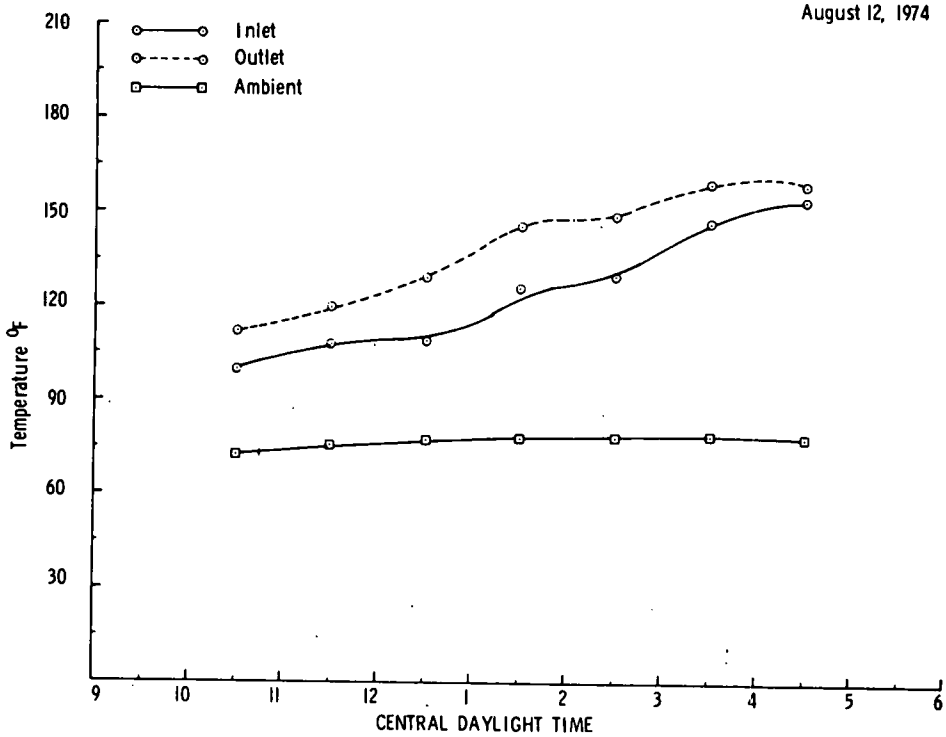
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



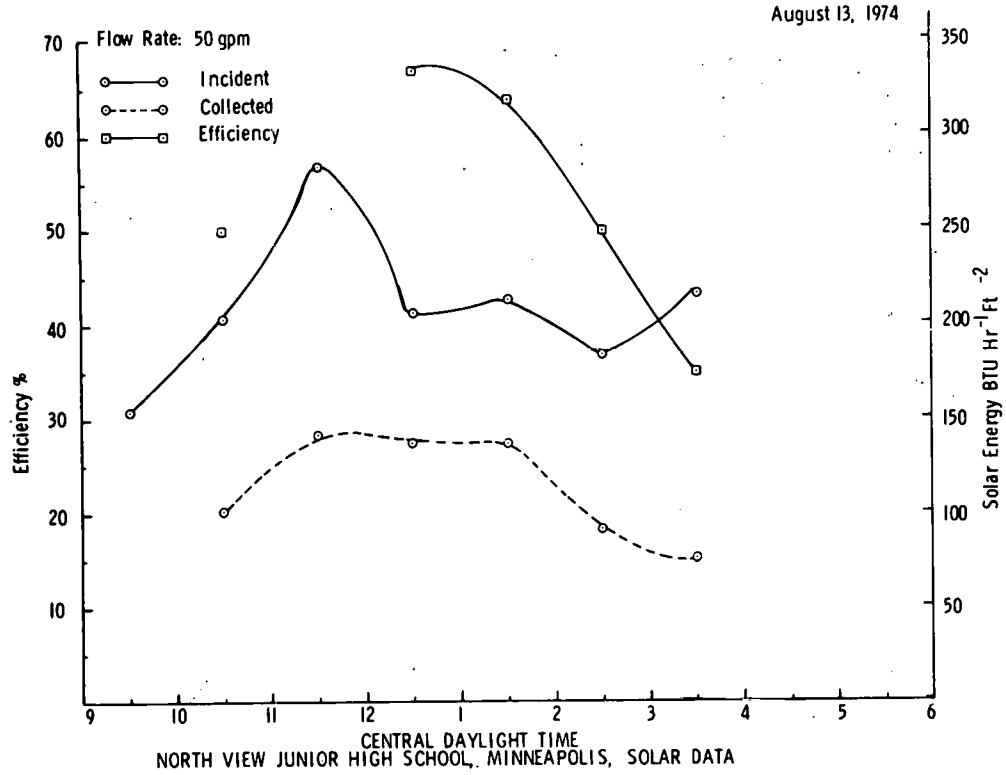
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



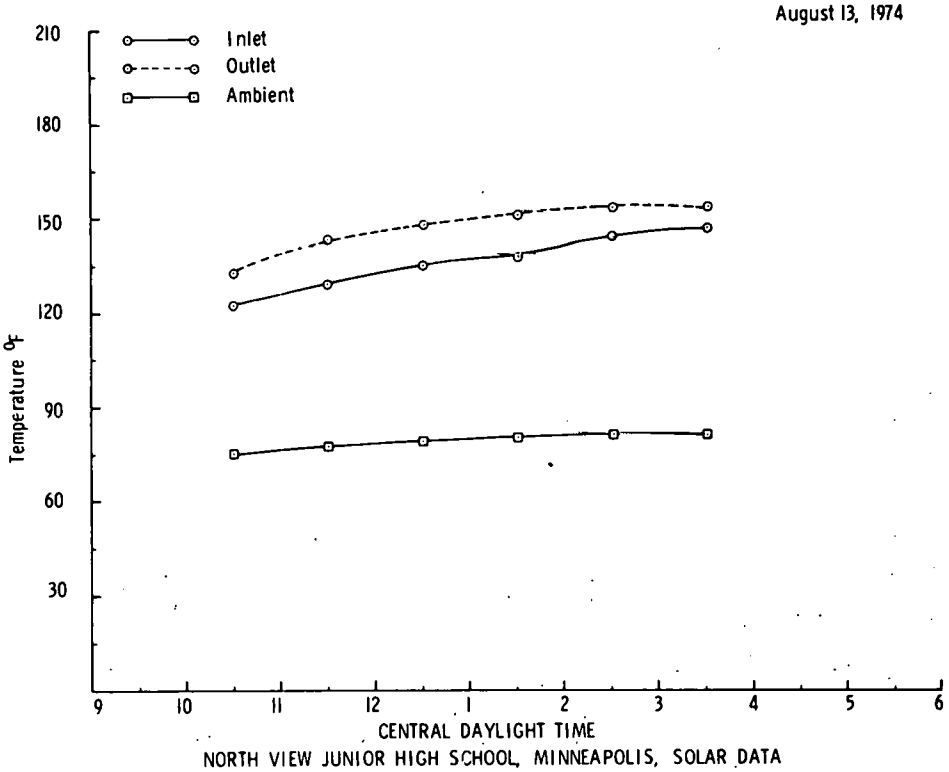
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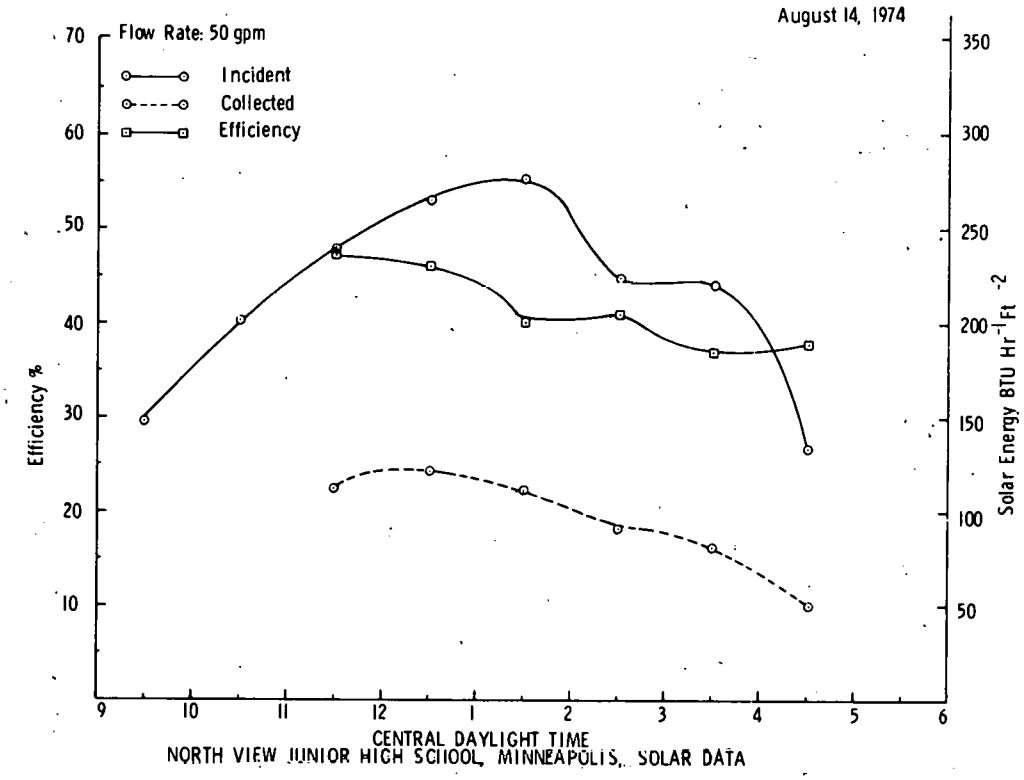
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



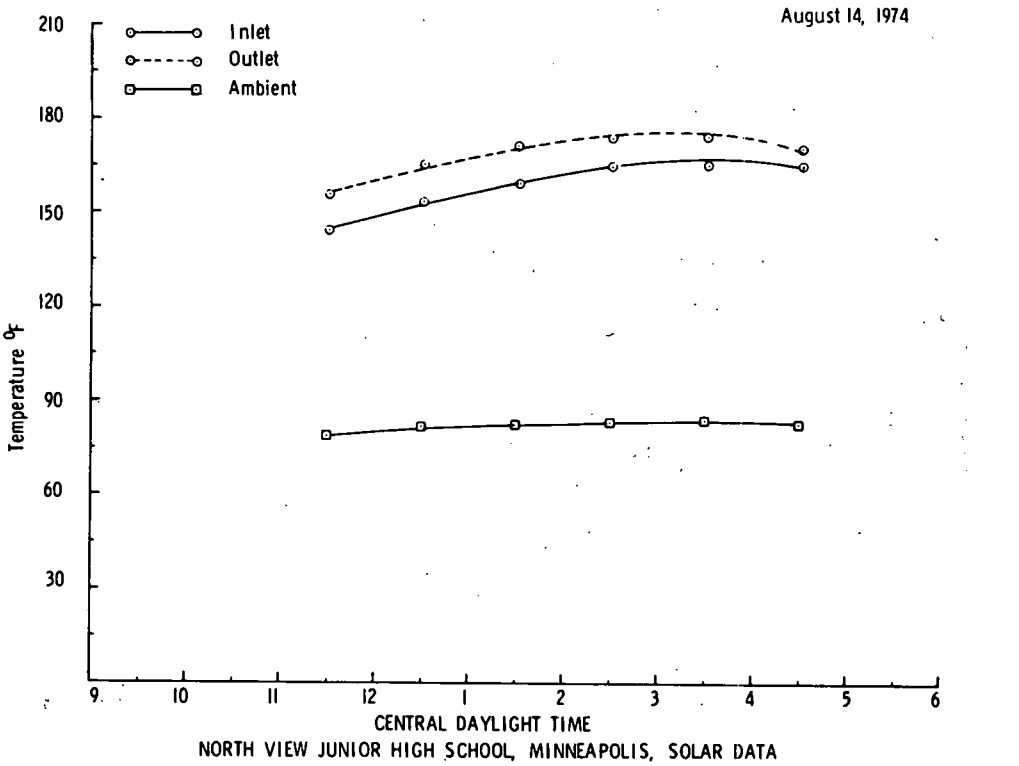
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



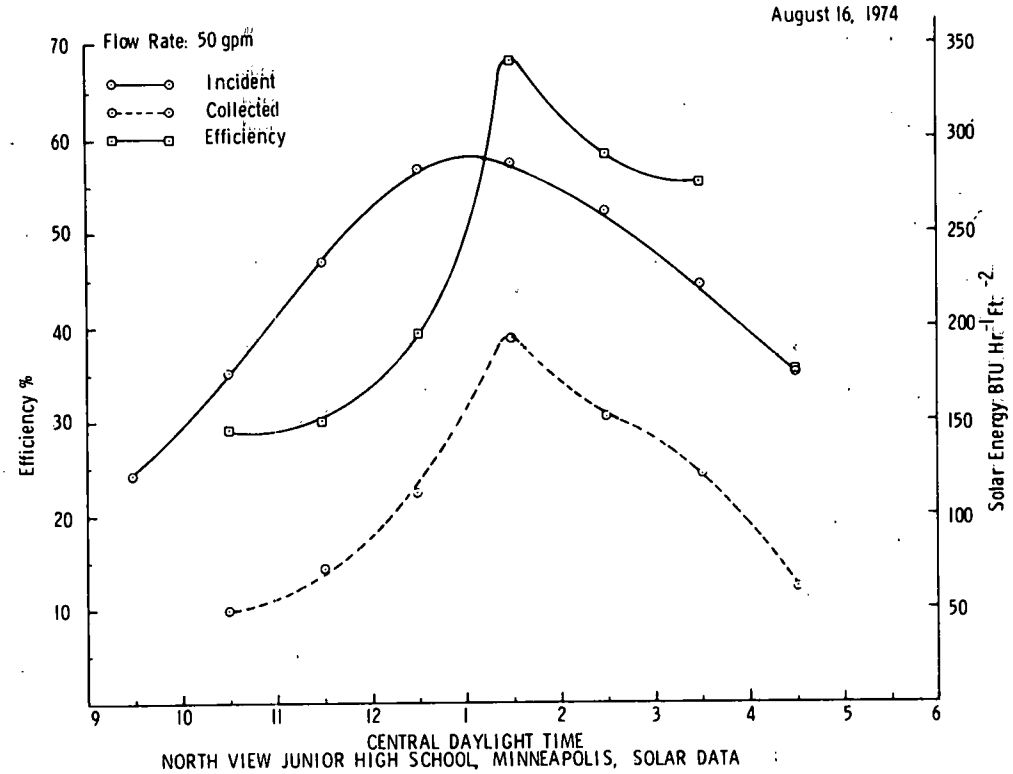
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



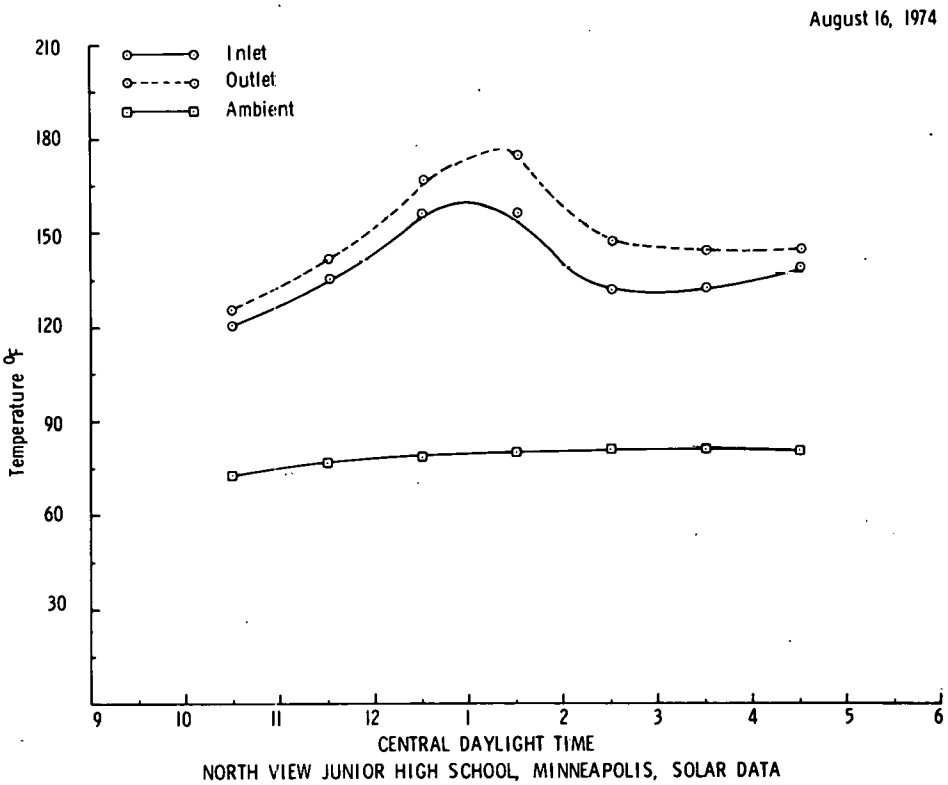
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



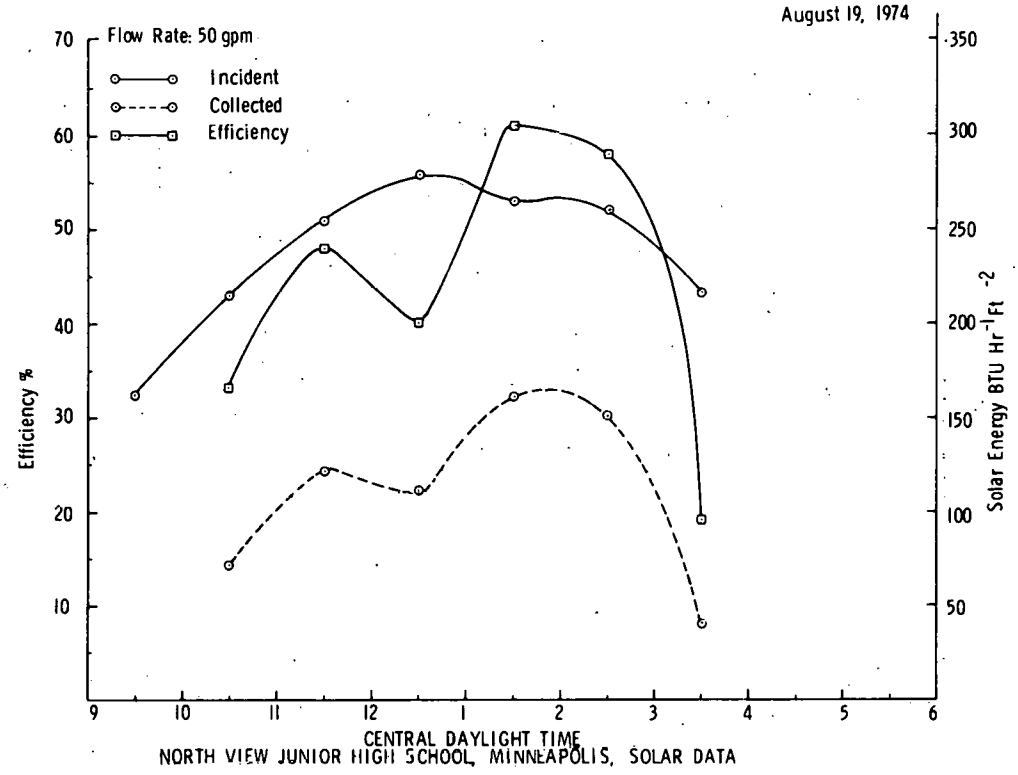
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



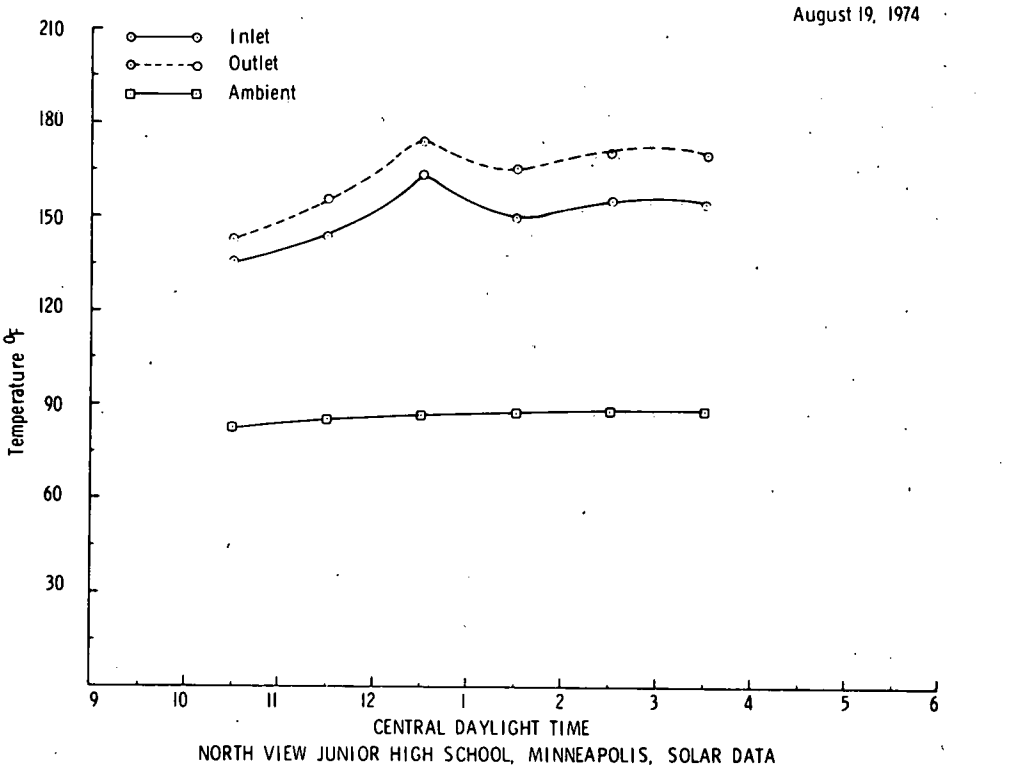
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



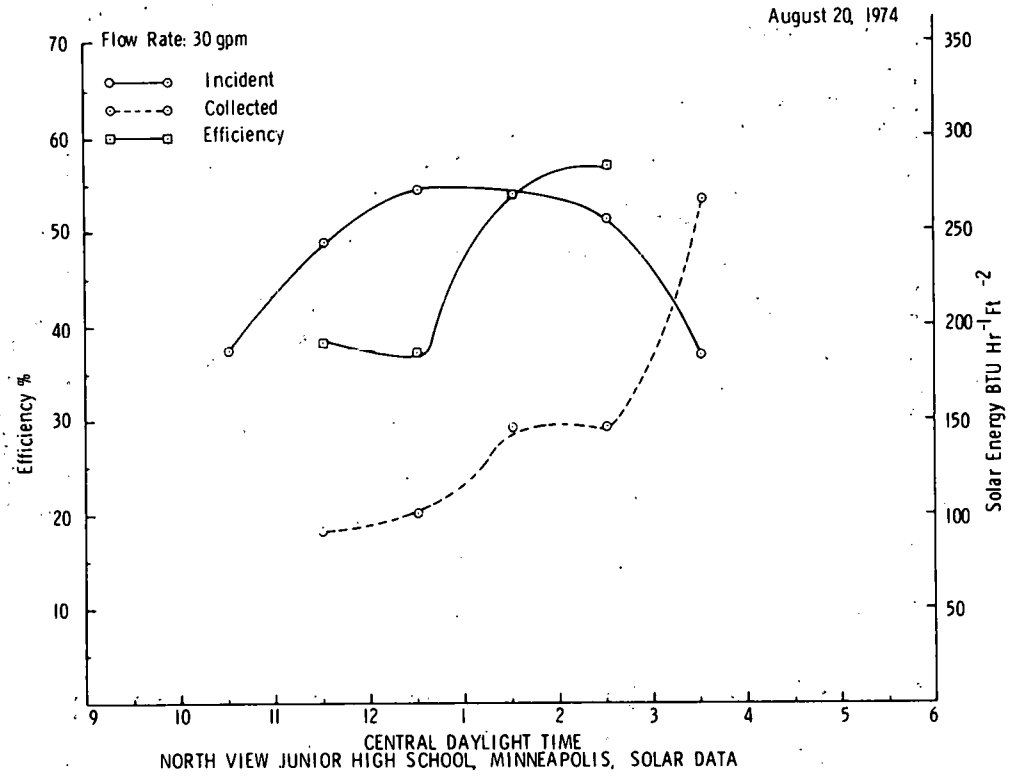
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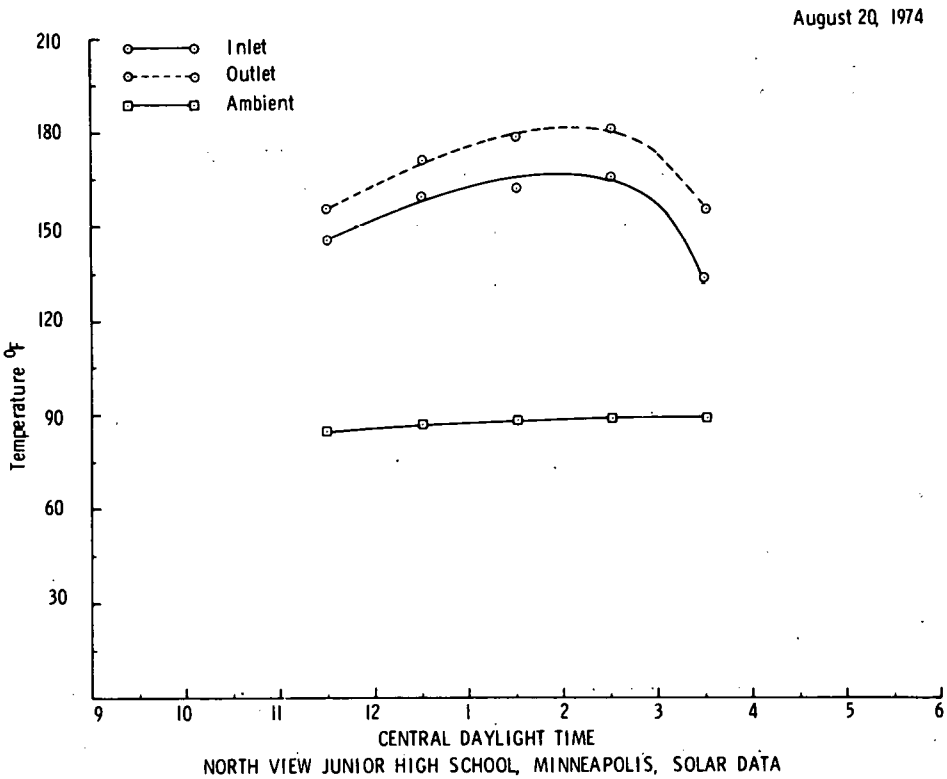
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



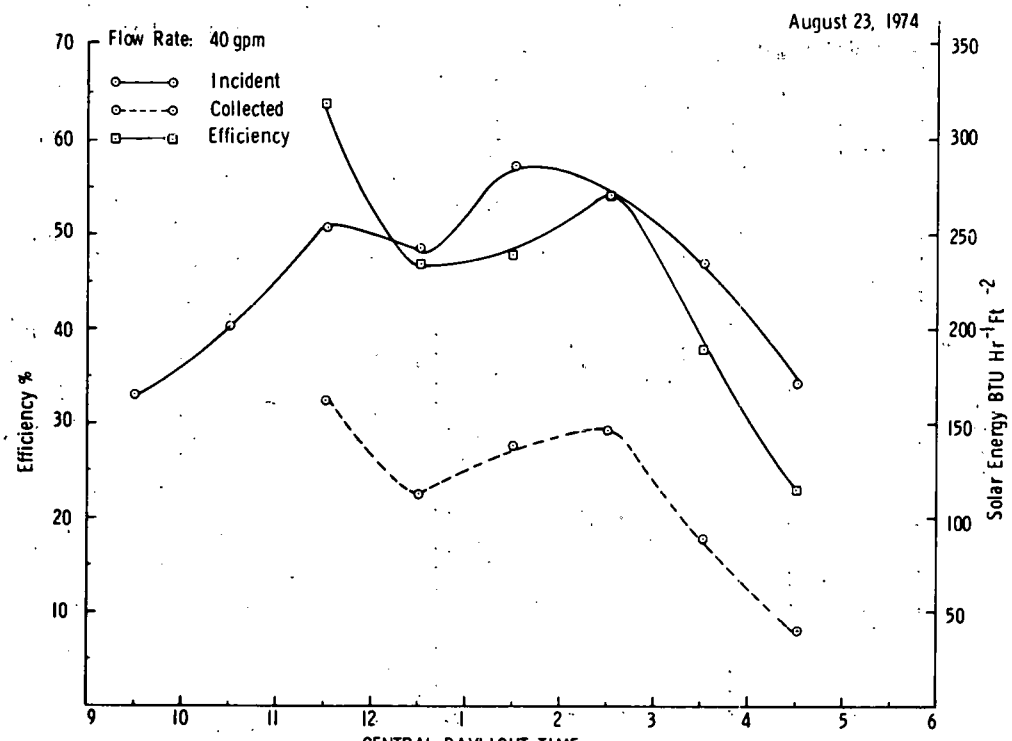
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



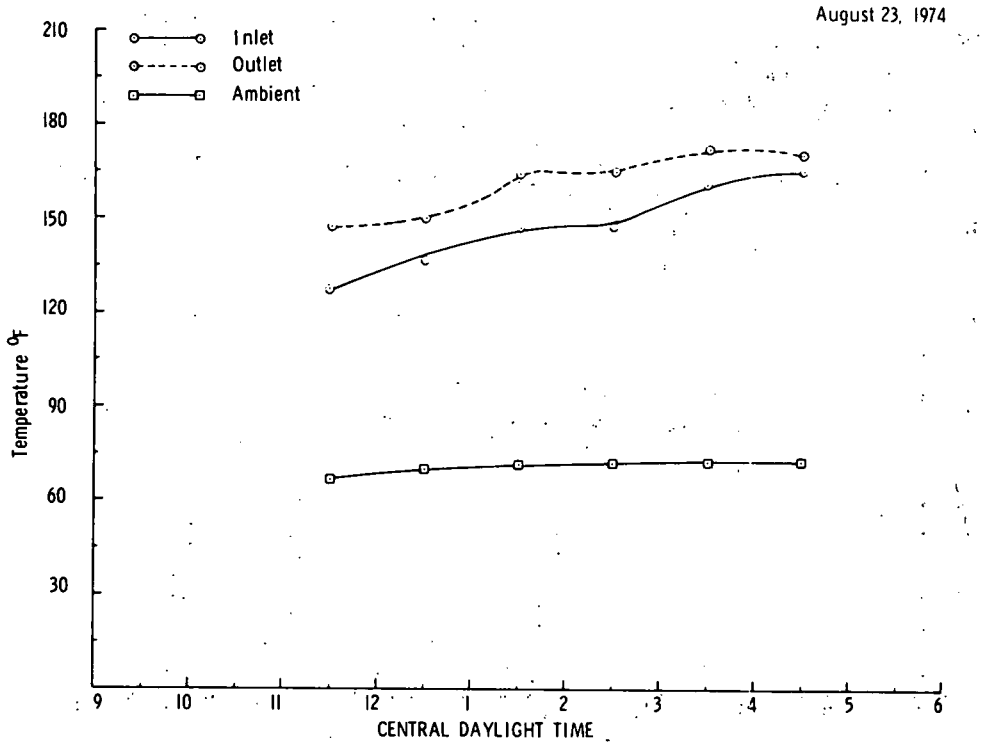
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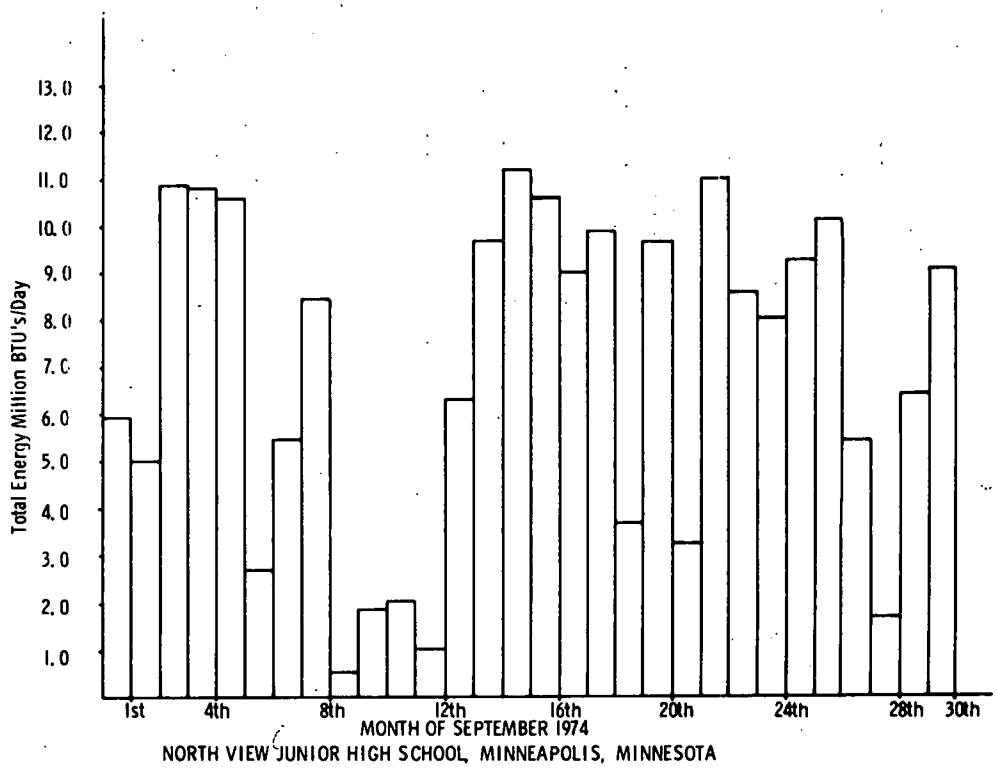
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA


Total Energy Million BTU's/Day
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
1st
4th
8th
12th
16th
20th
24th
28th
30th
MONTH OF SEPTEMBER 1974
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, MINNESOTA

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

MINNEAPOLIS-ST.PAUL, MINNESOTA
NAT WEATHER SERVICE FCST OFC
INTERNATIONAL AIRPORT
SEPTEMBER 1974

LATITUDE 44° 53' N LONGITUDE 93° 13' W ELEVATION (GROUND) 834 FT. STANDARD TIME USED: CENTRAL WBAN #14922

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING	COOLING	WEATHER TYPES ON DATES OF OCCURRENCE	SNOW, ICE PELLETS OR ICE ON GROUND AT 0&AM IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. ELEV. 838 FEET M.S.L.	WIND RESULTANT DIRECTION	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE HOURS AND TENTHS	PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DATE
1	63	36	50	-15	38	15	0		0	0	0	29.23	28	2.5	4.2	10	W	8.0	62	9	7	1
2	61	42	52	-13	38	13	0		0	.02	0	29.28	34	5.7	6.5	19	N	6.5	49	7	5	2
3	63	32	48	-16	34	17	0		0	0	0	29.30	30	3.6	4.3	9	NW	12.9	98	0	0	3
4	72	30	51	-8	38	9	0		0	0	0	29.27	17	6.7	7.2	12	SW	12.6	95	1	1	4
5	72	45	59	-5	43	6	0		0	0	0	29.20	17	11.9	12.4	22	SW	12.1	92	1	3	5
6	65	50	58	-5	48	7	0		0	.05	0	29.21	16	11.9	12.2	21	S	2.2	17	10	9	6
7	75	58	67	4	55	0	2	1 8	0	T	0	29.11	19	4.9	6.3	12	SW	2.4	18	7	6	7
8	75	57	66	4	52	0	1		0	T	0	29.14	01	4.6	9.1	16	N	9.0	70	5	5	8
9	62	56	59	-3	54	6	0	1 3	0	.19	0	29.12	07	8.8	11.2	26	SE	0.0	0	10	10	9
10	81	55	68*	6	60	0	3	2 8	0	T	0	28.93	16	8.6	11.0	27	S	3.4	27	10	8	10
11	74	55	65	4	59	0	0	1 3	0	.22	0	28.90	27	7.1	10.4	21	SW	1.4	11	10	9	11
12	55	44	50	-11	45	15	0		0	.07	0	29.13	32	9.2	9.4	16	NW	0.0	0	10	9	12
13	57	38	48	-13	38	17	0		0	0	0	29.28	31	5.7	7.2	16	NW	8.2	65	5	3	13
14	77	39	58	-2	40	7	0		0	0	0	29.10	23	11.1	11.7	27	SW	5.4	43	2	2	14
15	71	47	59	-1	42	6	0		0	0	0	29.19	33	6.4	8.1	12	N	12.6	100	0	0	15
16	77	41	59	-1	44	6	0		0	0	0	29.19	20	5.9	6.6	15	S	12.5	100	1	1	16
17	73	51	62	3	52	3	0		0	0	0	29.06	32	3.6	9.2	14	NE	12.0	96	2	1	17
18	82	46	64	5	52	1	0		0	0	0	29.06	20	7.8	9.8	19	SW	12.0	97	2	1	18
19	66	46	56	-3	48	9	0		0	0	0	29.18	34	7.7	8.5	13	N	4.4	35	7	4	19
20	66	40	53	-5	38	12	0		0	0	0	29.30	30	7.0	7.6	20	NW	10.8	88	4	4	20
21	48	32	40	-18	32	25	0		0	T	0	29.38	34	9.9	11.1	18	N	3.7	30	8	7	21
22	50	26*	38*	-20	25	27	0		0	0	0	29.46	32	1.9	4.6	8	NW	11.4	93	1	2	22
23	82	39	61	-6	38	14	0		0	0	0	29.20	15	11.0	11.6	21	SW	9.7	80	5	5	23
24	73	54	64	7	45	1	0		0	0	0	28.98	23	12.3	14.7	22	SW	11.1	92	4	5	24
25	71	41	56	-1	42	9	0		0	0	0	28.99	23	4.3	7.9	16	SW	12.0	99	6	3	25
26	85*	42	64	7	43	1	0		0	0	0	28.86	19	5.5	6.5	12	SW	12.0	100	0	1	26
27	70	52	61	5	50	4	0		0	T	0	28.87	02	4.8	10.1	19	N	7.0	66	7	6	27
28	54	38	46	-10	41	19	0		0	.03	0	28.96	36	11.6	11.7	19	N	0.7	6	10	8	28
29	66	29	48	-8	34	17	0	2	0	0	0	29.10	28	6.5	10.1	27	NW	8.3	70	5	4	29
30	50	33	42	-14	23	23	0		0	0	0	29.34	32	15.0	15.5	29	NW	8.3	70	4	5	30
	SUM	SUM				TOTAL	TOTAL			TOTAL	TOTAL	FOR THE MONTH:						TOTAL	%	SUM	SUM	
	2016	1302				289	6	NUMBER OF DAYS		.98	0	29.13	27	2.1	9.2	20	NW	233.4	FOR	153	134	
	AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.	PRECIPITATION		DEP.						DATE	30	POSSIBLE	MONTH	AVG.	AVG.	
	67.2	43.4	55.3	-4.7	43	118	-17	.01 INCH	6	-2.15								375.8	62	5.1	4.5	
						SEASON TO DATE		SNOW, ICE PELLETS														
	NUMBER OF DAYS					TOTAL	TOTAL	> 1.0 INCH	0	GREATEST IN 24 HOURS AND DATES								GREATEST DEPTH ON GROUND OF SNOW,				
	MAXIMUM TEMP.		MINIMUM TEMP.			137	618	THUNDERSTORMS	2	PRECIPITATION		SNOW, ICE PELLETS						ICE PELLETS OR ICE AND DATE				
	> 90° F	< 32° F	< 32° F	< 0° F		DEP.	DEP.	HEAVY FOG *	2	.25	11-12	0						0				
	0	0	4	0		132	40	CLEAR 10	PARTLY CLOUDY 12	CLOUDY 8												

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1																									1
2						T		.02																	2
3																									3
4																									4
5																									5
6										.04	.01												T		6
7			T																					T	7
8								T	T								T	T							8
9		.02	.02	.05	.03	T	T	.01	T	.01	T	T	T	T	.01	.03	.01				T	T	T		9
10													T	T											10
11					.02		T	.01			T			.01			.06	.09	.03		T	T			11
12						T	T	T	.03	.02	T	.01	T	.01	T	T		T	T				T	T	12
13																									13
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24																									24
25																									25
26																									26
27																								T	27
28	T	T	T	T	.03	T	T						T												28
29																									29
30																									30

MINNEAPOLIS-ST.PAUL, MINNESOTA

* EXTREME TEMPERATURES FOR THE MONTH, MAY BE THE LAST OF MORE THAN ONE OCCURRENCE.
- BELOW ZERO TEMPERATURE OR NEGATIVE DEPARTURE FROM NORMAL.
* : 70° AT ALASKAN STATIONS.
* ALSO ON AN EARLIER DATE, OR DATES.
X HEAVY FOG RESTRICTS VISIBILITY TO 1/4 MILE OR LESS.
T IN THE HOURLY PRECIPITATION TABLE AND IN COLUMNS 9, 10, AND 11 INDICATES AN AMOUNT TOO SMALL TO MEASURE

THE SEASON FOR DEGREE DAYS BEGINS WITH JULY FOR HEATING AND JANUARY FOR COOLING.
DATA IN COLUMNS 6, 12, 13, 14, AND 18 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
WIND DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. RESULTANT WIND IS THE VECTOR SUM OF WIND DIRECTIONS AND SPEEDS DIVIDED BY THE NUMBER OF OBSERVATIONS. FIGURES FOR DIRECTIONS ARE TENS OF DEGREES FROM TRUE NORTH: 1-NE., 09-EAST, 18-SOUTH, 27-WEST, 36-NORTH, AND 00-CALM. WHEN DIRECTIONS ARE IN TENS OF DEGREES IN COL. 17, ENTRIES IN COL. 16 ARE FASTEST OBSERVED 1-MINUTE SPEEDS. IF THE / APPEARS IN COL. 17, SPEEDS ARE GUSTS.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

SUBSCRIPTION PRICE: LOCAL CLIMATOLOGICAL DATA $2.00 PER YEAR INCLUDING ANNUAL ISSUE IF PUBLISHED. FOREIGN MAILING 75¢ EXTRA. SINGLE COPY: 20¢ FOR MONTHLY ISSUE; 15¢ FOR ANNUAL SUMMARY. MAKE CHECKS PAYABLE TO DEPARTMENT OF COMMERCE, NOAA. SEND PAYMENTS AND ORDERS TO NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC CENTER, ASHEVILLE, NORTH CAROLINA, 28801

William H. Haggard

DIRECTOR, NATIONAL CLIMATIC CENTER

SUMMARY BY HOURS

HOUR LOCAL TIME	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	DEW PT. °F	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
00	3	29.12	53	48	43	71	7.9	23	2.8
03	4	29.12	49	46	43	81	7.7	26	.8
06	5	29.15	46	44	43	87	6.1	35	.5
09	5	29.17	55	50	45	69	9.4	29	1.9
12	6	29.15	62	53	43	52	11.8	27	3.8
15	5	29.11	66	53	42	45	12.7	28	4.5
18	4	29.11	62	52	42	50	10.6	26	2.1
21	3	29.13	55	48	42	64	7.8	25	1.7

USCOMM - NOAA - ASHEVILLE 750
10/18/74

OBSERVATIONS AT 3-HOUR INTERVALS

DAY 01

00	0	UNL	25		48	43	38	88	32	4
03	2	UNL	25		43	41	39	86	00	0
06	5	UNL	25		40	39	38	93	00	0
09	7	250	25		55	48	40	57	18	5
12	10	250	25		62	47	31	31	36	3
15	10	140	25		62	49	34	35	31	10
18	10	80	20		58	49	38	46	29	3
21	10	200	20		48	46	42	77	23	4

DAY 02

00	6	200	20		51	46	41	69	23	3
03	8	100	25		49	44	42	88	00	0
06	7	90	25		47	45	44	89	36	5
09	8	90	25		50	47	45	83	00	0
12	7	90	25		58	48	37	46	34	12
15	7	70	25		58	45	29	33	36	12
18	8	70	25		55	44	33	40	34	8
21	0	UNL	25		45	39	35	73	33	5

DAY 03

00	0	UNL	25		42	38	36	79	31	4
03	0	UNL	25		36	35	34	92	24	3
06	0	UNL	25		35	35	34	96	00	0
09	0	UNL	25		53	45	35	51	01	3
12	0	UNL	25		58	46	32	36	32	6
15	0	UNL	25		62	48	33	34	31	9
18	0	UNL	25		59	47	34	38	26	5
21	0	UNL	25		52	45	37	57	00	0

DAY 04

00	0	UNL	20		47	42	36	86	33	3
03	0	UNL	25		43	40	38	78	33	3
06	4	UNL	25		40	38	35	82	32	4
09	3	UNL	20		56	48	41	57	18	5
12	0	UNL	25		69	54	40	35	19	8
15	0	UNL	25		72	54	37	28	16	8
18	0	UNL	25		68	54	40	35	18	10
21	0	UNL	25		58	50	41	58	17	9

DAY 05

00	0	UNL	25		55	48	43	64	18	10
03	0	UNL	25		50	46	41	71	19	8
06	0	UNL	25		45	43	41	86	13	6
09	0	UNL	25		61	53	45	56	16	7
12	0	UNL	25		70	55	43	38	17	16
15	0	UNL	25		71	55	42	35	19	18
18	0	UNL	20		66	54	44	45	16	12
21	0	UNL	15		58	50	44	64	17	9

DAY 06

00	9	UNL	12		52	48	45	77	16	7
03	4	UNL	12		50	47	44	80	14	8
06	9	110	10		50	47	45	83	14	9
09	10	75	7		60	53	47	62	18	11
12	10	75	10		61	56	52	72	17	14
15	10	75	15		64	56	48	58	17	12
18	10	50	12		63	55	48	58	17	16
21	10	26	12		61	55	51	70	17	8

DAY 07

00	10	16	12		59	55	52	78	17	8
03	10	12	7		56	56	55	90	14	5
06	10	8	7		58	56	55	90	15	5
09	10	8	7		62	58	56	87	21	6
12	10	28	10		68	60	55	63	23	6
15	10	UNL	15		74	63	55	52	26	6
18	1	UNL	12		71	61	55	57	22	4
21	0	UNL	12		61	56	53	74	17	4

DAY 08

00	8	110	20		65	60	56	73	22	8
03	10	UNL	25		60	58	56	87	22	6
06	6	90	8		57	56	56	96	31	4
09	10	12	7		61	57	55	81	01	13
12	1	UNL	25		71	60	52	51	02	8
15	0	UNL	25		75	60	48	40	01	8
18	8	UNL	25		71	57	48	41	06	8
21	2	UNL	25		63	55	48	58	02	7

DAY 09

00	10	46	25		62	55	50	85	12	11
03	10	80	15	TRW	56	54	52	87	10	17
06	10	7	10		57	55	54	90	12	10
09	10	8	8	F	58	56	55	90	05	9
12	10	5	8	F	58	57	56	93	05	7
15	10	8	8	R	57	56	55	93	01	6
18	10	7	10		56	54	53	90	04	10
21	10	8	15	R	56	54	53	90	03	8

DAY 10

00	10	7	15		58	54	52	87	05	7
03	10	4	8		55	54	53	93	06	6
06	10	3	8	F	56	55	55	96	11	8
09	10	3	8	F	61	60	60	97	13	6
12	10	4	8	M	71	67	64	81	18	14
15	10	UNL	8		80	71	66	62	18	18
18	10	11	7		77	71	66	69	18	14
21	3	UNL	12		74	68	65	74	18	10

DAY 11

00	0	UNL	20		74	68	65	74	21	14
03	10	42	20		72	67	64	76	22	13
06	10	10	5	F	63	61	60	90	34	5
09	10	8	10	F	63	61	60	90	29	7
12	10	250	10		68	63	60	76	31	12
15	10	50	10		66	60	56	70	32	9
18	10	90	7	RW	60	58	57	90	26	8
21	10	130	20	RW	57	54	52	83	30	4

DAY 12

00	5	UNL	25		55	52	50	83	32	4
03	3	UNL	20		51	48	47	88	33	7
06	10	22	25	RW	50	47	45	85	31	10
09	10	14	12	RW	47	45	44	89	34	8
12	10	12	12	RW	49	47	46	88	31	6
15	10	9	10	L	49	47	45	86	32	12
18	10	13	7	L	47	46	42	83	33	10
21	9	15	15		45	43	41	88	32	8

DAY 13

00	10	10	40		44	42	40	86	32	9
03	3	UNL	25		41	40	38	89	28	4
06	10	18	15		43	42	41	93	30	3
09	10	40	20		48	46	45	86	30	3
12	10	40	15		52	48	43	73	30	9
15	10	40	10		54	49	43	69	30	9
18	10	40	7		52	48	43	73	30	9
21	0	UNL	25		44	42	40	88	32	7

DAY 14

00	0	UNL	25		41	38	34	76	20	5
03	0	UNL	25		39	37	35	86	20	4
06	0	UNL	25		40	39	37	89	19	5
09	1	UNL	25		56	48	42	60	23	13
12	1	UNL	25		71	57	45	39	22	15
15	6	80	25		75	66	60	48	24	15
18	0	UNL	25		74	57	42	32	25	11
21	0	UNL	25		70	55	41	35	25	13

DAY 15

00	0	UNL	20		61	51	42	50	25	5
03	0	UNL	25		57	52	47	69	32	7
06	0	UNL	25		50	46	42	74	35	8
09	0	UNL	25		58	51	44	60	36	12
12	0	UNL	25		64	53	43	47	33	7
15	0	UNL	25		70	54	40	34	35	8
18	0	UNL	25		70	54	40	34	35	5
21	0	UNL	25		53	47	40	62	23	4

DAY 16

00	0	UNL	20		47	44	41	80	14	5
03	0	UNL	20		44	42	40	86	00	0
06	0	UNL	25		41	40	39	93	00	0
09	0	UNL	25		60	50	40	48	21	6
12	0	UNL	25		70	57	46	42	25	10
15	0	UNL	25		76	61	47	36	20	10
18	0	UNL	25		72	59	50	46	18	10
21	4	UNL	25		63	56	50	63	21	8

DAY 17

00	0	UNL	25		65	57	50	59	21	11
03	3	UNL	25		64	57	52	65	24	12
06	0	UNL	20		54	52	51	90	24	3
09	0	UNL	20		67	60	55	66	36	10
12	3	UNL	20		72	62	55	55	02	12
15	3	UNL	25		73	61	52	48	36	9
18	2	UNL	25		69	60	53	57	36	7
21	0	UNL	25		59	54	49	70	00	0

DAY 18

00	0	UNL	25		51	48	48	90	14	6
03	0	UNL	25		48	47	47	93	12	4
06	0	UNL	25		46	46	46	100	14	3
09	2	UNL	25		62	58	55	78	23	8
12	8	UNL	25		75	63	56	52	23	11
15	3	UNL	25		81	65	55	41	20	15
18	2	UNL	20		77	64	55	47	18	10
21	2	UNL	15		72	61	53	50	24	11

DAY 19

00	1	UNL	15		66	60	55	68	26	10
03	1	UNL	15		59	56	54	84	01	8
06	1	UNL	15		56	51	50	80	35	8
09	4	140	20		80	53	48	65	34	9
12	8	150	20		82	53	46	56	31	10
15	8	170	25		86	54	44	45	30	8
18	1	UNL	25		74	51	42	52	32	6
21	0	UNL	15		52	46	44	74	00	0

DAY 20

00	1	UNL	15		46	45	44	93	23	3
03	1	UNL	15		44	43	43	96	23	3
06	8	250	15		44	43	43	98	00	0
09	2	UNL	20		58	48	40	51	31	6
12	3	UNL	25		64	50	35	34	30	11
15	7	60	25		68	54	35	31	31	10
18	2	UNL	25		59	47	34	39	30	10
21	2	UNL	20		48	42	35	61	31	4

DAY 21

00	0	80	20		41	42	37	88	26	4
03	10	55	15		48	43	37	66	36	13
06	10	50	20		43	42	40	89	36	4
09	10	41	25		49	41	37	76	33	14
12	10	44	25		53	37	28	58	31	15
15	10	40	25		49	37	27	51	34	12
18	4	UNL	25		42	35	33	47	01	9
21	4	UNL	20		36	32	28	67	36	8

DAY 22

00	1	UNL	20		37	31	28	85	36	3
03	0	UNL	15		30	29	28	92	30	3
06	1	UNL	15		28	27	25	89	30	3
09	0	UNL	25		40	34	28	62	33	3
12	0	UNL	25		47	37	27	46	30	4
15	0	UNL	25		47	37	22	37	34	8
18	0	UNL	25		38	35	31	83	18	4
21	0	UNL	20		47	37	21	36	26	4

DAY 23

00	6	100	15		40	35	28	87	14	5
03	5	UNL	15		40	35	27	80	17	8
06	10	150	15		41	36	30	85	19	10
09	7	100	20		48	43	35	58	19	12
12	7	80	20		55	48	41	58	17	14
15	1	UNL	20		62	53	44	52	18	15
18	0	UNL	12		56	48	43	62	12	14
21	0	UNL	12		48	46	43	80	12	4

DAY 24

00	6	UNL	15		60	52	44	86	21	13
03	10	110	15		50	52	45	80	22	19
06	3	UNL	15		54	48	45	72	20	12
09	6	120	25		65	59	55	70	18	7
12	6	120	25		72	60	48	44	24	13
15	0	UNL	20		67	53	41	39	30	11
18	1	UNL	15		60	51	43	54	30	7

DAY 25

00	0	UNL	20		56	48	41	57	31	6
03	0	UNL	25		48	45	41	77	33	6
06	4	UNL	25		43	42	41	93	30	5
09	1	UNL	25		53	47	41	64	12	4
12	6	UNL	25		62	51	41	46	24	4
15	9	UNL	25		70	54	42	36	22	12
18	7	UNL	25		68	56	46	44	18	9
21	0	UNL	20		62	51	41	46	20	9

DAY 26

00	0	UNL	20		66	53	41	40	29	9
03	2	UNL	25		55	48	42	62	00	0
06	2	UNL	25		46	44	42	88	00	0
09	0	UNL	25		64	53	43	47	21	4
12	0	UNL	25		79	59	44	29	18	7
15	3	UNL	25		84	61	44	25	18	7
18	0	UNL	20		77	59	44	31	17	8
21	0	UNL	20		68	56	46	45	16	10

DAY 27

00	0	UNL	20		61	54	49	65	16	5
03	0	UNL	20		54	52	50	83	14	6
06	2	UNL	20		55	53	51	86	08	3
09	3	UNL	20		65	59	55	70	18	7
12	10	33	15		69	60	53	57	34	12
15	10	100	15		70	59	50	46	35	14
18	10	38	15		65	55	47	52	36	10
21	10	38	15		61	52	45	52	05	13

DAY 28

00	10	34	15		53	47	41	64	36	12
03	10	30	20		48	46	42	80	36	15
06	10	13	15		43	44	43	93	36	10
09	10	80	25		46	44	43	83	01	10
12	10	17	25		48	44	40	74	36	10
15	10	24	25		52	47	42	69	36	9
18	9	25	25		51	48	41	69	36	10
21	0	UNL	25		44	42	39	83	34	5

DAY 29

00	0	UNL	20		38	38	38	100	00	0
03	0	UNL	20		35	35	35	100	00	0
06	0	UNL	0	F	32	32	32	100	00	0
09	0	130	6	GF	44	43	43	96	19	4
12	7	UNL	25		62	48	35	37	18	13
15	3	UNL	15		56	50	34	31	30	15
18	2	UNL	15		53	43	30	41	31	20
21	7	50	15		46	38	26	46	31	18

DAY 30

00	2	UNL	25		33	33	24	55	20	15
03	10	38	25		33	34	25	57	34	17
06	10	31	25		38	37	23	59	31	17
09	10	33	25		43	34	23	51	33	17
12	10	37	25		47	37	22	37	32	14
15	10	38	25		53	38	18	28	33	11
18	10	35	25		49	35	21	40	31	11
21	10	32	25		37	32	24	59	32	8

NOTES

CEILING COLUMN:
UNL INDICATES UNLIMITED CEILING

WEATHER COLUMN:

- R - RAIN
- S - SNOW
- RW - RAIN SHOWERS
- SW - SNOW SHOWERS
- T - THUNDER
- ZR - FREEZING RAIN
- ZL - FREEZING DRIZZLE
- IP - SLEET
- GF - FOG
- BS - BLOWING SNOW
- BD - BLOWING DUST
- BN - BLOWING SAND
- H - HAZE
- K - SMOKE
- F - FOG

WIND COLUMNS:

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH: I.E., 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS; MULTIPLY BY 1.15 TO CONVERT TO MILES PER HOUR.

ADDITIONAL DATA

OTHER OBSERVATIONAL DATA CONTAINED IN RECORDS ON FILE CAN BE FURNISHED AT COST VIA MICROFILM, MICROFICHE, OR PAPER COPIES OF THE ORIGINAL RECORDS. INQUIRIES AS TO AVAILABILITY AND COSTS SHOULD BE ADDRESSED TO: DIRECTOR, NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

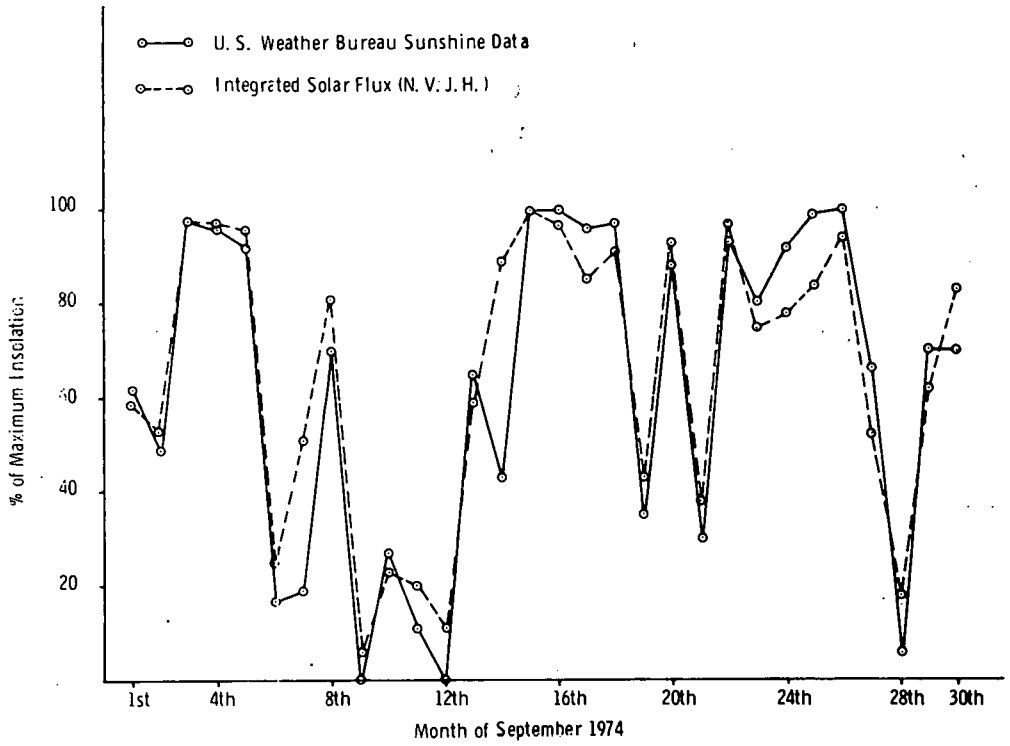
STATION: MINNEAPOLIS MINN YEAR & MONTH: 74 09

U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
210

FIRST CLASS


U. S. Weather Bureau Sunshine Data
Integrated Solar Flux (N. V. J. H.)
% of Maximum Insolation
100
80
60
40
20
1st
4th
8th
12th
16th
20th
24th
28th
30th
Month of September 1974

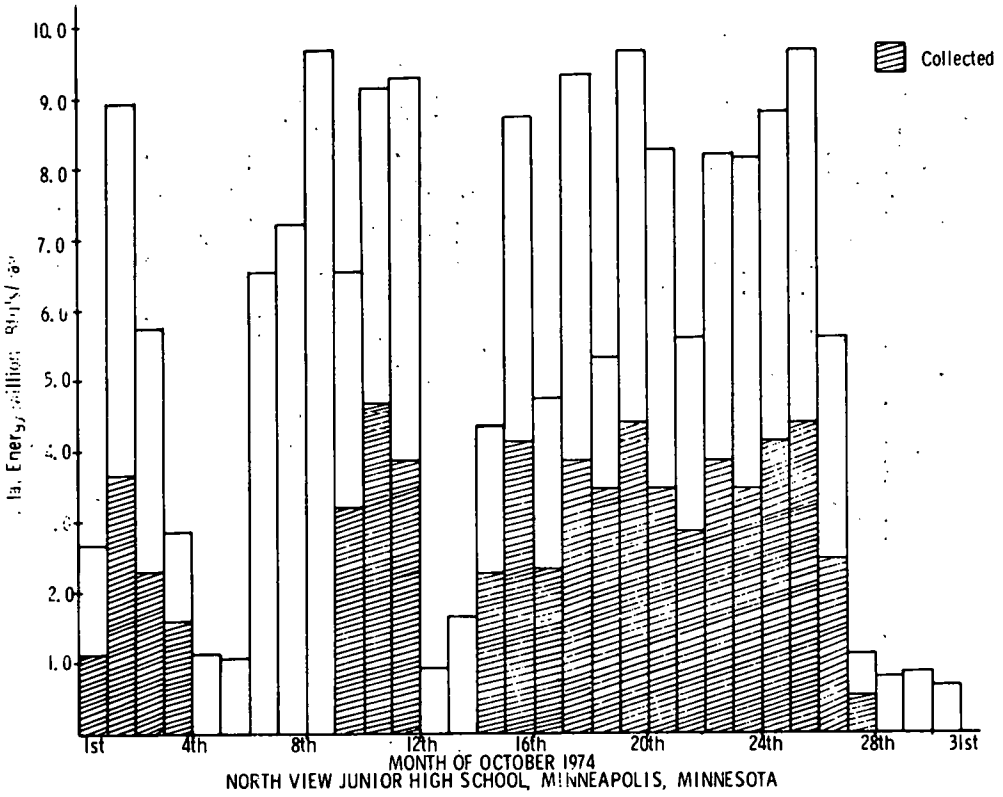
OCTOBER
1974

North View Junior High
Month of October 1974

Date	Mode of Operation	Overall Eff.= $\frac{Q_{collected}}{Q_{incident}}$
Oct. 1	Storage From Collector	49%
Oct. 2	Storage From Collector	40%
Oct. 3	Domestic Water Heating From Collector	39%
Oct. 4	Domestic Water Heating From Collector	57%
Oct. 5	Weekend, No Collection, Cloudy	---
Oct. 6	Weekend, No Collection, Cloudy	---
Oct. 7	No Collection, Glycol Addition	
Oct. 8	No Collection, Glycol Addition	
Oct. 9	No Collection, Glycol Addition	
Oct. 10	Domestic Water Heating From Collector	50%
Oct. 11	Domestic Water Heating From Collector	38%
Oct. 12	Air and Water Heating From Collector	42%
Oct. 13	Weekend, No Collection, Cloudy	---
Oct. 14	Cloudy, No Collection	---
Oct. 15	Fresh Air Heating From Collector	52%
Oct. 16	Air and Water Heating From Collector	47%
Oct. 17	Air and Water Heating From Collector	49%
Oct. 18	Air and Water Heating From Collector	42%
Oct. 19	Air and Water Heating From Collector	41%
Oct. 20	Air and Water Heating From Collector	45%
Oct. 21	Air and Water Heating From Collector	41%
Oct. 22	Air and Water Heating From Collector	51%
Oct. 23	Storage and Air Heating	48%
Oct. 24	Air and Water Heating From Collector	43.5%

North View Junior High
Month of October 1974

Date	Mode of Operation	Overall Eff. = $\frac{Q_{collected}}{Q_{incident}}$
Oct. 25	Air and Water Heating From Collector	47%
Oct. 26	Air and Water Heating From Collector	45%
Oct. 27	Air and Water Heating From Collector	45%
Oct. 28	Air and Water Heating From Collector	46%
Oct. 29	Cloudy	---
Oct. 30	Cloudy	---
Oct. 31	Cloudy	---


10.0
9.0
8.0
7.0
6.0
5.0
2.0
1.0
Collected
1st
4th
8th
12th
16th
20th
24th
28th
31st
MONTH OF OCTOBER 1974
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, MINNESOTA

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

MINNEAPOLIS-ST.PAUL, MINNESOTA
NAT WEATHER SERVICE FCST OFC
INTERNATIONAL AIRPORT
OCTOBER 1974

LATITUDE 44° 53' N LONGITUDE 93° 13' W ELEVATION (GROUND) 834 FT. STANDARD TIME USED: CENTRAL WBAN 94022

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING	COOLING	WEATHER TYPES ON DATES OF OCCURRENCE (1 FOG, 2 HEAVY FOG *, 3 THUNDERSTORM, 4 ICE PELLETS, 5 HAIL, 6 GLAZE, 7 DUSTSTORM, 8 SMOKE, HAZE, 9 BLOWING SNOW)	SNOW, ICE PELLETS OR ICE ON GROUND AT 0GAM IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. ELEV. 838 FEET M.S.L.	WIND RESULTANT DIRECTION	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE HOURS AND TENTHS	PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DATE
1	46	24	35*	-21	24	30	0		0	0	0	29.48	35	8.0	8.3	18	NE	7.8	64	7	6	1
2	52	22*	37	-18	21	28	0		0	0	0	29.56	17	5.3	6.8	16	SW	11.5	98	0	1	2
3	63	36	50	-5	31	15	0		0	0	0	29.24	16	12.8	13.2	25	S	8.1	70	5	5	3
4	73	47	60	5	51	5	0	3 8	0	.03	0	28.92	17	11.2	11.9	22	W	5.5	46	10	10	4
5	82	44	63	-2	43	12	0	3 8	0	.30	0	29.15	32	9.0	12.6	20	W	0.9	8	10	10	5
6	46	33	39	-15	37	26	0		0	.01	0	29.31	29	9.8	11.5	25	NW	0.1	1	10	9	6
7	54	29	42	-12	29	23	0		0	0	0	29.38	20	8.5	10.1	19	SW	9.0	79	8	8	7
8	66	41	54	0	38	11	0		0	0	0	29.09	30	7.4	12.5	20	NW	7.1	62	5	7	8
9	63	37	50	-3	39	15	0		0	0	0	29.20	25	1.9	6.0	13	W	11.2	98	3	4	9
10	83*	45	64	11	48	1	0	3	0	.35	0	29.03	19	11.8	12.2	34	SW	10.3	91	4	5	10
11	78	53	66*	13	53	0	1	3	0	.05	0	29.03	22	8.9	12.2	30	S	7.6	68	7	5	11
12	57	41	49	-3	37	16	0		0	0	0	29.47	02	9.9	12.1	22	NE	7.7	69	4	5	12
13	54	38	46	-6	41	19	0	1	0	T	0	29.19	17	7.6	7.9	16	SW	2.4	22	10	9	13
14	51	33	42	-10	37	23	0		0	0	0	29.18	30	15.2	16.1	29	NW	0.9	8	10	7	14
15	54	26	40	-11	30	25	0		0	T	0	29.23	20	8.6	9.1	22	SW	5.8	53	9	8	15
16	62	35	49	-2	37	16	0		0	0	0	29.02	27	7.2	9.6	18	SW	11.0	100	1	1	16
17	59	42	51	1	38	14	0		0	T	0	29.18	33	7.9	9.1	17	N	5.1	47	6	6	17
18	56	35	46	-4	35	19	0		0	0	0	29.37	33	5.6	6.8	16	NW	10.3	94	2	4	18
19	52	33	43	-6	33	22	0		0	0	0	29.34	03	5.2	7.1	14	NE	6.0	56	8	6	19
20	47	27	37	-12	24	28	0		0	0	0	29.55	14	6.6	8.9	14	SE	10.8	100	0	0	20
21	65	32	49	1	33	16	0		0	0	0	29.30	18	14.9	15.4	29	SW	10.2	95	1	1	21
22	62	47	55	7	36	10	0		0	0	0	29.34	29	1.8	10.2	19	SW	5.7	53	5	4	22
23	62	40	51	4	23	14	0		0	0	0	29.46	01	2.5	4.3	12	NE	8.9	84	4	4	23
24	71	41	56	10	42	9	0	1 8	0	0	0	29.25	27	2.5	7.1	15	N	7.6	72	3	3	24
25	57	36	47	1	29	18	0		0	0	0	29.44	33	5.3	6.6	11	N	10.5	100	9	5	25
26	64	27	46	1	26	19	0		0	0	0	29.37	21	4.7	4.9	14	SW	10.5	100	0	0	26
27	70	42	56	11	44	9	0		0	0	0	29.09	18	7.1	8.2	17	SW	6.2	60	5	6	27
28	66	56	61	17	55	4	0	1 8	0	.10	0	28.93	17	9.6	10.1	20	S	0.1	1	10	9	28
29	61	56	59	16	56	6	0	1 8	0	.37	0	28.94	13	9.1	9.4	13	SE	0.0	0	10	10	29
30	60	52	56	13	55	9	0	1	0	T	0	29.12	23	2.6	4.5	12	SE	0.0	0	10	8	30
31	64	56	60	18	57	5	0	1	0	.48	0	28.95	15	5.7	8.8	17	SW	0.1	1	10	10	31
	SUM	SUM				TOTAL	TOTAL			TOTAL	TOTAL	FOR THE MONTH:						TOTAL	%	SUM	SUM	
	1878	1206				467	1	NUMBER OF DAYS		1.69	0	29.23	21	2.5	9.5	34	SW	198.4	FOR	186	175	
	AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.	PRECIPITATION		DEP.						DATE:	10	POSSIBLE	MONTH	AVG.	AVG.	
	60.6	38.9	49.8	-0.2	38	-5	-6	.01 INCH OR MORE	8	-0.09								339.9	58	6.0	5.6	

NUMBER OF DAYS MAXIMUM TEMP. ≥ 90°	MAXIMUM TEMP. ≤ 32°	MINIMUM TEMP. ≤ 32°	MINIMUM TEMP. < 0°
0	0	7	0

SEASON TO DATE	TOTAL	TOTAL
	DEP.	DEP.
	804	819

SNOW, ICE PELLETS	
.1 OR MORE	0
THUNDERSTORMS	4
HEAVY FOG *	0
CLEAR 8	PARTLY CLOUDY 10 CLOUDY 13

GREATEST IN 24 HOURS AND DATES	PRECIPITATION	SNOW, ICE PELLETS
	.48 31	0

GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE
0

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

DATE	A.M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P.M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1																									1
2																									2
3																									3
4																	.03	T	T	T					4
5	T														T	.02	.12	.01	.01	.05	.06	.03	T	T	5
6			T	T	T	.01	T	T	T		T	T													6
7																									7
8																									8
9																									9
10																						.02	.16	.17	10
11	.05	T																							11
12																									12
13					T	T	T	T	T	T	T														13
14																									14
15																			T						15
16																									16
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26																									26
27																									27
28														.04	.06	T			T	T					28
29			T	.03	.01	.03	.02	.03	T					.01	T	T	T	T	T	.08	.08	.05	.01	.02	29
30							T	T																	30
31	T	T		.01	T	.01	.03	.01	T	.04	T					T	T	.02	.06	.01	.01	T	.12	.16	31

* EXTREME TEMPERATURES FOR THE MONTH, MAY BE THE LAST OF MORE THAN ONE OCCURRENCE.
\- BELOW ZERO TEMPERATURE OR NEGATIVE DEPARTURE FROM NORMAL.
* * 70° AT ALASKAN STATIONS.
\+ ALSO ON AN EARLIER DATE, OR DATES.
X HEAVY FOG RESTRICTS VISIBILITY TO 1/4 MILE OR LESS.
T IN THE HOURLY PRECIPITATION TABLE AND IN COLUMNS 9, 10, AND 11 INDICATES AN AMOUNT TOO SMALL TO MEASURE

THE SEASON FOR DEGREE DAYS BEGINS WITH JULY FOR HEATING AND JANUARY FOR COOLING.
DATA IN COLUMNS 8, 12, 13, 14, AND 15 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
WIND DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. RESULTANT WIND IS THE VECTOR SUM OF WIND DIRECTIONS AND SPEEDS DIVIDED BY THE NUMBER OF OBSERVATIONS. FIGURES FOR DIRECTIONS ARE TENS OF DEGREES FROM TRUE NORTH; I.E., 09=EAST, 18=SOUTH, 27=WEST, 36=NORTH, AND 00=CALM. WHEN DIRECTIONS ARE IN TENS OF DEGREES IN COL. 17, ENTRIES IN COL. 16 ARE FASTEST OBSERVED 1-MINUTE SPEEDS. IF THE / APPEARS IN COL. 17, SPEEDS ARE GUSTS.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

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William H. Haggard

DIRECTOR, NATIONAL CLIMATIC CENTER

SUMMARY BY HOURS

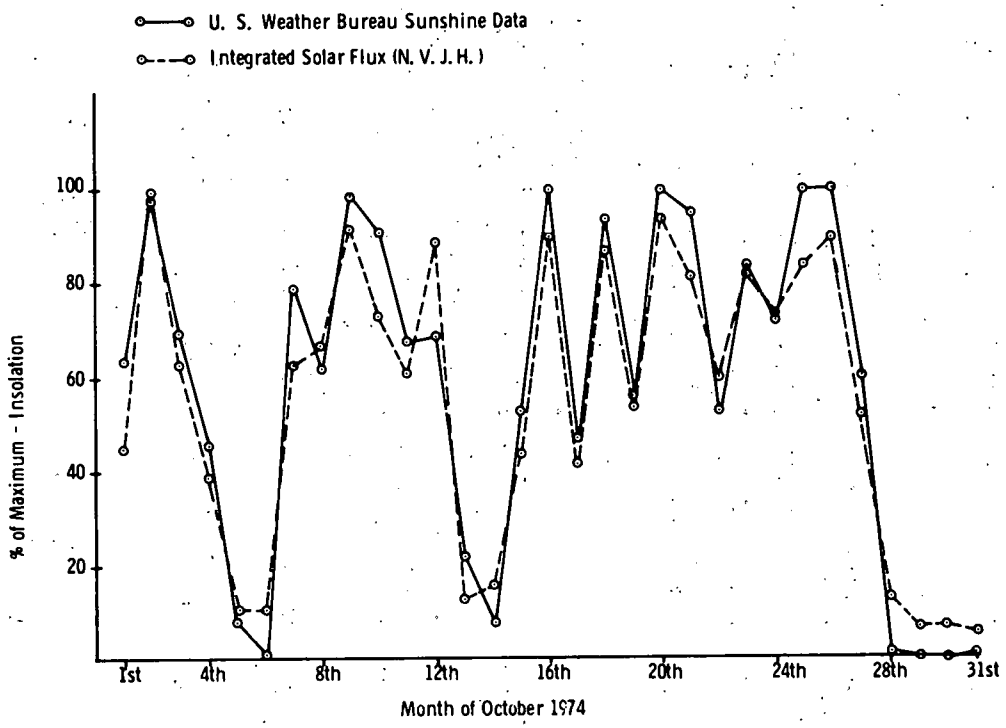
HOUR LOCAL TIME	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
00	5	29.23	46	42	37	72	7.8	23	1.7
03	5	29.23	44	41	37	78	7.9	28	.7
06	5	29.24	43	40	37	81	7.4	19	.9
09	6	29.26	49	44	39	71	10.3	22	3.3
12	7	29.24	57	48	39	55	11.8	22	5.0
15	6	29.20	59	49	38	48	12.2	21	4.5
18	6	29.20	54	47	38	58	9.8	19	2.7
21	5	29.21	51	45	38	69	8.7	18	2.3

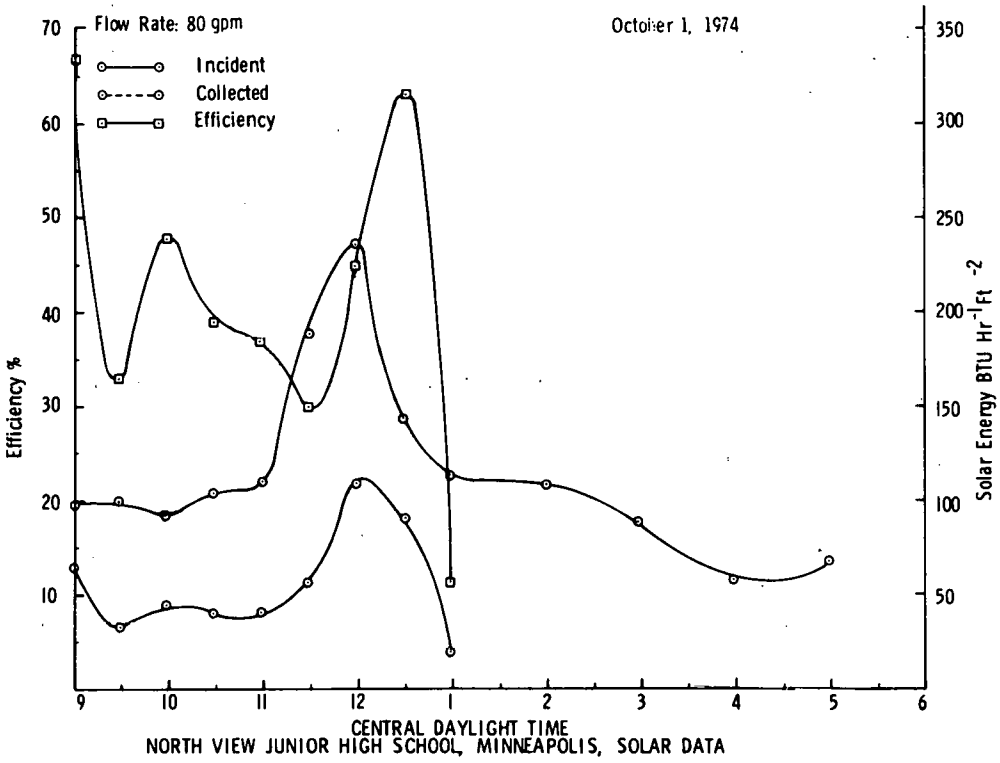
USCOMM - NOAA - ASHEVILLE 750
11/18/74

MINNEAPOLIS-ST.PAUL, MINNESOTA

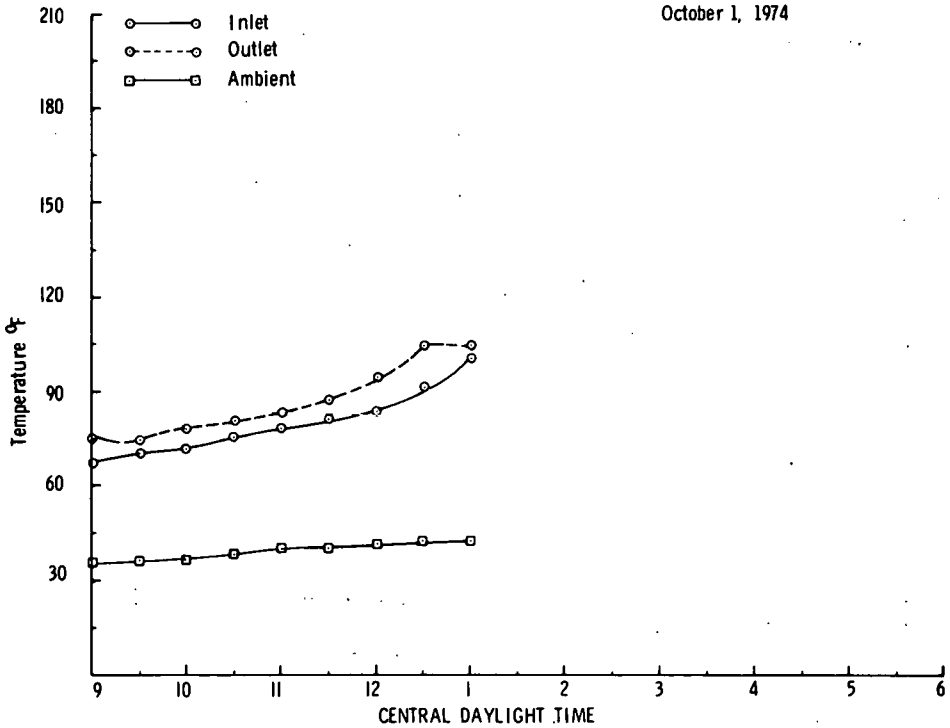
OBSERVATIONS AT 3-HOUR INTERVALS

| | | |

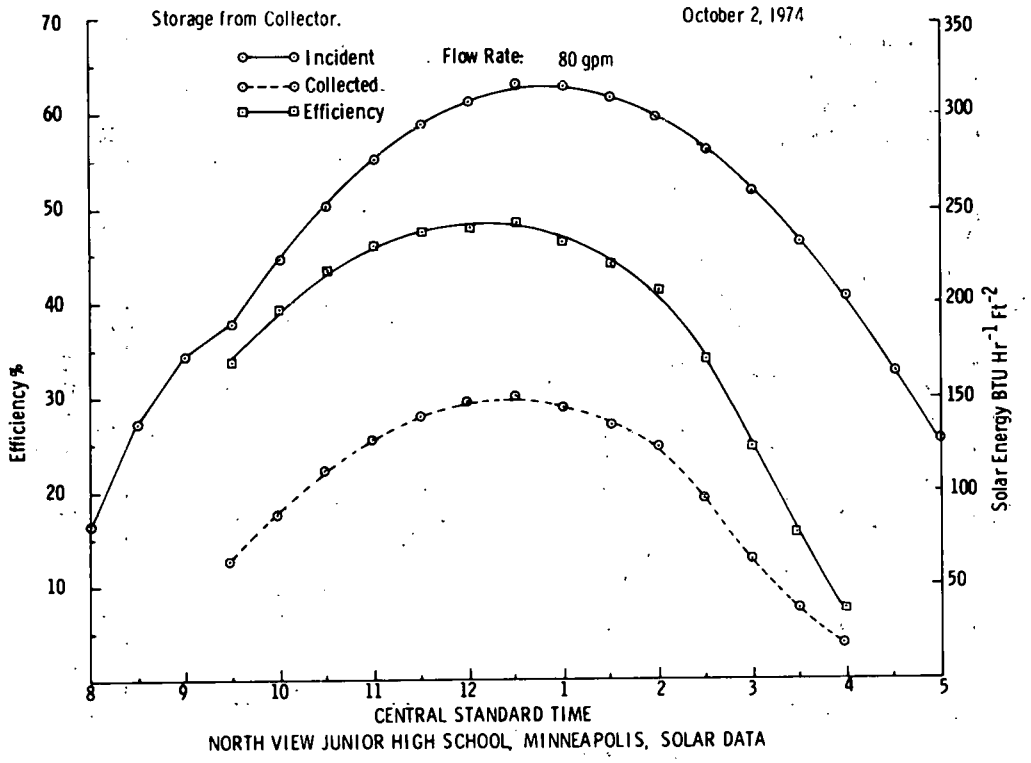

U. S. Weather Bureau Sunshine Data
Integrated Solar Flux (N. V. J. H.)
% of Maximum - Insolation
100
80
60
40
20
1st
4th
8th
12th
16th
20th
24th
28th
31st
Month of October 1974



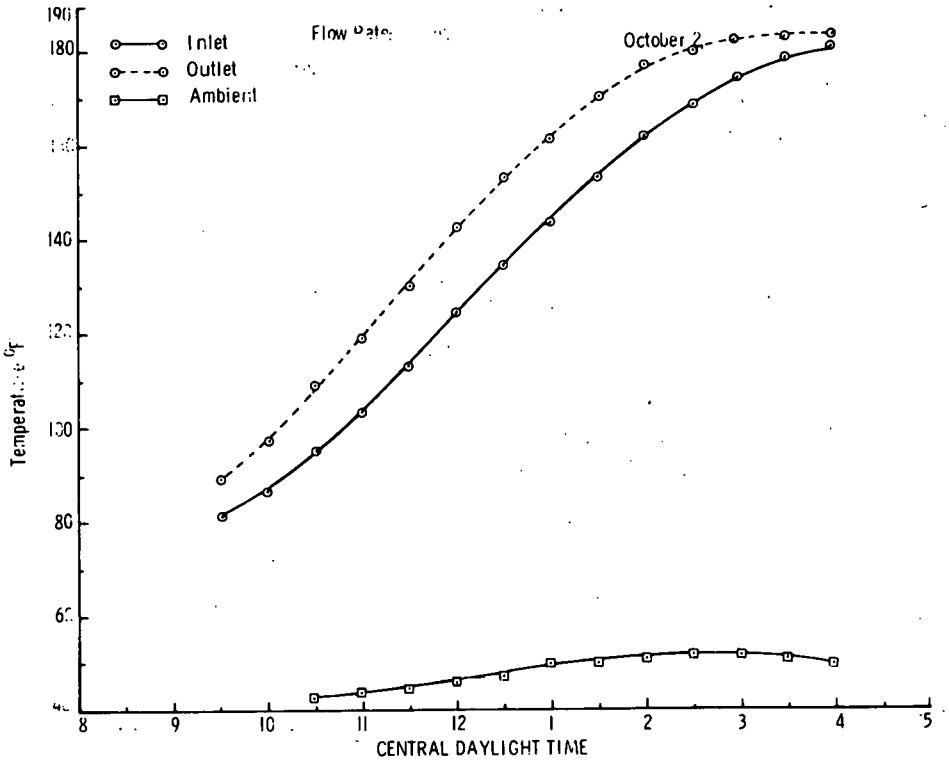
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



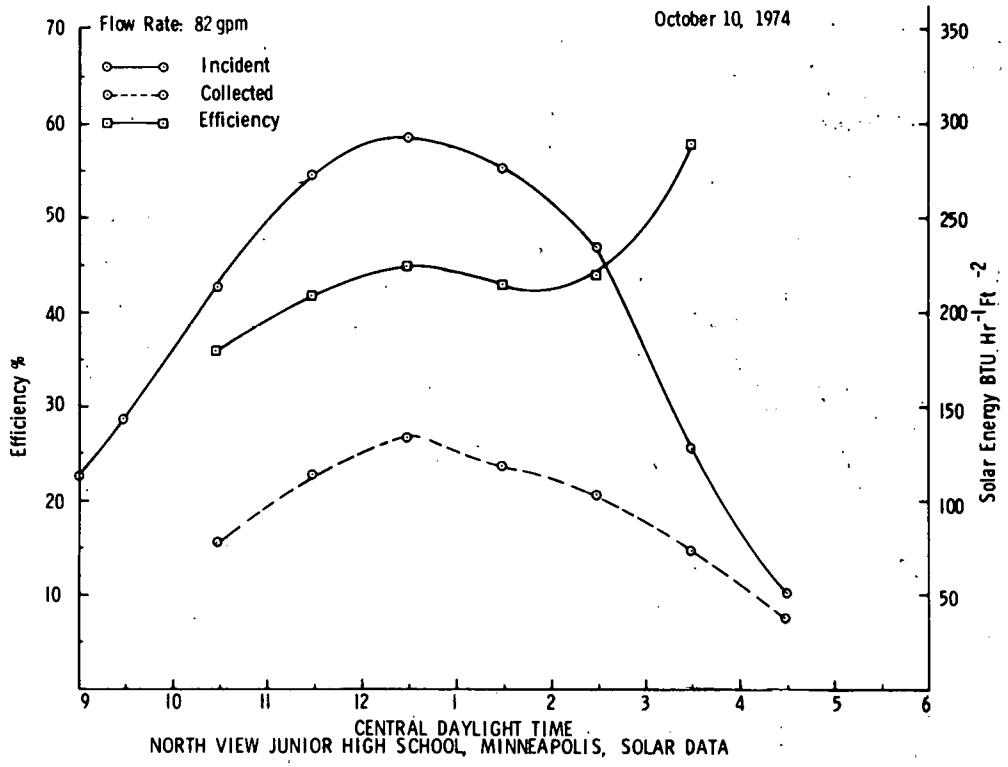
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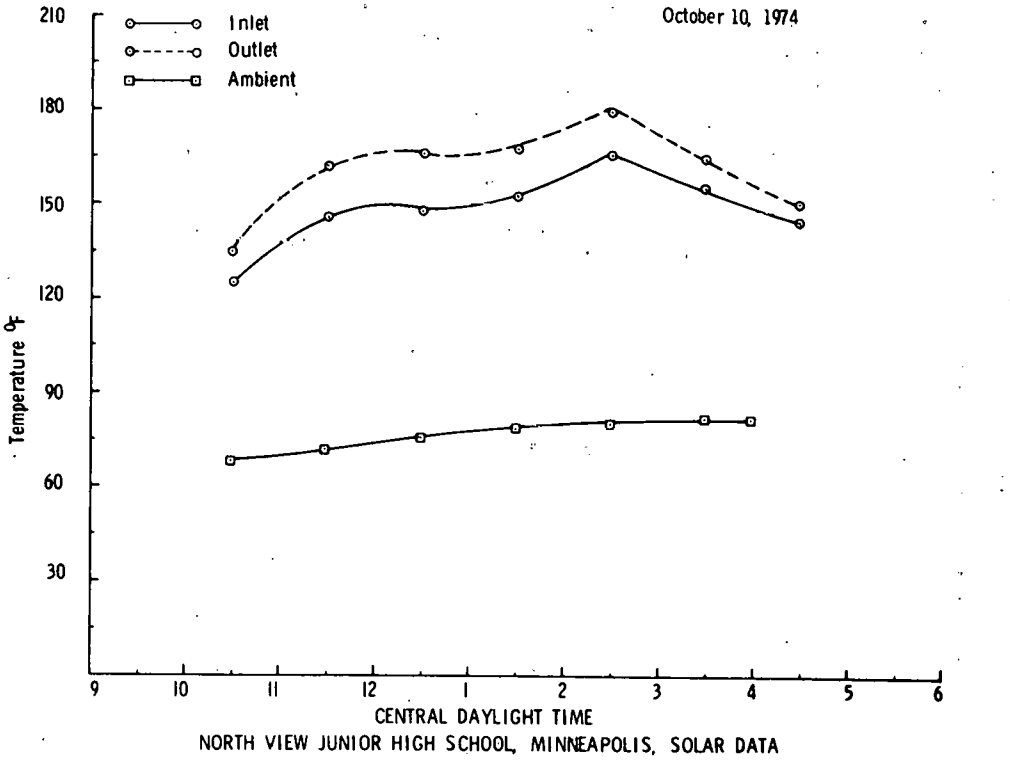
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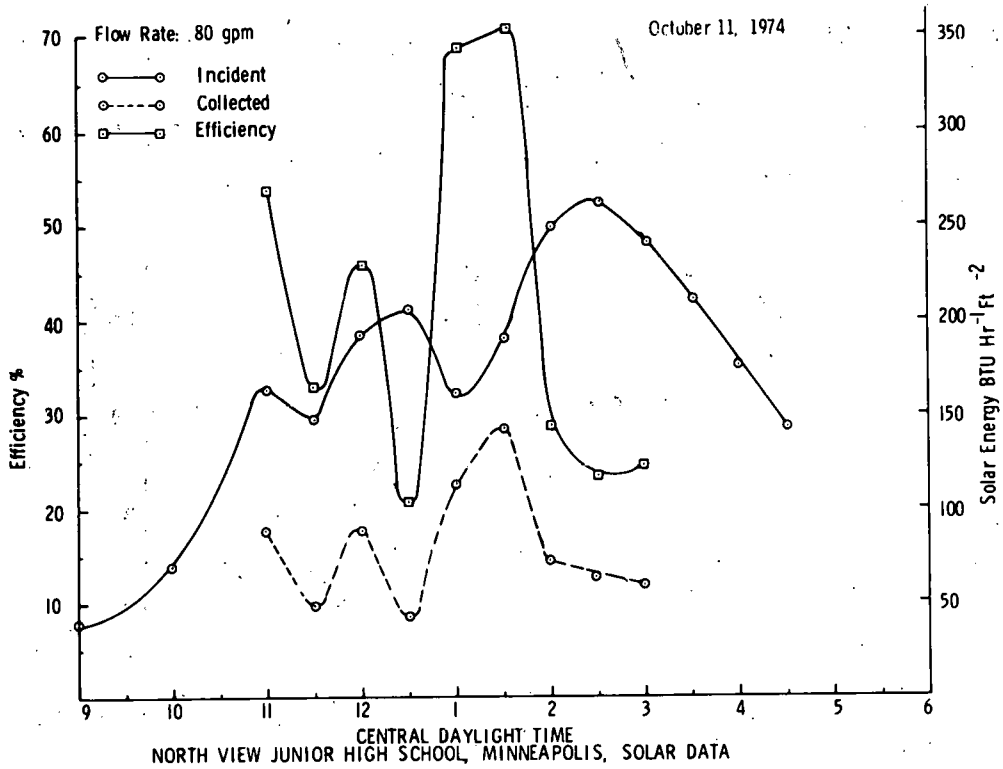
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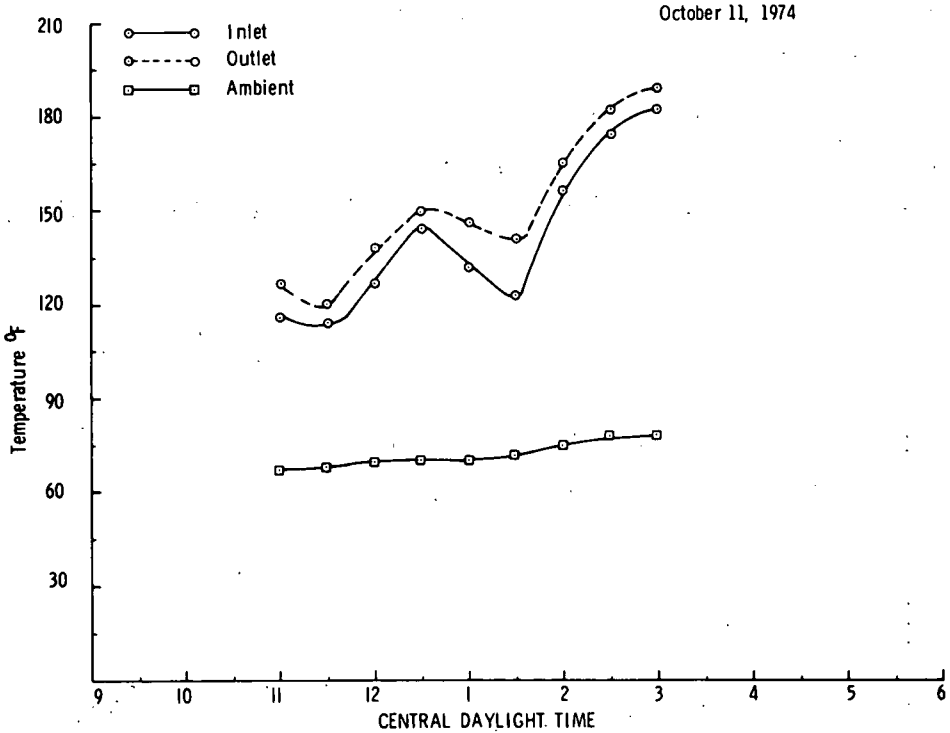
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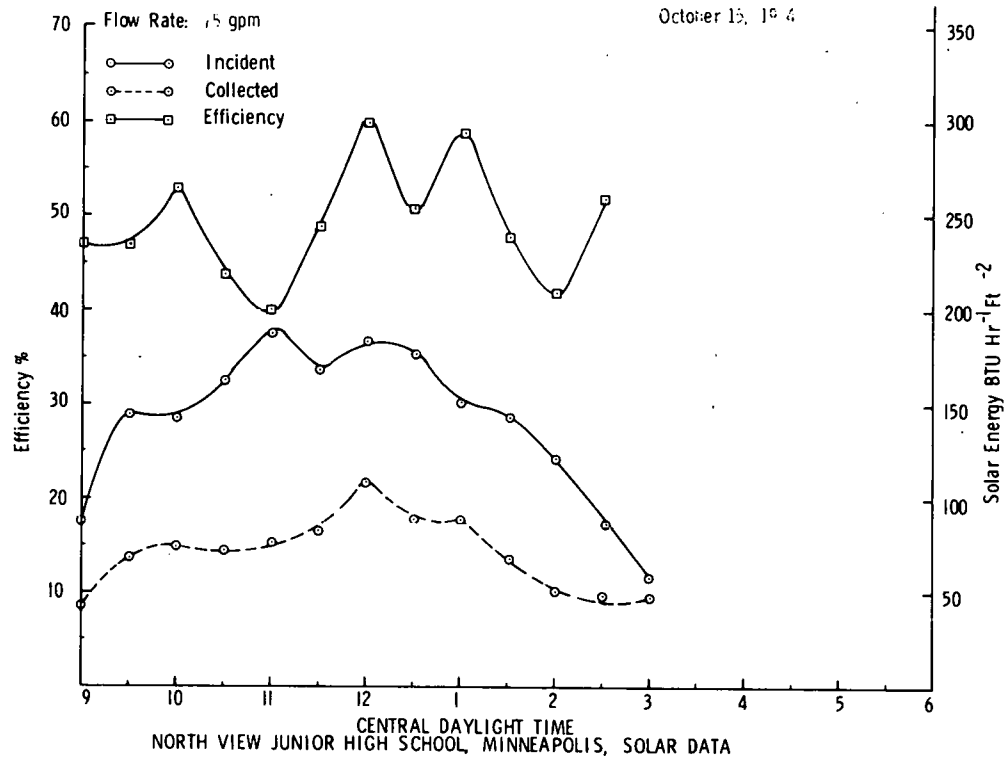
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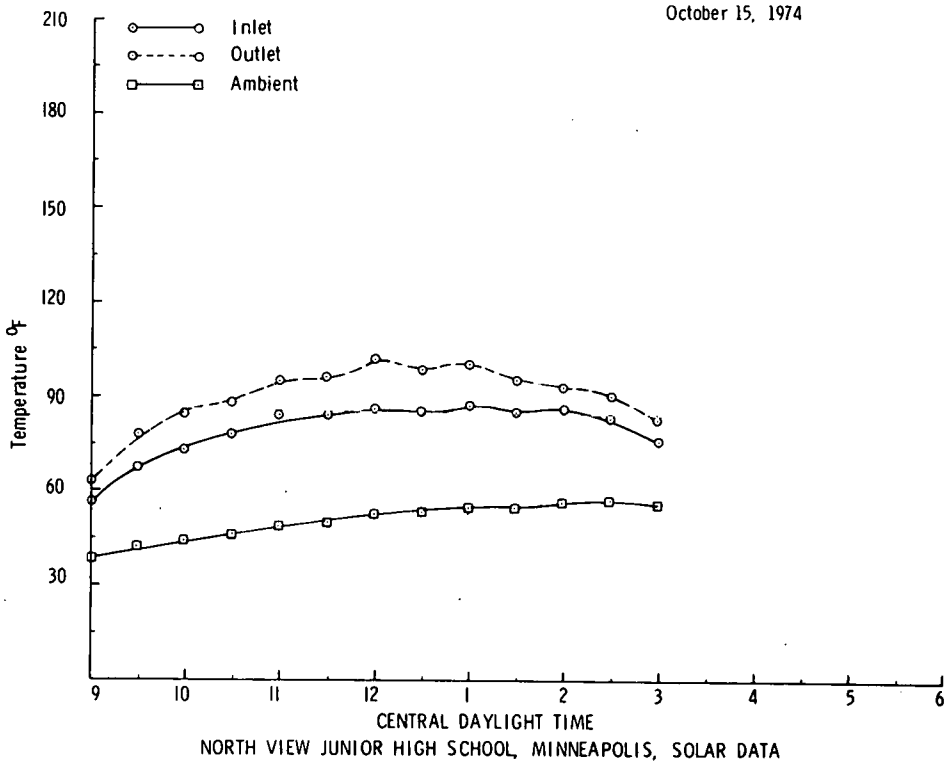
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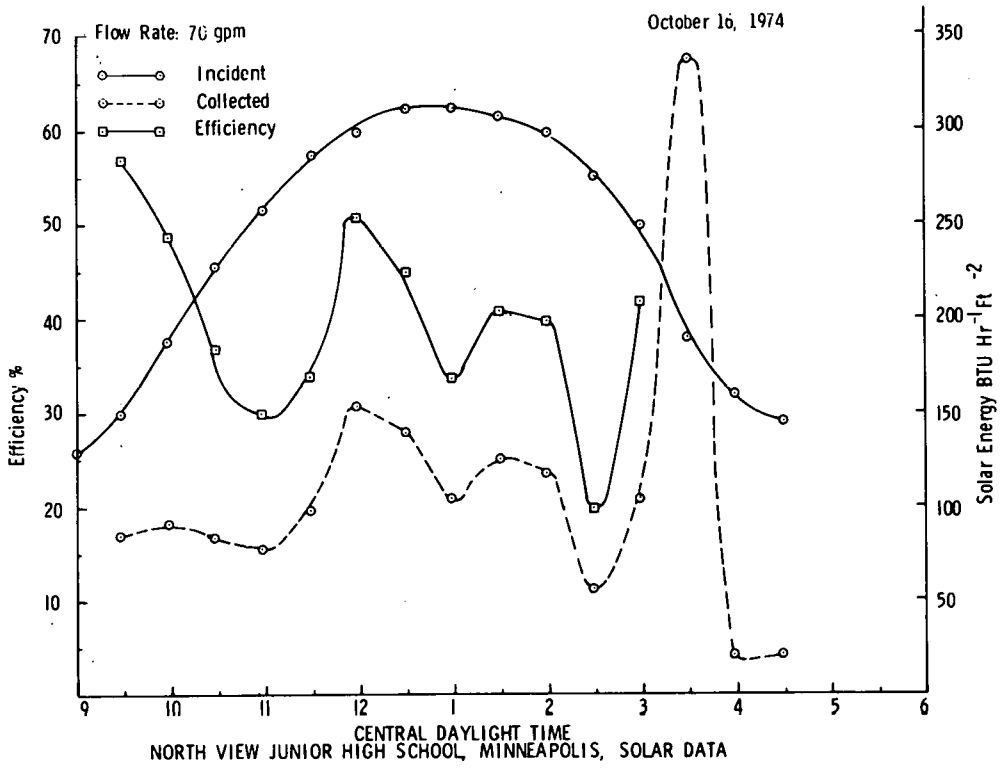
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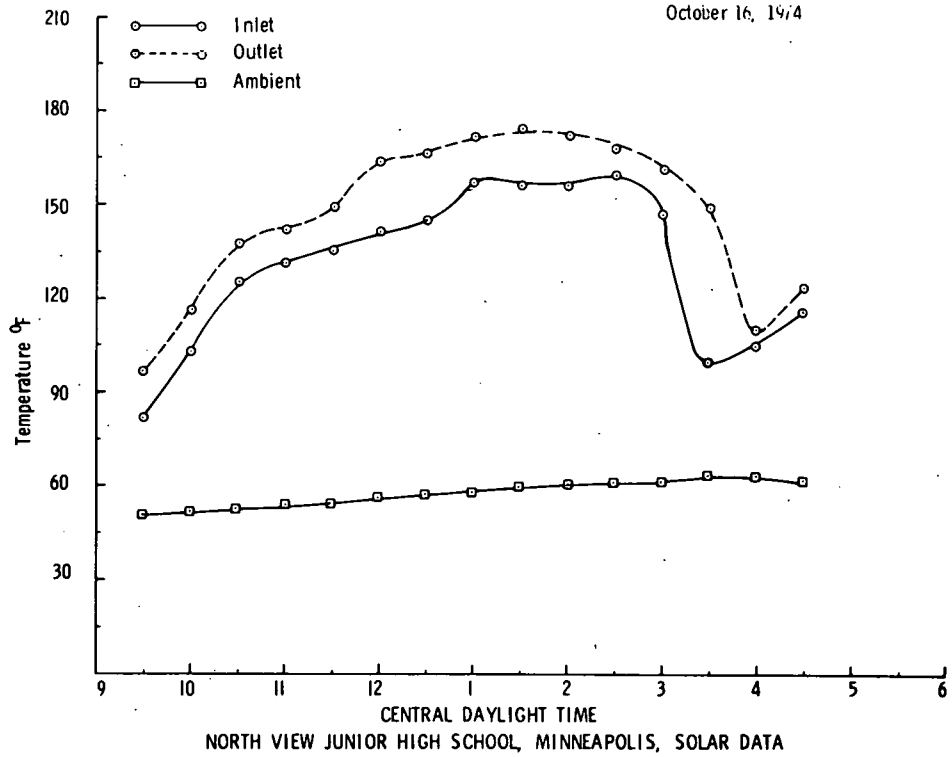
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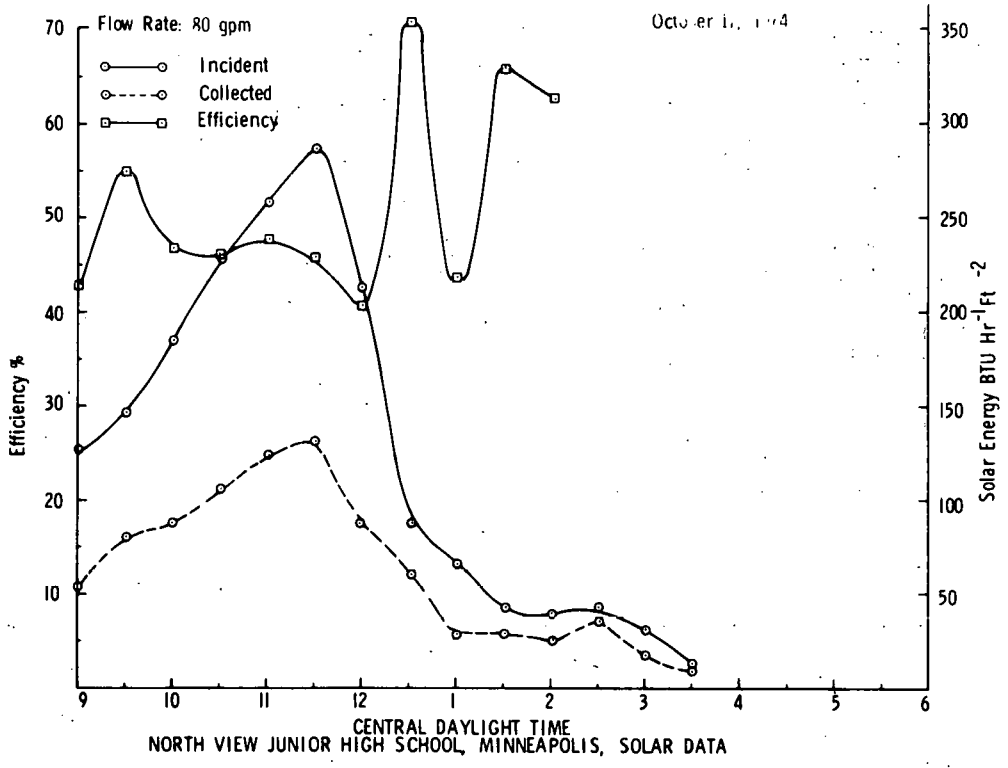
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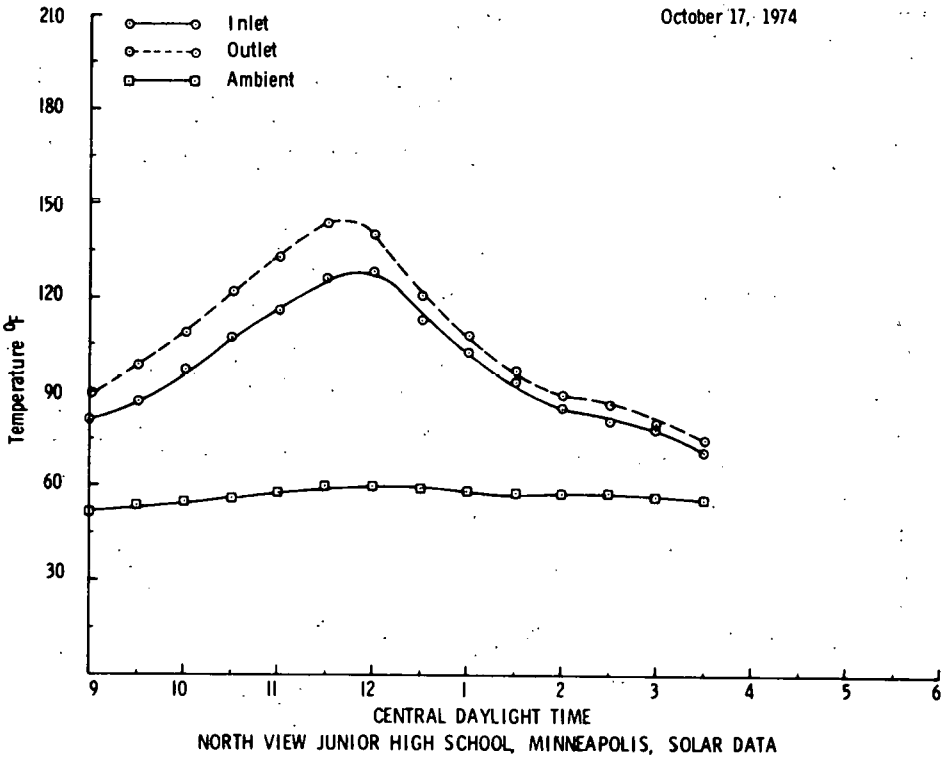
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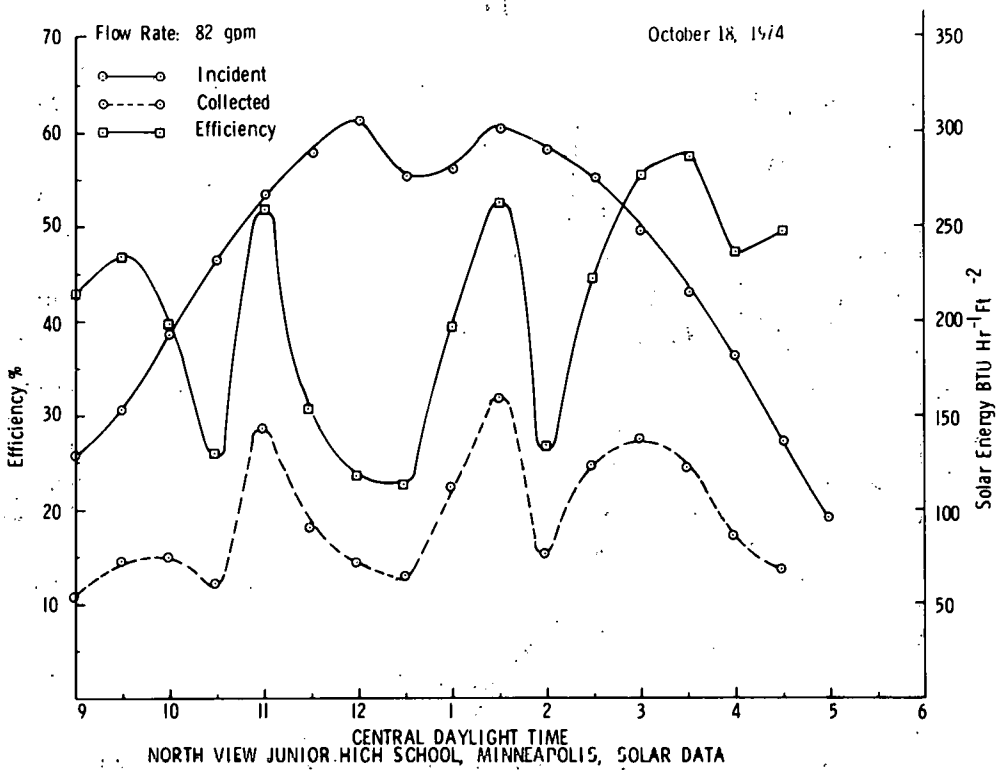
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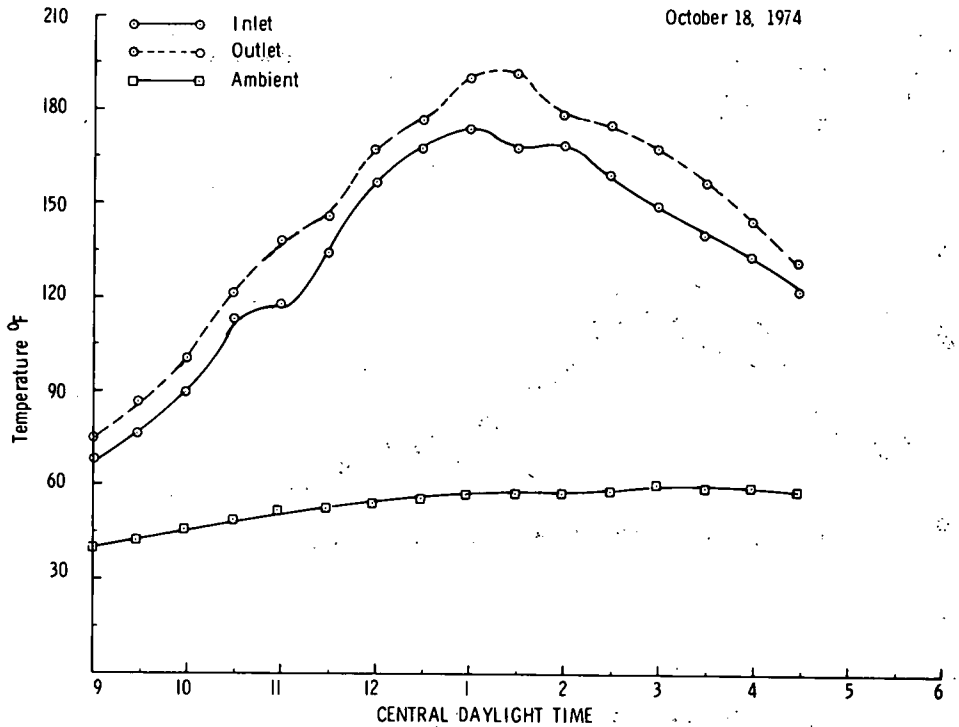
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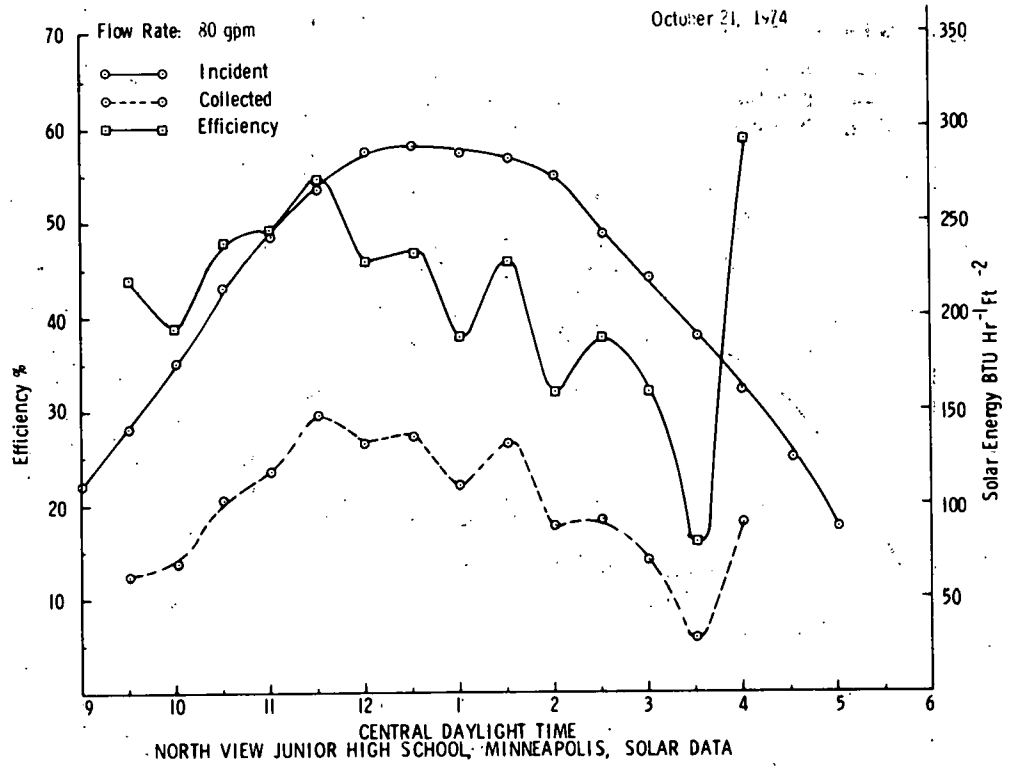
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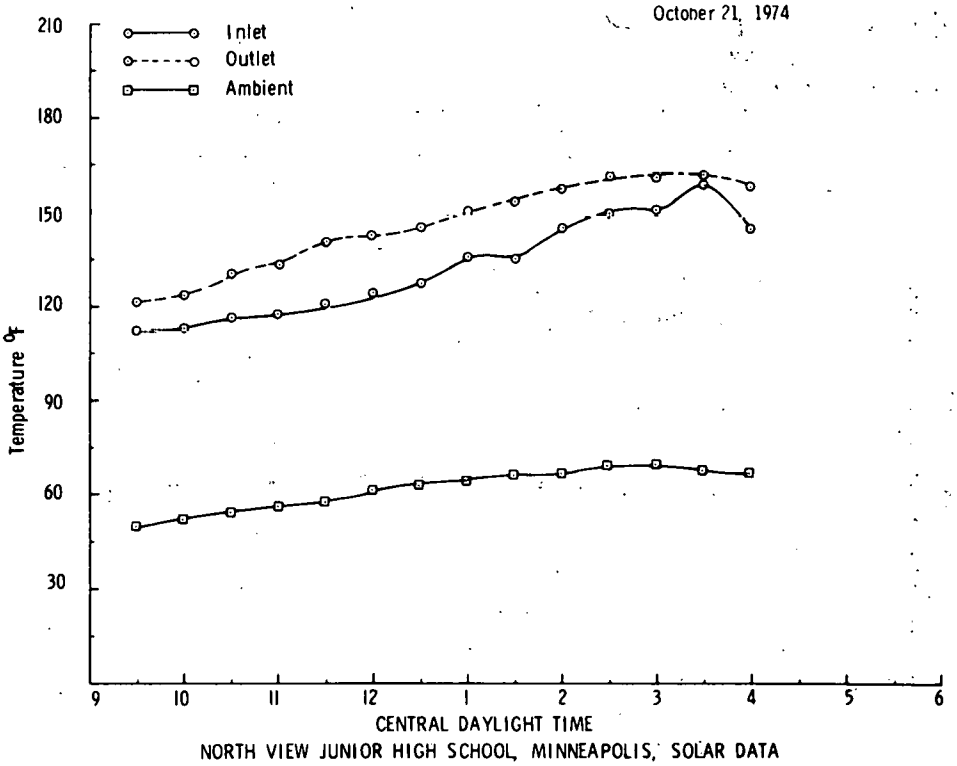
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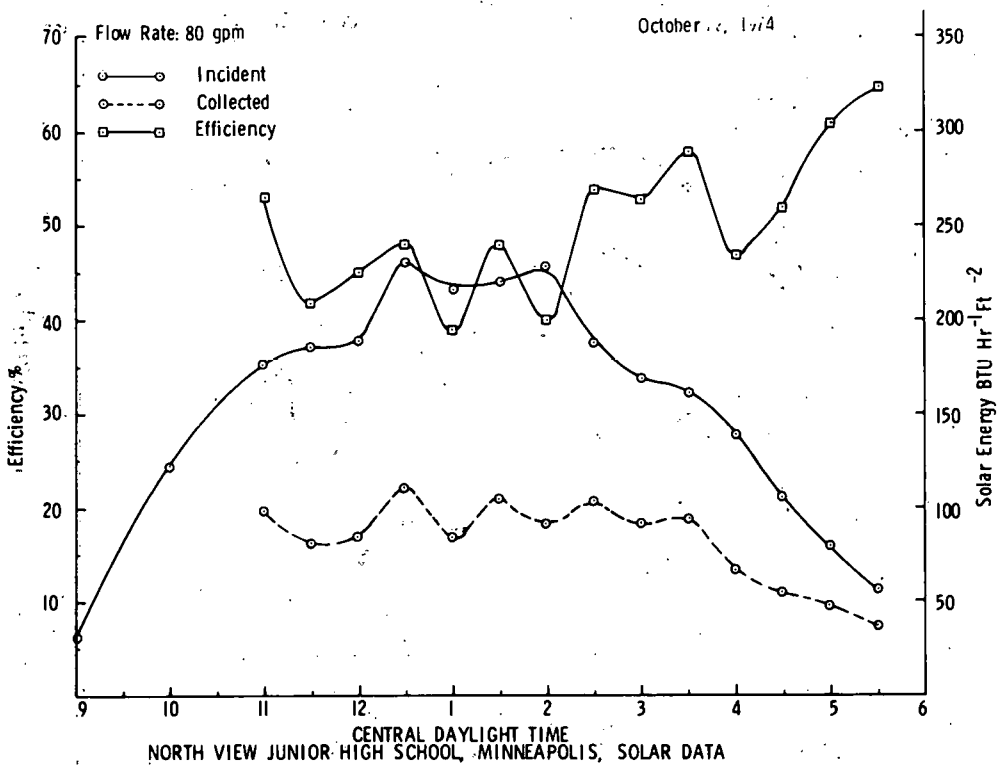
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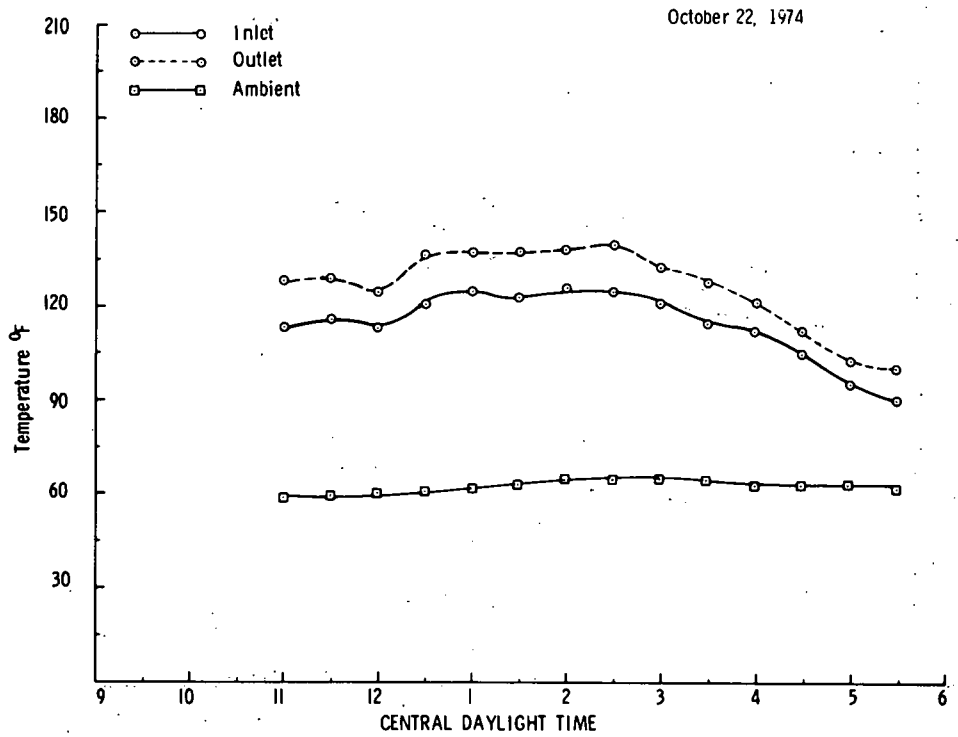
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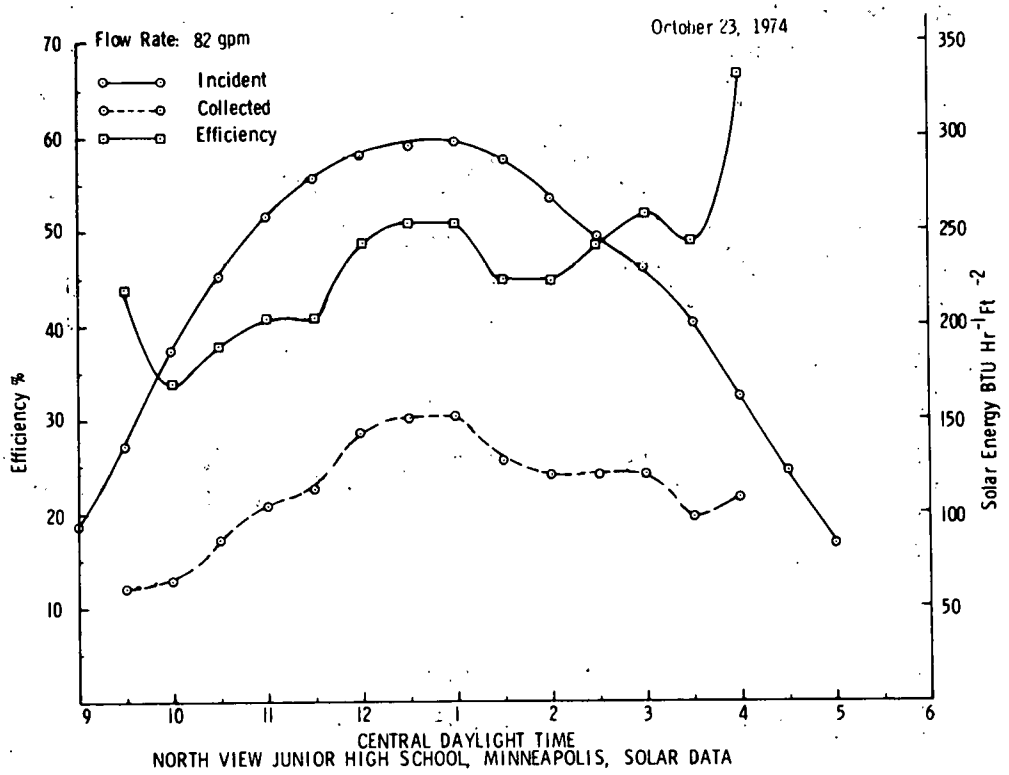
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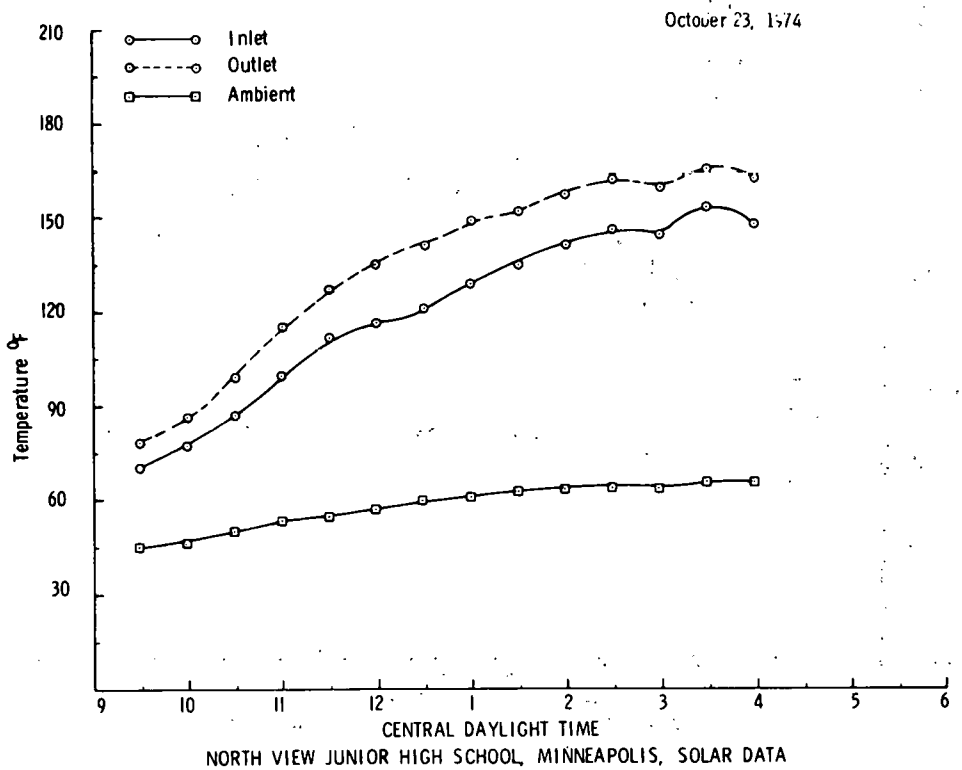
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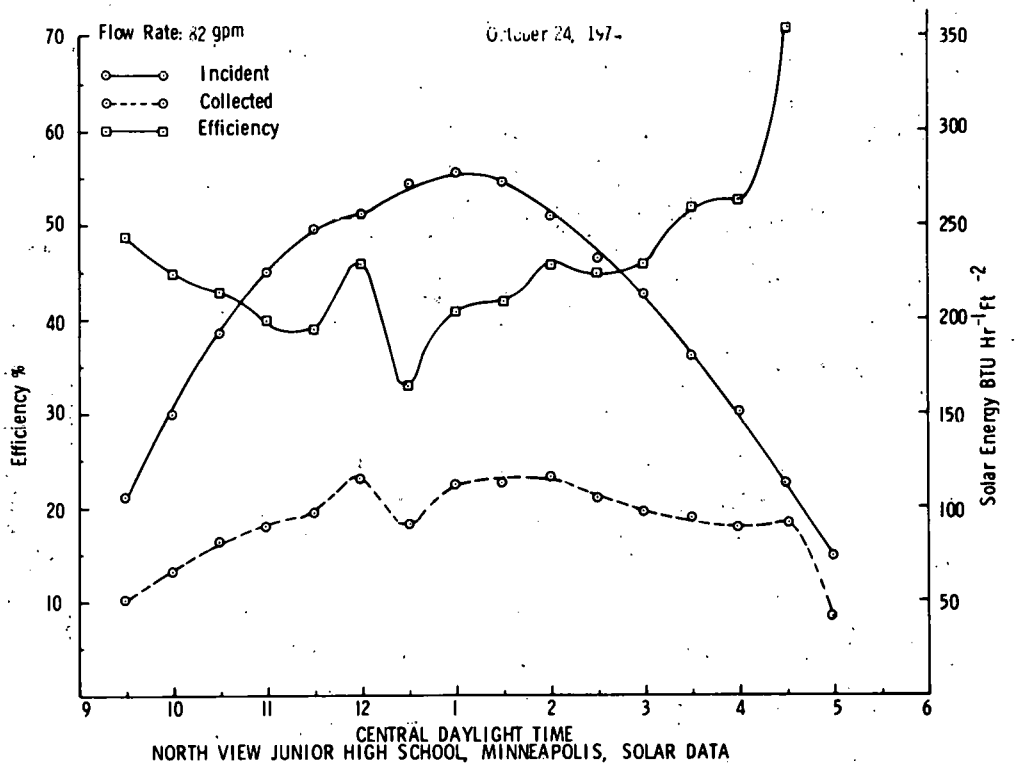
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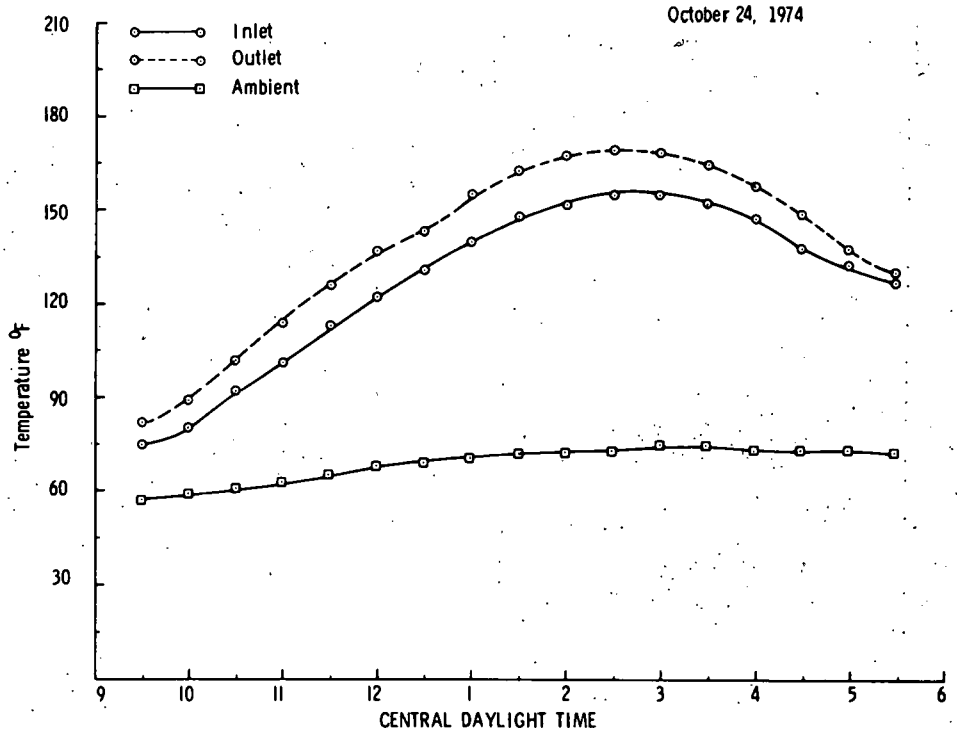
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



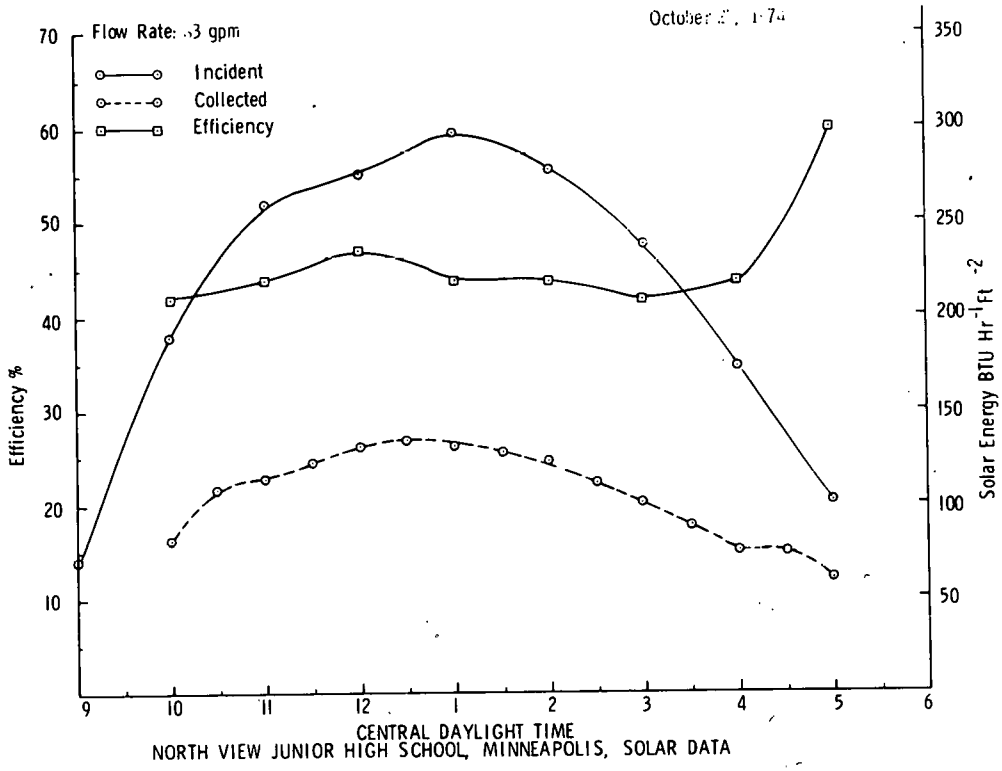
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



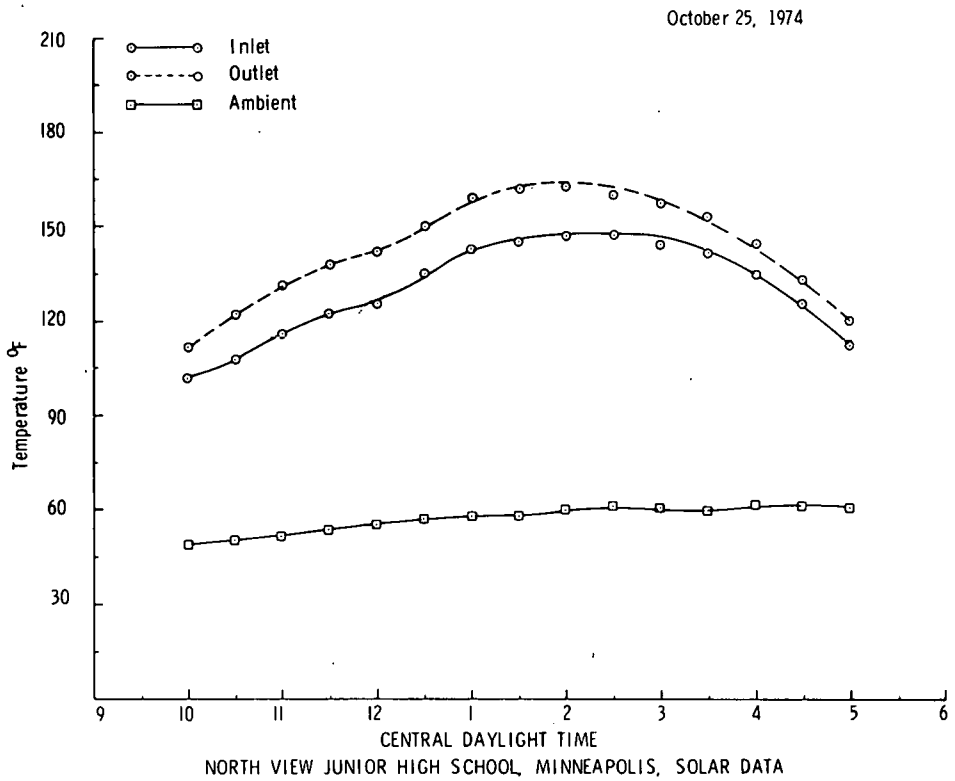
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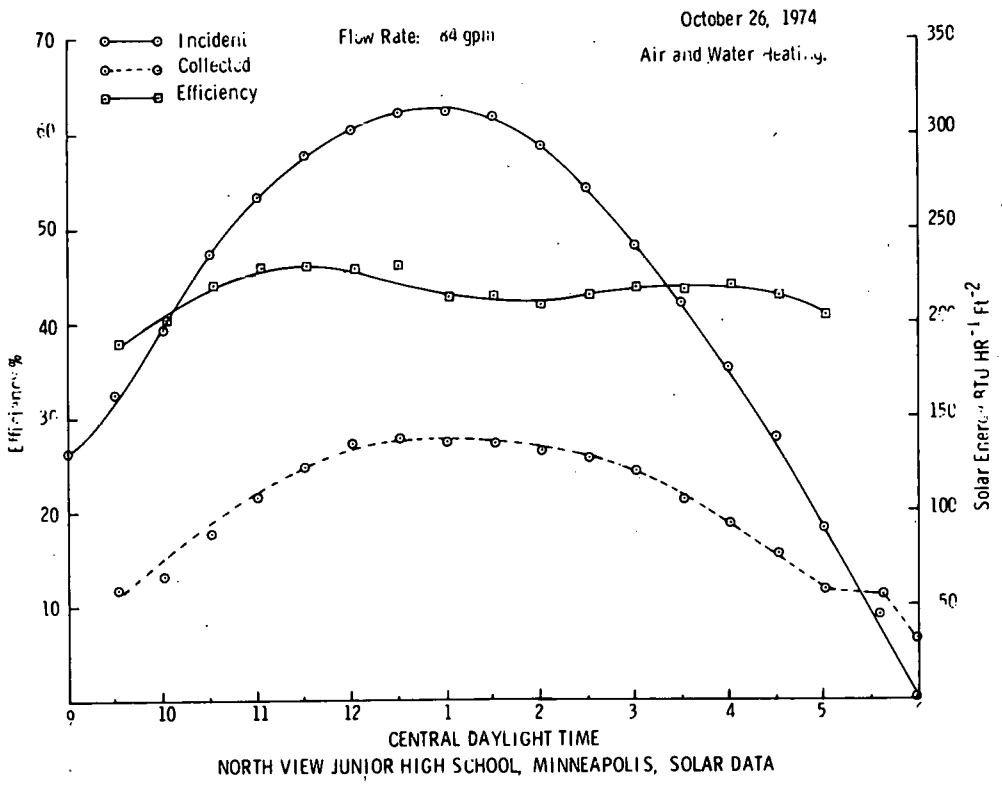
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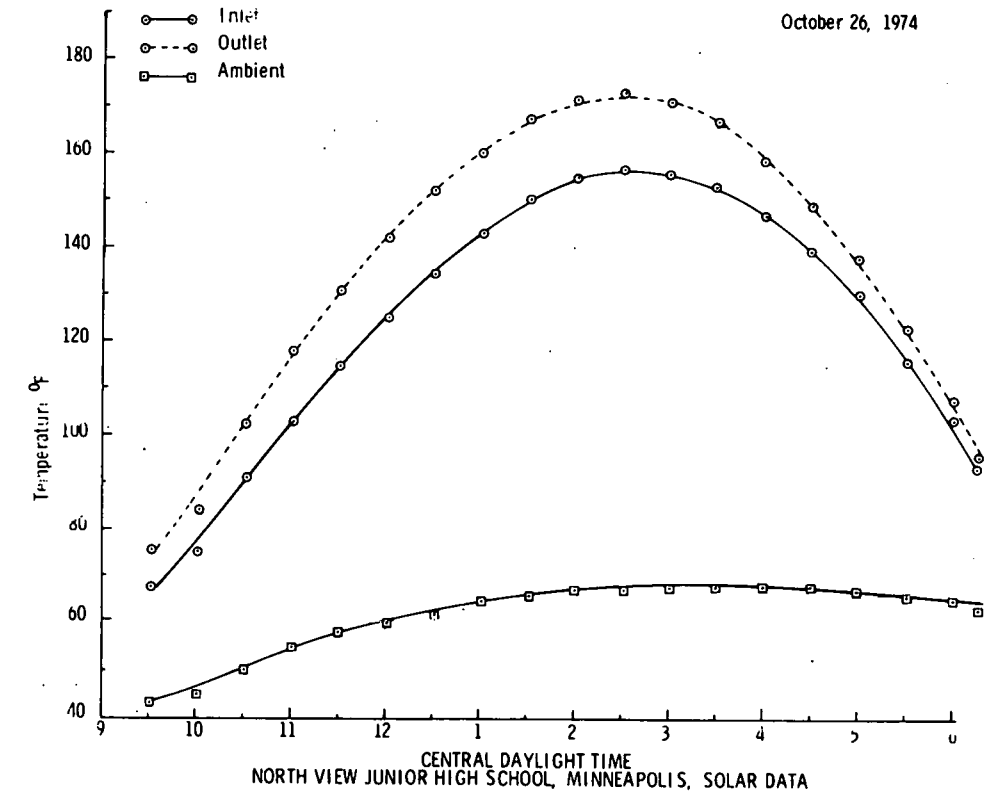
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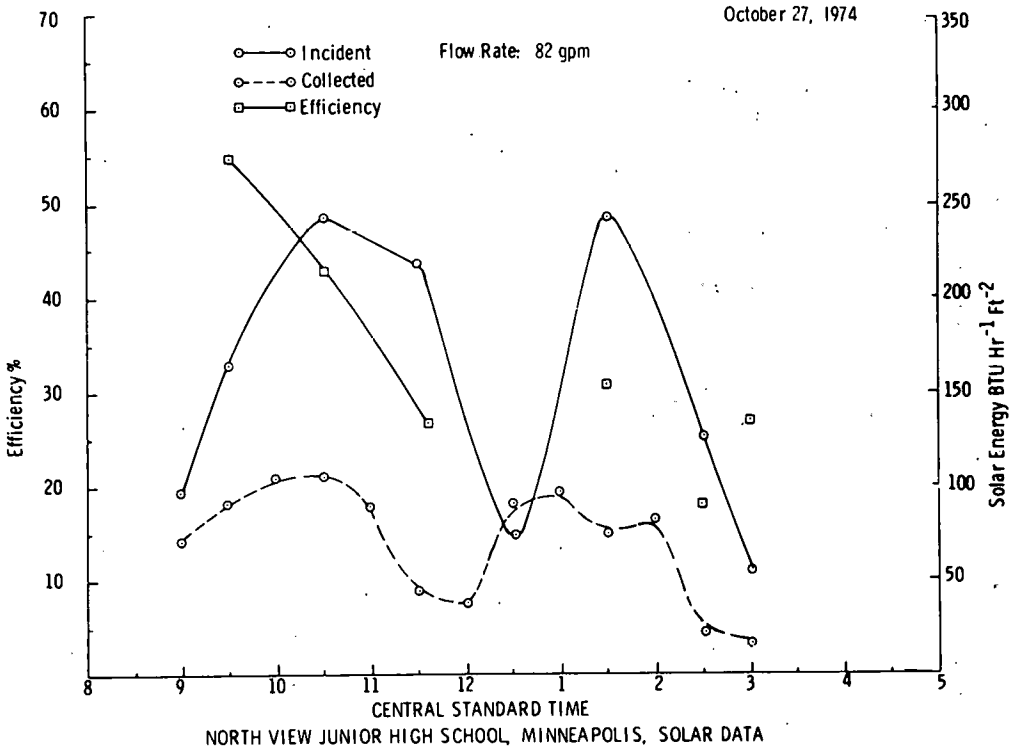
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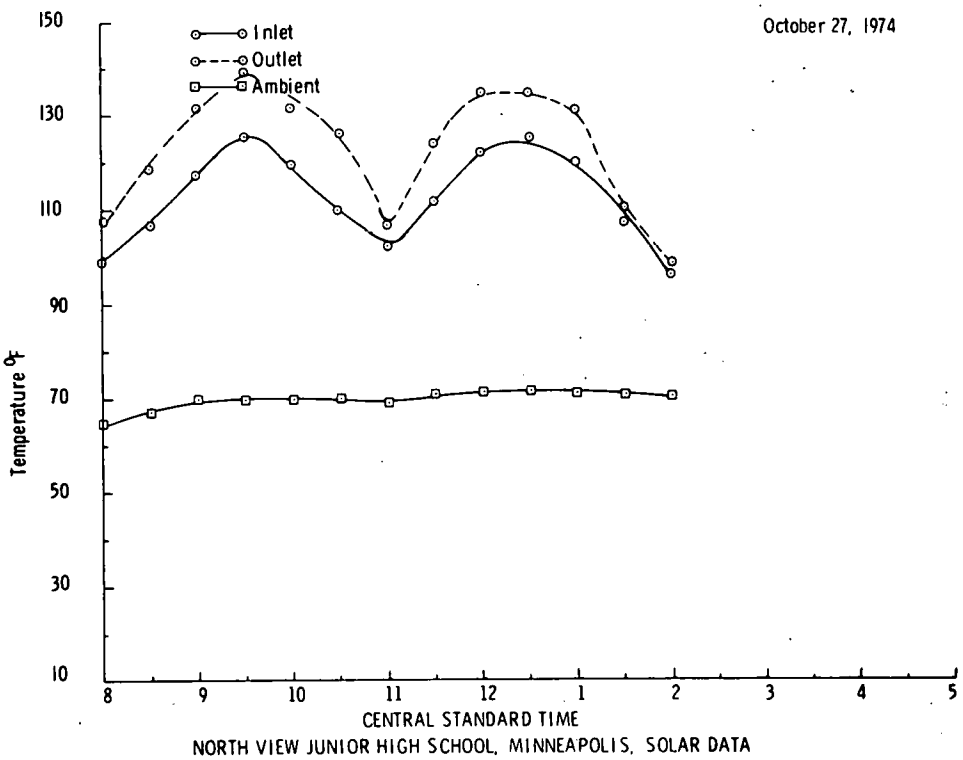
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



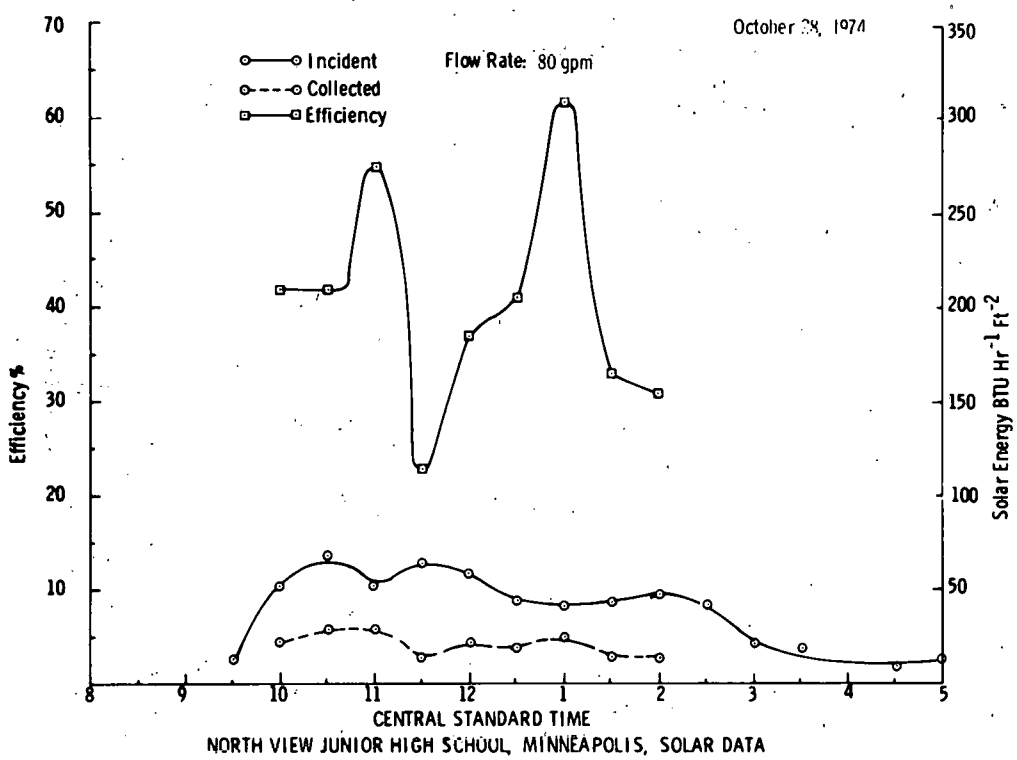
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



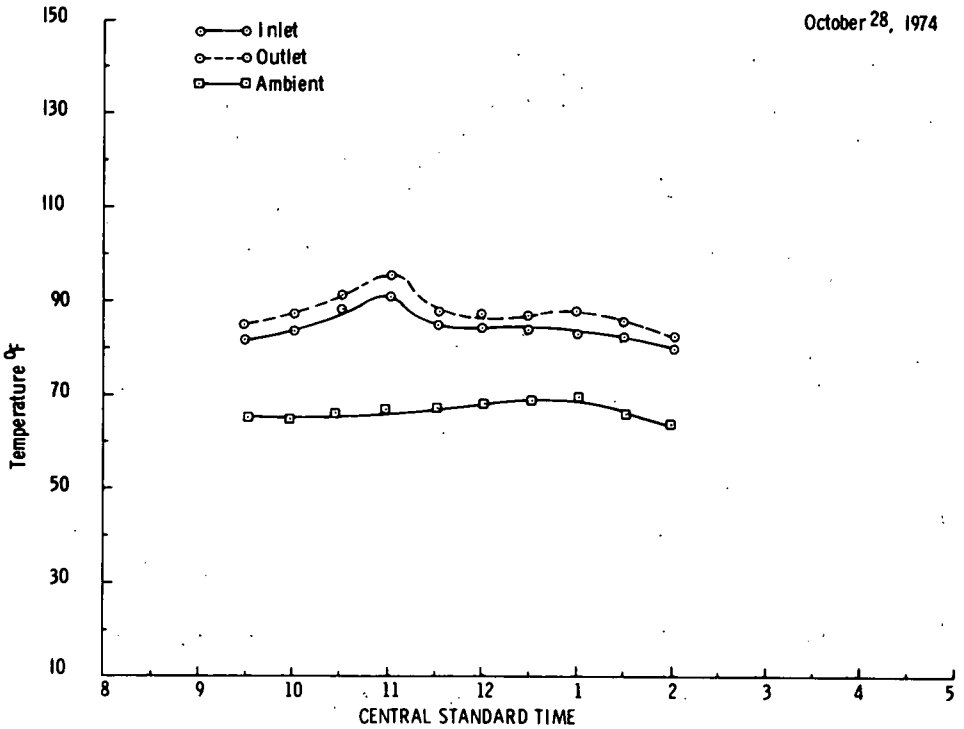
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

North View Junior High

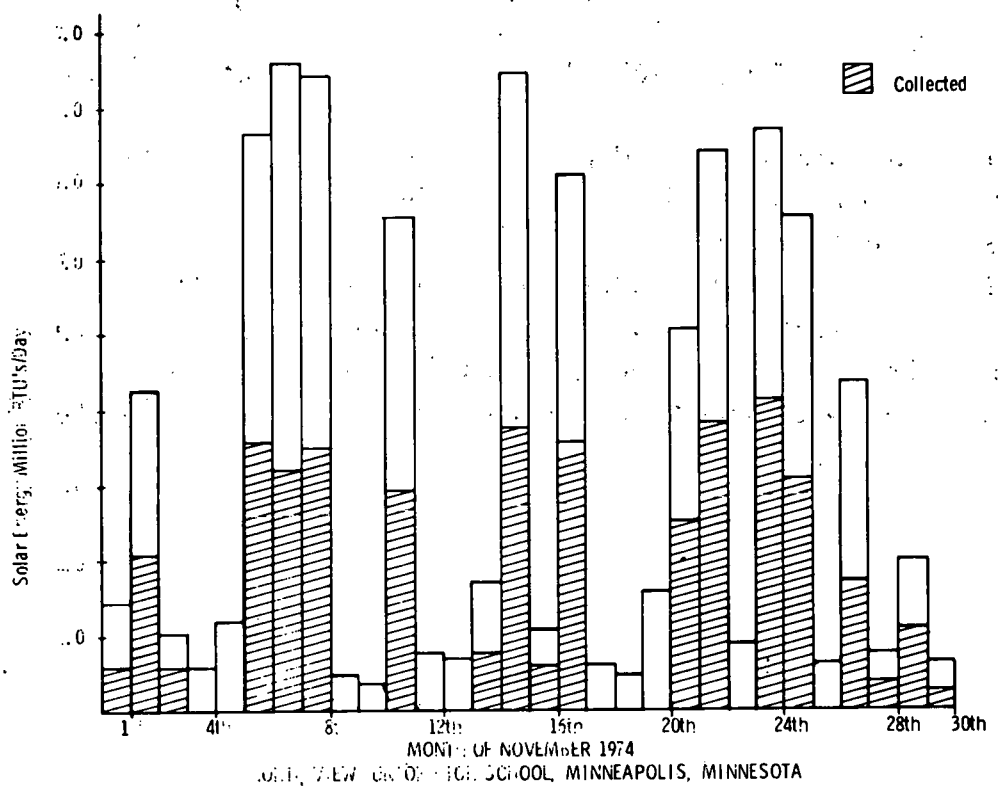
Month of November 1974

Date	Mode of Operation	Overall Eff. = $\frac{Q_{collected}}{Q_{incident}}$	
Nov. 1	Air and Water Heating From Collector	42.3%	2 hrs. of operation
Nov. 2	Air and Water Heating From Collector	50.0%	
Nov. 3	Air and Water Heating From Collector	45.0%	1 hour operation
Nov. 4	No Collection		
Nov. 5	No Collection		
Nov. 6	Air and Water Heating From Collector	46.0%	
Nov. 7	Air and Water Heating From Collector	36.0%	
Nov. 8	Air and Water Heating From Collector	41.0%	
Nov. 9	No Collection		
Nov. 10	No Collection		
Nov. 11	Air and Water Heating From Collector	44.0%	
Nov. 12	No Collection		
Nov. 13	No Collection		
Nov. 14	Air and Water Heating From Collector	44.0%	2 hrs. operation
Nov. 15	Air and Water Heating From Collector	43.0%	
Nov. 16	Air and Water Heating From Collector	55.0%	1 1/2 hrs oper.
Nov. 17	Air and Water Heating From Collector	50.0%	
Nov. 18	No Collection		
Nov. 19	No Collection		
Nov. 20	No Collection		
Nov. 21	Air and Water Heating From Collector	49.0%	
Nov. 22	Air and Water Heating From Collector	51.0%	
Nov. 23	No Collection		

North View Junior High

Month of November 1974

Date	Mode of Operation	Overall Eff. = $\frac{Q_{collected}}{Q_{incident}}$	
Nov. 24	Air and Water Heating From Collector	54.0%	
Nov. 25	Air and Water Heating From Collector	46.0%	
Nov. 26	No Collection		
Nov. 27	Air and Water Heating From Collector	39.0%	
Nov. 28	Air and Water Heating From Collector	44.0%	3/4 hr operation
Nov. 29	Air and Water Heating From Collector	52.0%	2 hours
Nov. 30	Air and Water Heating From Collector	43.0%	1/2 hours


Collected
Solar Energy, Million BTU's/Day
1
4th
8th
12th
16th
20th
24th
28th
30th
MONTH OF NOVEMBER 1974
SOUTH VIEW OF FIRE SCHOOL, MINNEAPOLIS, MINNESOTA

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

MINNEAPOLIS-ST.PAUL, MINNESOTA
NWS WEATHER SERVICE FCST OFC
INTERNATIONAL AIRPORT
NOVEMBER 1974

LATITUDE 44° 53′ N LONGITUDE 93° 13′ W ELEVATION (GROUND) 834 FT. STANDARD TIME USED: CENTRAL WBAN #14922

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING	COOLING	WEATHER TYPES ON DATES OF OCCURRENCE (1 FOG 2 HEAVY FOG 3 THUNDERSTORM 4 ICE PELLETS 5 HAIL 6 GLAZE 7 DUSTSTORM 8 SMOKE, HAZE 9 BLOWING SNOW)	SNOW, ICE PELLETS OR ICE ON GROUND AT 0GAM IN.	PRECIPITATION WATER EQUIVALENT IN.	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. ELEV. 830 FEET M.S.L.	WIND RESULTANT DIRECTION	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE HOURS AND TENTHS	SUNSHINE PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DATE
1	59	46	53*	12	50	12	0	1	0	.10	0	28.94	22	9.4	10.2	21	SW	3.9	38	7	7	1
2	51	31	41	0	35	24	0		0	0	0	29.25	27	8.8	9.5	15	NW	5.7	56	5	6	2
3	38	27	33	-7	28	32	0		0	0	0	29.25	29	6.0	7.2	15	NW	0.7	7	9	6	3
4	33	24	29	-10	27	36	0		0	T	T	29.07	33	3.0	6.0	12	NE	0.0	0	10	10	4
5	40	28	35	-4	28	30	0		0	0	0	29.18	34	7.4	8.5	12	NW	1.3	13	9	8	5
6	47	24	36	-2	28	29	0	1	0	0	0	29.33	22	6.2	7.2	12	SW	10.0	100	0	0	6
7	57	32	45	8	36	20	0		0	0	0	29.25	20	9.7	10.1	14	SW	9.7	98	0	0	7
8	62*	36	49	12	40	16	0	1	0	0	0	29.23	19	8.8	9.2	25	SW	9.9	100	0	0	8
9	48	43	46	10	41	19	0	1	0	.23	0	29.19	17	6.4	7.1	14	SW	0.0	0	10	10	9
10	45	43	44	9	42	21	0	1	0	.09	0	29.05	04	4.1	6.6	13	N	0.0	0	10	10	10
11	47	34	41	6	34	24	0		0	T	0	28.95	31	14.5	15.4	24	NW	6.7	68	4	7	11
12	38	30	34	0	24	31	0		0	T	T	28.97	31	15.4	15.5	23	NW	0.0	0	10	10	12
13	30	25	28	-5	18	37	0		0	T	T	28.89	32	13.2	13.4	20	NW	0.0	0	10	9	13
14	30	24	27	-6	18	38	0		0	T	T	29.00	30	15.7	16.1	21	NW	1.3	14	9	9	14
15	36	18	27	-5	19	38	0		0	0	0	29.08	26	7.8	8.6	14	NW	8.7	91	4	2	15
16	31	20	26	-6	23	39	0	1 8	0	0	0	29.10	19	3.7	6.5	14	W	0.3	3	9	4	16
17	53	21	37	6	28	28	0		0	0	0	29.06	22	4.5	5.3	14	W	9.4	99	5	2	17
18	41	23	32	1	34	33	0	2	0	T	0	28.95	15	4.0	5.5	12	S	0.0	0	10	8	18
19	45	35	40	10	40	25	0	1	0	.02	0	28.71	26	3.0	9.1	22	NW	0.0	0	10	9	19
20	35	29	32	2	23	33	0		0	0	0	28.89	32	15.4	15.7	28	NW	1.7	18	9	8	20
21	36	23	30	1	21	35	0		0	0	0	28.12	04	2.8	6.9	15	N	8.1	85	7	8	21
22	52	28	40	11	31	25	0		0	0	0	28.86	16	7.4	7.8	16	SW	8.6	93	4	5	22
23	43	30	37	9	33	28	0	45 8	0	.10	.2	28.96	36	12.7	13.5	24	N	8.8	84	1	1	24
24	33	18	26	-2	18	39	0		T	0	0	29.33	32	10.5	10.9	15	S	6.8	74	6	5	25
25	26	15	21	-6	12	44	0		0	0	0	29.46	10	4.3	8.1	19	S	6.8	74	6	5	25
26	32	24	28	2	21	37	0		0	.12	1.0	29.08	16	9.8	13.5	24	SE	0.0	0	10	10	26
27	30	14*	22	-4	15	43	0		1	T	T	29.01	29	8.2	10.2	23	NW	5.2	55	6	3	27
28	27	15	21*	-5	17	44	0		T	T	T	29.27	32	9.6	9.8	13	N	0.0	0	10	9	28
29	32	26	29	4	23	36	0		T	T	T	29.51	04	8.5	9.8	17	E	1.7	19	9	10	29
30	32	23	28	3	21	37	0		T	T	T	29.51	04	11.0	11.4	15	NE	0.0	0	10	8	30
	SUM 1210	SUM 810				TOTAL 933	TOTAL 0	NUMBER OF DAYS		TOTAL .66	TOTAL 1.2	FOR THE MONTH: 29.12	30	3.5	9.8	28	NW	TOTAL 107.0	% FOR MONTH	SUM 213	SUM 194	
	AVG. 40.3	AVG. 27.0	AVG. 33.7	DEP. 1.3	AVG. 27	DEP. -45	DEP. 0	PRECIPITATION .01 INCH	6	DEP. -0.54						DATE: 20		POSSIBLE 287.4		AVG. 7.1	AVG. 6.5	

NUMBER OF DAYS MAXIMUM TEMP. ≤ 90°	MAXIMUM TEMP. ≤ 32°	MINIMUM TEMP. ≤ 32°	MINIMUM TEMP. ≤ 0°
0	8	24	0

SEASON TO DATE	TOTAL	DEP.
HEATING	1737	610
COOLING	82	34

SNOW, ICE PELLETS	TOTAL
.1 INCH	1
THUNDERSTORMS	0
HEAVY FOG ≤ 1/4 MILE	1
CLEAR 4	PARTLY CLOUDY 9	CLOUDY 17

GREATEST IN 24 HOURS AND DATES		
PRECIPITATION	.32	9-10
SNOW, ICE PELLETS	1.0	26

GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE	
1	27+

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1	.01	.06	.02	.01																					1
2																									2
3													T	T	T										3
4																									4
5																									5
6																									6
7																									7
8														.01	.05	.06	.03	.04	.01	.01	T	.01	T	.01	8
9														T	T	T	T	T	T		T	T	T	T	9
10	.01	T	.01	T	T	T	T	.01	T	.02	.01	.02	.01	T	T	T	T	T	T	T				T	10
11	T																								11
12	T	T	T	T				T	T	T	T								T	T	T	T	T	T	12
13										T	T	T	T	T	T						T	T	T		13
14	T		T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			T	T	T		14
15																									15
16																									16
17																									17
18											T	T	T	T	T	T	T	T	T	T	T	T	T	T	18
19	T	T	.01	T	T	T				T	T	.01													19
20																									20
21																									21
22																.02	.06	.02	T	T					22
23																									23
24																									24
25													.01	.04	.02	.02	.02	.01	T	T					25
26																T									26
27					T	T							T	T	T			T	T	T	T	T	T	T	27
28																									28
29	T	T	T	T	T		T		T	T															29
30	T	T	T	T					T	T	T	T	T	T											30

MINNEAPOLIS-ST.PAUL, MINNESOTA

* EXTREME TEMPERATURES FOR THE MONTH, MAY BE THE LAST OF MORE THAN ONE OCCURRENCE.
- BELOW ZERO TEMPERATURE OR NEGATIVE DEPARTURE FROM NORMAL.
* ≤ 70° OF ALASKAN STATIONS.
* ALSO ON AN EARLIER DATE, OR DATES.
* HEAVY FOG RESTRICTS VISIBILITY TO 1/4 MILE OR LESS.
T IN THE HOURLY PRECIPITATION TABLE AND IN COLUMNS 9, 10, AND 11 INDICATES AN AMOUNT TOO SMALL TO MEASURE

THE SEASON FOR DEGREE DAYS BEGINS WITH JULY FOR HEATING AND JANUARY FOR COOLING.
DATA IN COLUMNS 6, 12, 13, 14, AND 15 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
WIND DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. RESULTANT WIND IS THE VECTOR SUM OF WIND DIRECTIONS AND SPEEDS, DIVIDED BY THE NUMBER OF OBSERVATIONS. FIGURES FOR DIRECTIONS ARE TENS OF DEGREES FROM TRUE NORTH: I.E., 09=EAST, 18=SOUTH, 27=WEST, 36=NORTH, AND 00=CALM. WHEN DIRECTIONS ARE IN TENS OF DEGREES IN COL. 17, ENTRIES IN COL. 16 ARE FASTEST OBSERVED 1-MINUTE SPEEDS. IF ONE * APPEARS IN COL. 17, SPEEDS ARE GUSTS.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

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I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC CENTER, ASHEVILLE, NORTH CAROLINA, 28801.

DIRECTOR, NATIONAL CLIMATIC CENTER

SUMMARY BY HOURS

HOUR LOCAL TIME	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE AIR °F	WET BULB °F	DEW PT. °F	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
00	6	29.11	33	31	28	82	9.5	30	3.1
03	6	29.10	31	30	27	85	9.2	30	2.6
06	5	29.11	30	29	26	85	8.6	30	2.3
09	7	29.13	33	31	27	81	9.6	30	3.5
12	8	29.12	38	34	28	70	11.3	28	4.9
15	7	29.11	39	35	28	68	11.7	28	4.8
18	6	29.12	35	33	28	75	9.6	31	4.0
21	6	29.14	33	31	27	79	8.9	32	3.3

USCOMM - NOAA - ASHEVILLE 750
12/19/74

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	SKY COVER (TENTHS)	CEILING (HNDS OF FT.)	VISIBILITY (WHOLE MILES)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	WIND REL. HUM. %	WIND DIR	WIND SPEED KNOTS
DAY 01										
00	10	4	4	RW	56	55	54	93	21	14
03	10	23	7	RW	54	53	52	93	20	8
06	10	18	12		54	52	50	86	21	14
09	10	75	20		53	51	48	83	24	15
12	10	10	25		54	52	50	86	22	10
15	4	UNL	25		58	53	48	72	22	8
18	5	UNL	20		53	50	47	80	36	2
21	0	UNL	20		50	48	47	89	00	0
DAY 02										
00	10	20	20		51	50	48	93	28	8
03	10	21	20		49	47	45	88	28	10
06	10	11	20		48	46	44	86	29	11
09	10	14	25		48	46	42	78	25	10
12	10	UNL	25		40	37	32	73	24	6
15	0	UNL	20		45	39	33	68	30	7
18	5	UNL	15		40	37	32	73	30	8
21	0	UNL	20		39	33	30	82	24	4
DAY 03										
00	10	23	12		36	34	32	85	23	7
03	0	UNL	15		30	30	28	96	26	5
06	1	UNL	20		29	29	27	92	00	0
09	10	31	20		32	31	28	85	33	8
12	10	25	25		36	32	28	67	28	8
15	10	21	25		36	32	27	73	30	9
18	10	21	20		34	31	27	78	32	9
21	0	UNL	25		31	29	26	82	25	4
DAY 04										
00	0	UNL	20		28	27	25	89	25	5
03	10	14	7		28	28	27	96	29	4
06	10	13	7		30	28	28	92	22	4
09	10	13	7		31	30	28	89	32	4
12	10	12	7		31	28	26	82	34	5
15	10	16	7		32	30	28	78	07	4
18	10	20	15		33	30	29	78	01	7
21	10	27	25		33	31	27	78	01	9
DAY 05										
00	10	80	25		33	31	28	82	01	10
03	10	80	12		32	31	29	89	36	7
06	10	UNL	12		33	29	26	92	36	7
09	10	37	15		33	32	30	89	02	6
12	10	22	20		37	33	29	67	32	8
15	10	20	15		40	35	28	62	30	9
18	10	25	25		39	32	27	73	33	6
21	10	18	25		33	31	27	79	30	6
DAY 06										
00	2	UNL	20		30	29	26	85	28	4
03	0	UNL	8		28	28	26	92	26	3
06	0	UNL	5	GF	28	28	24	92	22	3
09	0	UNL	4	GF	31	31	30	96	24	6
12	0	UNL	15		42	37	30	83	24	8
15	0	UNL	20		47	40	30	52	22	10
18	0	UNL	15		37	34	29	73	17	7
21	0	UNL	12		34	32	30	85	20	9
DAY 07										
00	0	UNL	15		34	32	30	85	20	8
03	0	UNL	10		33	32	30	89	19	7
06	0	UNL	7		34	33	31	89	20	8
09	0	UNL	8		41	38	35	78	20	12
12	0	UNL	12		53	47	40	62	22	10
15	0	UNL	12		56	48	42	60	21	11
18	0	UNL	15		48	45	41	77	18	7
21	0	UNL	12		41	40	39	93	18	7
DAY 08										
00	0	UNL	15		43	42	40	89	21	4
03	0	UNL	15		41	40	39	93	19	4
06	0	UNL	20		38	38	37	96	14	3
09	0	UNL	6	GF	45	44	42	89	18	7
12	0	UNL	15		58	51	44	60	20	14
15	0	UNL	25		62	50	38	43	21	18
18	0	UNL	25		54	47	40	59	18	8
21	0	UNL	20		46	43	39	77	17	6
DAY 09										
00	0	UNL	15		44	40	36	74	20	8
03	0	UNL	15		47	43	39	74	20	9
06	0	UNL	15		48	42	38	68	18	6
09	0	UNL	5		45	42	39	80	15	5
12	0	UNL	7		48	44	40	74	16	6
15	10	50	7		46	44	40	78	16	6
18	10	40	7		48	45	41	78	16	6
21	10	31	4		44	43	43	96	14	5
DAY 10										
00	10	7	2	RLF	44	43	43	96	13	5
03	10	10	2	RF	44	43	43	96	12	4
06	10	14	2	RF	44	43	42	93	10	5
09	10	4	0 10	LF	43	42	42	96	05	5
12	10	6	1	RLF	44	43	43	96	09	6
15	10	6	2 8	LF	44	43	42	93	01	5
18	10	10	6	LF	44	43	42	93	36	8
21	10	12	7	L	43	42	41	93	34	7
DAY 11										
00	10	10	10	R	43	42	41	93	34	11
03	8	14	12		43	41	38	85	34	14
06	4	UNL	10		36	36	35	96	31	12
09	1	UNL	25		38	38	31	75	32	10
12	0	UNL	25		49	39	32	60	30	17
15	8	17	15		38	35	31	76	28	18
18	10	21	12		38	35	31	76	31	11
21	10	16	25	R	37	35	32	82	32	14
DAY 12										
00	10	23	20	R	38	35	30	73	30	13
03	10	19	10	S	33	32	30	88	30	15
06	10	31	20		34	31	29	84	28	7
09	10	44	25	SW	33	30	24	70	31	15
12	10	31	25		34	29	21	59	31	16
15	10	30	25		32	28	20	61	32	15
18	10	38	25		35	32	28	69	32	11
21	10	34	25		31	27	20	64	30	9
DAY 13										
00	10	49	25	SW	25	23	16	69	31	15
03	10	40	6	SW	24	22	17	75	32	15
06	10	42	8	SW	26	23	16	69	29	11
09	9	UNL	15	SW	25	23	19	78	30	14
12	9	44	20	SW	30	26	19	64	30	15
15	10	49	25	SW	30	27	20	66	28	13
18	9	42	15		29	26	19	66	29	15
21	9	35	12	SW	29	26	19	66	29	14
DAY 14										
00	10	49	25	SW	25	23	16	69	31	15
03	10	40	6	SW	24	22	17	75	32	15
06	10	42	8	SW	26	23	16	69	29	11
09	9	UNL	15	SW	25	23	19	78	30	14
12	9	44	20	SW	30	26	19	64	30	15
15	10	49	25	SW	30	27	20	66	28	13
18	9	42	15		29	26	19	66	29	15
21	9	35	12	SW	29	26	19	66	29	14
DAY 15										
00	3	UNL	35		27	24	17	66	27	14
03	0	UNL	25		25	23	17	72	28	9
06	0	UNL	25		20	19	16	84	26	7
09	0	UNL	25		24	23	19	81	26	7
12	3	UNL	20		34	29	20	64	29	8
15	9	250	25		36	30	20	52	23	7
18	2	UNL	25		35	32	28	75	22	5
21	0	UNL	20		27	25	20	75	20	3
DAY 16										
00	0	UNL	15		22	22	20	92	11	5
03	1	UNL	10		25	24	22	88	12	7
06	3	UNL	7		23	23	21	92	18	6
09	10	7	7		25	24	22	88	24	6
12	10	11	6	N	30	29	27	89	35	10
15	10	12	7		30	29	26	85	24	6
18	0	UNL	7		27	26	24	88	17	3
21	0	UNL	7		24	24	22	92	15	3
DAY 17										
00	0	UNL	10		22	22	21	96	13	3
03	0	UNL	8		23	23	22	96	19	5
06	0	UNL	12		25	25	24	96	21	5
09	0	UNL	15		35	34	33	92	21	5
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18	0	UNL	25		43	38	31	63	23	5
21	0	UNL	15		34	32	30	85	00	0
DAY 18										
00	0	UNL	10		30	30	29	96	34	3
03	0	UNL	10		27	27	26	96	00	0
06	0	UNL	12		26	26	24	92	05	3
09	10	0	0 1	F	32	32	32	100	17	3
12	10	5	0 8	LF	38	38	38	100	16	6
15	10	7	3	LF	41	41	40	96	17	7
18	10	7	3	LF	41	41	40	96	15	8
21	10	4	2	LF	41	41	40	96	16	8
DAY 19										
00	10	4	2	LF	40	40	40	100	15	7
03	10	5	2 8	LF	40	40	40	100	13	8
06	10	5	4	F	41	41	41	100	13	8
09	10	5	1 8	F	42	42	42	100	00	0
12	10	5	2	F	46	44	44	96	27	7
15	10	11	3	F	46	44	43	93	28	8
18	10	18	8		41	39	36	82	30	14
21	7	120	10		36	34	31	82	29	10
DAY 20										
00	10	22	15		35	32	28	76	32	15
03	10	27	25		32	29	24	72	31	15
06	10	27	25		32	29	23	69	31	16
09	10	30	25		34	30	23	64	32	14
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18	10	UNL	25		31	28	22	69	32	12
21	10	25	25		29	26	20	69	34	12
DAY 21										
00	10	26	25		29	26	19	66	34	12
03	10	26	25		28	25	19	69	36	9
06	0	UNL	25		24	23	18	78	36	9
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12	8	UNL	25		32	28	20	61	00	0
15	10	UNL	10		34	30	23	64	15	7
18	10	UNL	20		32	29	24	72	13	5
DAY 22										
00	3	UNL	20		31	29	26	82	14	4
03	2	UNL	20		31	29	25	78	13	7
06	0	UNL	20		30	28	24	78	13	7
09	4	UNL	25		35	32	26	70	17	7
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DAY 23										
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18	10	10	4	S	34	33	32	92	35	12
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DAY 24										
00	10	130	25		30	27	20	66	33	9
03	0	UNL	25		26	24	19	75	31	8
06	0	UNL	25		21	20	17	84	31	7
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18	0	UNL	25		29	25	17	61	33	10
21	0	UNL	25		25	22	15	66	36	11
DAY 25										
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03	1	UNL	25		16	15	11	81	36	6
06	0	UNL	25		15	14	09	77	02	4
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18	2	UNL	25		23	20	12	63	14	9
21	10	UNL	25		24	21	14	66	14	13
DAY 26										
00	10	130	25		25	22	14	63	14	15
03	10	220	20		25	23	16	69	15	17
06	10	220	20		26	23	16	66	14	15
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15	10	11	1	B S	31	30	28	92	18	9
18	10	11	4	S	32	32	31	96	27	6
21	10	40	20		32	30	26	79	30	8
DAY 27										
00	1	UNL	25		24	23	20	85	25	4
03	0	UNL	15		18	18	15	88	20	3
06	0	UNL	15		14	14	11	88	22	4
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18	6	40	25		24	21	12	60	30	13
21	0	UNL	25		20	18	12	71	35	14
DAY 28										
00	0	UNL	25		17	16	10	74	32	8
03	10	18	20		16	15	12	84	31	8
06	10	16	20		19	18	15	84	33	7
09	10	13	20		21	20	16	81	33	10
12	10	18	20		26	24	19	75	33	9
15	10	20	15	SG	26	24	19	75	32	9
18	10	20	25		26	24	20	78	31	9
21	10	20	25	SW	27	26	22	81	35	8
DAY 29										
00	10	12	25		27	26	23	85	36	7
03	10	15	8	SW	27	26	23	85	36	5
06	8	50	15		26	25	23	88	01	6
09	9	38	10	SW	29	28	24	82	09	8
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15	8	31	25		32	28	21	64	09	11
18	10	110	25		30	28	23	75	05	7
21	10	250	25		29	27	23	78	02	7
DAY 30										
00	10	40	25		30	27	20	66	05	10
03	10	28	20	S	28	26	21	75	06	10
06	10	44	25		27	25	20	75	04	10
09	10	19	10	S	27	25	20	75	02	9
12	10	80	8	S	29	27	22	75	03	10
15	10	350	25		31	28	23	72	05	11
18	10	70	25		30	27	22	72	03	12
21	0	UNL	25		26	24	20	78	02	7

NOTES

CEILING COLUMN-
UNL INDICATES AN UNLIMITED CEILING

WEATHER COLUMN-

+	TORNADO
T	THUNDERSTORM
Q	SQUALL
R	RAIN
R+	RAIN SHOWERS
ZR	FREEZING RAIN
L	DRIZZLE
ZL	FREEZING DRIZZLE
S	SNOW
SP	SNOW PELLETS
IC	ICE CRYSTALS
S+	SNOW SHOWERS
SG	SNOW GRAINS
IP	ICE PELLETS
A	HAIL
F	FOG
IF	ICE FOG
GF	GROUND FOG
BD	BLOWING DUST
BN	BLOWING SAND
BS	BLOWING SNOW
BY	BLOWING SPRAY
K	SMOKE
H	HAZE
D	DUST

WIND COLUMNS-

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH: I.E., 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST, ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS: MULTIPLY BY 1.15 TO CONVERT TO MILES PER HOUR.

ADDITIONAL DATA

OTHER OBSERVATIONAL DATA CONTAINED IN RECORDS ON FILE CAN BE FURNISHED AT COST VIA MICROFILM, MICROFICHE, OR PAPER COPIES OF THE ORIGINAL RECORDS. INQUIRIES AS TO AVAILABILITY AND COSTS SHOULD BE ADDRESSED TO: DIRECTOR, NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

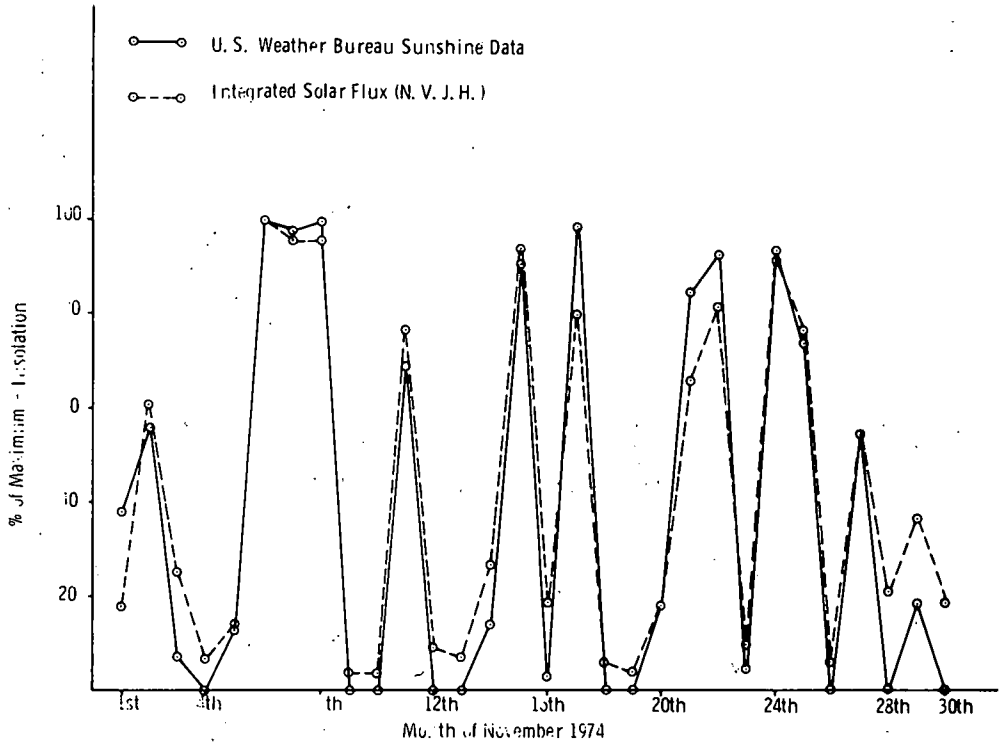
STATION: MINNEAPOLIS MINN YEAR & MONTH: 74 11

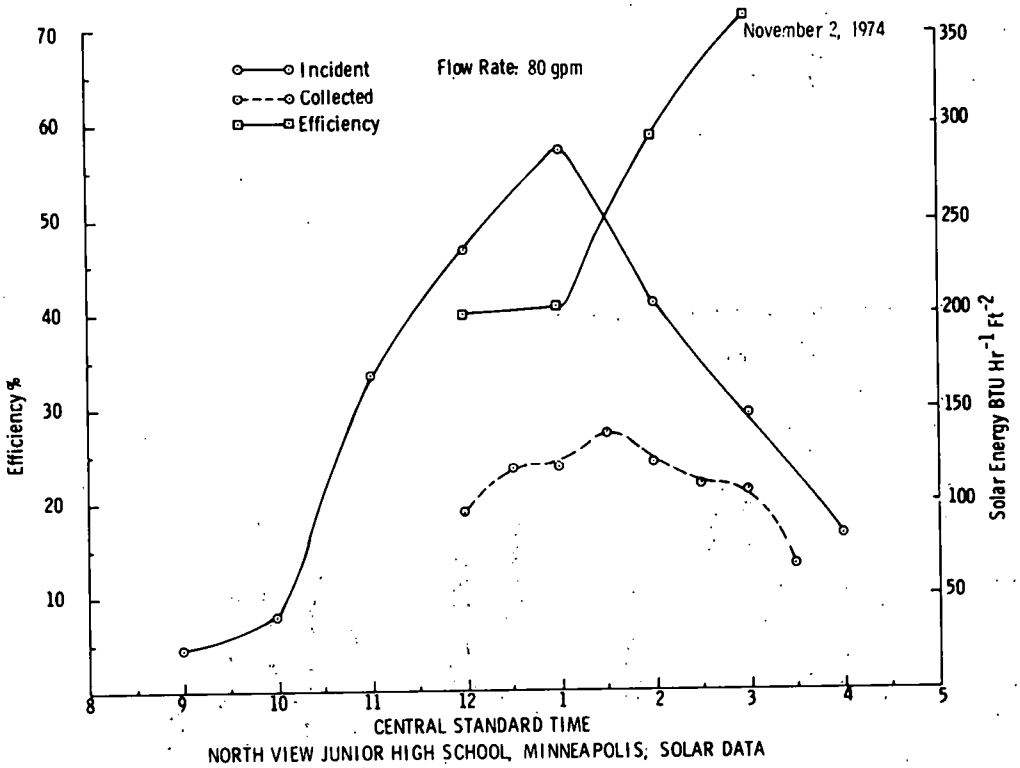
U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

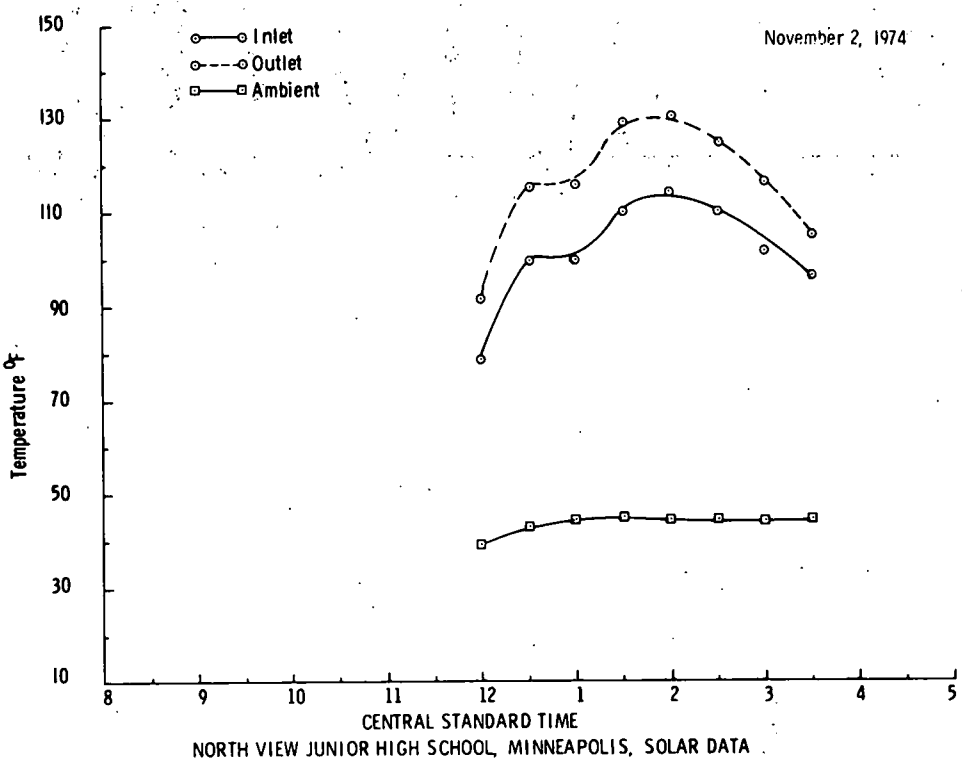
POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
210

FIRST CLASS

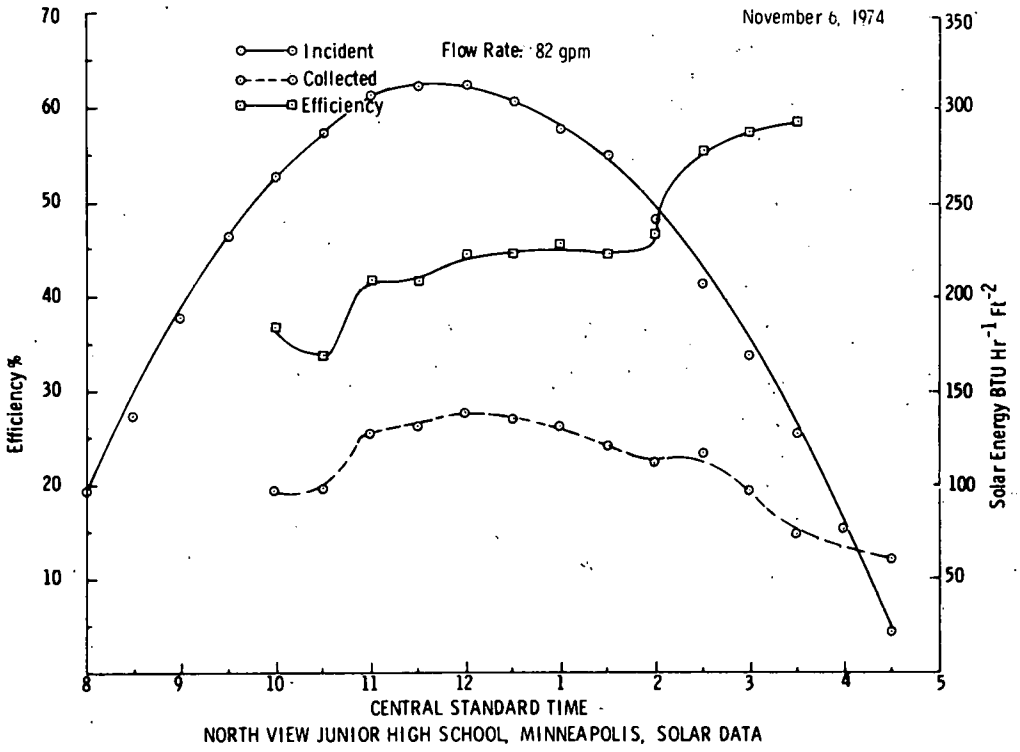

U. S. Weather Bureau Sunshine Data
Integrated Solar Flux (N. V. J. H.)
% of Maximum - Insolation
100
0
0
10
20
1st
4th
th
12th
15th
20th
24th
28th
30th
Month of November 1974



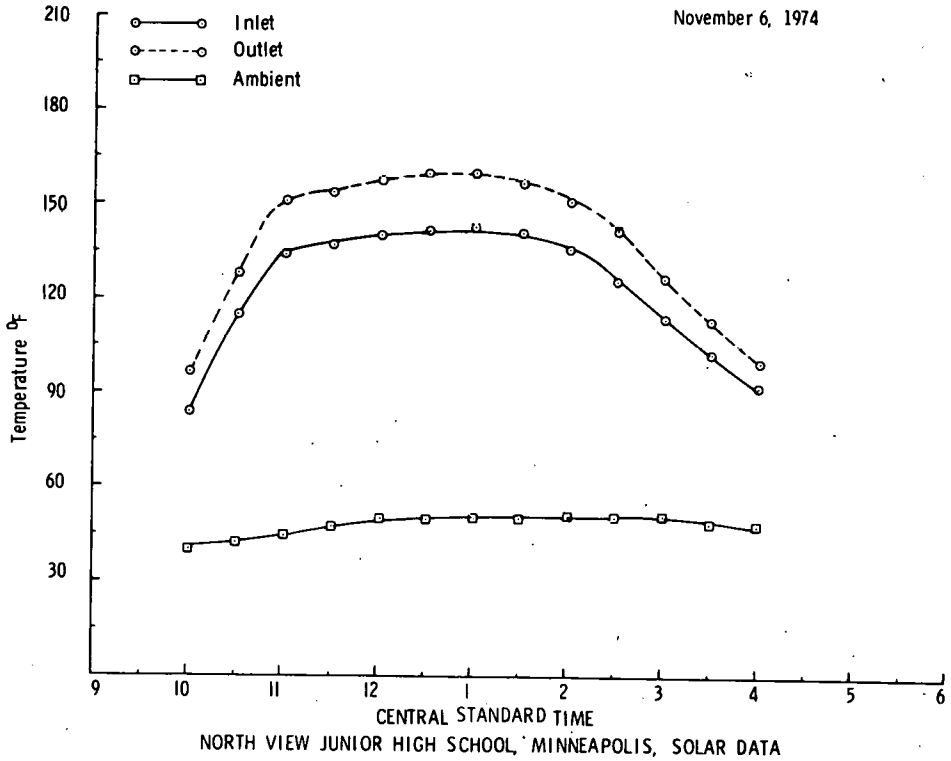
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



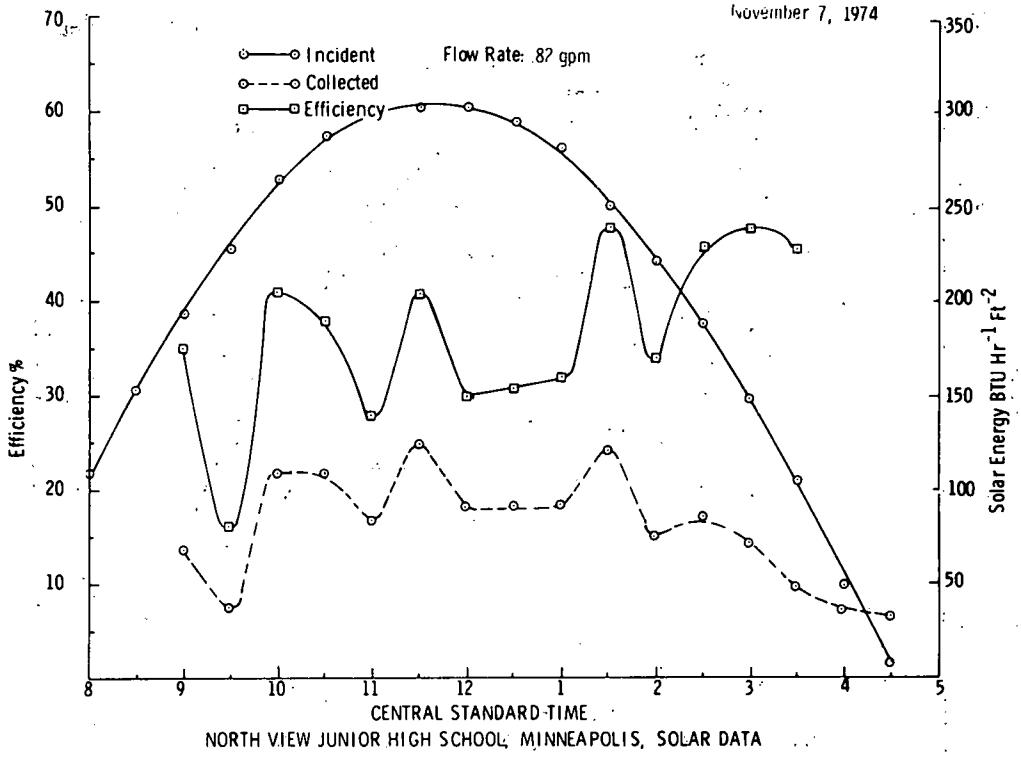
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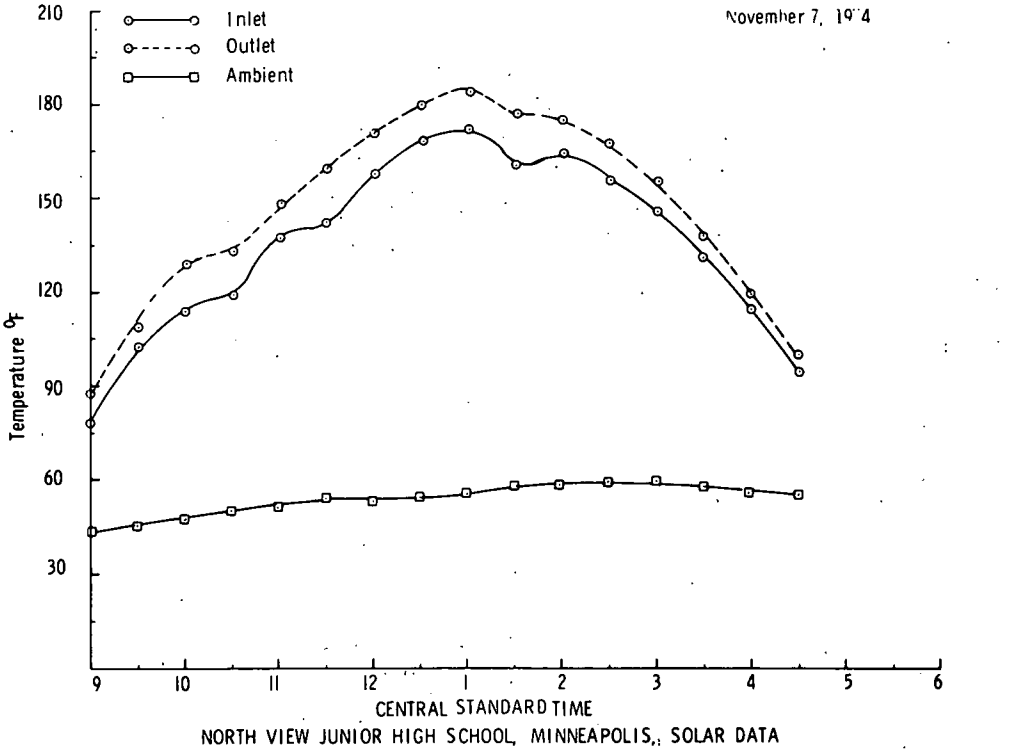
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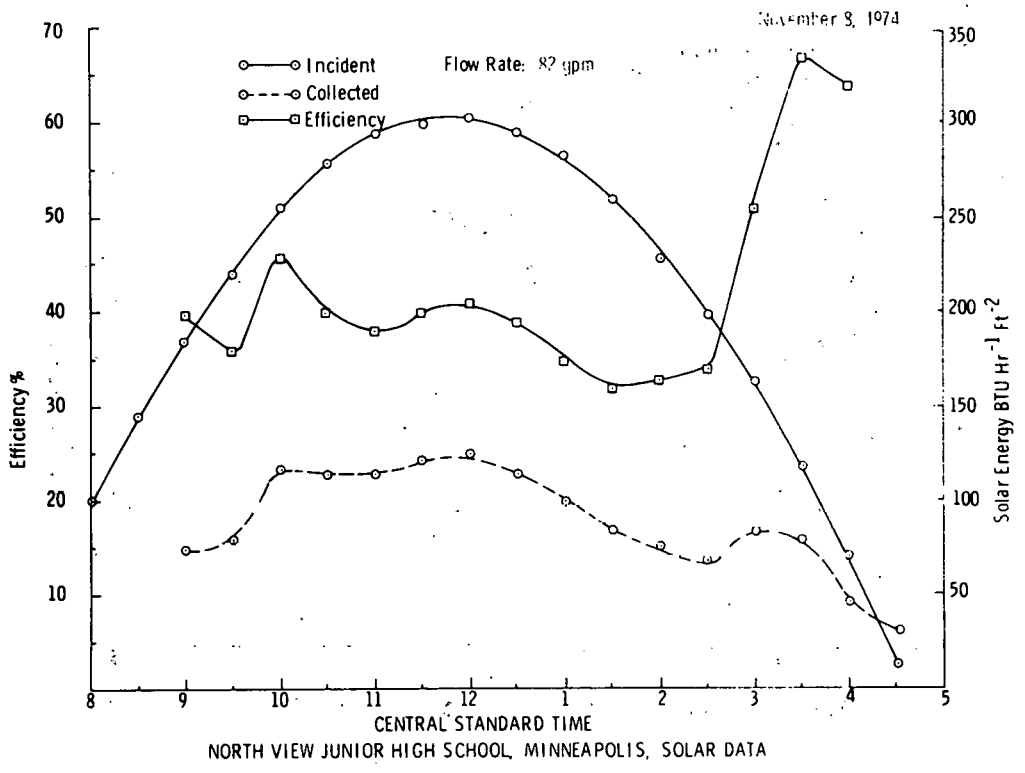
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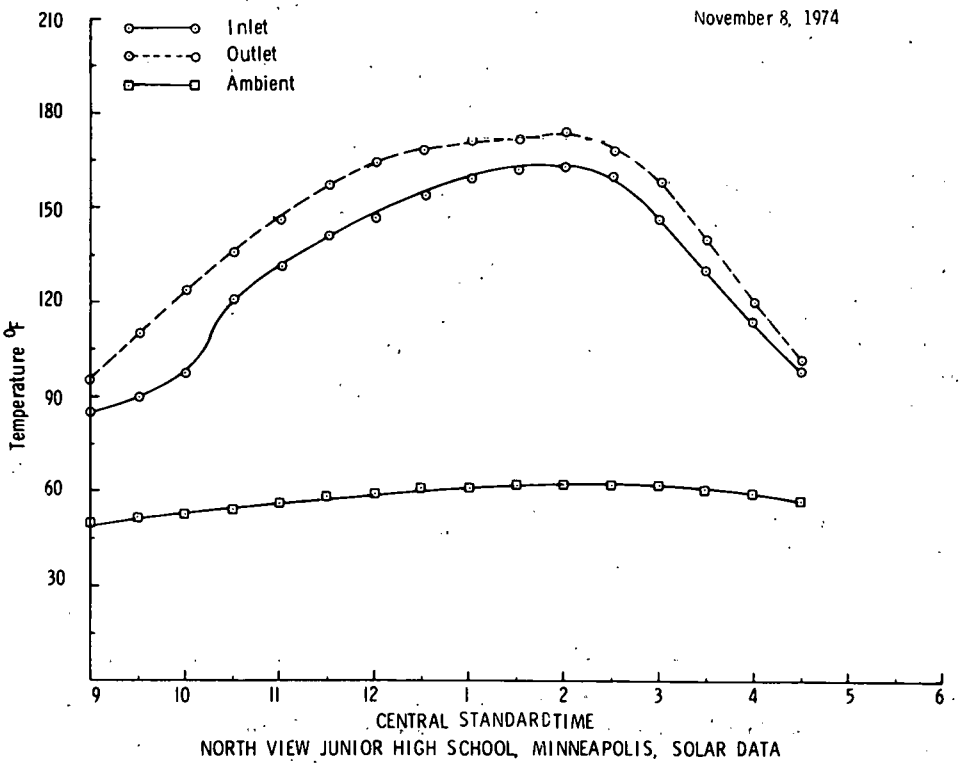
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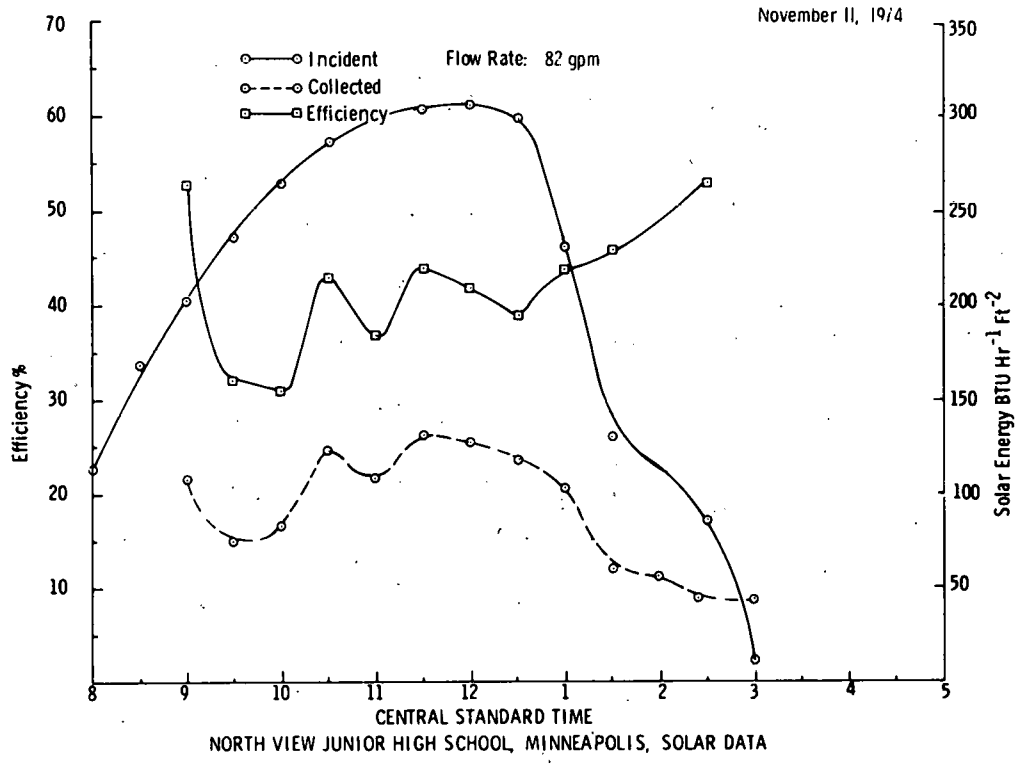
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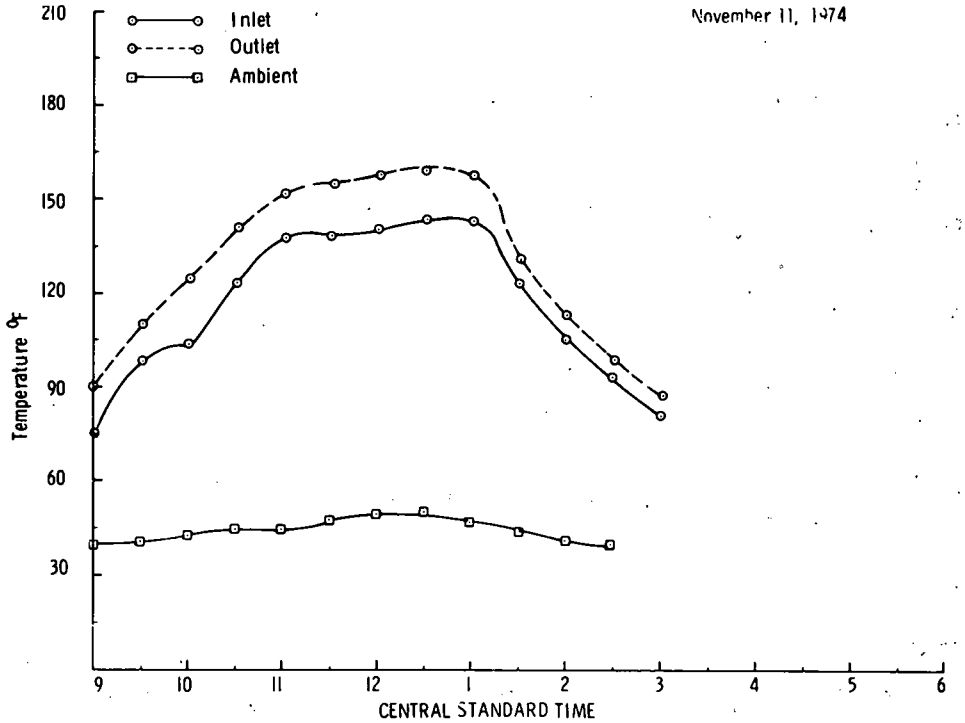
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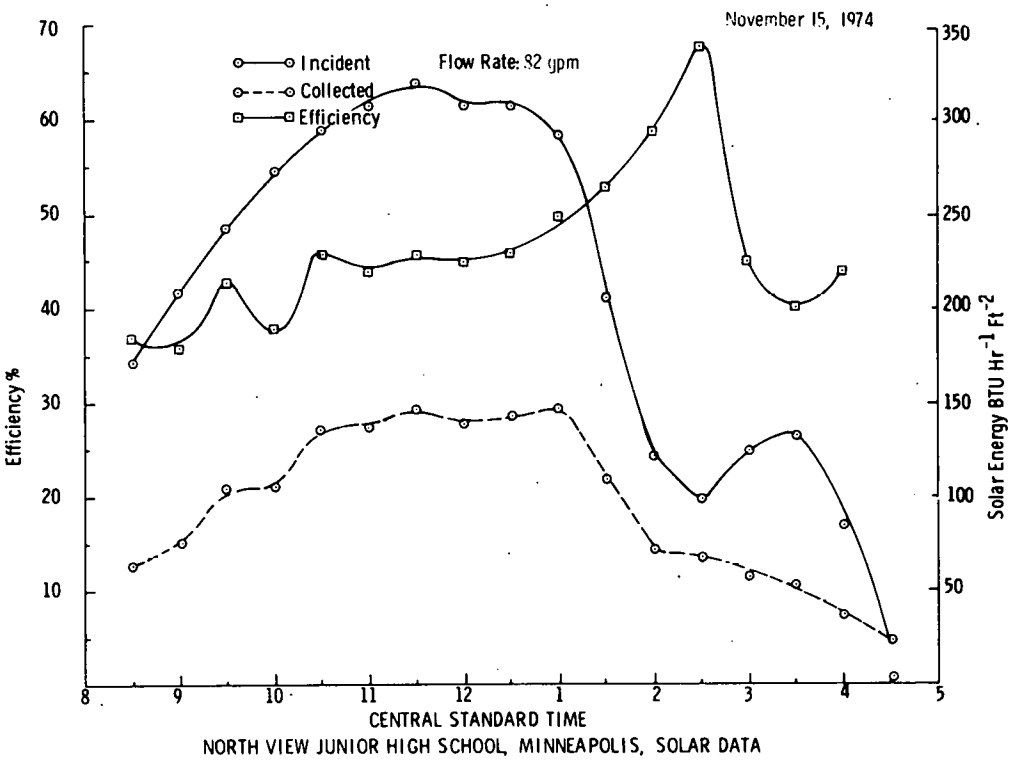
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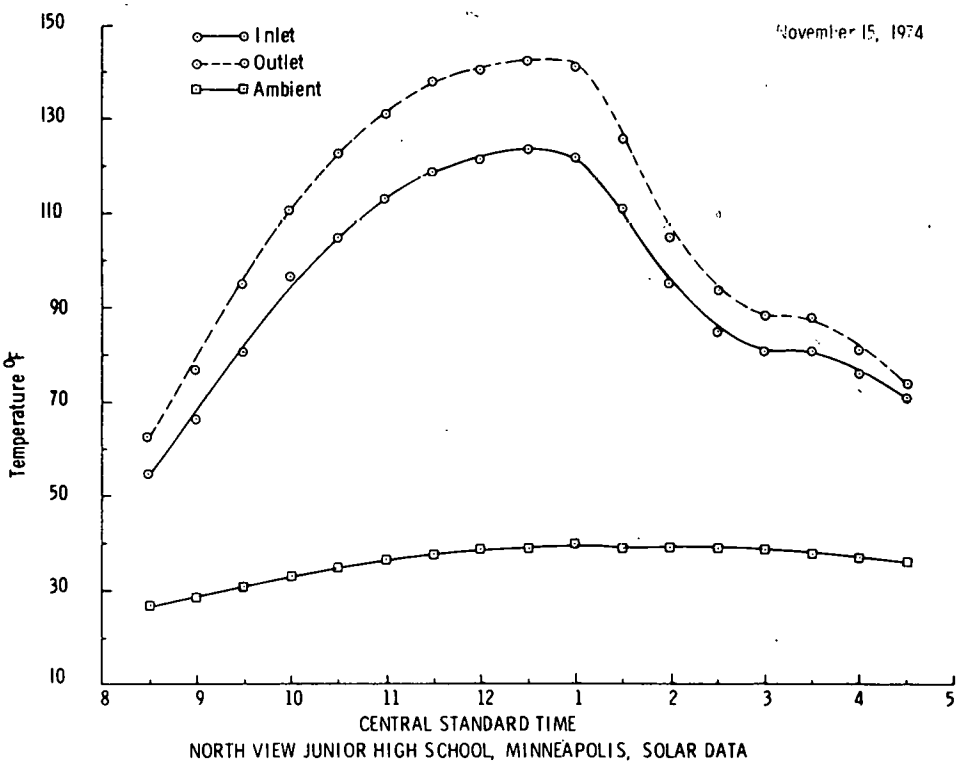
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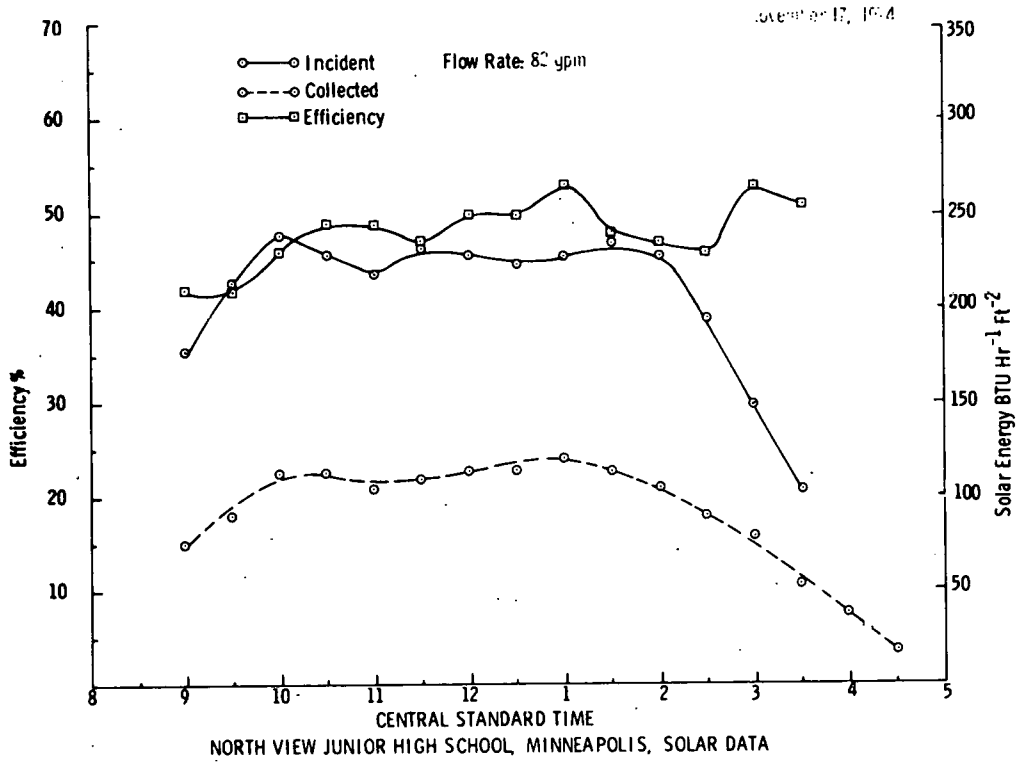
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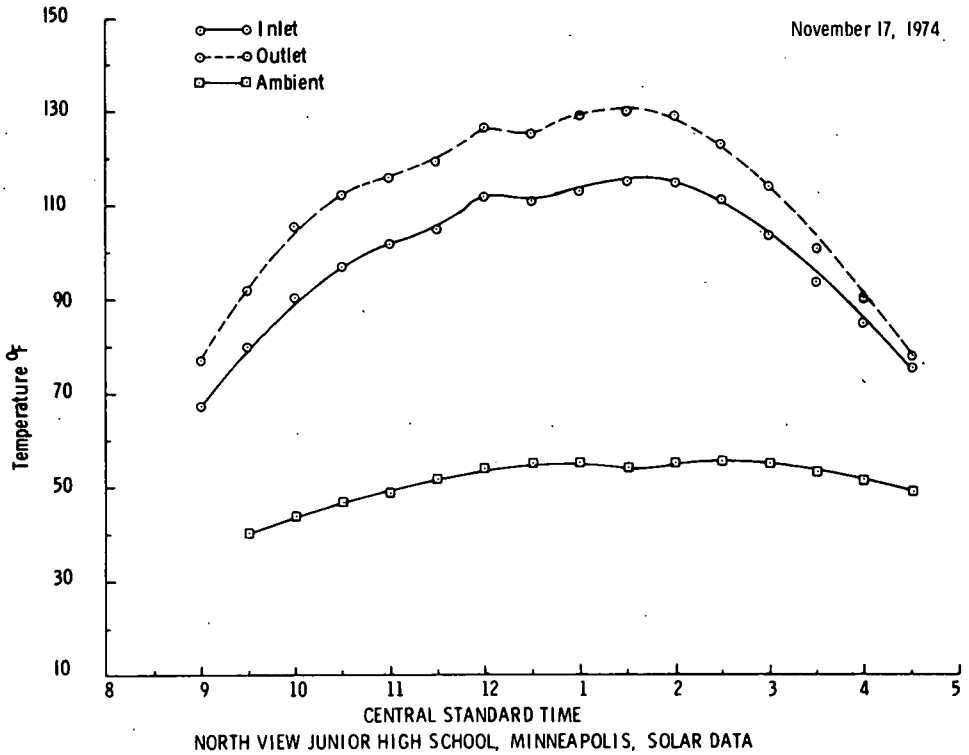
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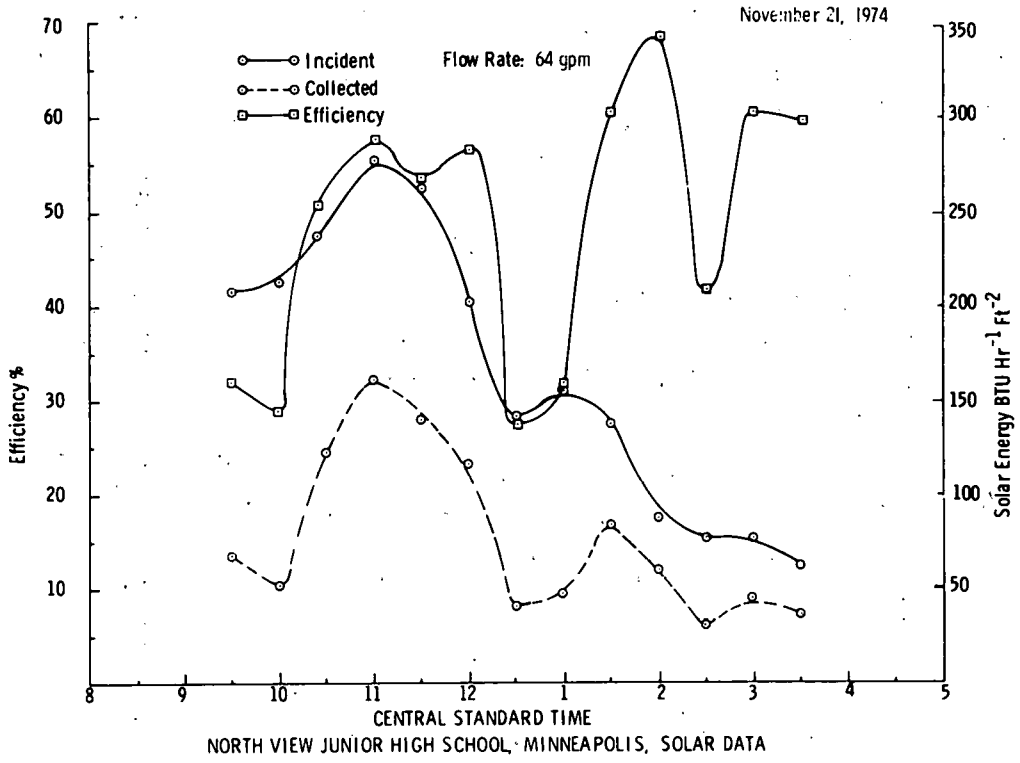
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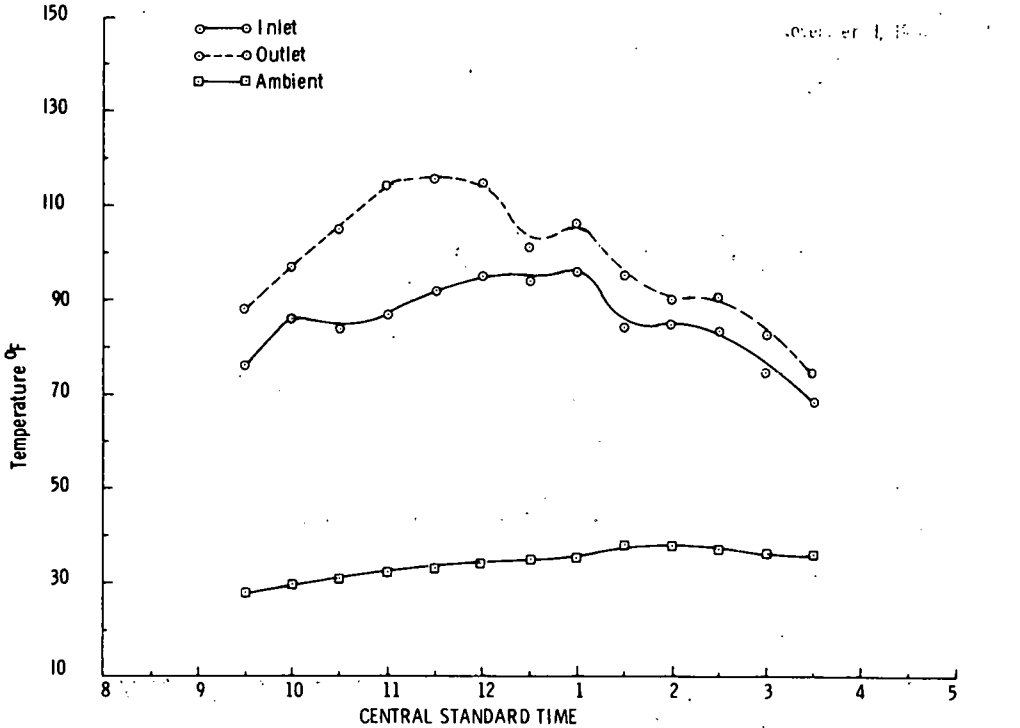
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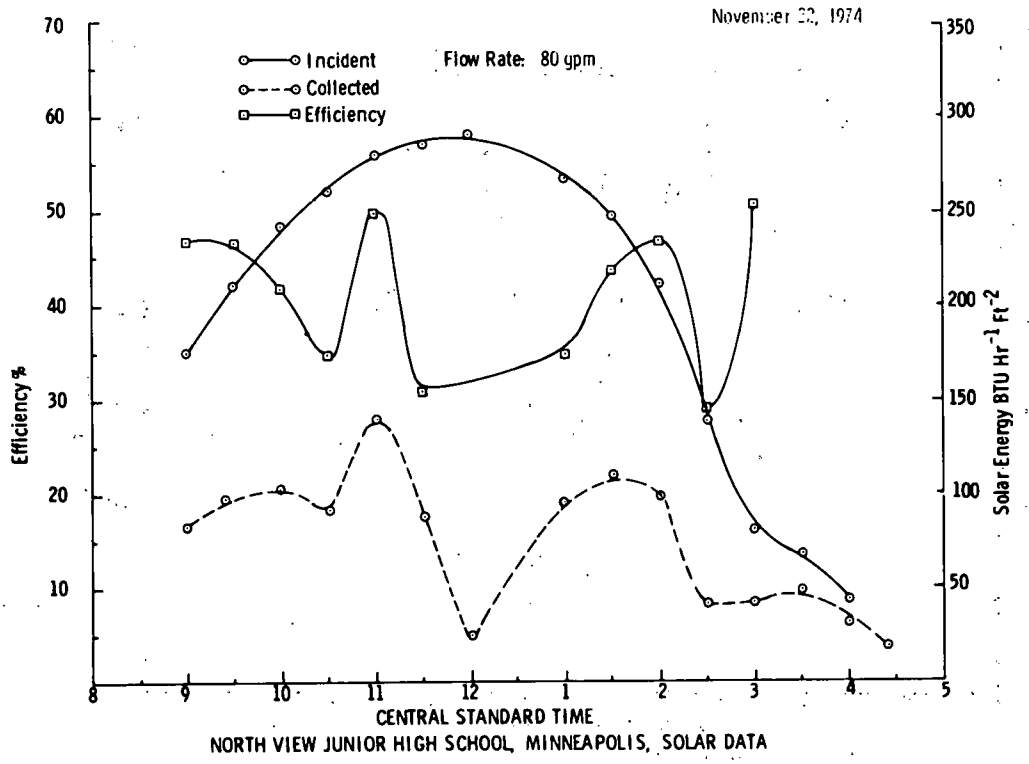
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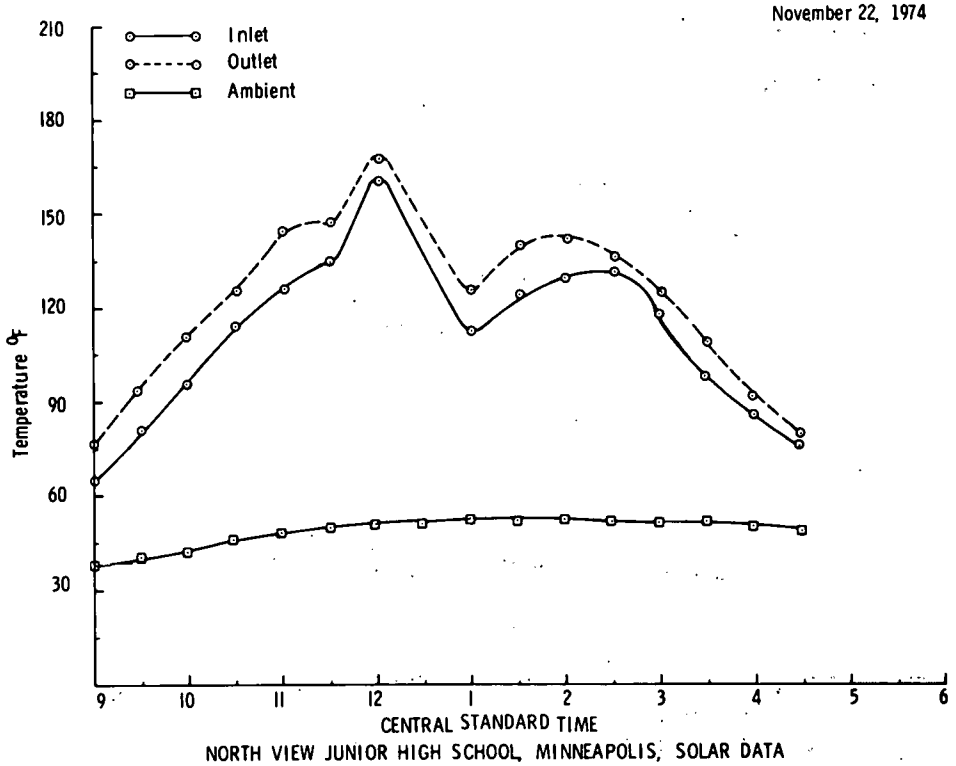
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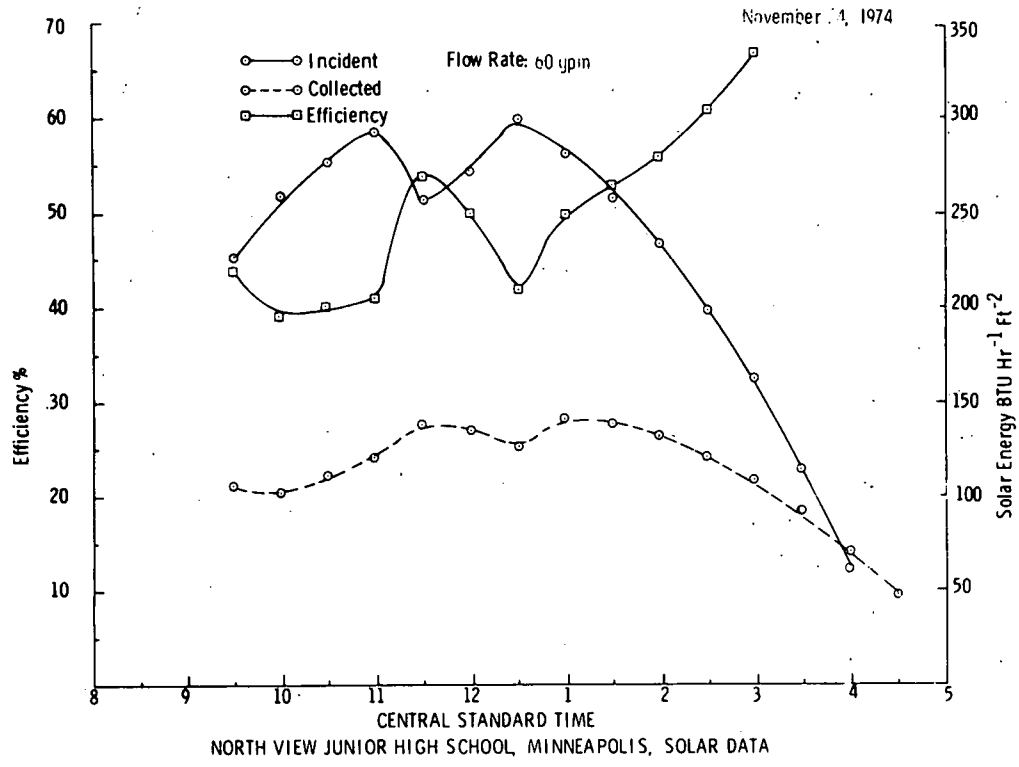
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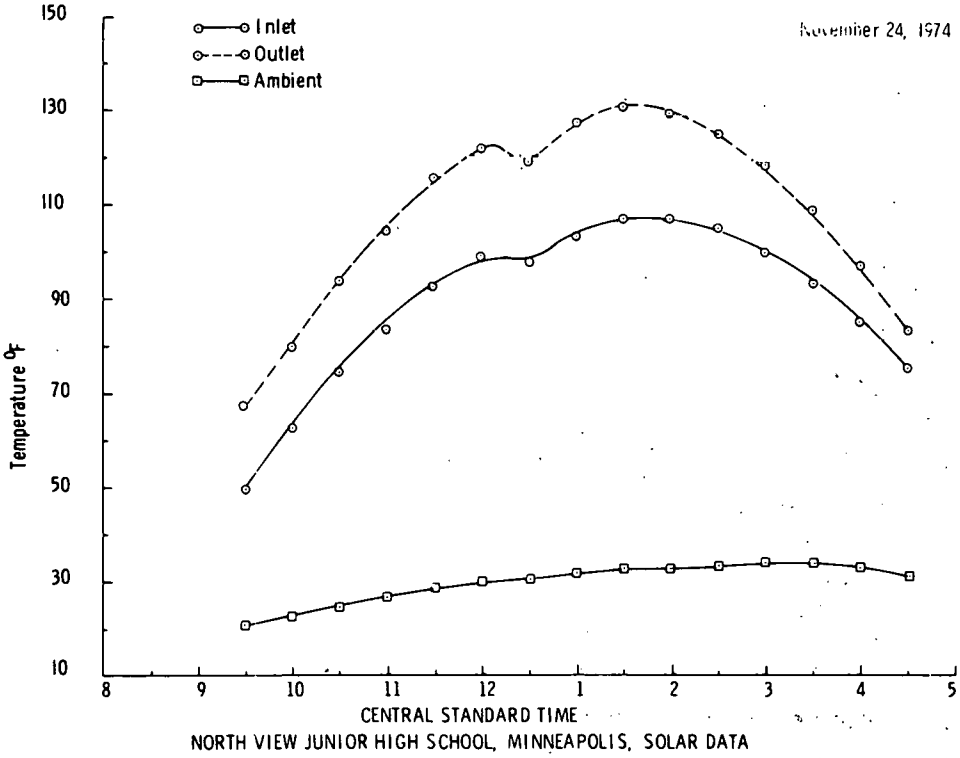
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



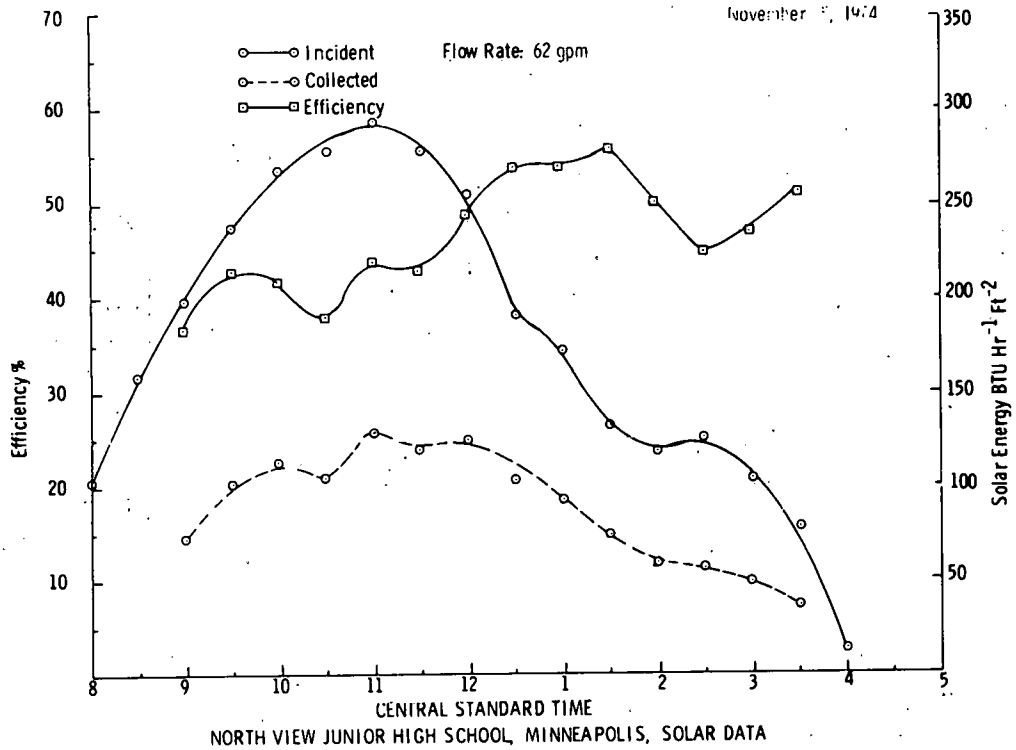
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



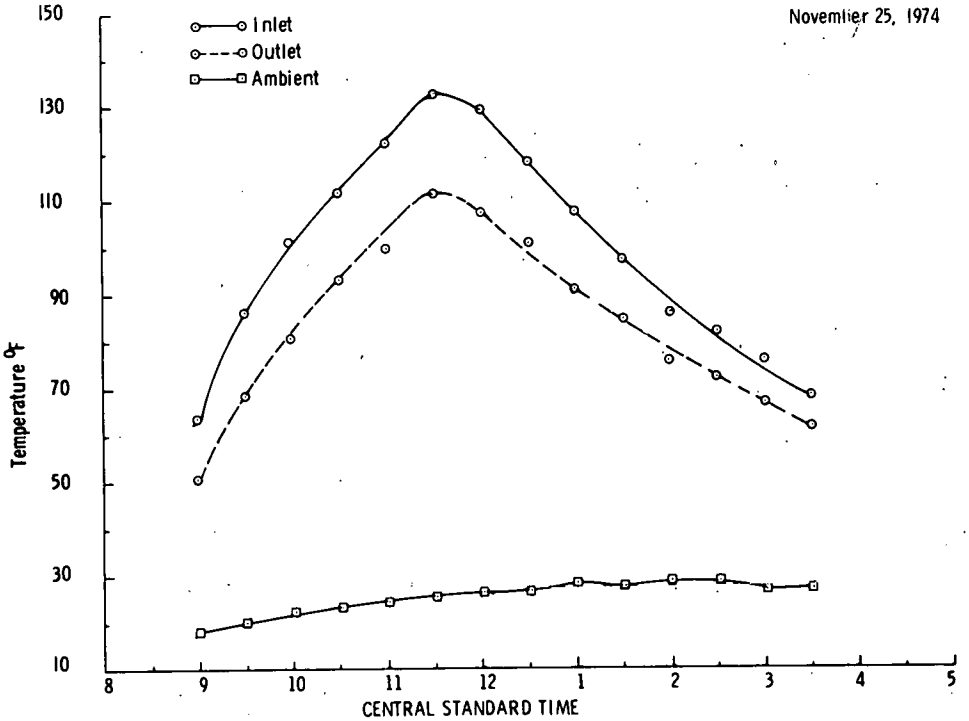
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



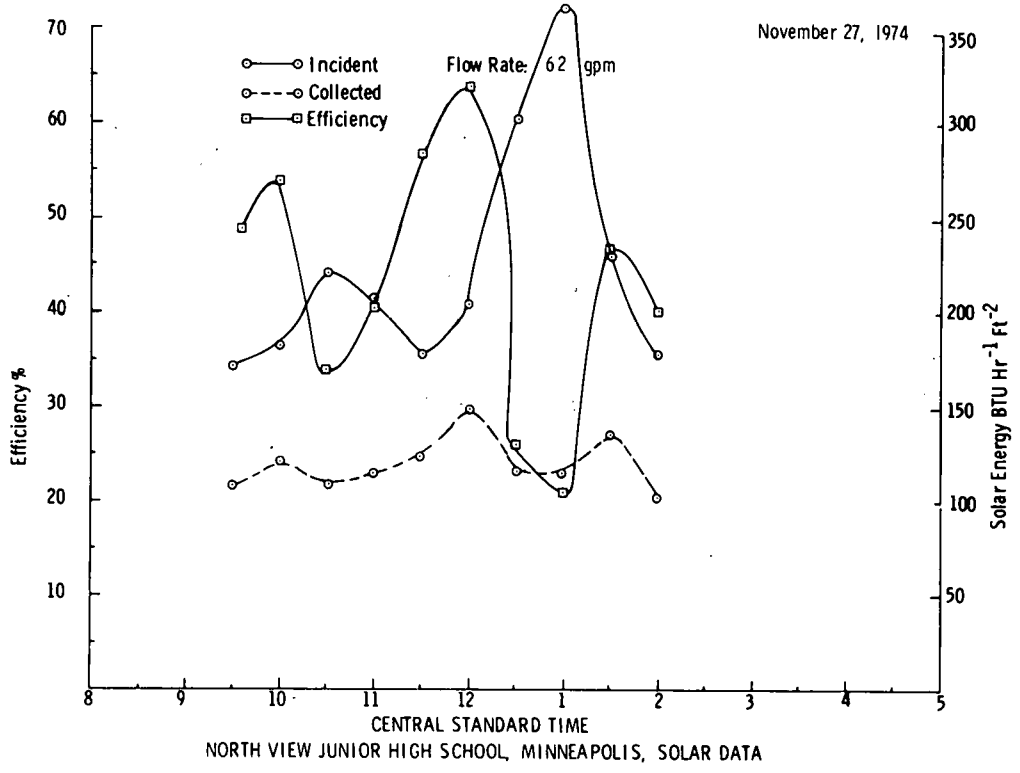
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



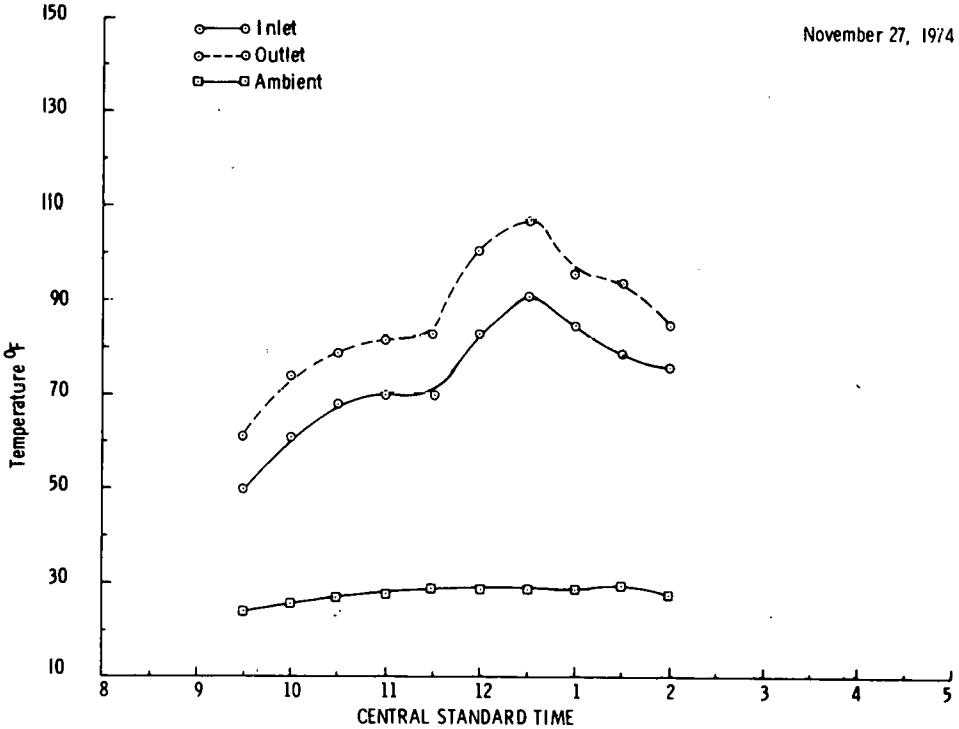
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

DECEMBER

1974

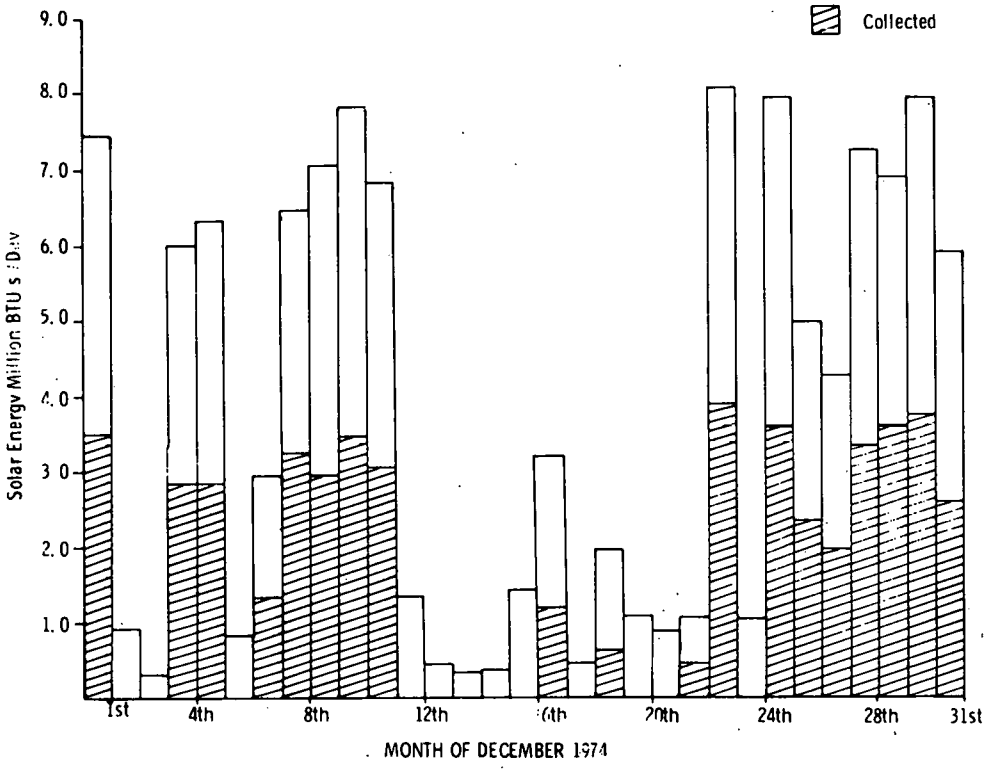
North View Junior High
Month of December 1974

Date	Mode of Operation	Overall Eff. = $\frac{Q_{collected}}{Q_{incident}}$
Dec. 1	Fresh Air and Water Heating From Collector	47%
Dec. 2	Cloudy and Foggy, No Collection	---
Dec. 3	Cloudy and Foggy, No Collection	---
Dec. 4	Air and Water Heating From Collector	47%
Dec. 5	Air and Water Heating From Collector	45%
Dec. 6	Cloudy (Air Heating From Storage)	---
Dec. 7	Air and Water Heating From Collector	45%
Dec. 8	Air and Water Heating From Collector	49%
Dec. 9	Air and Water Heating From Collector	41%
Dec. 10	Air and Water Heating From Collector	44%
Dec. 11	Water Heating and Storage From Collector	44%
Dec. 12	Cloudy, No Collection	---
Dec. 13	Cloudy, No Collection	---
Dec. 14	Cloudy, No Collection	---
Dec. 15	Cloudy, No Collection	---
Dec. 16	Cloudy, No Collection	---
Dec. 17	Air and Water Heating From Collector	36%
Dec. 18	Cloudy, No Collection	---
Dec. 19	Air and Water Heating From Collector	32%
Dec. 20	Cloudy, No Collection	---
Dec. 21	Cloudy, No Collection	---
Dec. 22	Air and Water Heating From Collector	42% (2 Hours)
Dec. 23	Air Heating From Collector	49%
Dec. 24	Cloudy, No Collection	---
Dec. 25	Air and Water Heating From Collector	45% Estimated (recorder failure)

North View Junior High

Month of December 1974

Date	Mode of Operation	Overall Eff. = $\frac{Q_{collected}}{Q_{incident}}$
Dec. 26	Air and Water Heating From Collector	47%
Dec. 27	Air and Water Heating From Collector	45%
Dec. 28	Air and Water Heating From Collector	46%
Dec. 29	Air and Water Heating From Collector	52%
Dec. 30	Air and Water Heating From Collector	47%
Dec. 31	Air and Water Heating From Collector	44%


Collected
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
Solar Energy Million BTU s : Day
1st
4th
8th
12th
16th
20th
24th
28th
31st
MONTH OF DECEMBER 1974

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

MINNEAPOLIS-ST.PAUL, MINNESOTA
NAT WEATHER SERVICE FCST OFC
INTERNATIONAL AIRPORT
DECEMBER 1974

LATITUDE 44° 53′ N LONGITUDE 93° 13′ W ELEVATION (GROUND) 834 FT. STANDARD TIME USED: CENTRAL WBAN #14922

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING	COOLING	WEATHER TYPES ON DATES OF OCCURRENCE (1 FOG, 2 HEAVY FOG *, 3 THUNDERSTORM, 4 ICE PELLETS, 5 HAIL, 6 GLAZE, 7 DUSTSTORM, 8 SMOKE, HAZE, 9 BLOWING SNOW)	SNOW, ICE PELLETS OR ICE ON GROUND AT 0GAM IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. CLEV. 838 FEET M.S.L.	WIND RESULTANT DIRECTION	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE HOURS AND TENTHS	PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DATE
1	34	17	26	2	19	39	0		T	0	0	29.39	01	9.6	9.8	14	N	7.4	82	6	5	1
2	26	15	21	-3	21	44	0	2	T	0	0	29.32	34	4.6	5.2	10	NW	0.2	2	10	6	2
3	26	14	20	-3	20	45	0	1	T	T	T	29.40	12	2.0	5.8	9	S	0.0	0	10	8	3
4	31	21	26	3	19	39	0	1	T	T	T	29.28	16	11.2	11.5	16	S	4.7	52	5	7	4
5	36	22	29	6	21	36	0	1 8	T	0	0	29.12	12	7.7	7.9	13	SE	5.5	61	0	1	5
6	33	23	28	6	25	37	0	1 8	T	0	0	29.07	26	.6	3.6	7	NW	0.0	0	10	8	6
7	37	11	24	2	20	41	0	1 8	T	0	0	29.06	35	9.9	9.9	20	N	2.9	33	8	8	7
8	17	6	12	-9	2	53	0		T	0	0	29.38	34	10.8	11.7	26	NE	4.5	51	5	4	8
9	29	6	18	-3	8	47	0		T	0	0	29.15	17	8.2	8.8	17	S	0.7	08	5	3	9
10	44*	19	32	11	22	33	0		T	0	0	28.96	24	5.3	5.9	11	W	8.6	97	1	1	10
11	43	18	31	11	23	34	0		T	0	0	28.91	25	4.0	4.9	7	NW	8.5	96	3	1	11
12	40	22	31	11	25	34	0		T	0	0	28.96	11	7.8	7.8	16	SE	4.2	48	10	10	12
13	36	32	34	15	30	31	0	1	T	.03	.8	29.10	11	8.6	9.4	15	SE	0.0	0	10	10	13
14	33	32	33	14	30	32	0	1	T	.02	.2	29.19	04	7.8	8.1	11	E	0.1	1	10	10	14
15	34	33	34	15	31	31	0	1	T	.09	1.3	28.76	03	10.7	12.5	18	E	0.0	0	10	10	15
16	33	18	26	8	22	39	0		T	.04	.7	28.85	32	15.6	15.8	20	N	4.3	48	10	9	16
17	18	16	18	0	12	47	0		1	T	.2	28.94	31	9.8	10.1	15	N	6.2	70	8	9	17
18	25	16	21	3	17	44	0	1	1	.13	2.1	28.88	18	6.4	8.1	11	S	0.0	0	10	10	18
19	26	23	25	8	18	40	0	1	3	.03	.6	28.86	29	6.5	6.9	9	NW	5.3	60	9	10	19
20	24	12	18	1	16	47	0	2	3	T	T	29.05	28	4.7	5.2	7	NW	3.3	38	10	9	20
21	24	12	18	1	15	47	0		3	T	T	29.00	22	5.8	6.8	16	SW	4.2	48	10	10	21
22	34	22	28	12	23	37	0	1 8	3	T	T	28.71	15	12.3	15.4	24	SE	4.1	47	10	9	22
23	31	19	25	8	15	40	0		3	0	0	29.05	26	12.8	13.4	20	W	8.3	94	0	2	23
24	21	11	16	0	13	49	0	1	3	.01	.2	29.27	27	7.3	7.8	12	NW	1.4	16	10	9	24
25	21	1*	11*	-5	7	54	0	1 4	2	T	T	29.23	21	6.2	8.5	15	S	8.6	98	1	2	25
26	30	15	23	8	16	42	0		2	0	0	29.11	20	9.0	9.4	13	SW	6.1	69	6	6	26
27	32	19	26	11	24	39	0	1 8	2	0	0	29.09	19	7.5	7.8	19	SW	6.3	72	6	8	27
28	38	28	34*	19	28	31	0	1	2	0	0	29.01	19	11.5	11.8	23	SW	8.8	100	6	5	28
29	32	19	26	12	22	39	0	1	1	0	0	29.12	32	6.2	7.1	14	NW	8.6	98	4	5	29
30	37	12	25	11	16	40	0		1	0	0	29.28	19	5.2	5.9	16	SW	8.8	100	0	0	30
31	32	16	24	10	17	41	0		T	0	0	29.18	26	3.4	8.2	15	NW	7.8	89	6	4	31
	SUM	SUM				TOTAL	TOTAL			TOTAL	TOTAL		FOR THE MONTH:					TOTAL	%	SUN	SUN	
	956	552				1252	0	NUMBER OF DAYS		.35	6.1	29.08	23	1.4	8.7	29	N	147.4	FOR	209	189	
	AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.	PRECIPITATION		DEP.						DATE:	07	POSSIBLE	MONTH	AVG.	AVG.	
	30.9	17.8	24.4	5.8	18	-186	0	.01 INCH	7	-0.54								274.1	54	6.7	6.4	

NUMBER OF DAYS				SEASON TO DATE		SNOW, ICE PELLETS		GREATEST IN 24 HOURS AND DATES				GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE
MAXIMUM TEMP.		MINIMUM TEMP.		TOTAL	TOTAL	.10 INCH	2	PRECIPITATION		SNOW, ICE PELLETS		3 | 24+
≥ 90	≤ 32	≤ 32	≤ 0	DEP.	DEP.	THUNDERSTORMS	0	.16	18-19	2.7	18-19	
0	17	30	0	-104	34	HEAVY FOG *	2	CLEAR 6	PARTLY CLOUDY 8		CLOUDY 16	

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1																									1
2																									2
3										T	T	T	T	T	T	T	T	T	T	T	T				3
4						T	T	T	T																4
5																									5
6																									6
7																									7
8																									8
9																									9
10																									10
11																									11
12																									12
13	T	T	T	T	T	T	T	T	.01	.02	T	T	T	T	T	T	T	T	T	T	T	T	T		13
14				T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	.02	14
15	.01	.01	.01	T	.01	T	.02	.02	.01	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	15
16	T	T	T	T	.02	T	.02	T	T	T	T	T	T						T	T	T	T	T	T	16
17	T	T	T		T	T	T	T	T				T	T	T	T	T	T	T	T	T	T	T	T	17
18	T	T	T	T							T	T	T	.01	.02	.02	.02	.03	.01	.01	T	T	T		18
19	T	T	.01	.01	T	T	T	T	T	.01	T	T	T	T				T	T	T	T	T			19
20	T	T	T	T						T	T	T	T	T					T	T	T	T	T	T	20
21			T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			21
22							T	T																	22
23																									23
24		T	T		T	T	T	T	T	T	T	T	T	T	T	T	T	.01	T	T	T	T	T		24
25	T	T	T				T	T	T	T															25
26																									26
27																									27
28																									28
29																									29
30																									30
31																									31

MINNEAPOLIS-ST.PAUL, MINNESOTA

* EXTREME TEMPERATURES FOR THE MONTH, MAY BE THE LAST OF MORE THAN ONE OCCURRENCE.
- BELOW ZERO TEMPERATURE OR NEGATIVE DEPARTURE FROM NORMAL.
≤ ≥ TO AT ALASKAN STATIONS.
- ALSO ON AN EARLIER DATE, OR DATES.
* HEAVY FOG RESTRICTS VISIBILITY TO 1/4 MILE OR LESS.
T IN THE HOURLY PRECIPITATION TABLE AND IN COLUMNS 9, 10, AND 11 INDICATES AN AMOUNT TOO SMALL TO MEASURE

THE SEASON FOR DEGREE DAYS BEGINS WITH JULY FOR HEATING AND JANUARY FOR COOLING.
DATA IN COLUMNS 6, 12, 13, 14, AND 16 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
WIND DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. RESULTANT WIND IS THE VECTOR SUM OF WIND DIRECTIONS AND SPEEDS DIVIDED BY THE NUMBER OF OBSERVATIONS. FIGURES FOR DIRECTIONS ARE TENS OF DEGREES FROM TRUE NOR TH: I.E., 09-EAST, 18-SOUTH, 27-WEST, 36-NORTH, AND 00-CALM. WHEN DIRECTIONS ARE IN TENS OF DEGREES IN COL. 17, ENTRIES IN COL. 16 ARE FASTEST OBSERVED 1-MINUTE SPEEDS. IF THE / APPEARS IN COL. 17, SPEEDS ARE OVER 9.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

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I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC CENTER, ASHEVILLE, NORTH CAROLINA, 28801

William H. Haggard

DIRECTOR, NATIONAL CLIMATIC CENTER

SUMMARY BY HOURS

HOUR LOCAL TIME	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
00	6	29.09	23	22	19	83	7.9	23	1.6
03	6	29.09	22	21	18	86	7.9	26	.8
06	6	29.09	21	20	18	87	8.8	16	.8
09	7	29.10	22	21	18	86	7.8	19	1.1
12	6	29.09	28	25	20	75	9.9	24	1.7
15	7	29.06	30	27	21	71	10.5	24	1.7
18	7	29.08	26	25	20	78	8.8	23	2.5
21	6	29.08	25	23	19	81	8.1	25	2.2

USCOMM - NOAA - ASHEVILLE 750
01/21/75

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	SKY COVER TENTHS	CEILING HNDRDS OF FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS OF MILES	VISIBILITY CODE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	TEMPERATURE REL. HUM.	WIND DIR	WIND SPEED KNOTS
DAY 01												
00	4	UNL	25				23	22	19	85	02	9
03	0	UNL	25				21	20	17	84	03	8
06	0	UNL	25				19	18	16	88	02	7
09	10	UNL	25				21	20	17	84	01	7
12	4	UNL	25				29	26	20	60	02	10
15	8	UNL	25				34	29	21	50	36	11
18	8	UNL	25				28	27	21	72	36	8
21	0	UNL	25				27	25	21	78	36	7
DAY 02												
00	1	UNL	25				22	21	19	88	36	6
03	7	UNL	6	1		RW	18	18	15	92	36	4
06	10	2	0	1		F	22	22	22	100	35	6
09	10	8	1			F	24	24	23	96	34	6
12	10	4	1	4		F	24	24	23	96	34	6
15	10	4	1			RW	28	26	24	82	34	9
18	3	UNL	9			RW	24	24	22	92	36	8
21	0	UNL	9			RW	21	21	20	96	00	0
DAY 03												
00	0	UNL	5			RW	16	16	14	92	33	3
03	0	UNL	5			RW	15	15	14	96	36	4
06	10	12	6			F	20	20	18	92	06	6
09	10	12	7			F	23	23	21	92	07	9
12	10	17	1	12		SF	28	28	23	92	02	4
15	10	10	4			F	26	26	22	86	18	4
18	10	8	5			SF	25	24	22	88	17	8
21	10	12	12				26	24	22	88	18	8
DAY 04												
00	10	11	12				25	24	21	88	18	7
03	10	8	7				23	22	20	88	18	10
06	10	8	6			SHF	22	21	19	88	18	12
09	10	9	4			F	21	21	19	92	18	10
12	3	UNL	7				28	26	19	58	15	12
15	3	UNL	7				30	26	19	64	15	12
18	4	UNL	15				25	23	17	72	15	10
21	10	150	20				23	21	16	71	15	5
DAY 05												
00	10	150	19				24	23	18	78	13	6
03	10	UNL	6			GFK	23	22	18	81	14	6
06	10	UNL	6			GFK	22	21	19	88	12	7
09	10	UNL	4			RW	23	22	20	81	13	8
12	10	UNL	6			W	32	29	22	67	11	8
15	10	UNL	6			W	36	32	24	62	11	10
18	0	UNL	6			W	30	28	23	75	12	6
21	0	UNL	7				28	26	24	82	15	4
DAY 06												
00	0	UNL	7				26	25	22	85	15	3
03	2	UNL	4				24	24	22	92	12	3
06	3	UNL	4			GF	23	22	20	88	15	3
09	10	110	1	8		GFK	28	28	26	92	20	3
12	10	110	2			RW	32	30	26	70	34	4
15	10	8	1	8		FR	31	30	27	85	30	6
18	10	10	2			FR	31	30	27	85	31	3
21	10	130	2	8		GF	29	28	26	88	00	0
DAY 07												
00	10	130	2	8		GF	27	27	25	92	35	3
03	8	190	3			GF	26	26	24	92	35	0
06	6	250	3			GF	24	24	22	92	00	0
09	7	UNL	3			GF	23	23	22	96	00	0
12	4	UNL	9				36	32	25	67	35	10
15	10	18	20				31	29	24	79	35	16
18	10	31	20				24	21	14	66	36	15
21	7	42	25				18	14	09	82	36	20
DAY 08												
00	0	UNL	25				11	09	01	84	36	18
03	0	UNL	20				10	08	01	87	35	14
06	0	UNL	20				08	07	00	90	35	14
09	0	UNL	15				08	07	01	93	36	12
12	0	UNL	6				15	12	02	56	33	8
15	0	UNL	6				17	14	01	48	30	8
18	0	UNL	6				15	11	03	64	28	6
21	0	UNL	20				12	11	04	90	00	0
DAY 09												
00	3	UNL	15				07	06	02	80	15	3
03	0	UNL	20				06	06	03	90	14	4
06	0	UNL	20				13	12	06	73	16	5
09	0	UNL	20				24	20	07	48	17	10
12	3	UNL	25				29	24	10	45	18	12
15	8	UNL	25				25	22	14	63	18	12
18	10	130	20				25	23	18	75	18	9
21	3	UNL	15				22	22	21	96	00	0
DAY 10												
00	0	UNL	20				26	24	19	79	25	6
03	0	UNL	15				23	22	18	81	20	4
06	0	UNL	15				22	21	19	88	22	5
09	3	UNL	25				26	25	22	85	25	5
12	3	UNL	25				40	33	21	47	27	6
15	0	UNL	25				44	37	27	51	27	6
18	0	UNL	15				34	31	26	73	24	5
21	3	UNL	20				28	27	24	86	20	4
DAY 11												
00	0	UNL	20				28	27	25	89	22	4
03	0	UNL	20				26	25	22	88	21	6
06	0	UNL	20				25	24	21	85	26	5
09	0	250	25				25	24	21	85	27	4
12	3	UNL	25				38	33	25	60	27	7
15	0	UNL	25				43	36	26	51	00	0
18	0	UNL	25				33	30	25	72	24	4
21	0	UNL	20				23	23	22	96	33	4
DAY 12												
00	3	UNL	15				22	22	21	96	00	0
03	0	UNL	10				20	20	20	100	00	0
06	0	UNL	10				25	25	23	88	12	4
09	0	UNL	10				27	27	25	92	11	7
12	0	UNL	10				35	32	27	73	11	9
15	0	UNL	10				38	35	28	65	11	13
18	0	UNL	10				37	33	27	67	11	12
21	0	UNL	10				36	33	27	70	11	9
DAY 13												
00	10	20	15				36	33	28	73	11	12
03	10	10	4			F	33	32	31	92	12	8
06	10	8	4			SF	33	32	30	89	13	10
09	10	8	4			SF	32	31	30	92	12	8
12	10	6	1			SF	32	31	30	92	11	7
15	10	10	4			SF	33	32	29	86	10	6
18	10	13	7			SF	32	31	30	92	07	6
21	10	13	7			SF	33	32	30	89	06	8
DAY 14												
00	10	15	8			F	32	31	28	85	09	7
03	10	12	8				32	31	28	85	08	7
06	10	6	6				32	31	28	85	10	6
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15	10	6	3			SF	33	32	31	92	08	8
18	10	6	6			SF	33	32	30	89	09	8
21	10	6	9			F	35	32	30	89	09	9
DAY 15												
00	10	5	1			SF	33	32	31	92	08	9
03	10	8	3			BS	33	33	31	92	06	14
06	10	8	5			LSF	34	33	32	92	08	13
09	10	10	4			SF	34	33	32	92	04	11
12	10	11	6			SF	34	33	32	92	02	10
15	10	10	7			S	34	33	32	92	02	10
18	10	12	8			S	33	32	30	89	35	10
21	10	15	15				33	32	29	85	33	10
DAY 16												
00	10	9	11			S	33	32	30	89	33	15
03	10	13	6			F	32	31	28	89	32	13
06	10	10	6			F	31	30	27	85	33	15
09	10	14	10			S	28	27	23	82	32	12
12	10	14	8			S	27	25	21	78	31	13
15	10	15	20				24	23	18	78	32	16
18	10	19	20			S	22	20	15	74	30	15
21	8	70	20			S	20	19	14	77	32	11
DAY 17												
00	4	UNL	25			S	18	17	14	84	31	8
03	10	36	25				18	17	12	77	32	10
06	10	34	10			S	18	17	12	77	32	12
09	5	UNL	15				18	16	11	81	32	6
12	9	20	25				18	16	10	71	32	12
15	10	20	25				18	16	10	71	31	12
18	10	20	25			SW	18	17	11	74	28	7
21	10	15	25			SW	17	16	13	84	34	3
DAY 18												
00	10	10	7			SW	17	17	14	88	20	6
03	10	9	10			S	16	16	13	88	20	3
06	10	9	10				17	17	15	92	17	7
09	10	8	9			F	18	18	15	88	17	8
12	10	26	4			S	20	18	17	88	16	9
15	10	12	1	8		SF	23	22	20	88	15	8
18	10	11	1	8		SF	23	21	19	82	15	6
21	10	36	7			S	25	24	21	85	27	0
DAY 19												
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03	[illegible]	70	[illegible]			[illegible]	23	22	20	88	30	7
06	[illegible]	22	[illegible]			S	23	22	19	85	32	7
09	[illegible]	12	[illegible]			S	23	22	19	88	29	7
12	[illegible]	[illegible]	[illegible]			S	25	23	19	78	30	8
15	[illegible]	[illegible]	[illegible]			[illegible]	24	22	17	75	29	6
18	[illegible]	16	7			S	24	23	18	78	00	0
21	[illegible]	22	10			S	24	23	20	85	26	8
DAY 20												
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03	10	14	7			S	20	20	18	92	24	5
06	10	7	5			F	19	19	17	92	32	3
09	10	10	5			SF	21	20	17	84	27	3
12	10	11	6				22	21	16	78	30	5
15	10	14	10				21	20	15	78	28	8
18	10	17	10				16	15	11	81	31	4
21	7	50	12									
DAY 21												
00	7	18	10				12	12	10	92	26	3
03	10	10	10			S	10	10	9	96	24	4
06	10	10	10			S	18	18	14	81	26	4
09	10	16	8			S	20	18	15	81	25	6
12	10	20	7			A	20	18	15	81	24	10
15	10	16	15				20	19	16	77	24	9
18	10	12	12			S	20	19	16	84	20	9
21	10	7	7			S	21	21	19	92	18	7
DAY 22												
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06	10	10	6			F	23	22	20	88	13	10
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18	10	20	7				33	32	29	85	15	9
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DAY 23												
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21	0	UNL	25				19	17	12	74	30	9
DAY 24												
00	10	10	25				20	18	13	74	22	6
03	10	7	20				17	16	11	77	28	10
06	10	9	9			S	15	13	10	88	28	6
09	10	8	4			SF	13	13	11	92	26	7
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DAY 25												
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18	0	UNL	20				14	13	09	80	18	7
21	0	UNL	20				18	17	12	77	20	12
DAY 26												
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03	0	UNL	20				15	14	10	80	18	10
06	0	UNL	15				18	17	12	77	18	10
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18	10	130	15				28	25	20	72	23	5
21	10	80	20				28	27	23	82	22	7
DAY 27												
00	10	130	25				28	24	20	78	16	3
03	10	130	15				19	19	16	88	19	4
06	8	130	15				21	21	19	92	18	3
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18	10	8	3			F	31	30	28	88	21	10
21	10	10	5			F	31	30	28	88	18	10
DAY 28												
00	10	7	6			F	31	30	28	88	19	9
03	10	11	6			F	32	31	28	88	18	15
06	3	UNL	10				30	28	26	85	17	10
09	1	UNL	10				30	28	25	82	20	11
12	6	UNL	15				35	32	27	73	20	11
15	10	UNL	12				37	34	29	73	18	9
18	9	UNL	12				32	31	28	88	10	7
21	0	UNL	12				33	31	28	82	21	11
DAY 29												
00	0	UNL	10				30	29	27	88	25	4
03	10	8	4			F	26	26	25	96	31	6
06	10	100	4			F	23	22	20	88	35	8
09	9	UNL	8				25	24	21	85	32	6
12	0	UNL	25				30	28	23	75	33	10
15	0	UNL	25				32	28	22	67	32	7
18	7	UNL	25				27	25	19	72	30	5
21	8	UNL	20				23	21	16	74	29	5
DAY 30												
00	3	UNL	20				19	18	14	81	21	3
03	0	UNL	15				15	15	14	96	00	0
06	0	UNL	20				14	14	12	92	24	3
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15	0	UNL	25				37	31	26	60	20	14
18	0	UNL	25				28	25	19	69	18	8
21	0	UNL	25				21	20	15	78	16	3

ADDITIONAL DATA

OTHER OBSERVATIONAL DATA CONTAINED IN RECORDS ON FILE CAN BE FURNISHED AT COST VIA MICROFILM, MICROFICHE, OR PAPER COPIES OF THE ORIGINAL RECORDS. INQUIRIES AS TO AVAILABILITY AND COSTS SHOULD BE ADDRESSED TO: DIRECTOR, NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

STATION: MINNEAPOLIS MINN YEAR & MONTH: 74 12

NOTES

CEILING COLUMN-
UNL INDICATES AN UNLIMITED CEILING

WEATHER COLUMN-

+	TORNADO
T	THUNDERSTORM
Q	SQUALL
R	RAIN
RW	RAIN SHOWERS
ZR	FREEZING RAIN
L	DRIZZLE
ZL	FREEZING DRIZZLE
S	SNOW
SP	SNOW PELLETS
IC	ICE CRYSTALS
SW	SNOW SHOWERS
SO	SNOW GRAINS
IP	ICE PELLETS
A	HAIL
F	FOG
IF	ICE FOG
GF	GROUND FOG
BD	BLOWING DUST
BN	BLOWING SAND
BS	BLOWING SNOW
BY	BLOWING SPRAY
K	SMOKE
H	HAZE
D	DUST

WIND COLUMNS-

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH: I.E., 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

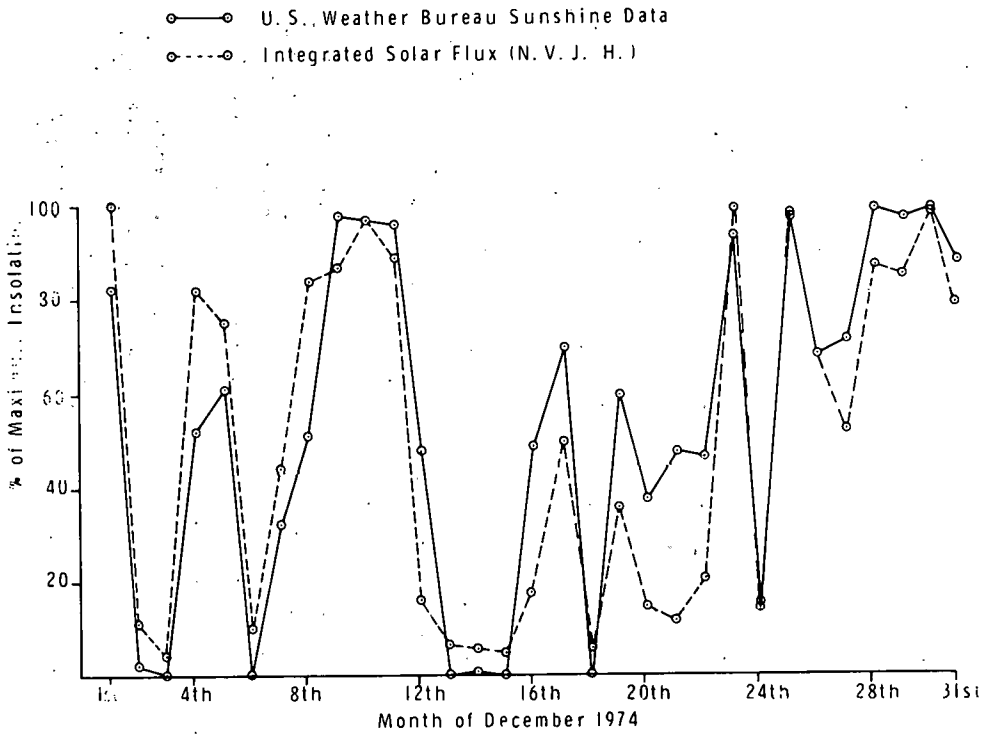
SPEED IS EXPRESSED IN KNOTS: MULTIPLY BY 1.15 TO CONVERT TO MILES PER HOUR.

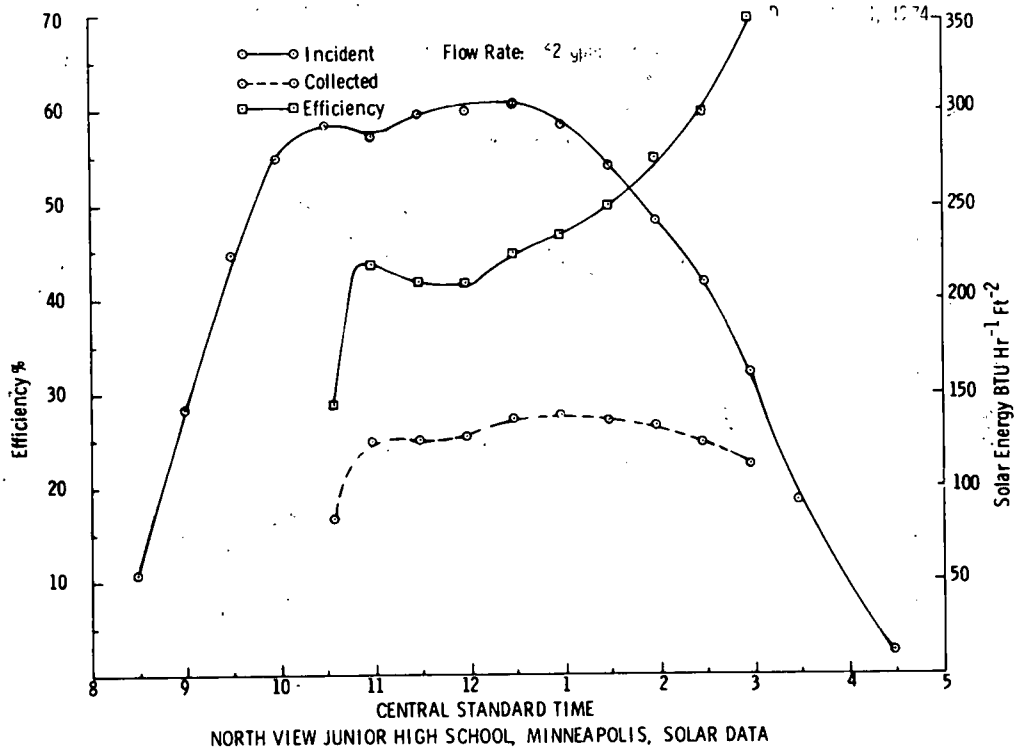
U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

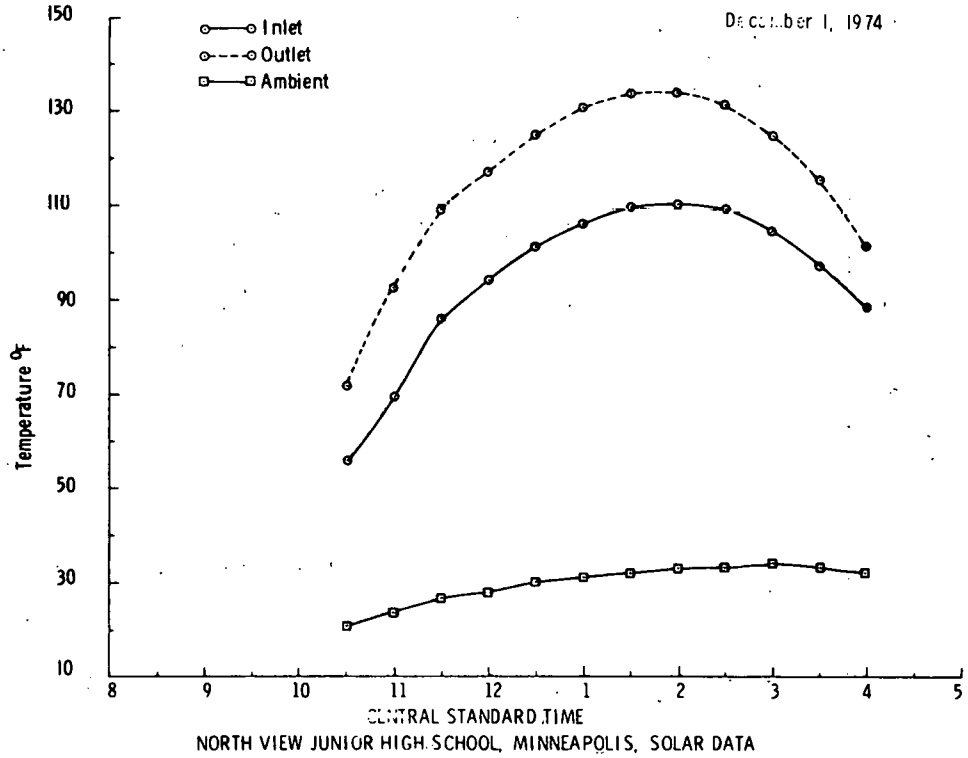
POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
210

FIRST CLASS

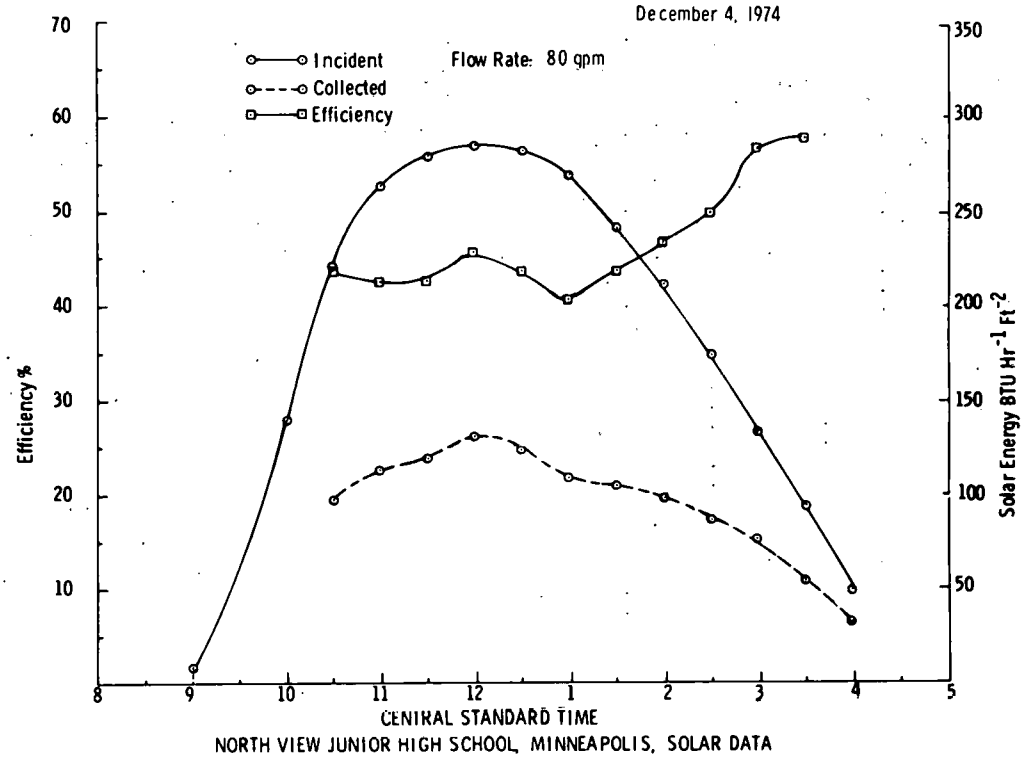

U. S. Weather Bureau Sunshine Data
Integrated Solar Flux (N. V. J. H.)
100
30
40
20
4th
8th
12th
16th
20th
24th
28th
Month of December 1974



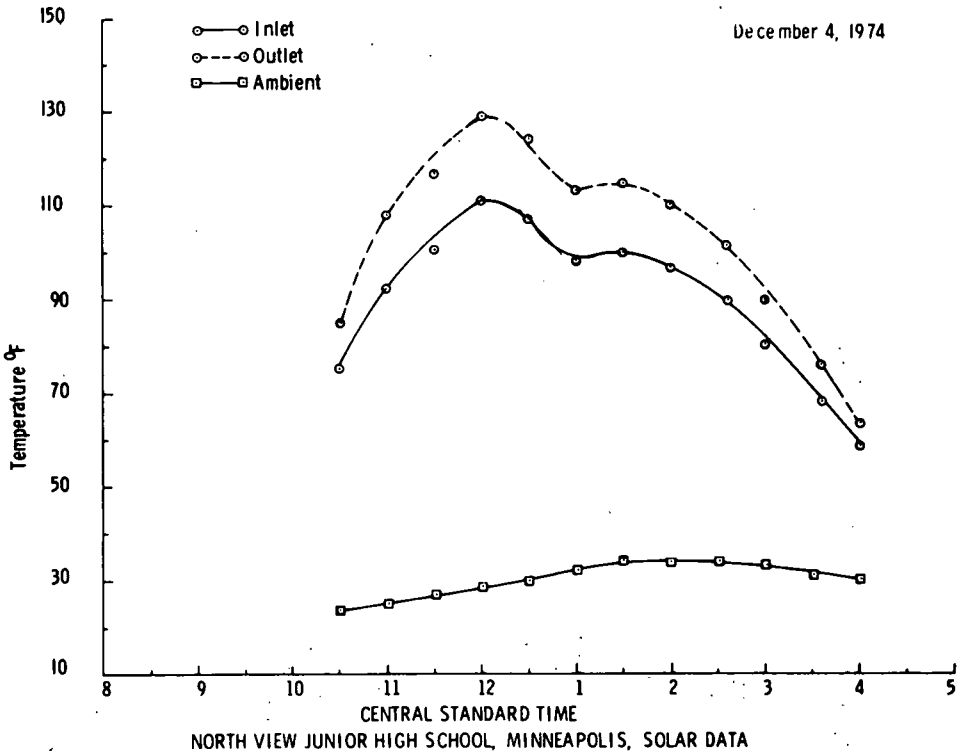
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



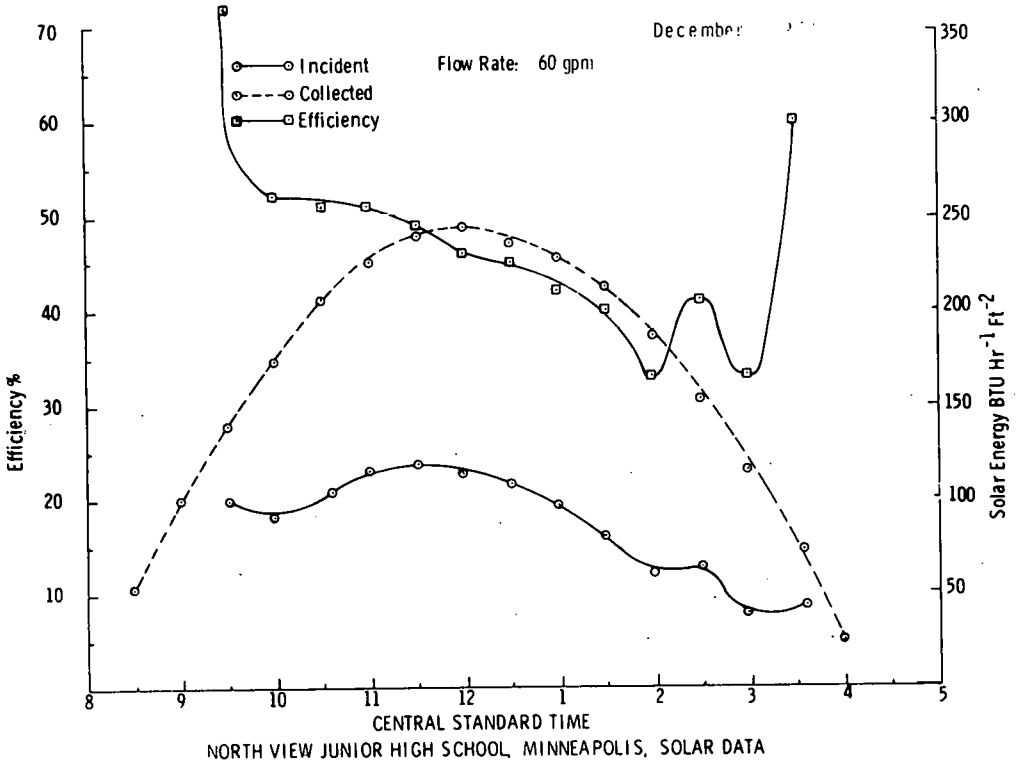
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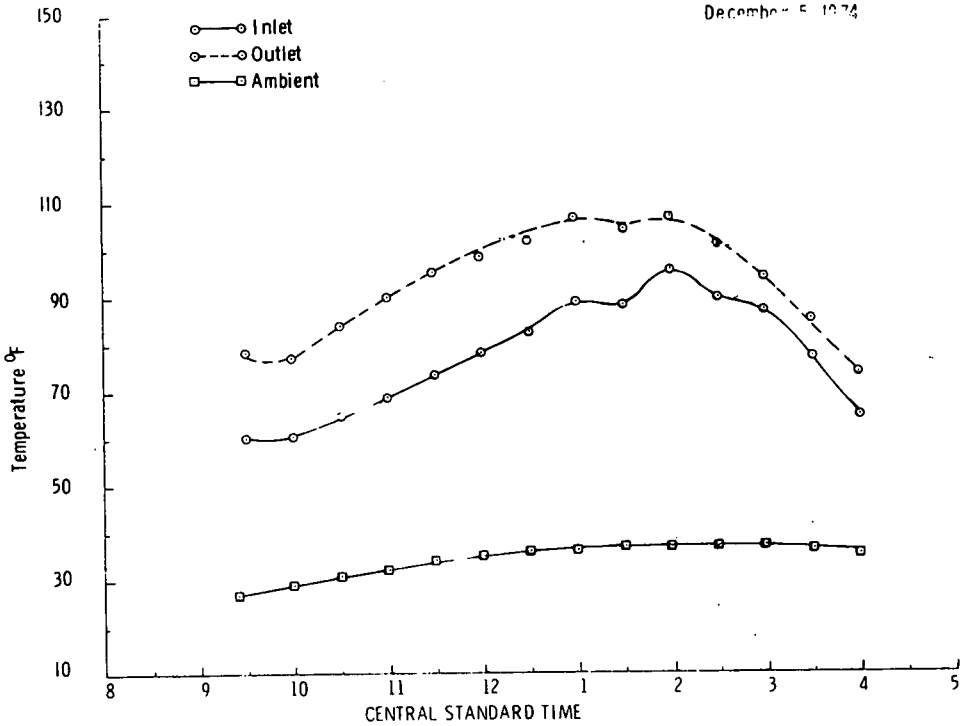
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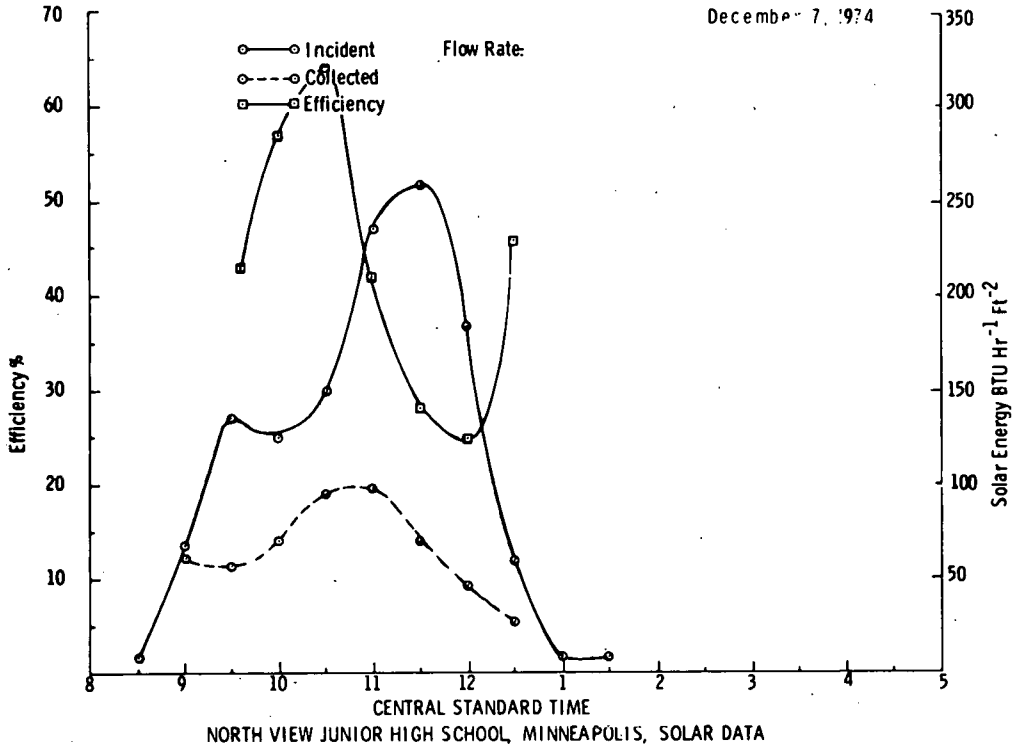
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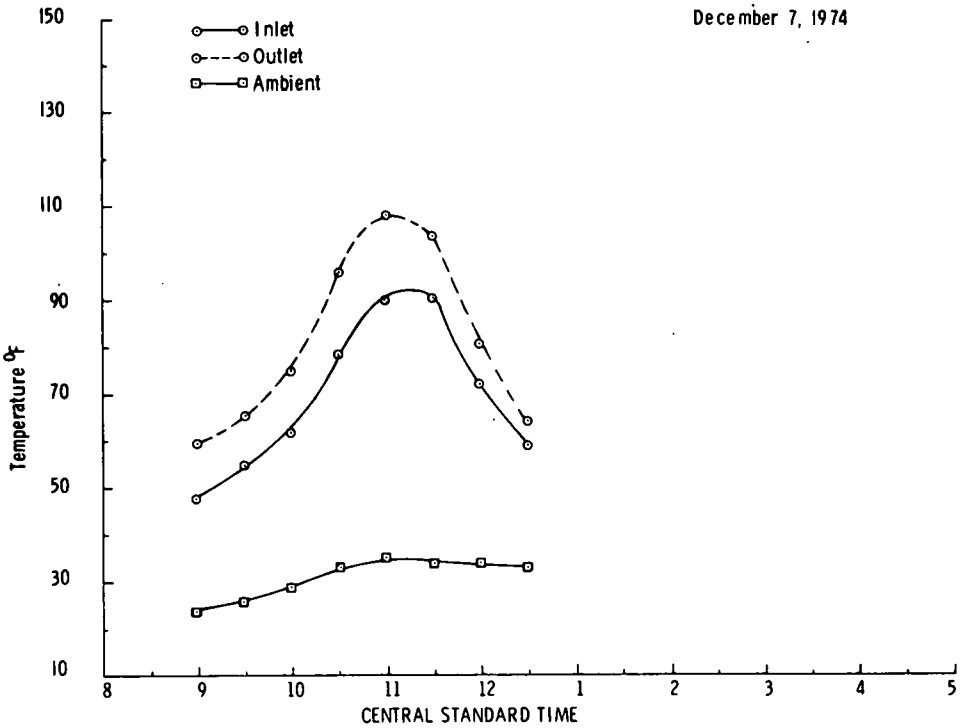
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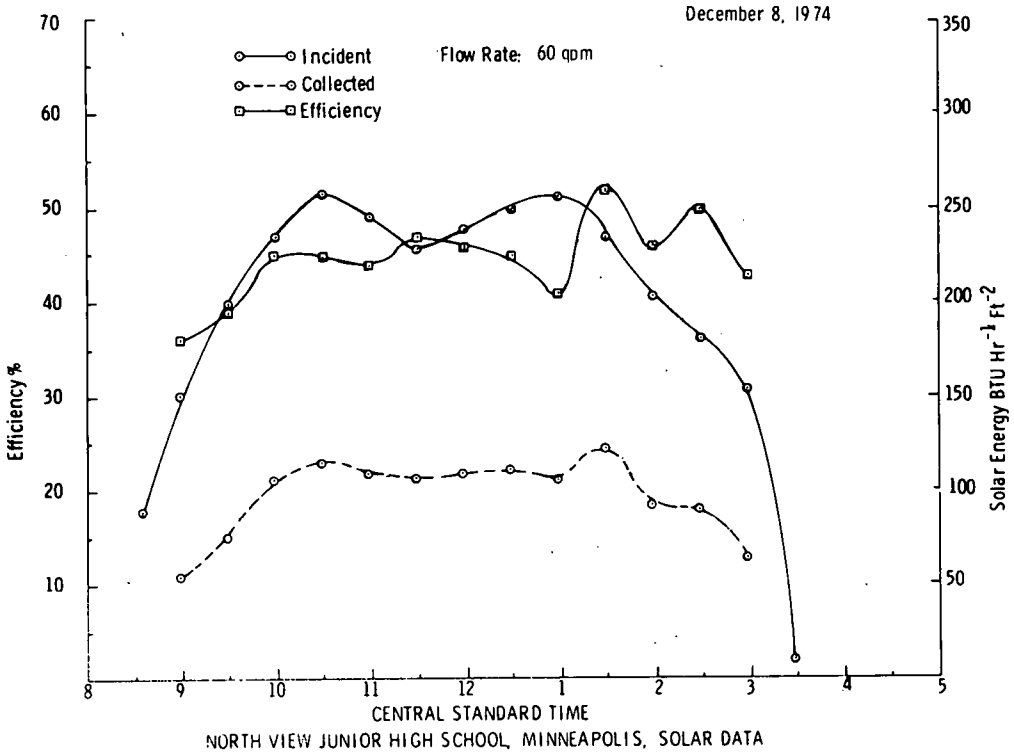
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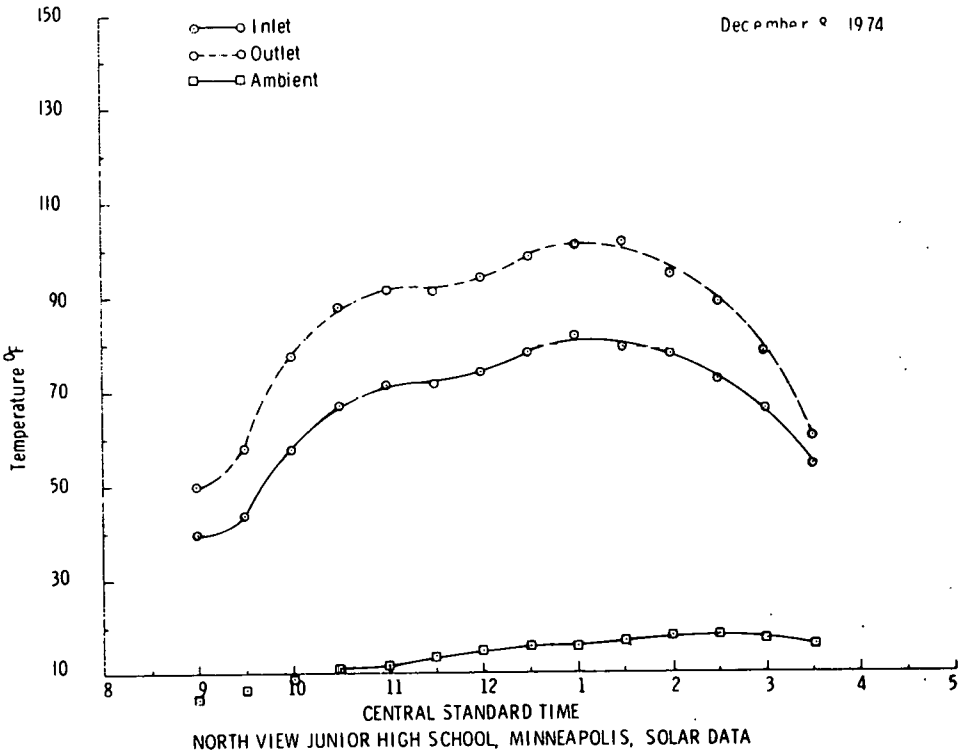
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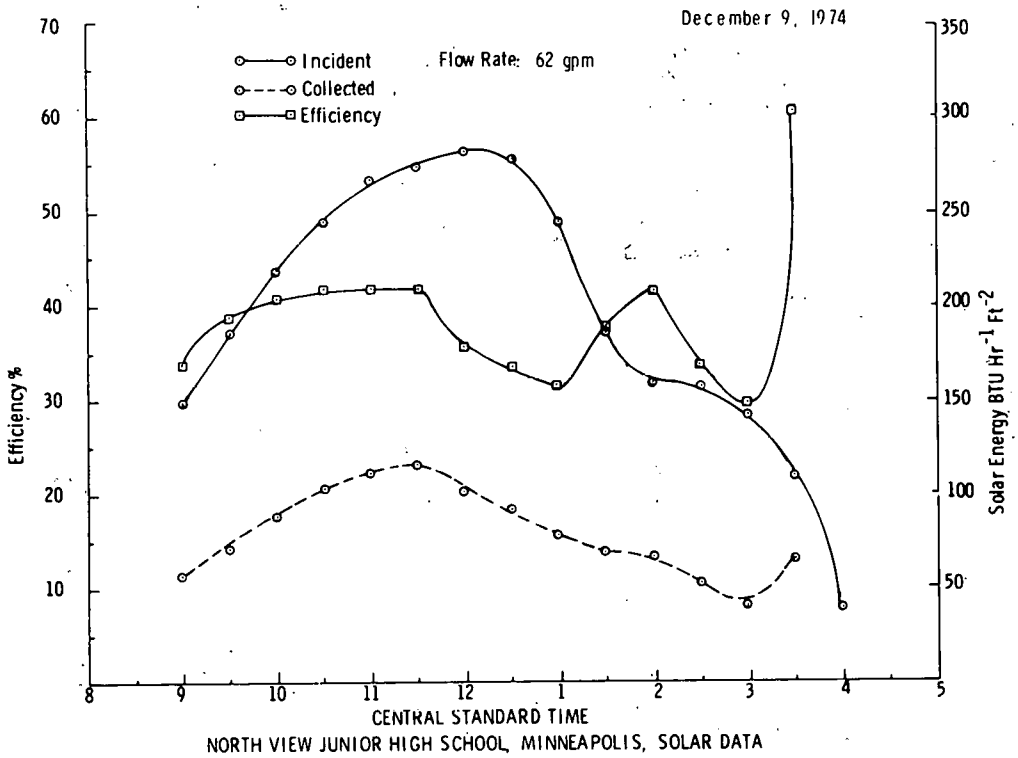
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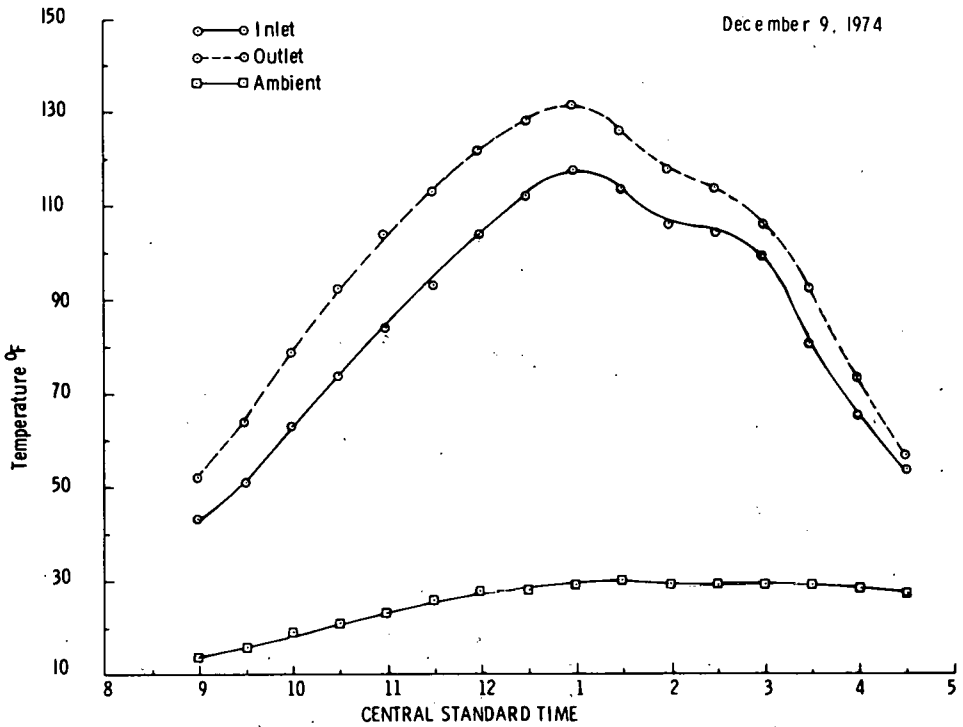
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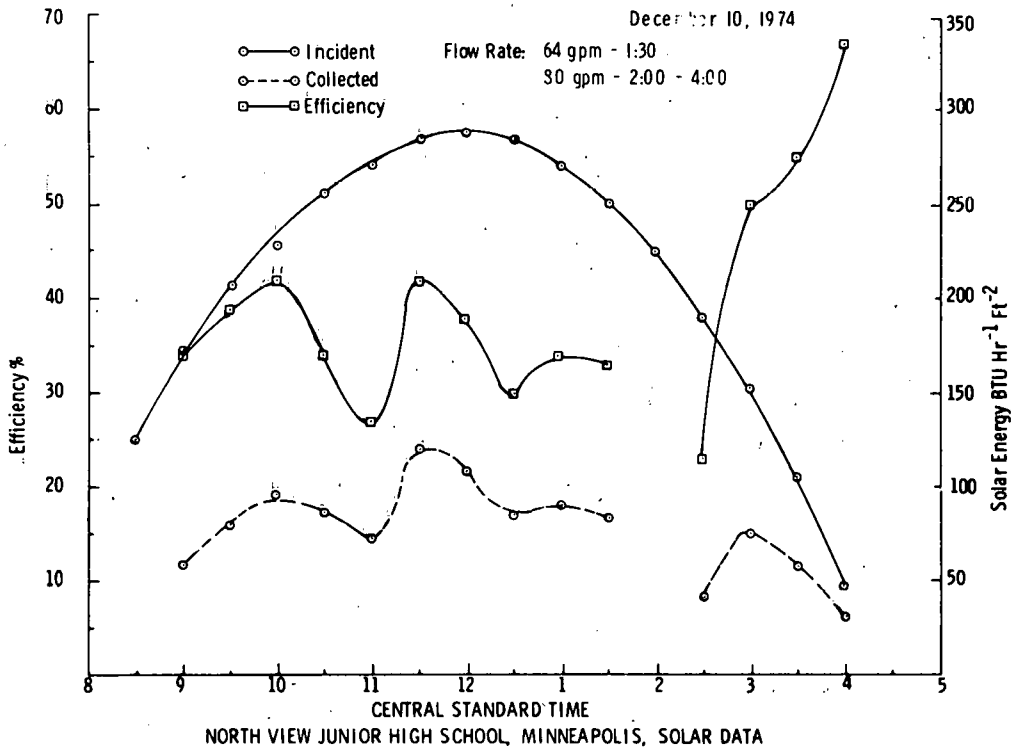
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



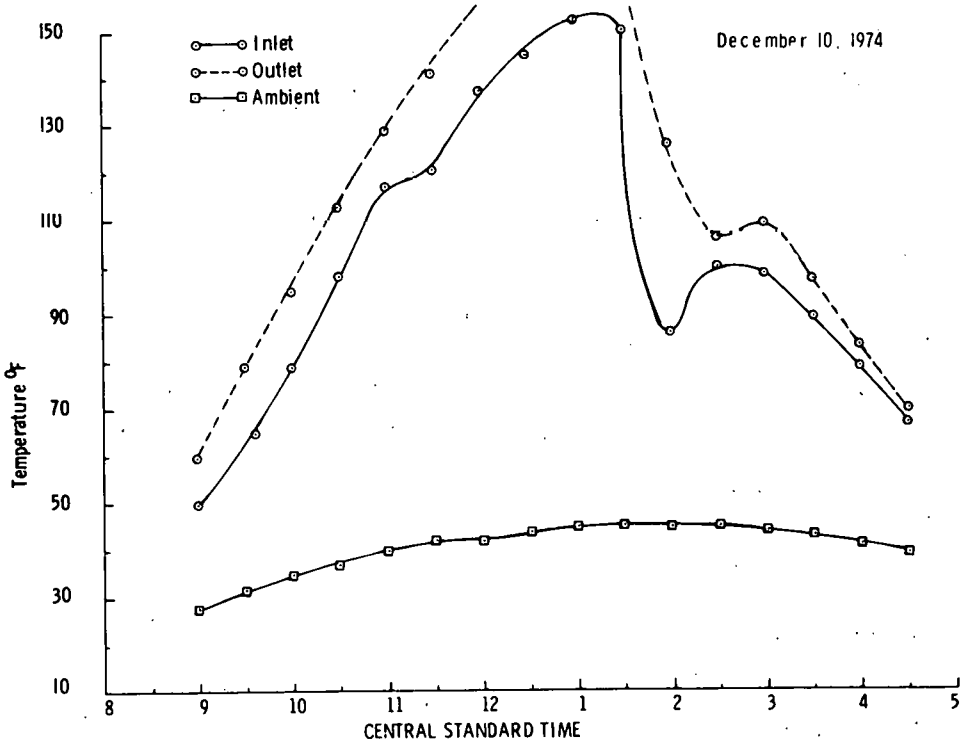
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



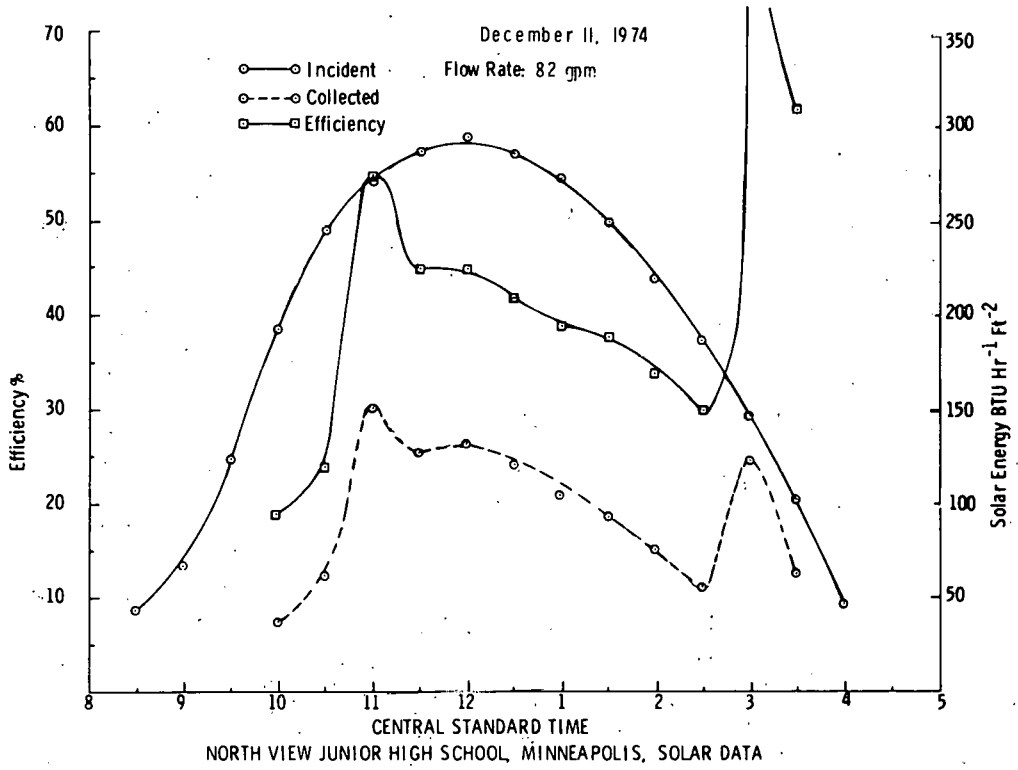
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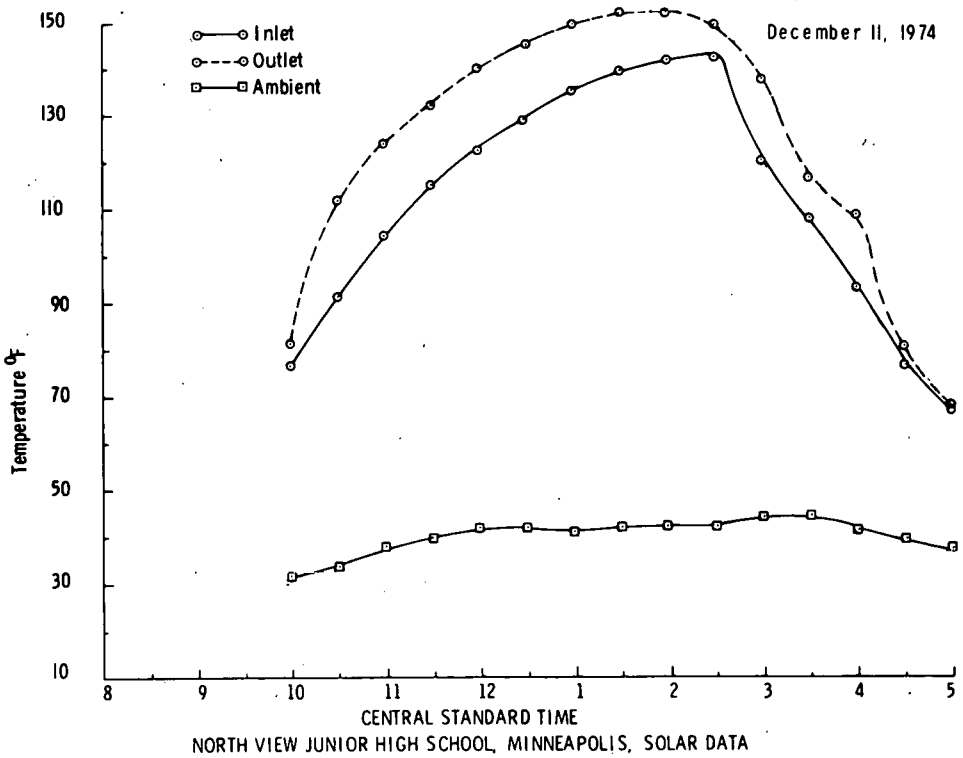
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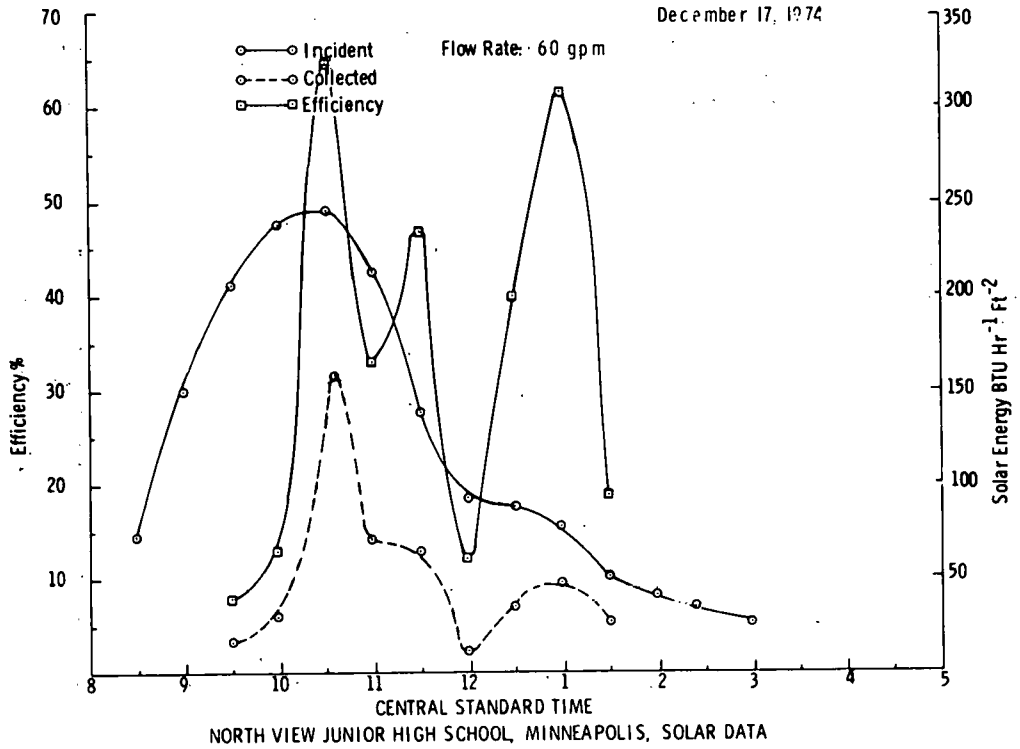
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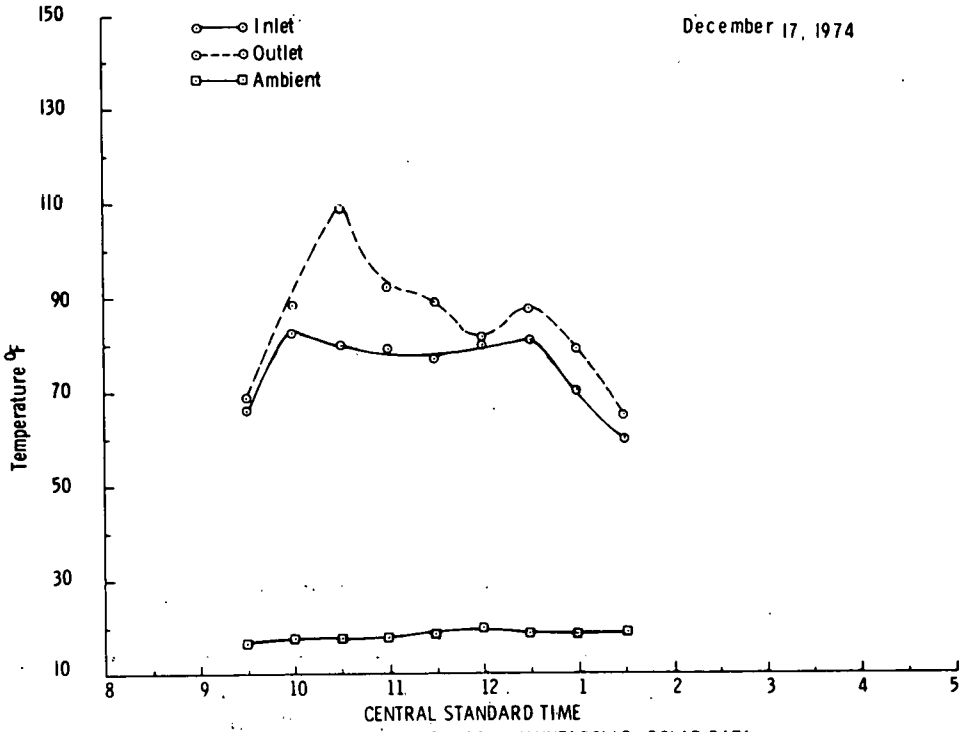
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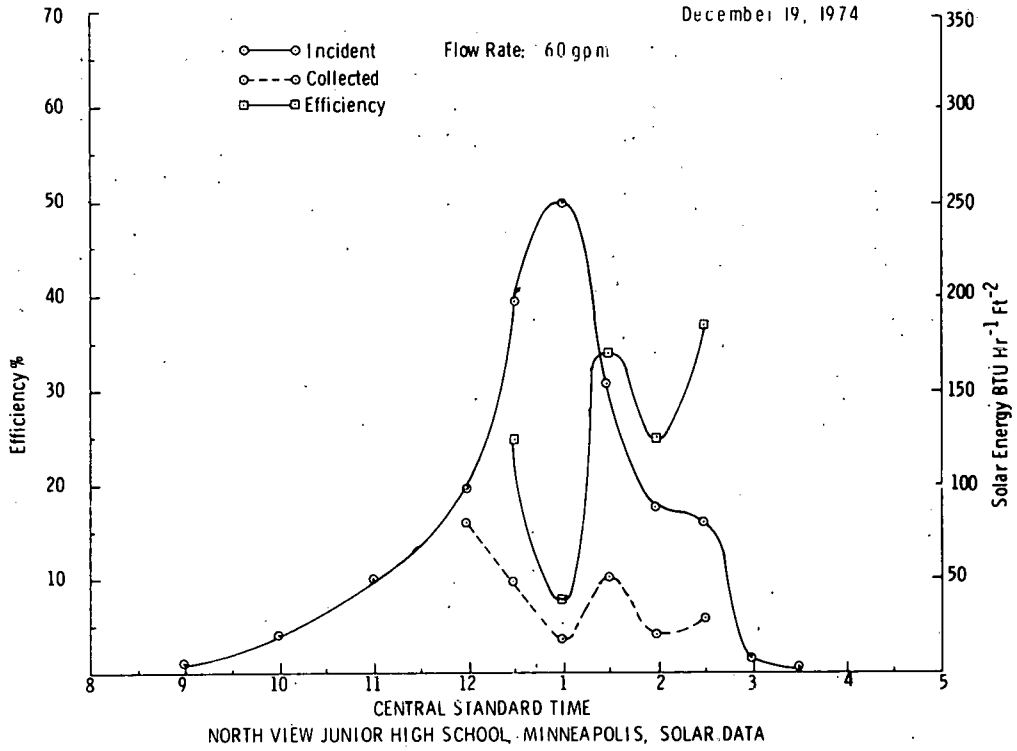
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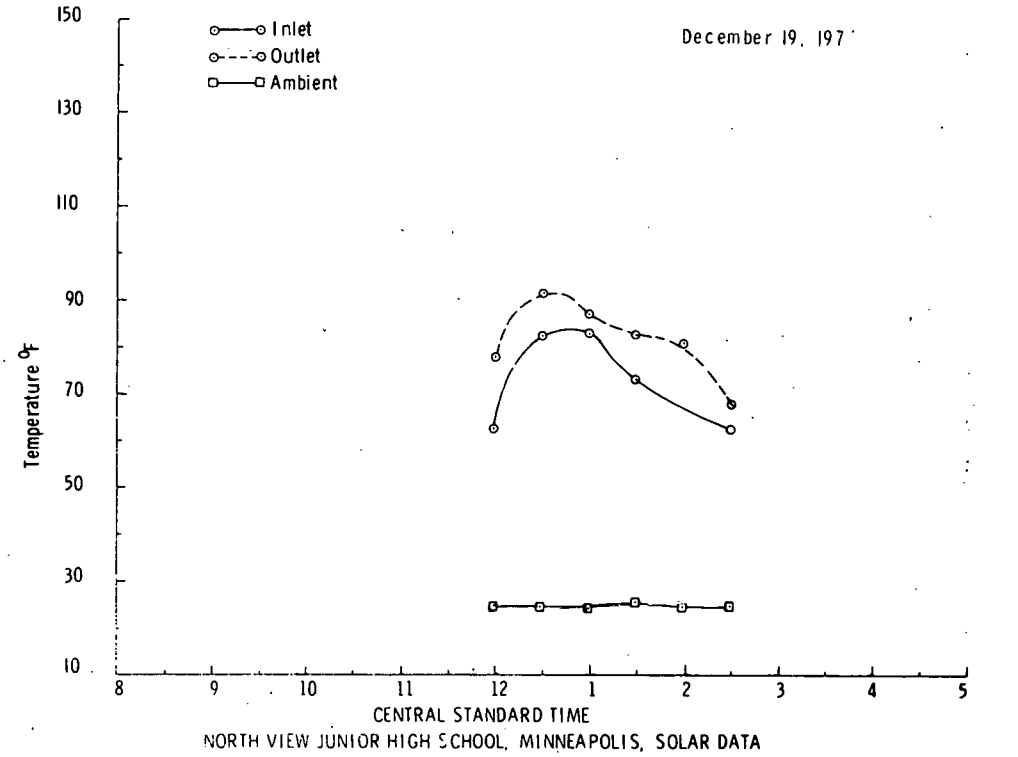
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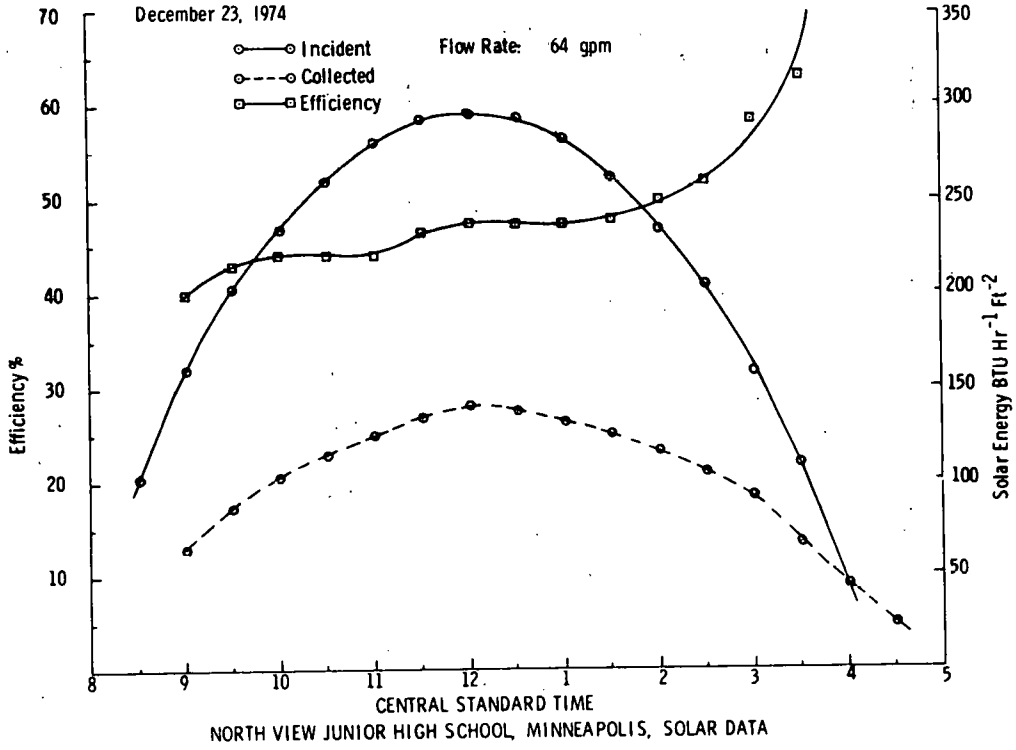
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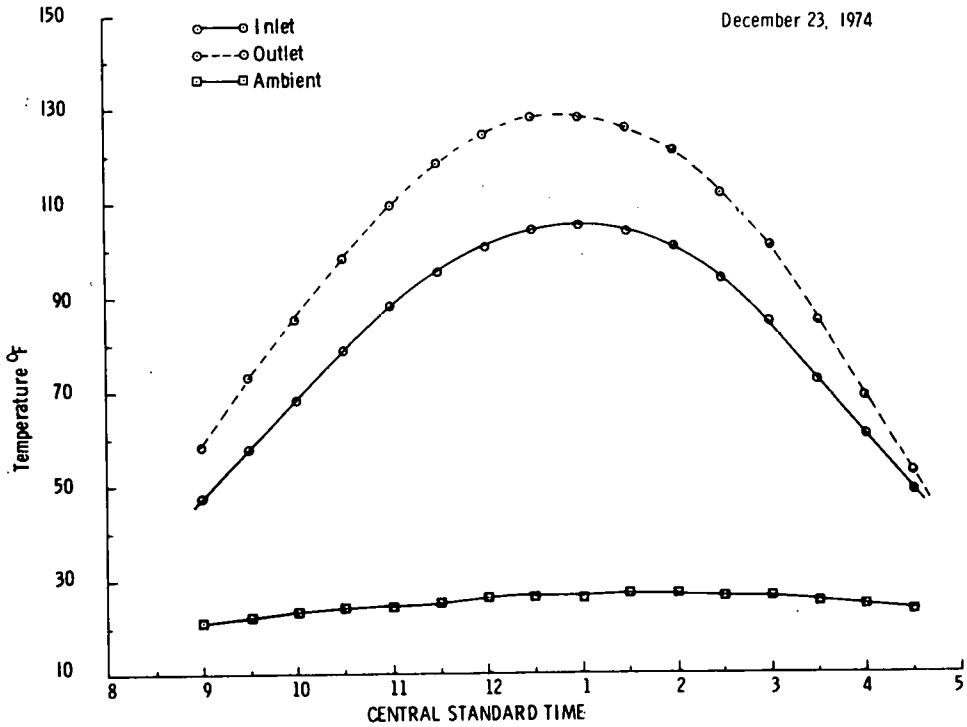
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



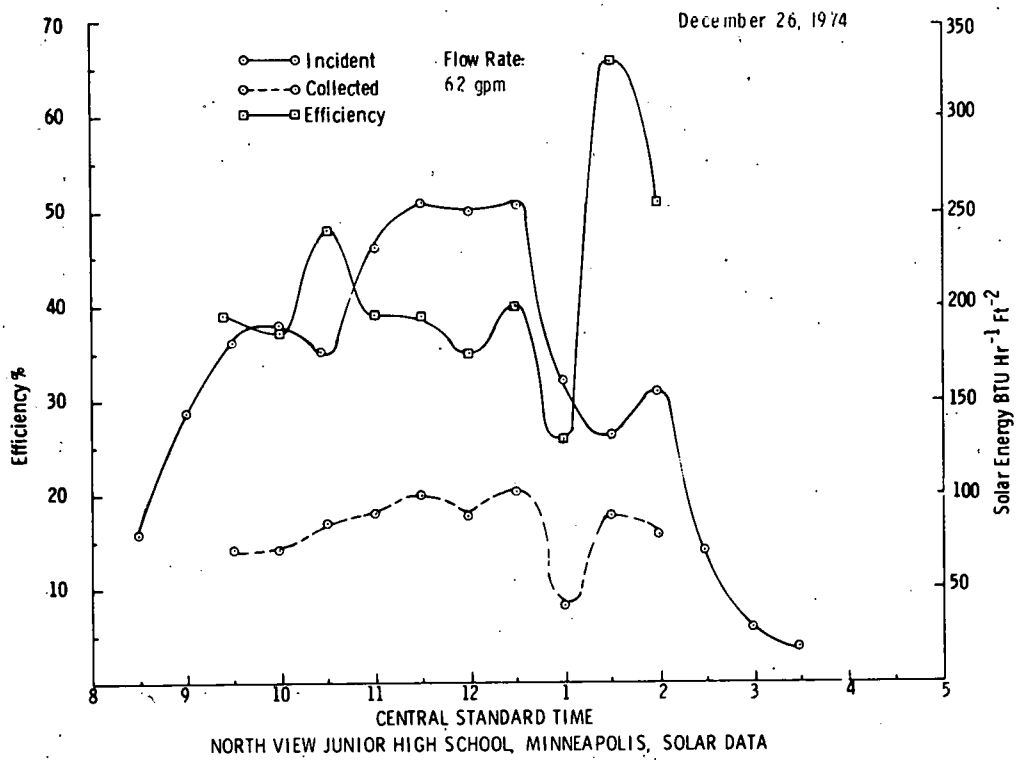
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



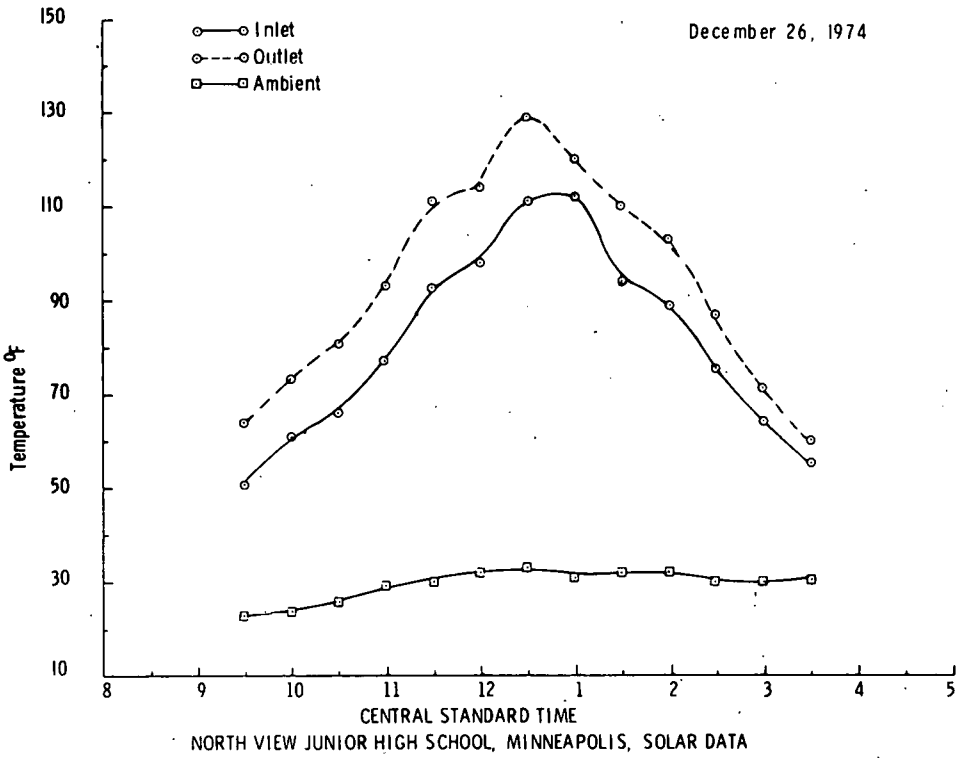
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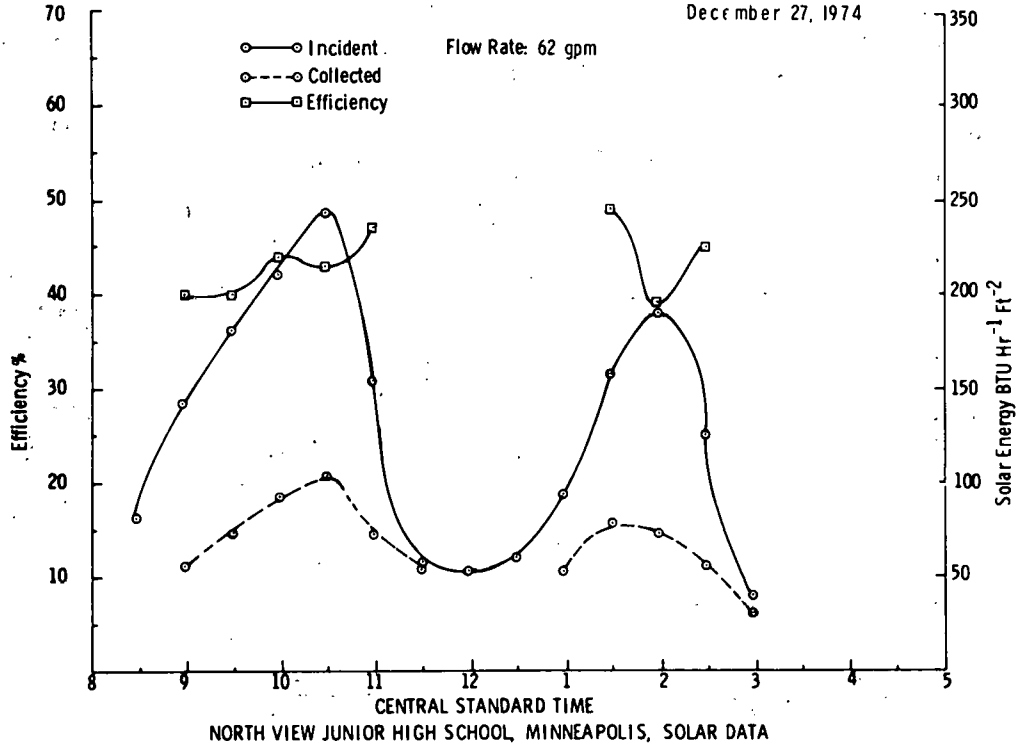
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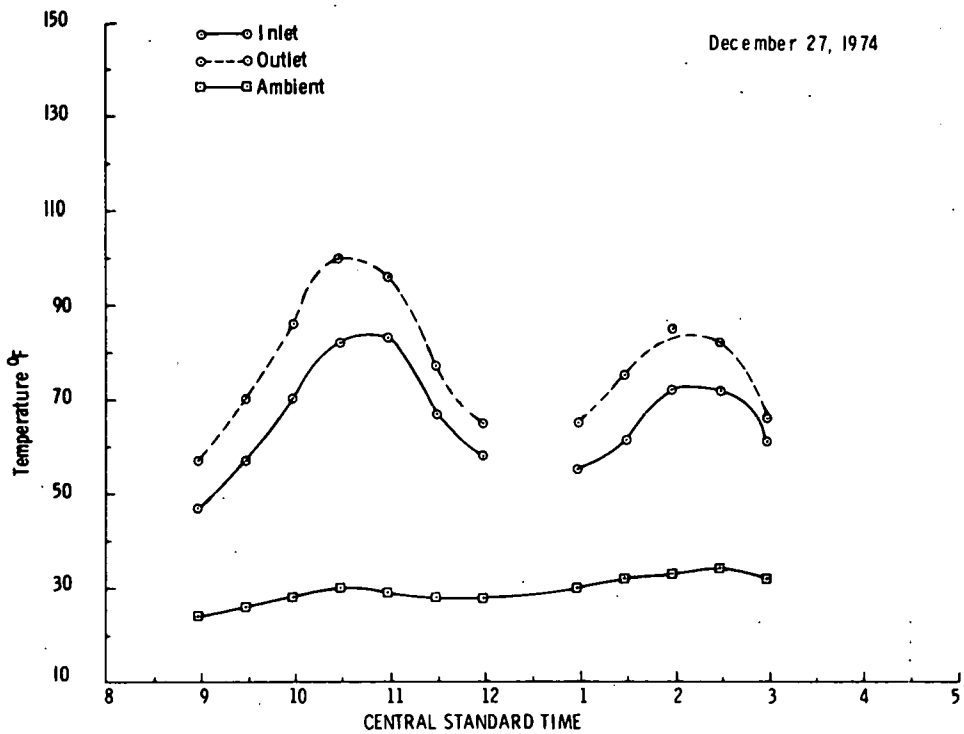
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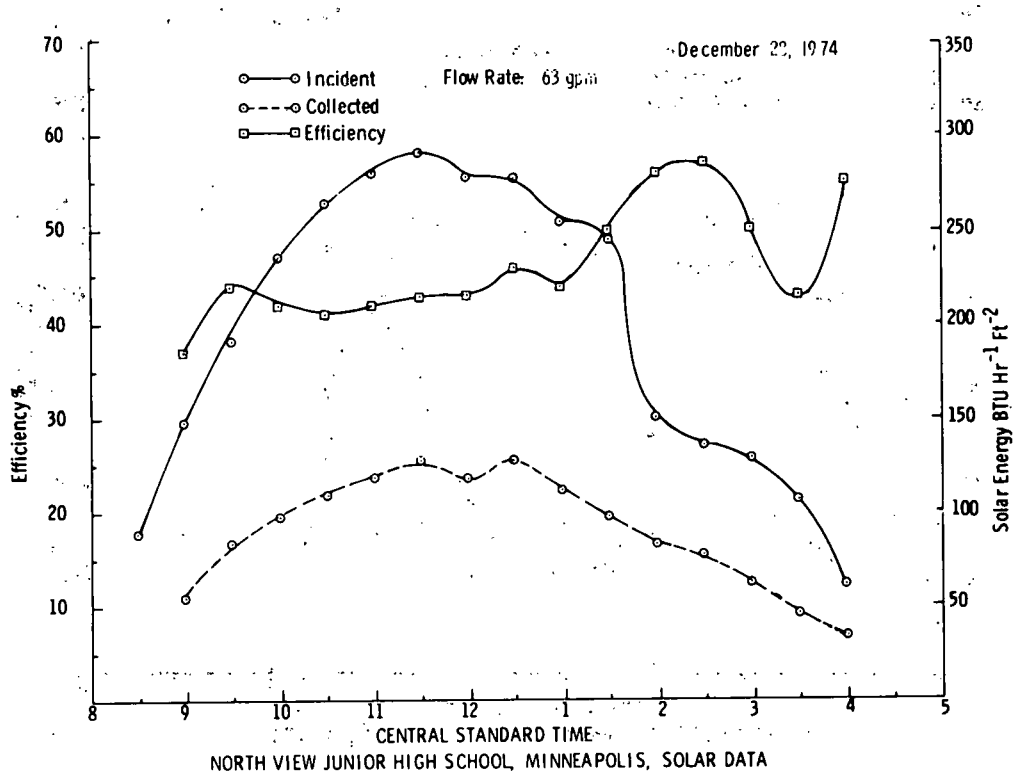
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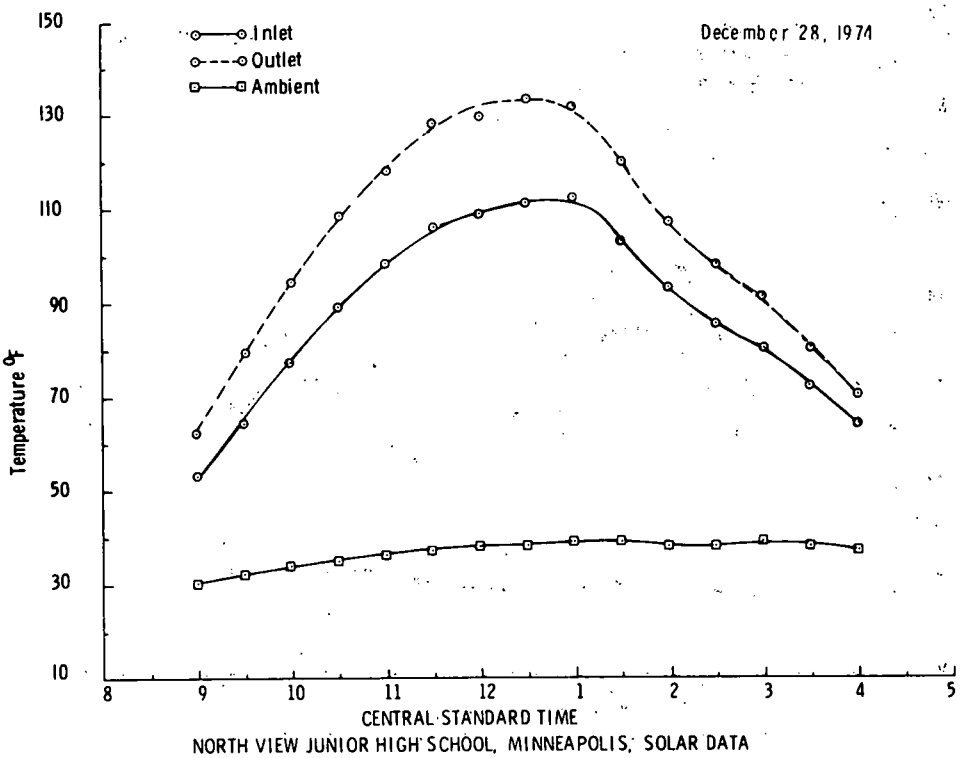
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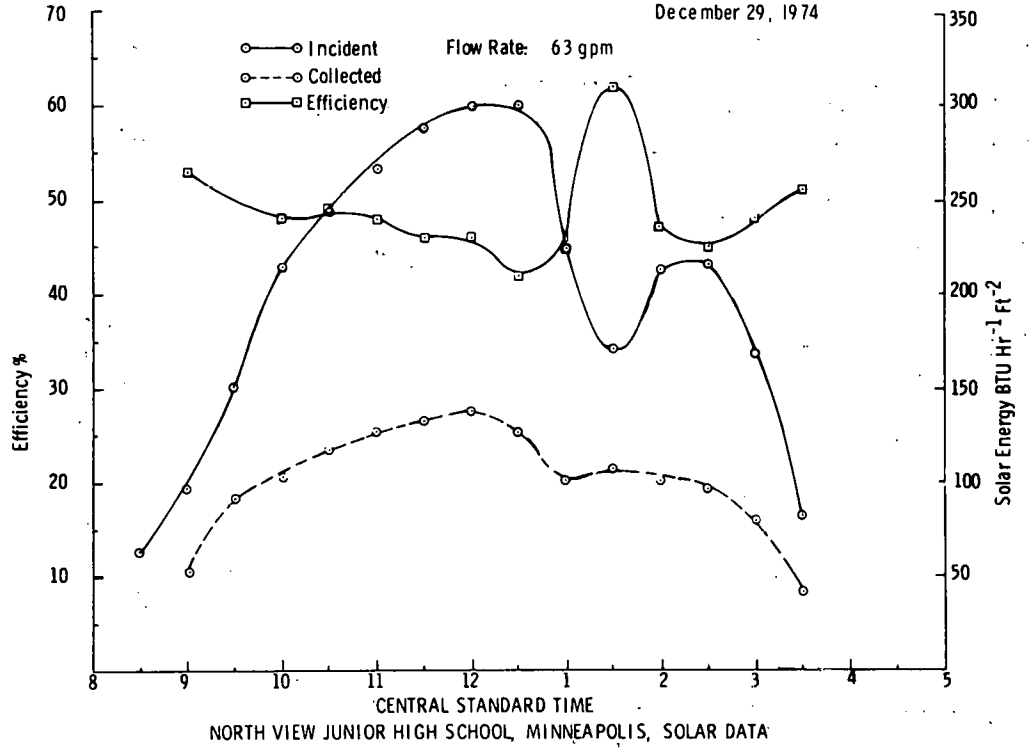
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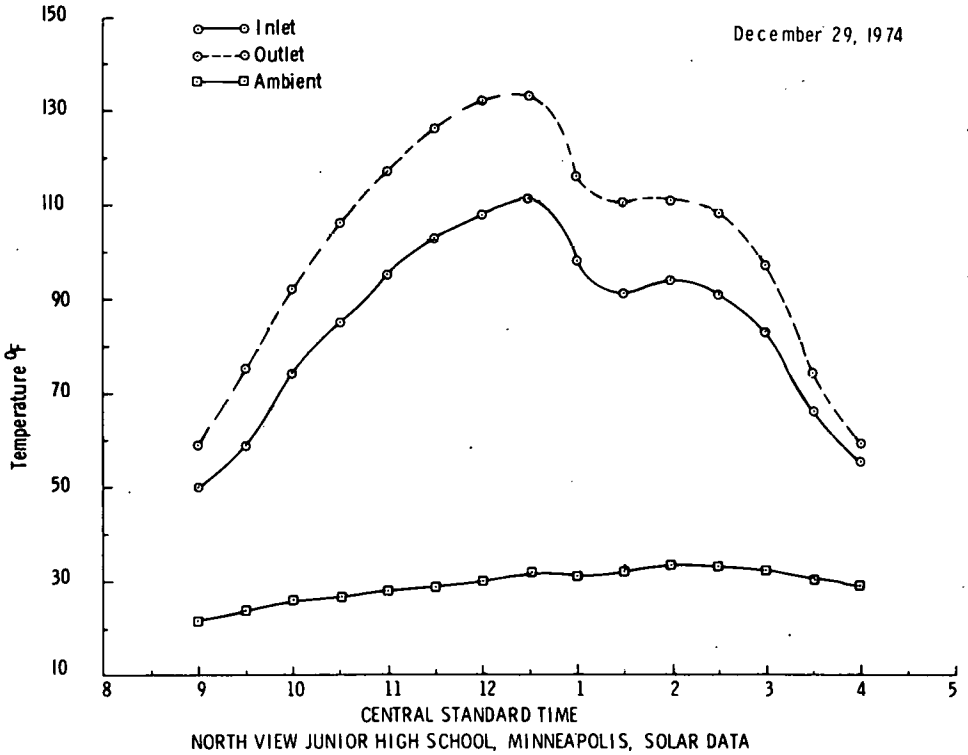
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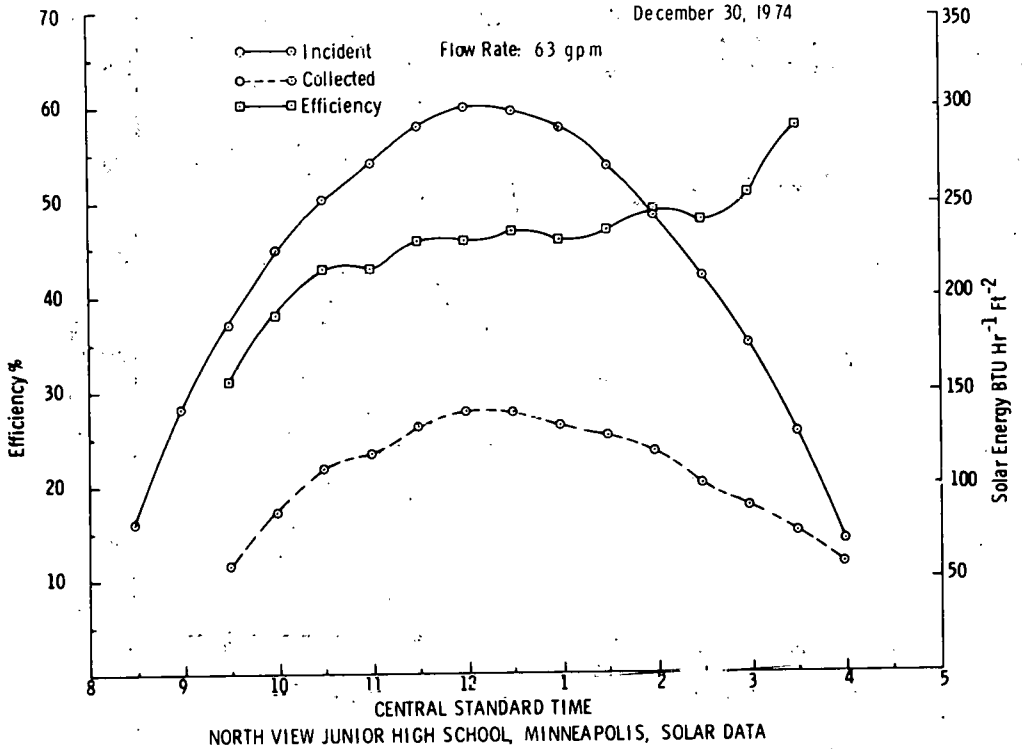
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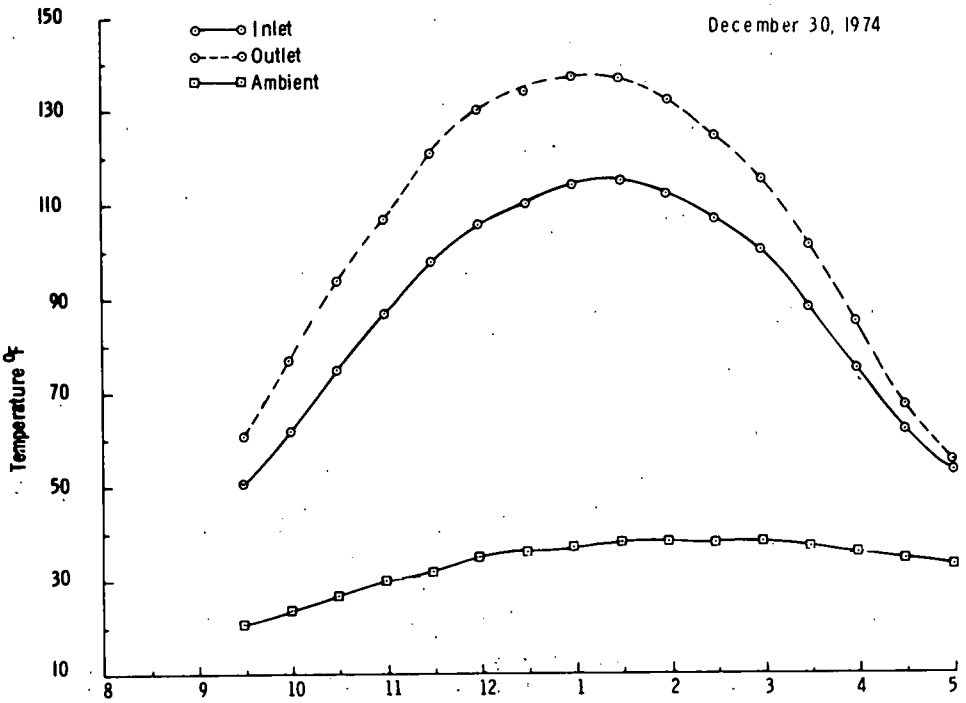
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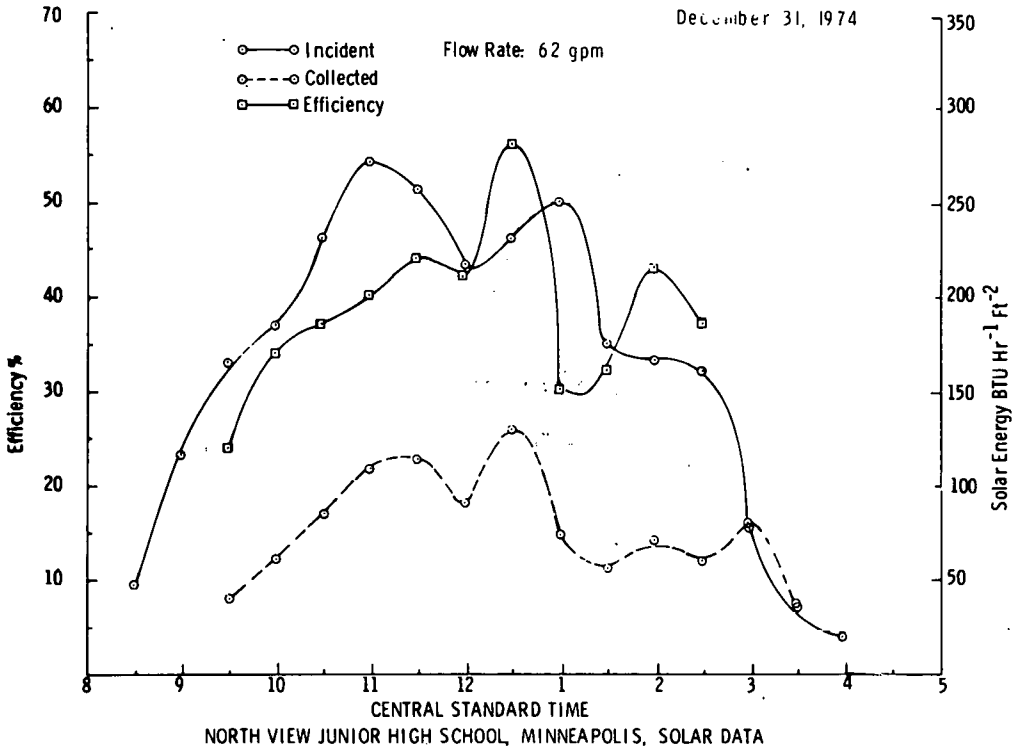
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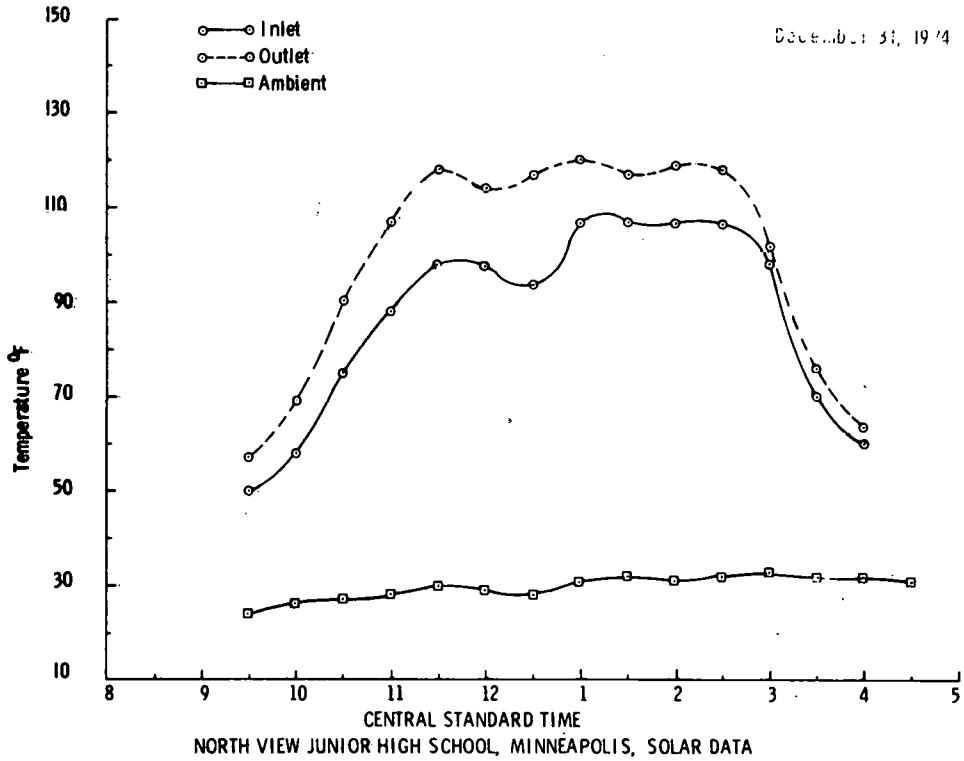
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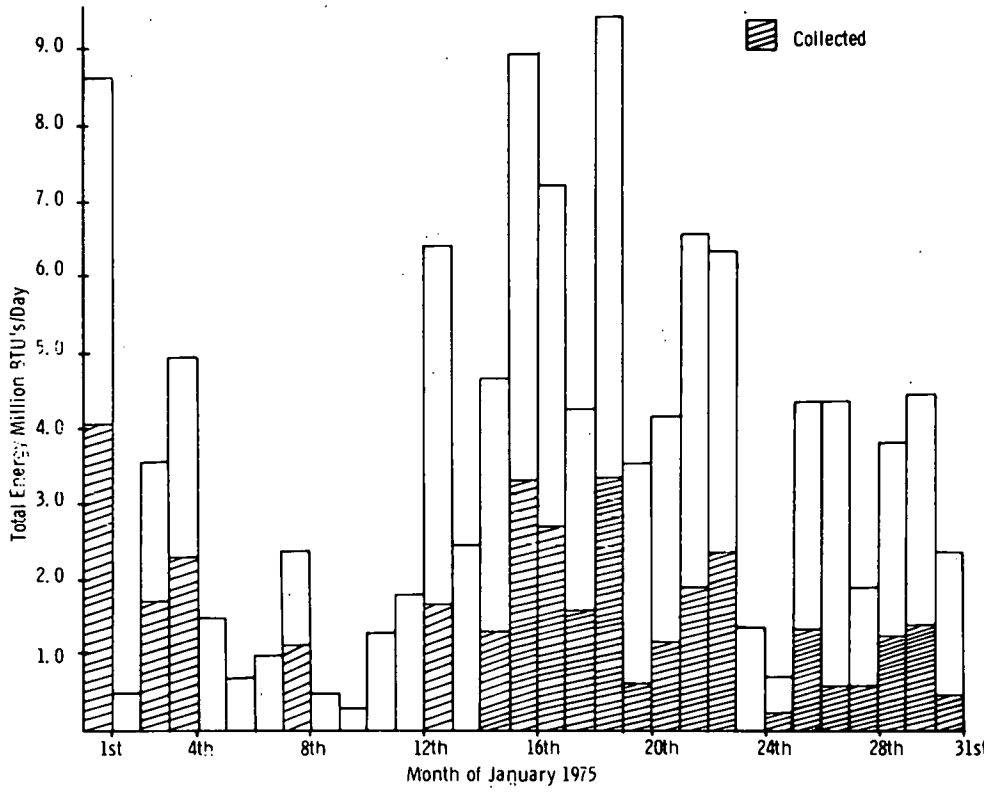
JANUARY
1975

North View Junior High
Month of January 1975

Date	Mode of Operation	Overall Eff. = $\frac{Q_{collected}}{Q_{incident}}$
Jan. 1	Air Heating From Collector	47%
Jan. 2	No Collection	---
Jan. 3	Air Heating From Collector	49%
Jan. 4	Air Heating From Collector	46%
Jan. 5	No Collection	---
Jan. 6	No Collection	---
Jan. 7	No Collection	---
Jan. 8	Air Heating From Collector	47%
Jan. 9	No Collection	---
Jan. 10	No Collection	---
Jan. 11	No Collection	---
Jan. 12	No Collection	---
Jan. 13	Air and Water Heating From Collector	26%
Jan. 14	No Collection	---
Jan. 15	Air and Water Heating From Collector	28%
Jan. 16	Air and Water Heating and Storage From Collector	37%
Jan. 17	Air and Water Heating and Storage From Collector	38%
Jan. 18	Air Heating From Collector	38%
Jan. 19	Air and Water Heating From Collector	36%
Jan. 20	Water Heating From Collector	17%
Jan. 21	Air and Water Heating From Collector	27%
Jan. 22	Air and Water Heating From Collector	28%
Jan. 23	Air and Water Heating and Storage From Collector	37%
Jan. 24	No Collection	---
Jan. 25	Air Heating From Collector	31%
Jan. 26	Air Heating From Collector	36%

North View Junior High
Month of January 1975

Date	Mode of Operation	Overall Eff. = $\frac{Q_{collected}}{Q_{incident}}$
Jan. 27	Air and Water Heating From Collector	13%
Jan. 28	Air Heating From Collector	32%
Jan. 29	Air and Water Heating From Collector	33%
Jan. 30	Air and Water Heating From Collector	31%
Jan. 31	Air and Water Heating From Collector	20%


Collected
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
Total Energy Million BTU's/Day
1st
4th
8th
12th
16th
20th
24th
28th
31st
Month of January 1975

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

MINNEAPOLIS-ST.PAUL, MINNESOTA
NAT WEATHER SERVICE FCST OFC
INTERNATIONAL AIRPORT
JANUARY 1975

LATITUDE 44° 53' N LONGITUDE 93° 13' W ELEVATION (GROUND) 834 FT. STANDARD TIME USED: CENTRAL WBAN #14922

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING	COOLING	WEATHER TYPES ON DATES OF OCCURRENCE	SNOW, ICE PELLETS OR ICE ON GROUND AT 06AM IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. ELEV. 838 FEET M.S.L.	WIND RESULTANT DIRECTION	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE HOURS AND TENTHS	PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DATE
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	27	13	20	6	13	45	0		T	0	0	29.35	28	4.3	6.8	10	NW	8.8	100	0	0	1
2	28	13	21	8	18	44	0		T	.30	5.0	29.26	15	8.8	9.5	17	SW	0.1	1	10	9	2
3	30	7	18	6	19	46	0	1	5	.03	.5	28.89	28	7.5	10.8	20	NW	7.4	83	7	6	3
4	24	5	15	2	10	50	0		5	0	0	29.06	20	2.8	5.9	13	E	8.8	99	3	3	4
5	27	6	17	4	16	48	0	1	5	T	T	29.09	12	9.2	9.4	19	SE	5.7	64	10	10	5
6	28	22	25	12	22	40	0	1	6	.04	.8	28.88	23	3.4	5.3	15	E	3.7	42	10	10	6
7	24	19	22	10	19	43	0	1	6	.01	.2	28.97	11	4.4	7.5	9	E	3.5	39	10	10	7
8	30	21	26	14	23	39	0	2 8	7	.08	1.2	28.86	34	1.6	4.3	7	E	5.3	58	8	9	8
9	33	25	29	17	28	36	0	2 6	7	.25	2.8	28.79	12	13.7	14.0	24	SE	0.9	1	10	10	9
10	34	32	33×	21	32	32	0	1 3 4 9	9	1.13	4.0	28.31	03	7.7	11.1	26	N	0.0	0	10	10	10
11	33	-6	14	2	- 2	51	0	1 9	8	.09	1.4	28.40	28	24.5	25.3			0.9	1	10	10	11
12	-1	-8	-5×	-17	-15	70	0	1 9	9	T	T	29.25	27	14.3	14.4			0.0	0	10	9	12
13	1	-9	-4	-16	-14	69	0	1	9	0	0	29.26	30	5.1	6.9			7.4	82	3	4	13
14	15	-11	2	-10	- 5	63	0	1	9	.04	.8	29.16	17	4.5	6.5	12	S	2.9	32	8	7	14
15	16	2	9	-3	.6	56	0		10	.02	.4	29.21	24	6.0	6.5	14	SW	5.9	64	7	4	15
16	16	3	10	-2	.4	55	0		9	T	T	29.42	25	5.4	6.0	8	W	9.2	100	1	1	16
17	27	6	17	5	13	48	0		9	.11	1.2	29.13	20	11.9	12.2	20	SE	5.6	61	4	6	17
18	30	12	21	10	18	44	0		10	.02	.2	28.78	28	13.9	16.0	25	NW	3.6	39	9	9	18
19	13	-12	1	-10	- 9	64	0		8	T	T	29.35	33	10.8	12.2	23	N	9.3	100	0	1	19
20	28	-12	8	-4	- 2	57	0	4 6	9	.12	1.2	28.88	18	13.1	13.7	25	SW	1.6	17	10	8	20
21	31	-6	13	1	12	52	0	1 9	10	.05	.9	29.06	32	10.3	11.9	24	NW	4.3	46	6	5	21
22	16	-14×	1	-11	-10	64	0		11	0	0	29.51	17	5.6	7.1	14	SW	7.4	79	4	4	22
23	32	16	24	12	18	41	0		11	T	T	29.11	16	5.9	7.3	12	SW	5.3	56	6	8	23
24	35×	20	28	16	26	37	0	1	11	T	T	28.68	14	4.1	5.9	13	W	0.7	7	10	10	24
25	34	20	27	15	23	38	0	6 9	11	.13	2.0	28.37	30	14.1	15.1	24	N	0.0	0	10	10	25
26	20	10	15	3	11	50	0		13	0	0	28.93	30	8.3	9.4	22	NW	6.0	63	6	7	26
27	17	7	12	0	5	53	0		12	.04	.4	29.25	29	4.9	5.5	10	E	4.3	45	8	9	27
28	19	3	11	-1	6	54	0	1 6 8	13	.12	1.0	29.22	09	4.0	6.9	13	E	1.0	10	10	10	28
29	26	2	14	2	15	51	0	1 6	16	.21	3.0	29.02	32	6.2	10.6	21	N	7.9	81	5	5	29
30	13	-2	6	-7	- 2	59	0		16	T	T	29.38	26	4.6	5.8	7	NW	6.3	65	10	8	30
31	15	-10	3	-10	- 2	62	0	1 8	15	.03	.4	29.59	34	1.8	4.3	8	E	3.7	38	10	8	31
	SUM 722	SUM 174				TOTAL 1561	TOTAL 0	NUMBER OF DAYS		TOTAL 2.82	TOTAL 27.4	29.05	26	2.9	9.5	26	N	TOTAL 137.5	% FOR 225	SUM 225	SUM 220	
	AVG. 23.3	AVG. 5.6	AVG. 14.5	DEP. 2.3	AVG. 10	DEP. -76	DEP. 0	PRECIPITATION .01 INCH	19	DEP. 2.09						DATE	10	POSSIBLE 286.0	MONTH 48	AVG. 7.3	AVG. 7.1	

SEASON TO DATE: TOTAL 4550, TOTAL 0

NUMBER OF DAYS: MAXIMUM TEMP. ≥ 90°F	≤ 32°	MINIMUM TEMP. ≤ 32°	≤ 0°
0	26	31	10

SNOW, ICE PELLETS: DEP. -180, DEP. 0

THUNDERSTORMS 1; HEAVY FOG ✕ 2; CLEAR 5; PARTLY CLOUDY 8; CLOUDY 18

GREATEST IN 24 HOURS AND DATES: PRECIPITATION 1.19 10-11; SNOW, ICE PELLETS 5.5 2-3

GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE: 16 30+

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1												T	.02	.04	.04	.04	.04	.03	.05	.01	.01	.01	.01	T	1
2																									2
3	.01	.01	.01	T	T	T	T	T	T	T	T	T													3
4																									4
5																							T	T	5
6	T	T	T	.01	.01	T	.02	T	T	T		T						T	T				T	T	6
7	T	T	T	T	T	T	T	T			T	T	T	T									T	.01	7
8	T	.02	.02	.01	.02	.01	T	T	T	T	T														8
9	T	T					T	T	T				.02	.02	.03	.03	.01	T	T	.02	.04	.02	.04	.02	9
10	T	.01	.01	T	T	T	T	T	T	.05	.04		.11	.10	.15	.15	.14	.16	.08	.04	.02	.04	.01	.02	10
11	.04	.02	T	T	T	T	.01	T	T	.01	T	T	.01	T	T	T	T	T	T	T	T	T	T	T	11
12	T	T	T	T	T	T	T	T	T	T	T	T	T												12
13																									13
14				T	T	T							T	.01	.01	.01	.01	T	T		T	T	T	T	14
15	T	T														.01	.01	T	T	T					15
16		T																							16
17																						T	.09	.02	17
18	.01	.01	T	T	T																				18
19			T	T																					19
20																				T	.02	.04	.04	.02	20
21	T	T						T	T	.02	.02	.01	T	T											21
22																									22
23				T	T	T						T	T			T	T	T	T	T	T				23
24																									24
25		T	T	T	T	T	T	.01	.02	.02	.01	.01	T	T	T	.01	.01	.01	.01	.02	T	T	T	T	25
26																									26
27								T	.02	.01	.01	T	T							T	.01	.06	.04	.01	27
28																									28
29	.03	.05	.03	.03	.02	.02	.01	.02	T	T	T	T	T	T	T			T	T	T	T				29
30										T	T	T								T	.02	.01	T	T	30
31																									31

MINNEAPOLIS-ST.PAUL, MINNESOTA

- EXTREME TEMPERATURES FOR THE MONTH, MAY BE THE LAST OF MORE THAN ONE OCCURRENCE.
- BELOW ZERO TEMPERATURE OR NEGATIVE DEPARTURE FROM NORMAL.
- * TO AT ALASKA STATIONS.
- + ALSO ON AN EARLIER DATE, OR DATES.
- X HEAVY FOG RESTRICTS VISIBILITY TO 1/4 MILE OR LESS.
- T IN THE HOURLY PRECIPITATION TABLE AND IN COLUMNS 9, 10, AND 11 INDICATES AN AMOUNT TOO SMALL TO MEASURE.

THE SEASON FOR DEGREE DAYS BEGINS WITH JULY FOR HEATING AND JANUARY FOR COOLING.
DATA IN COLUMNS 6, 12, 13, 14, AND 16 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
WIND DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. RESULTANT WIND IS THE VECTOR SUM OF WIND DIRECTIONS AND SPEEDS DIVIDED BY THE NUMBER OF OBSERVATIONS. FIGURES FOR DIRECTIONS ARE TENS OF DEGREES FROM TRUE NORTH: I.E., 09=EAST, 18=SOUTH, 27=WEST, 36=NORTH, AND 00=CALM. WHEN DIRECTIONS ARE IN TENS OF DEGREES IN COL. 17, ENTRIES IN COL. 18 ARE FASTEST OBSERVED 1-MINUTE SPEEDS. IF THE / APPEARS IN COL. 17, SPEEDS ARE GUSTY.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

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William H. Haggard

DIRECTOR, NATIONAL CLIMATIC CENTER

SUMMARY BY HOURS

HOUR (LOCAL STANDARD TIME)	AVERAGES: SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE °F: AIR	WET BULB	DEW PT.	RELATIVE HUMIDITY: %	WIND SPEED M.P.H.	RESULTANT WIND: DIRECTION	SPEED M.P.H.
00	6	29.03	14	14	10	82	8.1	25	2.3
03	8	29.04	13	13	9	82	8.3	27	3.4
06	8	29.04	12	12	7	81	8.9	27	2.4
09	8	29.06	13	12	8	80	9.1	26	2.0
12	8	29.06	17	16	10	74	11.0	27	4.3
15	6	29.04	19	18	12	73	12.7	25	4.7
18	6	29.05	17	16	11	77	9.7	27	3.1
21	6	29.05	15	14	10	81	8.0	22	1.9

USCOMM - NOAA - ASHEVILLE 750
10/21/75

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	SKY COVER TENTHS	CEILING HNDS OF FT.	VISIBILITY WHOLE MILES	VISIBILITY TENTHS	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
DAY 01											
00	0	UNL	25			20	10	14	77	28	7
03	0	UNL	25			17	16	12	81	29	5
06	0	UNL	25			18	15	12	84	29	7
09	0	UNL	25			15	14	11	84	30	4
12	0	UNL	25			23	21	15	71	30	8
15	0	UNL	25			27	23	14	58	29	8
18	0	UNL	25			21	19	13	71	29	3
21	0	UNL	25			15	14	11	84	11	7
DAY 02											
00	0	UNL	20			13	13	10	88	13	5
03	9	UNL	15			14	13	10	84	12	8
06	10	UNL	15			18	15	12	84	14	9
09	10	110	15			22	21	17	81	17	12
12	0	UNL	1		S	29	27	22	75	20	9
15	0	UNL	25			27	27	25	92	15	9
18	0	8	0	12	S	26	26	24	92	15	8
21	0	8	0	8	S	27	27	25	92	15	8
DAY 03											
00	10	14	3		S	26	25	23	88	17	8
03	10	11	3		S	27	26	24	88	21	7
06	10	15	10			28	27	24	85	29	14
09	10	20	20		S	27	26	22	81	32	12
12	0	20	20			30	28	23	75	30	12
15	0	UNL	25			28	25	19	69	32	9
18	0	UNL	25			18	17	12	77	26	8
21	0	UNL	20			10	10	07	88	24	9
DAY 04											
00	0	UNL	19			10	10	08	92	20	3
03	10	60	19			11	11	08	88	11	4
06	2	UNL	12			05	05	02	87	12	6
09	3	UNL	12			06	06	03	87	12	6
12	10	10	15			18	17	14	84	23	6
15	0	UNL	20			24	22	16	71	26	10
18	0	UNL	15			20	19	14	77	25	3
21	0	UNL	19			13	13	12	96	23	3
DAY 05											
00	5	UNL	15			13	13	12	96	00	0
03	10	150	15			12	12	09	88	09	5
06	10	100	4		F	15	15	13	92	12	8
09	10	90	8			18	18	15	88	12	9
12	10	120	10			23	22	18	81	12	13
15	10	140	12			27	25	20	75	11	12
18	10	80	12			25	23	19	76	13	8
21	10	90	8			25	24	20	81	13	10
DAY 06											
00	10	10	3		S	27	26	22	81	14	8
03	10	13	1	8	S	27	26	24	88	00	0
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09	10	8	2		SF	28	27	24	85	28	5
12	10	10	3		SF	28	25	21	81	25	12
15	10	14	10			25	24	20	81	28	5
18	10	11	7		S	24	23	20	85	24	4
21	10	12	7			23	22	19	85	16	3
DAY 07											
00	10	9	7		S	22	21	19	88	18	8
03	10	5	1	8	SF	20	20	18	92	17	5
06	10	5	0	8	SF	20	20	19	96	18	3
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18	10	7	2	8	F	22	22	20	92	05	7
21	10	7	2	8	F	24	23	21	88	06	7
DAY 08											
00	10	10	1	8	S	24	24	22	92	02	7
03	10	12	1	8	S	24	24	22	92	35	3
06	10	12	1	8	S	24	24	22	92	36	4
09	10	20	1	12	SF	23	23	22	96	00	0
12	10	35	2	8	F	27	26	23	85	31	5
15	10	1	UNL	5	OVC	28	26	24	92	20	3
18	10	4	UNL	4	F	23	23	22	96	26	4
21	10	3	UNL	3	F	26	26	24	92	12	4
DAY 09											
00	10	2	0	4	F	26	26	25	96	12	5
03	10	3	2		F	26	26	25	96	15	10
06	10	2	1		F	27	27	26	96	12	12
09	10	4	1	8	F	28	28	28	96	12	14
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18	10	6	1		F	32	31	30	92	12	15
21	10	4	1	8	SF	32	32	31	96	11	8
DAY 10											
00	10	8	2		SF	33	32	30	88	34	8
03	10	15	2	8	SBS	18	15	12	84	20	22
06	10	7	0	12	SBS	08	05	01	80	28	26
09	10	4	0	8	SBS	00	00	-05	79	28	26
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21	10	4	0	12	SBS	-05	-05	-15	61	27	22
DAY 11											
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03	10	13	3		SBS	-07	-07	-18	88	28	14
06	10	10	2	8	SBS	-06	-06	-17	88	28	16
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15	10	13	5		BS	-01	-02	-13	86	27	10
18	10	10	2		BS	-02	-03	-12	82	26	11
21	10	10	5		BS	-05	-05	-15	81	29	6
DAY 12											
00	2	UNL	2	8	IF	-08	-08	-17	84	27	6
03	10	9	6		IF	-08	-08	-19	84	28	5
06	10	80	12			-04	-05	-16	86	05	5
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21	0	UNL	25			-05	-05	-11	75	22	3
DAY 13											
00	0	UNL	25			-09	-09	-15	74	00	0
03	0	UNL	10			-10	-10	-18	67	23	8
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18	10	18	5		SF	13	13	10	88	18	4
21	5	15	12			15	15	12	88	25	6
DAY 14											
00	0	UNL	25			-09	-09	-15	74	00	0
03	0	UNL	10			-10	-10	-18	67	23	8
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18	10	18	5		SF	13	13	10	88	18	4
21	5	15	12			15	15	12	88	25	6
DAY 15											
00	0	UNL	15			10	17	15		S	7
03	0	UNL	15			10	10	07	88	29	4
06	0	UNL	12			08	05	00	76	00	0
09	0	UNL	10			03	03	-01	83	23	4
12	0	UNL	12			10	09	05	80	22	9
15	0	UNL	10			15	14	08	74	23	10
18	0	UNL	12			15	14	11	84	25	7
21	0	UNL	25			14	14	11	88	26	6
DAY 16											
00	0	UNL	25			15	14	10	80	27	7
03	0	UNL	15			12	11	07	80	27	8
06	7	UNL	20			07	07	04	87	27	4
09	0	UNL	25			04	03	-02	76	25	6
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21	0	UNL	25			06	05	01	80	00	0
DAY 17											
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06	0	UNL	25			15	14	09	77	20	10
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12	0	UNL	20			26	25	20	78	19	15
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18	0	220	15			25	23	19	78	19	11
21	0	110	15			25	24	20	81	17	11
DAY 18											
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03	0	UNL	25			28	28	26	92	27	8
06	0	UNL	25			30	28	25	82	32	12
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18	0	UNL	25			20	18	10	66	30	10
21	0	UNL	25			18	14	07	67	30	9
DAY 19											
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21	0	UNL	25			-09	-09	-18	64	22	5
DAY 20											
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03	0	UNL	25			-12	-12	-19	70	14	7
06	0	UNL	25			-04	-05	-15	58	18	14
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12	0	250	25			13	11	01	58	18	16
15	0	80	20			19	17	12	74	18	16
18	0	20	15			19	18	14	81	19	14
21	0	UNL	25		SIP	26	25	22	85	20	14
DAY 21											
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03	0	UNL	25		F	31	30	27	85	32	14
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18	0	UNL	25			07	05	-07	52	32	11
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DAY 22											
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DAY 23											
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18	8	UNL	7			27	25	19	72	13	4
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DAY 24											
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DAY 25											
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18	10	14	1	8	S	25	24	21	85	33	13
21	10	15	5		S	23	22	19	85	33	13
DAY 26											
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18	8	UNL	25			16	15	11	81	24	3
21	10	UNL	20			15	14	11	84	24	3
DAY 27											
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18	10	200	20			13	12	09	70	29	6
21	10	200	20			10	09	04	76	22	4
DAY 28											
00	10	200	20			09	08	04	80	26	6
03	10	200	20			08	08	05	87	24	3
06	10	200	15			04	04	01	87	00	0
09	10	120	6		GF	06	06	03	87	33	5
12	10	110	5		RW	14	12	08	70	11	5
15	10	70	15			17	15	08	68	07	9
18	10	70	10			18	16	10	71	08	10
21	10	9	0	8	S	19	18	13	77	07	10
DAY 29											
00	10	70	5		ZRS	18	18	16	88	06	13
03	10	20	2	8	S	20	20	18	92	04	5
06	10	30	3		S	20	19	17	88	34	9
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18	0	UNL	20			18	17	12	77	26	10
21	0	UNL	15			09	08	04	80	24	6
DAY 30											
00	7	UNL	15			02	02	-03	79	23	3
03	10	UNL	12			01	00	-05	76	25	7
06	10	200	10			00	00	-08	80	26	3
09	9	UNL	10			-01	-01	-08	72	20	5
12	10	14	6		S	10	08	00	84	29	6
15	10	UNL	15			12	11	05	73	25	6
18	10	90	10		SW	10	09	04	76	32	6
21	10	UNL	15			07	06	00	73	31	4

ADDITIONAL DATA

OTHER OBSERVATIONAL DATA CONTAINED IN RECORDS ON FILE CAN BE FURNISHED AT COST VIA MICROFILM, MICROFICHE, OR PAPER COPIES OF THE ORIGINAL RECORDS. INQUIRIES AS TO AVAILABILITY AND COSTS SHOULD BE ADDRESSED TO: DIRECTOR, NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

STATION: MINNEAPOLIS MINN YEAR & MONTH: 75 01

NOTES

CEILING COLUMN-
UNL INDICATES NO UNLIMITED CEILING

WEATHER COLUMN-

+	TORNADO
T	THUNDERSTORM
Q	SQUALL
R	RAIN
RW	RAIN SHOWERS
ZP	FREEZING RAIN
L	DRIZZLE
ZL	FREEZING DRIZZLE
S	SNOW
SP	SNOW PELLETS
IC	ICE CRYSTALS
SW	SNOW SHOWERS
SG	SNOW GRAINS
IP	ICE PELLETS
A	HAIL
F	FOG
IF	ICE FOG
GF	GROUND FOG
BD	BLOWING DUST
BN	BLOWING SAND
BS	BLOWING SNOW
BY	BLOWING SPRAY
K	SMOKE
H	HAZE
D	DUST

WIND COLUMNS-

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH: I.E., 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

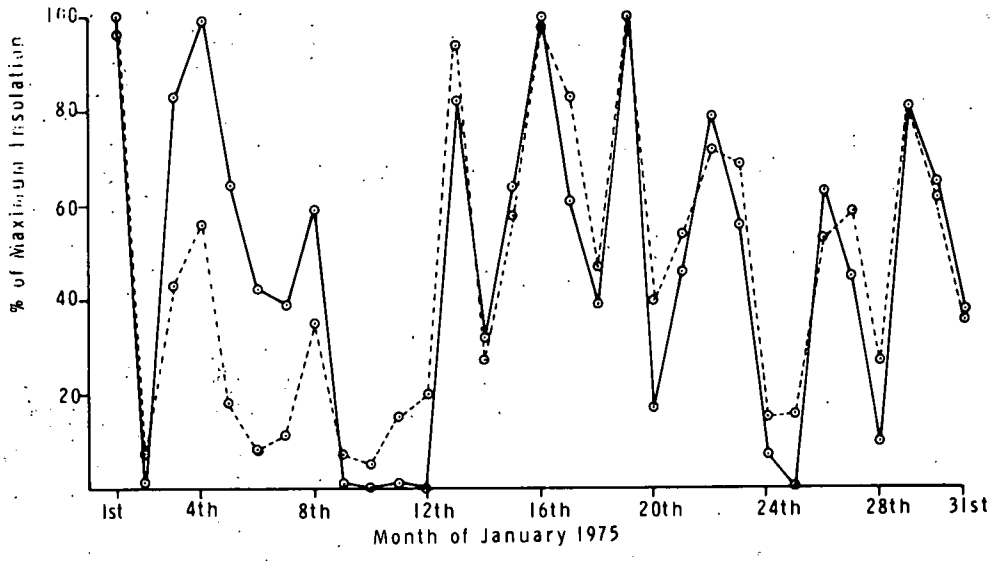
SPEED IS EXPRESSED IN KNOTS; MULTIPLY BY 1.15 TO CONVERT TO MILES PER HOUR.

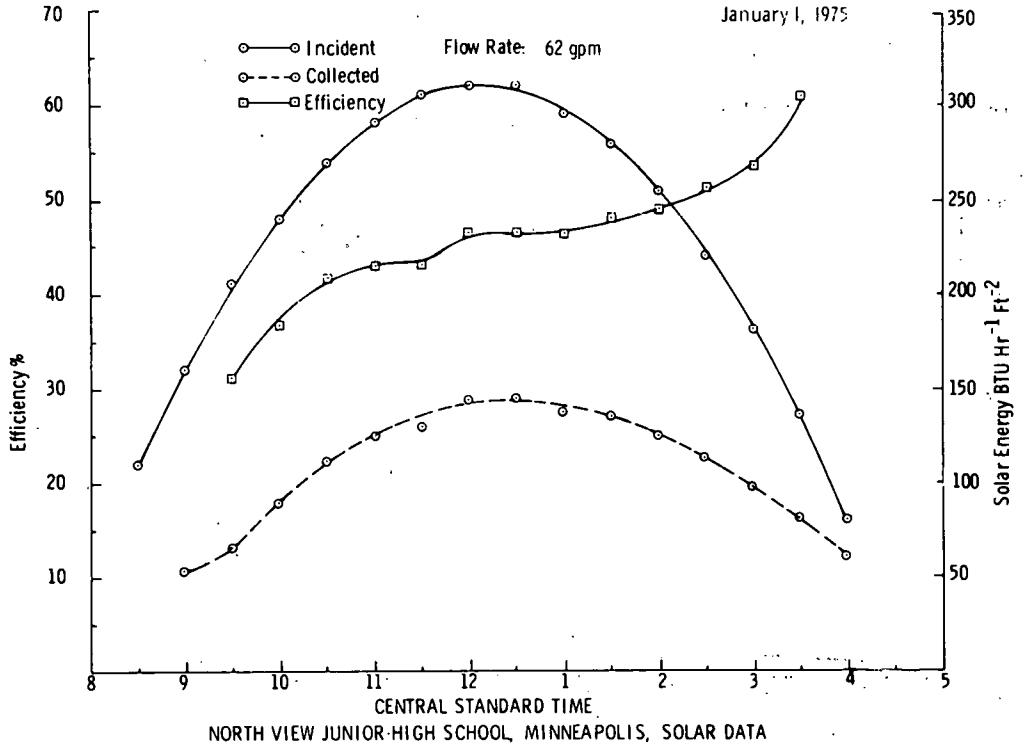
U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

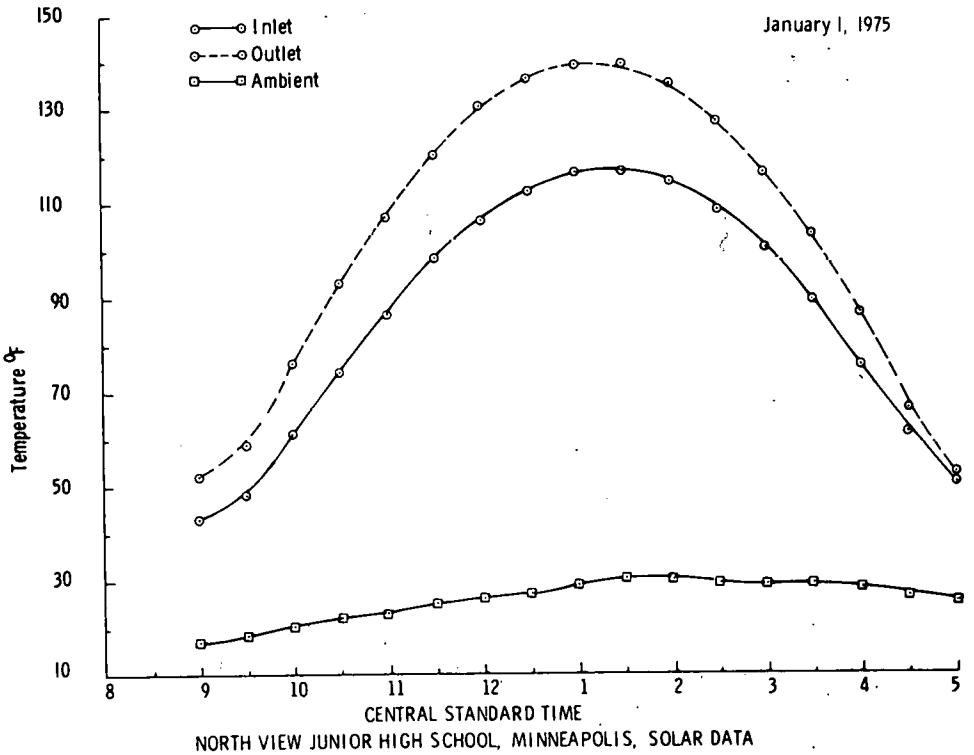
POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
210

FIRST CLASS

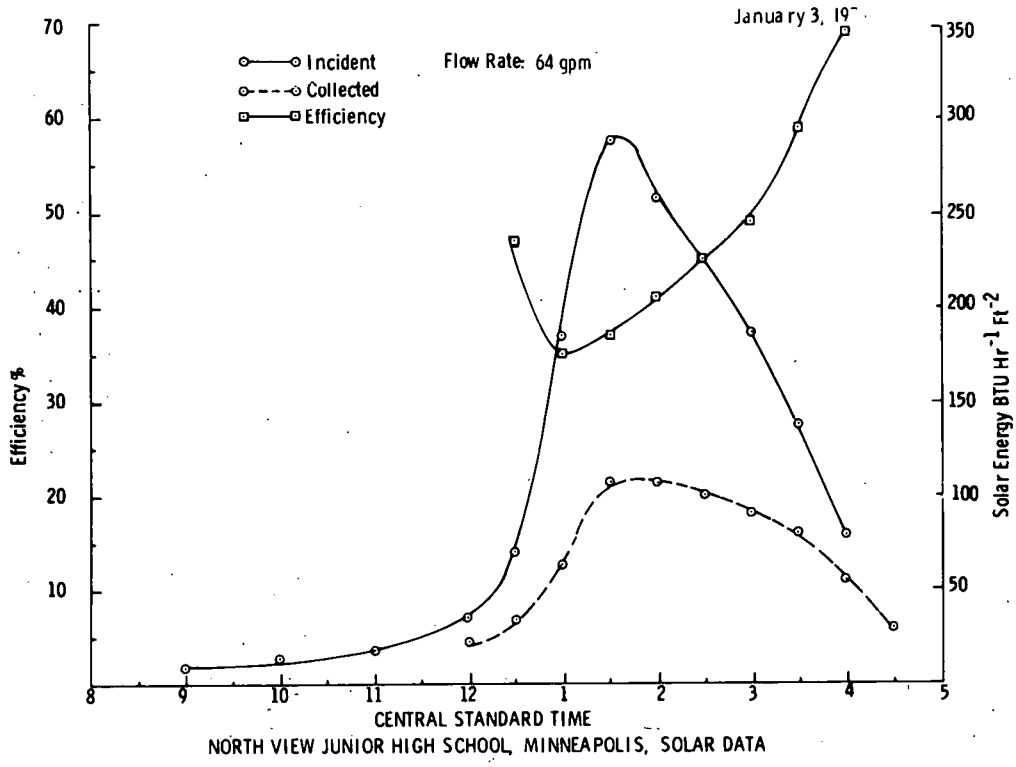

% of Maximum Insulation
100
80
60
40
20
1st
4th
8th
12th
16th
20th
24th
28th
31st
Month of January 1975



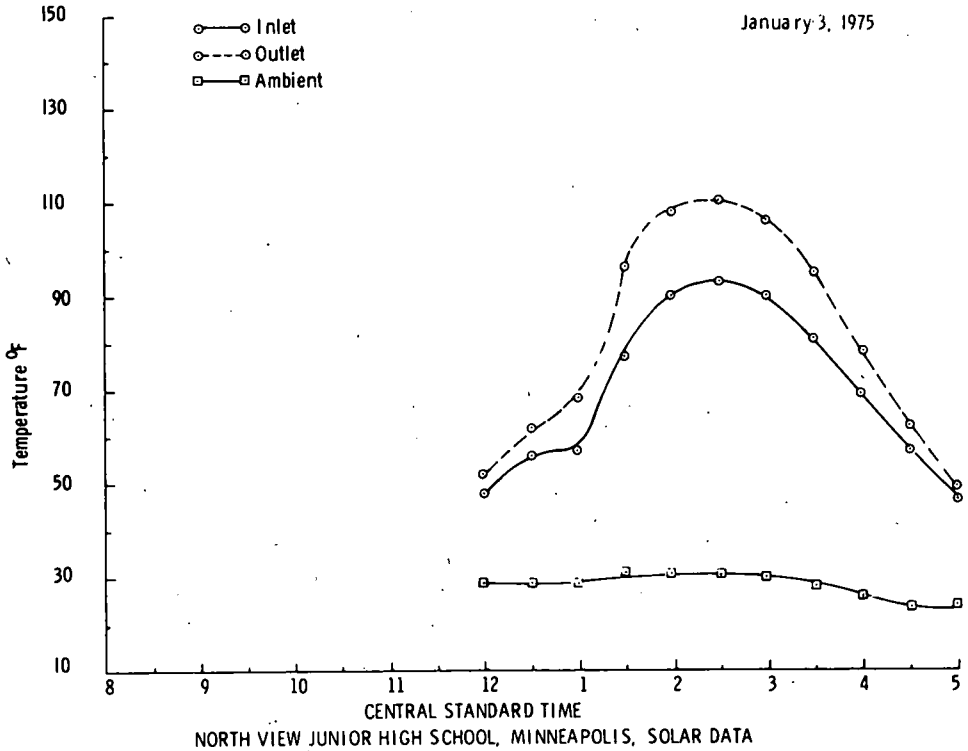
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



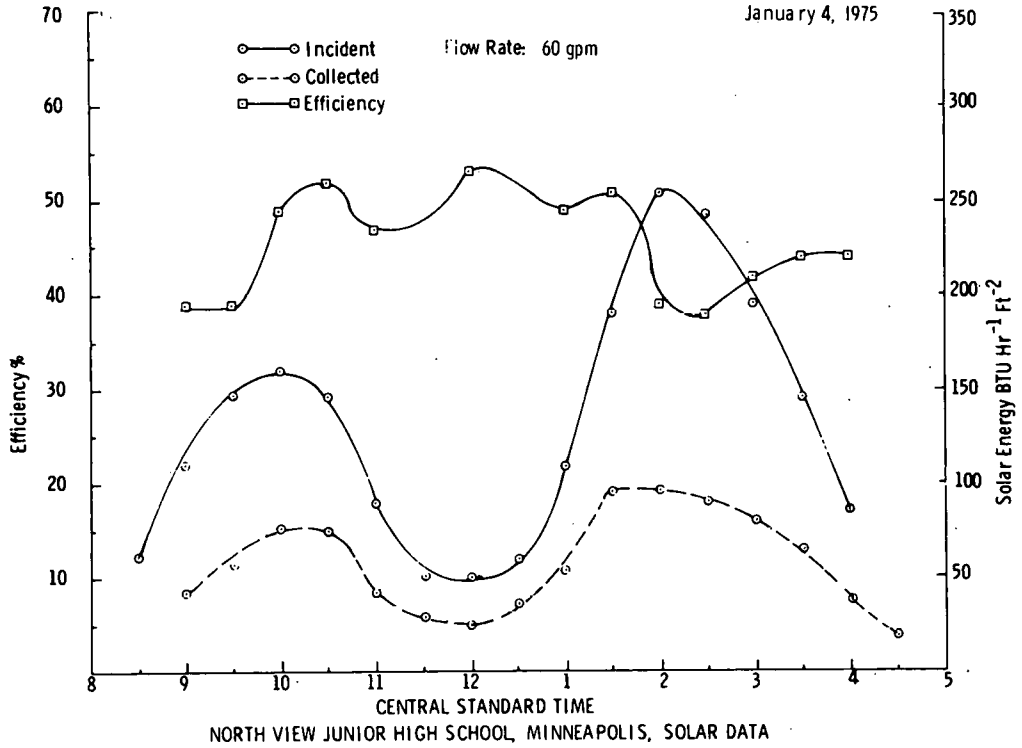
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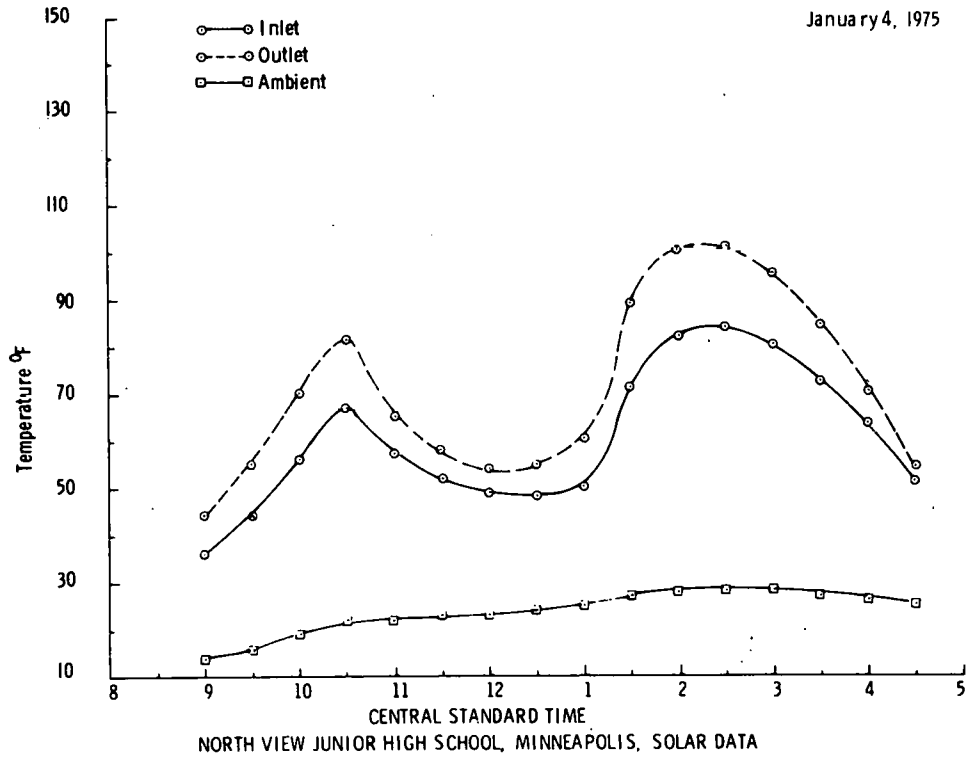
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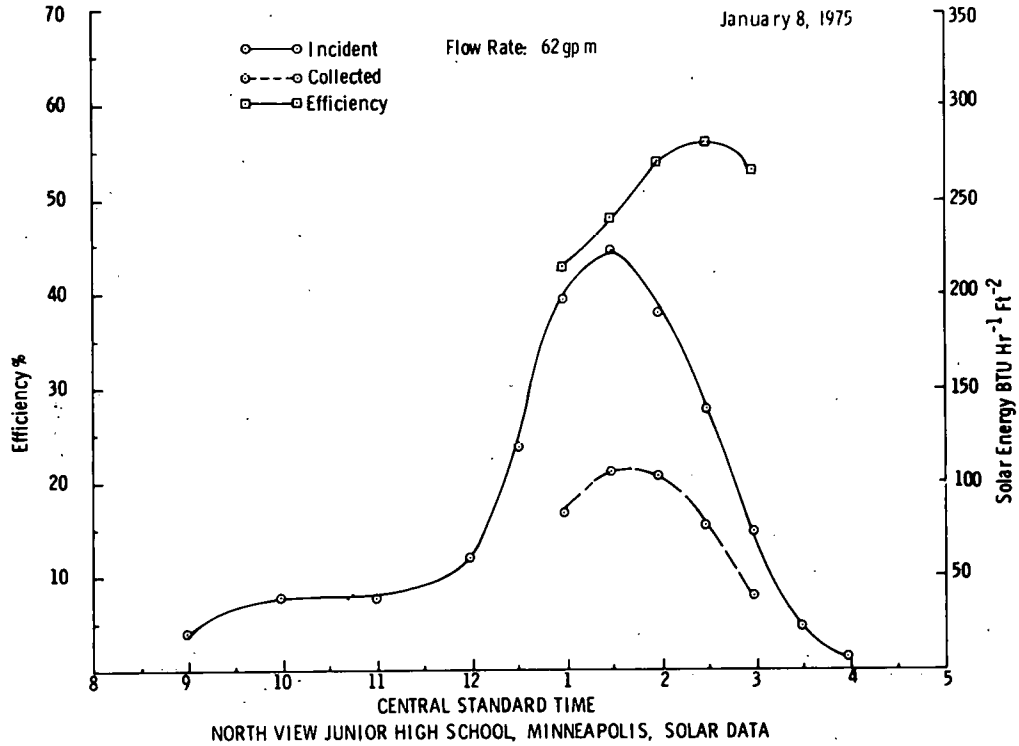
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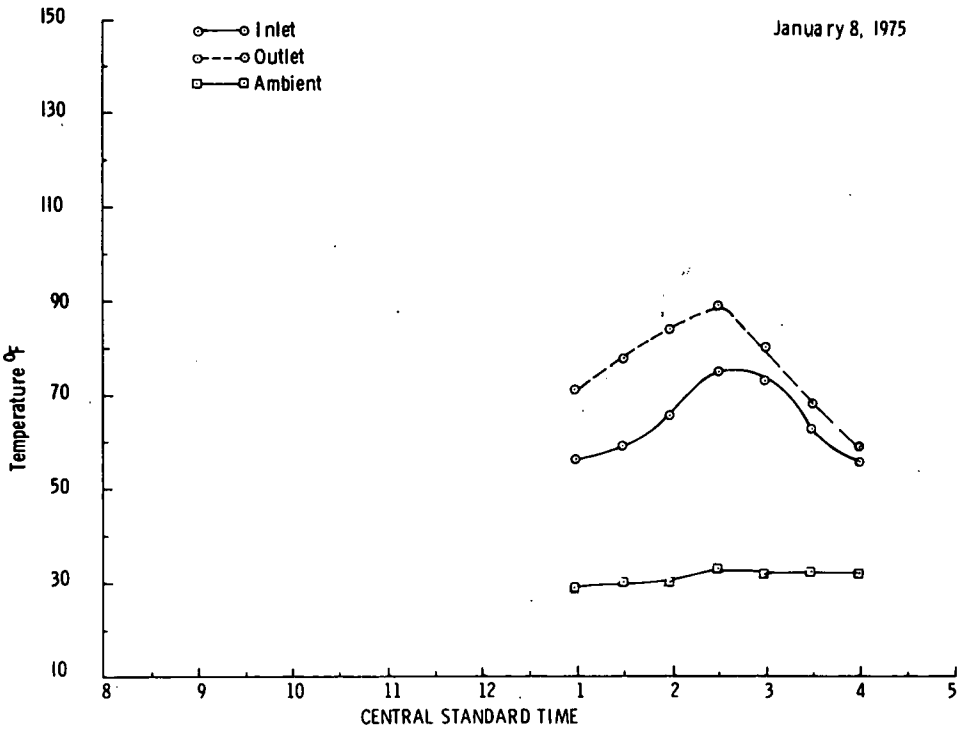
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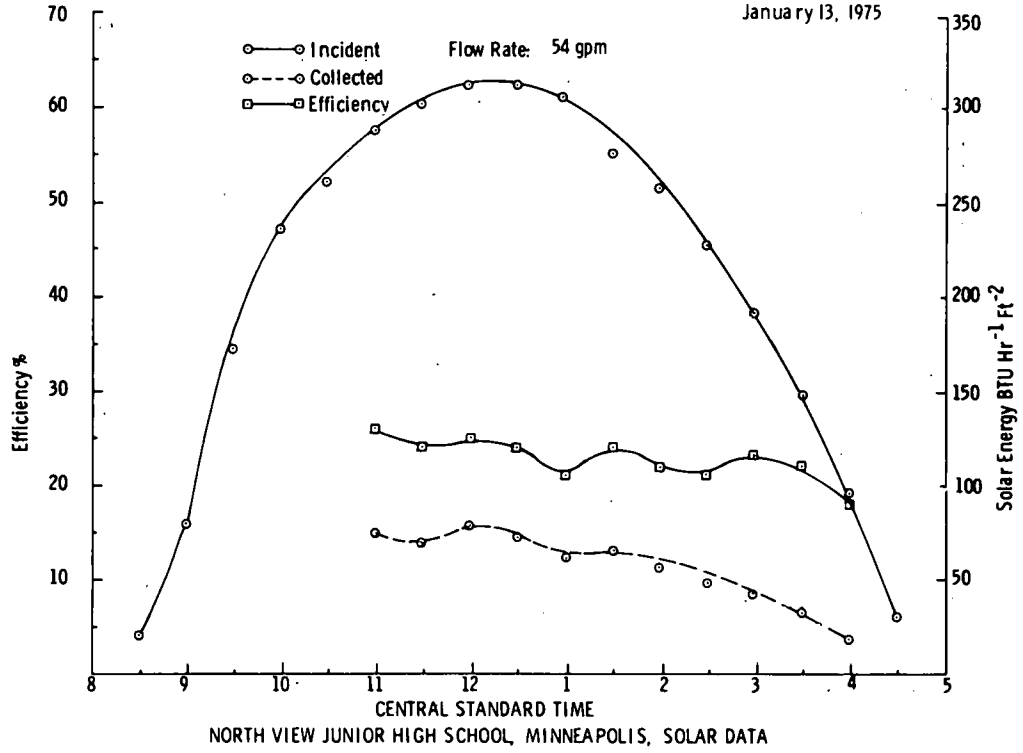
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



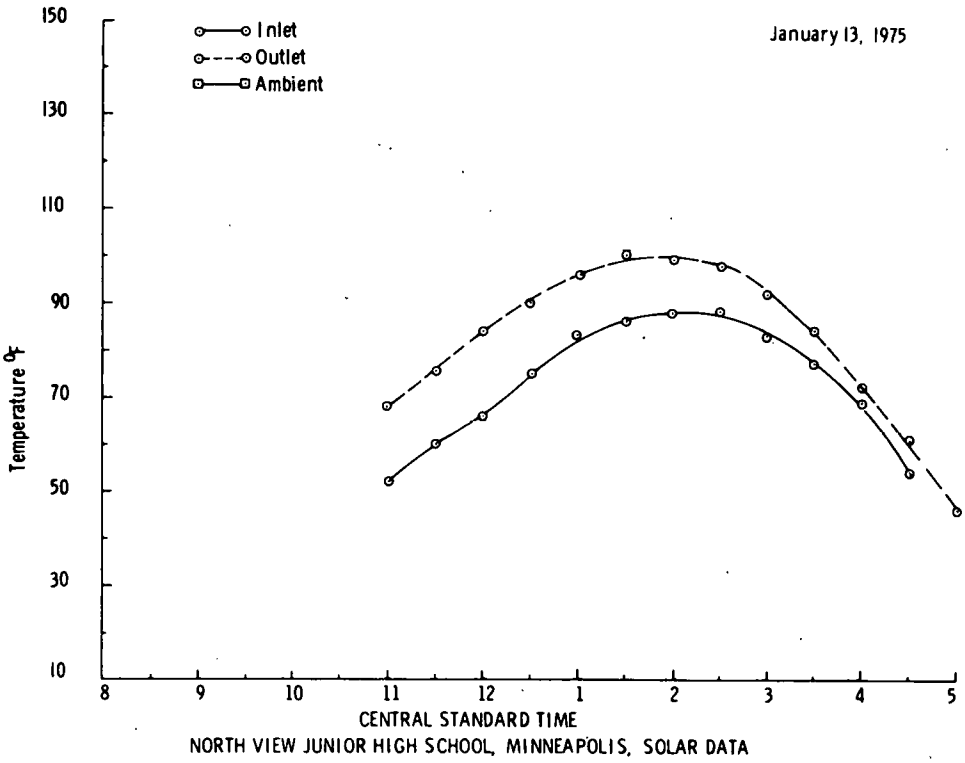
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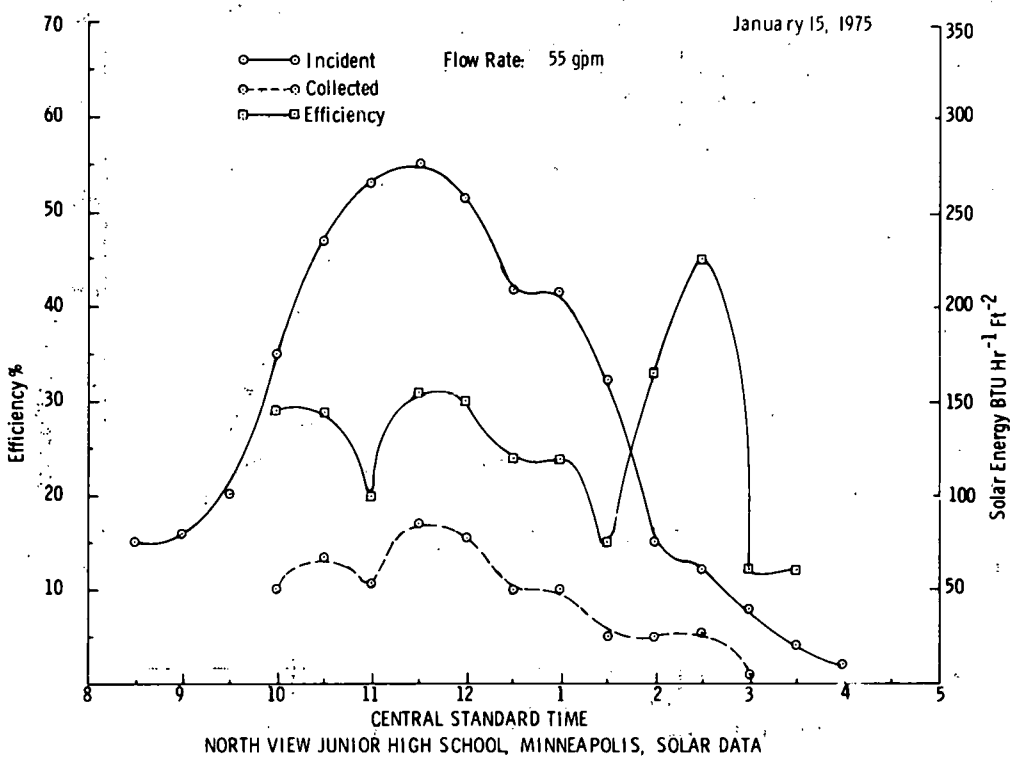
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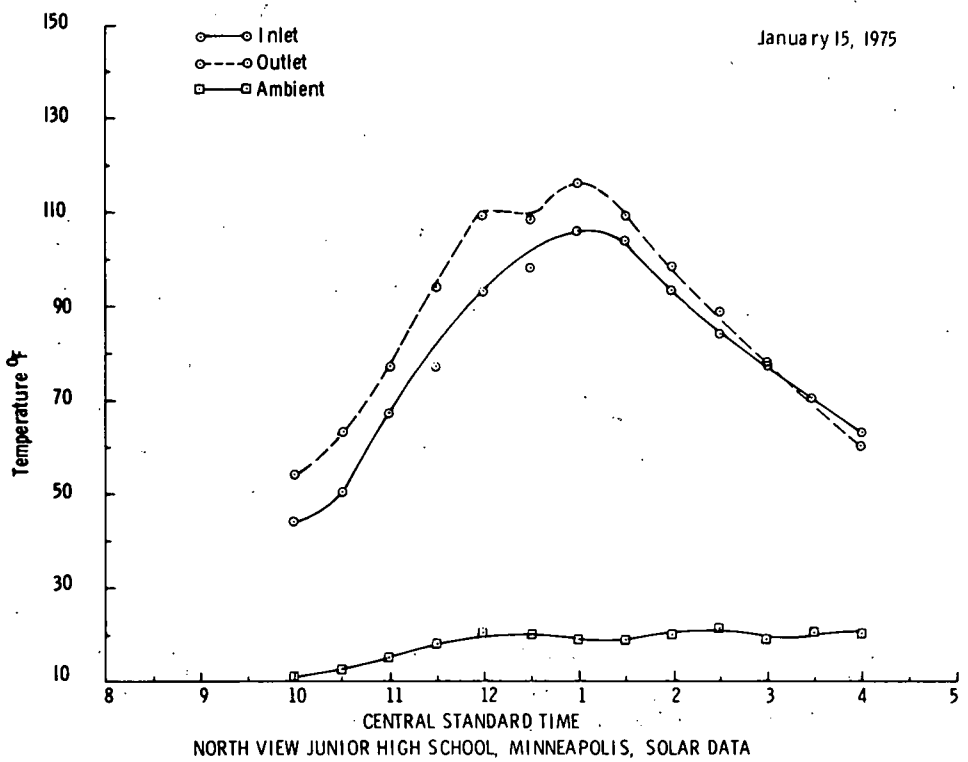
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



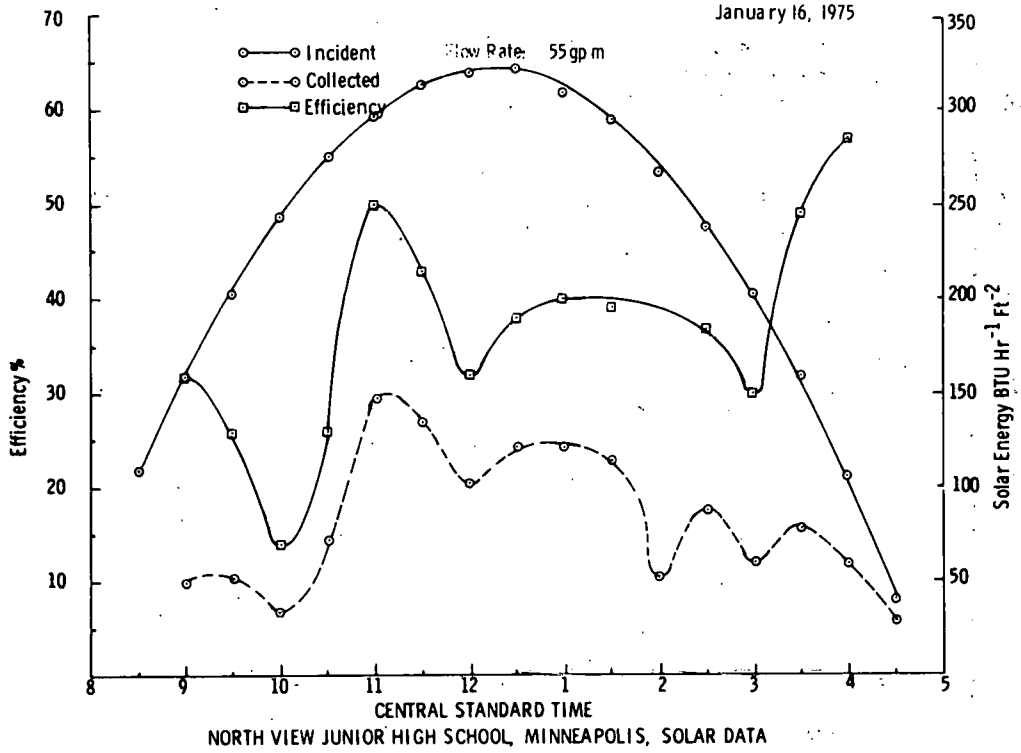
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



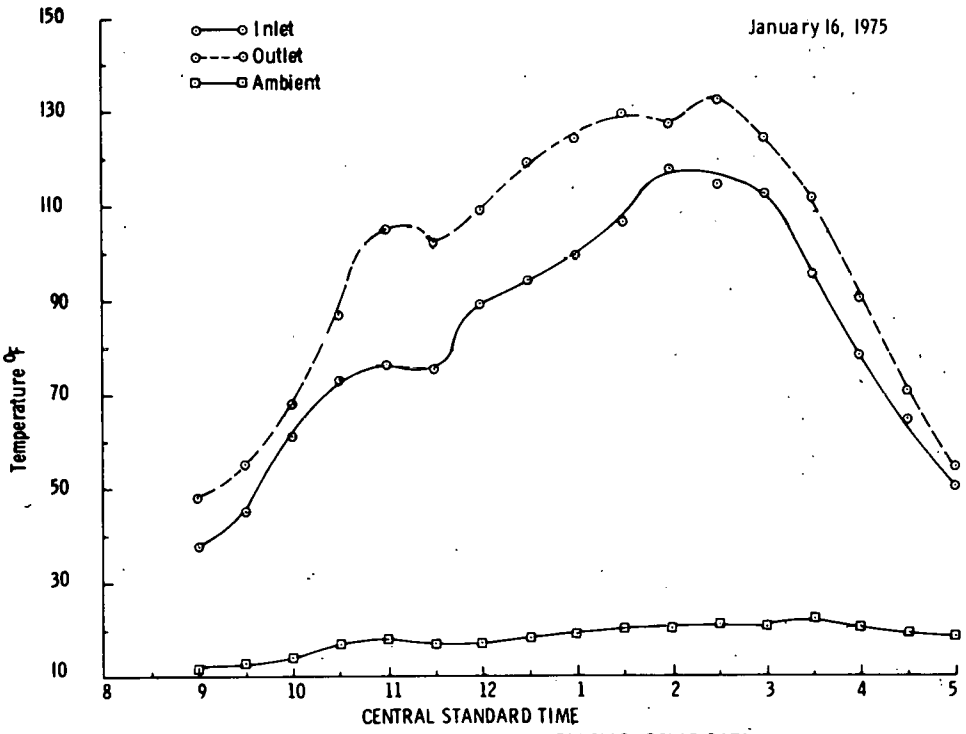
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



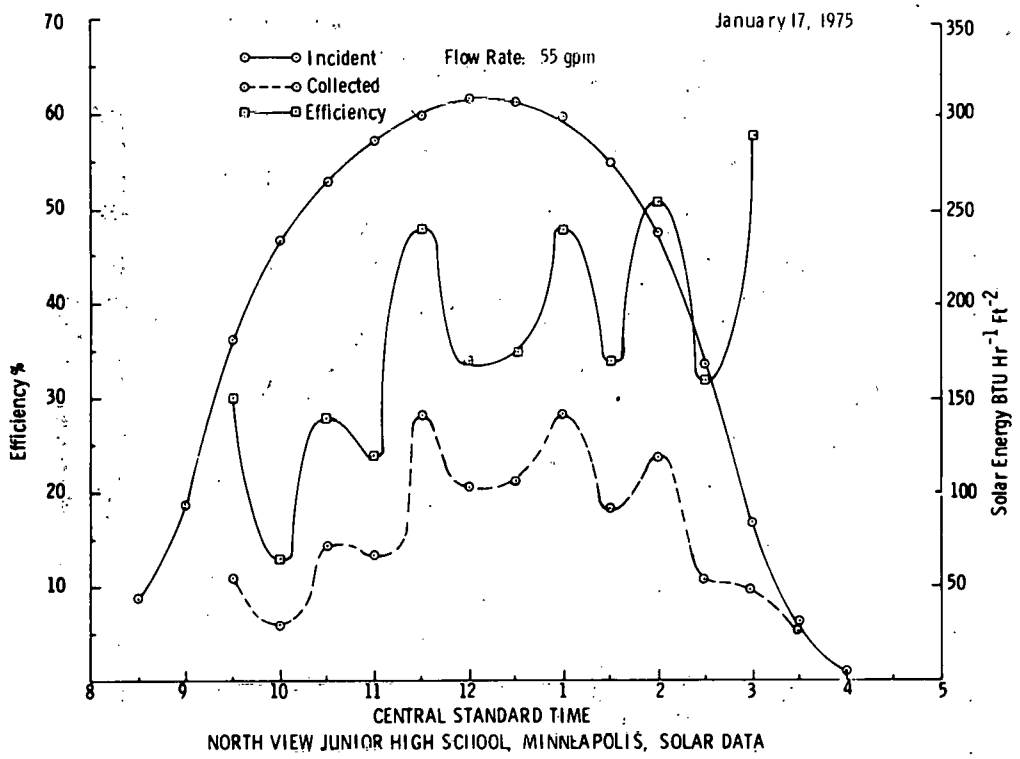
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



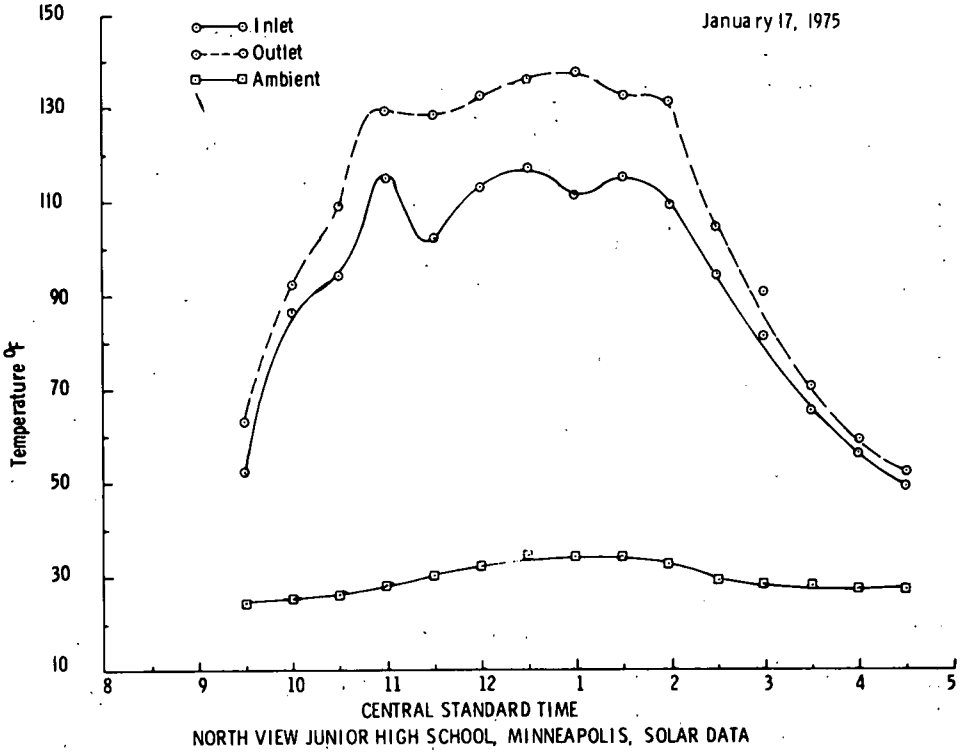
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



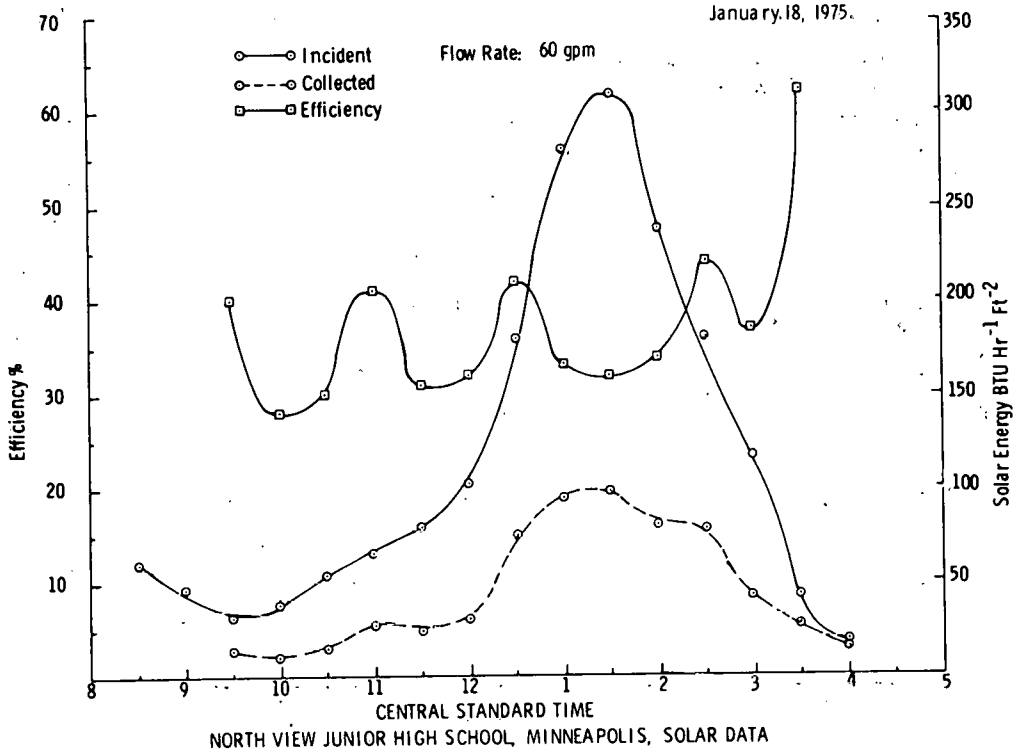
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



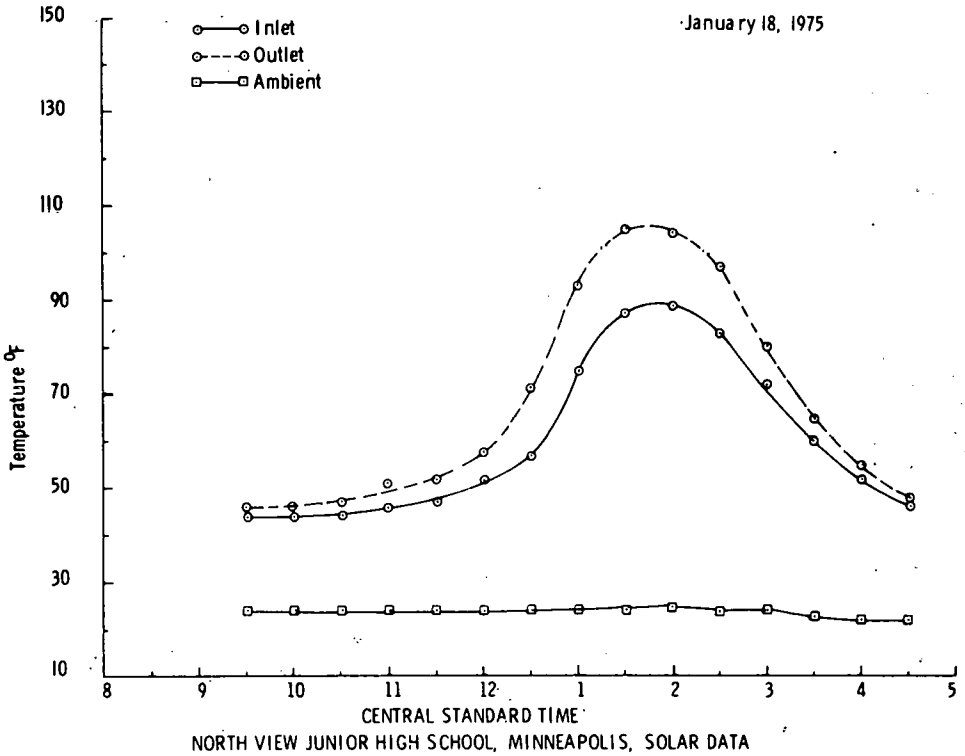
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



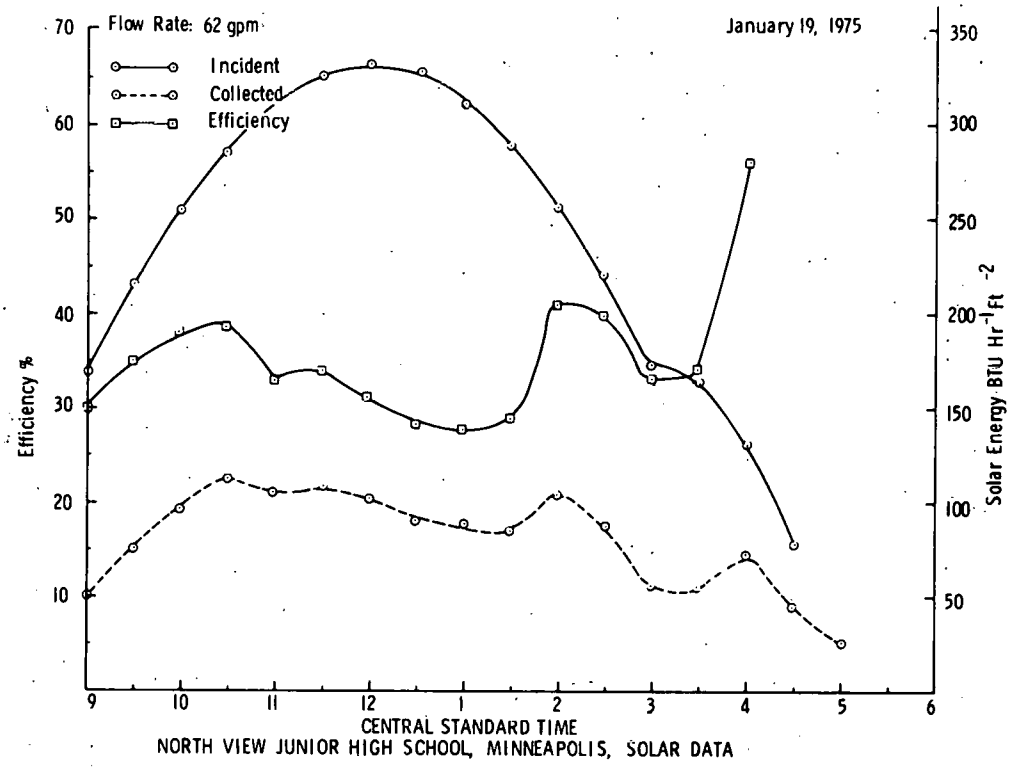
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



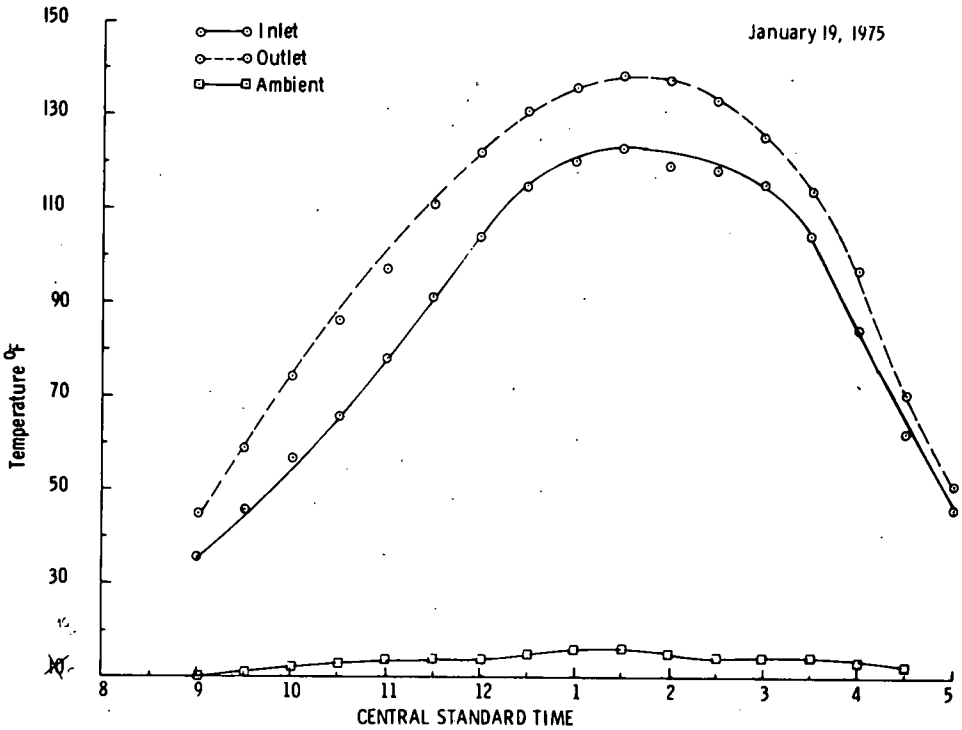
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



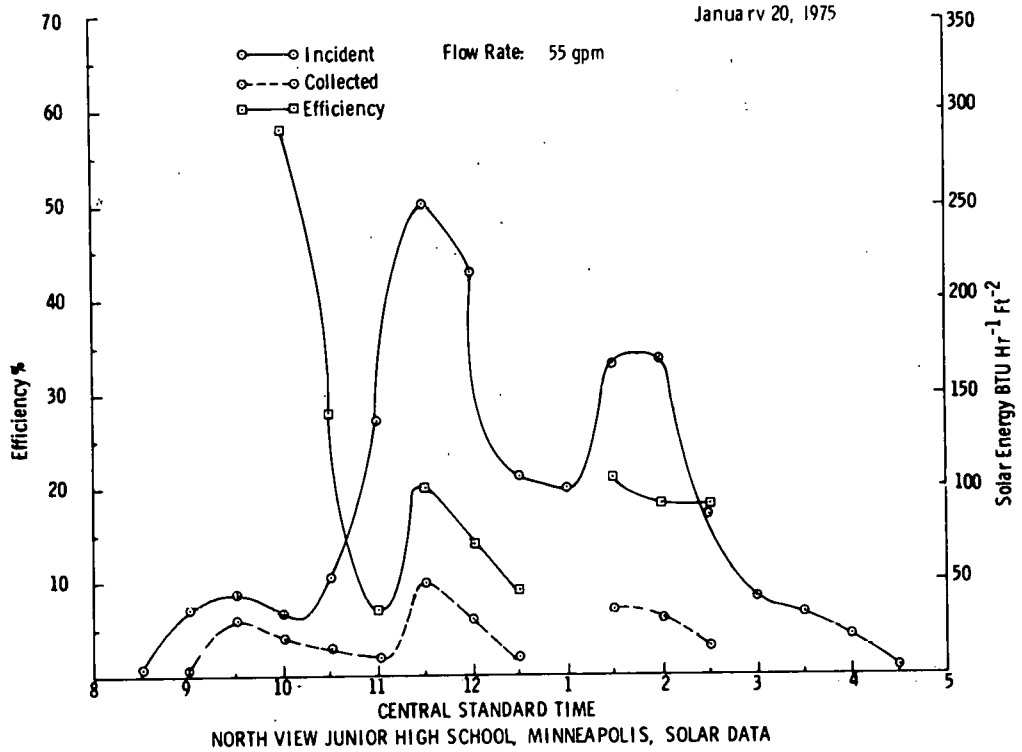
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



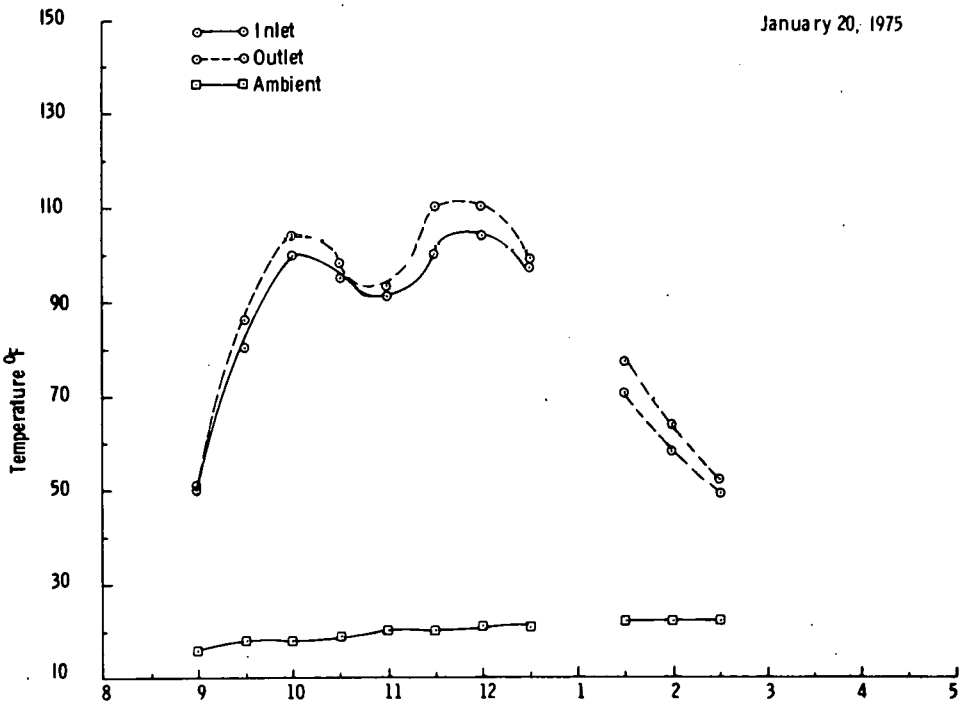
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



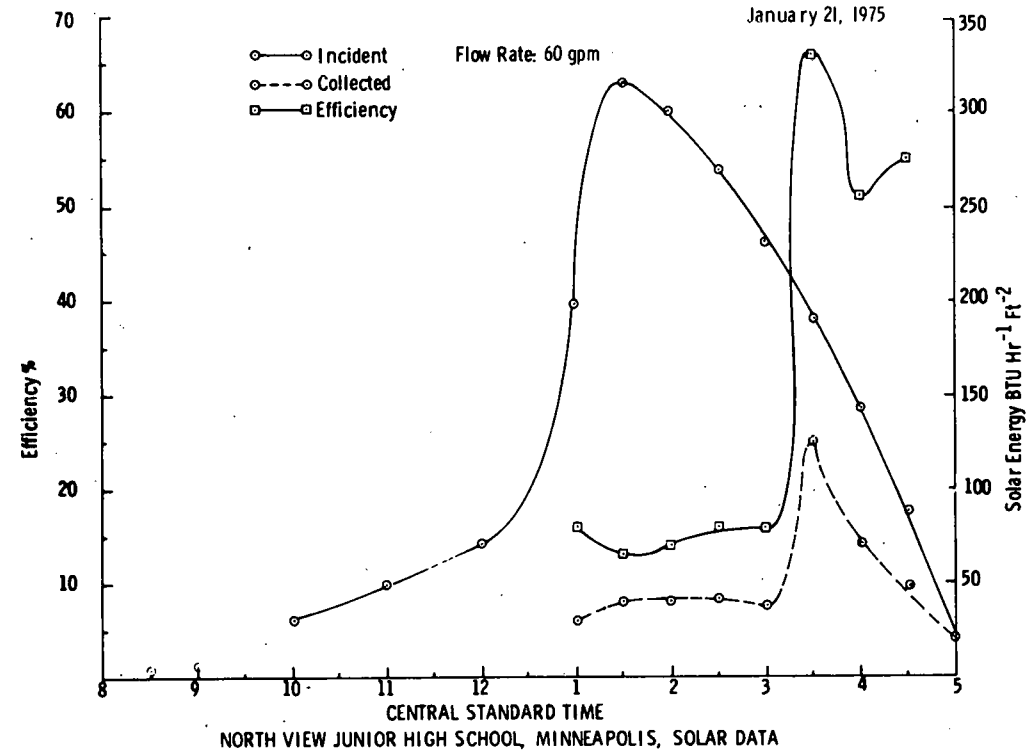
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



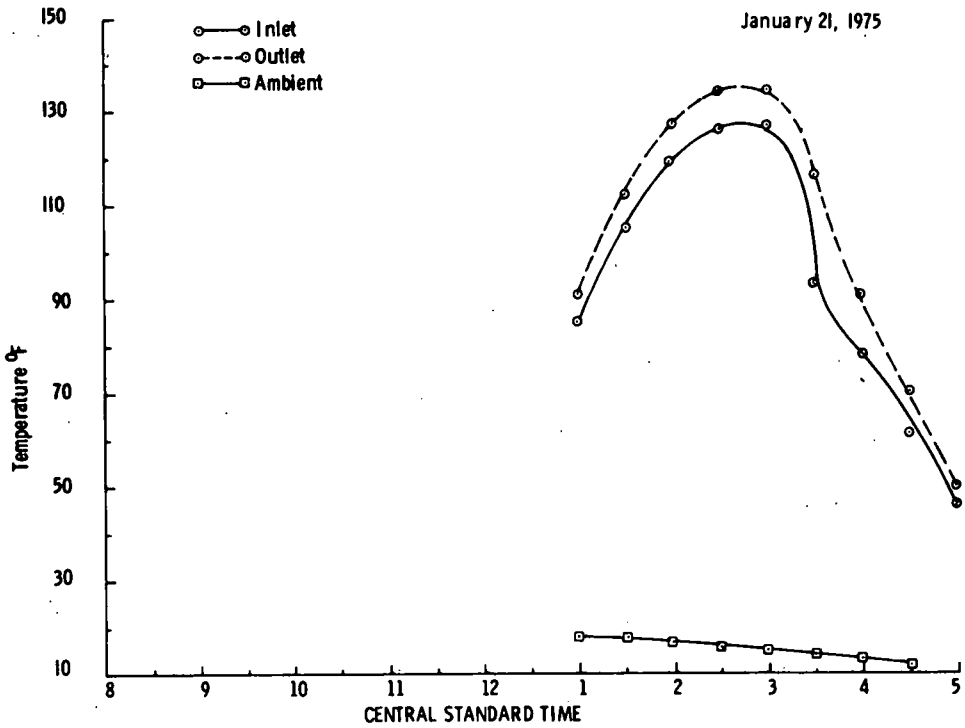
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



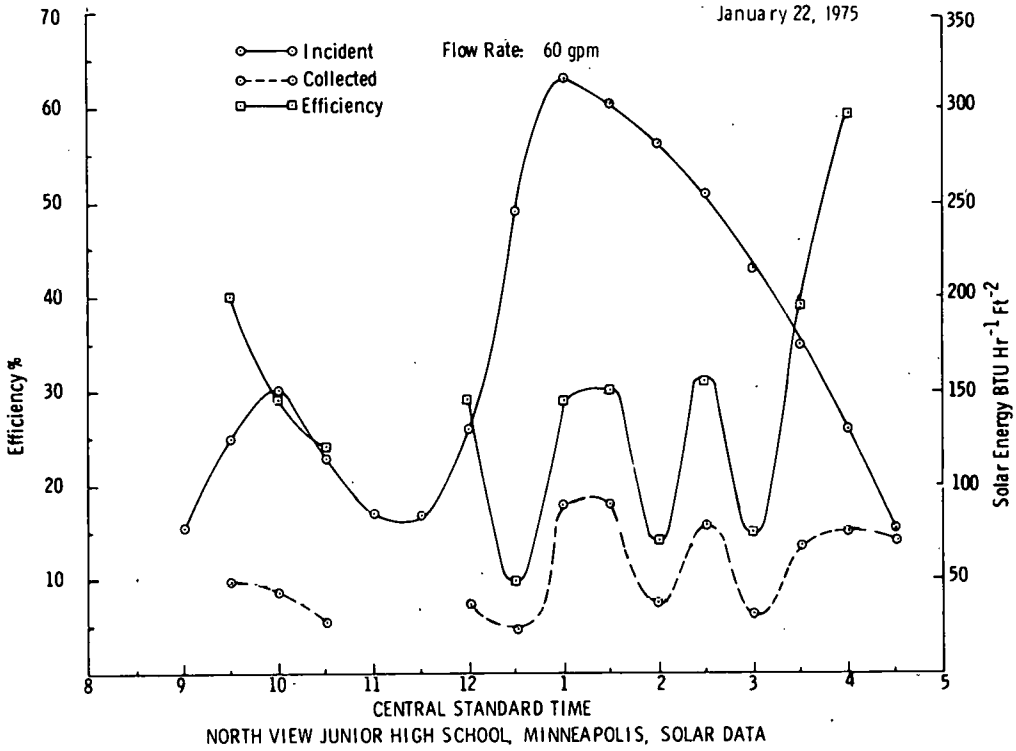
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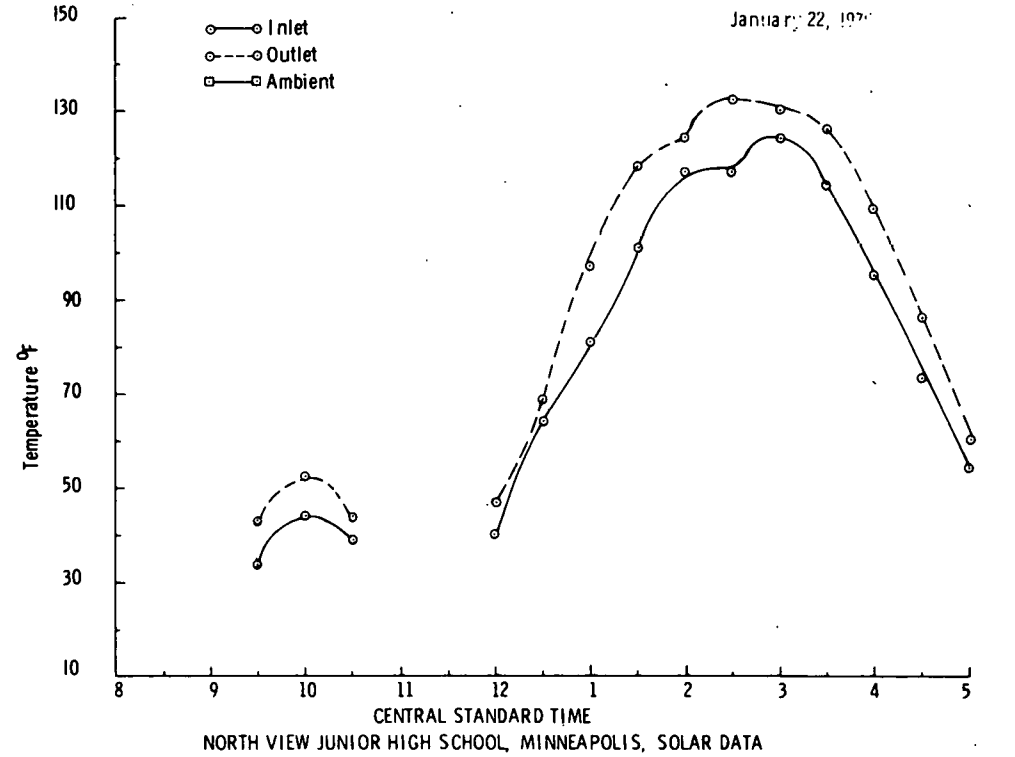
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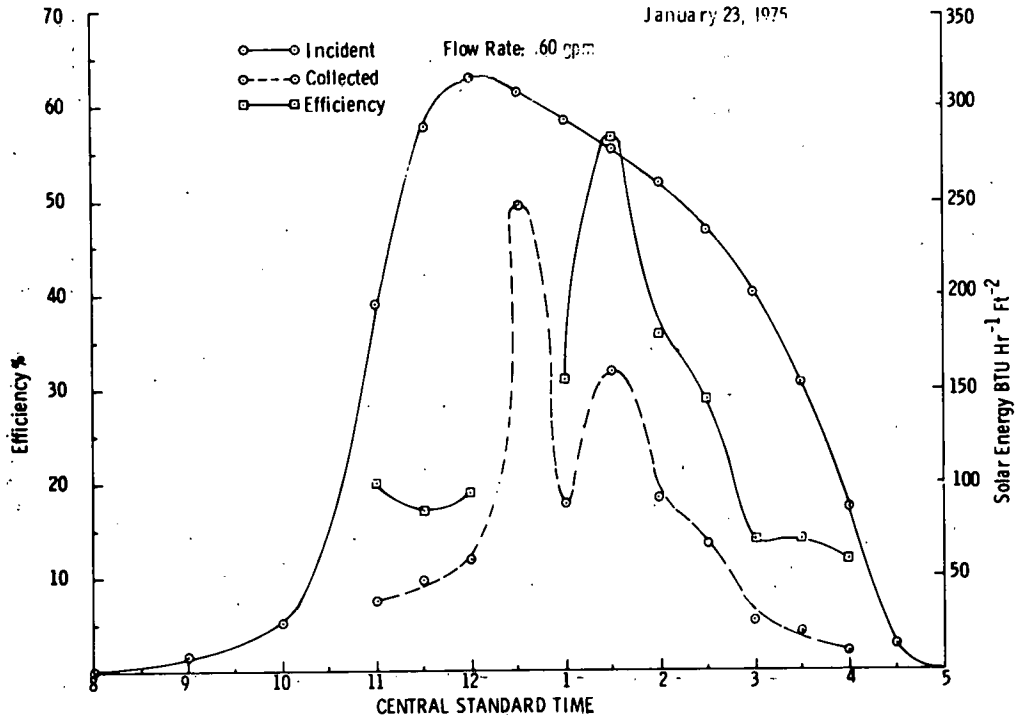
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



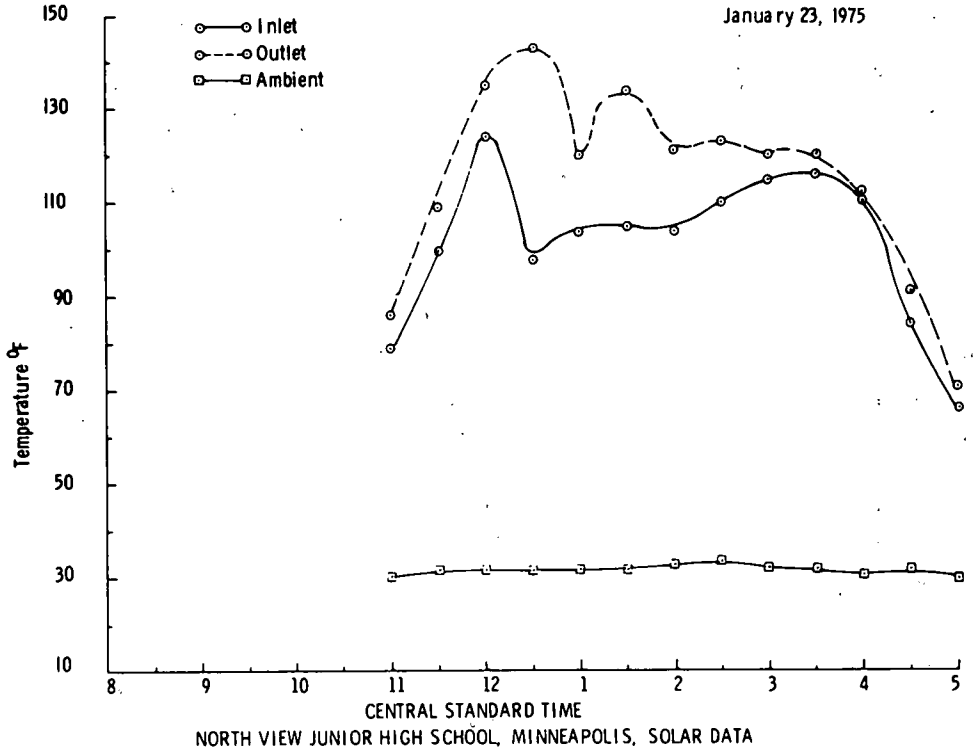
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



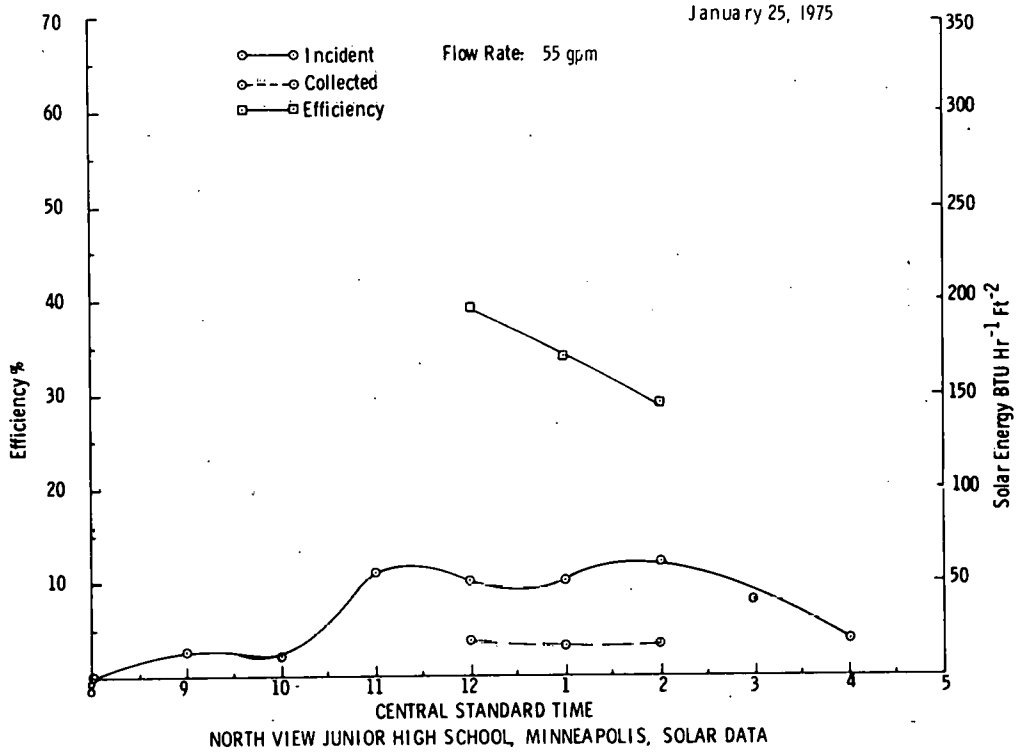
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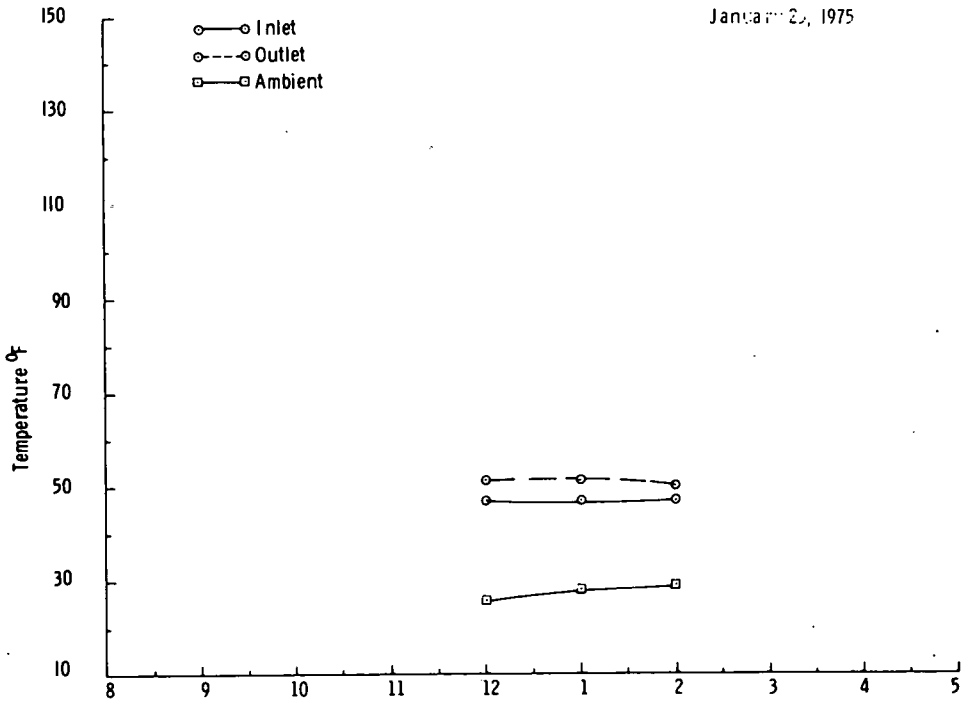
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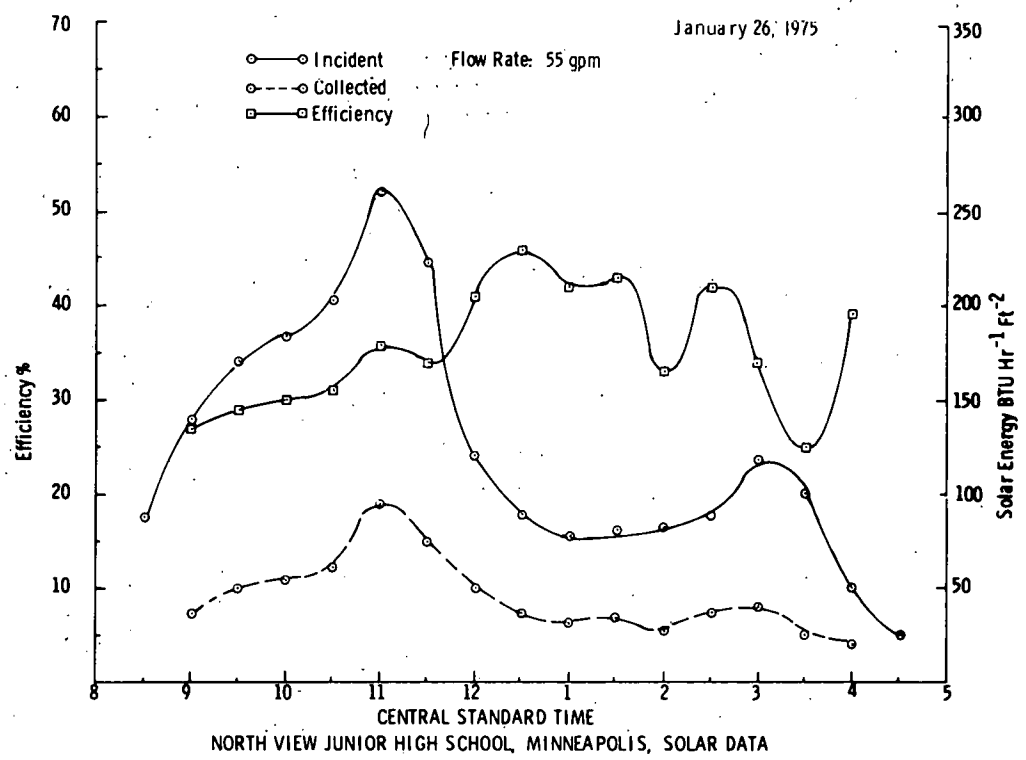
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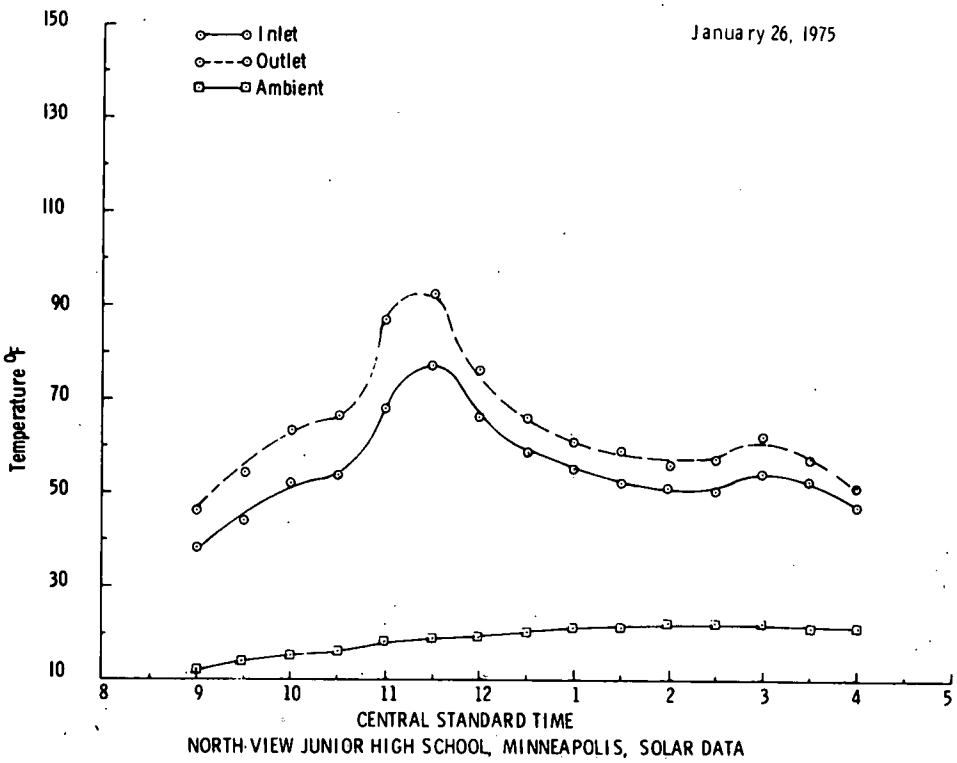
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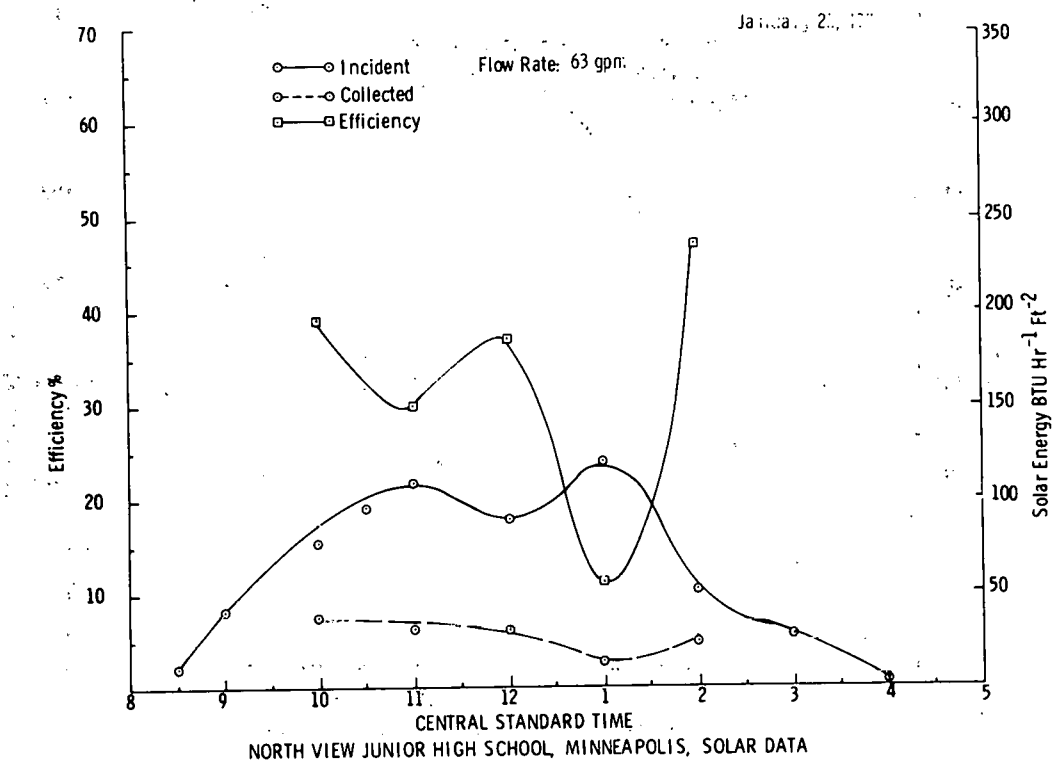
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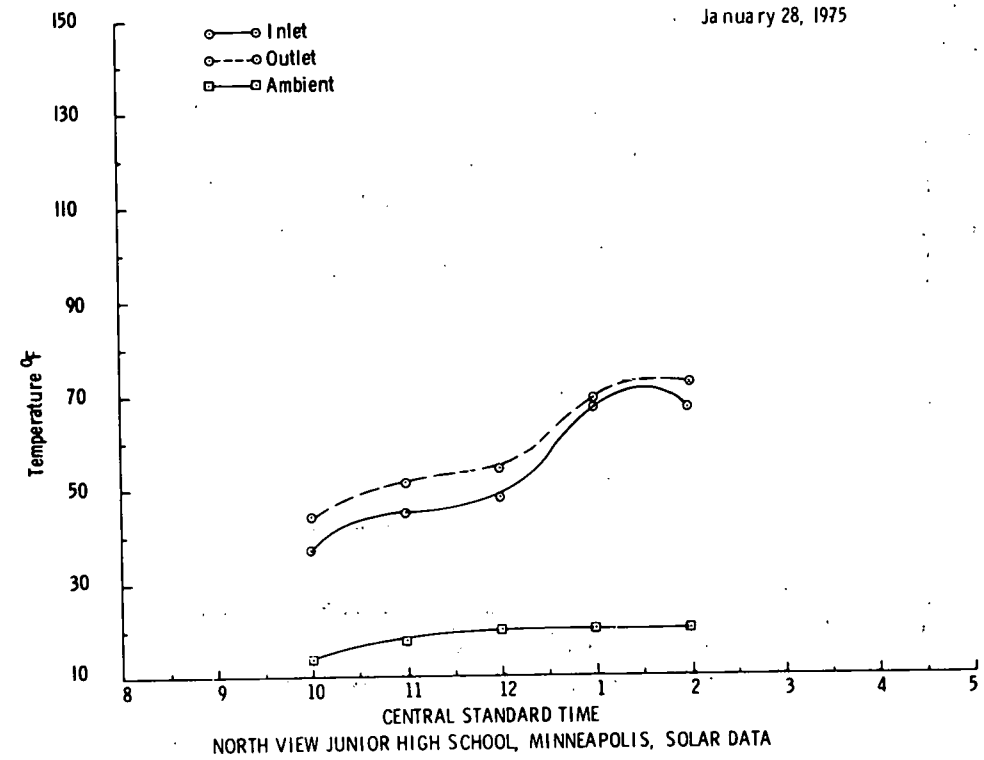
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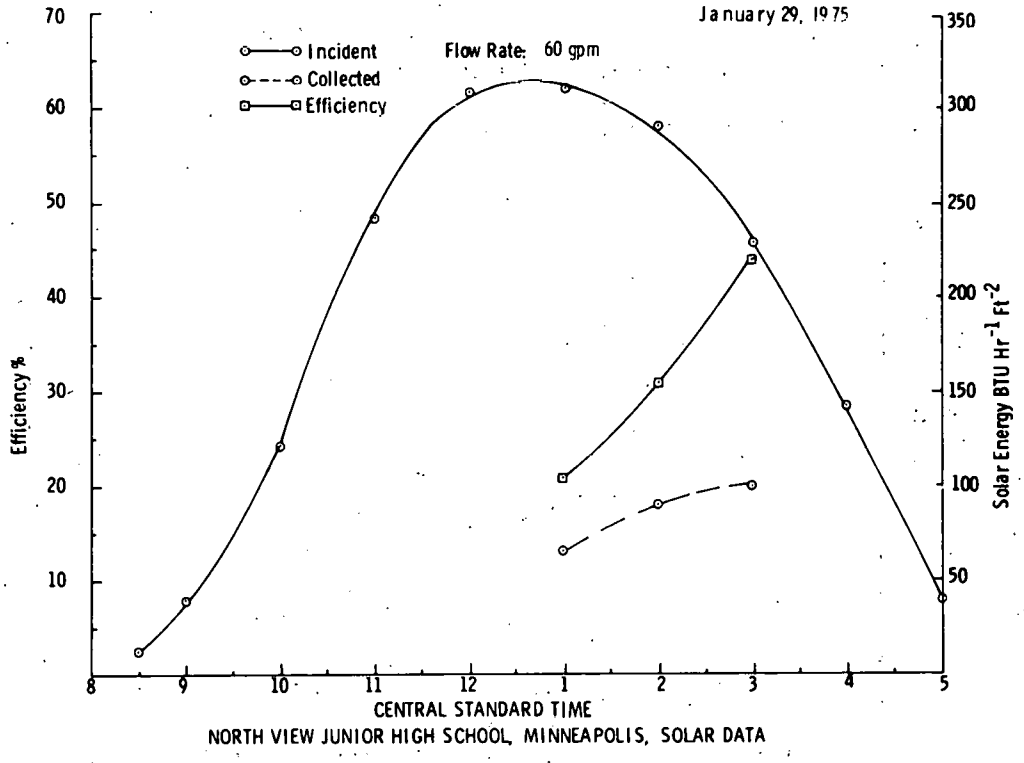
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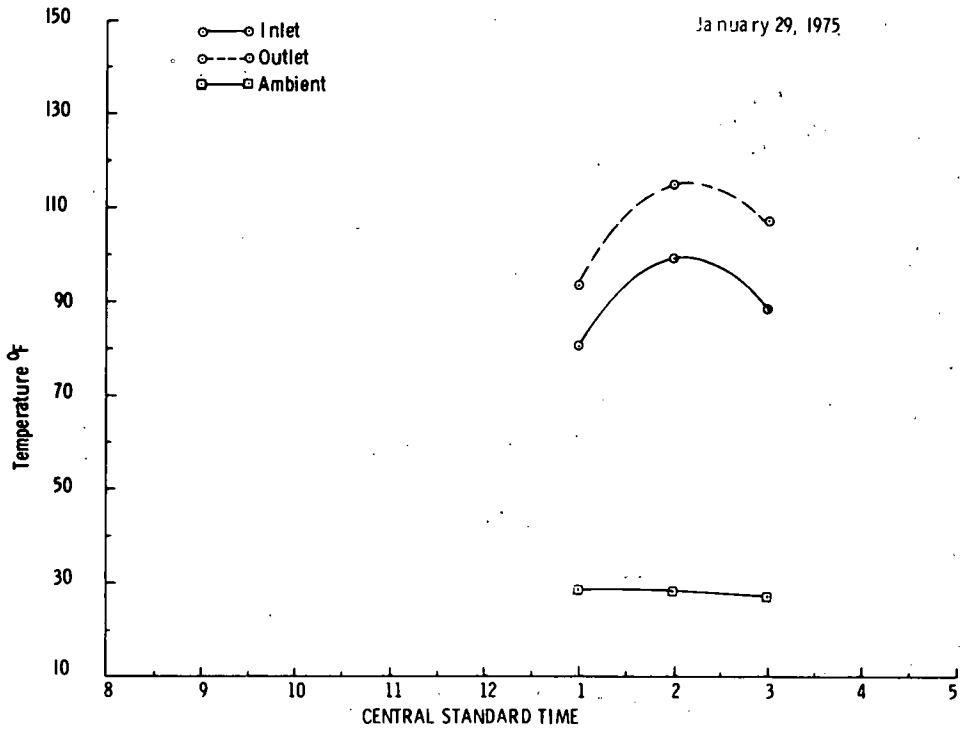
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



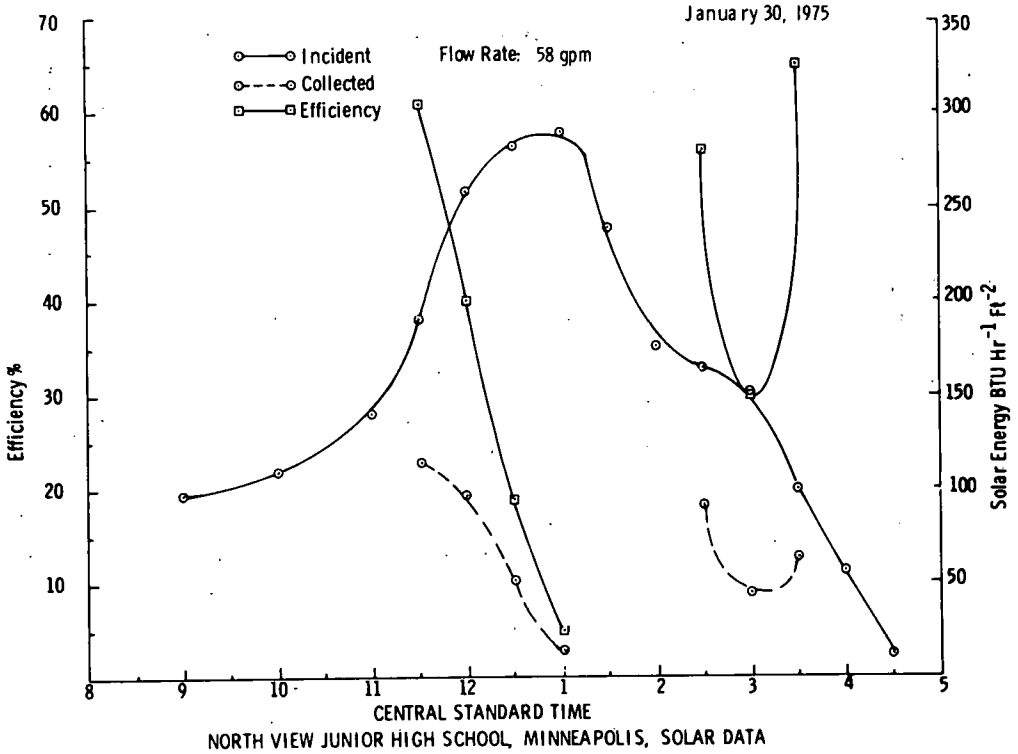
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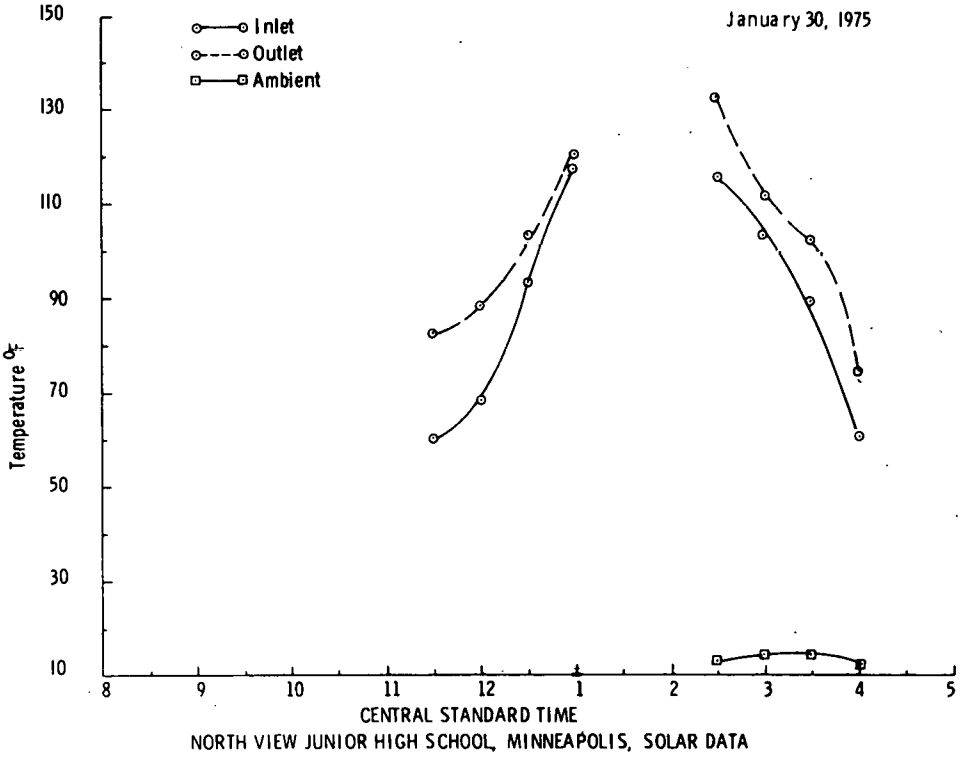
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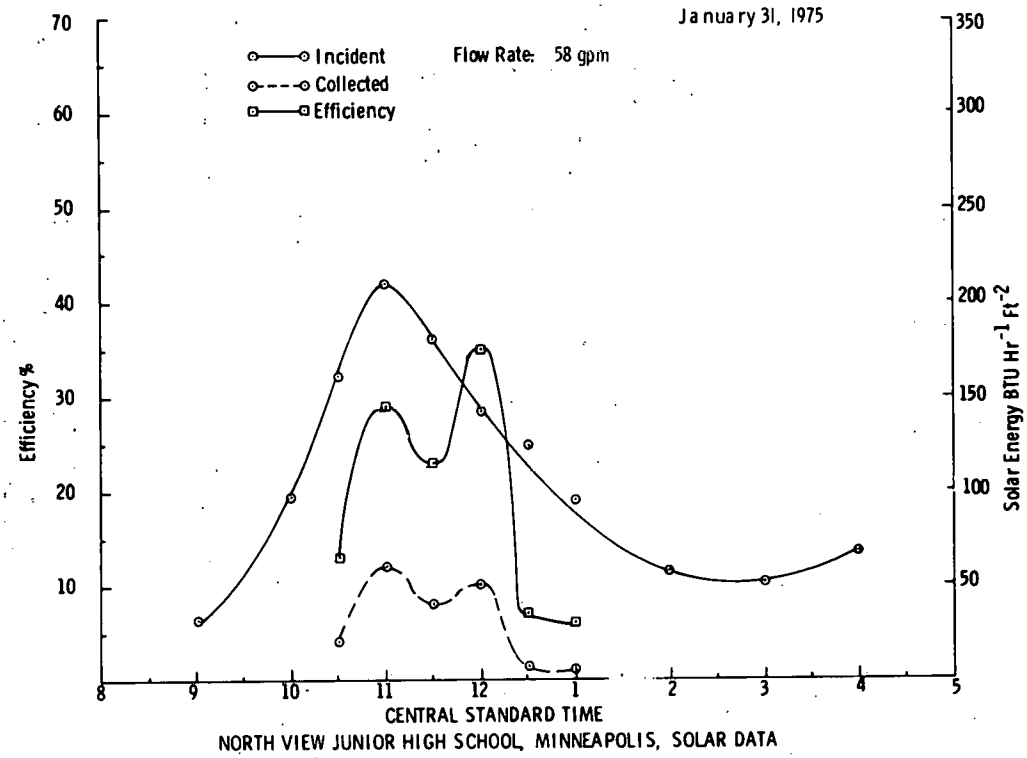
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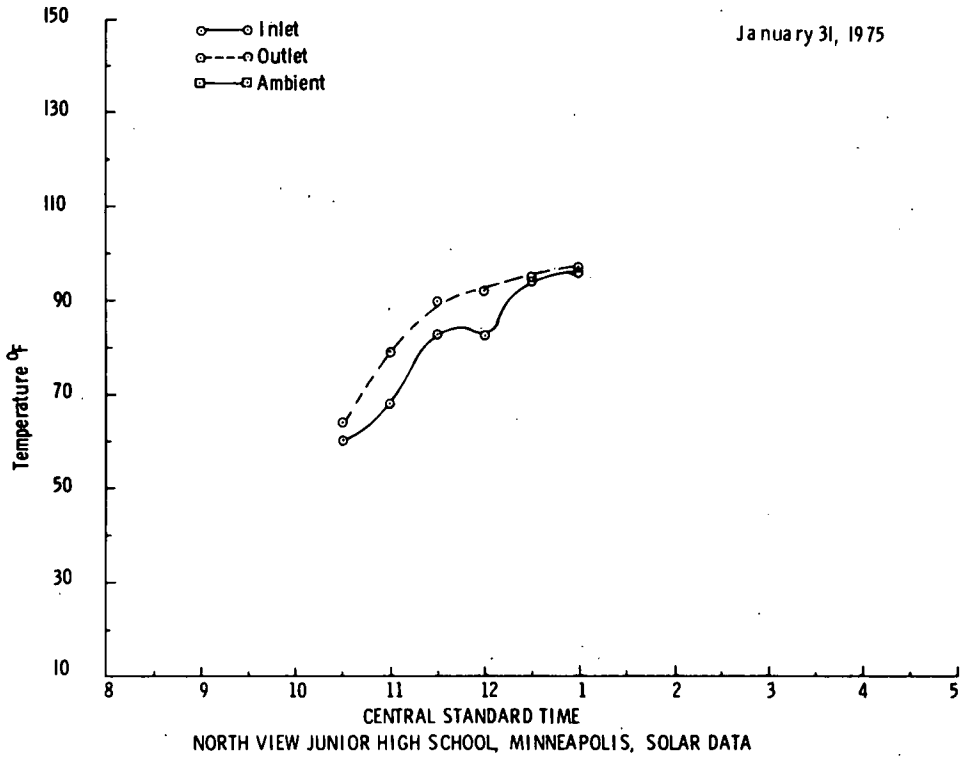
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



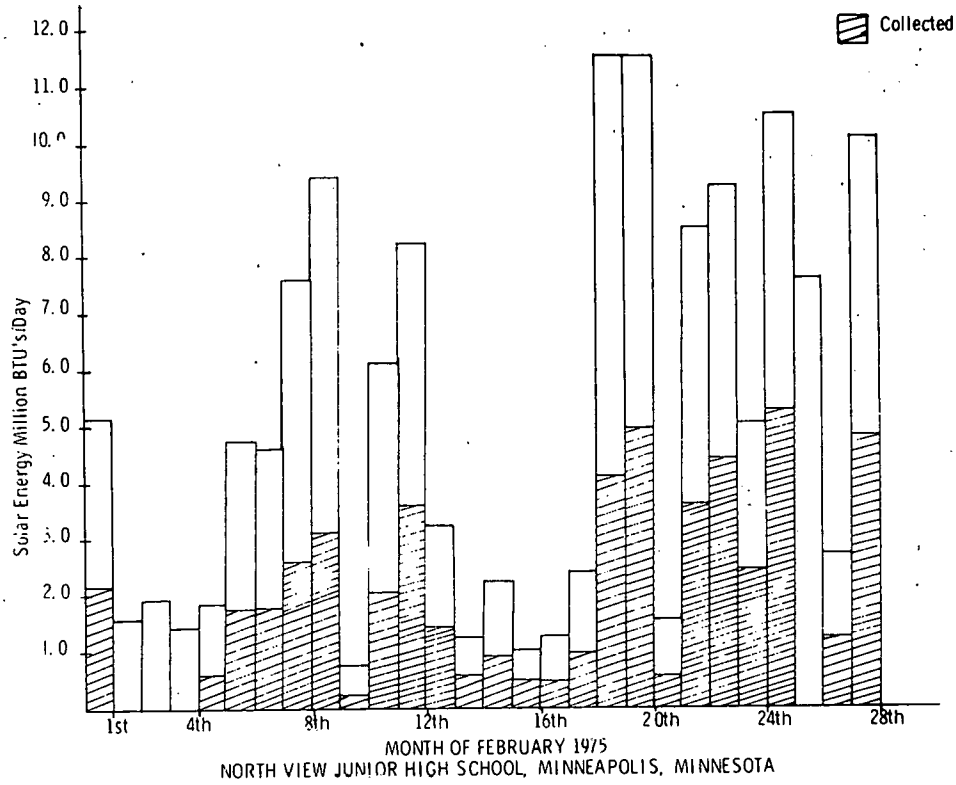
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

North View Junior High
Month of February 1975

Date	Mode of Operation	Overall Eff. = $\frac{Q_{collected}}{Q_{incident}}$
Feb. 1	Air Heating From Collector	42%
Feb. 2	No Collection	---
Feb. 3	No Collection	---
Feb. 4	No Collection	---
Feb. 5	Air Heating From Collector	35% (1 hour)
Feb. 6	Air Heating and Storage	36%
Feb. 7	Air Heating From Collector	39%
Feb. 8	Air Heating From Collector	34%
Feb. 9	Air and Water Heating From Collector	33. 50%
Feb. 10	Air Heating From Collector	28%
Feb. 11	Air and Water Heating From Collector	33%
Feb. 12	Air Heating From Collector	44%
Feb. 13	Air Heating From Collector	46%
Feb. 14	Air Heating From Collector	45%
Feb. 15	Air Heating From Collector	42%
Feb. 16	Air Heating From Collector	48%
Feb. 17	Air Heating From Collector	40%
Feb. 18	Air Heating From Collector	43%
Feb. 19	Air and Water Heating and Storage From Collector	36%
Feb. 20	Air and Water Heating and Storage From Collector	45%
Feb. 21	Air Heating From Collector	35%
Feb. 22	Air and Water Heating From Collector	43%
Feb. 23	Air and Water Heating From Collector	50%
Feb. 24	Air Heating From Collector	49%
Feb. 25	Air and Water Heating From Collector	50%
Feb. 26	System Repair, No Collection	---
Feb. 27	Air and Water Heating From Collector	45%
Feb. 28	Air and Water Heating From Collector	48%


Collected
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
Solar Energy Million BTU's/Day
1st
4th
8th
12th
16th
20th
24th
28th
MONTH OF FEBRUARY 1975
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, MINNESOTA

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

MINNEAPOLIS-ST.PAUL, MINNESOTA
NAT WEATHER SERVICE FCST OFC
INTERNATIONAL AIRPORT
FEBRUARY 1975

LATITUDE 44° 53' N LONGITUDE 93° 13' W ELEVATION (GROUND) 834 FT. STANDARD TIME USED: CENTRAL WBAN #14922

DAY	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING	COOLING	WEATHER TYPES ON DATES OF OCCURRENCE (1 FOG, 2 HEAVY FOG *, 3 THUNDERSTORM, 4 ICE PELLETS, 5 HAIL, 6 GLAZE, 7 DUSTSTORM, 8 SMOKE, HAZE, 9 BLOWING SNOW)	SNOW, ICE PELLETS OR ICE ON GROUND AT 06AM IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. ELEV. 838 FEET M.S.L.	WIND RESULTANT DIRECTION	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE HOURS AND TENTHS	PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DAY
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	21	4	13	0	9	52	0	1 8	15	T	.1	29.63	05	2.5	3.9	8	E	8.5	87	7	7	1
2	28	15	21	8	18	44	0	1 6 8	15	.02	.2	29.60	12	5.2	5.3	8	SE	0.0	0	10	10	2
3	29	24	27	14	21	38	0	8	15	0	0	29.55	14	10.1	10.4	16	E	0.0	0	10	10	3
4	30	26	28	14	25	37	0	1 4 6	15	.17	1.6	29.29	11	5.5	7.5	11	SE	0.0	0	10	10	4
5	27	5	16	2	14	49	0	1	17	.09	1.3	29.18	32	12.8	13.2	21	NW	5.0	50	10	10	5
6	7	-5	1	-13	-10	64	0		17	0	0	29.16	29	10.8	11.5	17	NW	9.8	98	6	4	6
7	15	-6	5	-9	- 6	60	0		16	0	0	29.29	28	10.8	11.5	17	NW	7.0	69	8	8	7
8	1	-17	-8	-23	-19	73	0		16	0	0	29.34	27	6.9	10.4	23	NW	9.3	92	6	4	8
9	2	-22*	-10*	-25	-22	75	0	1	16	0	0	29.34	30	10.7	11.2	19	NW	10.1	99	4	3	9
10	10	-1	5	-10	- 5	60	0		16	.29	3.6	29.34	21	7.1	8.2	16	SW	0.0	0	10	7	10
11	16	-10	3	-12	- 2	62	0	1 8	18	T	T	29.08	11	9.3	11.8	16	SE	8.4	82	4	5	11
12	13	-3	5	-11	- 2	60	0		19	.01	.1	29.08	29	1.9	3.9	8	E	6.3	61	7	8	12
13	9	-5	2	-14	-12	63	0		19	T	.1	29.33	30	11.3	12.2	20	NE	5.0	49	10	10	13
14	23	9	16	0	1	49	0		19	0	0	29.41	02	3.6	5.3	10	NE	0.0	0	10	10	14
15	28	22	25	9	15	40	0		18	0	0	29.26	08	7.3	7.8	8	NE	0.0	0	10	10	15
16	31	23	27	10	18	38	0		17	0	0	29.21	01	2.9	3.9	5	NE	0.0	0	10	10	16
17	32	27	30*	13	23	35	0		17	.08	.9	29.00	03	2.6	5.8	12	E	0.0	0	10	10	17
18	27	6	17	0	21	48	0	1	18	.08	.9	28.96	30	7.5	8.2	17	NW	0.4	2	10	8	18
19	25	0	13	-5	6	52	0	1	18	0	0	28.94	21	5.8	7.1	15	SW	10.3	97	0	0	19
20	30	8	18	0	13	47	0	1 8	17	0	0	28.84	15	6.1	6.3	6	SE	10.7	100	0	0	20
21	36*	15	26	8	23	39	0	1 4 8	17	.05	.2	28.87	15	8.8	11.8	23	W	1.9	18	10	7	21
22	35	20	28	9	22	37	0		14	T	T	29.08	26	12.3	12.9	27	W	6.5	60	7	8	22
23	30	16	23	4	17	42	0		13	T	T	29.10	34	9.9	11.1	18	NE	8.8	81	3	7	23
24	32	17	25	6	22	40	0		13	0	0	28.75	35	11.6	13.2	20	N	7.5	69	6	6	24
25	35	23	29	9	20	36	0		13	T	T	28.62	28	22.1	22.4	37	NW	8.8	82	3	4	25
26	27	12	20	0	12	45	0		13	T	T	29.11	30	16.4	17.4	25	NW	6.8	62	9	8	26
27	28	12	20	0	16	45	0		13	T	T	28.98	16	1.4	7.5	15	SE	3.9	35	9	8	27
28	22	9	16	-5	9	49	0		13	0	0	29.00	31	12.8	13.2	19	NW	11.0	99	1	1	28

SUM	SUM				TOTAL	TOTAL		TOTAL	TOTAL	FOR THE MONTH:								TOTAL	%	SUM	SUM	
647	222				1379	0	NUMBER OF DAYS	.79	8.0	29.14	31	3.3	9.7	37	NW	146.1	FOR	201	193	
AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.	PRECIPITATION	DEP.						DATE: 25		291.8	POSSIBLE MONTH	50	AVG.	AVG.		
23.1	7.9	15.5	-1.0	9	21	0	.01 INCH 8	-0.05											7.2	6.9		

NUMBER OF DAYS				SEASON TO DATE		SNOW, ICE PELLETS		GREATEST IN 24 HOURS AND DATES				GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE
MAXIMUM TEMP.		MINIMUM TEMP.		TOTAL	TOTAL	.1 INCH 3		PRECIPITATION		SNOW, ICE PELLETS		
≥ 90 °F	≤ 32 °F	≤ 32 °F	≤ 0 °F	DEP.	DEP.	THUNDERSTORMS 0		.29	10	3.6	10	19 14+
0	25	28	9	-159	0	HEAVY FOG * 0		CLEAR 5	PARTLY CLOUDY 8	CLOUDY 15		

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1	T	T	T			T	T	T																	1
2							T	.01	T	.01	T	T													2
3																									3
4	T	.01	.01	.01	T	T	T					T	.01	.01	.01	.02	.01	.01	.02	.01	.02	.01	.01	T	4
5	T	.01	.01	.01	.01	T	.01	.01	T	T			T	T	T	T	T	.01	T	.01	.01	T	T		5
6																									6
7																									7
8																									8
9																									9
10												T	.02	.01	.01	.01	.08	.06	.06	.03	.01	T	T	T	10
11																						T	T	T	11
12	T	T	T	T	T	T	T	T	.01	T															12
13																T	T	T	T	T	T				13
14																									14
15																									15
16																									16
17																		T		T	T	.04	.01	.02	17
18	.01	.01	.01	.01	T	.01	.01	T	T	T	T	.01	T	.01	T	T	T								18
19																									19
20																									20
21									T	T	T	.01	.04	T											21
22					T	T	T						T	T											22
23																									23
24																									24
25	T	T	T	T																					25
26			T	T	T.				T	T					T										26
27	T	T																T	T						27
28																									28

MINNEAPOLIS-ST. PAUL, MINNESOTA

* EXTREME TEMPERATURES FOR THE MONTH, MAY BE THE LAST OF MORE THAN ONE OCCURRENCE.
- BELOW ZERO TEMPERATURE OR NEGATIVE DEPARTURE FROM NORMAL.
* ≥ 10° AT ALASKAN STATIONS.
\# ALSO ON AN EARLIER DATE, OR DATES.
\# HEAVY FOG RESTRICTS VISIBILITY TO 1/4 MILE OR LESS.
T IN THE HOURLY PRECIPITATION TABLE AND IN COLUMNS 9, 10, AND 11 INDICATES AN AMOUNT TOO SMALL TO MEASURE

THE SEASON FOR DEGREE DAYS BEGINS WITH JULY FOR HEATING AND JANUARY FOR COOLING.
DATA IN COLUMNS 6, 12, 13, 14, AND 15 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
WIND DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. RESULTANT WIND IS THE VECTOR SUM OF WIND DIRECTIONS AND SPEEDS DIVIDED BY THE NUMBER OF OBSERVATIONS. FIGURES FOR DIRECTIONS ARE TENS OF DEGREES FROM TRUE NORTH: I.E., 09=EAST, 18=SOUTH, 27=WEST, 36=NORTH, AND 00=CALM. WHEN DIRECTIONS ARE IN TENS OF DEGREES IN COL. 17, ENTRIES IN COL. 16 ARE FASTEST OBSERVED 1-MINUTE SPEEDS. IF THE / APPEARS IN COL. 17, SPEEDS ARE GUSTS.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

SUBSCRIPTION PRICE: LOCAL CLIMATOLOGICAL DATA $2.55 PER YEAR INCLUDING ANNUAL ISSUE IF PUBLISHED. FOREIGN MAILING $2.10 EXTRA. SINGLE COPY: 20¢ FOR MONTHLY ISSUE; 15¢ FOR ANNUAL SUMMARY. MAKE CHECKS PAYABLE TO DEPARTMENT OF COMMERCE, NOAA. SEND PAYMENTS AND ORDERS TO NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC CENTER, ASHEVILLE, NORTH CAROLINA, 28801

William S. Haggard

DIRECTOR, NATIONAL CLIMATIC CENTER

SUMMARY BY HOURS

HOUR (LOCAL TIME)	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE °F AIR	WET BULB	DEW PT.	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
00	7	29.15	15	14	9	75	9.1	30	2.5
03	7	29.14	14	13	7	73	8.8	31	3.9
06	7	29.13	13	12	6	73	9.7	31	2.9
09	8	29.16	14	13	7	74	9.8	32	2.6
12	8	29.15	19	17	10	68	10.8	32	3.2
15	7	29.11	21	19	11	66	10.9	30	4.2
18	7	29.12	20	18	11	69	9.6	30	3.4
21	6	29.13	17	16	10	73	8.9	30	3.7

USCOMM - NOAA - ASHEVILLE 750
03/19/75

OBSERVATIONS AT 3-HOUR INTERVALS

DAY 01

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	50	2		S	13	12	08	84	35	3
03	10	33	6		OFK	04	03	-01	78	39	4
06	10	30	7		S	10	10	07	84	02	5
09	10	UNL	10			10	10	07	88	00	0
12	10	UNL	10			17	16	11	77	00	0
15	3	UNL	10			20	18	13	74	14	5
18	1	UNK	7			18	17	12	77	07	5
21	10	26	10			17	16	12	81	07	4

DAY 02

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	27	8			15	15	12	88	12	4
03	10	16	5		FK	17	17	14	88	00	0
06	10	22	4		F	16	16	15	92	14	5
09	10	11	1	0	FLSF	20	20	18	92	11	6
12	10	9	1	0	FLSF	22	22	20	92	12	5
15	10	11	1	0	SF	25	24	21	89	13	4
18	10	16	3		SF	26	25	22	85	11	6
21	10	23	8		F	26	25	22	85	10	7

DAY 03

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	50	8			26	25	22	85	12	6
03	10	60	8			25	23	19	78	16	9
06	10	50	8			25	23	19	78	14	10
09	10	40	8			25	23	19	78	16	9
12	10	50	8			27	26	22	81	13	12
15	10	40	8			29	27	22	75	14	12
18	10	40	8			28	26	21	75	14	10
21	10	55	8			28	26	20	72	12	8

DAY 04

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	20	7			28	27	23	78	14	9
03	10	20	2		SIP	27	27	25	92	13	7
06	10	10	4		SF	27	26	24	88	12	7
09	10	20	4		F	27	26	24	88	13	8
12	10	10	2	0	SF	28	27	24	85	12	7
15	10	10	1		SF	30	28	26	85	07	4
18	10	10	1		SF	28	28	26	89	01	5
21	10	20	2		SF	28	28	26	92	01	5

DAY 05

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	20	2		SF	27	26	24	88	36	5
03	10	20	2		SF	25	24	22	88	33	13
06	10	15	3		S	20	19	16	84	32	10
09	10	9	3		S	17	16	15	84	33	10
12	10	20	7			18	18	13	77	32	14
15	10	20	2		S	17	16	12	81	30	15
18	10	28	4		S	15	14	10	80	31	12
21	10	35	4		S	11	10	05	77	32	13

DAY 06

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	7	UNL	25			05	04	-02	72	31	13
03	0	UNL	25			00	00	-13	54	31	11
06	0	UNL	25			-04	-05	-16	56	27	9
09	2	UNL	12			-01	-02	-13	86	30	8
12	0	UNL	15			05	03	-09	52	31	12
15	0	UNL	20			07	05	-07	52	28	14
18	7	UNL	20			02	01	-08	59	25	7
21	0	UNL	25			-01	-02	-10	69	28	6

DAY 07

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	25			-04	-04	-12	68	24	6
03	10	200	15			-04	-04	-12	68	23	5
06	10	75	15			-02	-02	-11	85	18	6
09	10	80	20			00	00	-08	88	13	5
12	10	50	20			10	08	-02	58	24	8
15	9	UNL	25			15	12	02	56	29	12
18	7	UNL	25			13	11	01	58	30	14
21	10	110	25			07	05	-07	52	31	14

DAY 08

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	3	UNL	25			01	00	-19	46	32	15
03	1	UNL	20			-04	-05	-18	50	30	8
06	9	UNL	15			-07	-07	-18	58	31	9
09	9	UNL	20			-08	-08	-20	55	31	8
12	10	UNL	20			-03	-04	-17	50	31	7
15	2	UNL	25			-02	-03	-17	48	32	12
18	2	UNL	25			-06	-07	-20	50	28	10
21	2	UNL	25			-11	-11	-25	49	27	9

DAY 09

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	25			-17	-17	-28	56	25	7
03	0	UNL	8			-20	-20	-28	65	22	5
06	0	UNL	6		IF	-21	-21	-30	62	24	6
09	7	UNL	25			-16	-16	-26	59	23	7
12	6	UNL	25			-04	-05	-17	53	19	6
15	1	UNL	25			01	00	-15	46	20	19
18	2	UNL	25			-02	-03	-16	51	17	9
21	2	UNL	25			-04	-05	-16	56	15	5

DAY 10

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	5	UNL	25			-01	-02	-12	59	15	15
03	0	UNL	20			00	00	-11	59	14	9
06	0	130	15			00	00	-11	59	13	8
09	10	100	15			02	01	-08	62	12	10
12	10	31	2		S	07	06	-03	63	11	14
15	10	60	4		S	10	08	01	67	08	10
18	10	5	0	8	S	08	07	00	70	05	9
21	10	20	3		S	08	07	01	73	03	7

DAY 11

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00						03	02	-03	76	02	5
03	0	UNL	10			-01	-01	-07	75	36	4
06	0	UNL	10			-02	-02	-11	69	35	3
09	0	UNL	3		GF	-02	-02	-08	75	00	0
12	4	UNL	6		K	10	08	03	73	00	0
15	10	80	6		K	16	14	06	64	23	3
18	10	36	8			11	08	01	64	24	5
21	10	20	10			14	12	05	67	25	7

DAY 12

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	14	8		S	13	12	08	73	26	7
03	10	18	6		S	13	12	07	77	28	8
06	10	15	4		S	10	09	05	80	28	8
09	5	60	10		S	10	09	01	67	33	12
12						08	07	-04	55	31	17
15						04	04	-08	52	30	13
18						-02	-03	-16	51	17	9
21						02	01	-12	51	34	8

DAY 13

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	140	25			-01	-02	-14	93	35	8
03	8	150	25			-01	-02	-16	90	01	0
06	8	150	15			-04	-05	-18	90	01	7
09	9	UNL	20			-04	-05	-17	93	36	5
12	9	200	20			05	03	-13	83	00	0
15	10	44	15			07	05	-10	85	00	0
18	10	30	1	8	S	08	08	-02	89	17	4
21	10	50	19		S	08	08	08	96	08	7

DAY 14

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	44	15			08	07	-07	48	07	7
03	10	30	10			12	09	-06	44	06	5
06	10	40	15			15	10	-01	53	08	6
09	10	40	25			15	12	00	51	10	8
12	10	38	20			18	14	-01	43	12	6
15	10	42	20			22	17	02	42	08	8
18	10	38	25			22	17	06	50	06	8
21	10	40	25			23	20	11	60	05	6

DAY 15

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	44	25			23	20	12	63	02	5
03	10	42	25			22	19	11	62	36	9
06	10	40	20			22	19	11	62	02	10
09	10	40	25			22	20	13	68	02	8
12	9	44	25			27	24	15	61	02	9
15	10	46	25			28	25	17	60	36	5
18	10	44	25			27	24	16	60	33	5
21	10	40	25			26	24	18	72	35	5

DAY 16

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	38	25			25	23	18	75	31	4
03	10	36	12			24	23	18	78	31	4
06	10	40	12			23	22	18	81	00	0
09	10	38	10			24	23	19	81	04	4
12	10	38	10			27	25	19	72	00	0
15	10	42	10			30	27	20	66	04	5
18	10	40	15			30	27	21	69	01	4
21	10	36	12			30	27	22	72	09	6

DAY 17

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	27	12			30	27	22	72	00	0
03	10	21	12			28	27	22	75	06	5
06	10	19	12			28	26	22	78	09	7
09	10	22	10			29	27	23	78	36	4
12	10	20	12			31	28	23	72	32	8
15	10	20	25			32	29	23	69	30	3
18	10	26	20			31	28	24	75	00	0
21	10	15	1	8	S	30	28	27	88	29	4

DAY 18

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	20	2		S	27	27	25	92	32	6
03	10	14	2		S	27	27	25	92	26	5
06	10	14	2		S	28	26	24	92	31	6
09	10	8	1	4	SF	26	25	23	88	26	5
12	10	11	3		SF	27	26	22	81	30	10
15	10	20	7			27	25	20	75	30	12
18	10	21	25			25	23	18	75	32	8
21	0	UNL	12			13	13	10	88	25	4

DAY 19

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	10			07	07	04	87	24	5
03	0	UNL	10			03	01	-05	72	24	4
06	0	UNL	15			08	07	07	72	18	4
09	0	UNL	7			04	03	-01	79	12	5
12	0	UNL	25			22	20	15	74	20	11
15	0	UNL	25			24	22	15	68	24	12
18	0	UNL	15			25	21	15	73	23	9
21	0	UNL	15			18	15	12	84	21	3

DAY 20

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	8	UNL	10			15	15	13	92	16	4
03	0	UNL	10			10	10	07	88	17	6
06	0	UNL	8			07	07	04	87	14	6
09	0	UNL	7	8	GFK	10	10	07	88	13	5
12	0	UNL	3		K	22	20	15	74	18	6
15	0	UNL	4		K	30	27	20	66	16	7
18	0	UNL	5		K	24	23	18	78	13	6
21	0	UNL	5		K	20	19	17	88	18	4

DAY 21

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	4		GF	17	17	14	88	12	6
03	0	UNL	5		GF	16	16	13	88	12	7
06	0	UNL	6		GF	20	19	17	88	12	9
09	10	250	4		K	27	25	21	78	12	10
12	10	40	4		RF	32	31	28	85	13	13
15	10	22	3		K	34	32	30	85	15	10
18	10	21	4		K	36	34	31	82	21	14
21	10	31	15			36	33	28	76	22	13

DAY 22

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	25	20			35	32	28	76	25	10
03	10	19	25			30	28	23	75	25	10
06	10	17	25			30	28	24	78	28	10
09	10	13	15		S	28	27	23	82	25	12
12	1	UNL	25			30	27	22	72	27	10
15	9	UNL	25			31	28	22	69	31	8
18	8	UNL	25			27	25	19	72	27	11
21	9	UNL	25			25	23	21	16	74	28	6

DAY 23

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	27	25			22	21	18	85	31	8
03	10	26	25			26	24	19	75	32	8
06	9	40	25		S	22	20	15	74	31	12
09	10	17	11			18	17	11	74	34	9
12	9	60	25			23	21	15	71	35	7
15	0	UNL	25			27	24	17	66	36	7
18	7	60	25			27	24	18	69	03	12
21	10	38	25			27	25	20	75	35	14

DAY 24

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	31	25			29	27	23	78	01	14
03	10	17	25			31	29	25	78	35	14
06	10	15	15			28	27	24	84	35	15
09	10	10	8			27	26	24	88	35	14
12	10	12	12			32	29	24	72	35	14
15	10	10	10			30	28	23	78	31	12
18	10	20	20			27	25	20	75	03	5
21	10	25	25			22	21	16	78	22	4

DAY 25

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	17	15			23	21	15	71	24	4
03	10	28	20		S	35	32	28	76	30	20
06	6	70	25			31	28	22	69	30	22
09	3	UNL	25			28	25	18	66	28	25
12	1	UNL	25			31	27	18	59	30	24
15	0	UNL	25			33	29	20	59	28	20
18	7	34	25			32	28	21	64	30	16
21	1	UNL	25			28	26	20	72	28	25

DAY 26

HOUR	SKY COVER (TENTHS)	CEILING (HNDS. OF FT.)	VISIBILITY (WHOLE MILES)	VISIBILITY (TENTHS MILE)	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	3	UNL	15			20	18	13	74	31	10
03	0	UNL	25			16	14	06	64	33	13
06	0	UNL	25			11	10	03	70	31	11
09	0	UNL	25			14	12	04	84	31	8
12	1	UNL	25			18	16	10	71	33	16
15	2	UNL	25			21	19	12	88	32	14
18	1	UNL	25			20	18	11	88	30	11
21	0	UNL	20			16	15	10	77	28	9

NOTES

CEILING COLUMN-
UNL INDICATES AN UNLIMITED CEILING

WEATHER COLUMN-

+	TORNADO
T	THUNDERSTORM
Q	SQUALL
R	RAIN
RW	RAIN SHOWERS
ZR	FREEZING RAIN
L	DRIZZLE
ZL	FREEZING DRIZZLE
S	SNOW
SP	SNOW PELLETS
IC	ICE CRYSTALS
SW	SNOW SHOWERS
SG	SNOW GRAINS
IP	ICE PELLETS
A	HAIL
F	FOG
IF	ICE FOG
GF	GROUND FOG
BD	BLOWING DUST
BN	BLOWING SAND
BS	BLOWING SNOW
BY	BLOWING SPRAY
K	SMOKE
H	HAZE
D	DUST

WIND COLUMNS-

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS, INDICATED IN TENS OF DEGREES FROM TRUE NORTH: I.E., 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST, ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS; MULTIPLY BY 1.15 TO CONVERT TO MILES PER HOUR.

ADDITIONAL DATA

OTHER OBSERVATIONAL DATA CONTAINED IN RECORDS ON FILE CAN BE FURNISHED AT COST VIA MICROFILM, MICROFICHE, OR PAPER COPIES OF THE ORIGINAL RECORDS. INQUIRIES AS TO AVAILABILITY AND COSTS SHOULD BE ADDRESSED TO: DIRECTOR, NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

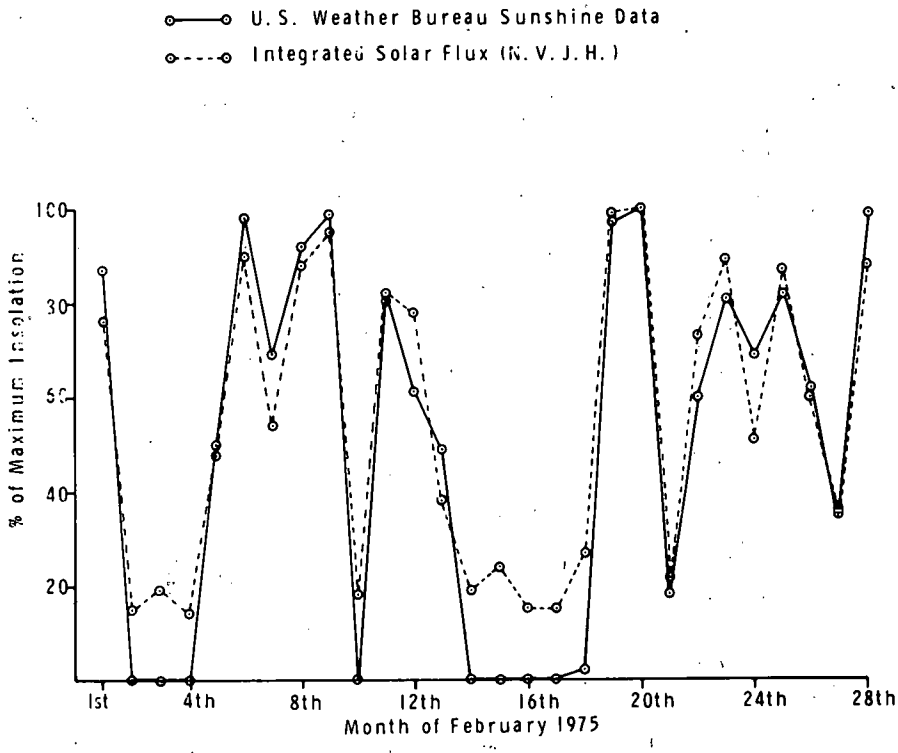
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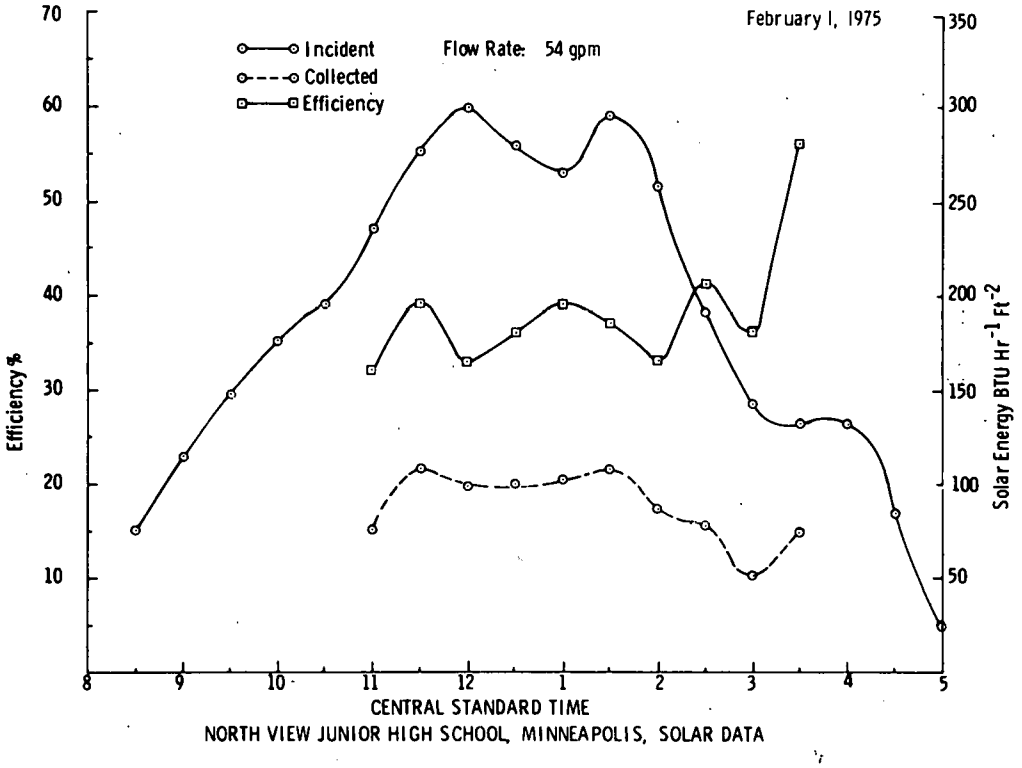
U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

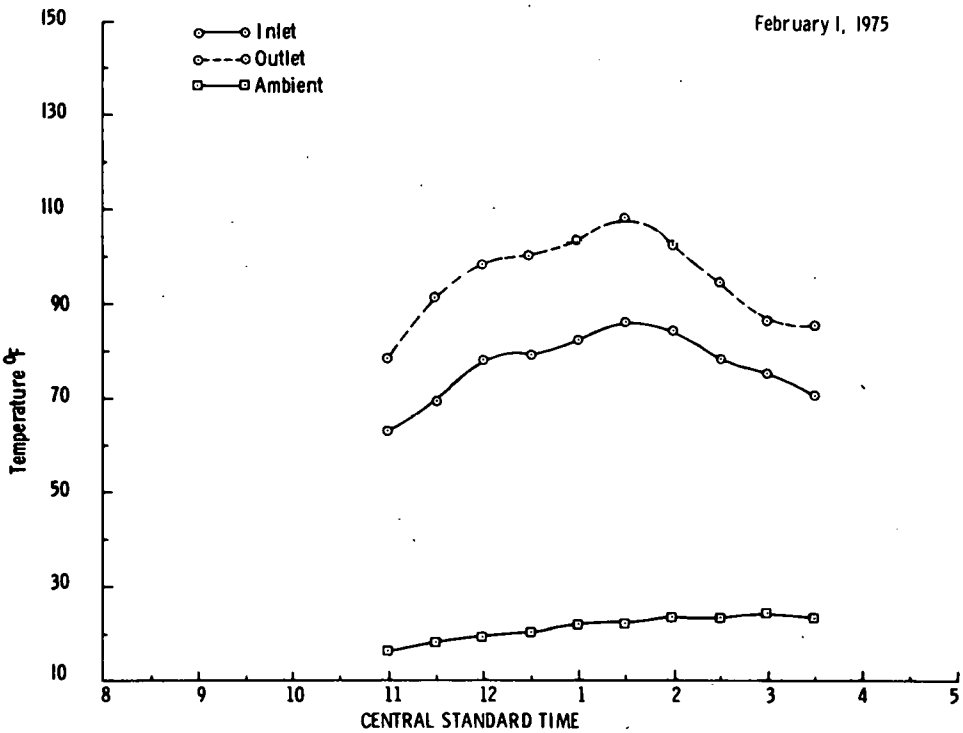
POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
210

FIRST CLASS

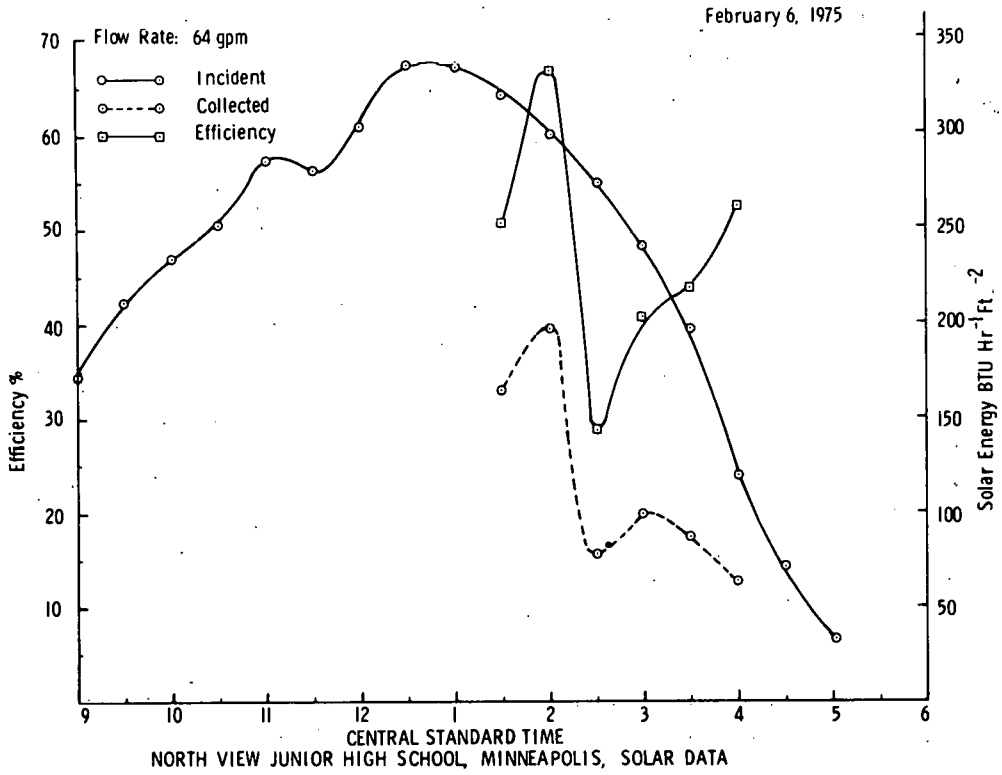

U.S. Weather Bureau Sunshine Data
Integrated Solar Flux (N.V.J.H.)
% of Maximum Insolation
100
30
50
40
20
1st
4th
8th
12th
16th
20th
24th
28th
Month of February 1975



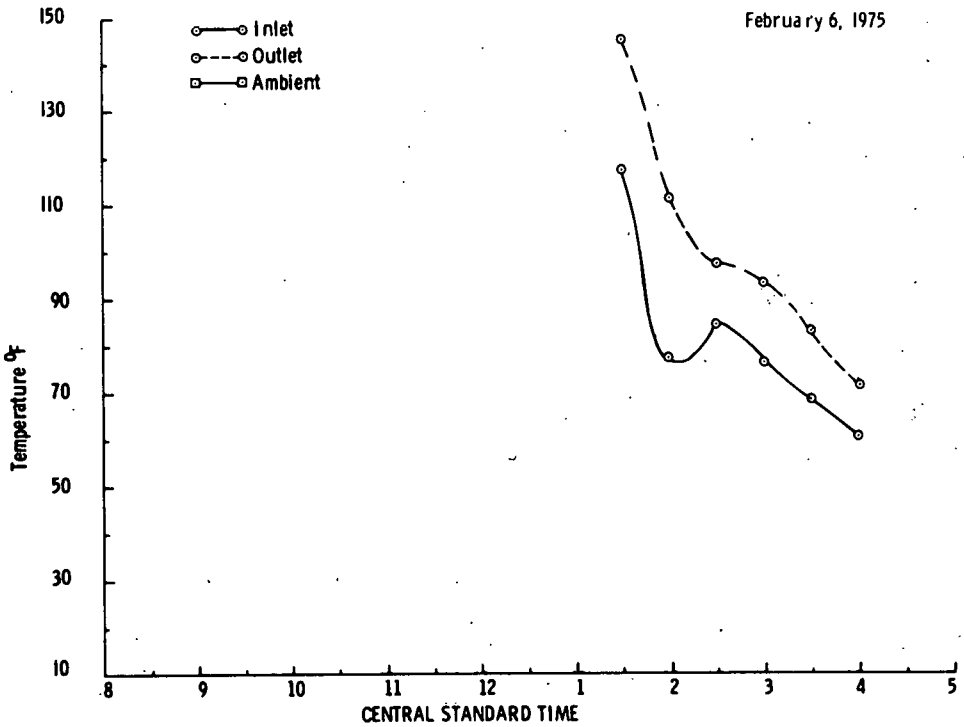
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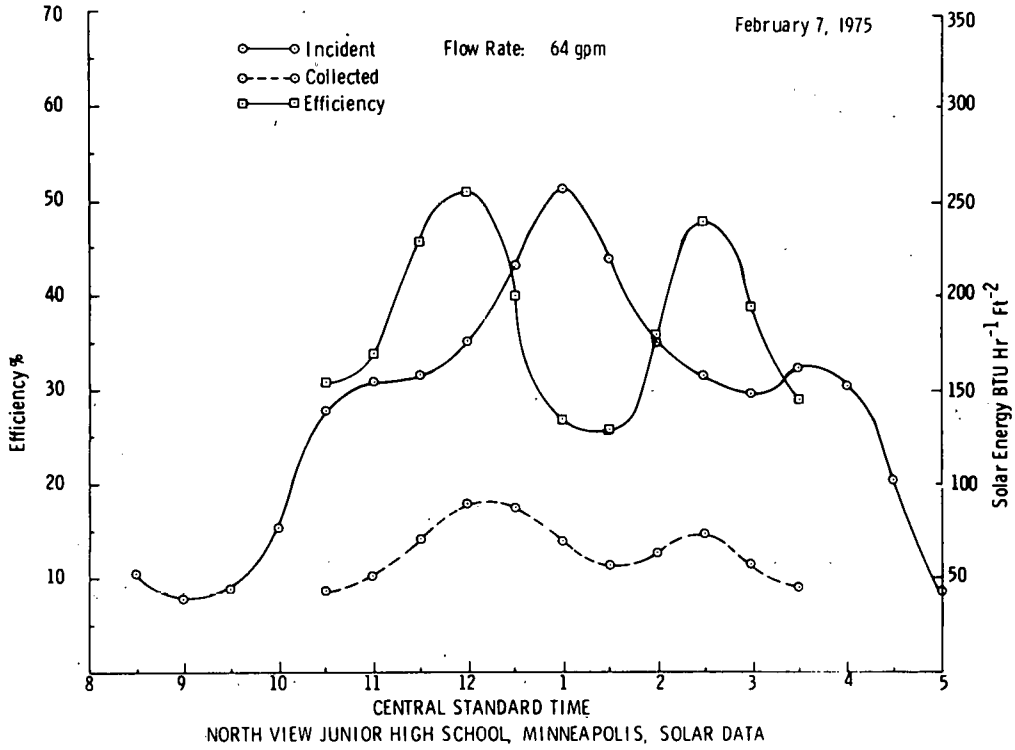
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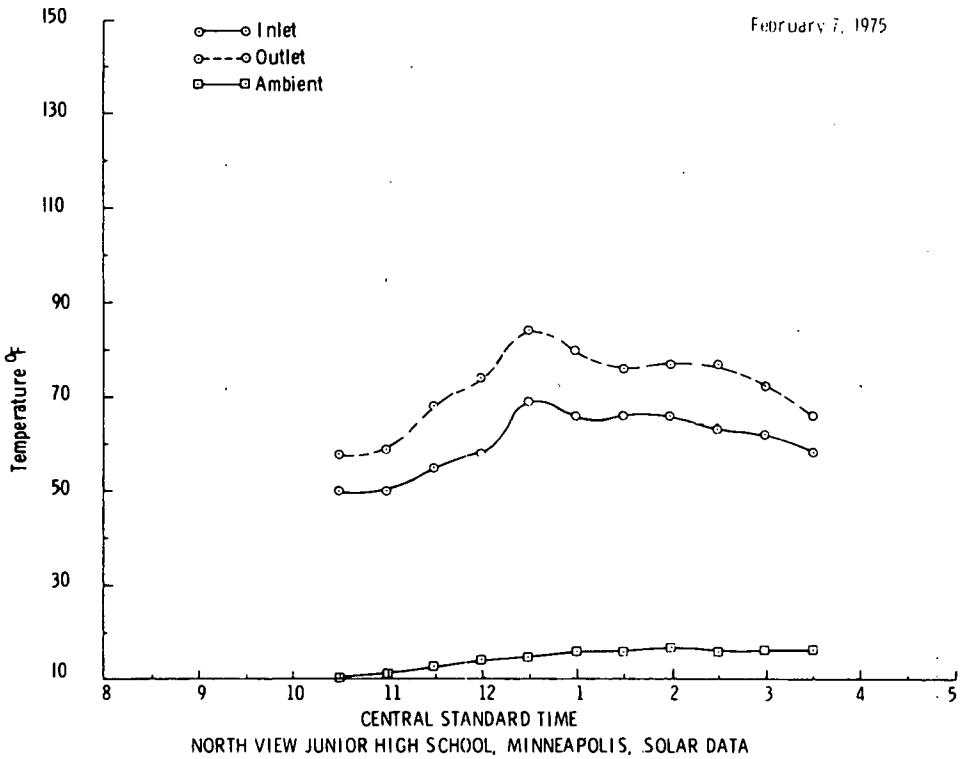
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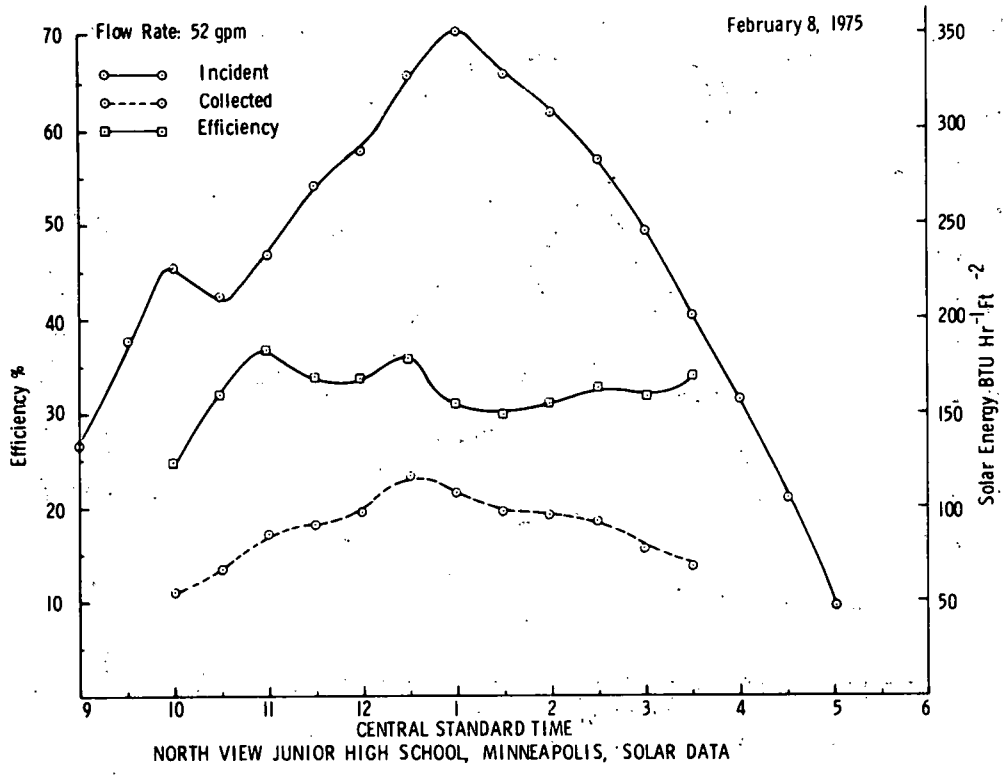
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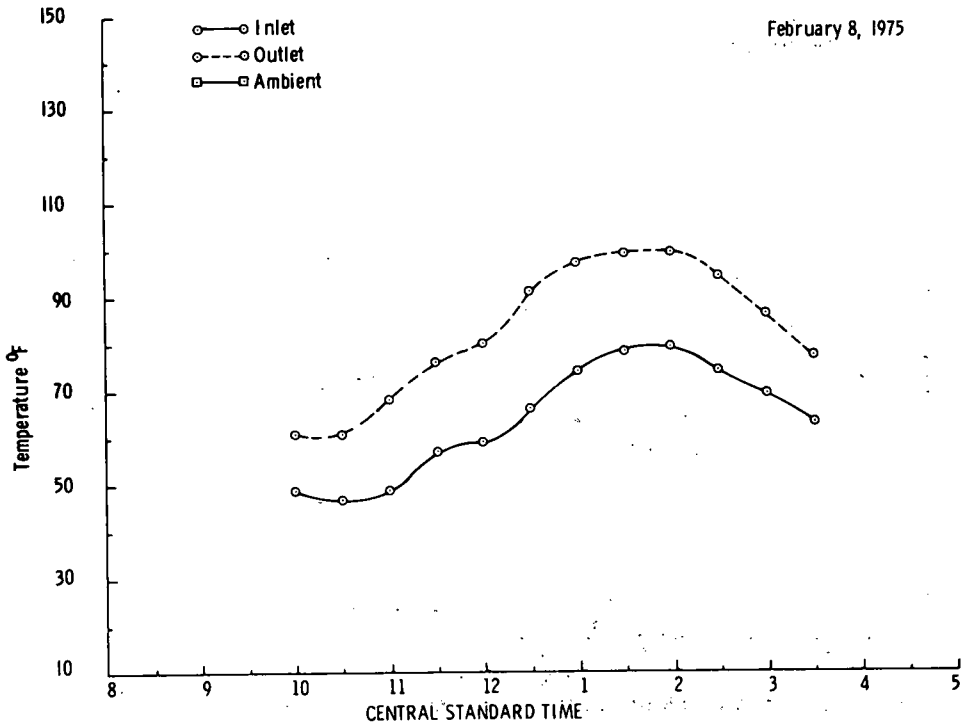
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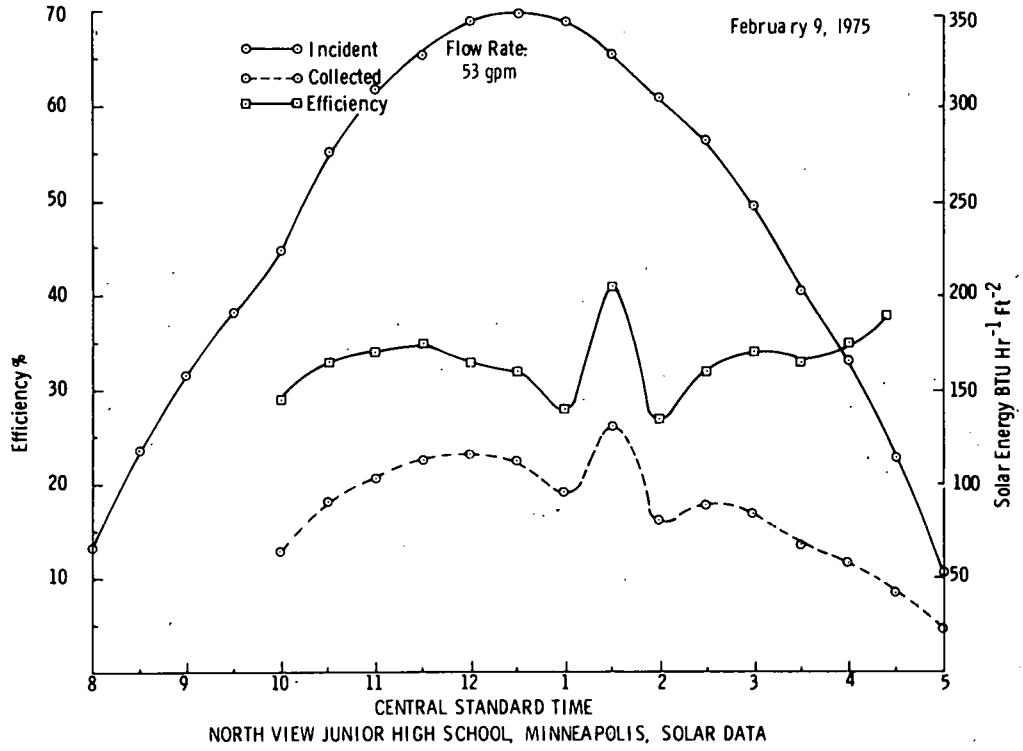
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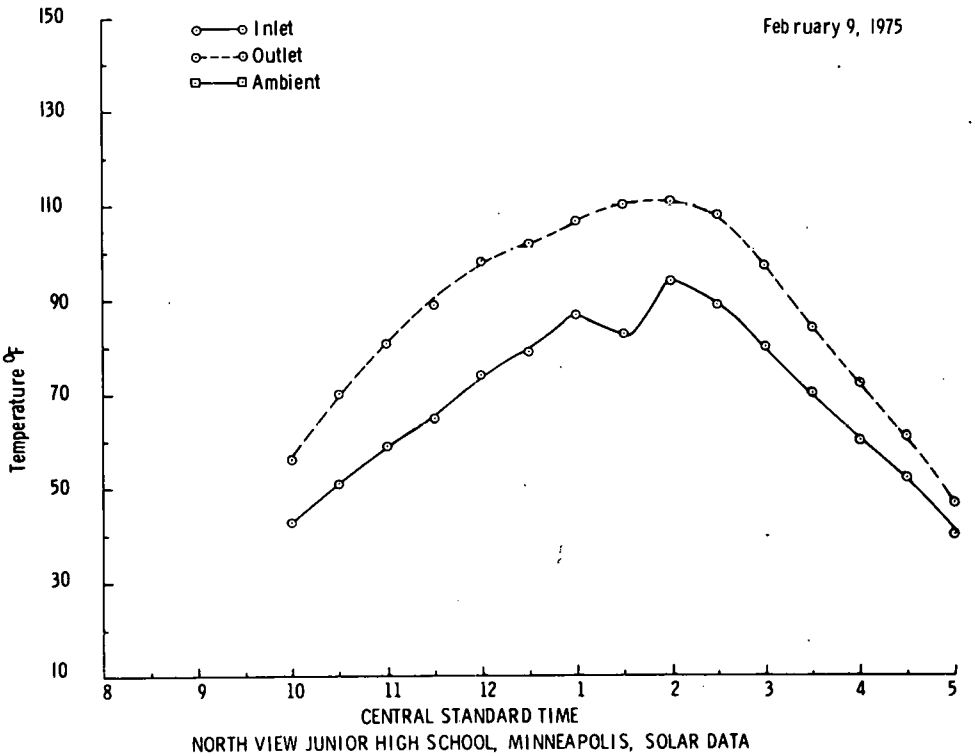
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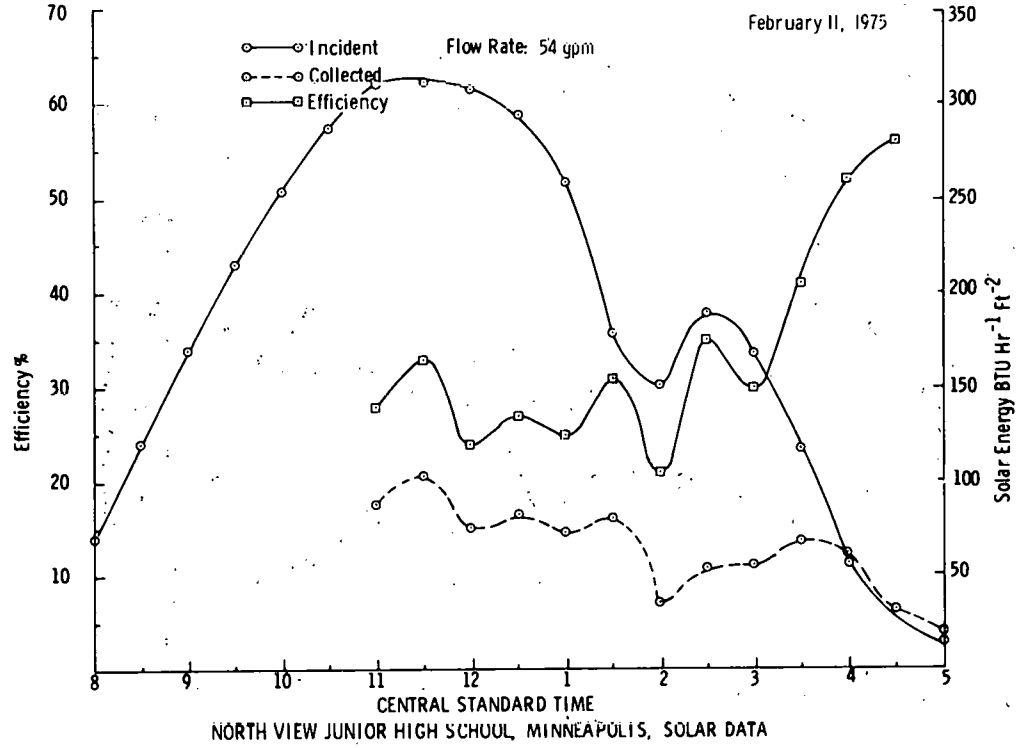
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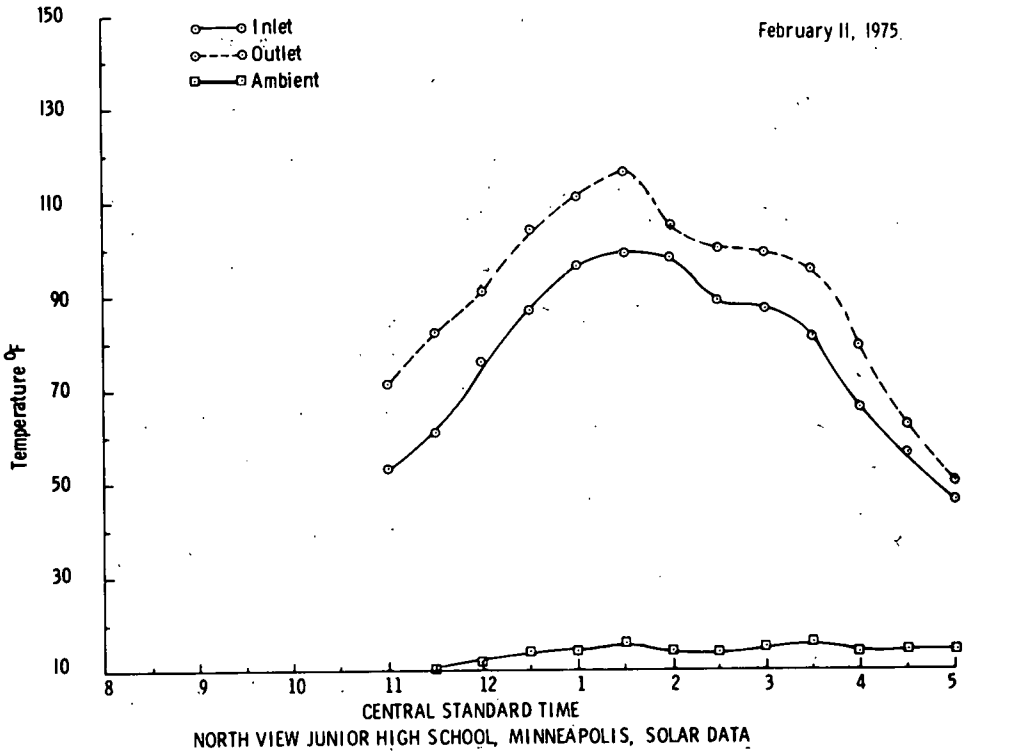
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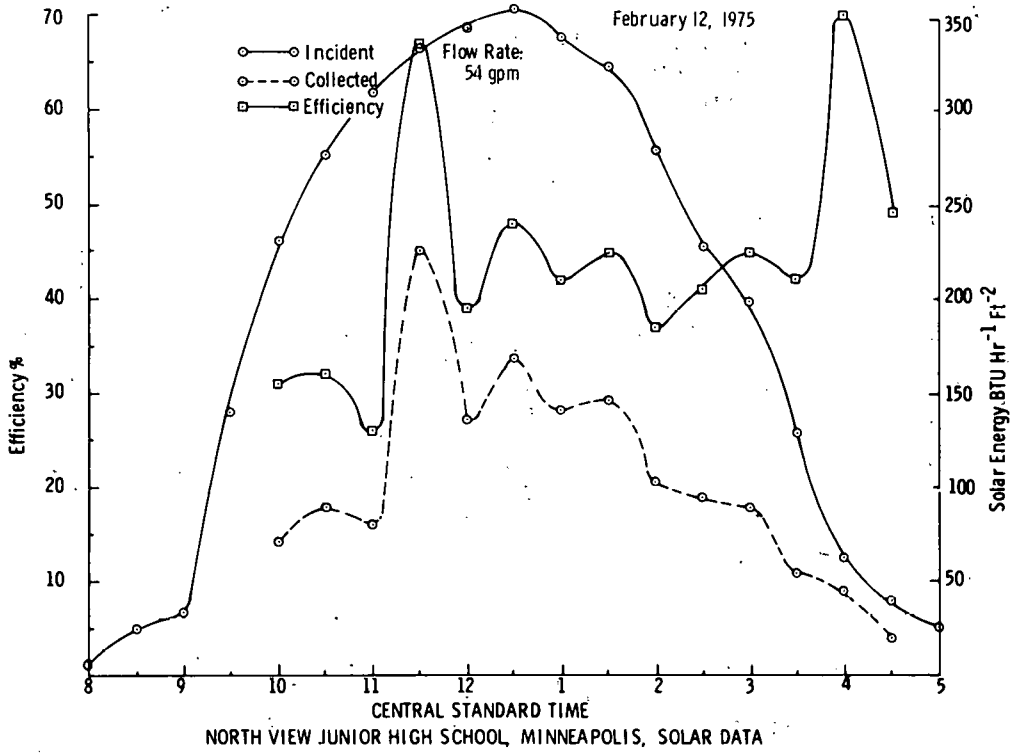
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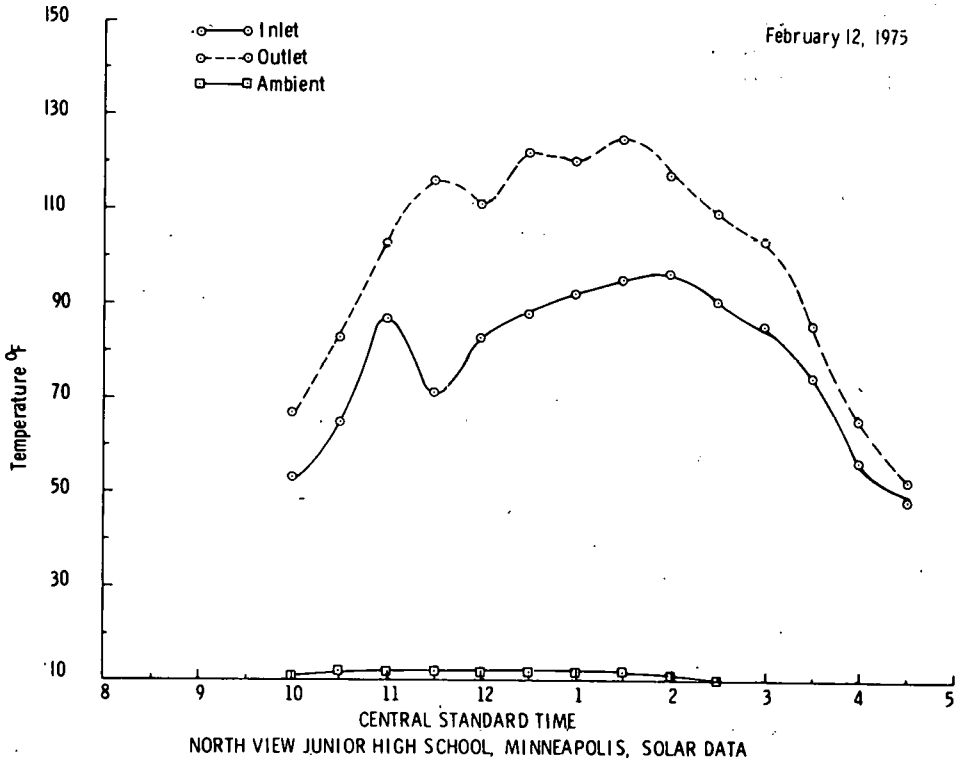
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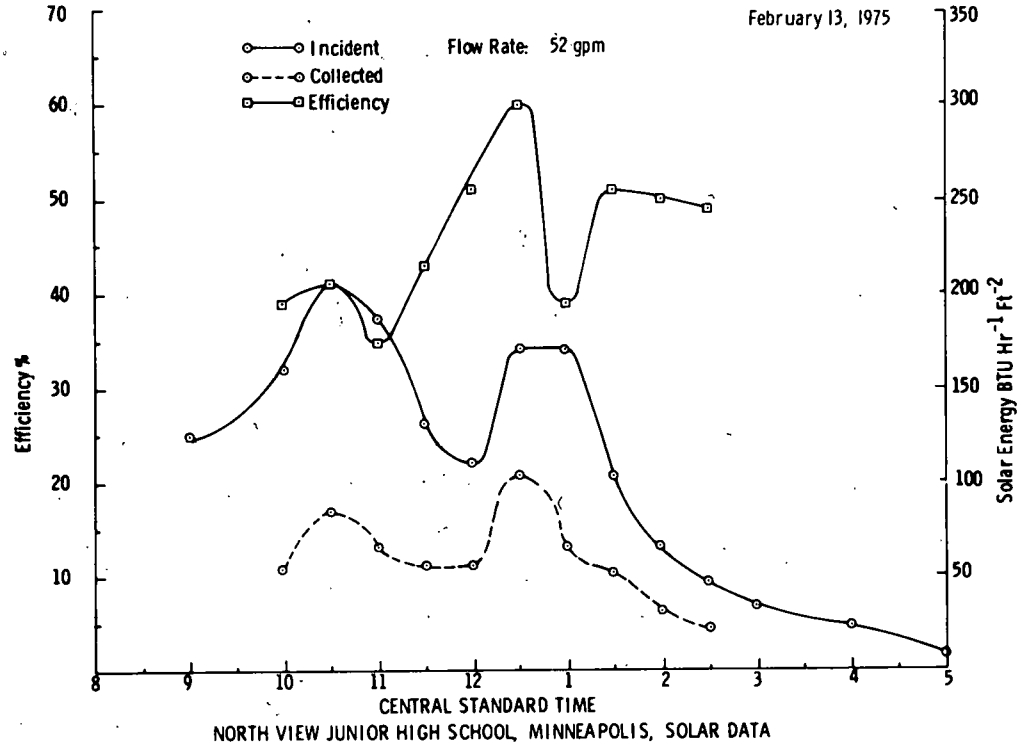
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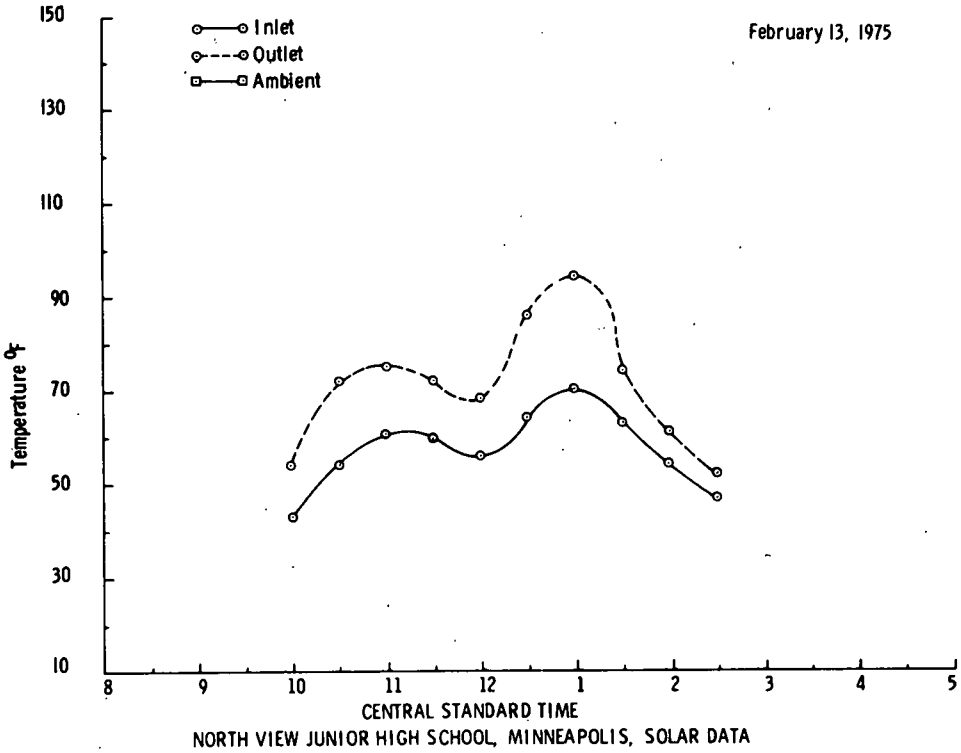
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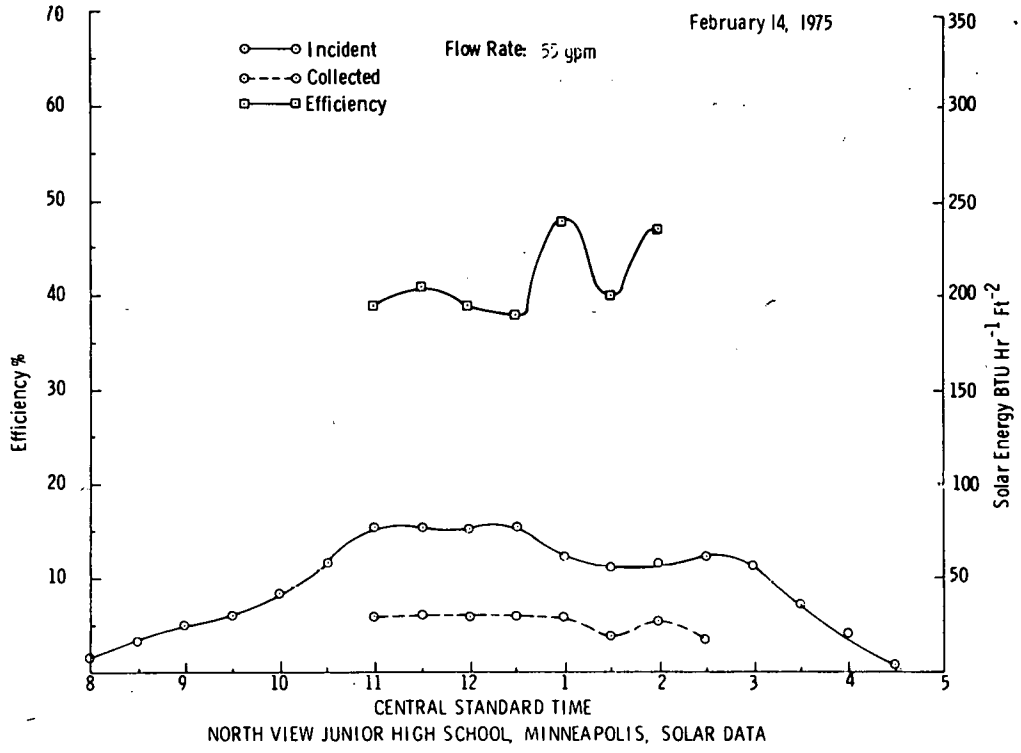
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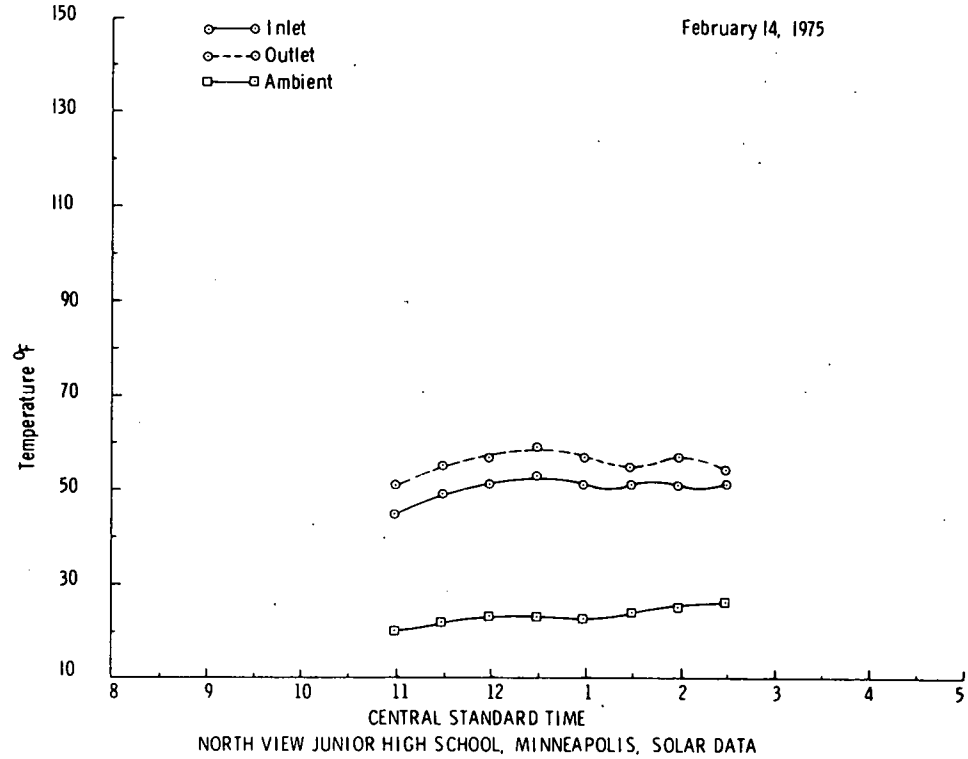
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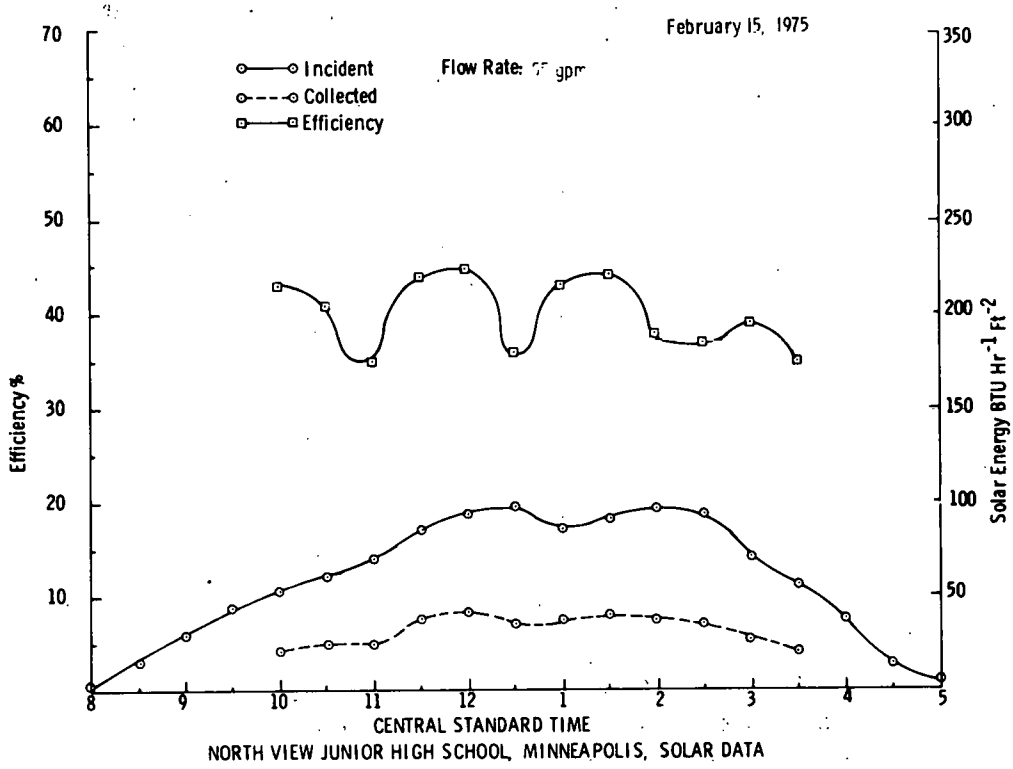
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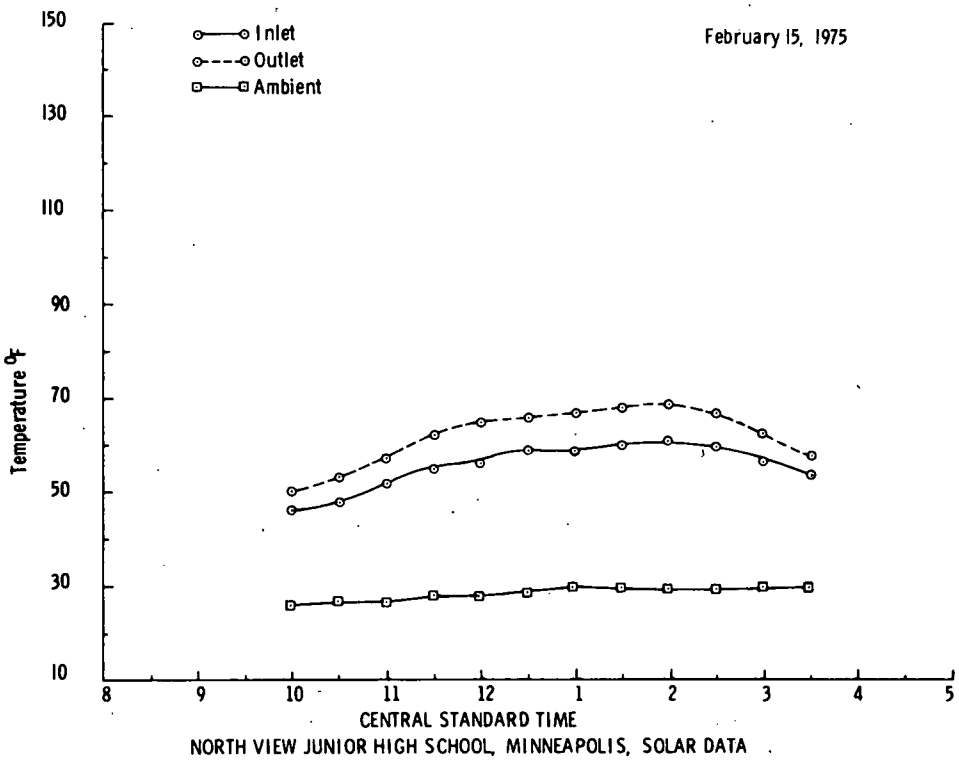
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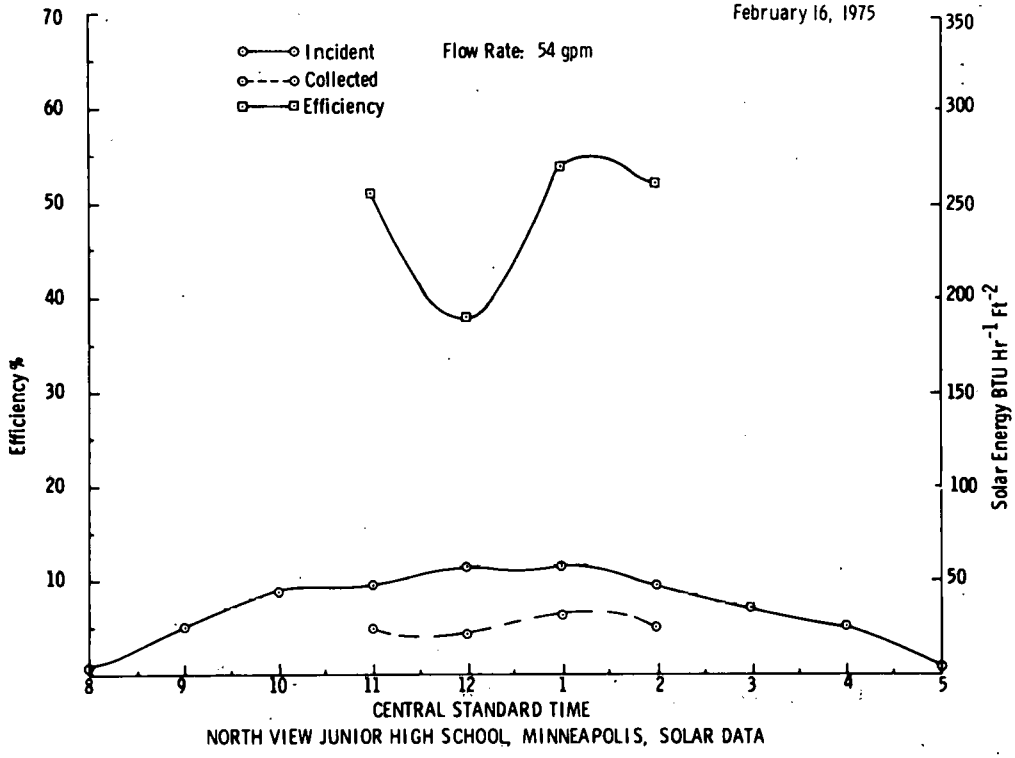
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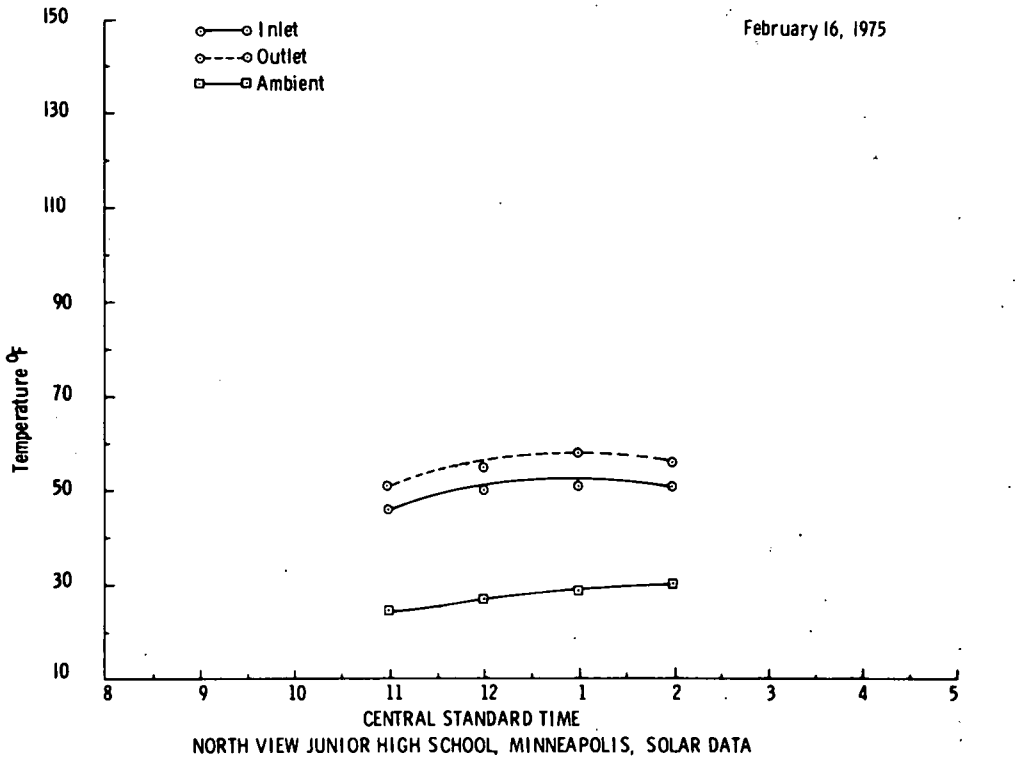
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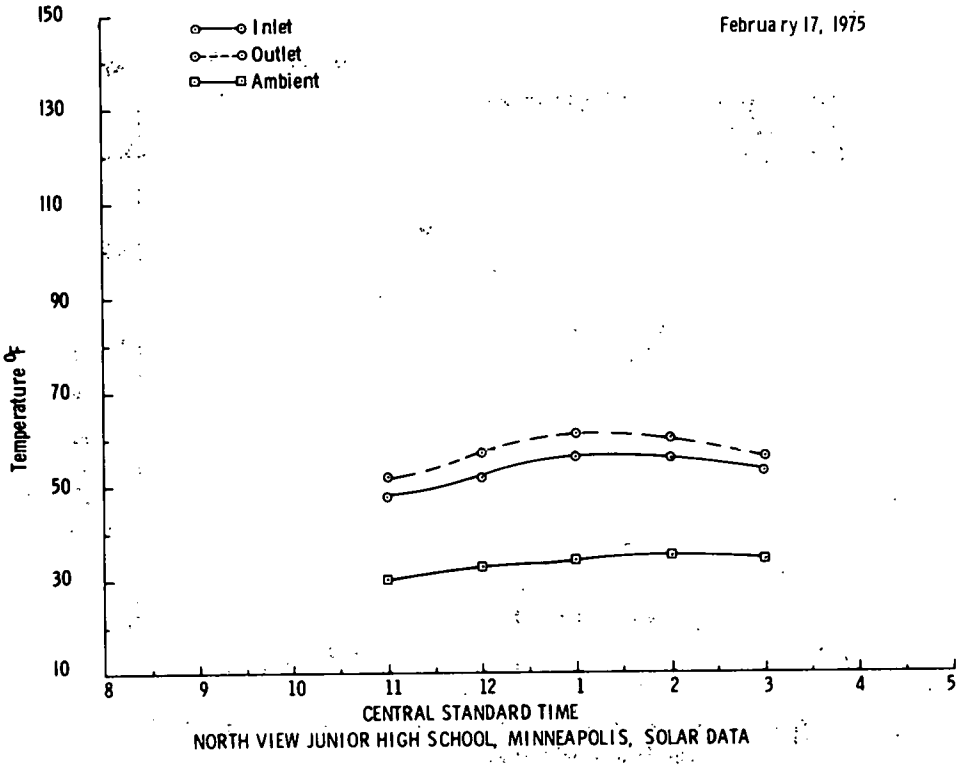
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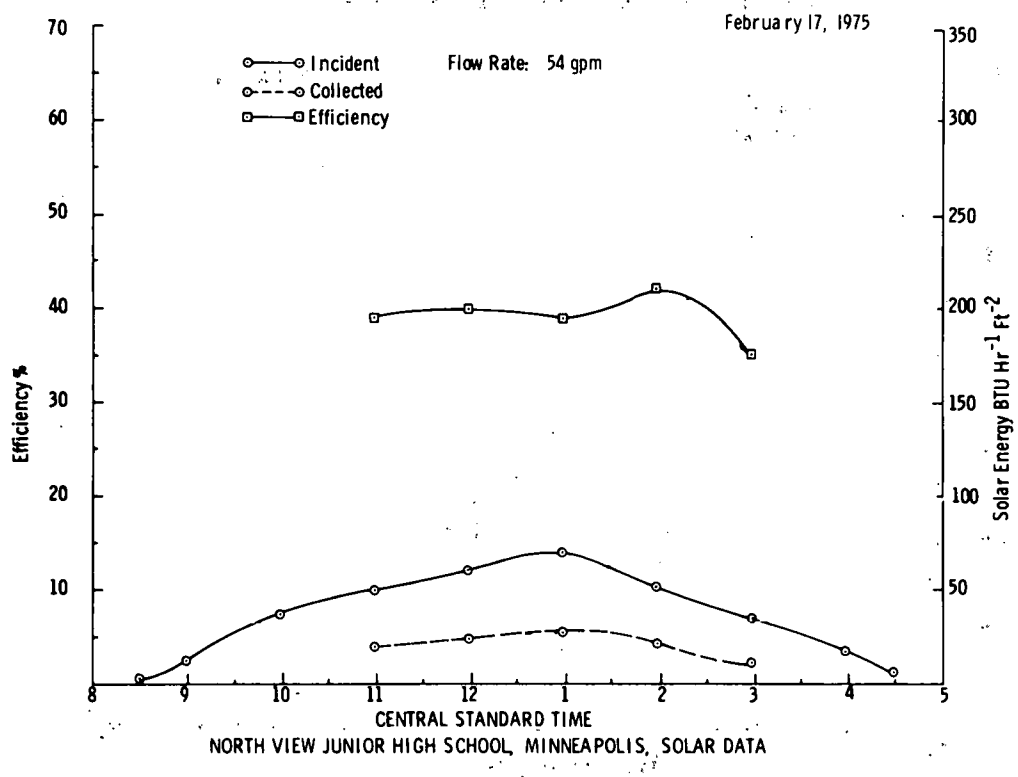
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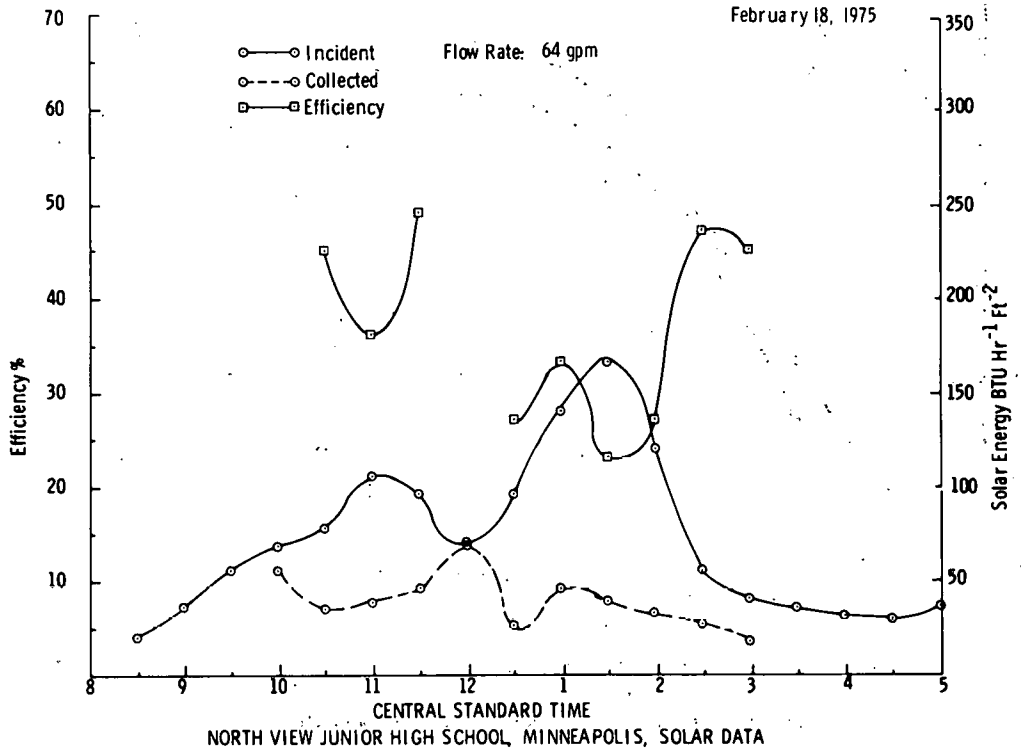
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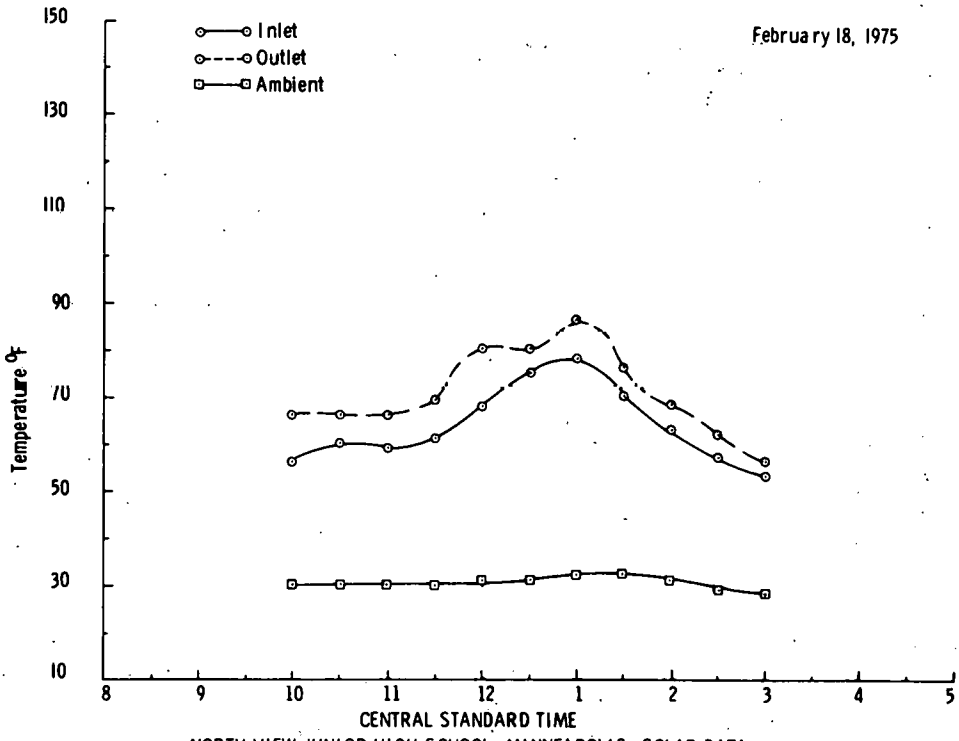
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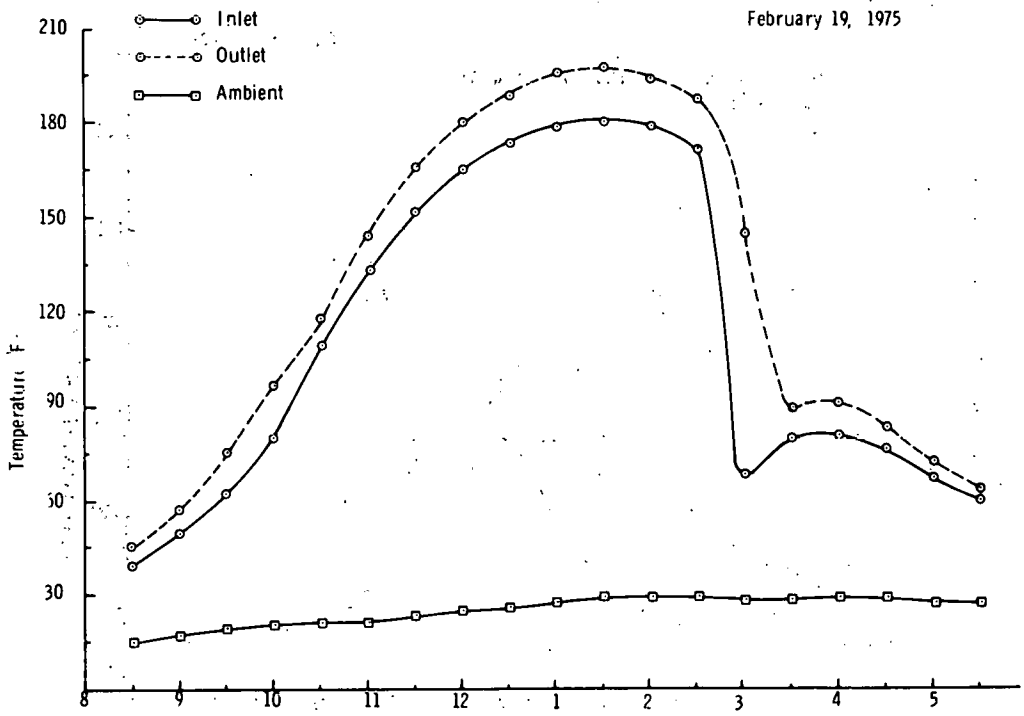
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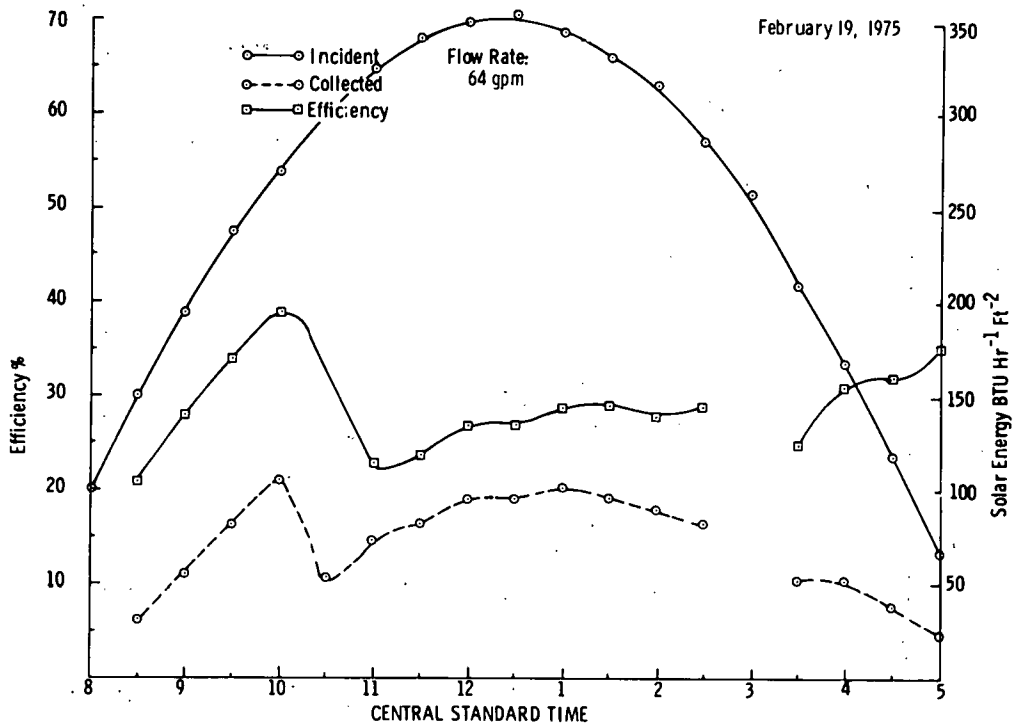
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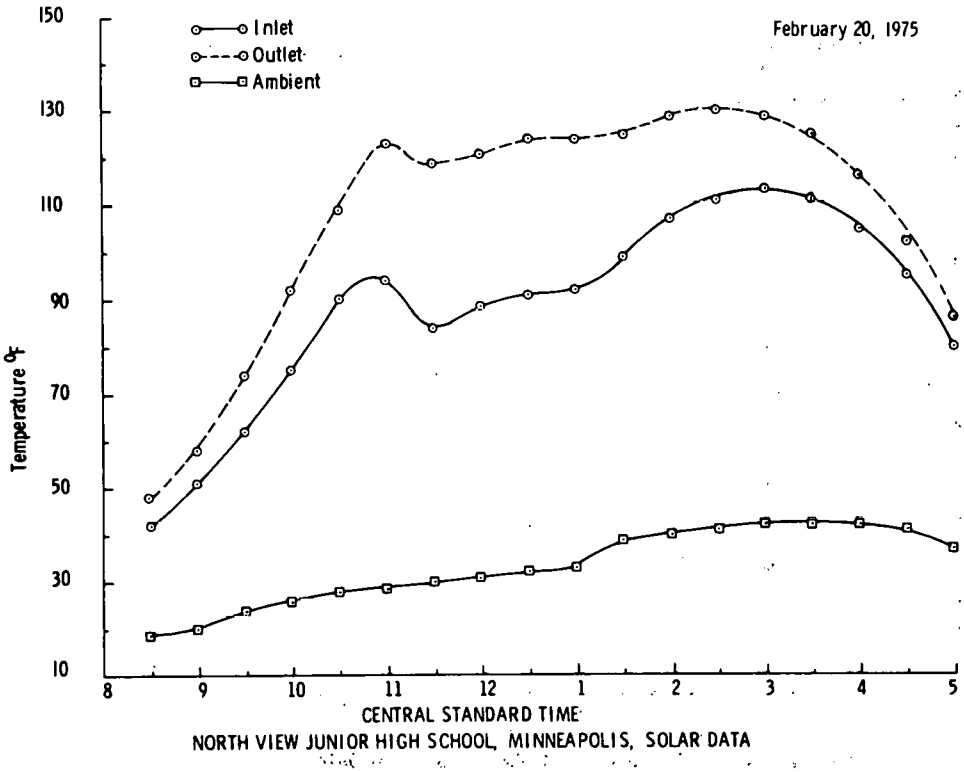
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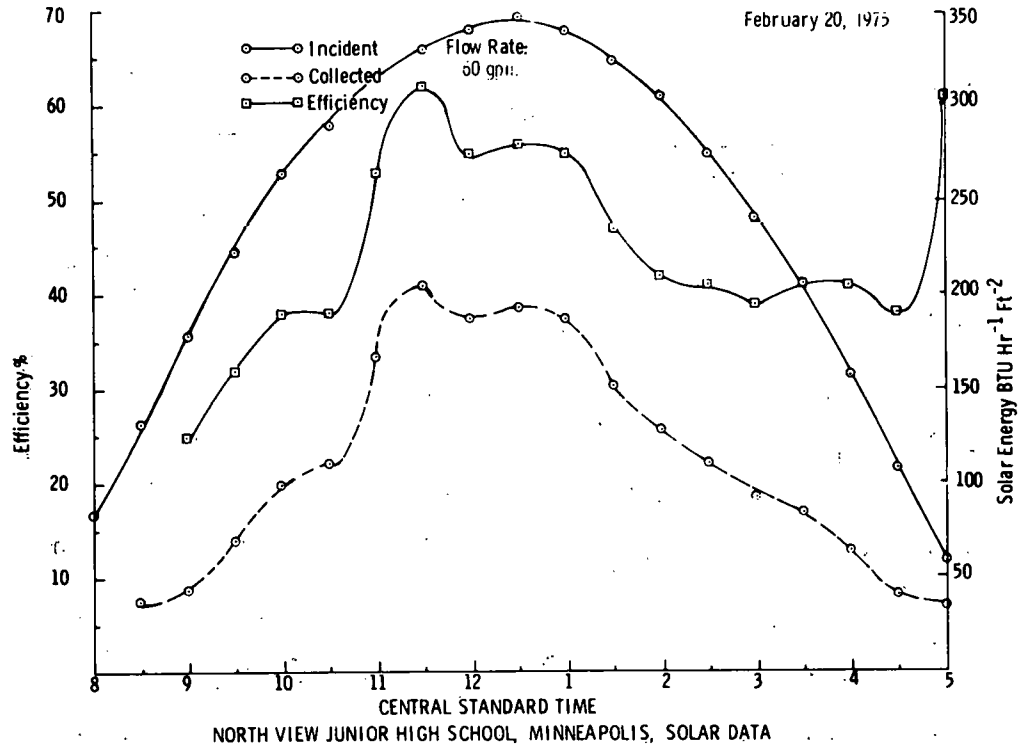
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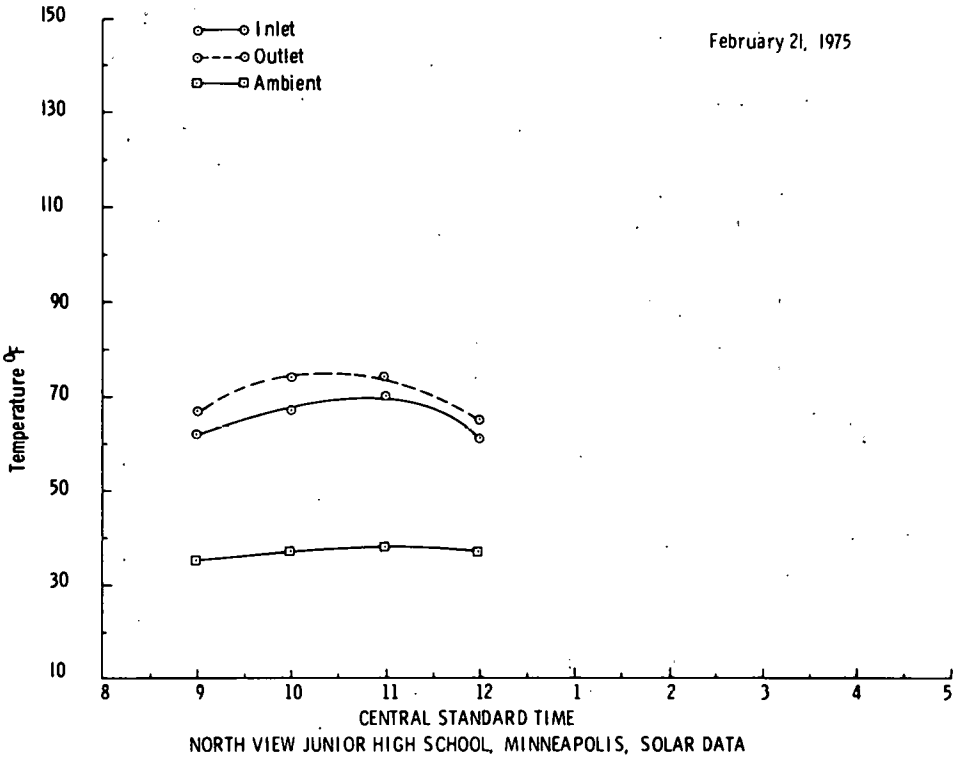
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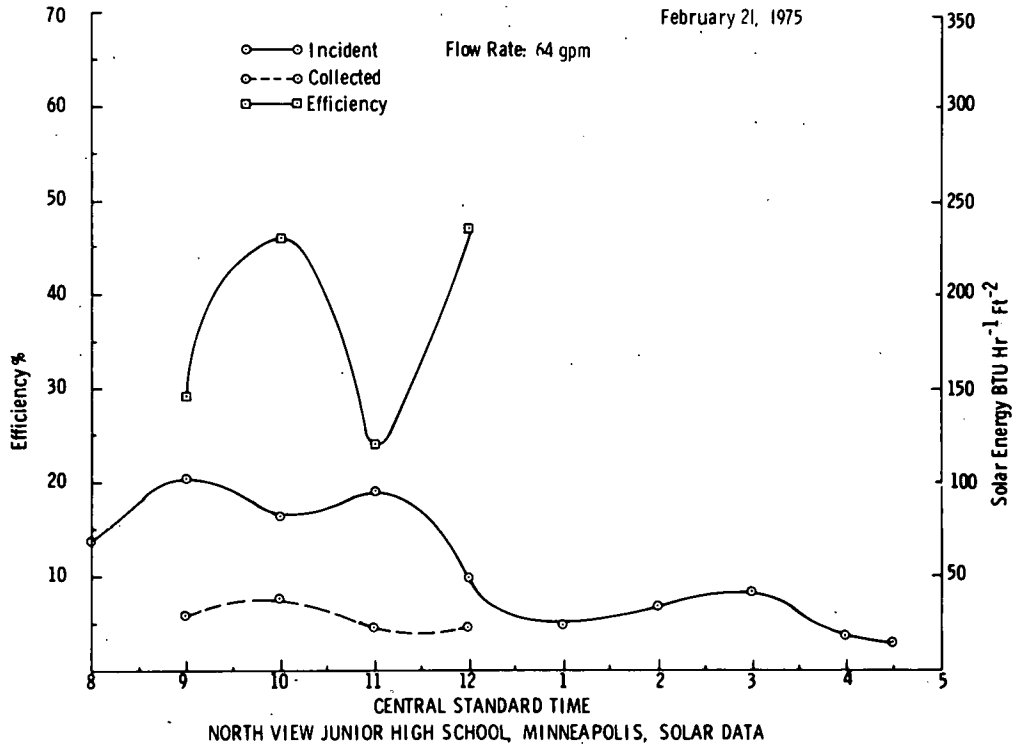
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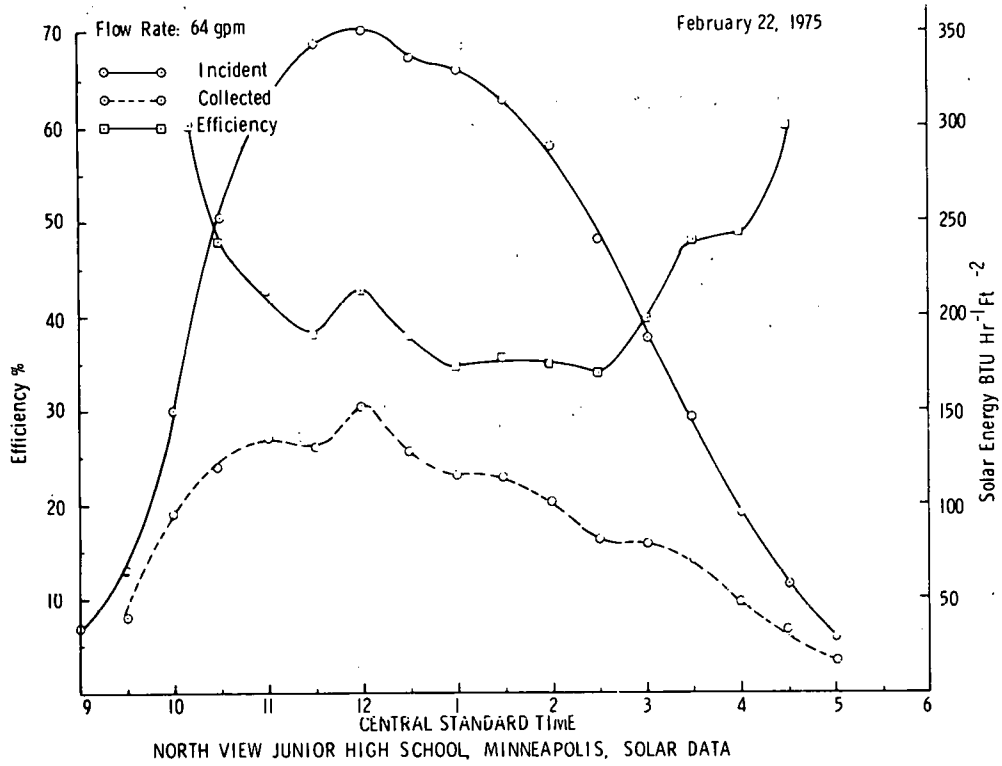
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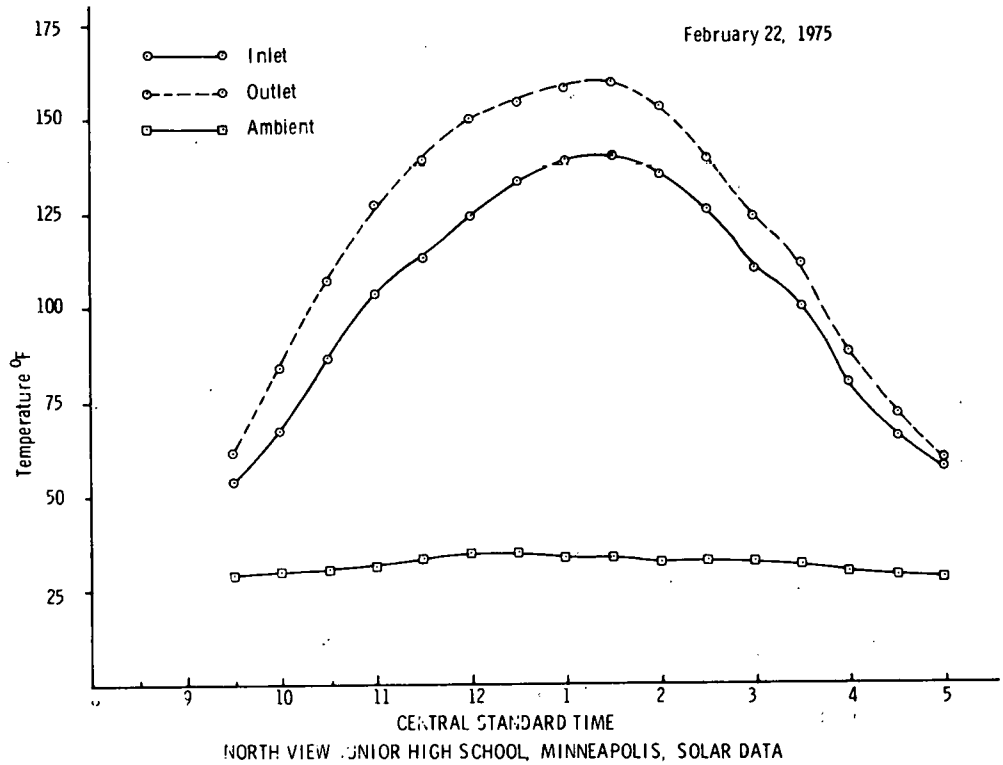
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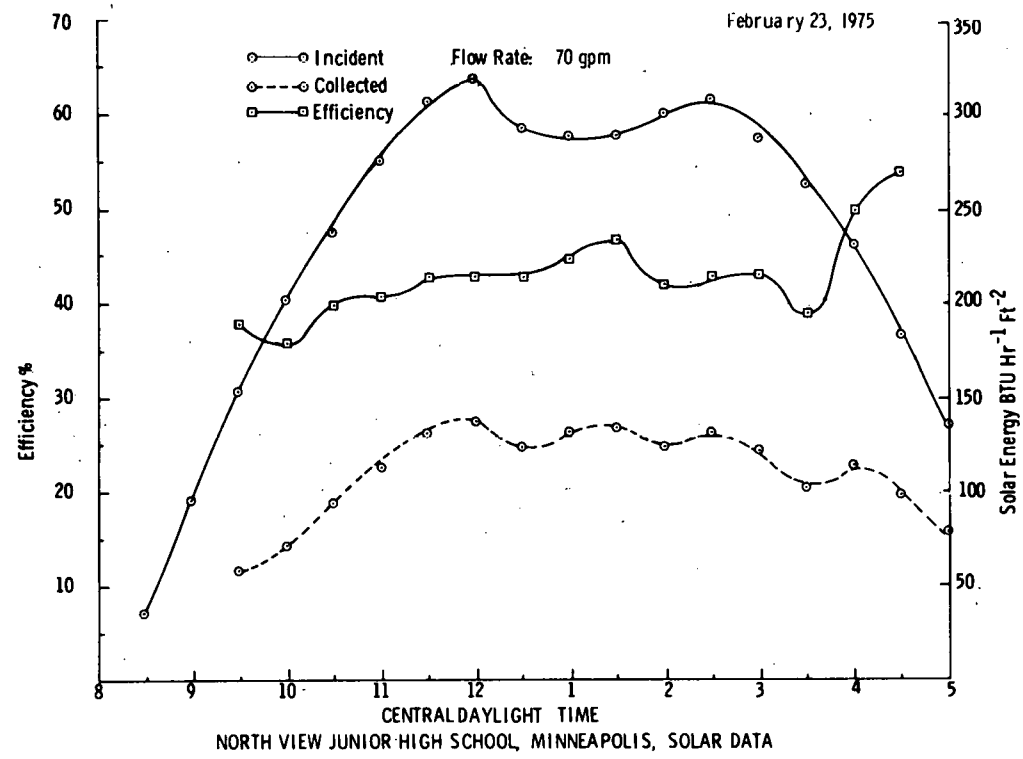
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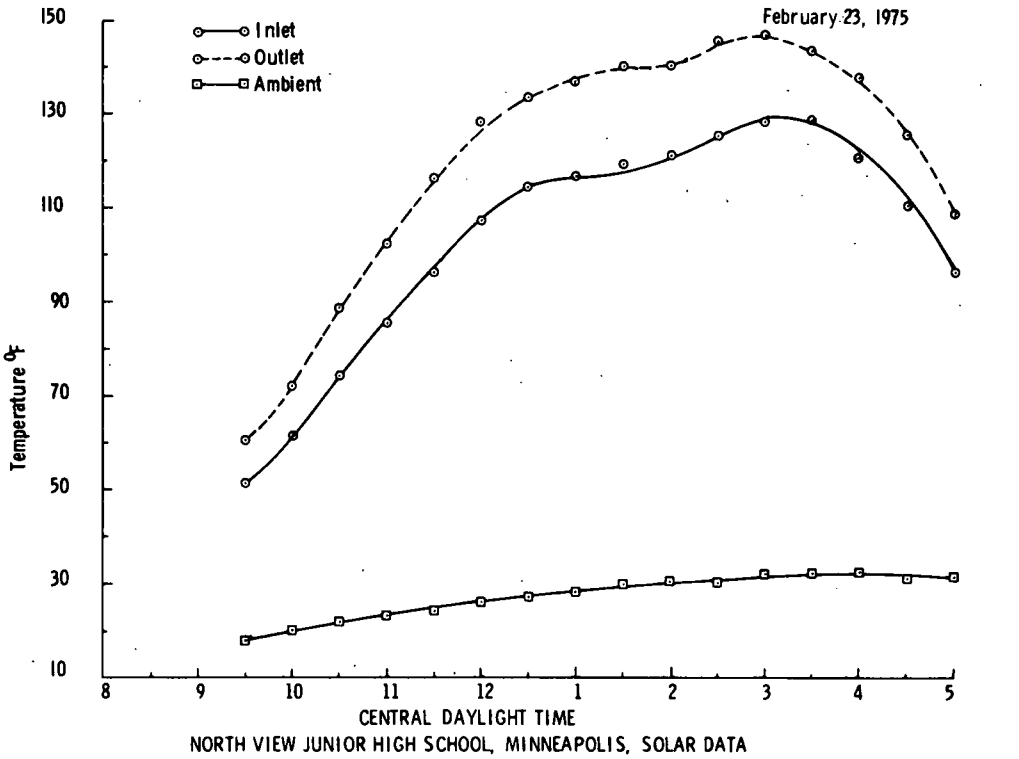
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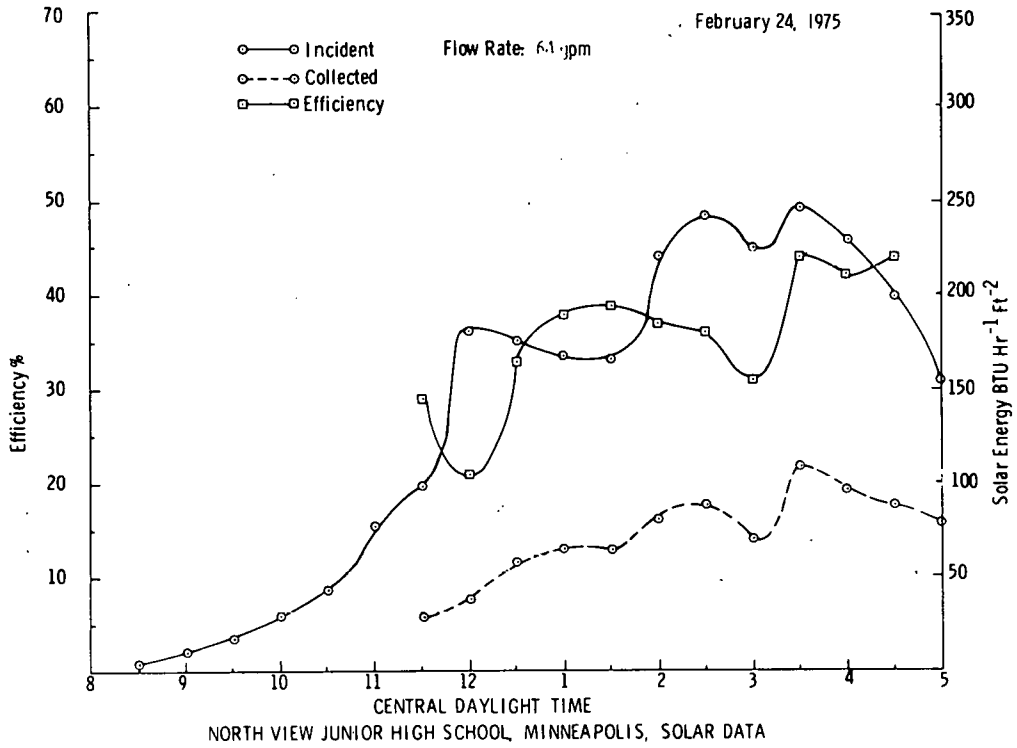
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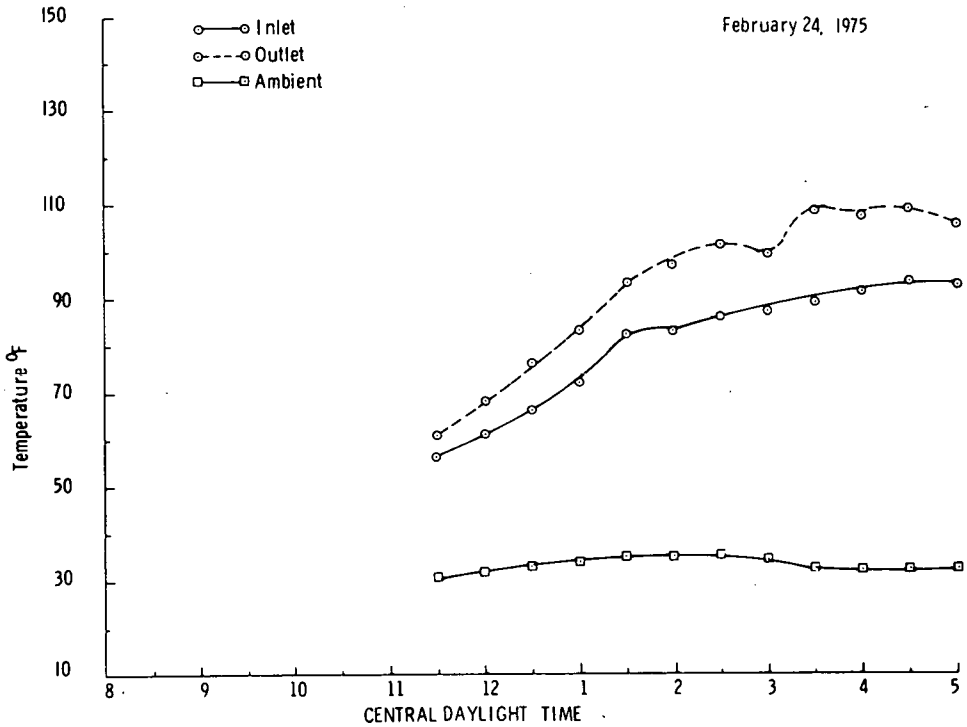
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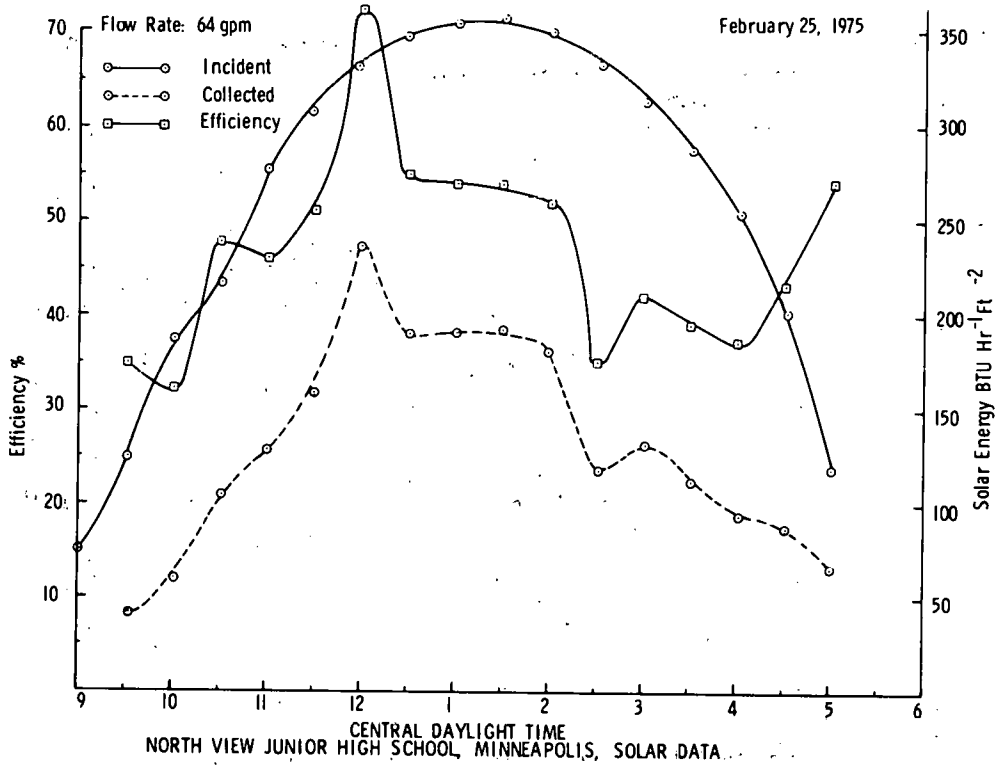
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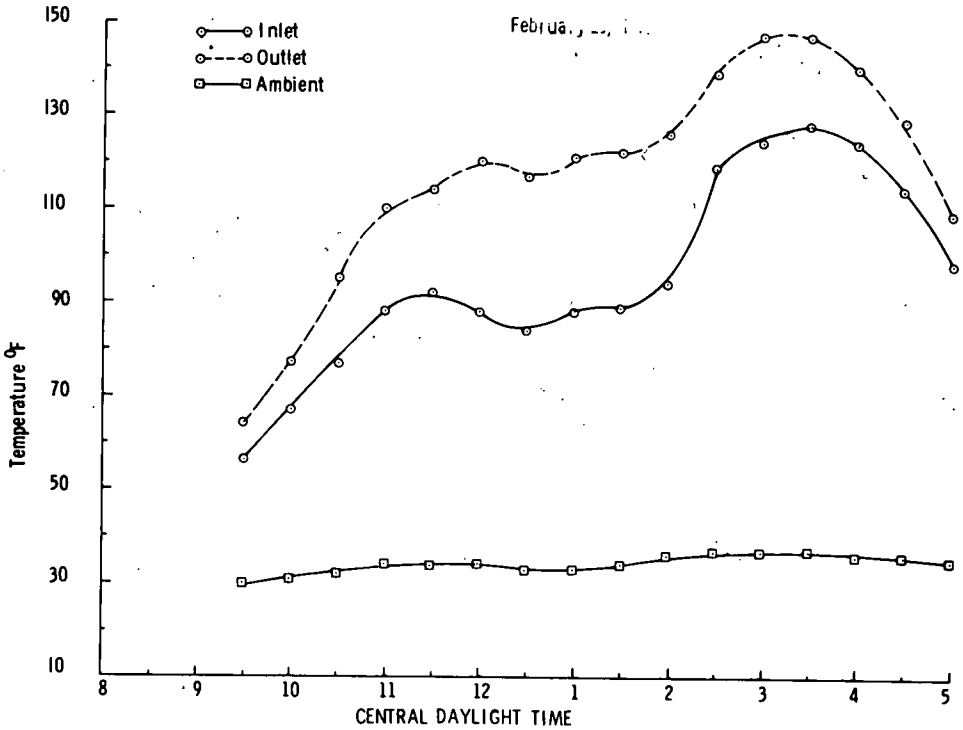
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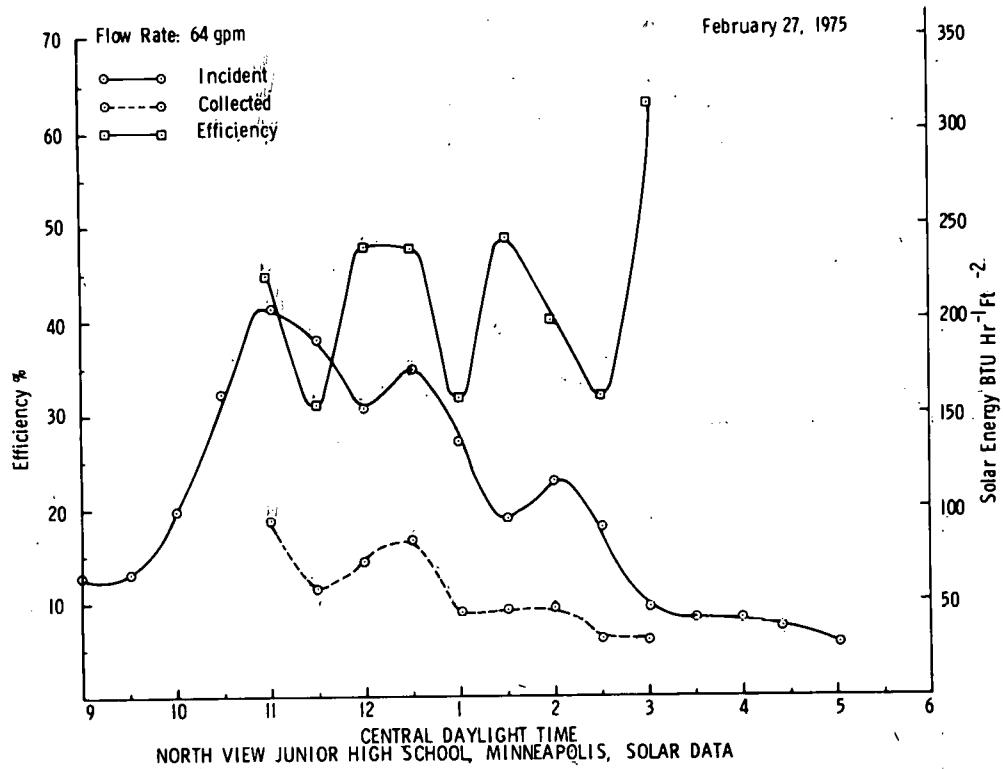
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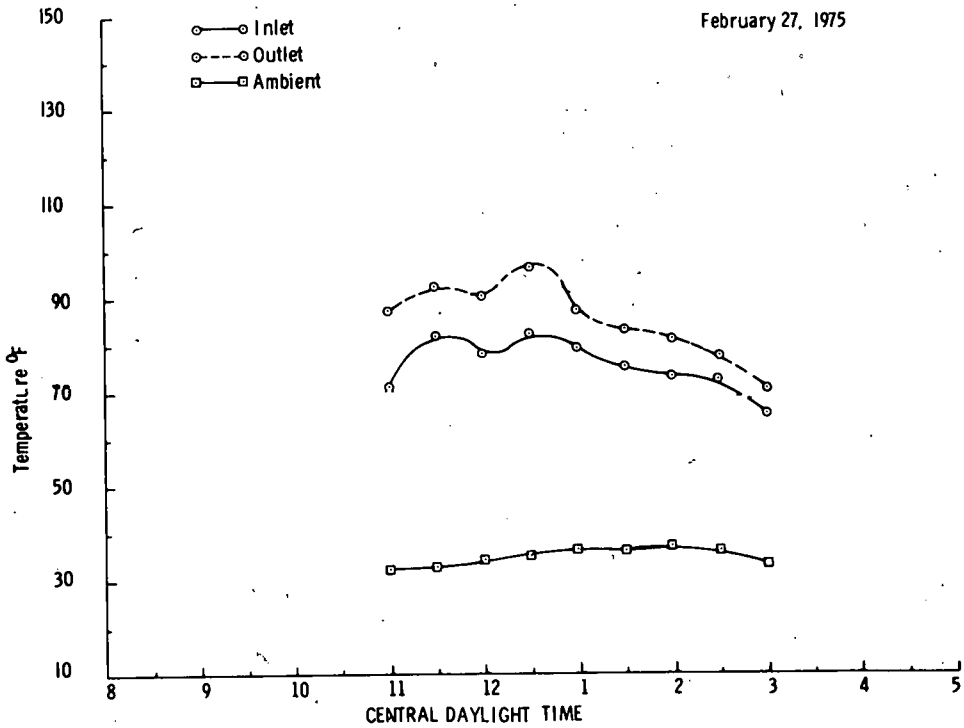
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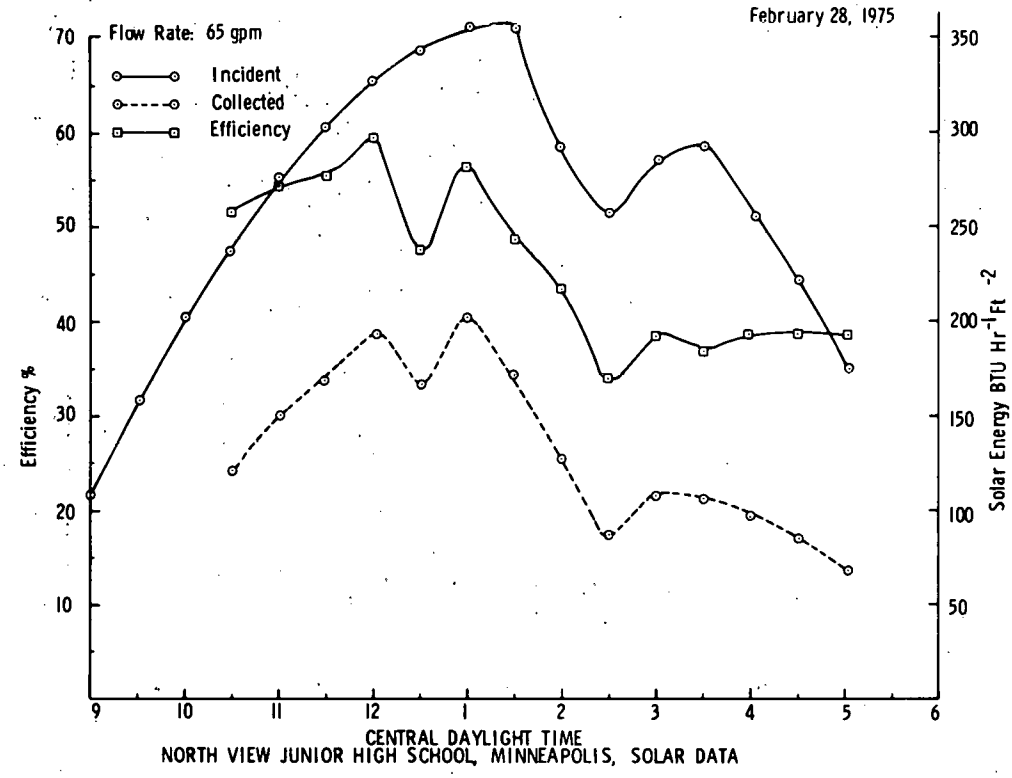
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



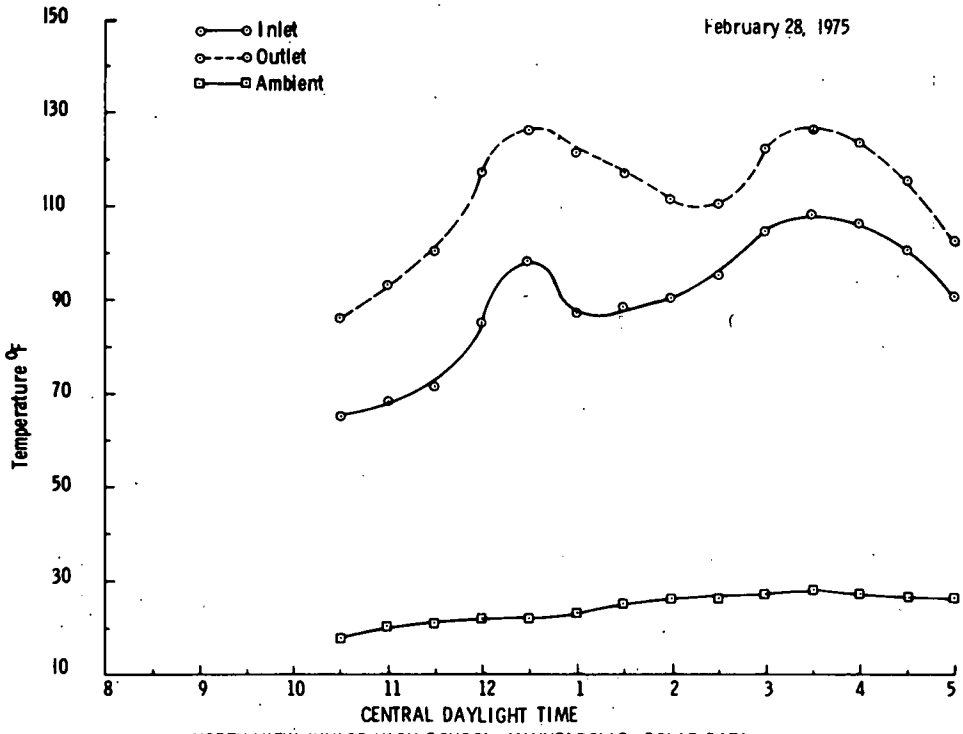
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

North View Junior High

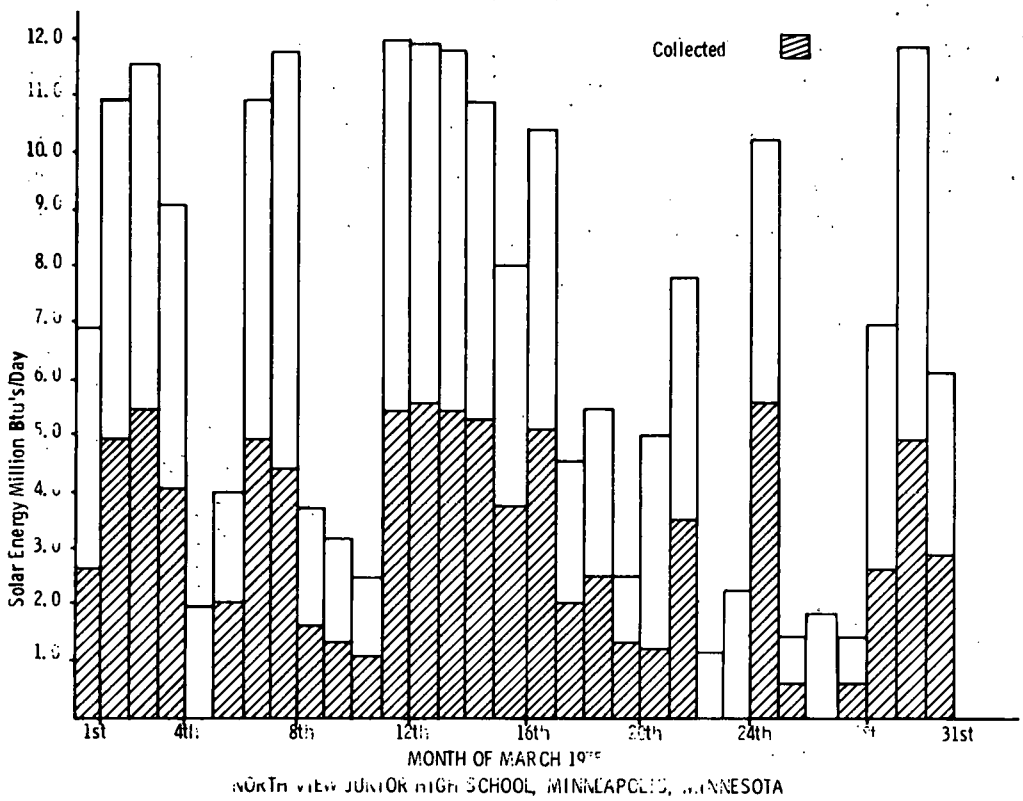
Month of March 1975

Date	Mode of Operation	Overall Eff. = $\frac{Q_{collected}}{Q_{incident}}$
March 1	Air Heating From Collector	40.0%
March 2	Air & Water Heating From Collector	45.0%
March 3	Air & Water Heating From Collector	47.0%
March 4	Air & Water Heating From Collector	46.0%
March 5	Cloudy, No Collection	
March 6	Air Heating From Collector	51.0%
March 7	Air & Water Heating From Collector	46.0%
March 8	Air & Water Heating & Storage From Coll.	37.0%
March 9	Air Heating From Collector	44.0%
March 10	Air Heating From Collector	42.5%
March 11	Air Heating From Collector	45.0%
March 12	Air & Water Heating & Storage From Coll.	45.0%
March 13	Air & Water Heating & Storage From Coll.	47.0%
March 14	Air & Water Heating & Storage From Coll.	50.0%
March 15	Air & Water Heating & Storage From Coll.	49.0%
March 16	Air & Water Heating From Collector	48.0%
March 17	Air & Water Heating & Storage From Coll.	49.0%
March 18	Air & Water Heating From Collector	45.0%
March 19	Air Heating From Collector	47.0%
March 20	Air & Water Heating From Collector	52.0%
March 21	Water Heating From Collector	42.0%
March 22	Air & Water Heating From Collector	45.0%
March 23	Cloudy, No Collection	
March 24	Cloudy, No Collection	
March 25	Water Heating From Collector	55.0%

North View Junior High

Month of March 1975

Date	Mode of Operation	Overall Eff. = $\frac{Q_{collected}}{Q_{incident}}$
March 26	Water Heating From Collector	45.0%
March 27	No Collection	
March 28	Air Heating From Collector	43.0%
March 29	Air & Water Heating From Collector	38.0%
March 30	Air & Water Heating From Collector	42.0%
March 31	Air Heating From Collector	49.0%



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, MINNESOTA

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

MINNEAPOLIS-ST.PAUL, MINNESOTA
NWS WEATHER SERVICE FCST OFC
INTERNATIONAL AIRPORT
MARCH 1975

LATITUDE 44° 53' N LONGITUDE 93° 13' W ELEVATION (GROUND) 834 FT. STANDARD TIME USED: CENTRAL WBAN #14922

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING	COOLING	WEATHER TYPES ON DATES OF OCCURRENCE (1 FOG, 2 HEAVY FOG X, 3 THUNDERSTORM, 4 ICE PELLETS, 5 HAIL, 6 GLAZE, 7 DUSTSTORM, 8 SMOKE, HAZE, 9 BLOWING SNOW)	SNOW, ICE PELLETS OR ICE ON GROUND AT 0&AM IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. ELEV. 838 FEET M.S.L.	WIND DIRECTION	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE HOURS AND TENTHS	SUNSHINE PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DATE
1	17	5	11	-10	2	54	0			T	T	29.11	31	12.6	12.9	19	NW	8.8	79	5	4	1
2	21	6	14	-8	5	51	0			T	.1	29.32	33	10.6	11.1	18	N	11.2	100	0	U	2
3	21	0	11	-11	1	54	0			0	0	29.40	30	7.2	7.8	15	NW	10.3	94	0	1	3
4	20	-1	14	-8	8	51	0	8		0	0	29.21	18	5.1	6.2	10	S	9.7	86	8	7	4
5	34	25	30	7	26	35	0	1		.02	.2	28.80	23	7.3	10.8	18	NW	0.0	0	10	10	5
6	33	23	28	5	21	37	0			0	0	29.08	29	4.1	5.8	10	NW	3.6	32	10	10	6
7	28	16	22	-2	15	43	0			T	T	29.30	32	12.9	13.2	20	NW	11.4	99	2	2	7
8	18	4	12	-12	4	53	0			0	0	29.60	30	6.8	9.1	15	NW	11.1	97	0	1	8
9	22	3	13	-12	8	52	0			.01	.5	29.28	19	6.4	7.3	10	S	2.1	18	10	10	9
10	25	15	20	-5	17	45	0	1	8	.03	.8	29.20	03	1.4	3.5	8	E	4.9	42	10	10	10
11	29	15	22	-3	19	43	0	1		.19	2.5	29.10	17	7.0	7.5	17	S	1.0	9	10	10	11
12	26	8	18	-10	11	48	0			.11	2.0	28.98	31	11.6	13.7	26	NW	10.9	93	2	3	12
13	20	-8*	6*	-20	-1	59	0			0	0	29.37	22	3.2	5.0	8	S	11.8	100	0	0	13
14	26	-2	12	-15	3	53	0	1	8	0	0	29.23	17	6.0	7.2	14	SW	11.2	95	6	3	14
15	34	9	22	-5	15	43	0			0	0	29.21	19	5.3	7.1	14	SW	11.8	99	5	3	15
16	39	18	28	0	23	37	0	1	8	0	0	29.26	13	6.5	8.6	11	S	8.8	74	8	6	16
17	41	30	36	8	29	29	0	1	8	T	0	29.13	16	12.0	12.4	17	S	10.4	87	9	8	17
18	40	26	33	4	33	32	0	2	8	T	0	28.95	19	6.9	7.5	13	S	4.8	40	8	8	18
19	42	25	34	4	29	31	0	2		T	0	28.85	15	4.4	5.5	17	SE	9.6	79	5	5	19
20	40	26	33	3	30	32	0	1		.06	0	28.96	08	2.1	7.6	17	E	4.3	36	10	7	20
21	42*	36	39*	8	32	26	0	1	8	0	0	28.78	04	4.6	7.2	18	NW	0.4	3	10	10	21
22	39	28	34	3	25	31	0			0	0	28.84	33	8.1	10.8	18	NW	9.9	80	7	8	22
23	34	30	32	0	27	33	0	1 3 4 6	9	.21	2.7	28.71	07	19.4	19.7	38	E	0.0	0	10	10	23
24	31	13	22	-10	24	43	0	6	9	.36	3.5	28.41	03	15.9	17.8	29	N	0.9	7	10	10	24
25	20	10	15	-18	4	50	0		9	T	T	29.17	36	15.4	16.0	26	NE	11.8	95	1	3	25
26	25	13	19	-15	8	46	0		9	.03	.8	29.51	11	16.9	17.3	26	SE	1.0	9	10	9	26
27	33	24	29	-5	24	36	0	4 6	9	.60	4.1	29.17	11	20.3	20.4	38	NE	0.0	0	10	10	27
28	36	27	32	-3	24	33	0	6		T	T	28.94	18	16.2	20.3	27	SW	3.8	30	10	9	28
29	27	12	20	-15	13	45	0			T	T	28.92	29	16.2	17.4	23	NW	8.5	67	8	6	29
30	18	4	11	-25	0	54	0			.03	1.0	28.86	28	6.8	11.4	14	W	11.2	88	3	5	30
31	28	14	21	-16	14	44	0			.02	.3	28.88	02	8.0	12.4	17	NE	5.4	43	9	7	31
	SUM	SUM				TOTAL	TOTAL			TOTAL	TOTAL		FOR THE MONTH:					TOTAL	%	SUM	SUM	
	919	450				1324	0	NUMBER OF DAYS		1.67	18.3	29.08	36	.5	10.9	38	E	210.6	FOR	206	193	
	AVG.	AVG.		AVG.	DEP.	DEP.	DEP.	PRECIPITATION		DEP.						DATE	23	POSSIBLE	MONTH	AVG.	AVG.	
	29.6	14.5	22.1	-6.2	16	186	0	.01 INCH	12	-0.01								369.8	57	6.6	6.2	

SEASON TO DATE

NUMBER OF DAYS MAXIMUM TEMP. ≥ 90°	≤ 32°	MINIMUM TEMP. ≤ 32°	≤ 0°	SEASON TO DATE DEP.	DEP.	NUMBER OF DAYS TOTAL	TOTAL
0	18	30	4	27	0	SNOW, ICE PELLETS ≥ 1.0 INCH	6
						THUNDERSTORMS	1
						HEAVY FOG X	2
						CLEAR 8 PARTLY CLOUDY 5 CLOUDY 18	

GREATEST IN 24 HOURS AND DATES PRECIPITATION		SNOW, ICE PELLETS		GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE	
.63	26-27	4.7	26-27	17	18+

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1																T	T	T	T			T	T	T	1
2	T																		T	T	T	T	T	T	2
3																									3
4																									4
5		T	T	T	.01	.01	T	T	T																5
6																									6
7													T												7
8																									8
9					T	T	T	T	.01	T	T	T	T						T	T	T	T	T	T	T	9
10	T	T	T	T	.01	.01	T	T	T	T	T	T	T	T	T	.01	T	T	T	T	T	T			10
11	T	T	T	T	T	T	T	T	T	T	T	T				1	.09	.08	.08	.03	.02	.02	.02	.02	11
12	.03	.04	.02	T	T	.02	T	T																	12
13																									13
14																									14
15																									15
16																									16
17																							T	T	17
18	T	T	T	T																					18
19														T	T										19
20																.06	T								20
21																									21
22																									22
23								T	.06	.06	.03	.03	T	T	T	T	T	T	T	.01	.01	.01	T	T	23
24	T	T	.01	.02	.01	T	.02	.03	.02	.03	.03	.03	.01	.01	.01	.01	.02	.01	.02	.03	.02	.01	T	.01	24
25	T	T	T	T	T	T																			25
26																T	T	T					.01	.02	26
27	.01	.01	.10	.11	.03	.03	.02	.03	.03	.02	.03	.02	T	T	.07	.04	.05	T					T	T	27
28	T	T	T	T														T	T				T	T	28
29	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T									29
30																				T	T	T	.02	.01	30
31	.01	.01	T	T	T																				31

MINNEAPOLIS-ST. PAUL, MINNESOTA

- EXTREME TEMPERATURES FOR THE MONTH MAY BE THE LAST OF MORE THAN ONE OCCURRENCE.
- BELOW ZERO TEMPERATURE OR NEGATIVE DEPARTURE FROM NORMAL.
- T = TRACE OF PRECIPITATION OR SNOW, ICE PELLETS LESS THAN 0.1 INCH OR LESS WITH WATER EQUIVALENT LESS THAN 0.01 INCH. 10" AT ALASKAN STATIONS.
- ALSO ON AN EARLIER DATE, OR DATES.
- X HEAVY FOG RESTRICTS VISIBILITY TO 1/4 MILE OR LESS.
- IN THE HOURLY PRECIPITATION TABLE AND IN COLUMNS 9, 10, AND 11 INDICATES AN AMOUNT TOO SMALL TO MEASURE

THE SEASON FOR DEGREE DAYS BEGINS WITH JULY FOR HEATING AND JANUARY FOR COOLING.

DATA IN COLUMNS 6, 12, 13, 14, AND 15 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.

WIND DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. RESULTANT WIND IS THE VECTOR SUM OF WIND DIRECTIONS AND SPEEDS DIVIDED BY THE NUMBER OF OBSERVATIONS. FIGURES FOR DIRECTIONS ARE TENS OF DEGREES FROM TRUE NORTH: I.E., 09=EAST, 18=SOUTH, 27=WEST, 36=NORTH, AND 00=CALM. WHEN DIRECTIONS ARE IN TENS OF DEGREES IN COL. 17, ENTRIES IN COL. 16 ARE FASTEST OBSERVED 1-MINUTE SPEEDS. IF THE / APPEARS IN COL. 17, SPEEDS ARE GUSTS.

ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

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William H. Haggard

DIRECTOR. NATIONAL CLIMATIC CENTER

SUMMARY BY HOURS

HOUR LOCAL TIME	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE °F AIR	WET BULB	DEW PT.	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
00	6	29.08	21	20	16	79	10.8	04	.7
03	6	29.07	20	19	14	79	10.1	06	1.1
06	6	29.08	18	17	12	79	9.6	36	1.3
09	6	29.10	20	19	14	76	9.9	05	1.5
12	7	29.10	26	23	17	70	11.3	27	1.2
15	7	29.07	28	25	19	68	12.9	30	1.4
18	7	29.07	27	24	18	70	11.7	23	.5
21	6	29.08	24	22	18	75	10.8	04	.4

USCOMM - NOAA - ASHEVILLE 750

04/18/75

OBSERVATIONS AT 3-HOUR INTERVALS

DAY 01

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	20			12	10	03	97	31	9
03	0	UNL	20			08	07	00	97	33	10
06	0	UNL	20			08	04	-06	83	31	9
09	2	UNL	20			09	07	-02	81	33	11
12	4	UNL	25			18	12	02	86	32	14
15	10	50	20			17	15	08	88	32	15
18	9	UNL	20		S	16	14	08	91	29	12
21	3	UNL	20			13	11	04	87	30	9

DAY 02

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	70	6		S	13	12	07	77	33	9
03	0	UNL	25			10	08	04	78	33	9
06	0	UNL	25			07	06	01	78	33	9
09	2	UNL	25			10	08	02	70	36	10
12	4	UNL	25			17	15	07	69	35	10
15	10	UNL	25			21	18	08	57	34	10
18	9	UNL	25			18	16	07	62	31	12
21	3	UNL	25			13	11	05	84	31	8

DAY 03

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	25			08	07	-01	86	31	7
03	0	UNL	25			06	04	-03	86	30	6
06	0	UNL	20			01	00	-07	89	31	6
09	0	UNL	20			08	06	-04	86	29	4
12	4	UNL	25			18	15	03	80	31	9
15	10	UNL	25			21	18	10	62	32	9
18	9	UNL	25			17	15	07	85	31	8
21	10	UNL	25			12	11	08	93	26	6

DAY 04

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	20			06	05	02	87	22	5
03	0	UNL	15			02	02	-01	87	20	4
06	4	UNL	8			-01	-01	-07	78	24	4
09	9	UNL	7			02	02	-03	79	22	4
12	8	UNL	12			18	17	12	74	21	3
15	9	200	12			24	22	16	71	14	0
18	10	24	8			26	24	20	81	18	7
21	10	20	7			26	26	22	85	16	8

DAY 05

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	18	7			28	28	25	85	10	10
03	10	11	4		SW	30	28	26	85	10	9
06	10	10	3		SW	30	28	28	92	10	6
09	9	7	3		F	30	28	28	92	10	7
12	8	6	3		F	33	32	30	89	33	10
15	9	11	3		F	34	32	30	85	26	10
18	10	30	20			33	30	26	72	30	13
21	10	33	25			26	24	19	75	29	10

DAY 06

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	28	25			25	23	18	76	27	8
03	10	26	20			24	23	19	81	27	8
06	10	31	12			23	22	18	81	26	9
09	10	35	12			26	24	21	78	00	0
12	10	37	12			30	27	22	72	23	4
15	9	100	15			33	29	23	64	01	7
18	10	28	25			32	28	23	69	31	4
21	10	60	25			30	27	22	72	34	6

DAY 07

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	7	80	25			26	26	20	72	33	7
03	2	UNL	25			26	25	17	72	38	10
06	1	UNL	25			18	17	12	77	33	9
09	0	UNL	25			18	17	12	77	33	11
12	3	UNL	20			33	31	16	74	31	13
15	6	UNL	12			26	24	17	69	31	15
18	2	UNL	20			23	20	13	65	32	14
21	0	UNL	20			19	17	12	74	32	13

DAY 08

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	2	UNL	20			16	15	08	74	32	13
03	2	UNL	20			15	12	06	73	33	11
06	1	UNL	20			08	07	02	76	33	9
09	0	UNL	25			11	09	01	64	34	7
12	3	UNL	25			17	14	05	59	33	3
15	6	UNL	12			18	16	08	59	26	9
18	2	UNL	20			13	11	03	64	24	5
21	3	UNL	20			06	05	00	76	24	6

DAY 09

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	20			04	03	-03	72	21	6
03	2	UNL	20			06	05	00	76	14	5
06	10	60	20			07	06	02	80	13	5
09	10	30	10		S	07	06	02	80	13	5
12	10	18	1	1/2	S	11	10	08	80	12	7
15	10	33	7		S	19	18	13	77	16	7
18	10	UNL	12		S	22	20	14	71	16	7
21	10	40	12		S	21	20	15	78	18	8

DAY 10

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	28	4		S	18	18	14	92	00	0
03	10	28	4		S	19	19	16	88	05	3
06	10	25	2	0	S	19	19	16	88	01	4
09	10	20	2	0	SW	20	19	15	81	07	8
12	10	15	2	0	SW	23	21	15	74	00	0
15	10	20	2		SW	25	23	18	76	00	0
18	10	21	2	0	SW	24	23	19	81	33	4
21	10	20	6		SW	22	21	18	85	22	5

DAY 11

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	21	7			18	17	14	84	20	3
03	10	15	3		S	18	18	14	84	23	4
06	10	20	3		S	18	18	15	88	00	0
09	10	22	3		SF	22	21	19	88	14	8
12	10	55	3		F	29	26	22	78	18	12
15	10	20	7			29	27	22	75	17	9
18	10	8	0	1/2	S	27	26	23	85	17	10
21	10	10	1		S	26	25	23	88	16	8

DAY 12

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	10	1		S	26	25	23	88	18	6
03	10	18	2		S	25	24	22	88	24	6
06	10	19	5		S	24	23	20	85	32	14
09	0	UNL	25			17	15	05	62	33	13
12	1	UNL	25			17	14	09	79	31	17
15	0	UNL	25			18	16	06	97	30	15
18	0	UNL	25			13	13	03	96	31	15
21	0	UNL	25			12	10	01	81	31	10

DAY 13

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	25			06	05	-02	89	31	8
03	0	UNL	25			02	01	-05	72	00	0
06	0	UNL	25			-01	-01	-06	79	23	3
09	0	UNL	12			02	01	-06	88	20	6
12	0	UNL	25			16	13	03	86	23	5
15	0	UNL	25			19	16	06	87	22	6
18	0	UNL	25			15	12	02	86	16	6
21	0	UNL	20			09	07	-01	83	17	4

DAY 14

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	15			07	06	00	73	00	0
03	0	UNL	20			02	02	-03	78	12	5
06	0	UNL	10			00	00	-05	78	11	4
09	0	UNL	3		GFK	06	06	00	78	12	9
12	0	UNL	20			19	16	06	57	18	11
15	0	UNL	25			26	22	08	48	21	11
18	0	UNL	25			23	20	10	57	17	9
21	0	UNL	25			18	14	08	71	16	9

DAY 15

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	9	UNL	12			13	12	06	73	19	5
03	0	UNL	12			12	11	06	77	12	6
06	3	UNL	7			11	10	05	77	14	6
09	0	UNL	10			16	17	11	74	17	8
12	3	UNL	15			32	28	22	67	21	10
15	9	UNL	12			34	30	23	64	23	11
18	9	UNL	12			32	29	23	69	23	6
21	9	UNL	12			28	26	22	76	00	0

DAY 16

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	8			22	21	18	88	11	9
03	5	UNL	1	4	GF	18	18	16	92	12	9
06	9	UNL	1	0	GF	17	17	14	88	11	7
09	8	80	0	12	GFK	22	21	19	88	13	8
12	9	120	3	0	RW	34	31	26	73	12	9
15	10	UNL	3		W	38	36	28	67	14	7
18	9	UNL	6		W	38	35	30	73	15	8
21	10	36	6		W	33	31	28	82	15	9

DAY 17

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	1	UNL	6			34	31	27	76	15	8
03	8	250	5		W	32	30	26	79	17	12
06	5	UNL	9		W	30	28	25	82	16	7
09	2	UNL	2	0	RW	34	32	28	82	17	11
12	6	UNL	7		W	38	36	31	76	18	12
15	9	UNL	7			41	37	32	70	18	15
18	8	UNL	7			38	35	30	70	14	10
21	10	28	7			37	35	32	82	18	11

DAY 18

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	3	1		LF	36	35	34	92	17	14
03	10	9	2	0	LF	36	34	33	92	19	8
06	10	4	2	0	F	35	34	33	92	20	9
09	10	2	0	4	F	38	36	34	86	23	6
12	10	2	0	3	F	39	39	34	96	22	4
15	9	UNL	2	0	GF	37	36	34	80	20	6
18	3	UNL	8		W	38	36	31	76	17	6
21	0	UNL	0	2	F	29	29	28	96	19	4

DAY 19

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	1	0	2	F	27	27	25	92	14	4
03	8	UNL	0	3	F	26	26	24	92	15	5
06	5	UNL	5		GF	25	25	23	92	11	6
09	3	UNL	7			32	31	30	92	00	0
12	10	30	15			40	36	31	70	17	7
15	7	100	25			41	37	31	66	16	6
18	1	UNL	20			40	37	32	73	14	6
21	0	UNL	15			38	34	32	85	29	4

DAY 20

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	10			36	34	30	79	31	10
03	0	UNL	7			32	30	27	82	32	4
06	0	UNL	5		GF	27	27	25	92	27	4
09	5	UNL	4		GF	35	33	30	82	06	9
12	10	200	9			37	35	31	79	17	9
15	10	100	8			37	35	32	82	11	9
18	10	100	6		RW	37	35	32	82	11	9
21	10	80	10			39	36	32	76	09	12

DAY 21

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	65	10			39	36	31	73	10	11
03	10	40	8			37	36	31	79	11	7
06	10	30	8			37	36	31	79	36	6
09	10	18	6		F	37	36	32	82	06	6
12	10	18	6		H	41	38	36	79	06	3
15	10	19	6		H	41	38	34	76	01	6
18	10	100	6		H	40	37	34	79	36	6
21	10	100	6			38	36	31	76	33	6

DAY 22

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	2	UNL	25			37	34	30	76	32	13
03	0	UNL	25			31	28	25	78	31	12
06	0	UNL	25			28	26	22	78	31	8
09	5	UNL	25			33	30	24	70	31	10
12	9	UNL	25			36	32	26	64	31	9
15	10	UNL	25			38	33	26	62	32	8
18	10	160	25			37	32	25	62	06	9
21	10	55	25			35	32	26	70	07	10

DAY 23

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	100	25			34	31	28	73	05	7
03	10	80	25			34	31	28	73	07	14
06	10	66	25			34	31	28	73	08	13
09	10	2	0	4	S	31	30	28	89	08	17
12	9	10	5		SDGS	31	30	28	89	07	22
15	10	12	3		LF	32	31	28	85	07	24
18	10	13	3		ELF	31	30	27	85	09	20
21	10	13	7		S	31	30	28	89	06	20

DAY 24

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	2	UNL	25			30	28	25	85	07	10
03	0	UNL	25			31	30	27	85	08	19
06	0	UNL	25			31	30	28	89	08	13
09	5	UNL	25			31	30	28	89	04	10
12	9	UNL	25			31	29	28	82	02	14
15	10	UNL	25			30	28	24	82	01	18
18	10	160	25			29	24	21	85	01	18
21	10	55	25			30	28	24	82	01	18

DAY 25

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	15	4		SDS	13	12	09	84	36	20
03	10	18	4		SDS	13	12	08	73	35	18
06	7	UNL	25			11	08	01	64	36	18
09	1	UNL	25			13	11	01	68	36	17
12	1	UNL	25			17	14	04	66	34	12
15	3	UNL	25			20	17	08	64	35	14
18	0	UNL	25			20	18	09	80	02	6
21	0	UNL	25			17	14	04	86	06	6

DAY 26

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	25			15	13	04	81	07	11
03	7	UNL	25			14	12	02	80	11	11
06	10	130	25			13	11	03	84	11	12
09	10	100	25			16	14	06	84	11	15
12	10	80	25			18	17	08	82	10	18
15	10	42	25			21	18	10	82	11	14
18	10	38	20			24	21	14	86	11	20
21	10	44	20			26	22	18	86	11	19

DAY 27

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	13	2		S	24	23	20	85	12	18
03	10	7	0	12	S	24	23	21	88	11	17
06	10	40	12		S	26	25	21	81	11	16
09	10	26	2	0	S	26	25	23	88	11	19
12	10	18	3		SBS	28	27	24	85	11	16
15	10	13	1	0	ERSGIP	29	28	26	89	11	20
18	10	18	26			31	30	27	85	12	21
21	10	13	25			31	30	27	85	12	21

DAY 28

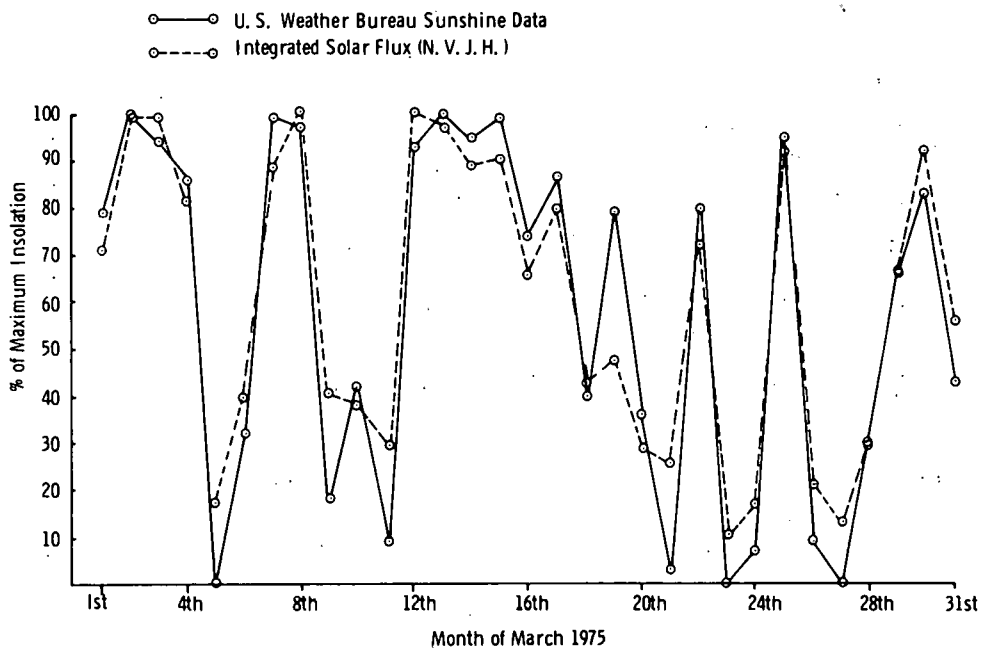
HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	9	5		S	33	32	30	89	12	22
03	10	8	6		L	35	34	33	92	16	15
06	9	27	20			30	27	21	69	19	20
09	10	20	25			28	26	20	72	20	14
12	10	24	25			30	27	22	72	19	14
15	10	26	25			30	27	22	72	21	20
18	10	28	15		S	29	27	22	75	24	17
21	10	15	20			29	27	22	75	24	17

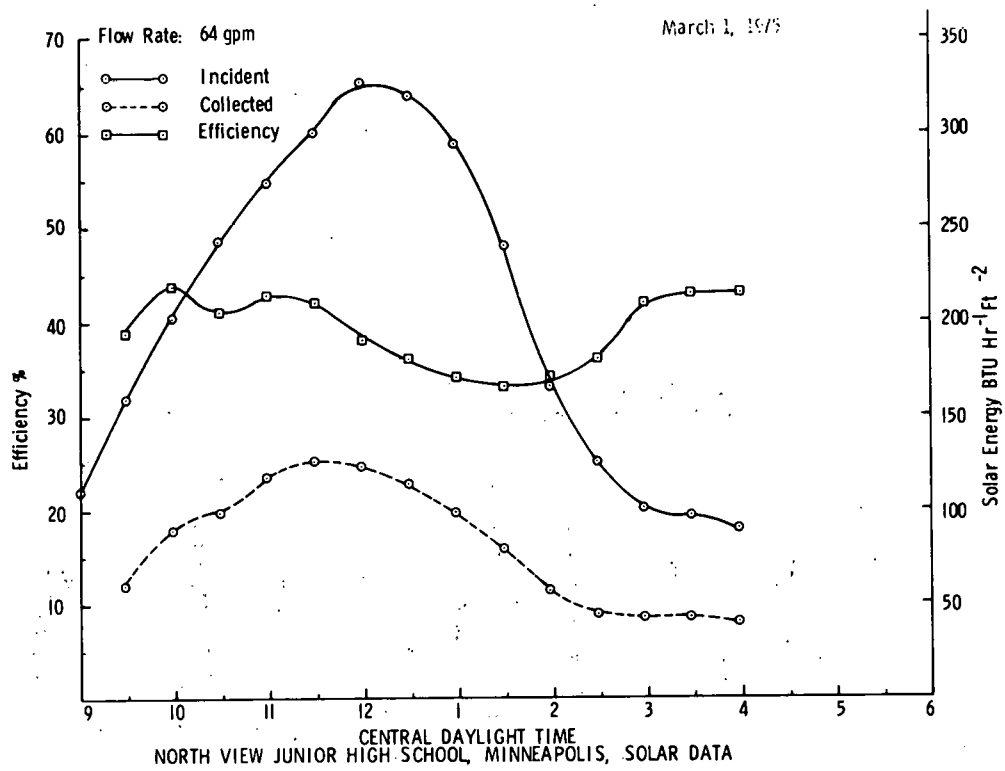
DAY 29

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	10	15	10		S	37	36	21	78	26	14
03	10	20	15		S	34	32	18	71	26	13
06	10	19	7		S	30	28	13	74	29	14
09	10	19	7		S	30	28	12	71	28	18
12	10	30	7		S	32	30	15	68	27	16
15	10	29	25		S	34	31	15	65	32	18
18	0	UNL	25			22	19	10	80	31	17
21	0	UNL	25			18	14	05	82	30	19

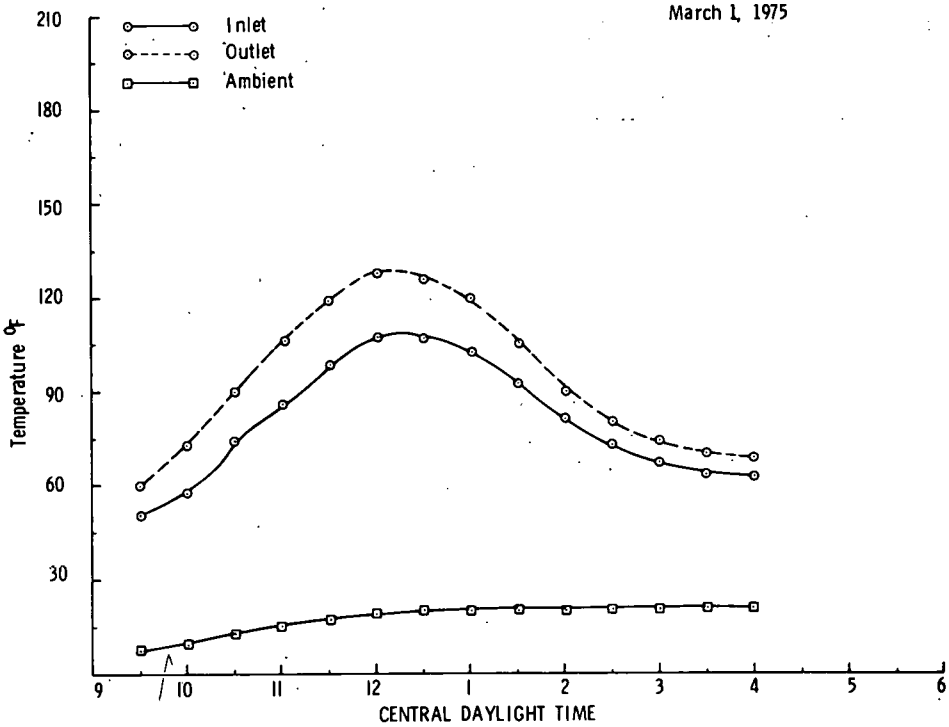
DAY 30

HOUR	SKY COVER	CEILING HUNDS. FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
00	0	UNL	25			12	10	01	81	31	14
03	0	UNL	25			07	05	-04	80	31	10
06	0	UNL	25			04	03	-08	86	30	10
09	0	UNL	25			07	06	-07	92	30	8
12	0	UNL	25			13	10	-05	88	30	10
15	0	UNL	25			16	13	02

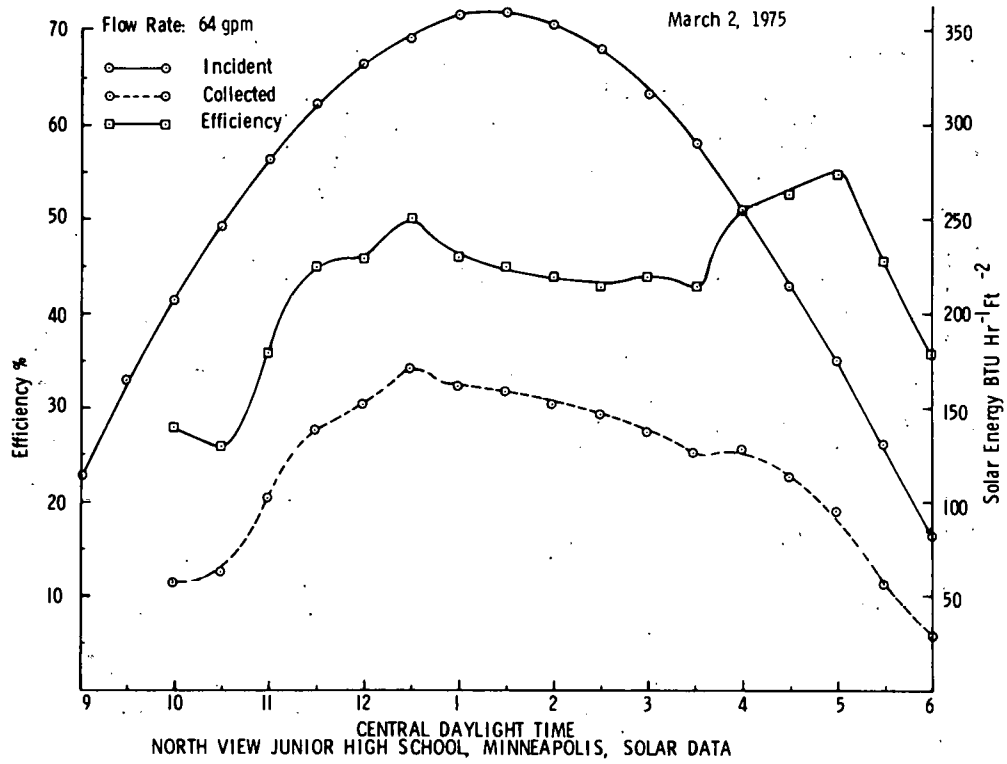

U. S. Weather Bureau Sunshine Data
Integrated Solar Flux (N. V. J. H.)
% of Maximum Insolation
100
90
80
70
60
50
40
30
20
10
1st
4th
8th
12th
16th
20th
24th
28th
31st
Month of March 1975



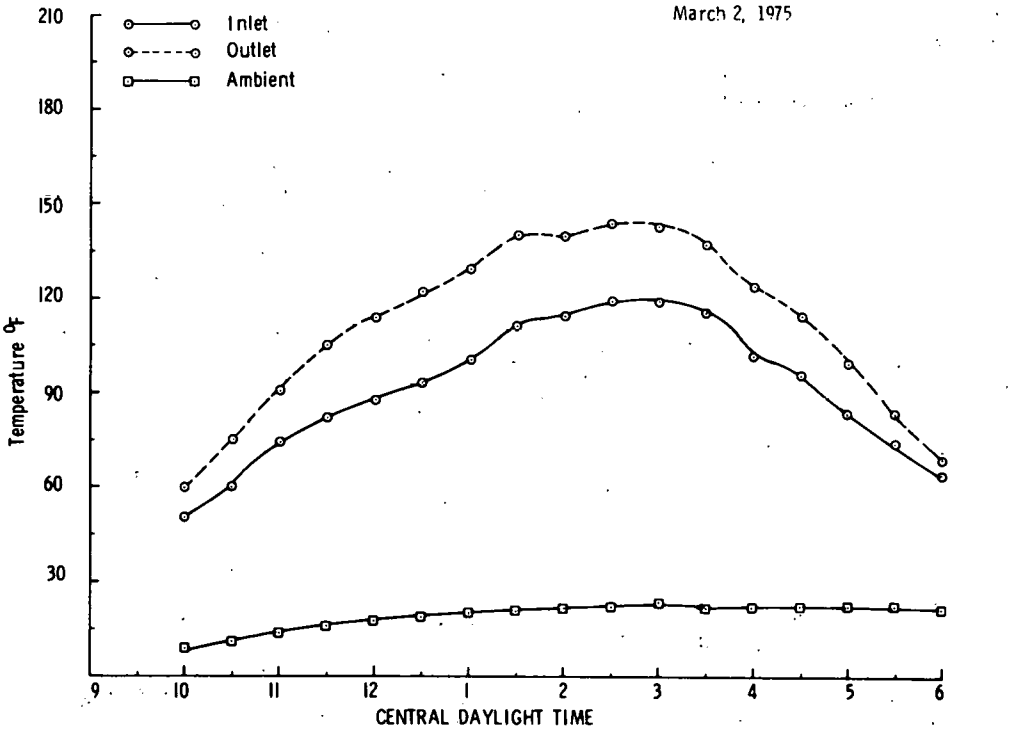
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



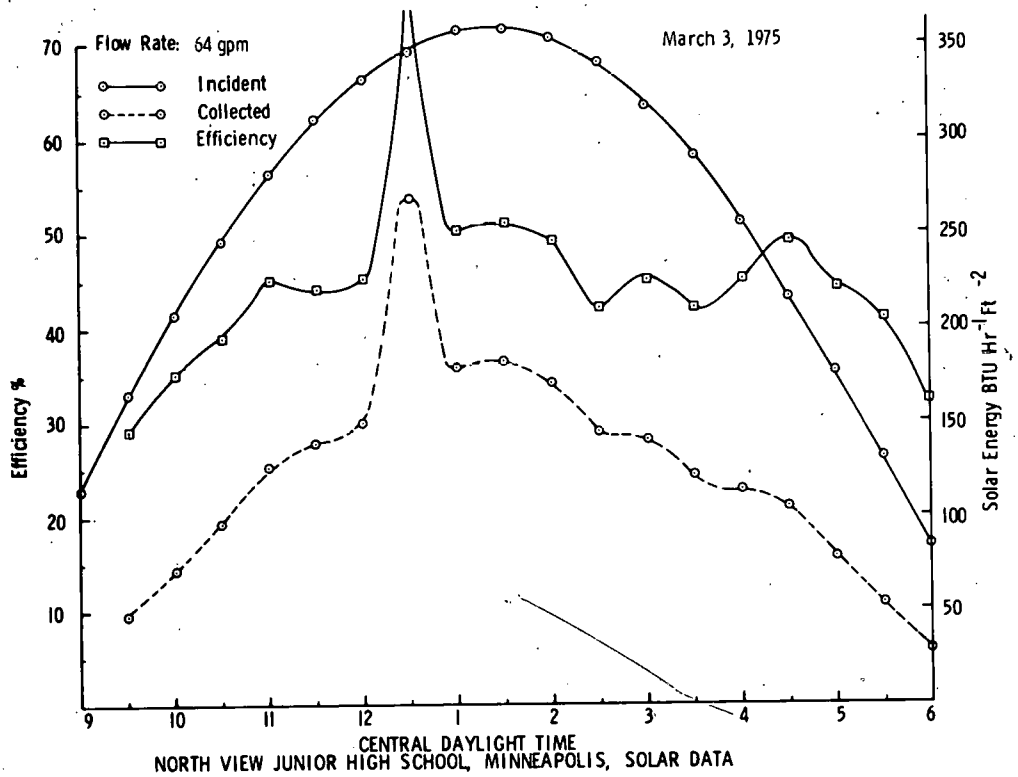
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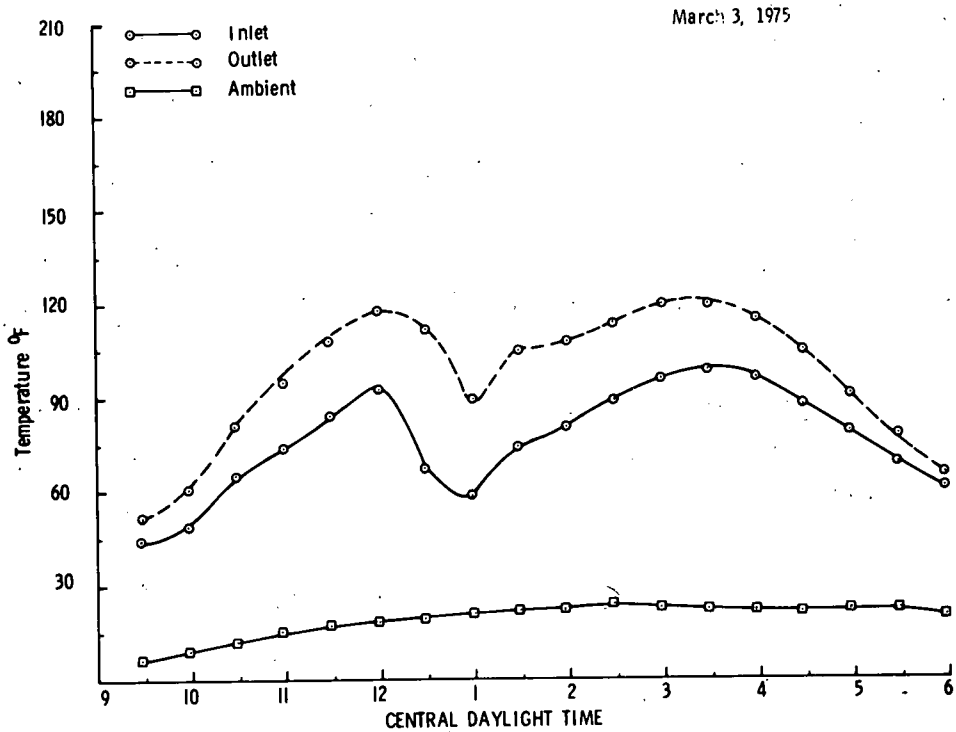
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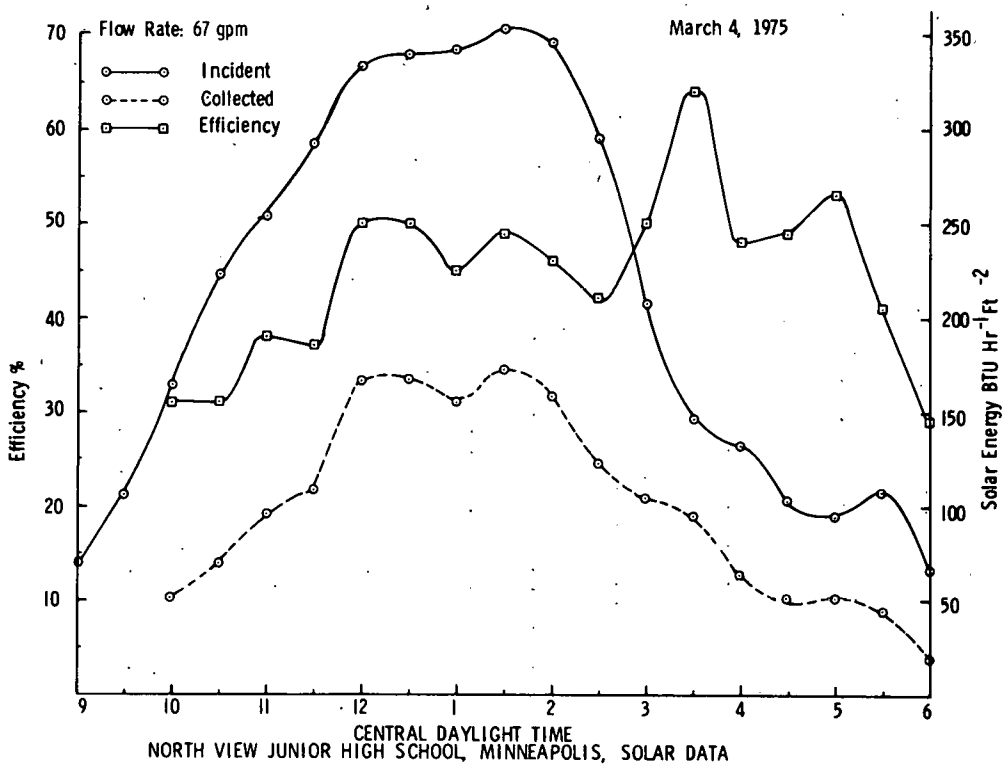
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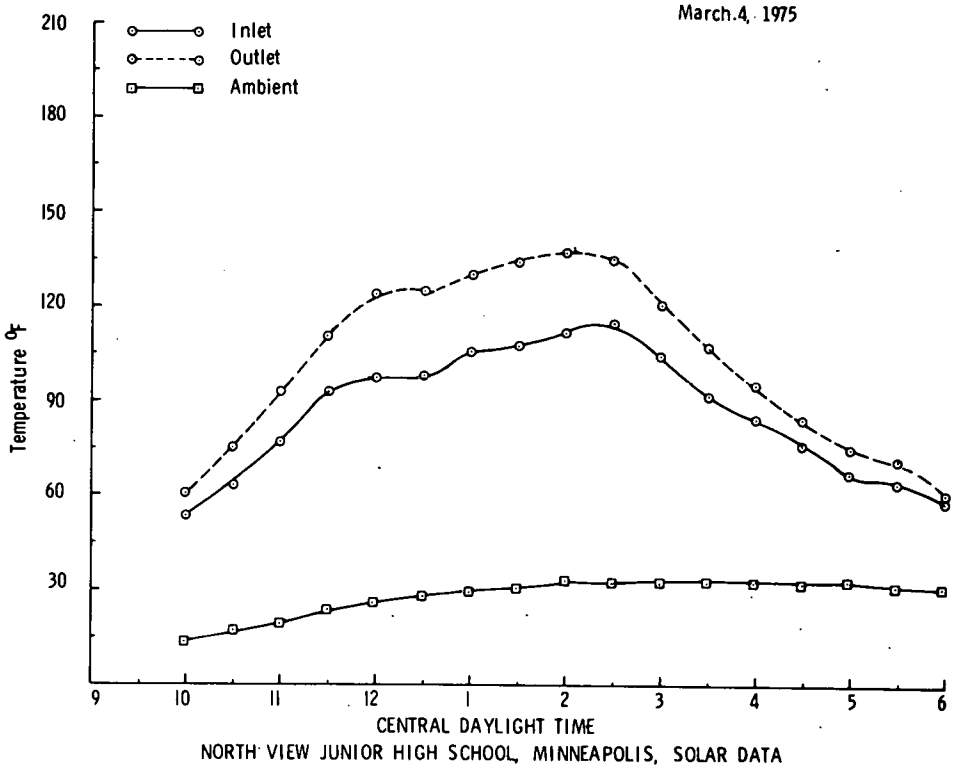
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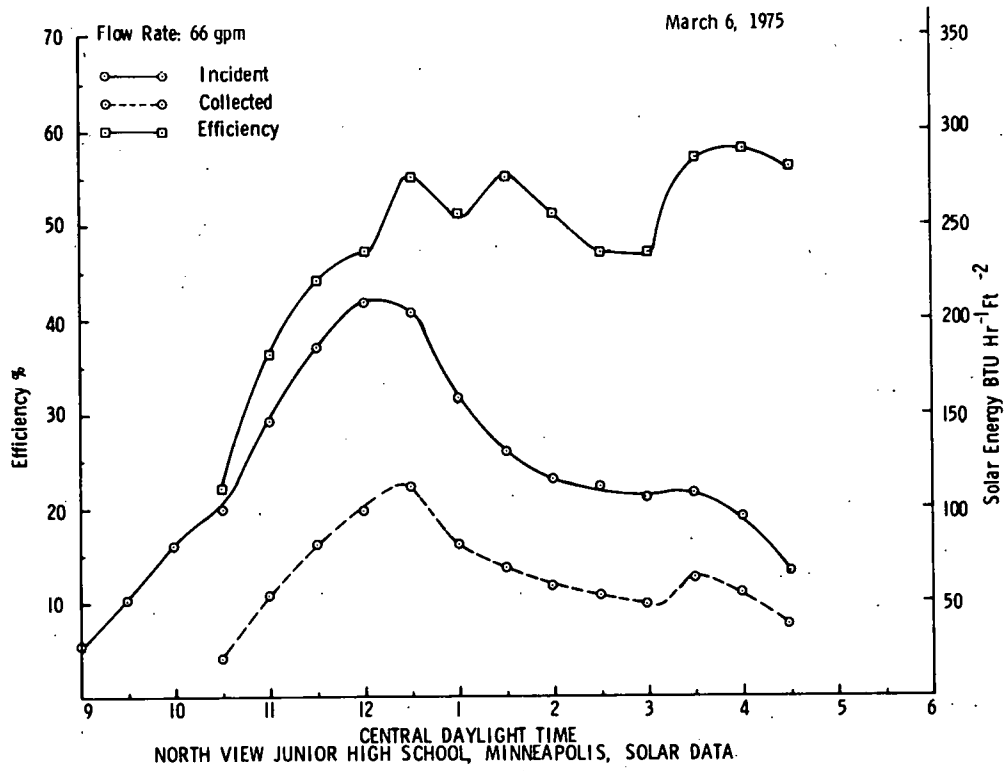
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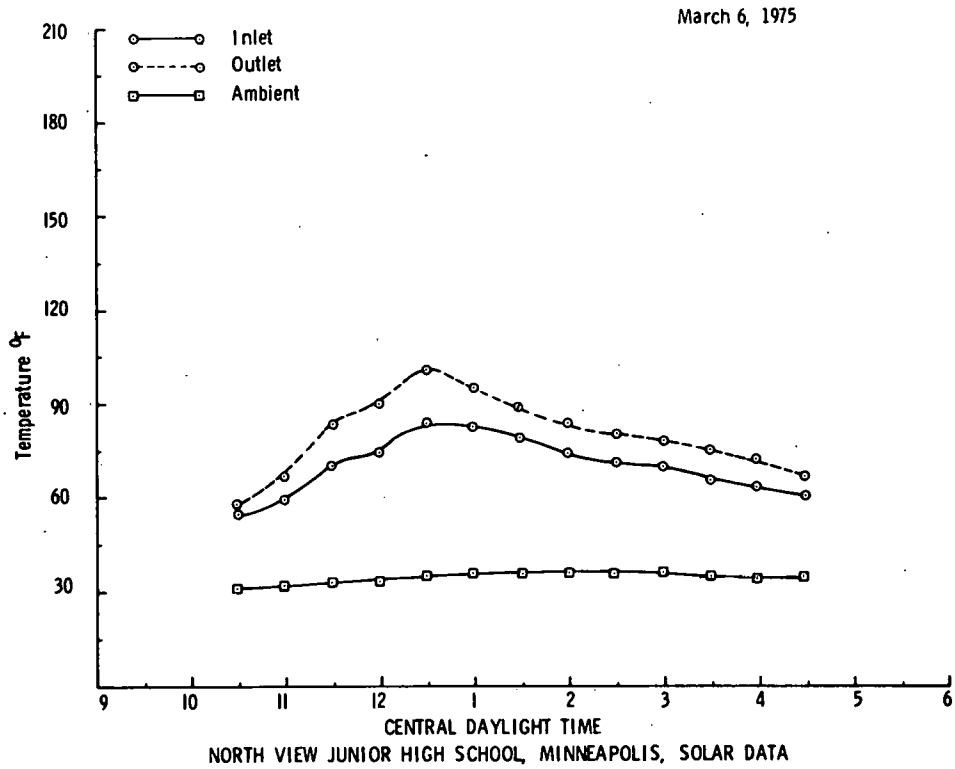
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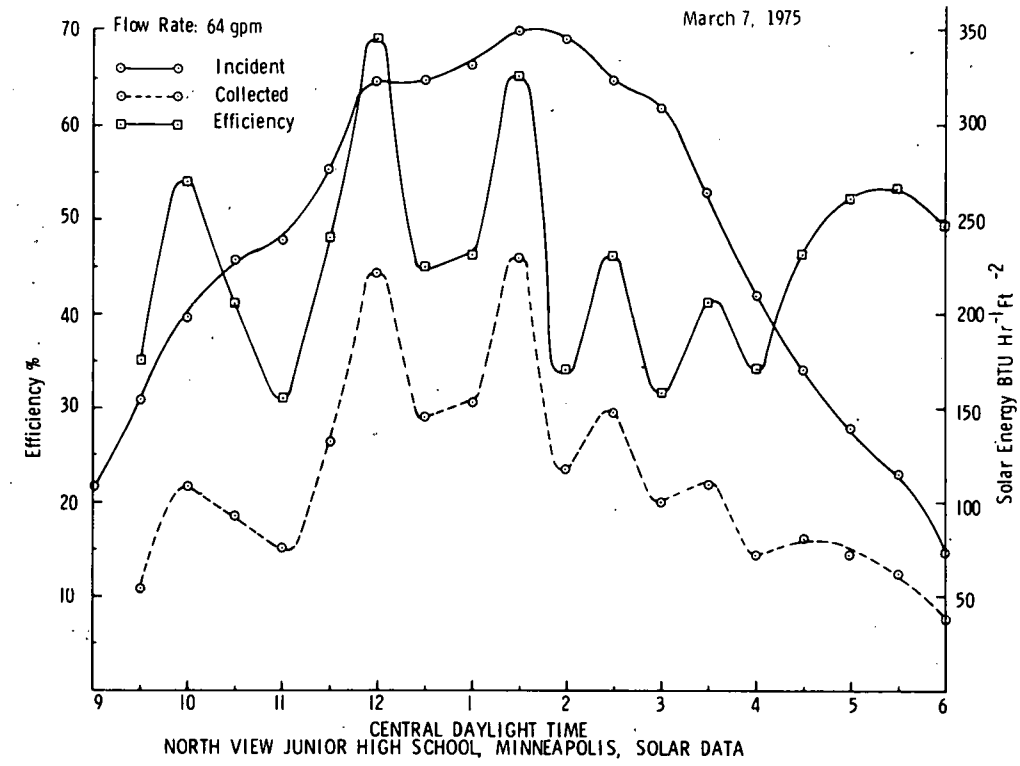
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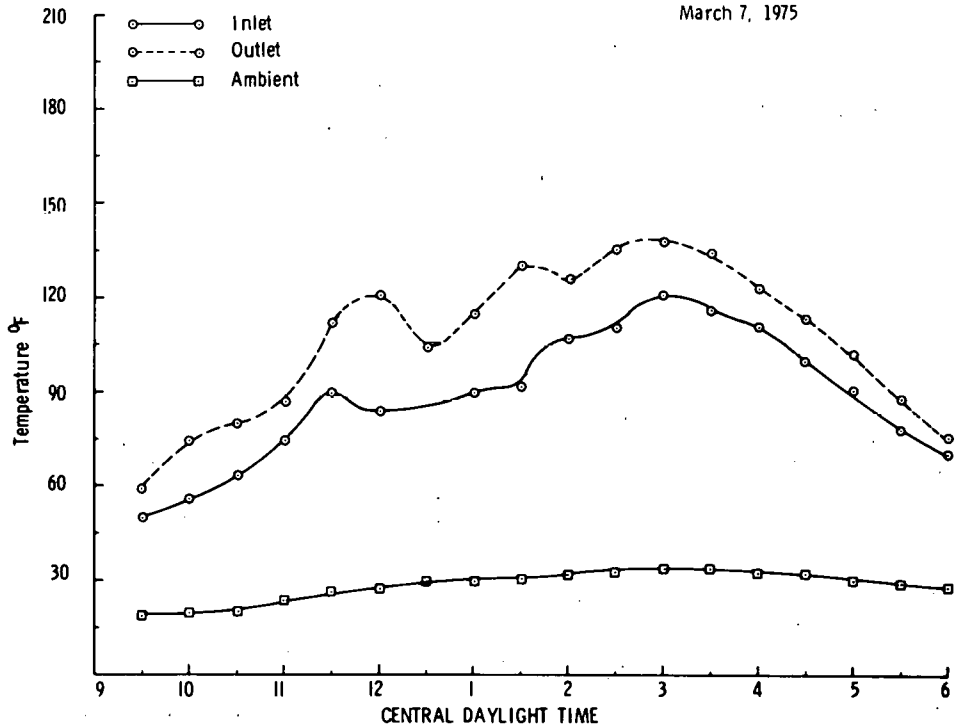
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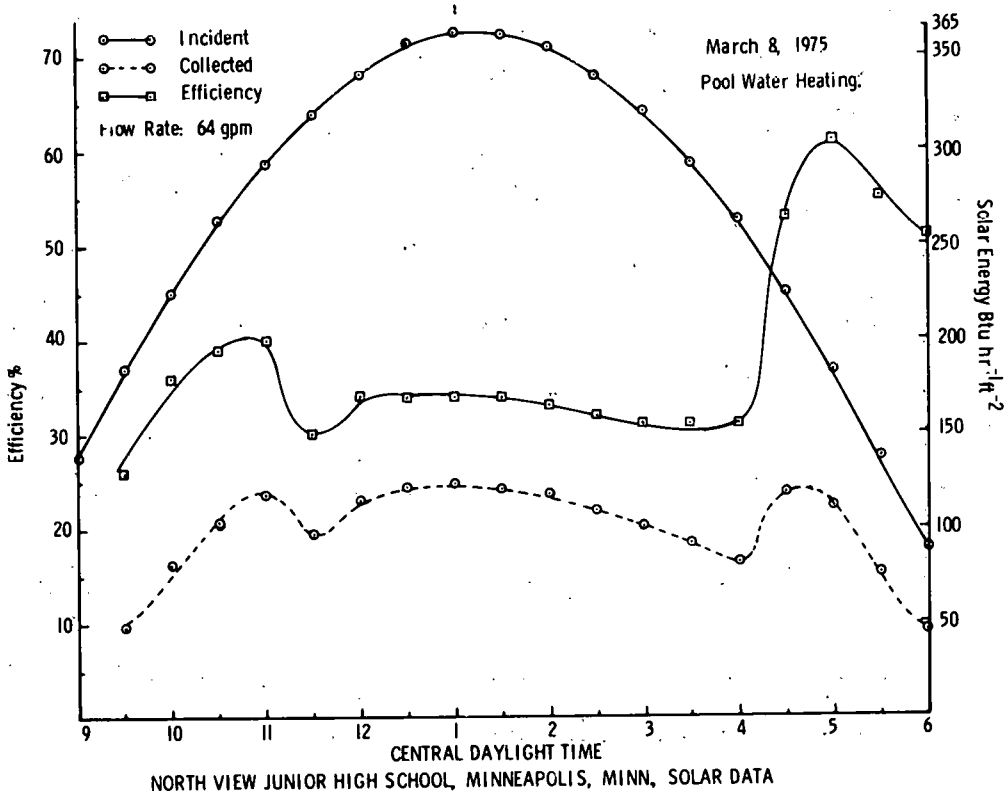
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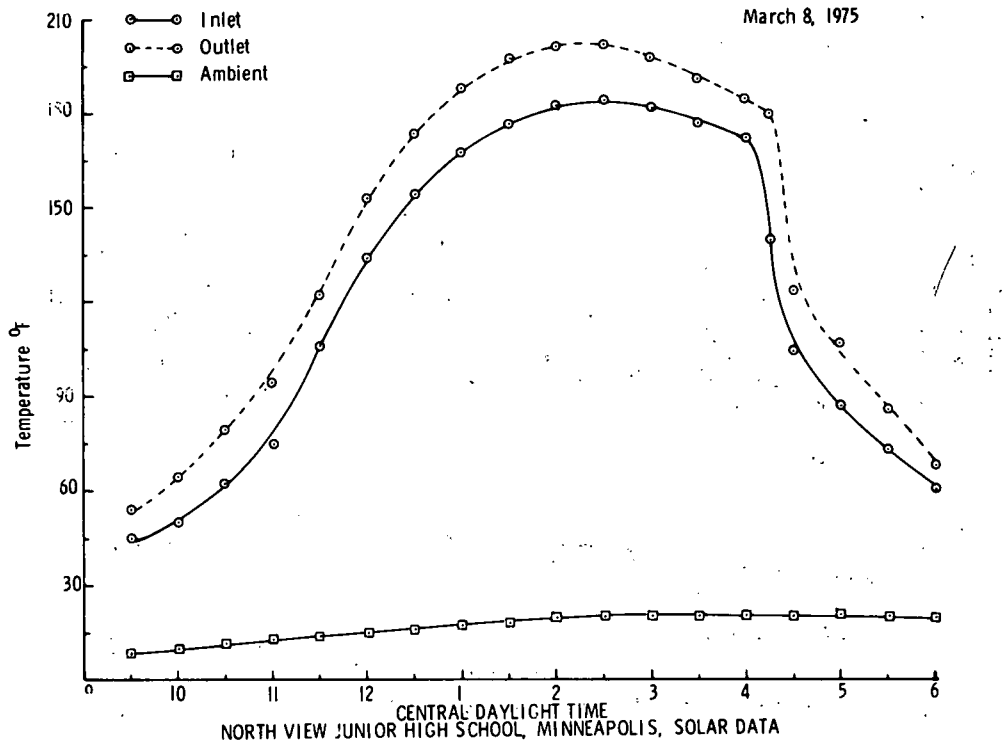
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



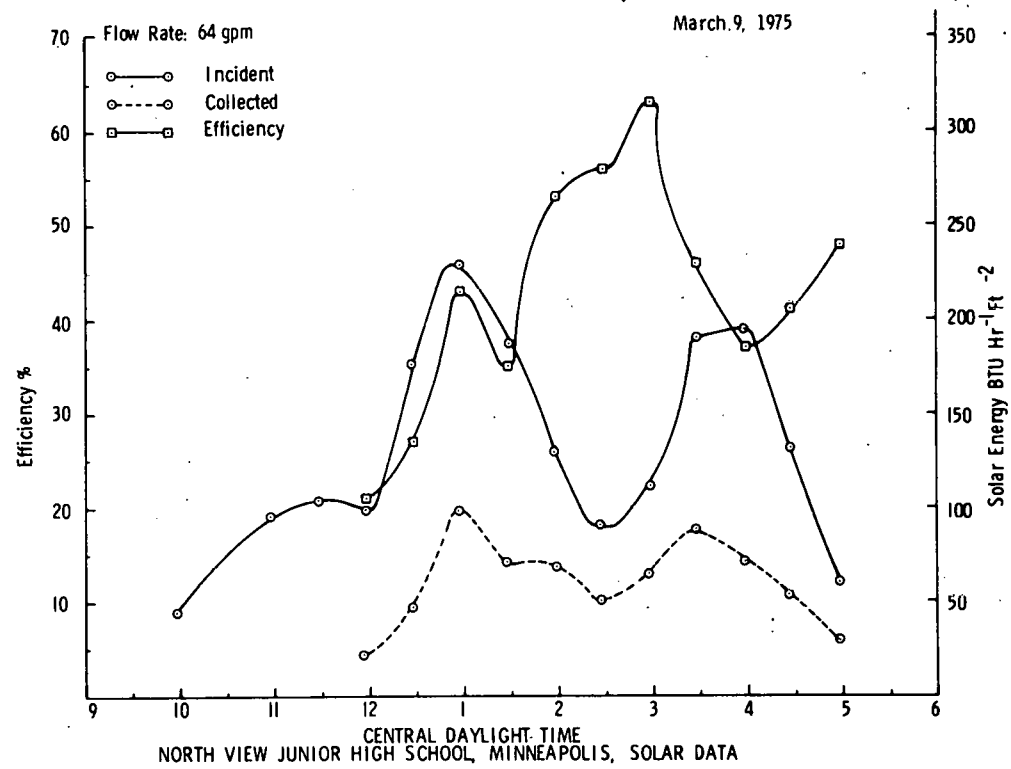
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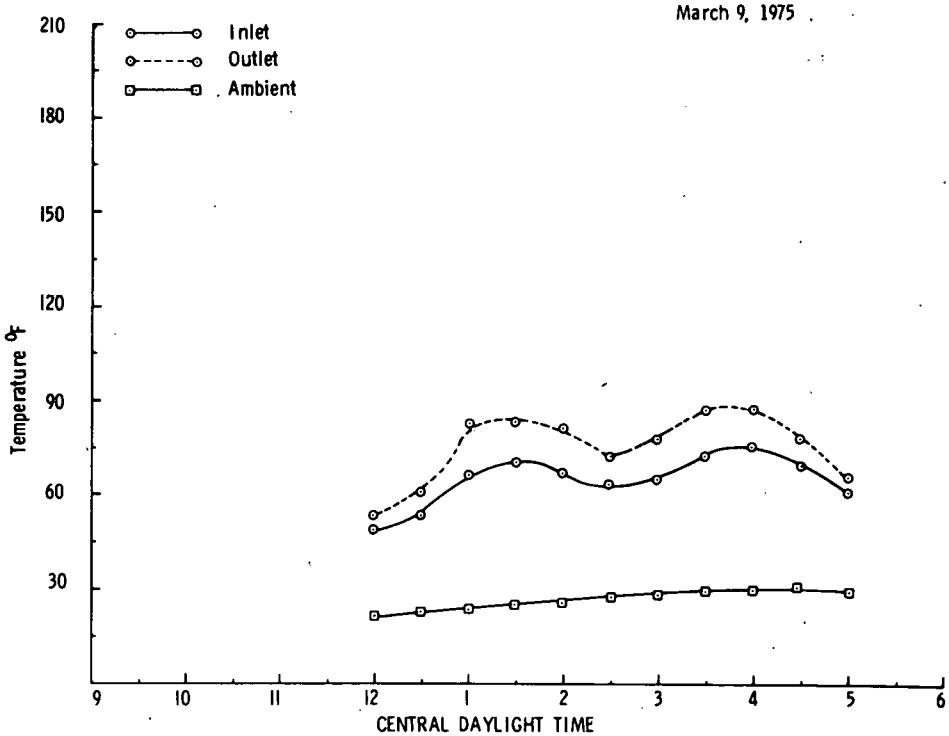
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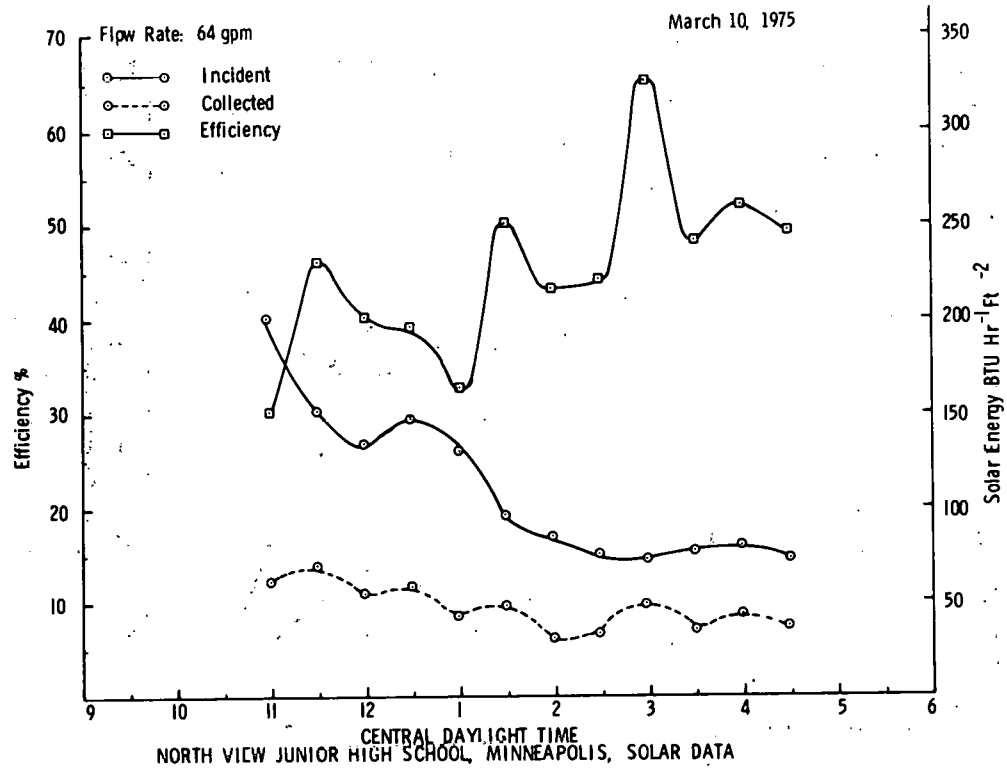
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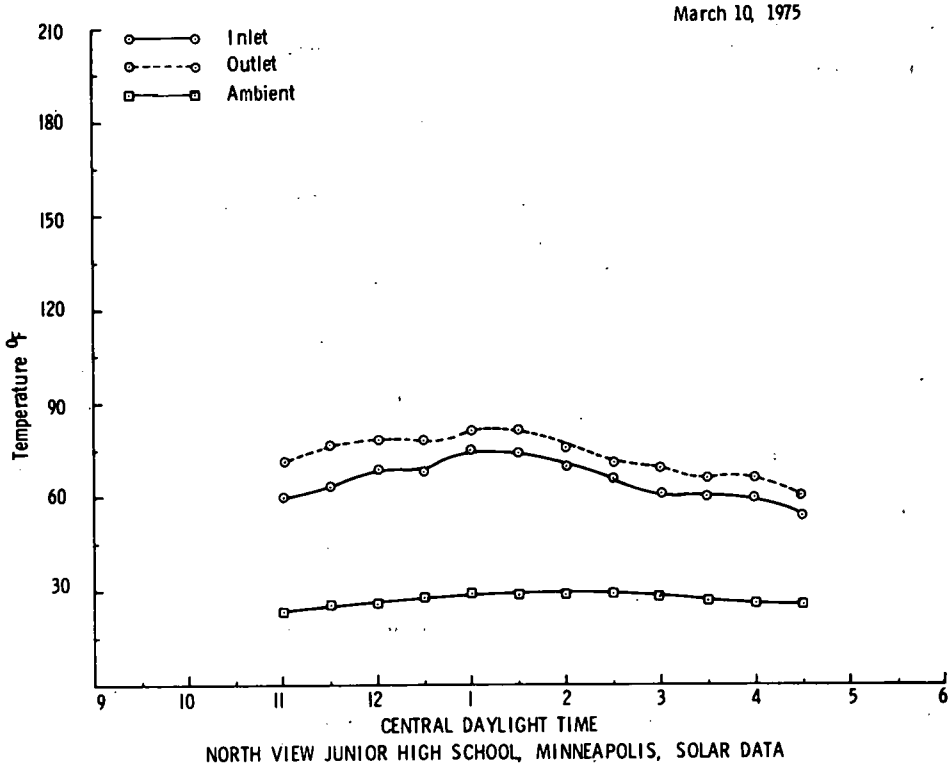
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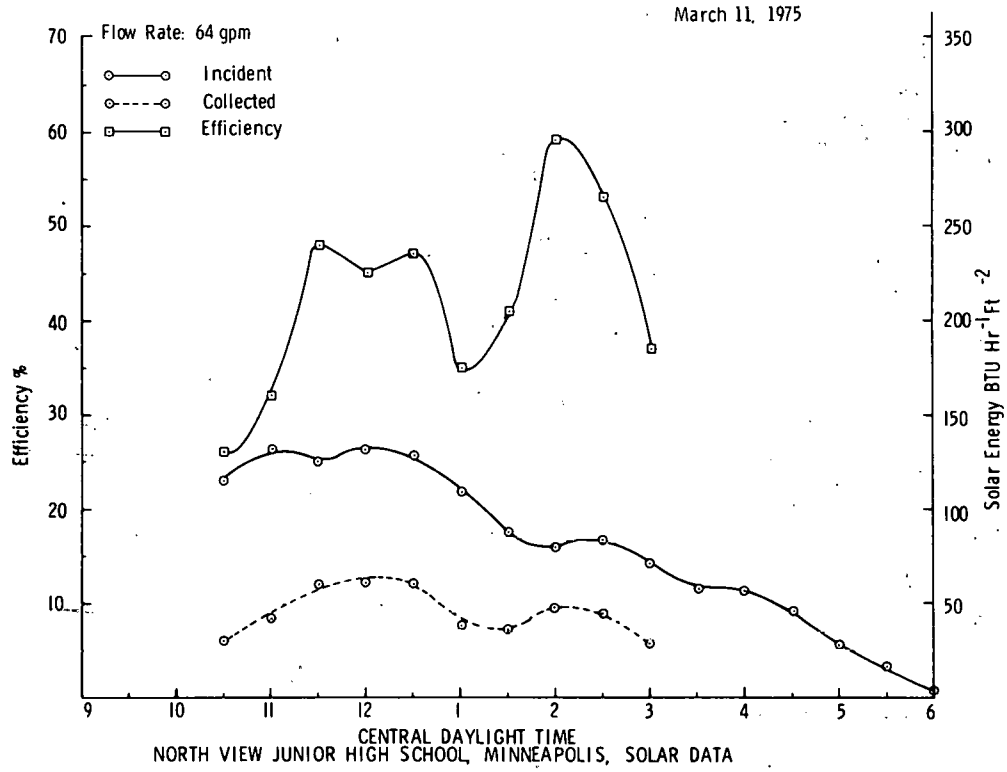
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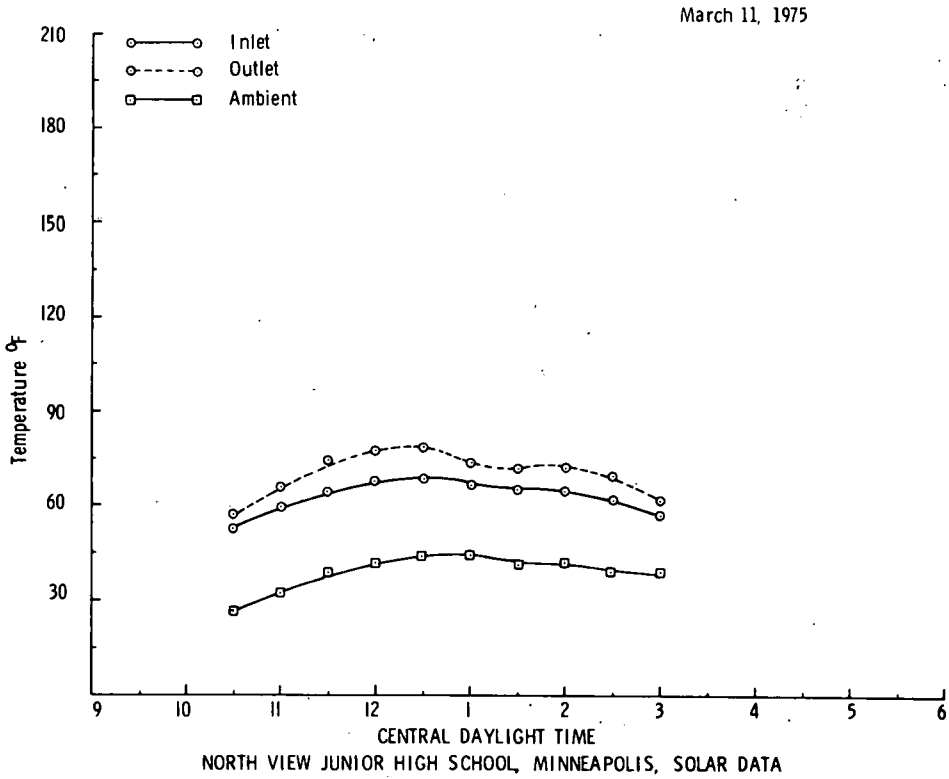
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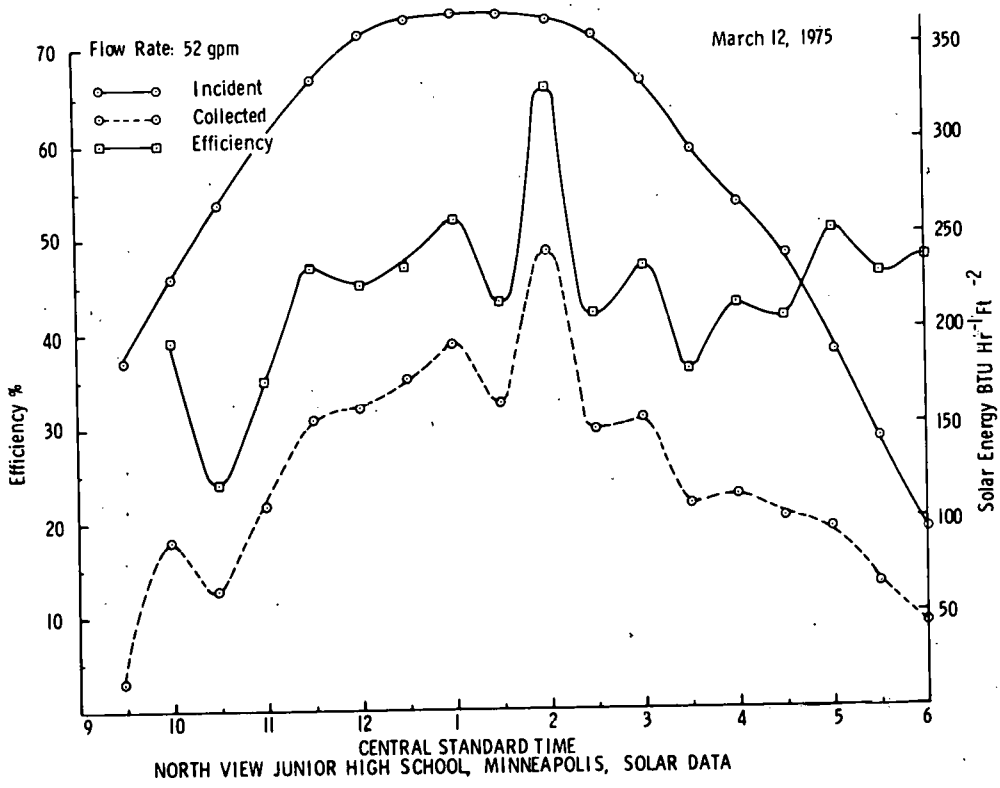
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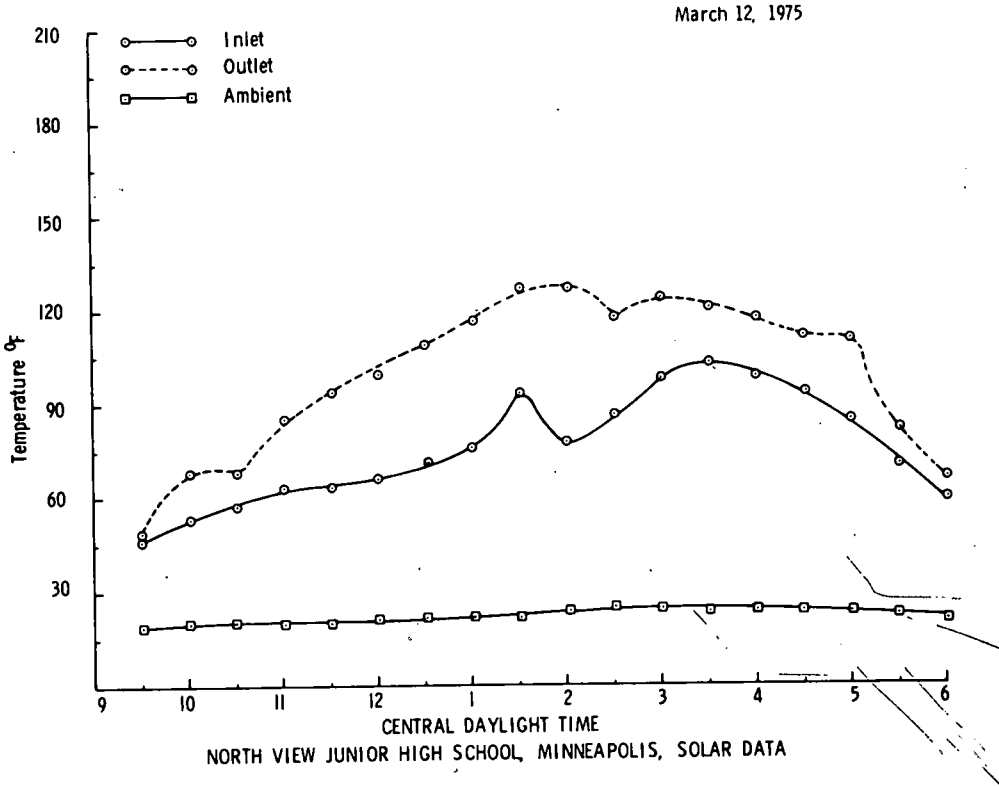
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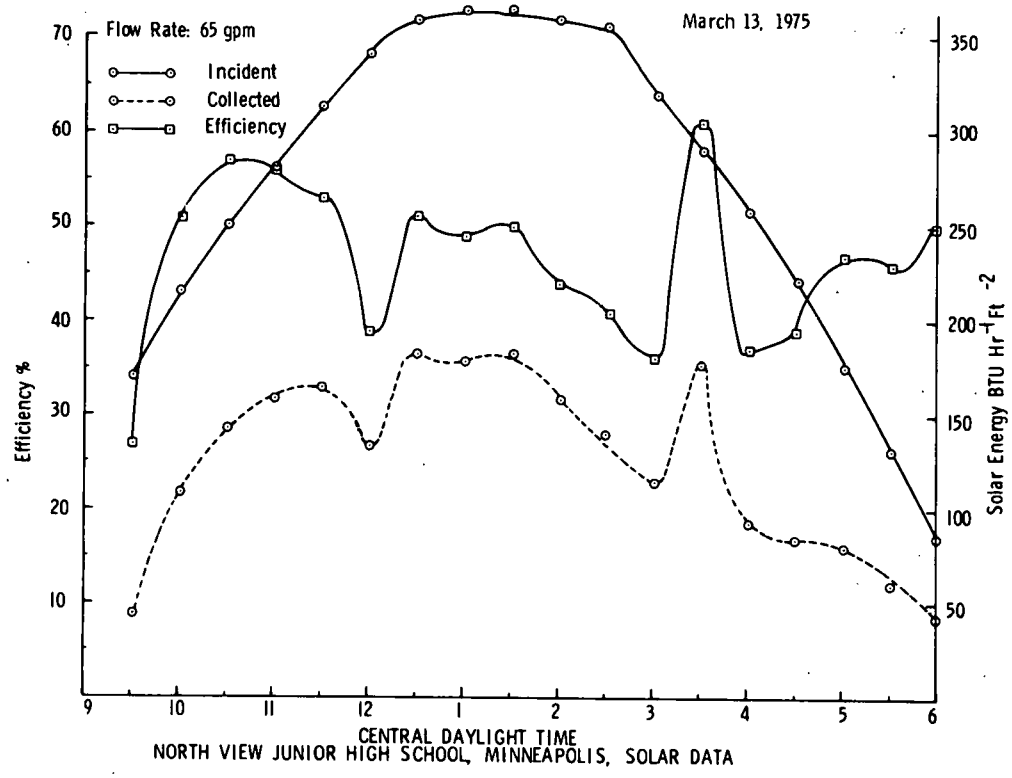
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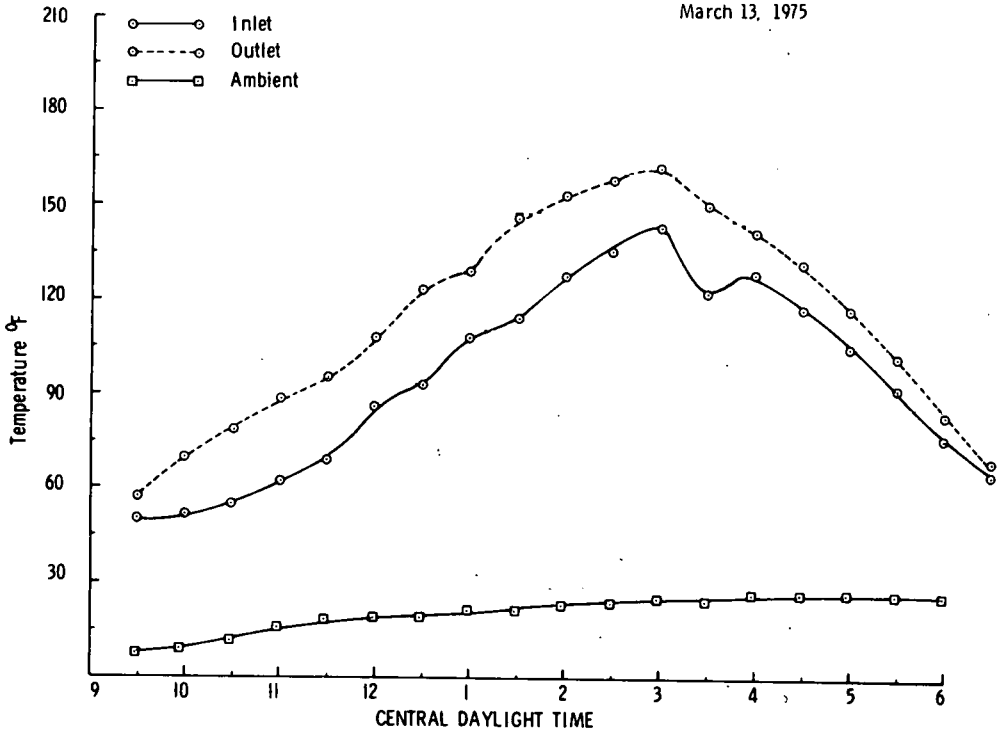
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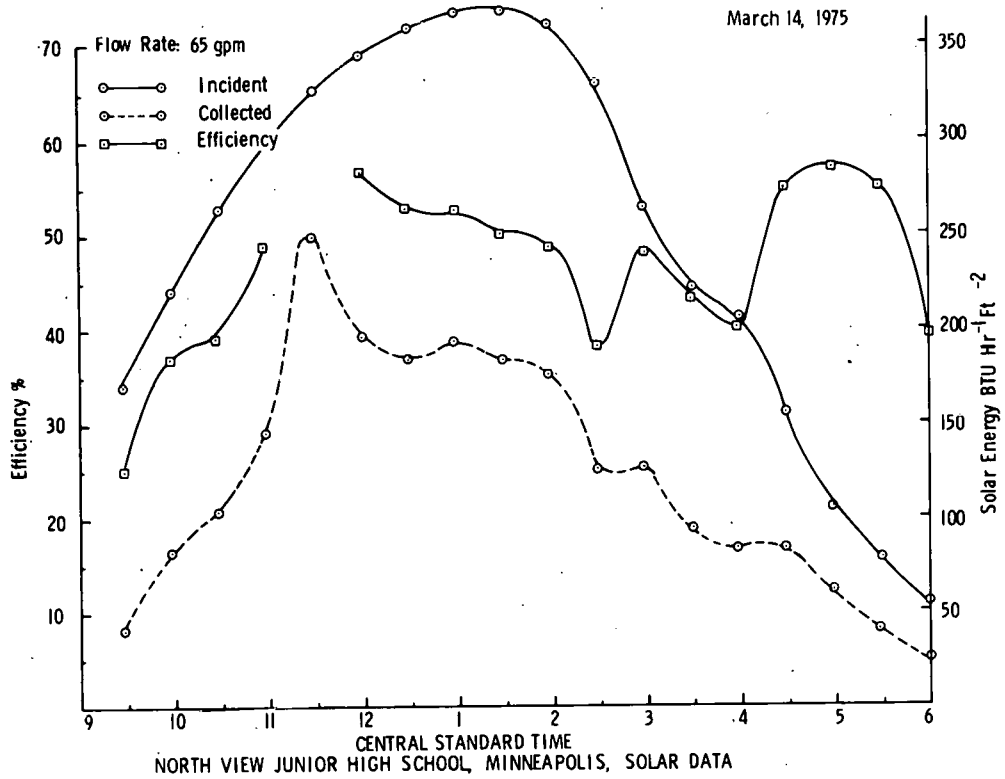
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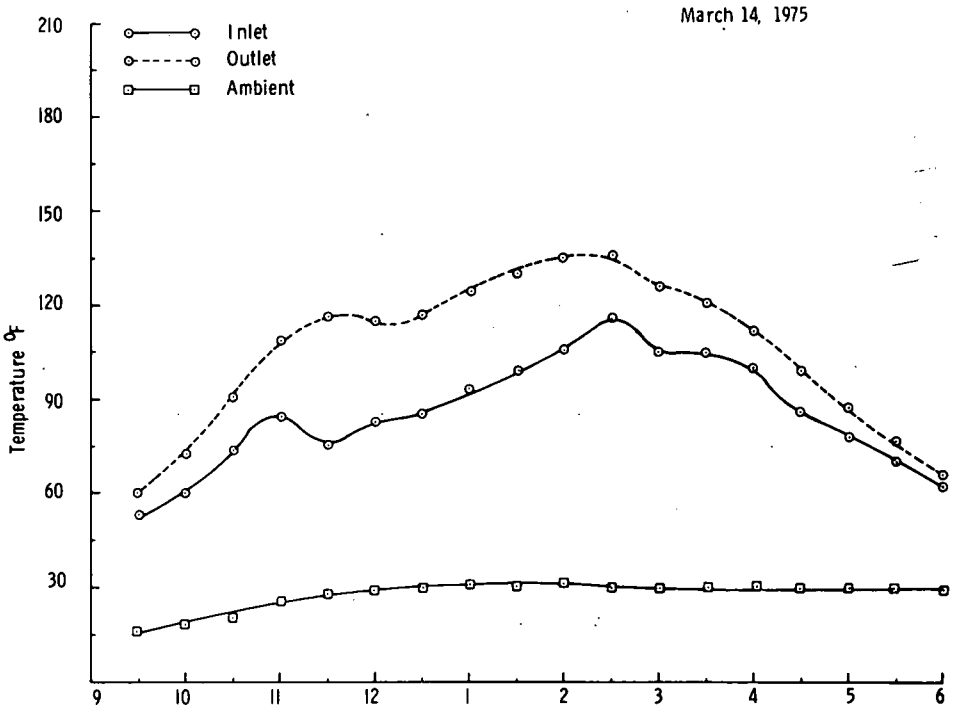
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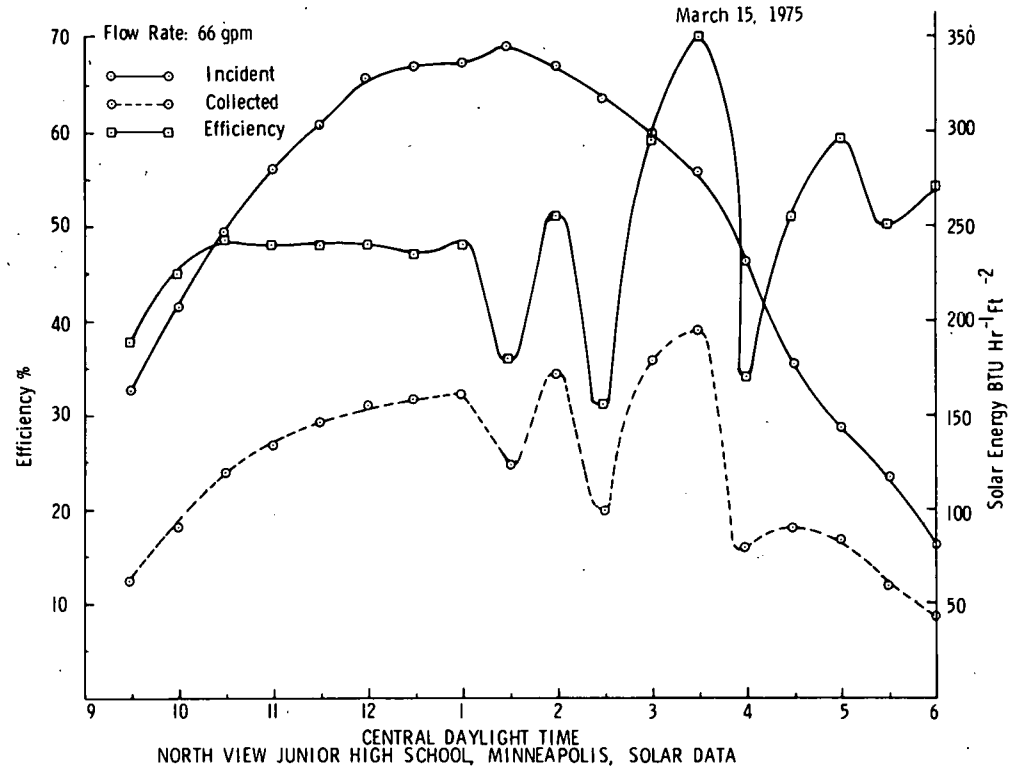
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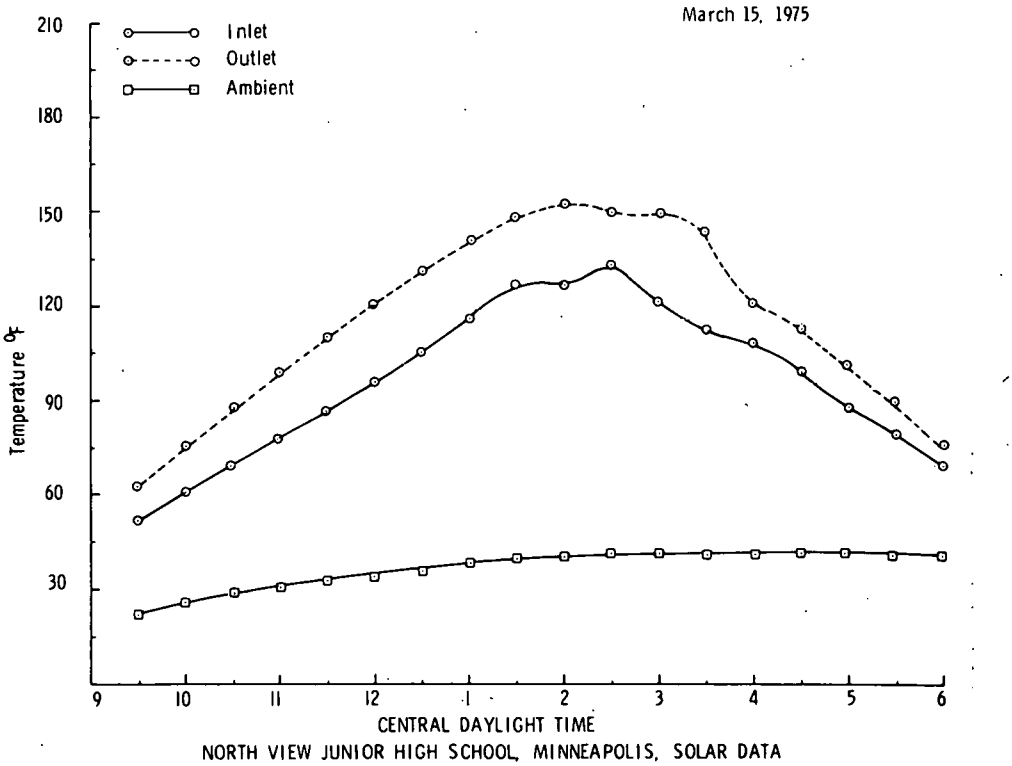
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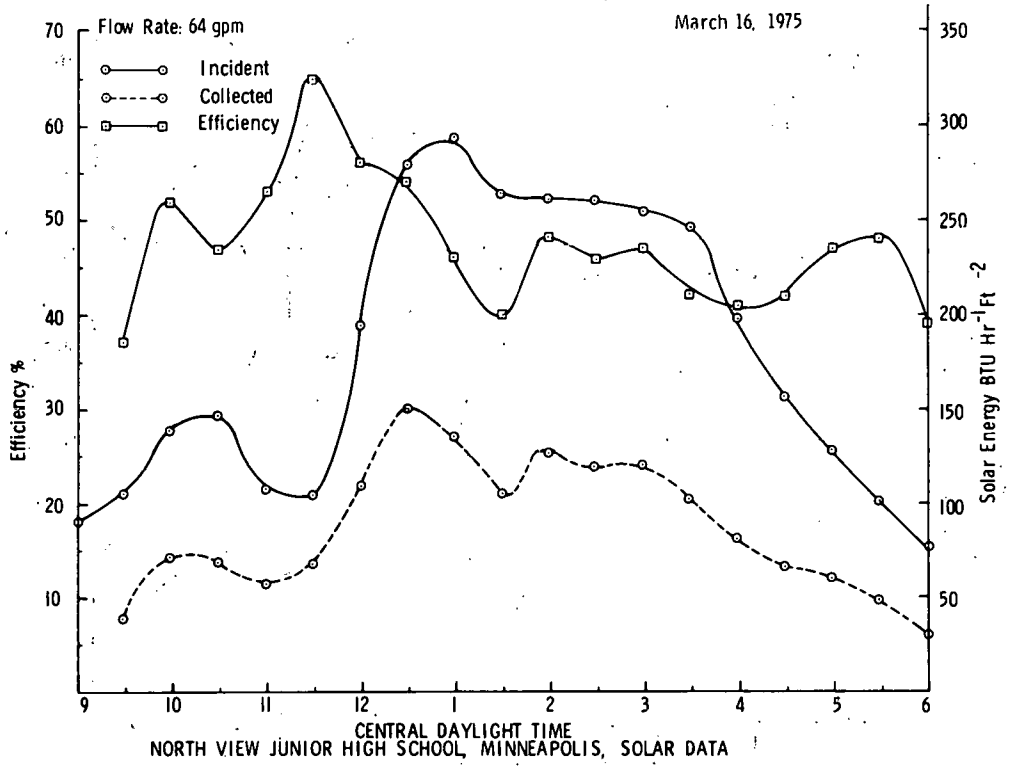
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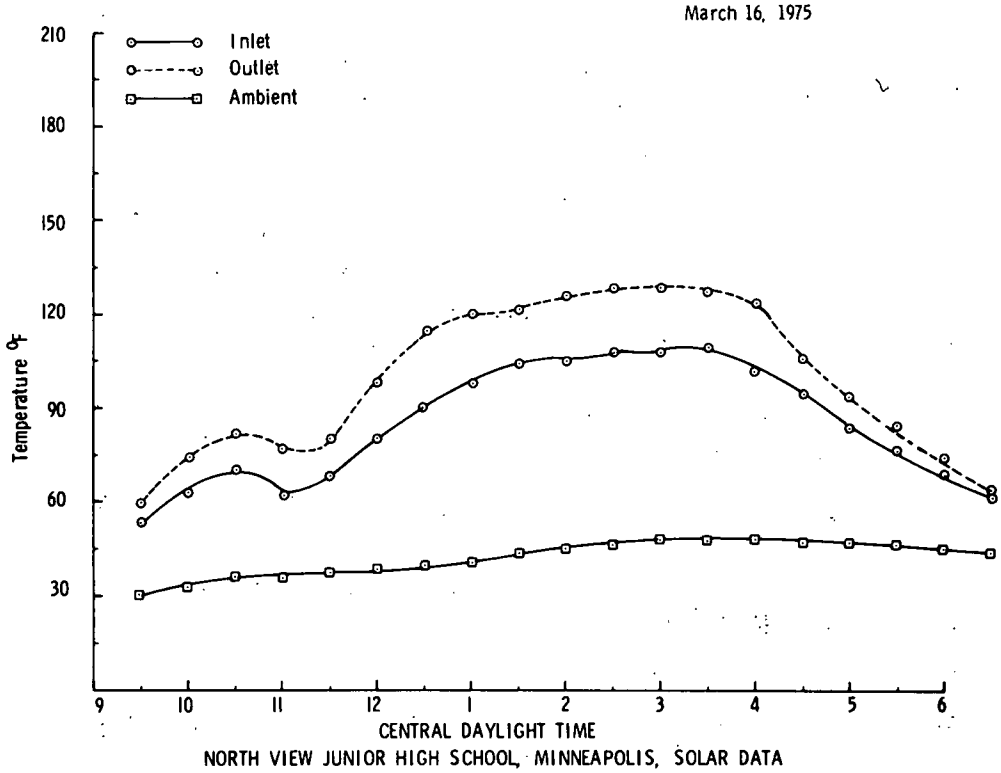
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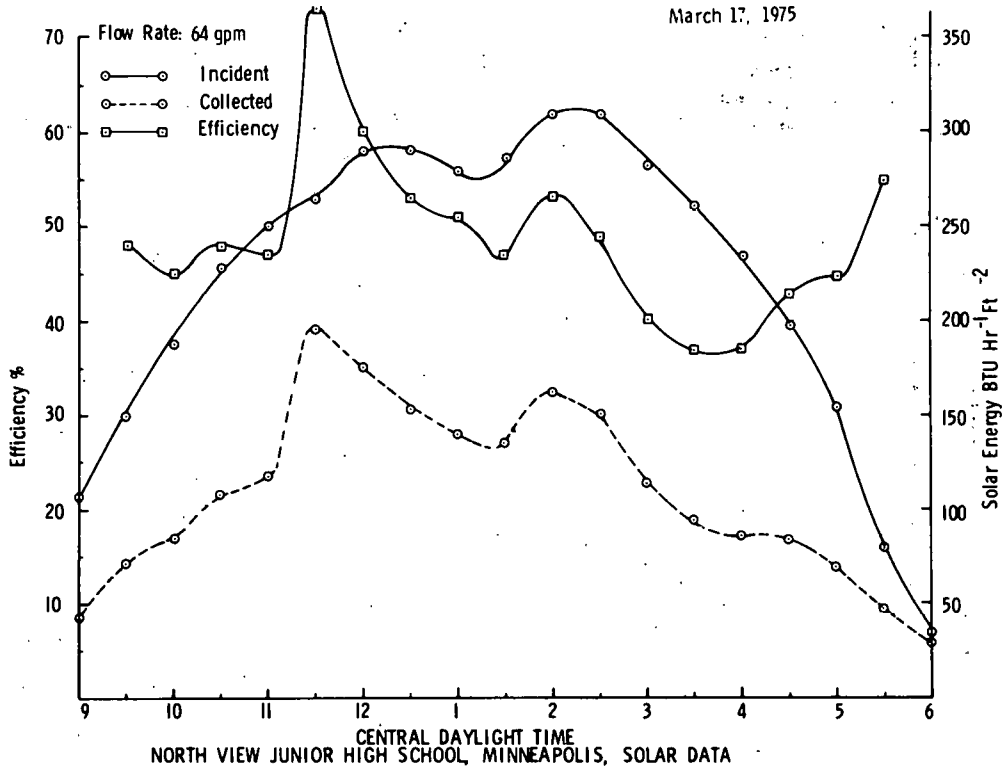
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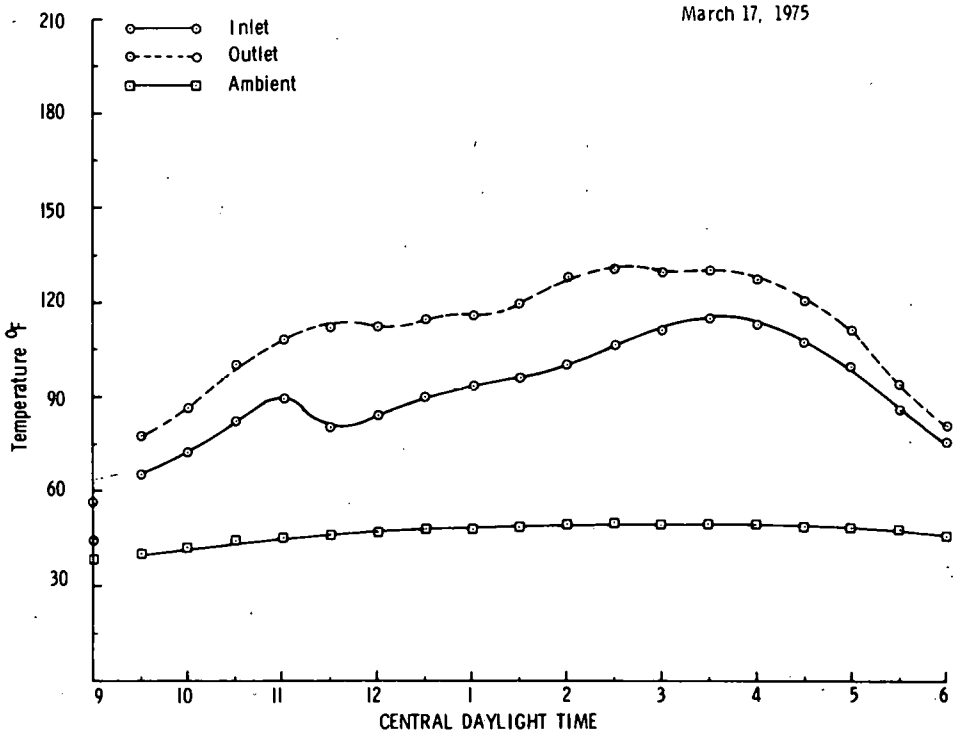
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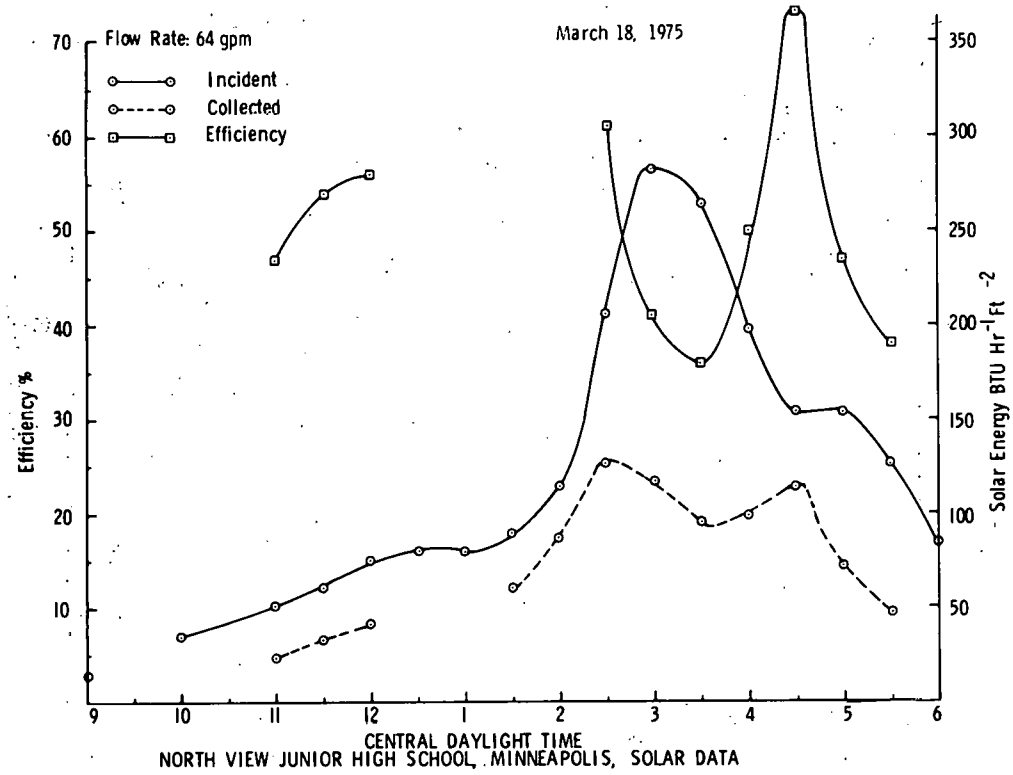
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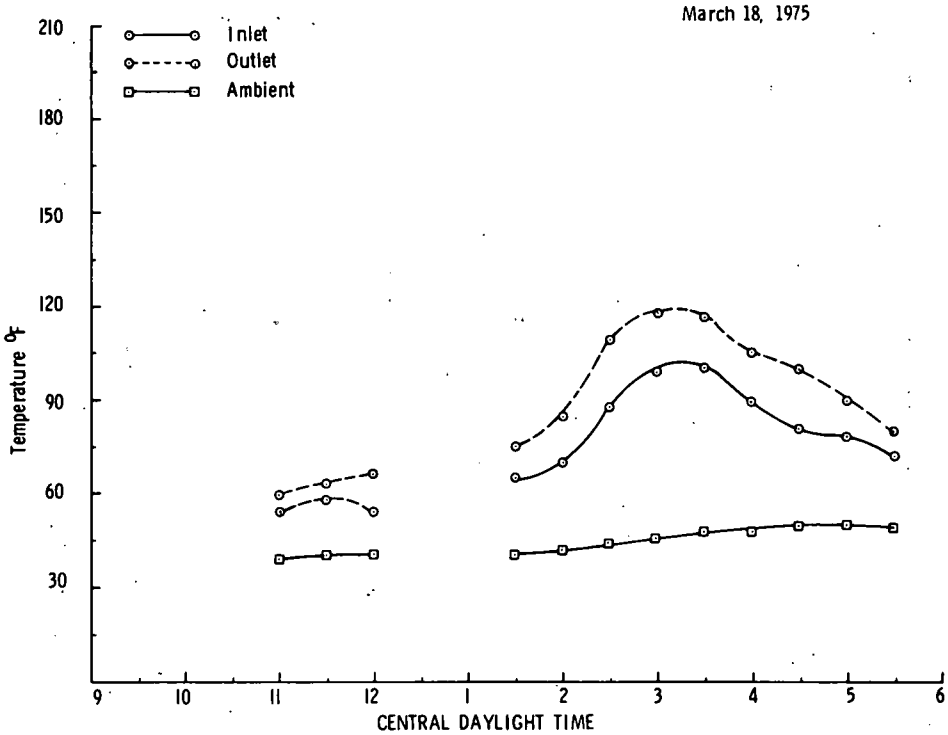
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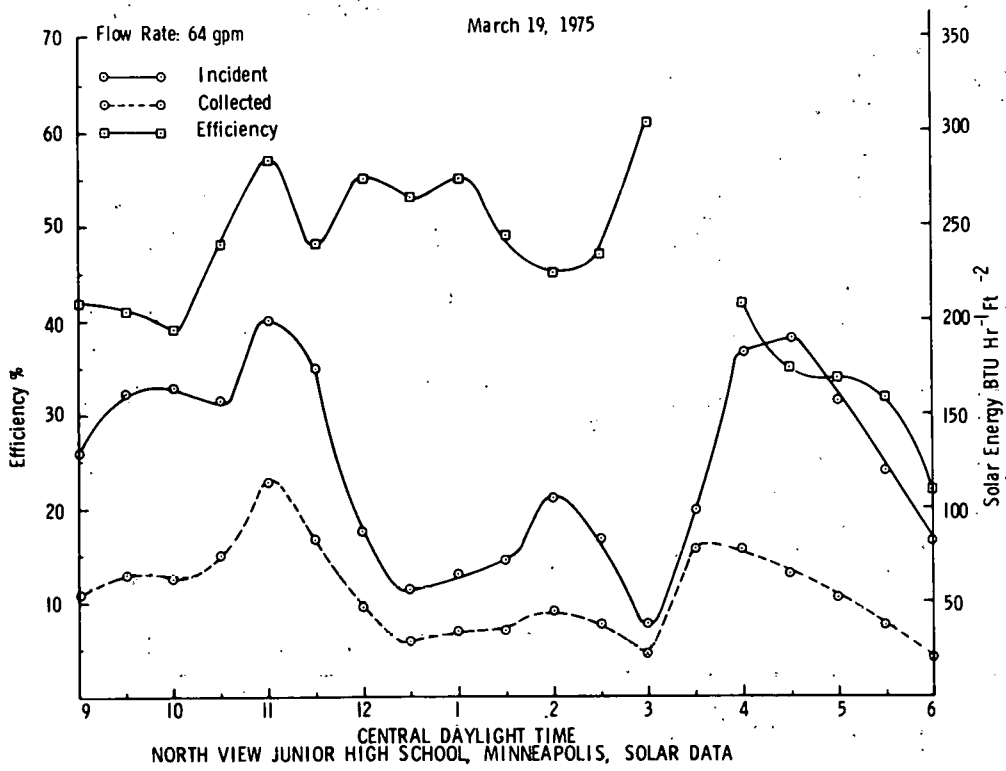
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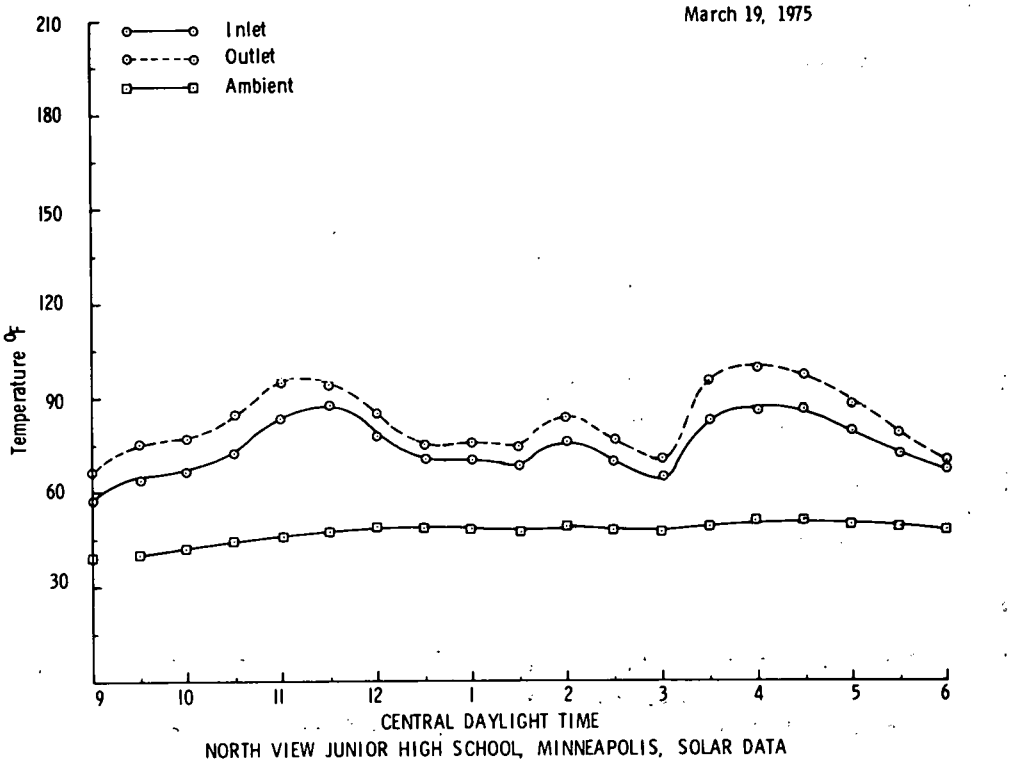
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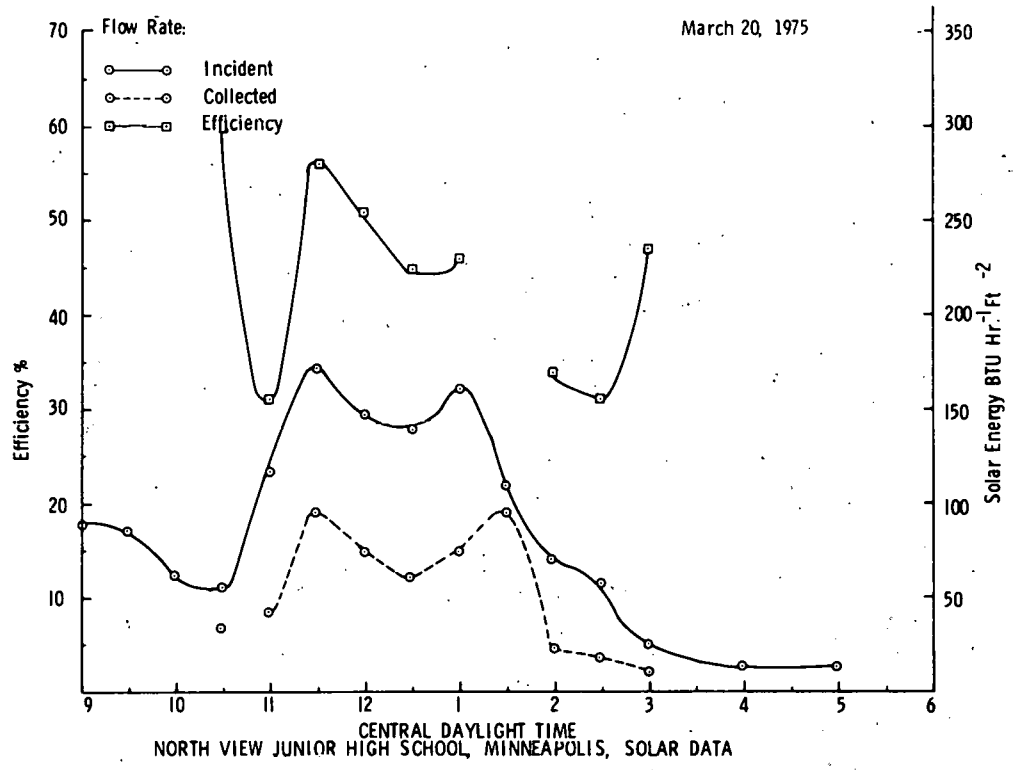
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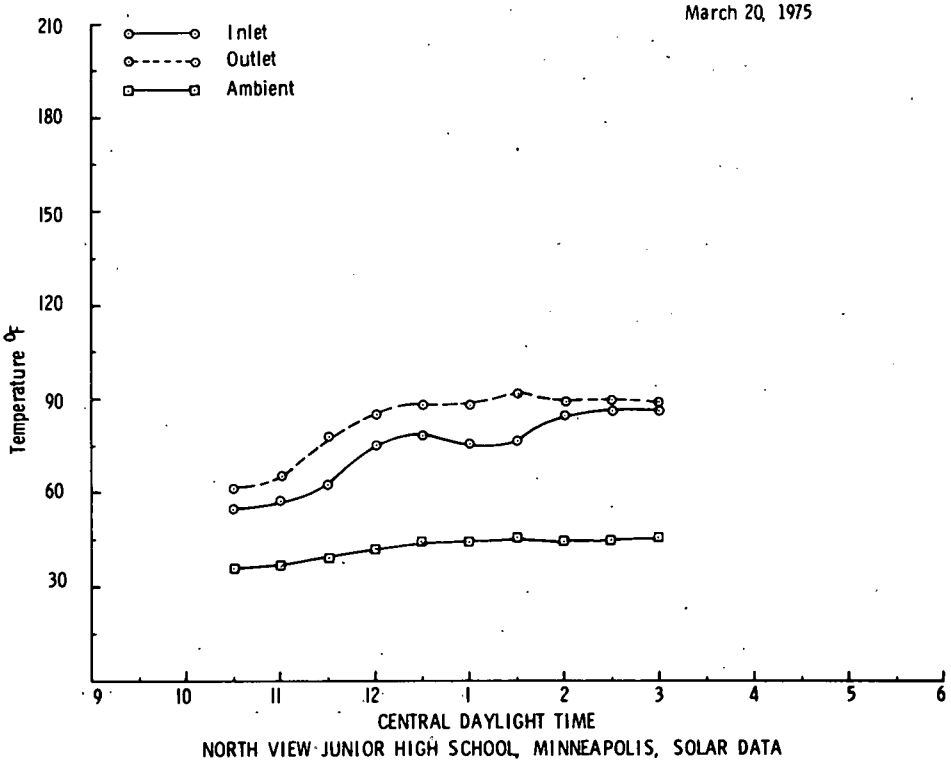
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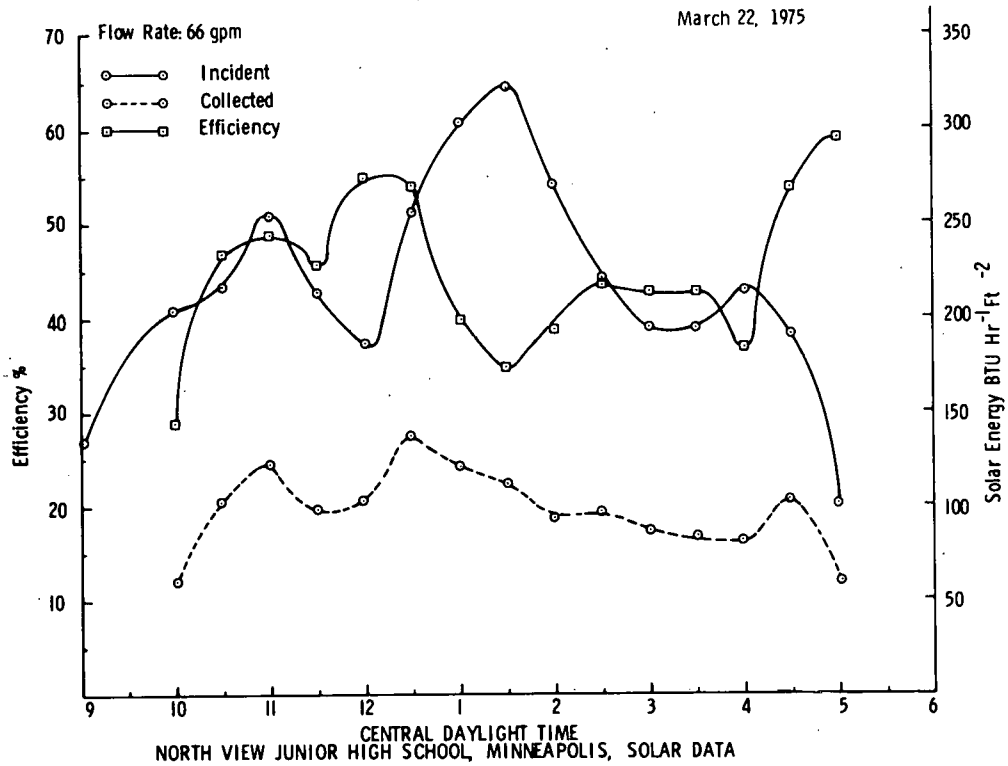
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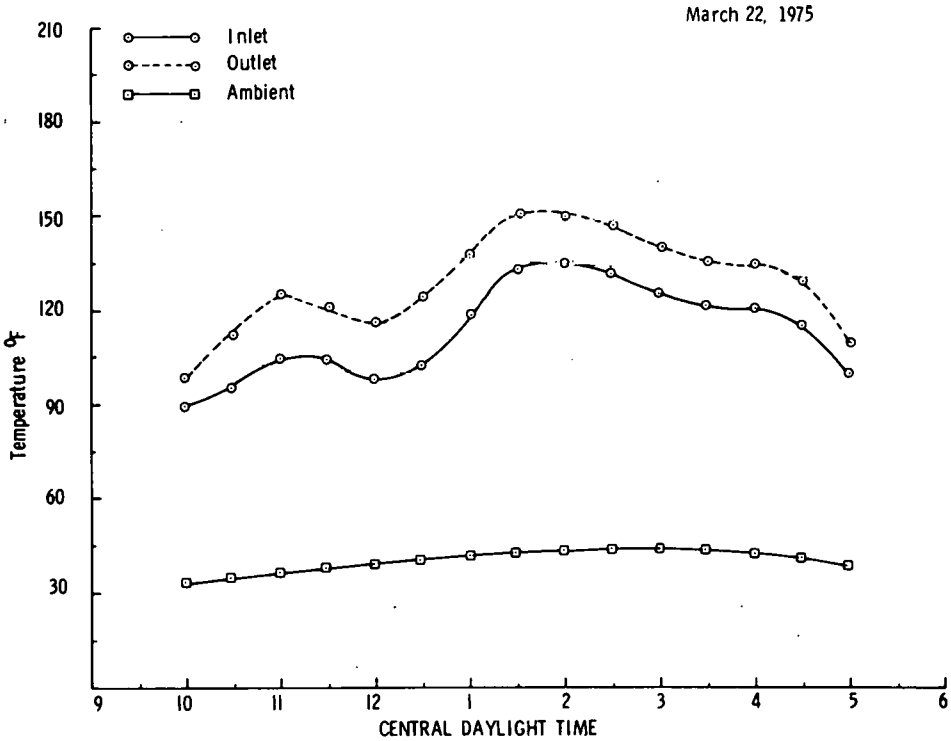
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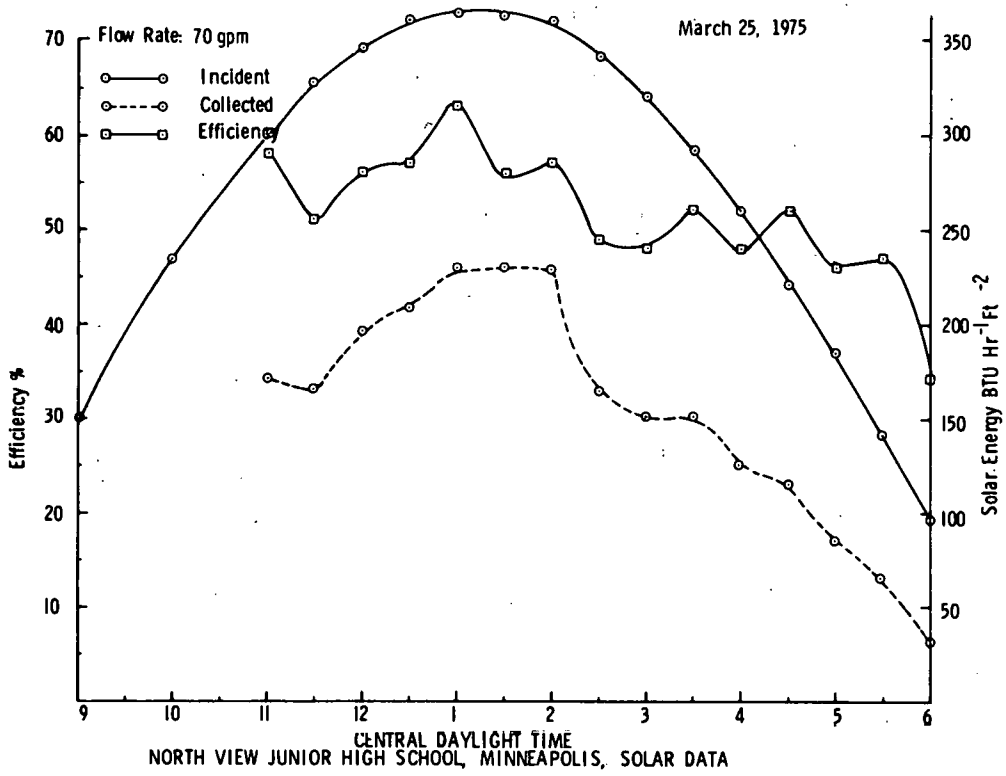
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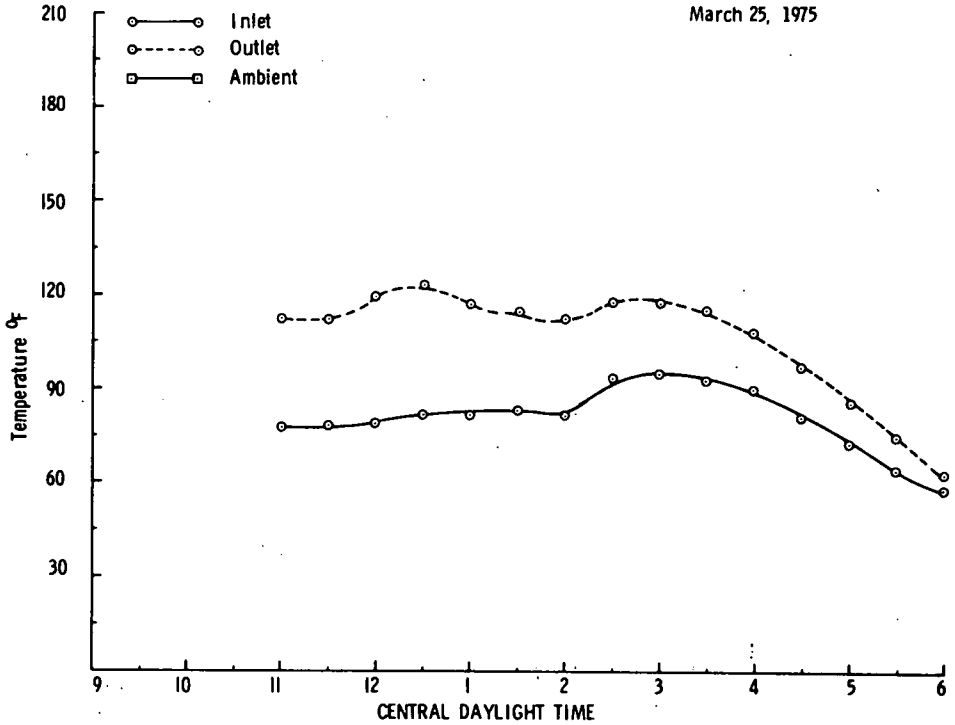
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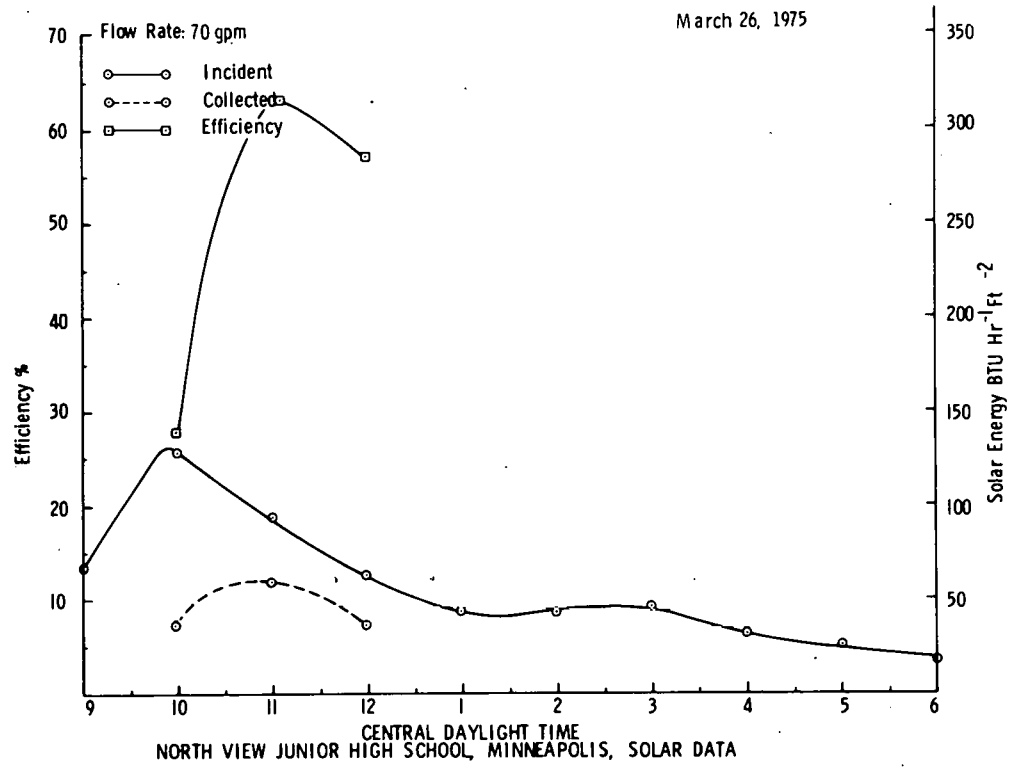
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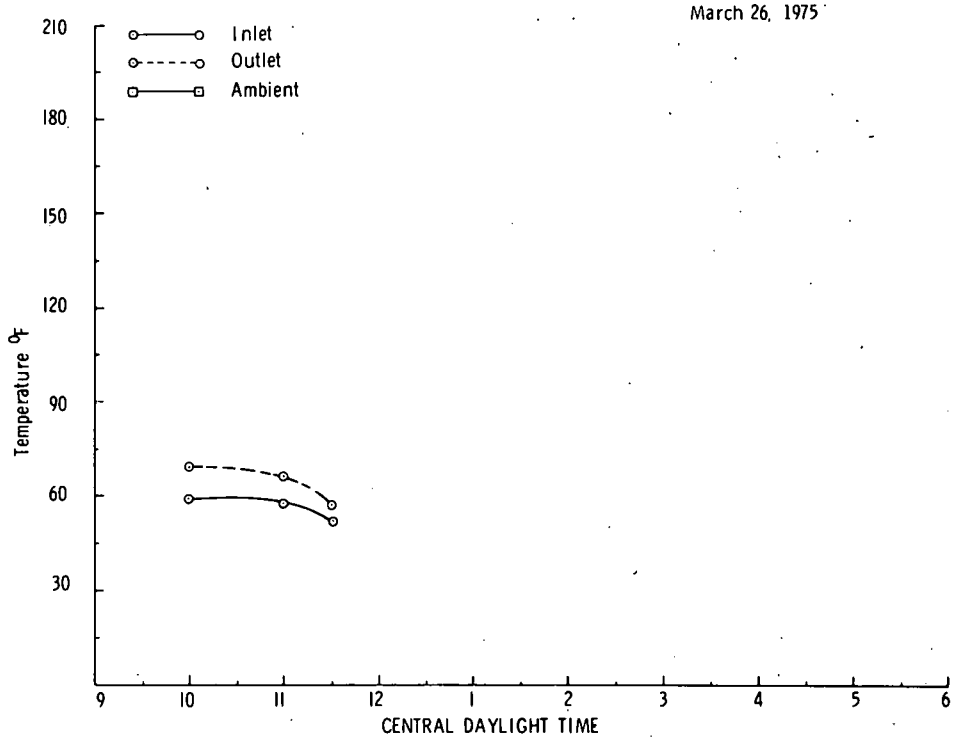
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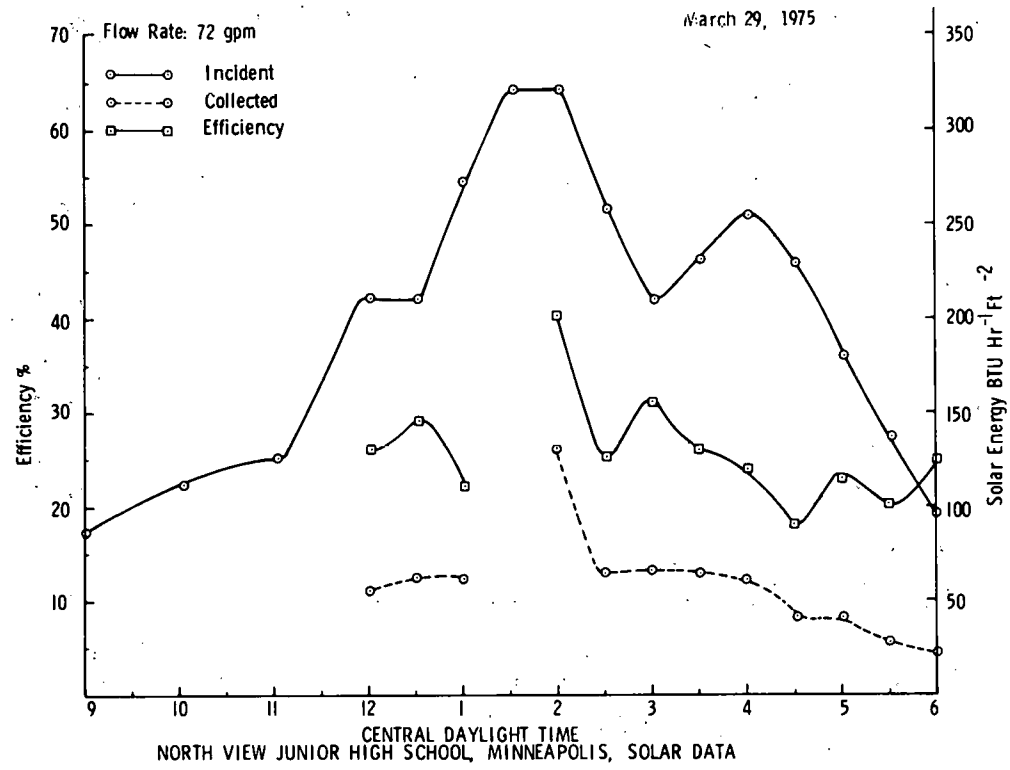
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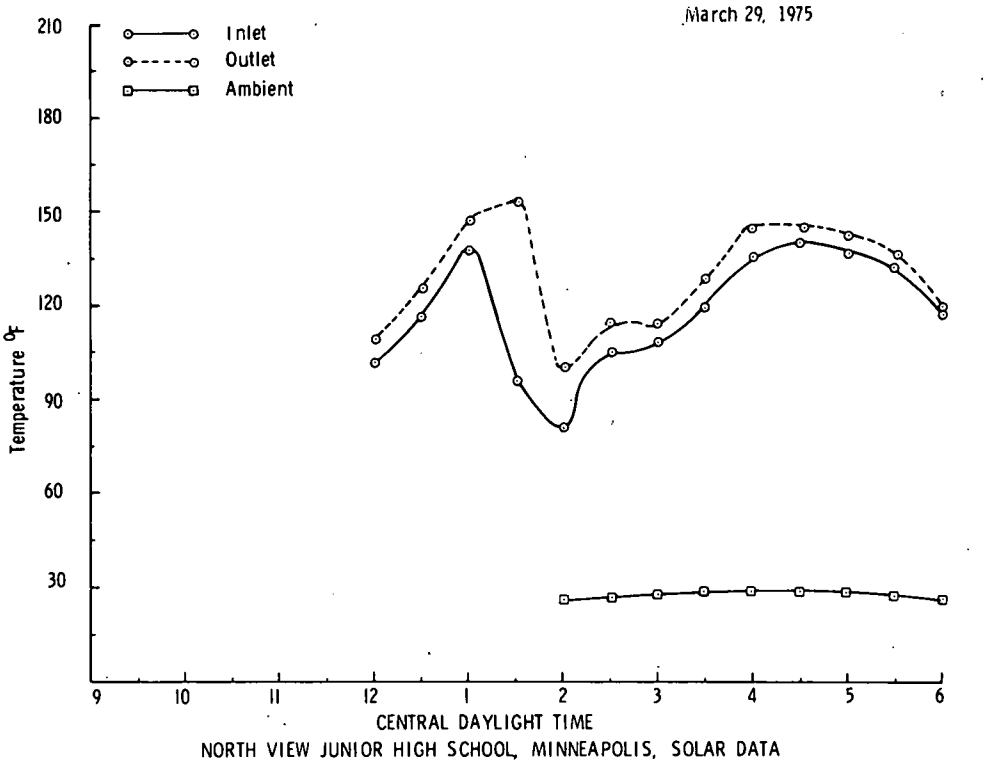
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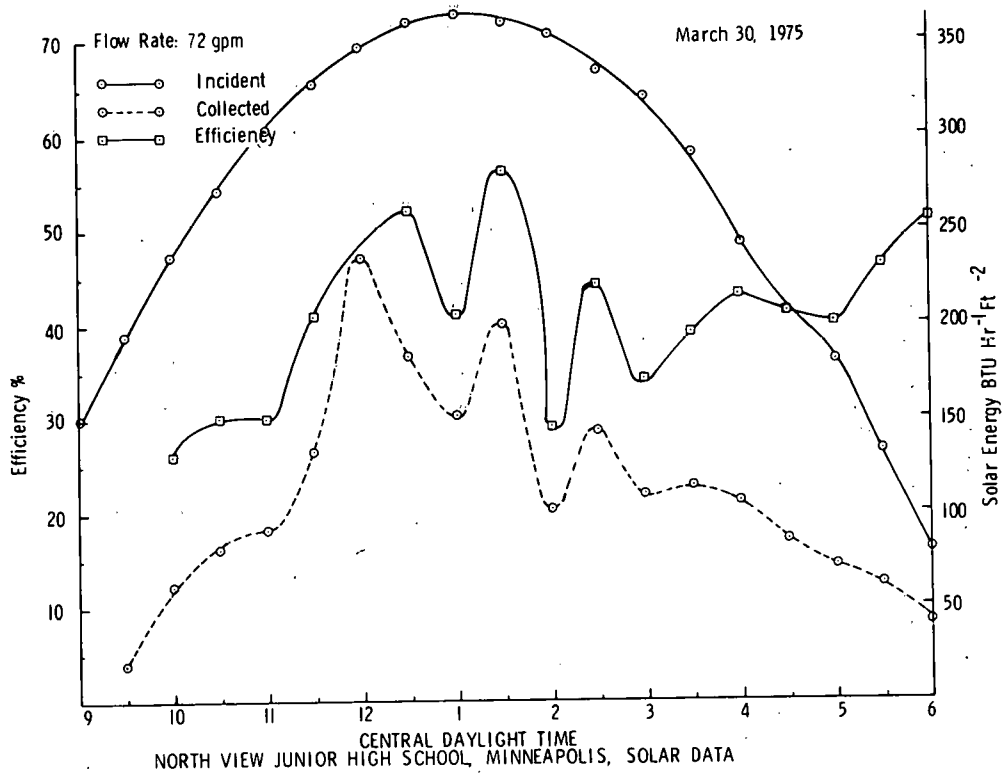
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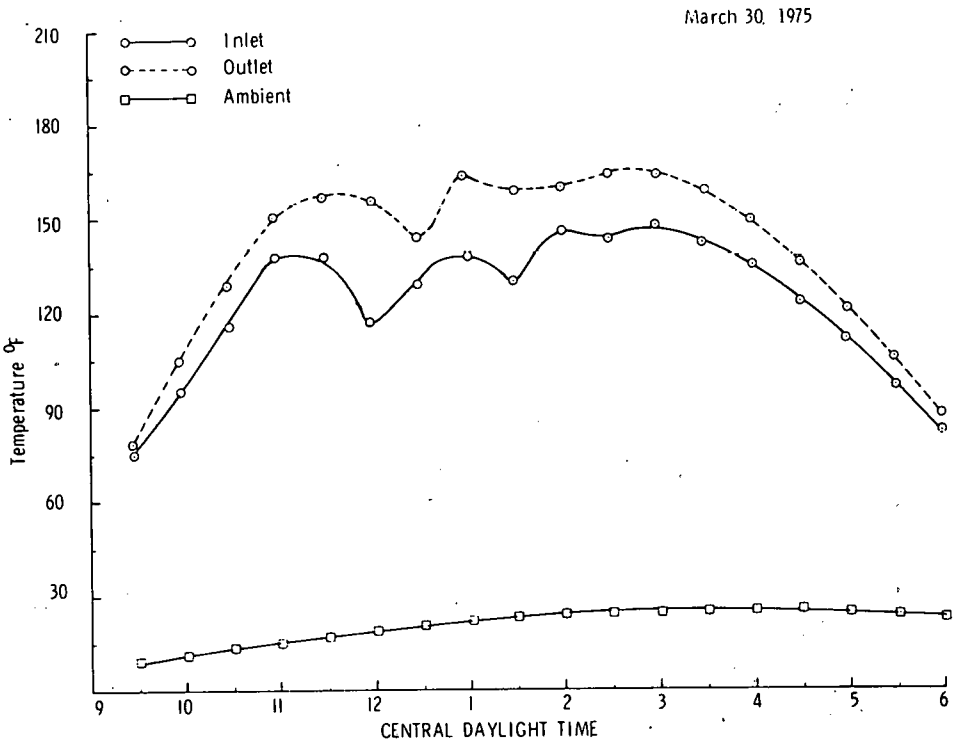
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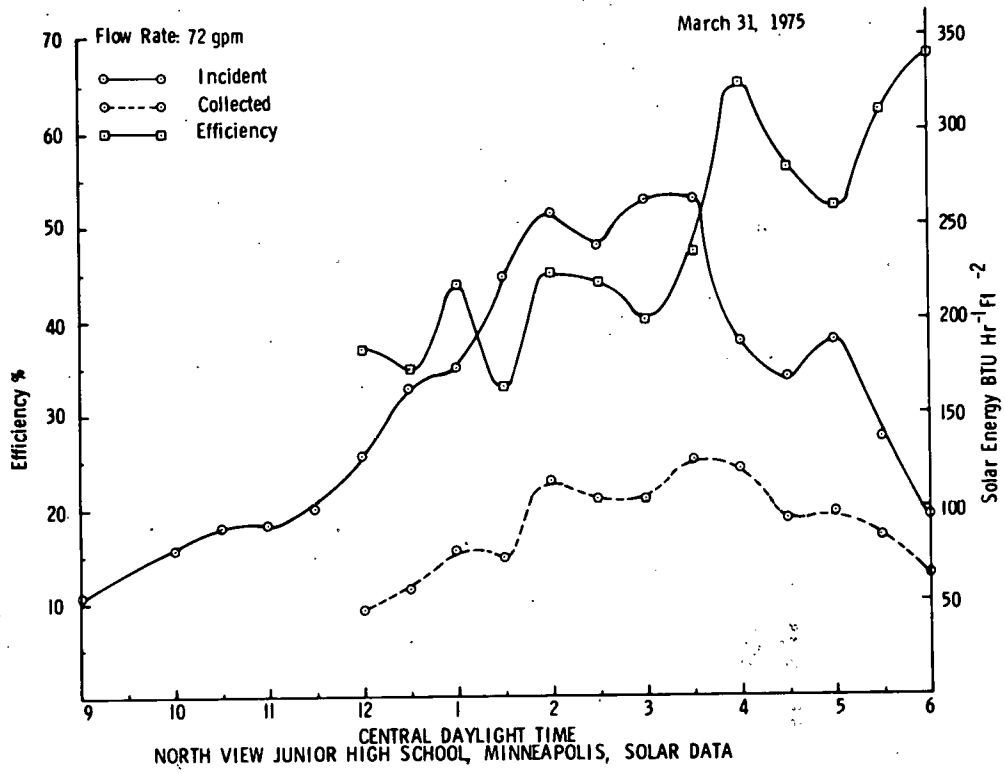
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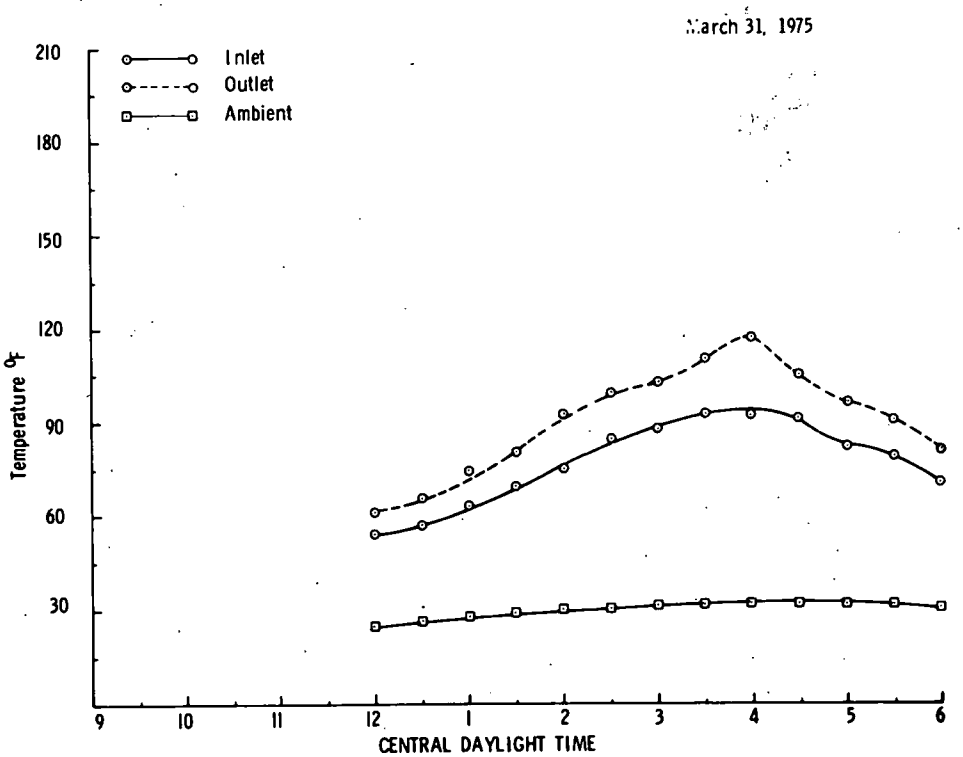
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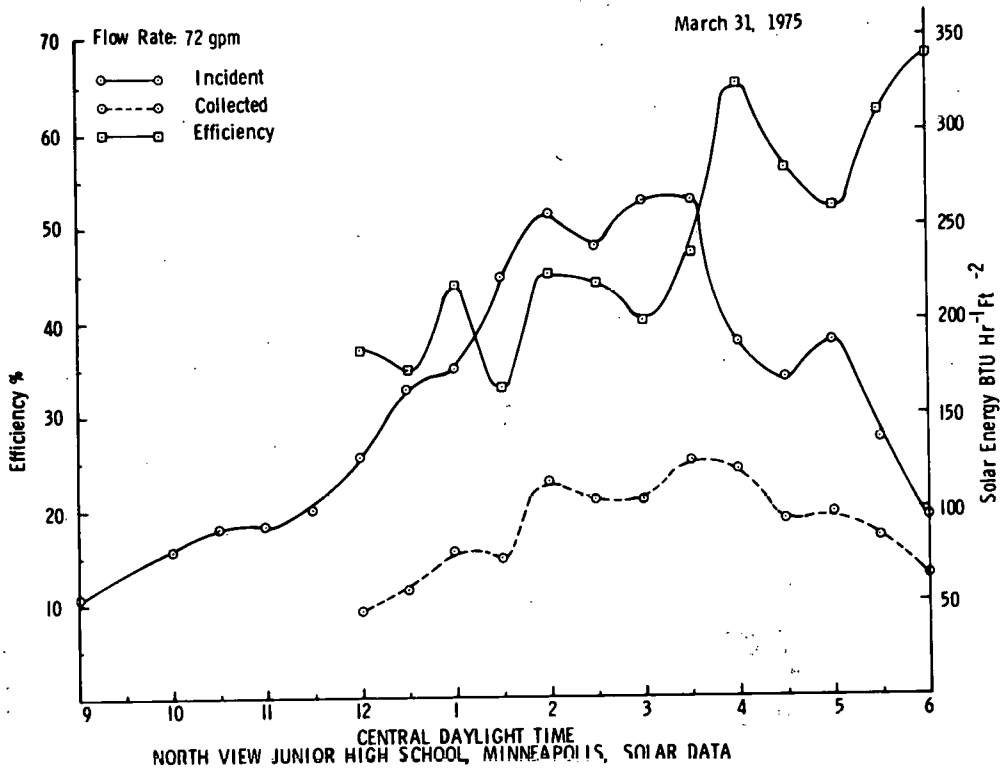
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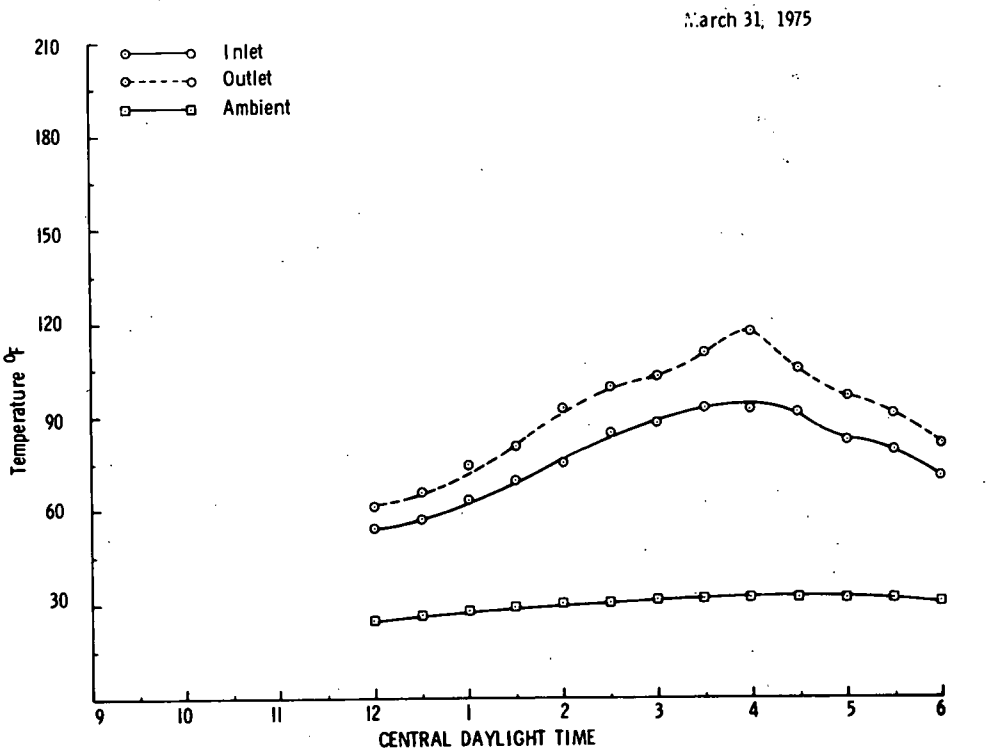
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



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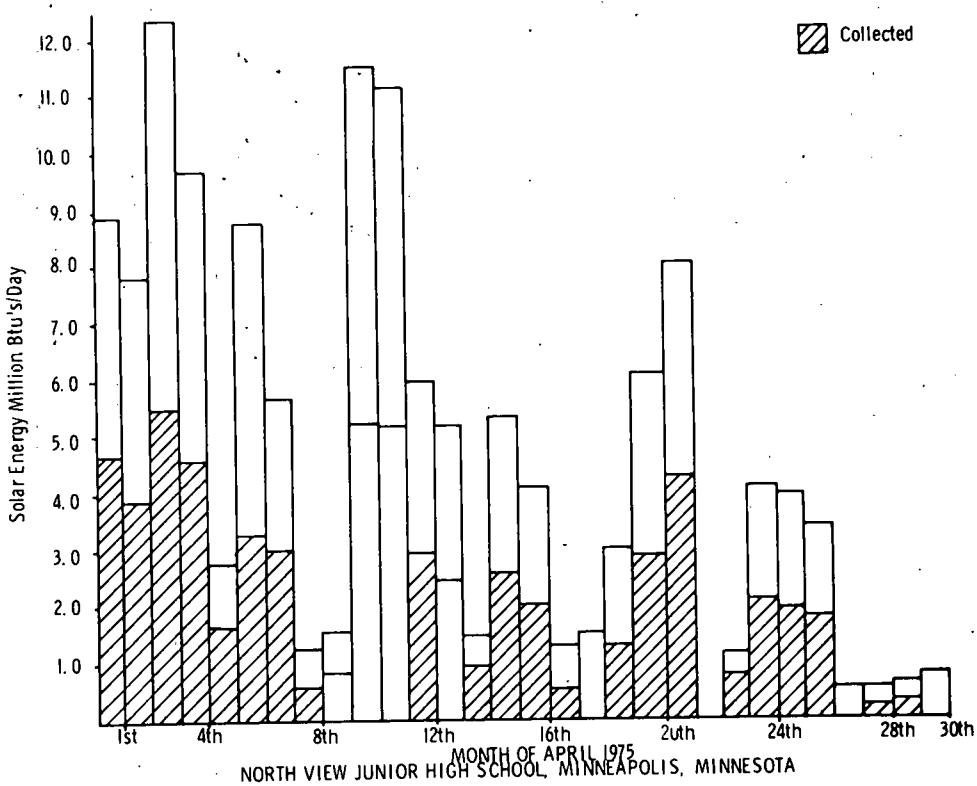


NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

North View Junior High

Month of April 1975

Date	Mode of Operation	Overall Eff. = $\frac{Q_{collected}}{Q_{incident}}$
April 1	Air and Water Heating and Storage	53%
April 2	Air Heating and Storage	50%
April 3	Storage and D. W. Heating from Collector	43%
April 4	Air and Water Heating from Collector	47.5%
April 5	Air Heating from Collector	56%
April 6	Air and Water Heating from Collector	54%
April 7	Air and D. W. Heating from Collector	37%
April 8	Air Heating from Collector	55%
April 9	Air Heating from Collector	52%
April 10	Air and D. W. Heating and Storage from Collector	45%
April 11	Air and Water Heating and Storage from Collector	45%
April 12	Air & Water Heating from Collector	49.5%
April 13	Air & Water Heating from Collector	47%
April 14	Air Heating from Collector	45%
April 15	Air & Water Heating from Collector	48%
April 16	Air & Water Heating from Collector	49.5%
April 17	Air Heating from Collector	41%
April 18	Cloudy, No Collection	---
April 19	Air Heating from Collector	44.1%
April 20	Air Heating & Storage from Collector	48%
April 21	Air & Water Heating & Storage from Collector	53%
April 22	Storage & Domestic Water Heating from Collector	47%
April 23	Air Heating from Collector	65.5%
April 24	Air & Water Heating from Collector	50%
April 25	Air Heating from Collector	49%
April 26	Air & Water Heating from Collector	52.5%
April 27	Cloudy, No Collection	---
April 28	Air Heating from Collector	50% (2 hours)
April 29	Air Heating from Collector	47% (2 hours)
April 30	Cloudy, No Collection	---


Collected
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
Solar Energy Million Btu's/Day
1st
4th
8th
12th
16th
20th
24th
28th
30th
MONTH OF APRIL 1975
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, MINNESOTA

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

MINNEAPOLIS-ST.PAUL, MINNESOTA
NAT WEATHER SERVICE FCST BFC
INTERNATIONAL AIRPORT
APRIL 1975

LATITUDE 44° 53′ N LONGITUDE 93° 13′ W ELEVATION (GROUND) 834 FT. STANDARD TIME USED: CENTRAL WBAN #14922

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING	COOLING	WEATHER TYPES ON DATES OF OCCURRENCE (1 FOG, 2 HEAVY FOG X, 3 THUNDERSTORM, 4 ICE PELLETS, 5 HAIL, 6 GLAZE, 7 DUSTSTORM, 8 SMOKE, HAZE, 9 BLOWING SNOW)	SNOW, ICE PELLETS OR ICE ON GROUND AT 06AM IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. - - - ELEV. 838 FEET M.S.L.	WIND RESULTANT DIRECTION	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE HOURS AND TENTHS	PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	MIDNIGHT TO MIDNIGHT	DATE
1	23	9*	16*	-21	4	49	0			0	0	29.30	31	5.7	6.2	10	N	6.6	52	10	9	1
2	28	17	23	-15	9	42	0			0	0	29.23	34	11.0	11.8	17	N	7.2	56	10	8	2
3	28	11	20	-19	7	45	0			0	0	29.30	31	10.6	10.8	15	NW	12.8	98	1	1	3
4	35	12	24	-15	11	41	0			0	0	29.44	10	6.2	7.2	16	E	11.9	92	6	4	4
5	35	25	30	-10	14	35	0			0	0	29.56	09	13.5	13.7	24	SE	3.3	25	10	8	5
6	38	31	35	-5	20	30	0			0	0	29.51	10	13.5	13.7	22	SE	5.0	38	10	9	6
7	41	29	35	-6	19	30	0			0	0	29.36	10	13.4	13.7	21	E	11.7	89	9	6	7
8	39	30	35	-7	19	30	0			4	T	29.27	10	14.0	14.2	23	E	0.0	0	10	9	8
9	38	30	33	-9	24	32	0			3	.16	29.26	09	14.0	14.5	25	SE	0.4	3	10	10	9
10	44	29	37	-6	24	28	0			4	.05	29.32	36	5.6	6.6	10	NE	10.9	83	7	6	10
11	44	22	33	-10	25	32	0			3	0	29.30	25	5.5	5.8	13	E	10.4	78	3	2	11
12	44	25	35	-9	28	30	0	2		2	0	29.25	22	5.0	5.8	10	SW	5.4	41	9	7	12
13	51	31	41	-3	32	24	0	1 8		1	T	29.28	12	11.1	11.2	19	SE	11.5	86	8	8	13
14	48	37	43	-2	35	22	0	8		T	T	29.30	11	6.3	6.9	14	SW	8.4	63	10	10	14
15	51	36	44	-1	36	21	0	1 8		T	T	29.26	21	5.5	6.8	12	W	8.3	61	10	9	15
16	54	33	44	-2	38	21	0	1 8		T	0	29.15	13	4.8	5.5	13	SE	9.0	67	10	9	16
17	52	44	48	2	41	17	0	1 3 5 8		0	1.44	28.71	11	7.4	11.5	23	SE	1.1	8	10	10	17
18	44	39	42	-5	36	23	0	1		T	0	28.50	31	11.8	12.1	20	NW	1.2	9	10	10	18
19	42	34	38	-9	31	27	0	8		T	.02	28.68	29	15.8	16.1	28	NW	7.7	56	10	10	19
20	47	33	40	-8	27	25	0			T	0	29.31	30	8.8	10.8	14	NE	9.4	69	9	9	20
21	55	30	43	-5	31	22	0			0	T	29.42	18	4.5	7.1	14	SW	10.3	75	8	8	21
22	59	38	49	1	41	16	0	1 3		0	.99	29.25	14	11.3	12.4	19	S	8.8	63	8	9	22
23	59	47	53*	4	49	12	0	1 8		0	.30	28.83	01	5.9	8.9	21	SE	7.0	50	9	10	23
24	54	42	48	-1	40	17	0	1		0	T	29.06	06	8.7	9.9	17	E	6.6	47	10	10	24
25	60*	44	52	2	42	13	0	1 8		0	.10	29.18	08	7.6	8.3	14	SE	6.7	48	10	10	25
26	59	44	52	2	34	13	0	3		0	.05	29.27	12	17.0	17.1	33	SE	8.4	60	10	10	26
27	50	42	46	-4	41	19	0	1 3		0	2.22	29.05	13	18.7	19.6	34	SE	0.7	5	10	10	27
28	49	42	46	-5	41	19	0	1 3		0	.03	28.69	12	20.9	21.3	32	SE	3.8	27	10	10	28
29	52	45	49	-2	40	16	0	1 8		0	.02	28.61	20	12.7	14.6	30	SW	3.3	23	10	10	29
30	46	36	41	-11	38	24	0	1		0	.02	28.80	24	11.2	11.5	17	W	4.2	30	9	8	30

SUM	SUM					TOTAL	TOTAL		TOTAL	TOTAL				FOR THE MONTH:				TOTAL	%	SUM	SUM	
1367	957					775	0	NUMBER OF DAYS	5.40	2.2	29.15	11	3.6	11.2	34	SE	202.0	FOR	266	249	
AVG.	AVG.	AVG.	DEP.	AVG.		DEP.	DEP.	PRECIPITATION	DEP.						DATE	27	POSSIBLE	MONTH	AVG.	AVG.	
45.6	32.2	38.9	-6.2	29		178	0	.01 INCH 12	3.36								405.1	50	8.9	8.3	

NUMBER OF DAYS				SEASON TO DATE			GREATEST IN 24 HOURS AND DATES				GREATEST DEPTH ON GROUND OF SNOW.
MAX≥90°	MAX≤32°	MIN≤32°	MIN≤0°	TOTAL	TOTAL		PRECIPITATION		SNOW, ICE PELLETS		ICE PELLETS OR ICE AND DATE
0	3	14	0	DEP. 205	DEP. 0	THUNDERSTORMS 5					10 2+
				8028		HEAVY FOG X 1	2.23	27-28	2.1	9-10	
						CLEAR 2	PARTLY CLOUDY 2		CLOUDY 26		

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1																									1
2																									2
3																									3
4																									4
5																									5
6																									6
7																									7
8																			T	T	T	T			8
9				T	T	.01	.03	.01	.03	.01	T	.01	.01	.01	T	T	T		T	.01	T	.01	.01	.01	9
10	.03	.01	.01	T	T	T	T																		10
11																									11
12																									12
13								T			T		T												13
14								T		T	T		T	T	T	T	T	T	T						14
15																			T						15
16																									16
17											T		.81	.31	.16	.06	.05	.01	.04	T		T	T		17
18																									18
19				T	T	.01	T	.01	T	T	T	T	T												19
20																									20
21																		T							21
22																.06	.06	.16	.13	.09	.24	.10	.03	.12	22
23	.18	.12	T																						23
24																				T	T			T	24
25	.08	.01		.01	T																				25
26															T	.02	T		T	.02	T	T	.01		26
27	T	.08	T	.16	.36	.38	.02	.08	T	.11	.57	.17	.04	.02	T		T	.07	T	T	T	.05	.08	.05	27
28	.01				T	T		T	T	T						T	T				.01	.01			28
29						.02	T	T	T					T	T	T	T	T	T			T	T		29
30						T	.02	T	T	T	T	T	T				T	T							30

MINNEAPOLIS-ST.PAUL, MINNESOTA

M EXTREME TEMPERATURES FOR THE MONTH MAY BE THE LAST OF MORE THAN ONE OCCURRENCE.
- BELOW ZERO TEMPERATURE OR NEGATIVE DEPARTURE FROM NORMAL.
* 70° AT ALASKAN STATIONS.
* ALSO ON AN EARLIER DATE, OR DATES.
X HEAVY FOG RESTRICTS VISIBILITY TO 1/4 MILE OR LESS.
T IN THE HOURLY PRECIPITATION TABLE AND IN COLUMN 9, 10, AND 11 INDICATES AN AMOUNT TOO SMALL TO MEASURE

THE SEASON FOR DEGREE DAYS BEGINS WITH JULY FOR HEATING AND JANUARY FOR COOLING.
DATA IN COLUMNS 6, 12, 13, 14, AND 15 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
WIND DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. RESULTANT WIND IS THE VECTOR SUM OF WIND DIRECTIONS AND SPEEDS DIVIDED BY THE NUMBER OF OBSERVATIONS. FIGURES FOR DIRECTIONS ARE TENS OF DEGREES FROM TRUE NORTH: I.E., 09=EAST, 18=SOUTH, 27=WEST, 36=NORTH. AND 00=CALM. WHEN DIRECTIONS ARE IN TENS OF DEGREES IN COL. 17, ENTRIES IN COL. 16 ARE FASTEST OBSERVED 1-MINUTE SPEEDS. IF THE / APPEARS IN COL. 17, SPEEDS ARE GUSTS.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

SUBSCRIPTION PRICE: LOCAL CLIMATOLOGICAL DATA $2.55 PER YEAR INCLUDING ANNUAL ISSUE IF PUBLISHED. FOREIGN MAILING $2.10 EXTRA. SINGLE COPY: 20¢ FOR MONTHLY ISSUE: 15¢ FOR ANNUAL SUMMARY. MAKE CHECKS PAYABLE TO DEPARTMENT OF COMMERCE. NOAA. SEND PAYMENTS AND ORDERS TO NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC CENTER, ASHEVILLE, NORTH CAROLINA, 28801

William H. Haggard

DIRECTOR, NATIONAL CLIMATIC CENTER

SUMMARY BY HOURS

HOUR (LOCAL TIME)	AVERAGES: SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE °F AIR	WET BULB °F	DEW PT. °F	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
00	7	29.18	36	34	28	73	9.8	10	3.0
03	7	29.15	34	32	27	77	10.0	11	3.4
06	8	29.16	33	31	27	78	10.3	10	4.4
09	9	29.17	37	34	28	74	12.2	12	4.7
12	9	29.16	42	38	31	65	13.1	13	4.4
15	9	29.14	44	39	31	60	12.7	11	3.9
18	9	29.13	43	38	31	63	11.5	11	2.4
21	8	29.15	39	36	30	70	10.0	10	2.8

USCOMM - NOAA - ASHEVILLE 750
05/20/75

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	SKY COVER TENTHS	CEILING HNDS. OF FT.	VISIBILITY WHOLE MILES	VISIBILITY FRACTIONS OF MILES	WEATHER	TEMPERATURE DIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
DAY 01											
00	0	UNL	25			14	12	01	56	32	8
03	0	UNL	25			09	07	-02	61	30	7
06	0	110	25			12	10	01	61	32	9
09	0	UNL	25			15	13	03	61	00	0
12	10	UNL	25			22	18	06	50	02	4
15	10	120	25			23	19	05	46	31	4
18	10	65	25			21	18	07	55	20	8
21	10	60	25			21	18	08	57	32	7
DAY 02											
00	10	90	25			18	17	09	65	31	7
03	4	UNL	25			18	17	08	62	36	8
06	10	UNL	20			18	16	08	58	01	11
09	10	UNL	20			20	17	08	60	36	9
12	10	200	25			26	22	11	53	35	9
15	10	200	25			28	23	10	47	35	11
18	9	UNL	25			26	22	10	51	32	12
21	0	UNL	25			20	17	08	60	32	14
DAY 03											
00	0	UNL	25			17	15	08	68	32	12
03	9	99	25			14	12	04	64	31	14
06	0	UNL	25			11	10	03	70	31	10
09	0	UNL	20			16	14	08	64	31	9
12	0	UNL	20			24	21	11	58	31	9
15	0	UNL	20			28	23	08	43	33	5
18	5	UNL	20			26	21	08	46	31	10
21	0	UNL	25			22	18	08	55	28	6
DAY 04											
00	0	UNL	25			18	16	08	65	00	0
03	0	UNL	25			14	13	08	77	23	3
06	0	UNL	12			14	13	08	77	06	3
09	8	UNL	8			22	20	12	65	12	5
12	9	250	15			30	25	12	47	11	9
15	8	250	20			34	28	14	44	13	6
18	2	UNL	20			34	27	12	40	08	12
21	6	250	20			31	25	13	47	09	15
DAY 05											
00	0	UNL	25			28	24	13	53	07	8
03	0	UNL	25			27	23	11	51	09	14
06	0	75	25			26	22	09	48	09	14
09	0	UNL	25			26	22	10	51	09	14
12	10	75	25			31	26	14	48	09	13
15	10	80	25			34	28	17	50	08	13
18	10	110	20			35	29	18	50	10	10
21	10	90	20			35	29	19	52	09	9
DAY 06											
00	10	80	25			33	29	20	59	09	9
03	10	75	25			33	28	20	58	08	10
06	10	65	25			32	28	20	61	11	14
09	10	65	25			31	27	20	64	11	14
12	10	70	25			34	29	20	57	11	13
15	10	UNL	25			37	31	20	50	09	15
18	10	UNL	25			38	32	20	48	08	12
21	10	UNL	25			35	29	19	52	11	8
DAY 07											
00	1	UNL	25			32	28	19	59	11	10
03	1	UNL	25			30	26	17	58	09	9
06	7	UNL	25			28	25	16	58	10	14
09	10	250	25			33	28	17	52	11	15
12	10	250	25			37	30	18	46	12	11
15	10	250	25			40	33	21	47	09	15
18	10	UNL	25			40	34	23	51	09	10
21	3	UNL	25			38	30	20	52	11	11
DAY 08											
00	0	UNL	25			34	28	15	46	10	11
03	0	UNL	25			32	27	17	54	09	14
06	0	110	25			30	26	16	56	10	14
09	10	250	25			32	28	19	58	12	13
12	10	75	25			35	30	22	59	10	13
15	10	130	25			38	32	22	53	10	13
18	10	90	25			39	33	22	51	10	12
21	10	80	25			37	32	22	55	08	9
DAY 09											
00	10	65	25			35	30	20	54	09	14
03	10	34	25			35	28	19	54	11	16
06	10	27	7	S		32	28	21	64	10	16
09	10	9	1	S		30	28	27	88	08	13
12	10	13	2	S		32	31	28	85	09	15
15	10	38	7	S		34	31	26	73	08	10
18	10	42	12			36	31	23	59	10	12
21	10	40	7	S		31	30	28	88	04	5
DAY 10											
00	10	20	2	S		30	29	27	88	06	7
03	10	15	1	8 S		30	29	27	88	03	3
06	10	10	1	S		30	29	27	88	36	6
09	10	UNL	12			34	31	25	70	35	5
12	10	UNL	20			40	35	27	60	34	9
15	2	UNL	25			44	36	23	44	01	7
18	2	UNL	25			42	33	18	38	01	5
21	1	UNL	25			32	28	20	61	31	8
DAY 11											
00	0	UNL	25			29	26	19	66	21	3
03	0	UNL	25			26	24	20	78	00	0
06	1	UNL	25			24	22	17	76	00	0
09	7	UNL	7			35	32	27	73	25	5
12	10	UNL	8			40	36	31	70	24	10
15	4	UNL	12			44	38	29	56	27	12
18	8	UNL	12			40	35	28	62	27	8
21	5	UNL	10			35	32	27	73	25	4
DAY 12											
00	0	UNL	8			32	31	28	85	23	4
03	0	UNL	4		GF	28	28	26	92	21	3
06	0	UNL	2		GF	26	26	24	92	23	4
09	0	2	0	12 F		31	31	30	96	23	5
12	10	250	7			40	36	31	70	21	8
15	10	UNL	15			44	38	30	58	24	6
18	10	250	15			40	36	31	70	24	6
21	10	150	8			36	34	30	78	13	4
DAY 13											
00	6	UNL	8			34	32	28	79	12	7
03	9	UNL	8			31	30	27	85	11	5
06	7	75	8		GF	32	31	28	85	12	7
09	8	90	6		H	42	38	33	71	12	13
12	10	90	7		RW	44	40	34	68	13	13
15	6	65	10			48	43	36	61	11	14
18	8	UNL	10			50	44	37	61	12	10
21	10	250	10			44	40	34	68	13	9
DAY 14											
00	10	65	10			42	39	34	73	12	8
03	10	65	10			40	37	33	76	08	6
06	10	90	10			38	35	30	70	08	7
09	10	65	7			42	38	33	71	11	4
12	10	30	7		RW	48	42	35	61	12	10
15	10	30	7		S	43	40	37	79	13	9
18	10	30	2		RWH	42	41	38	83	10	6
21	10	25	4		H	40	38	36	86	00	0
DAY 15											
00	9	33	7			37	35	34	89	19	6
03	10	80	6		GF	36	35	34	92	11	5
06	9	16	3		F	36	35	33	89	00	0
09	10	20	2	8 F		43	41	38	83	18	4
12	10	25	7			48	43	37	68	24	9
15	10	30	6			51	46	39	64	22	10
18	10	25	7			47	43	39	74	23	8
21	10	80	7			41	39	37	86	21	5
DAY 16											
00	10	6	1		F	44	43	42	93	31	12
03	10	6	4		F	41	40	38	93	31	12
06	10	15	15			40	38	36	88	32	8
09	10	20	20			40	38	36	88	32	10
12	10	20	20			42	38	36	78	32	14
15	10	20	20			42	38	35	78	32	10
18	10	35	20			42	37	31	69	31	11
21	10	55	15			39	35	30	70	27	7
DAY 17											
00	2	UNL	9		GF	38	38	37	93	22	3
03	8	44	6		GF	35	35	34	88	00	0
06	4	UNL	0	12 GF		33	33	32	88	00	0
09	10	20	0	12 F		40	38	36	93	11	6
12	10	95	5	H		46	46	40	71	11	8
15	10	80	10			54	47	40	59	14	10
18	10	100	10			53	47	41	64	14	4
21	10	110	10			47	44	40	77	11	7
DAY 18											
00	10	90	15			38	36	32	76	27	12
03	10	12	15			38	38	33	78	28	12
06	10	11	10		RW	38	33	31	85	28	14
09	10	18	3		SW	38	34	32	85	29	16
12	10	19	10		RW	38	36	34	88	28	15
15	10	28	20			42	37	30	63	29	17
18	10	36	20			38	35	29	67	31	15
21	10	30	25			38	34	28	70	29	11
DAY 19											
00	10	26	25			36	33	28	73	30	10
03	10	31	25			34	32	29	82	31	8
06	10	30	20			33	32	29	85	30	10
09	10	24	25			35	32	26	70	32	10
12	10	38	25			43	36	25	49	30	12
15	10	48	25			47	38	26	44	31	14
18	10	250	25			45	37	24	44	26	9
21	10	UNL	25			38	32	25	64	12	6
DAY 20											
00	10	UNL	25			38	32	28	73	30	10
03	10	UNL	20			34	32	29	82	31	8
06	10	UNL	15			33	32	29	85	30	10
09	10	UNL	15			35	32	26	70	32	10
12	10	UNL	20			43	36	25	49	30	12
15	10	250	15			47	38	26	44	31	14
18	10	75	10			45	37	24	44	26	9
21	8	90	8			40	38	36	88	22	4
DAY 21											
00	10	UNL	25			34	30	24	67	13	5
03	10	UNL	20			31	28	24	75	11	4
06	10	UNL	15			30	28	23	75	12	6
09	10	UNL	15			42	37	30	63	15	10
12	10	UNL	20			50	42	32	50	21	6
15	10	UNL	20			55	46	33	43	27	3
18	10	UNL	20			50	46	33	77	23	11
21	10	UNL	20			44	42	40	86	22	4
DAY 22											
00	2	UNL	7			40	39	38	93	12	5
03	10	80	6		GF	40	39	38	93	12	5
06	4	UNL	7		GF	38	37	35	88	12	8
09	6	UNL	7			47	43	39	74	15	12
12	10	UNL	15			58	50	42	55	17	17
15	10	90	15			57	50	43	60	14	15
18	10	53	2		TRW	51	48	46	86	12	10
21	10	48	2	8 TRWF		50	49	48	93	09	12
DAY 23											
00	10	22	2	8 RWOF		50	49	48	93	05	8
03	10	18	4	F		51	50	49	93	17	8
06	10	11	1	8 F		51	50	49	93	03	3
09	10	9	2	8 F		56	53	51	83	35	10
12	10	18	3	F		57	53	50	78	32	7
15	10	25	6	H		59	54	48	70	36	7
18	10	21	7			57	53	50	78	01	7
21	10	25	10			48	46	42	77	36	12
DAY 24											
00	10	25	10			47	44	41	80	02	9
03	10	12	10			45	43	40	83	09	7
06	10	15	8			44	42	40	88	01	7
09	10	10	7			42	40	38	88	08	10
12	10	20	15			47	44	40	77	07	9
15	10	20	20			54	48	41	62	10	9
18	10	33	15			53	47	41	64	05	6
21	10	70	15			50	45	40	69	07	12
DAY 25											
00	10	20	15		RW	38	36	32	76	27	12
03	10	38	10		RW	38	38	33	78	28	12
06	10	28	10			38	33	31	85	28	14
09	10	20	7			42	39	29	85	29	16
12	10	16	6		H	44	40	34	88	28	15
15	10	35	7			55	50	45	69	10	7
18	10	48	10			58	51	48	82	06	8
21	8	250	10			52	48	41	92	10	8
DAY 26											
00	10	UNL	12			50	44	38	84	10	11
03	10	200	12			48	42	38	77	11	8
06	8	200	10			44	40	36	74	12	14
09	10	200	20			50	41	29	44	12	10
12	10	200	25			58	46	33	39	12	22
15	10	80	12		TRW	48	42	33	64	12	14
18	10	70	25			52	43	31	49	12	15
21	10	40	15			50	43	35	57	13	15
DAY 27											
00	10	31	12		T	40	42	34	56	12	13
03	10	35	15			43	41	38	83	17	19
06	10	8	2		TRW	42	41	40	93	11	18
09	10	8	8		RW	44	43	42	93	13	18
12	10	7	8		RW	47	45	44	88	13	16
15	10	8	12			48	46	44	88	14	19
18	10	10	6		RW	47	45	44	88	13	20
21	10	10	7		L	46	44	42	88	13	15
DAY 28											
00	10	17	8		TRW	43	42	40	88	13	24
03	10	11	15			43	41	38	88	14	18
06	10	10	15			43	42	40	88	13	18
09	10	8	8		L	44	43	41	88	12	18
12	10	10	12			48	46	44	88	12	18
15	10	13	10			48	45	43	83	11	18
18	10	11	7			48	45	41	83	11	16
21	10	8	4		RWF	45	43	41	88	11	15
DAY 29											
00	10	80	6		GF	46	44	42	88	13	8
03	10	90	7			46	43	40	80	15	12
06	10	34	20			45	43	40	83	17	9
09	10	23	25			46	43	40	80	22	16
12	10	38	25			52	46	38	61	21	12
15	10	44	25		RW	52	46	40	64	21	15
18	10	42	25		RW	50	45	40	69	20	14
21	10	24	25			47	44	40	77	22	15
DAY 30											
00	10	16	25			46	43	40	80	23	10
03	10	33	25			46	42	38	80	23	11
06	10	11	2		LF	43	42	40	89	23	10
09	10	13	6		RW	42	41	38	88	25	13
12	10	23	10		RW	44	41	38	80	24	13
15	10	23	10			44	41	38	83	25	9
18	10	130	15			44	40	35	71	27	9
21	1	UNL	29			38	36	32	76	24	5

NOTES

CEILING COLUMN-
UNL INDICATES NO UNLIMITED CEILING

WEATHER COLUMN-

+	TORNADO
T	THUNDERSTORM
Q	SQUALL
R	RAIN
RW	RAIN SHOWERS
ZR	FREEZING RAIN
L	DRIZZLE
ZL	FREEZING DRIZZLE
S	SNOW
SP	SNOW PELLETS
IC	ICE CRYSTALS
SW	SNOW SHOWERS
SG	SNOW GRAINS
IP	ICE PELLETS
A	HAIL
F	FOG
IF	ICE FOG
GF	GROUND FOG
BD	BLOWING DUST
BN	BLOWING SAND
BS	BLOWING SNOW
BY	BLOWING SPRAY
K	SMOKE
H	HAZE
D	DUST

WIND COLUMNS

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH: I.E., 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS; MULTIPLY BY 1.15 TO CONVERT TO MILES PER HOUR.

ADDITIONAL DATA

OTHER OBSERVATIONAL DATA CONTAINED IN RECORDS ON FILE CAN BE FURNISHED AT COST VIA MICROFILM, MICROFICHE, OR PAPER COPIES OF THE ORIGINAL RECORDS. INQUIRIES AS TO AVAILABILITY AND COSTS SHOULD BE ADDRESSED TO: DIRECTOR, NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

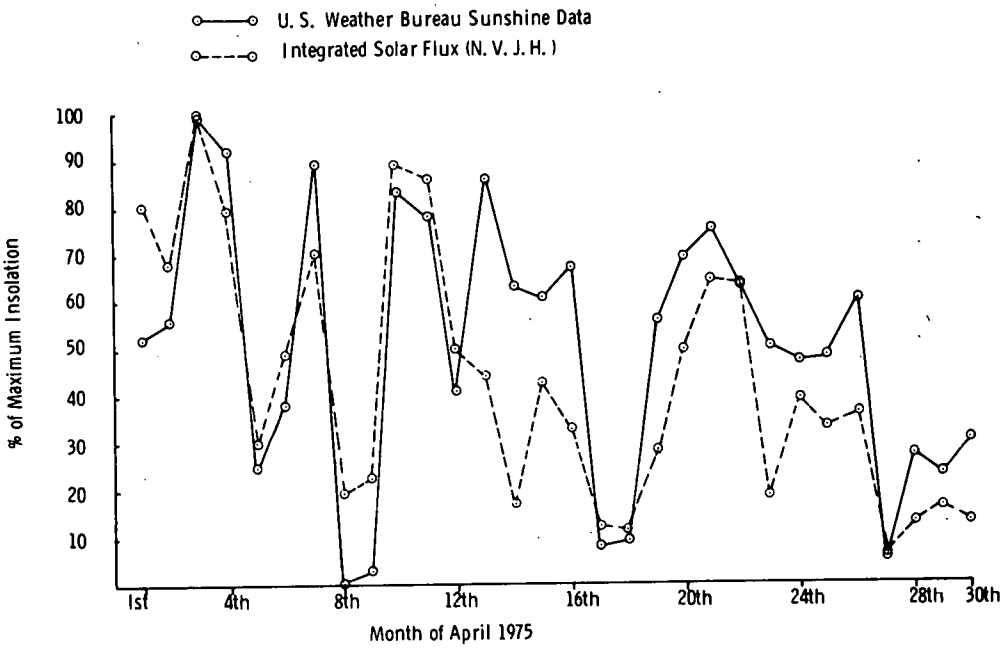
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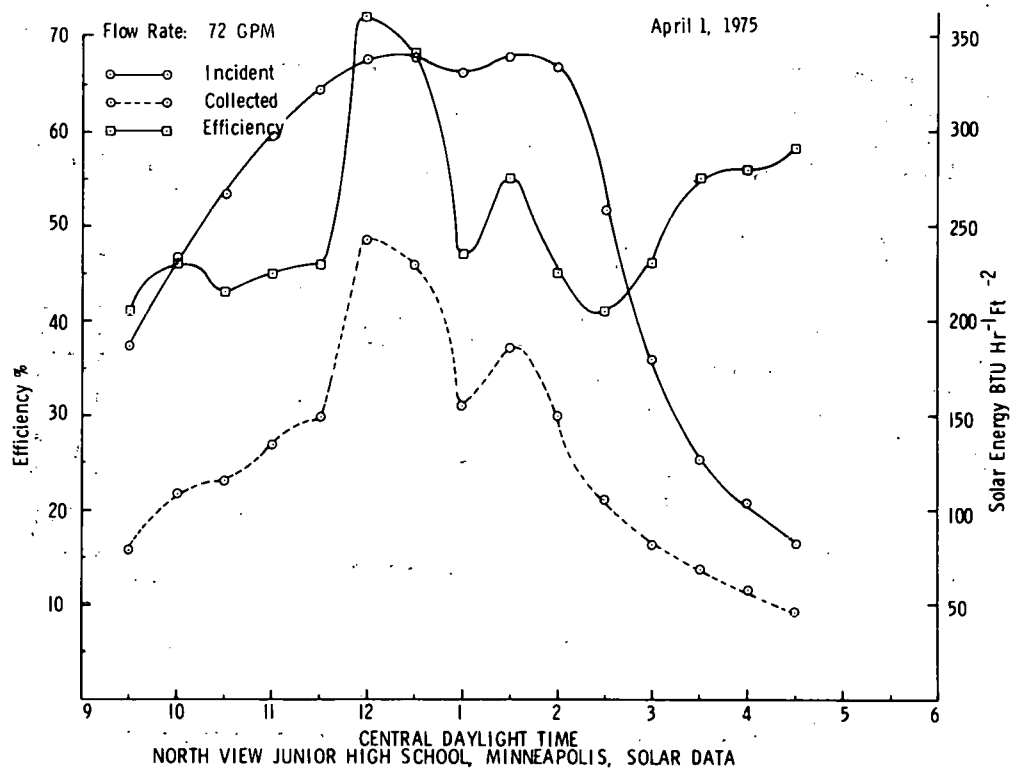
U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

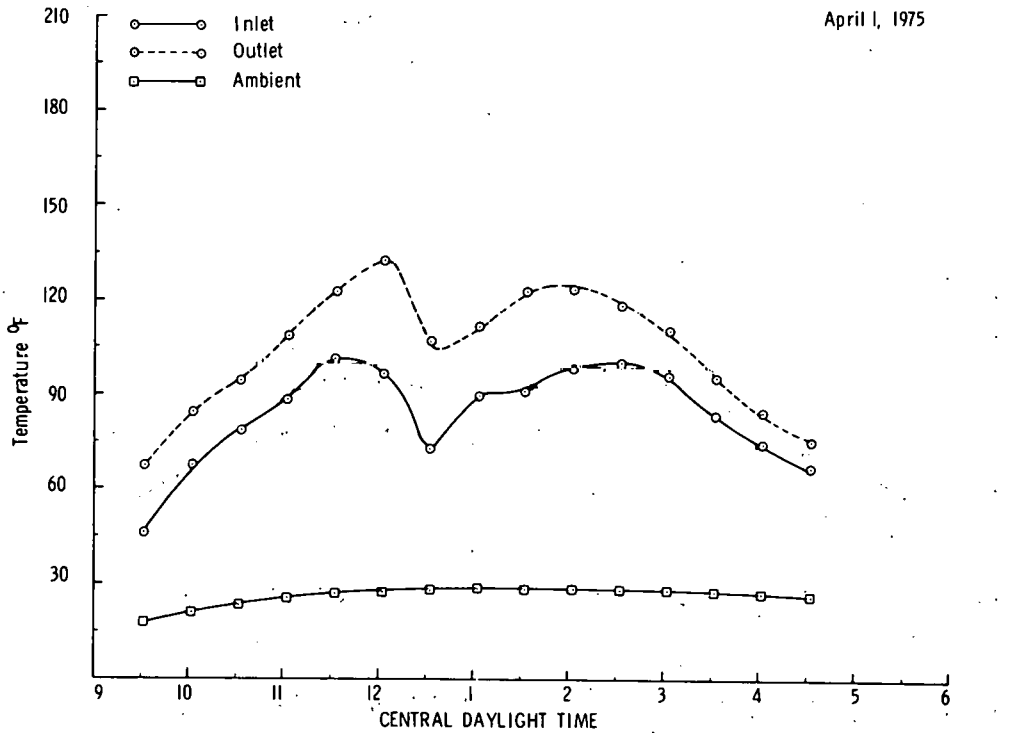
POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
210

FIRST CLASS

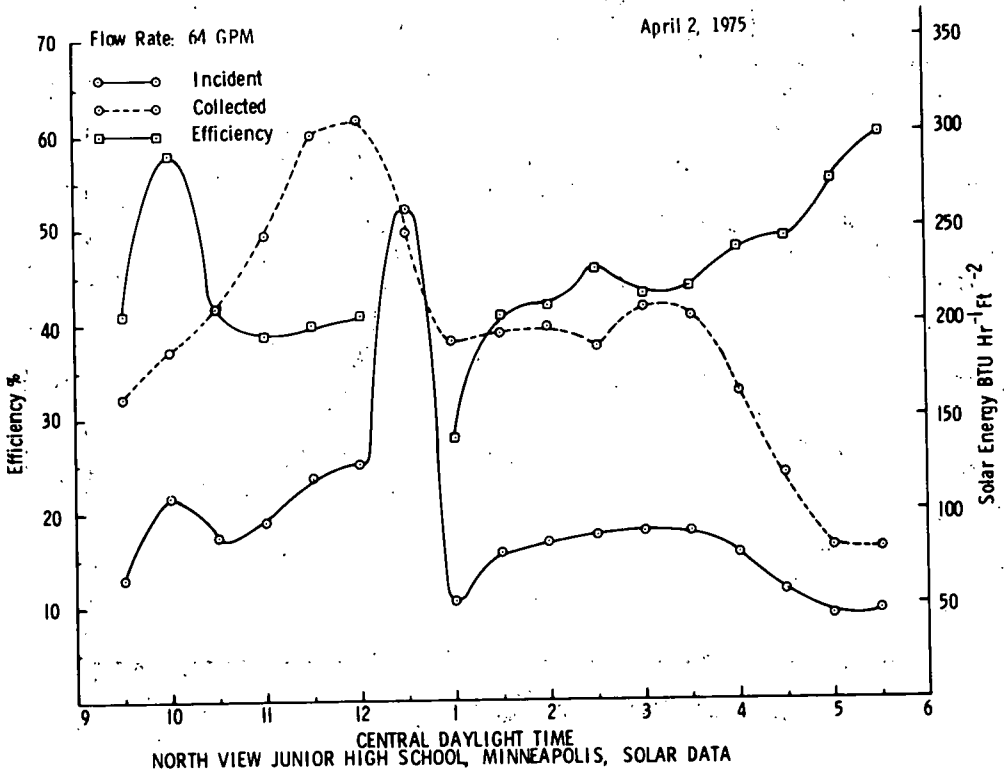

U. S. Weather Bureau Sunshine Data
Integrated Solar Flux (N. V. J. H.)
% of Maximum Insolation
100
90
80
70
60
50
40
30
20
10
1st
4th
8th
12th
16th
20th
24th
28th
30th
Month of April 1975



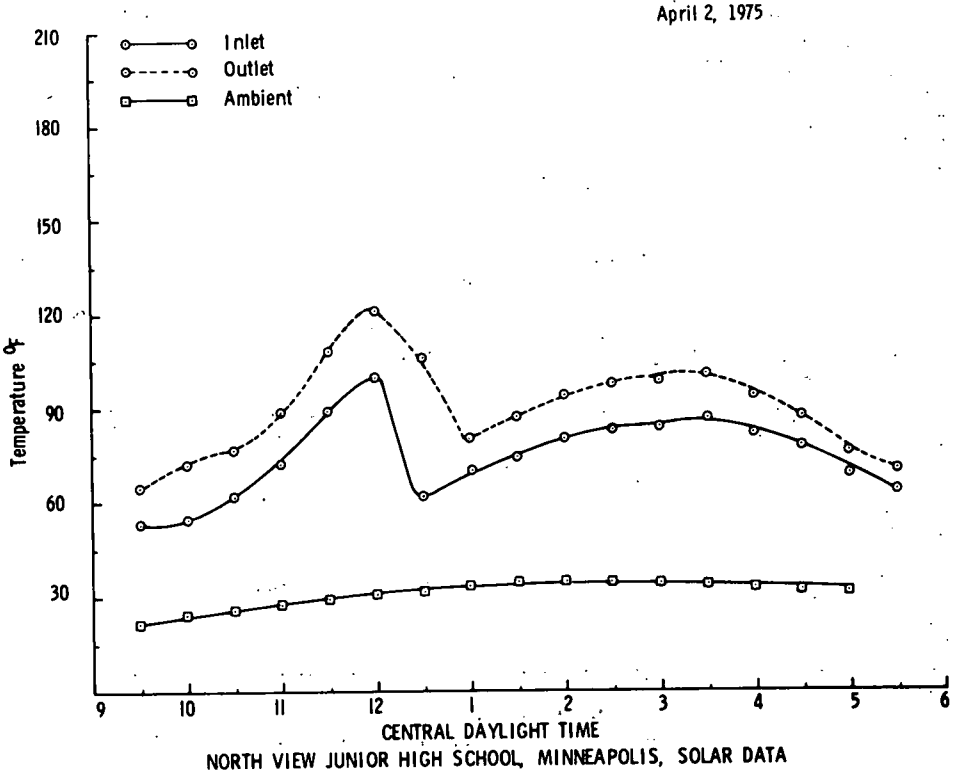
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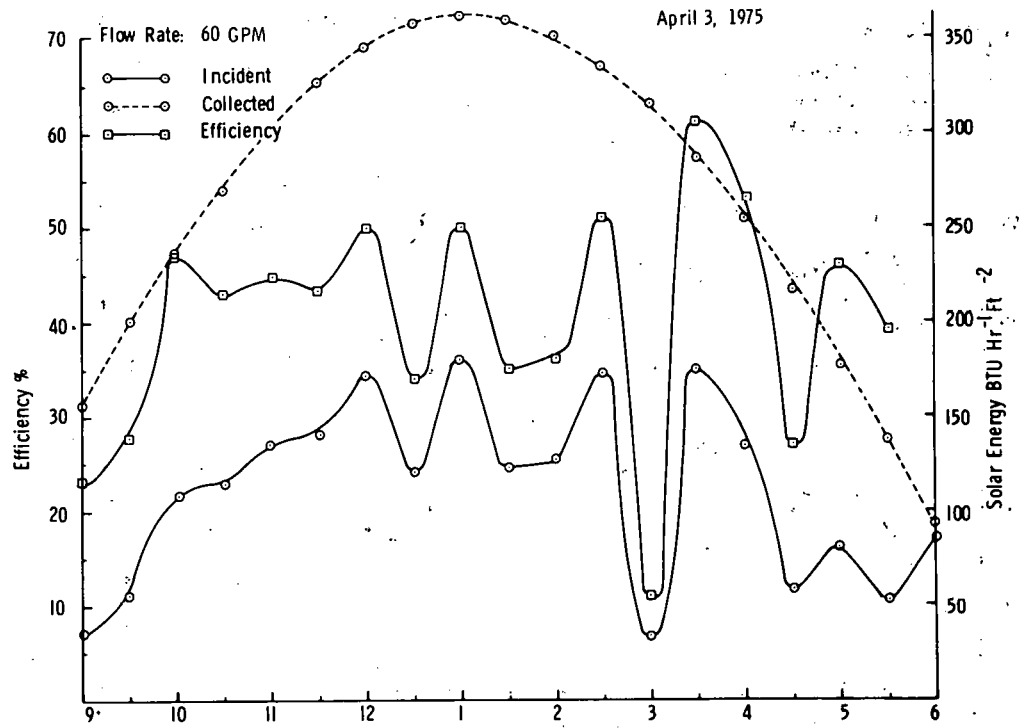
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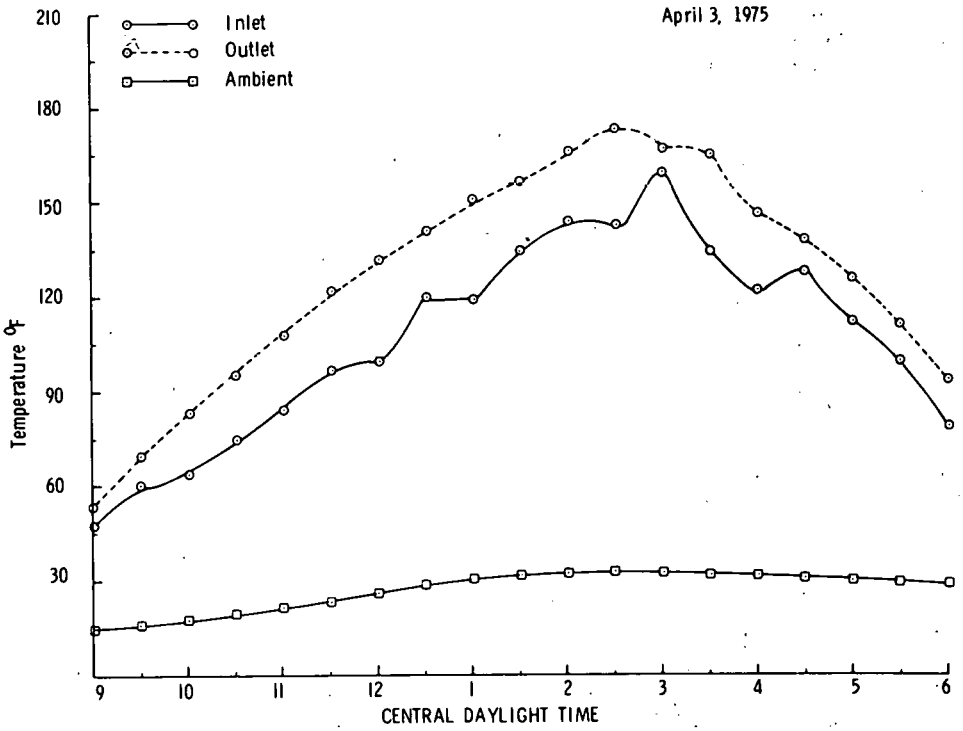
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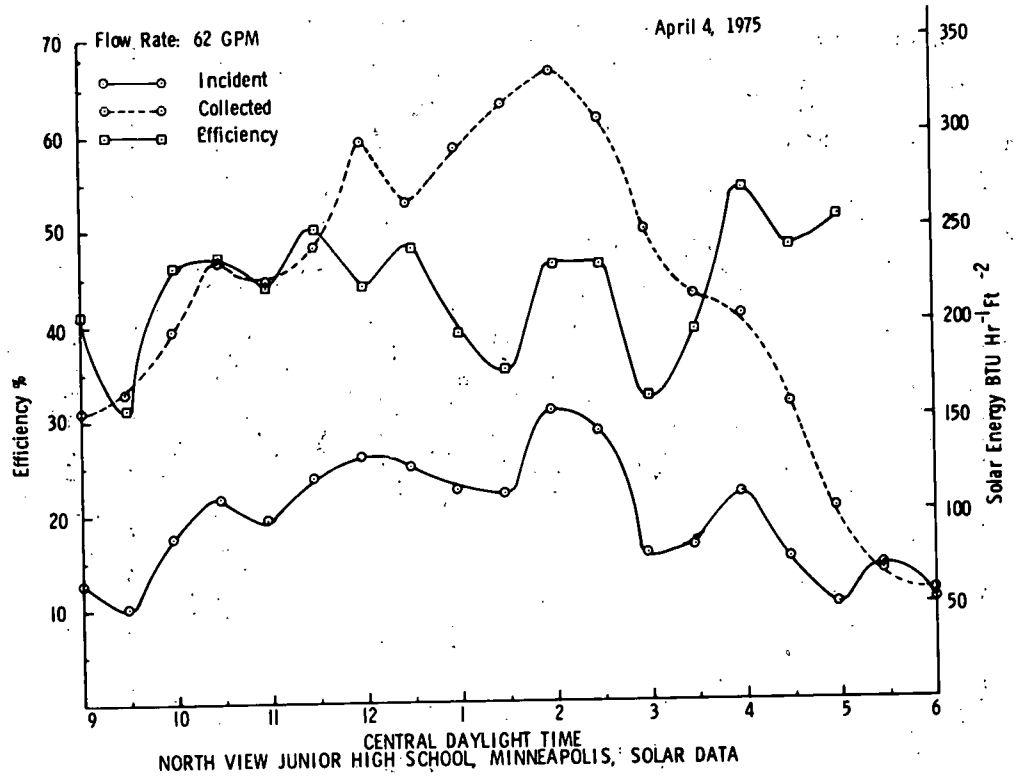
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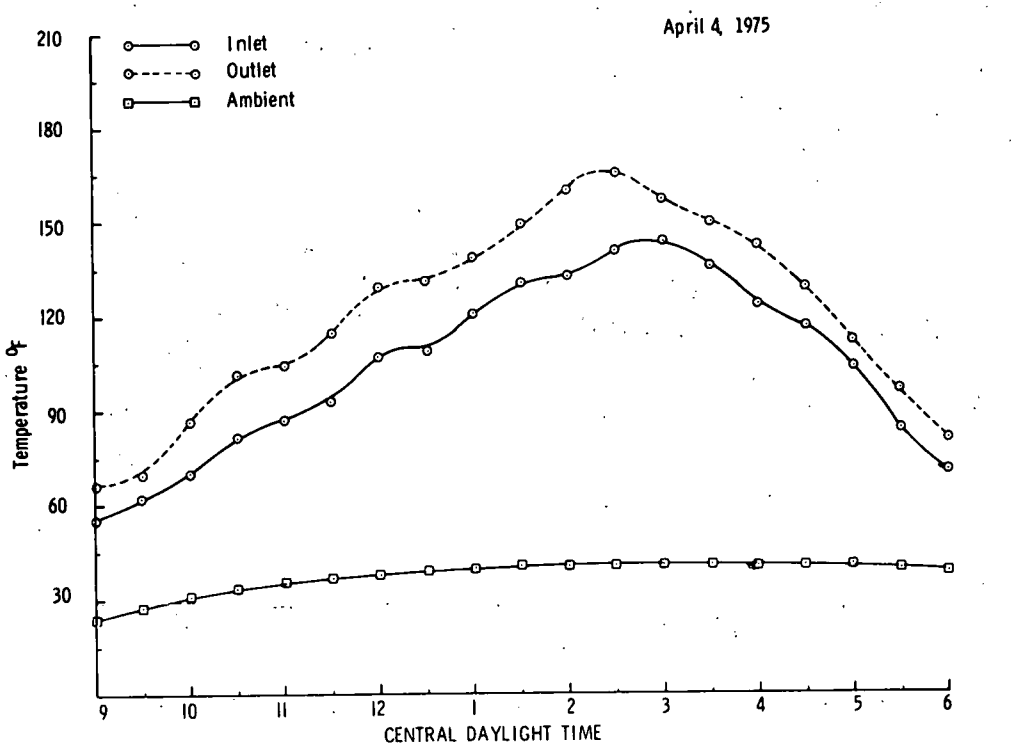
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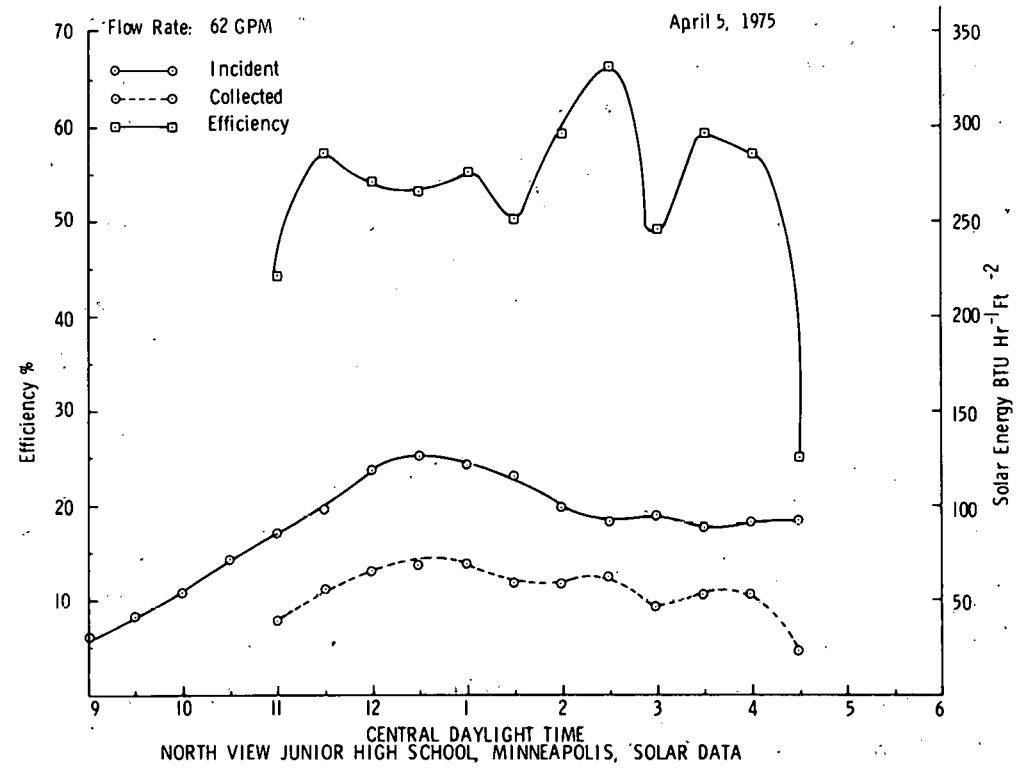
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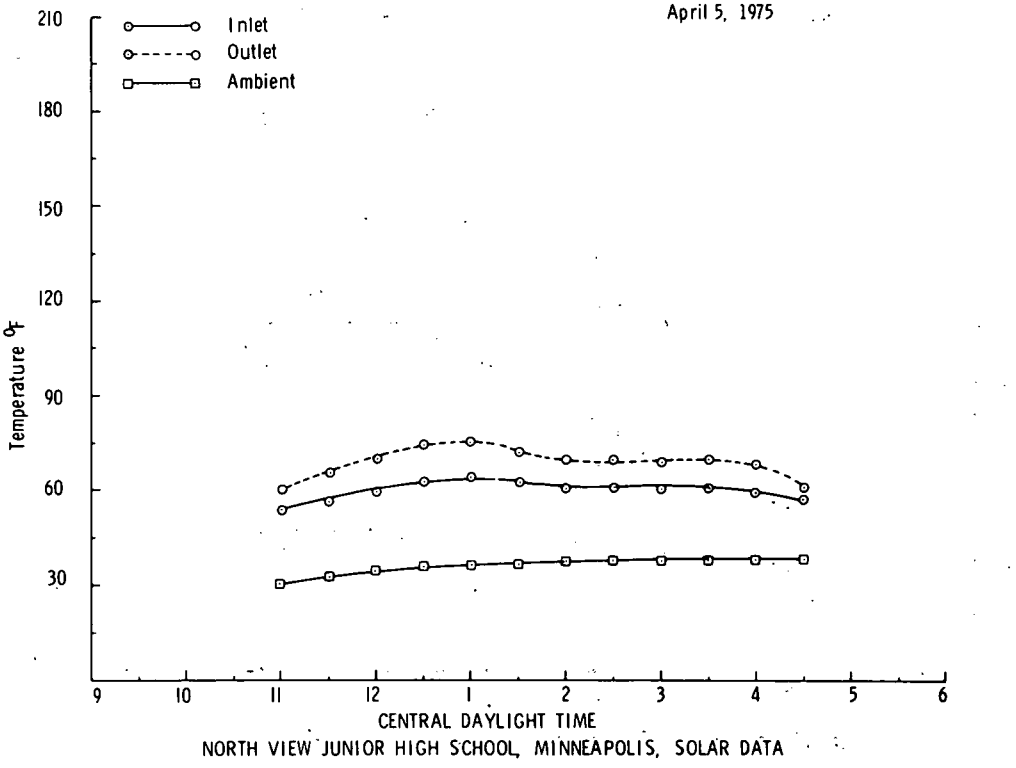
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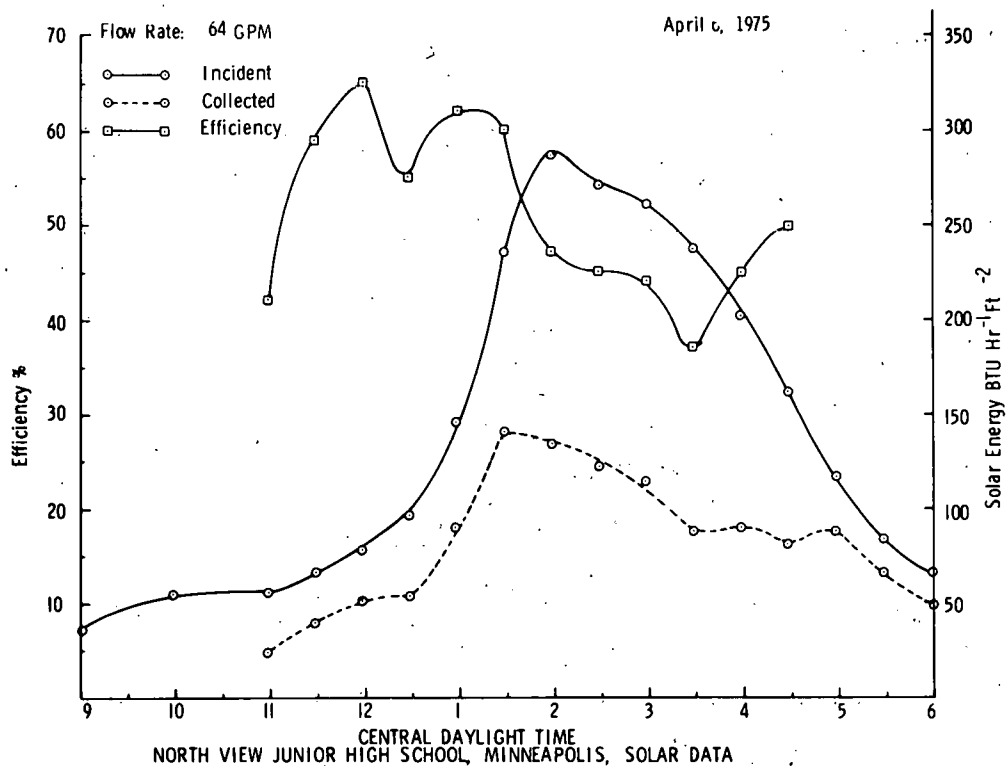
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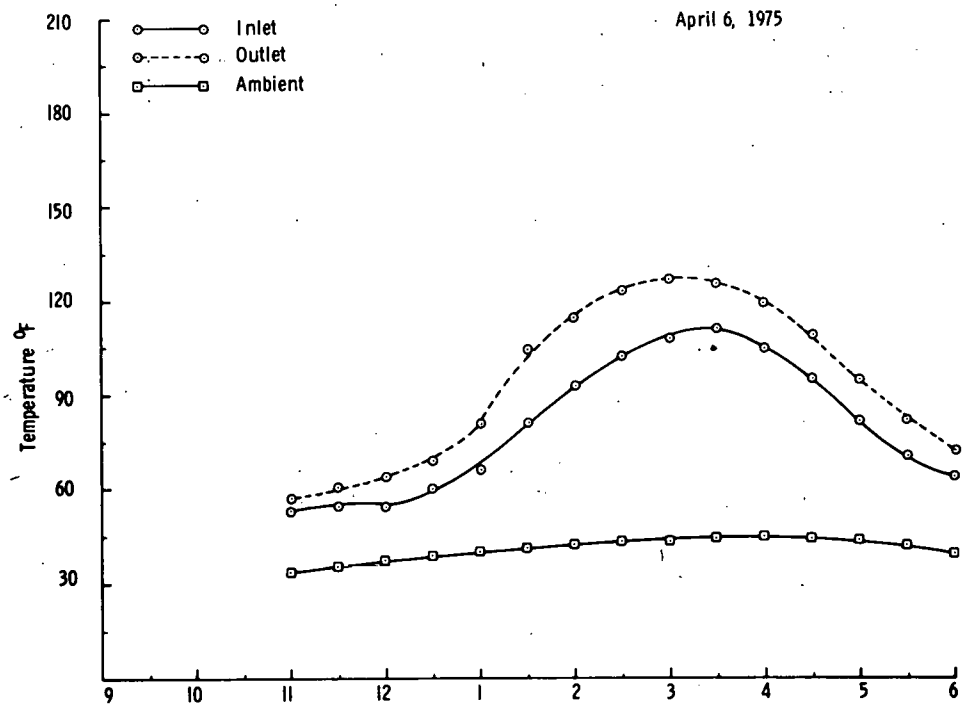
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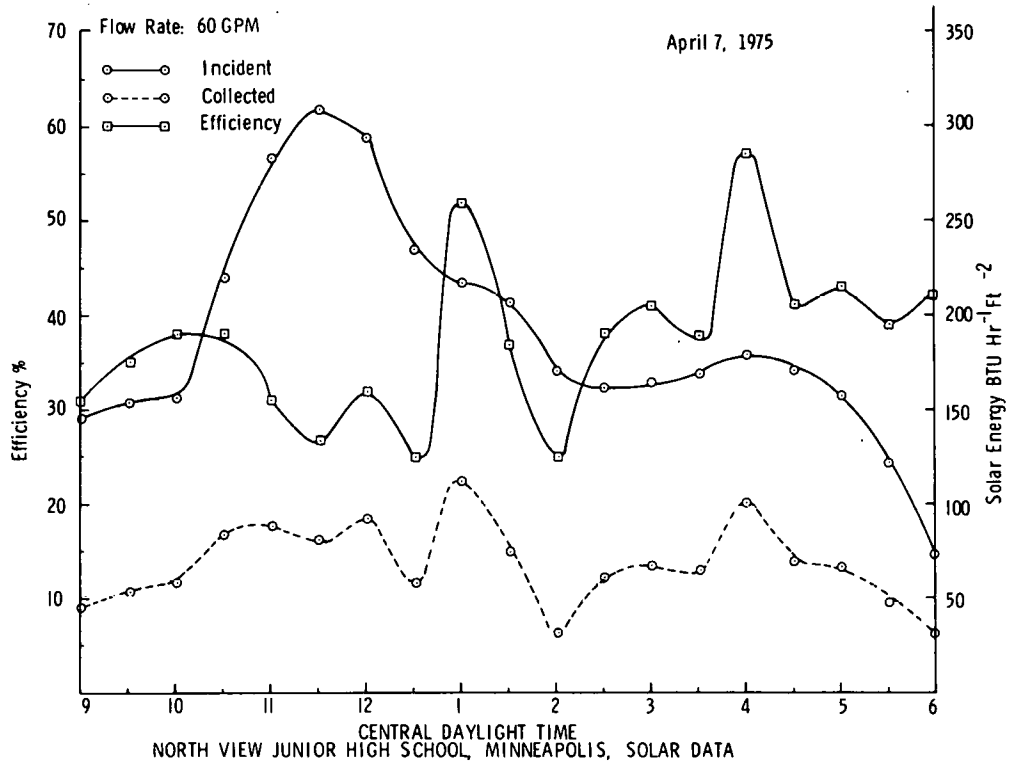
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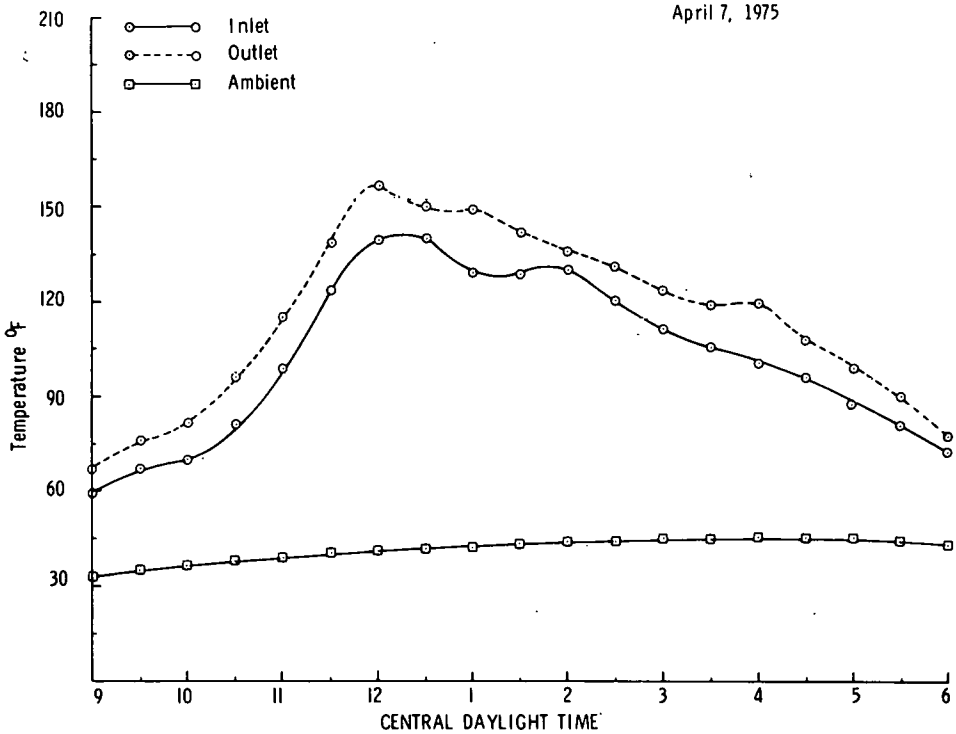
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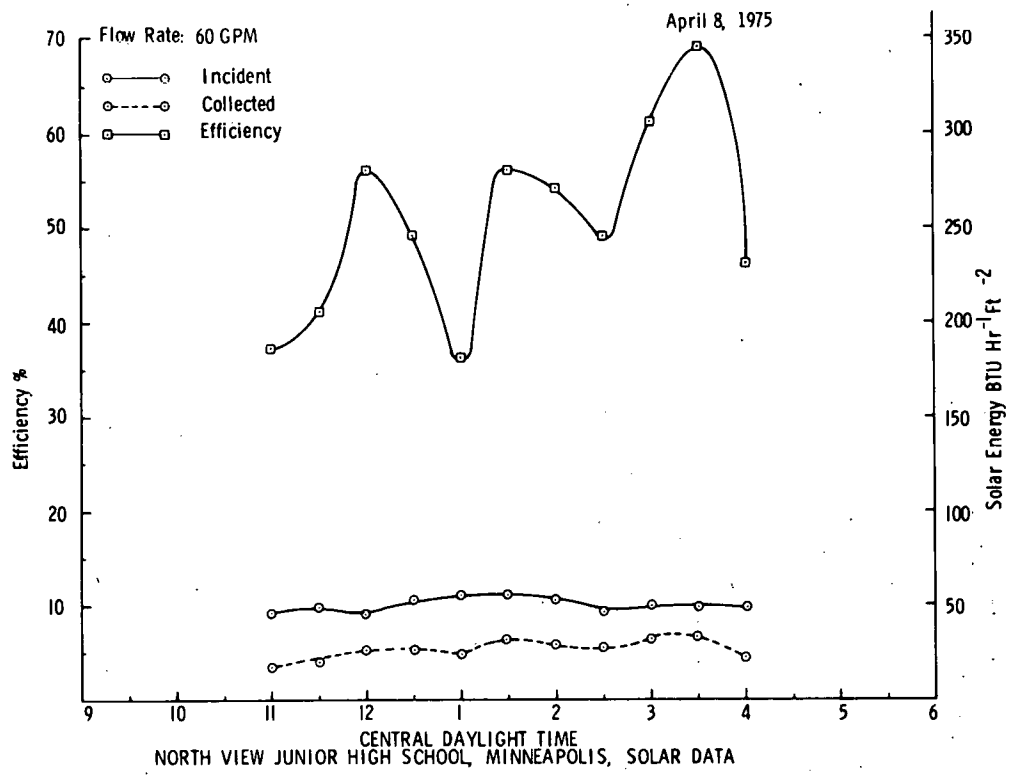
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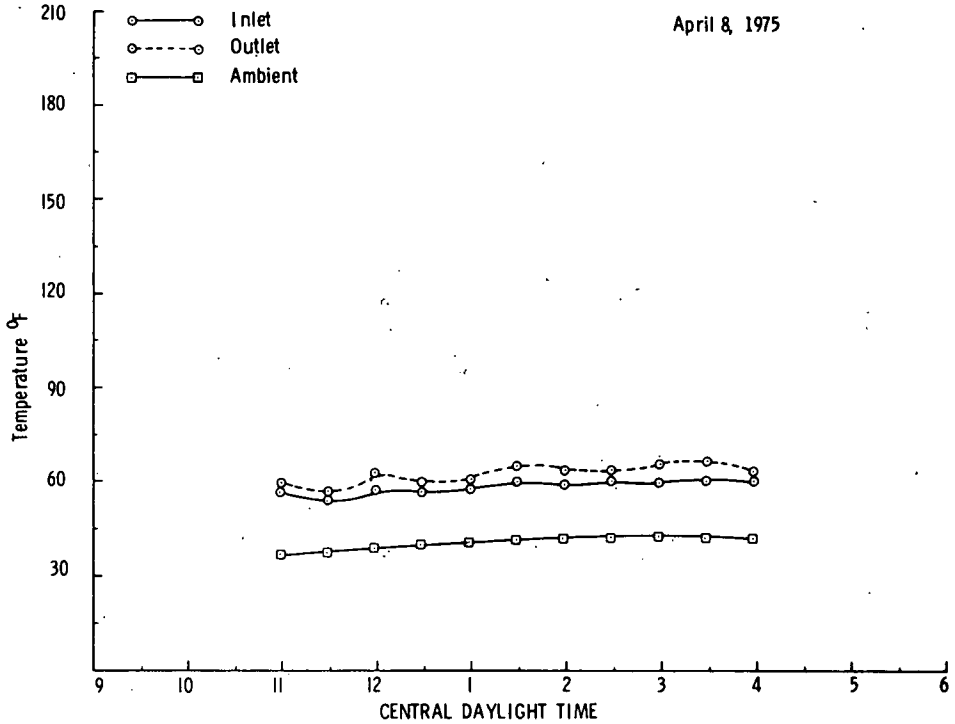
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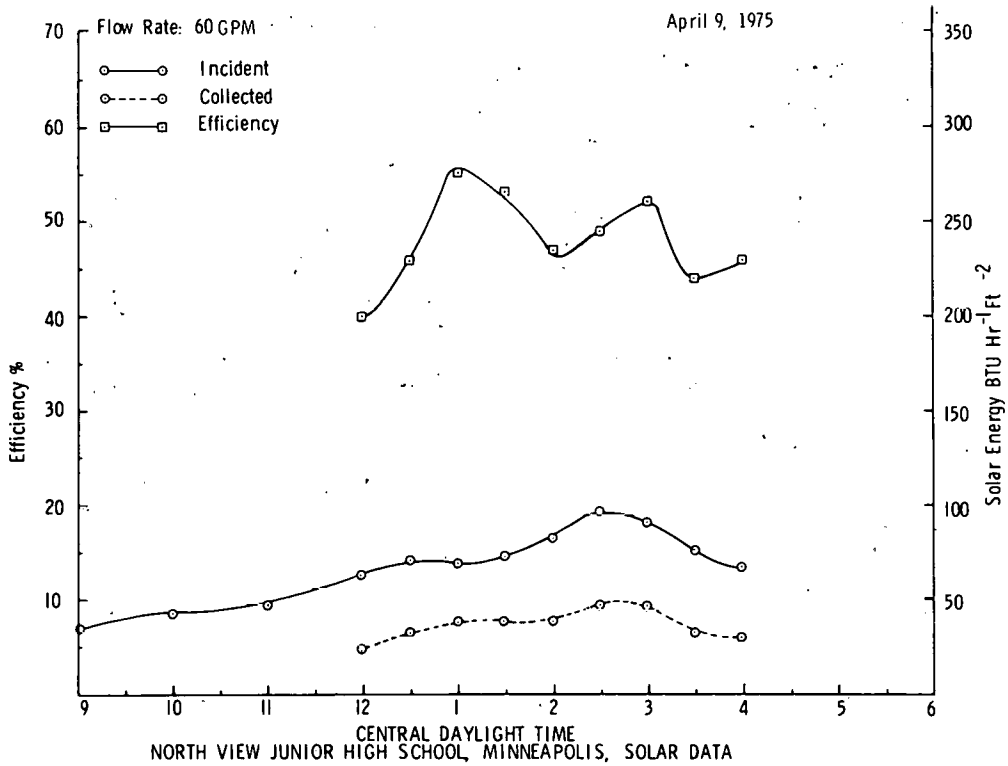
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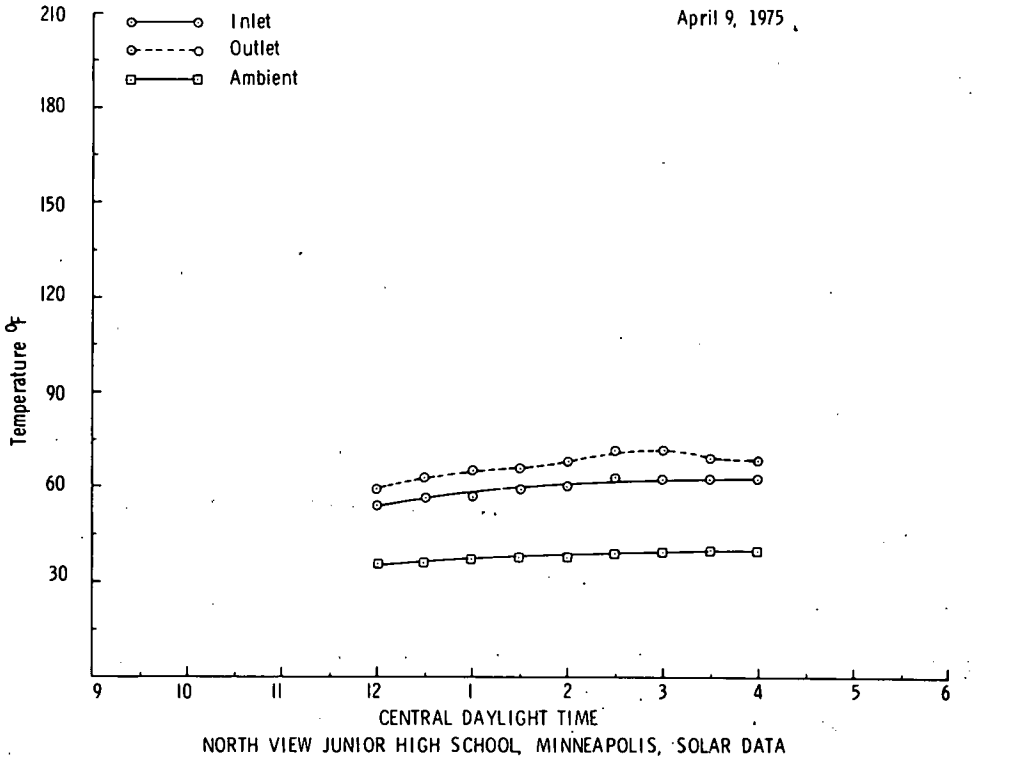
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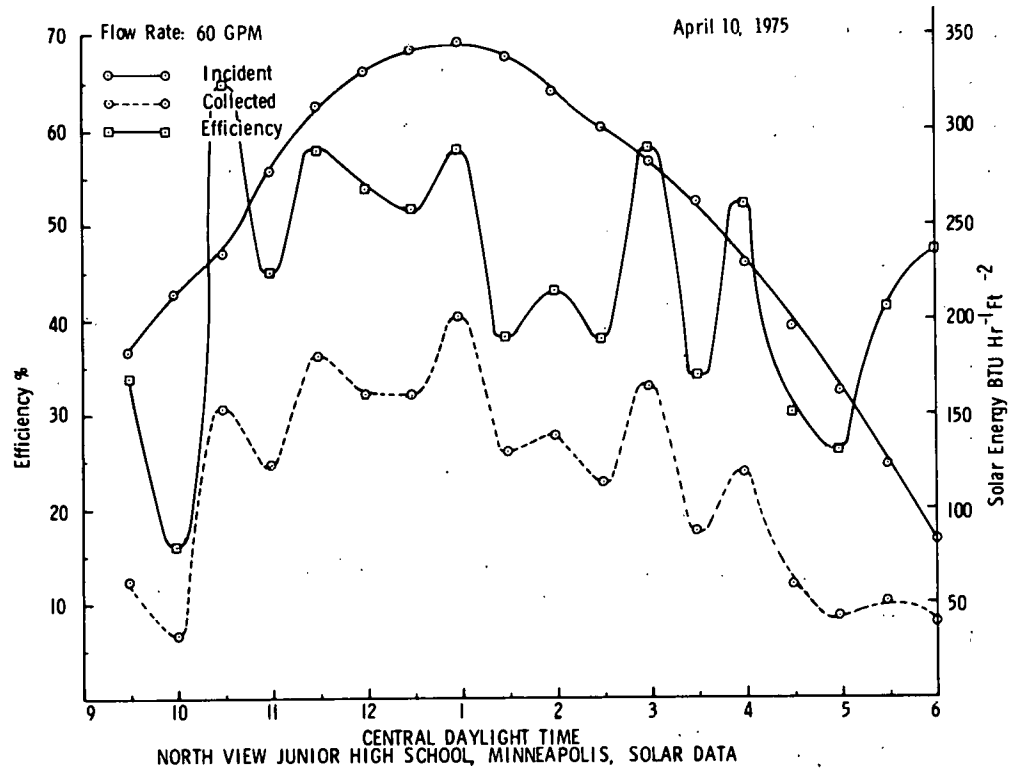
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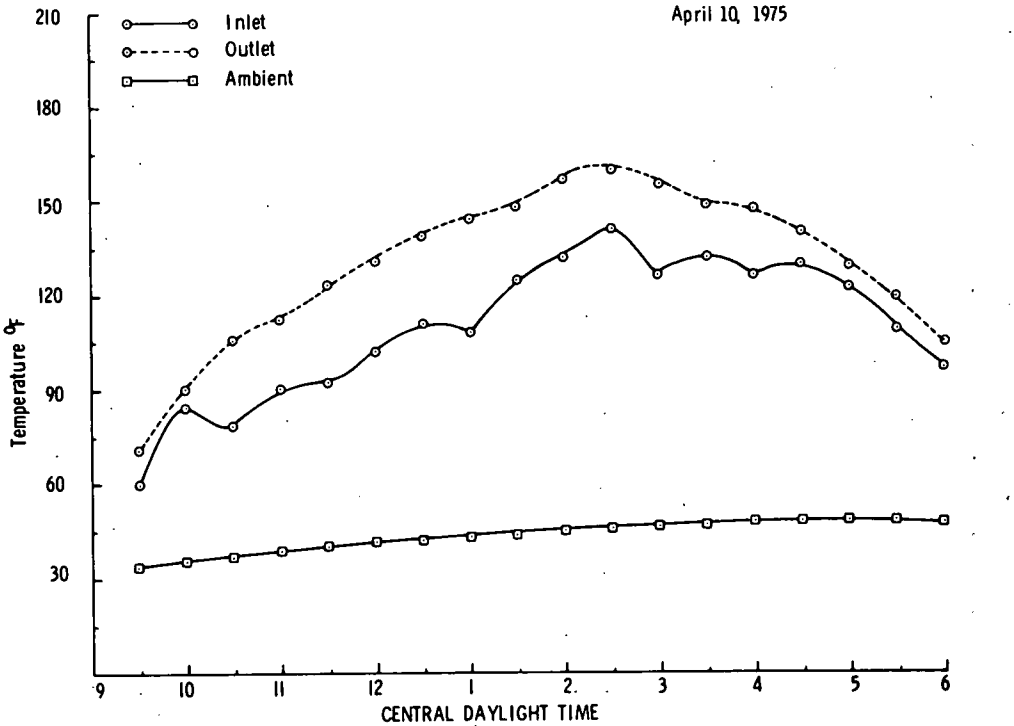
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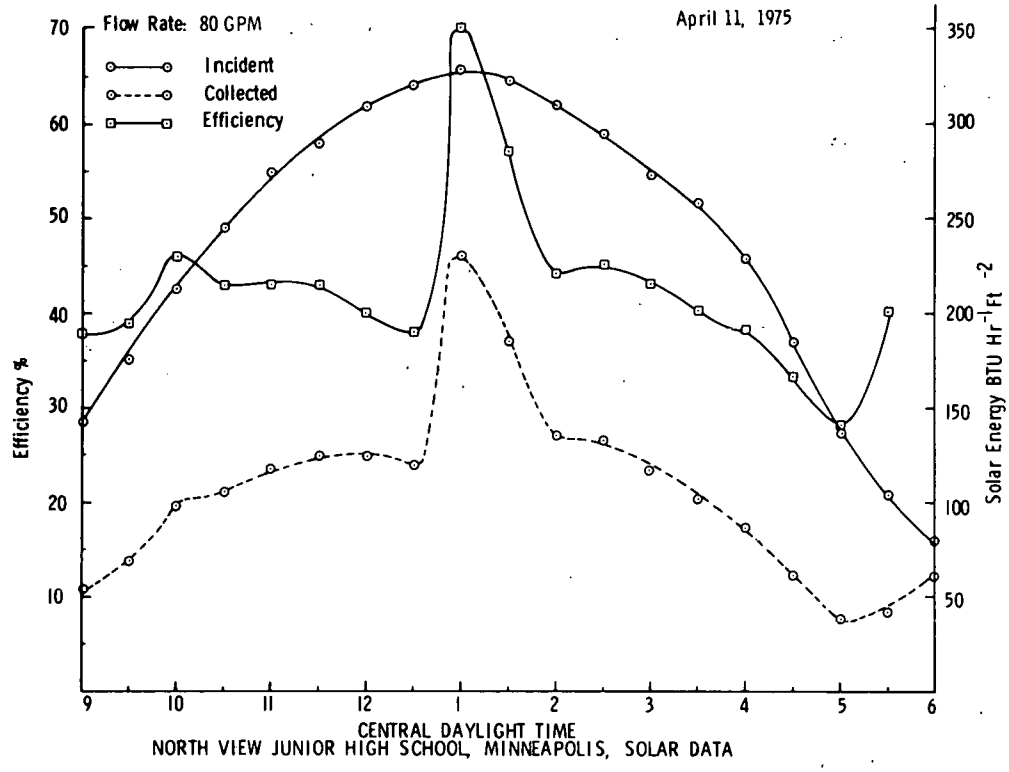
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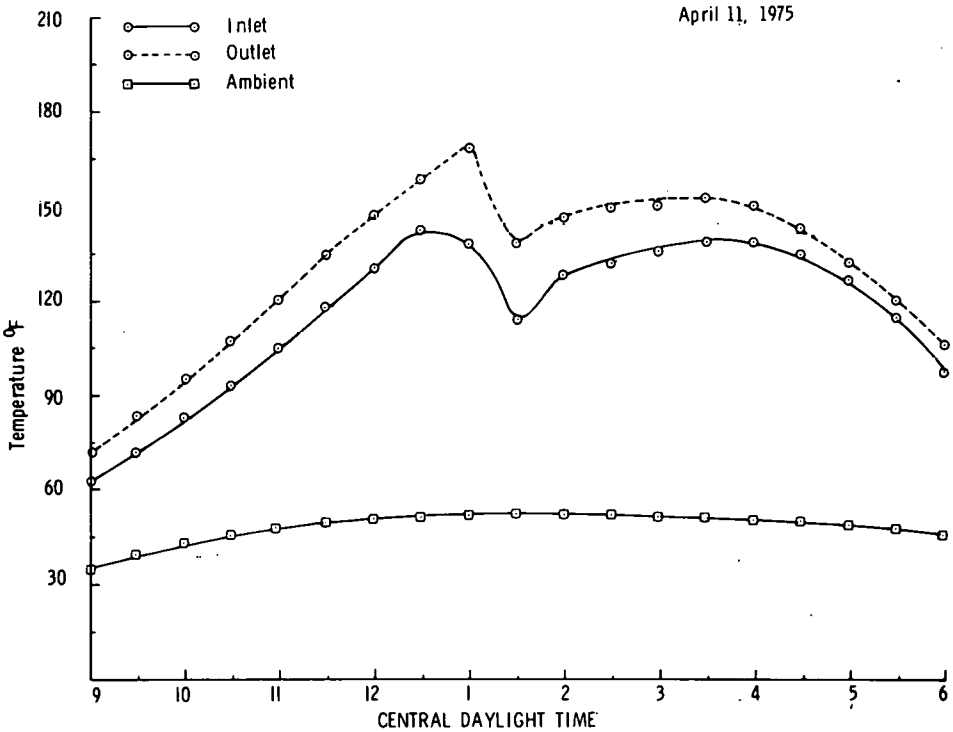
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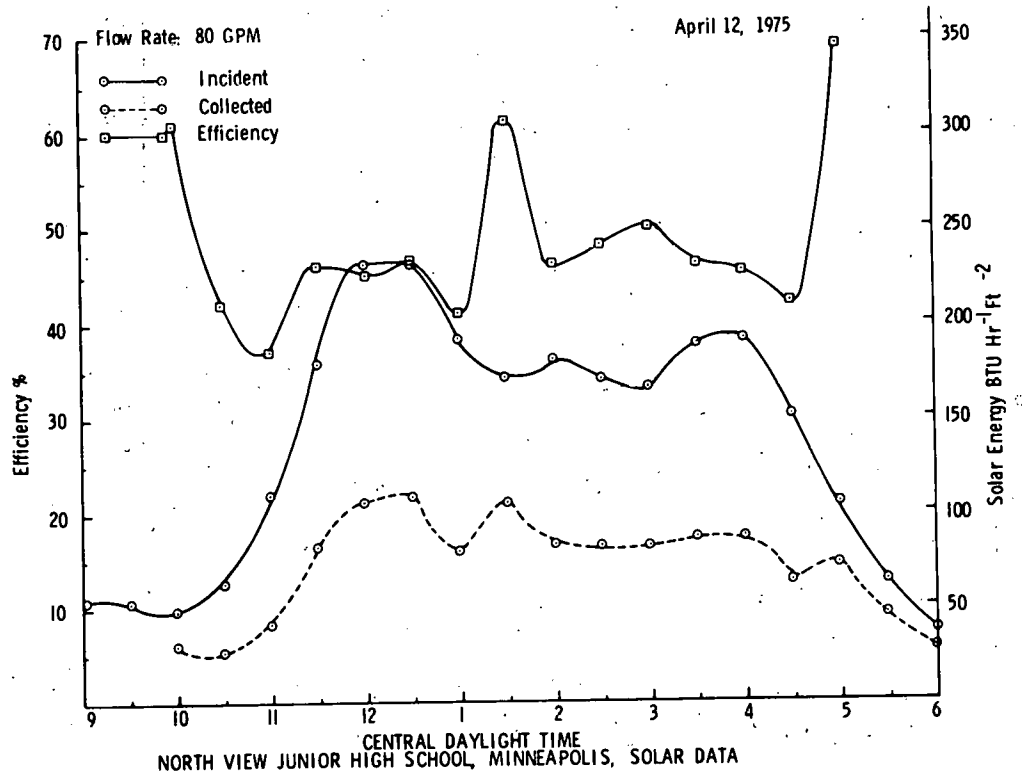
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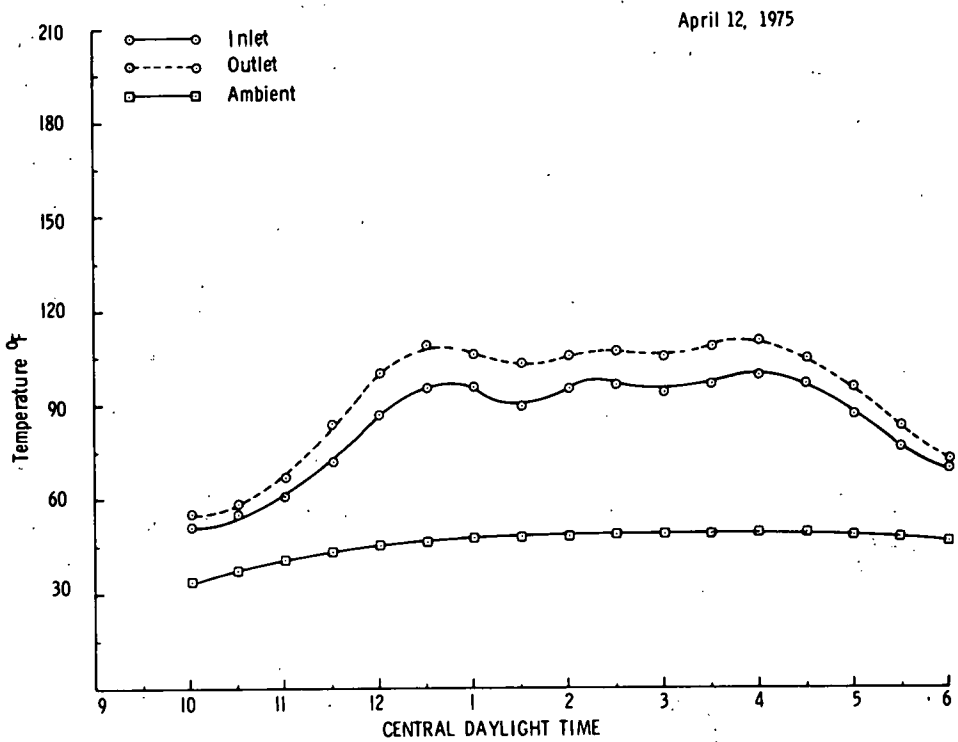
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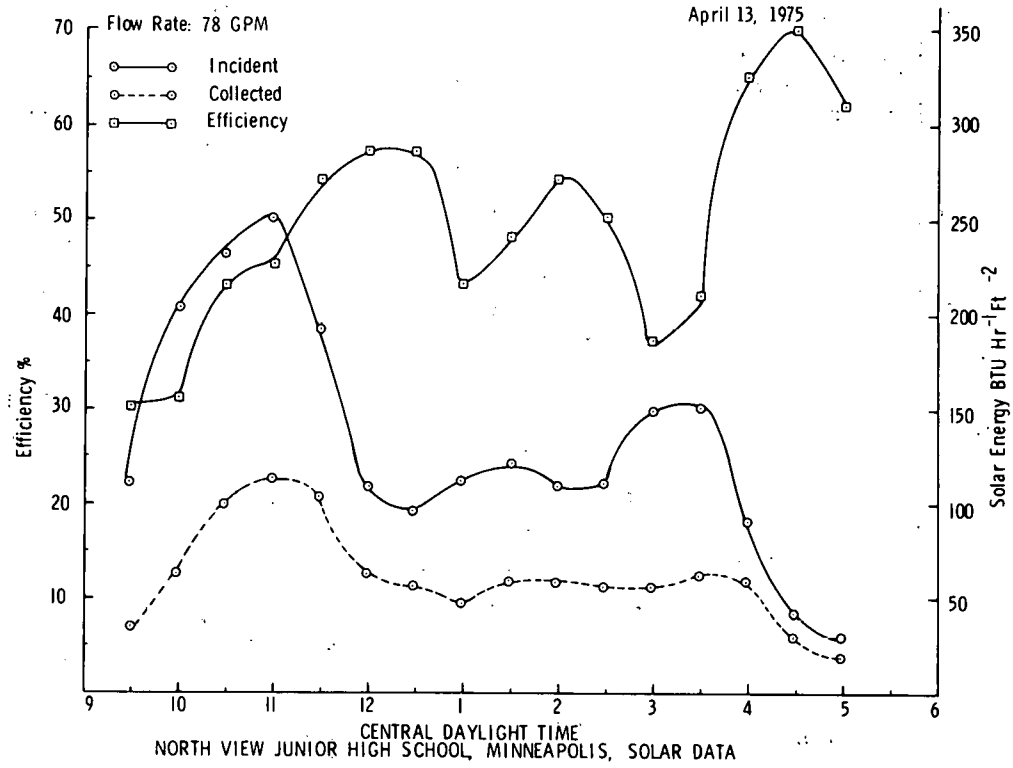
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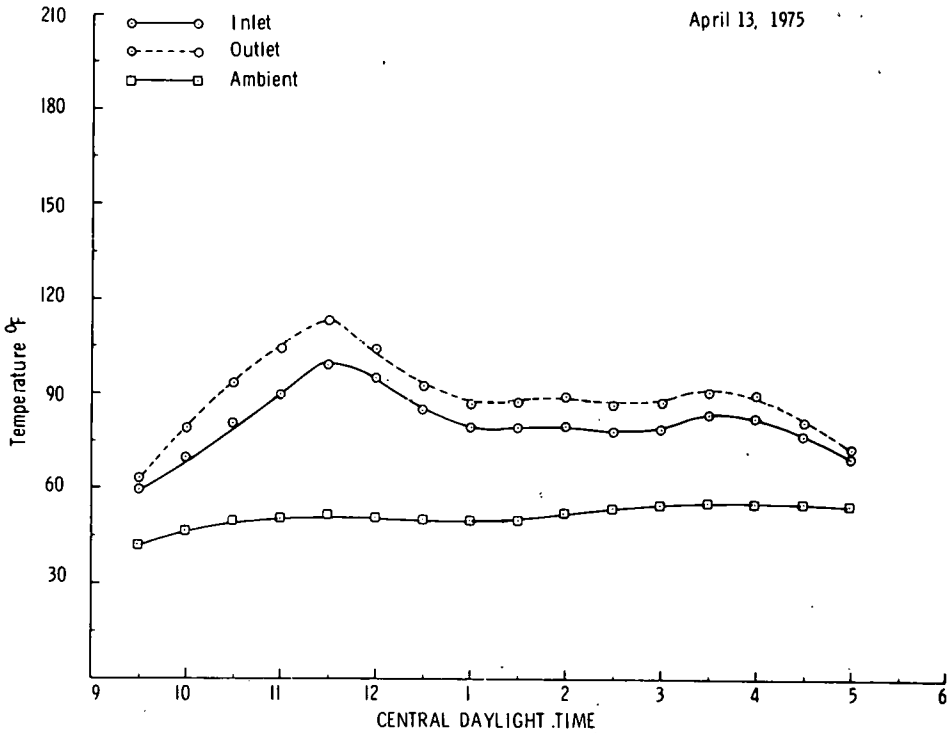
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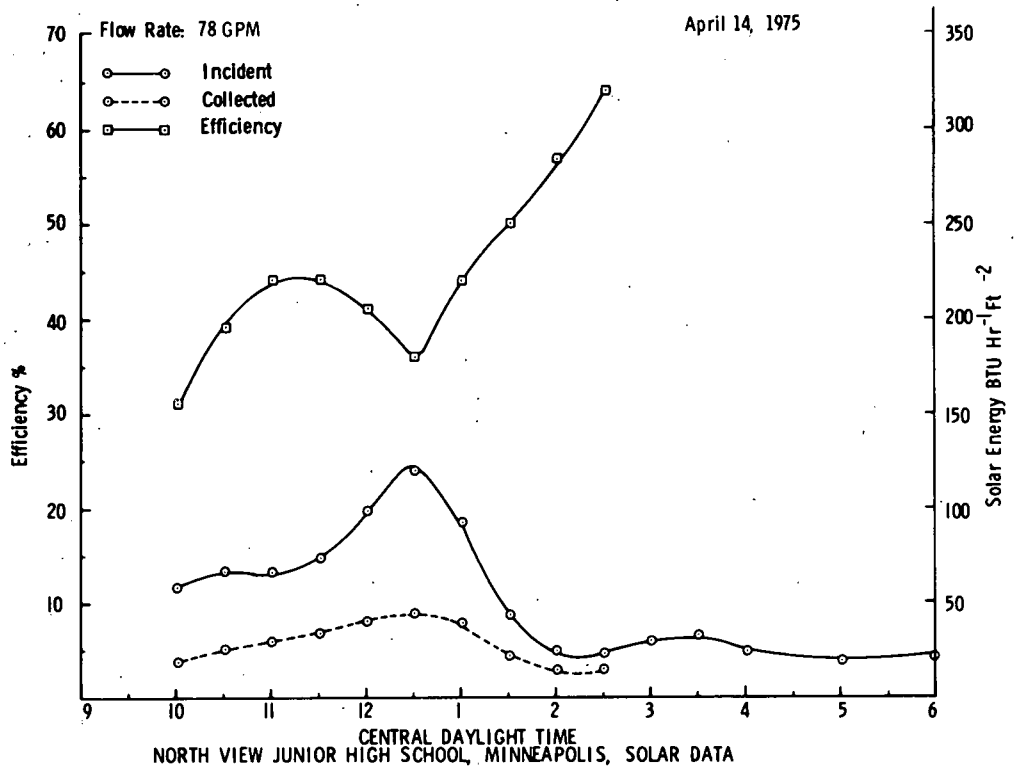
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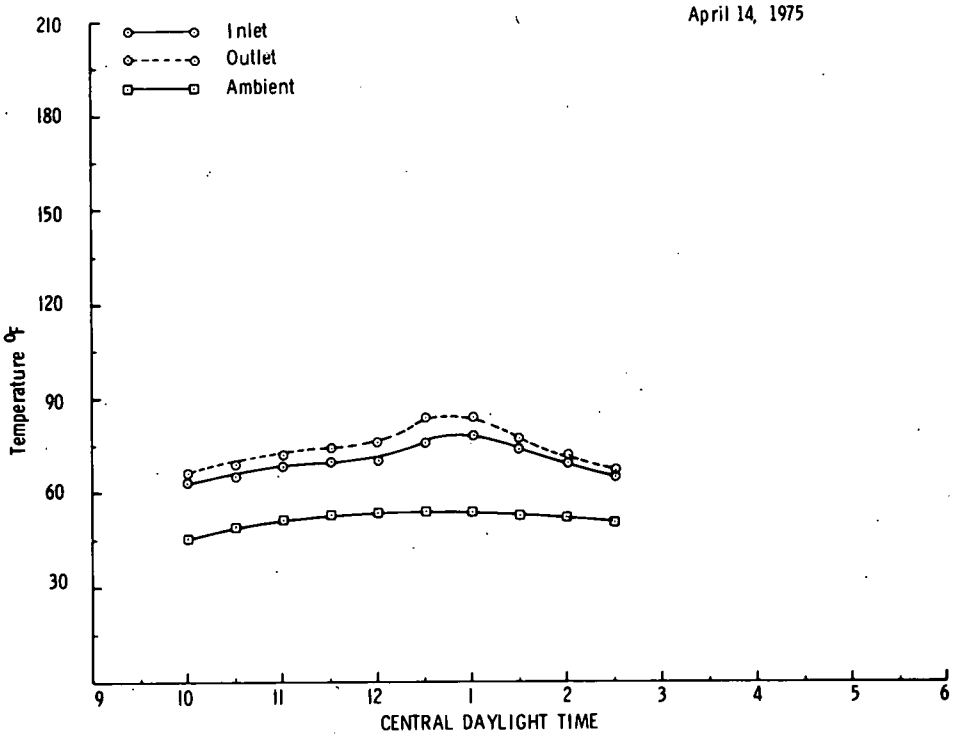
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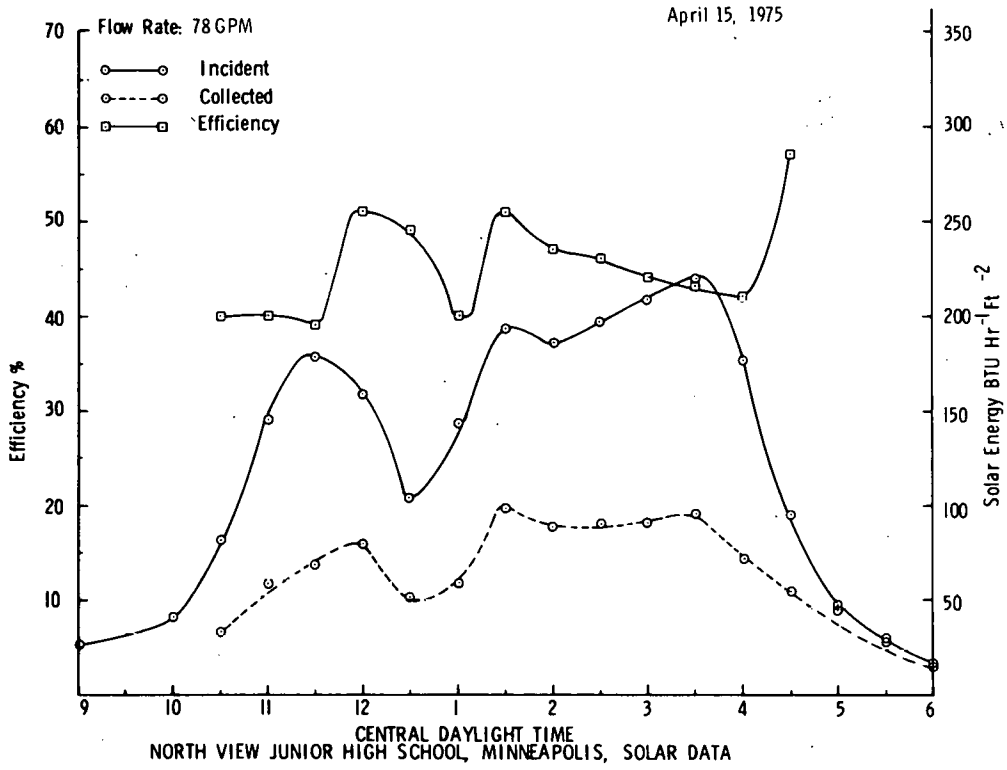
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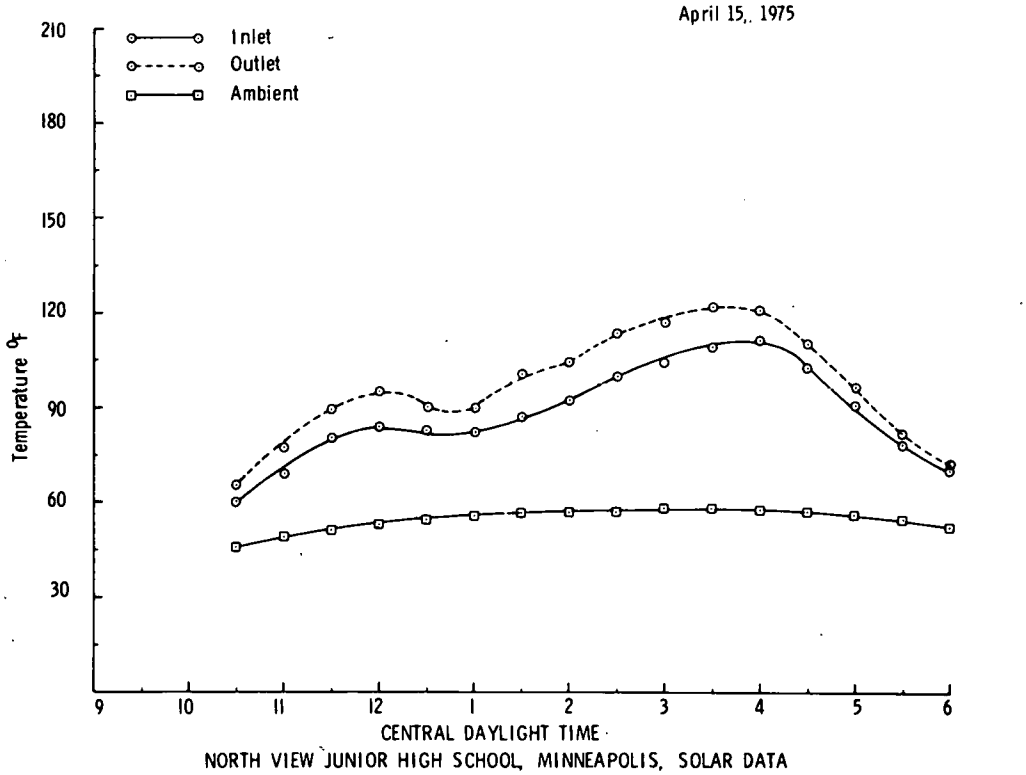
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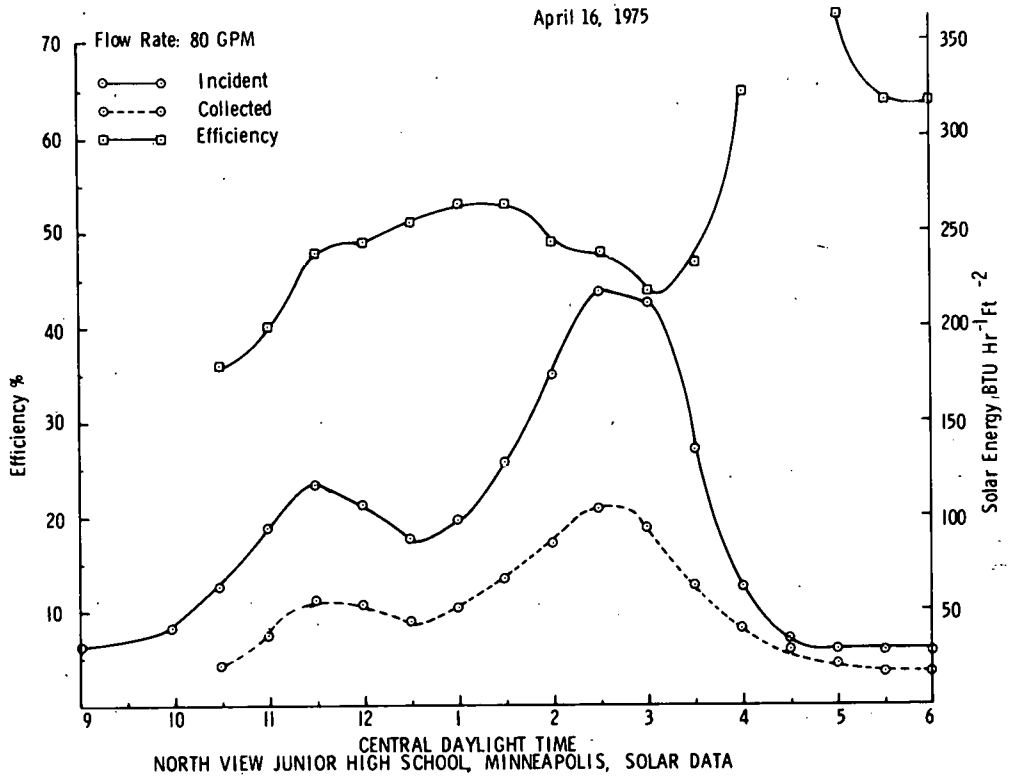
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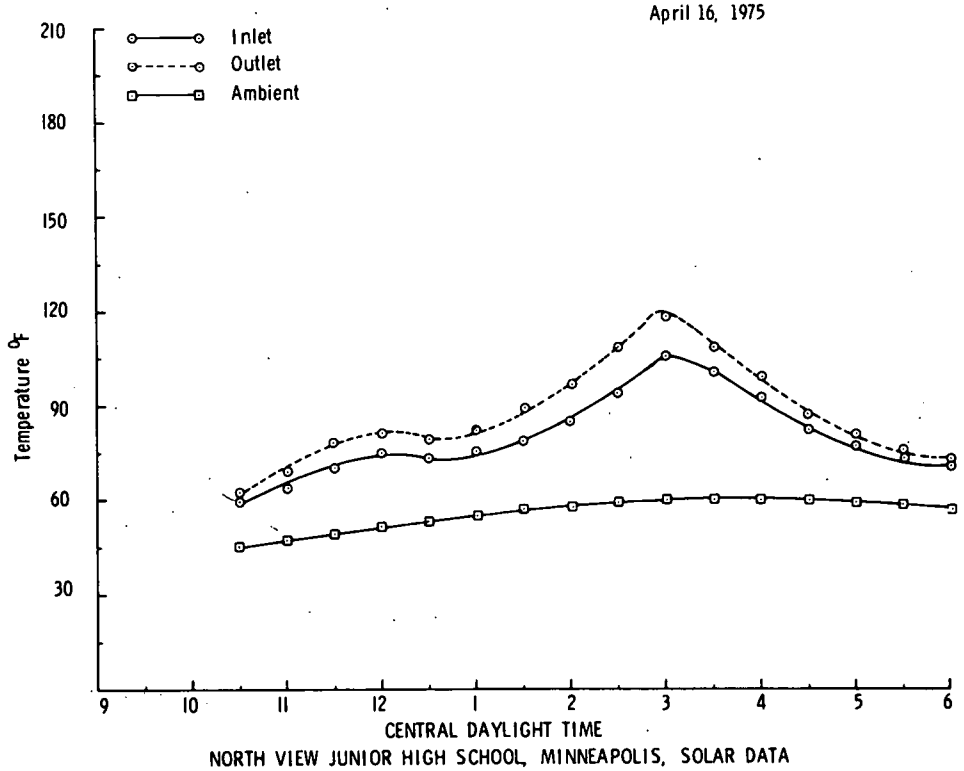
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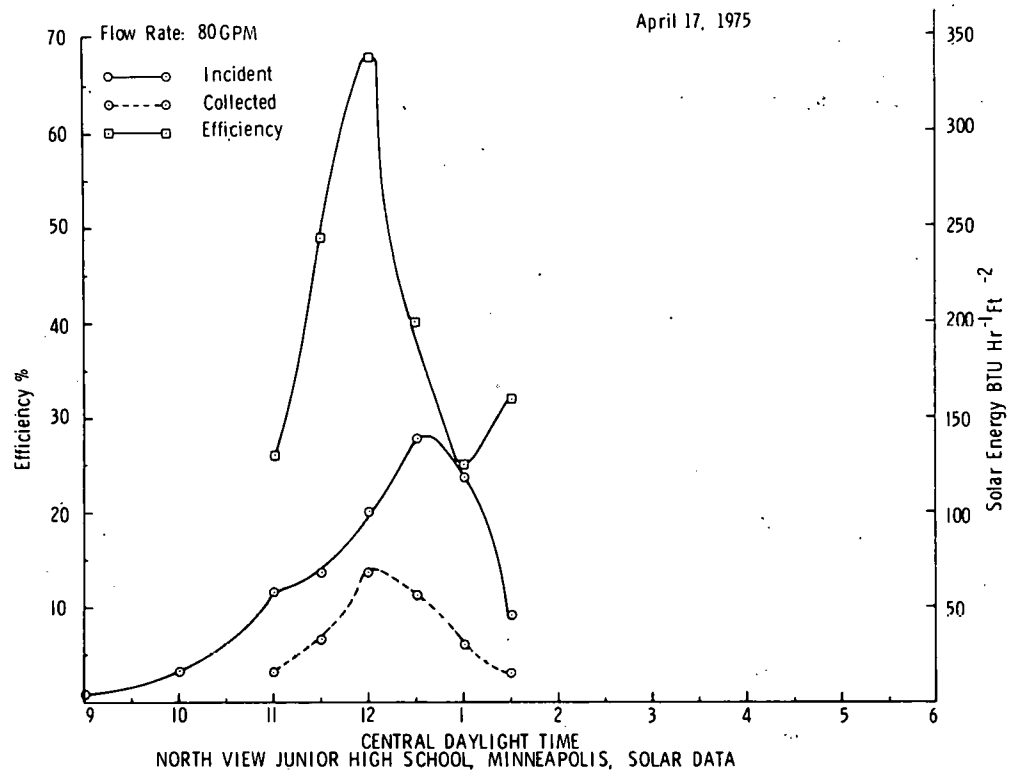
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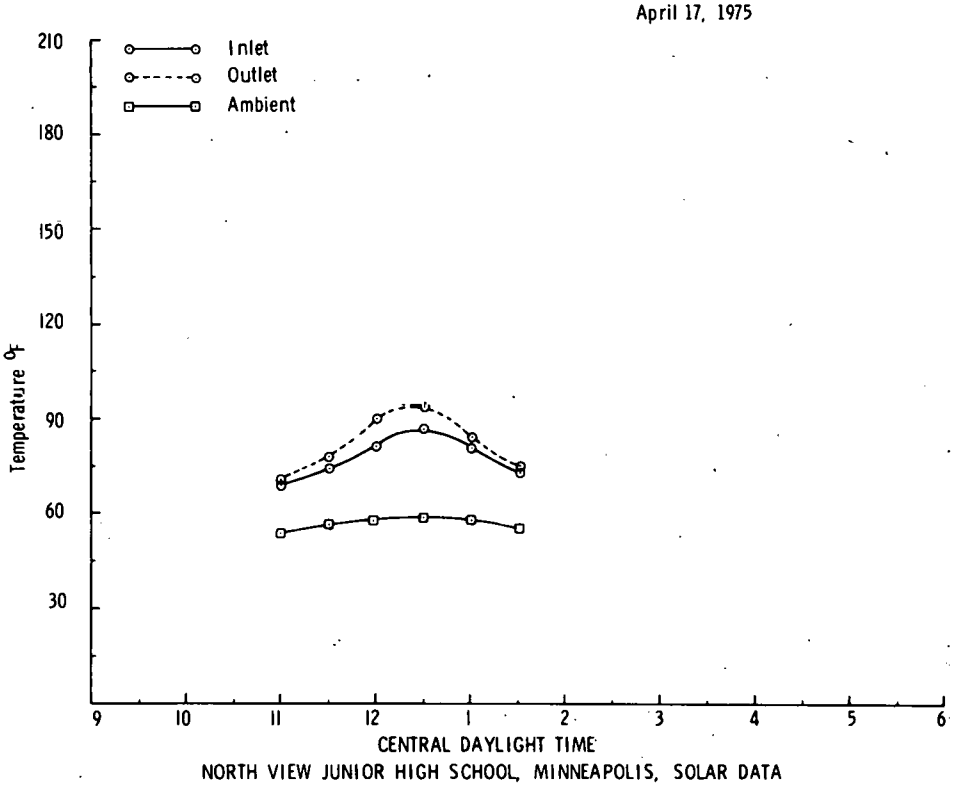
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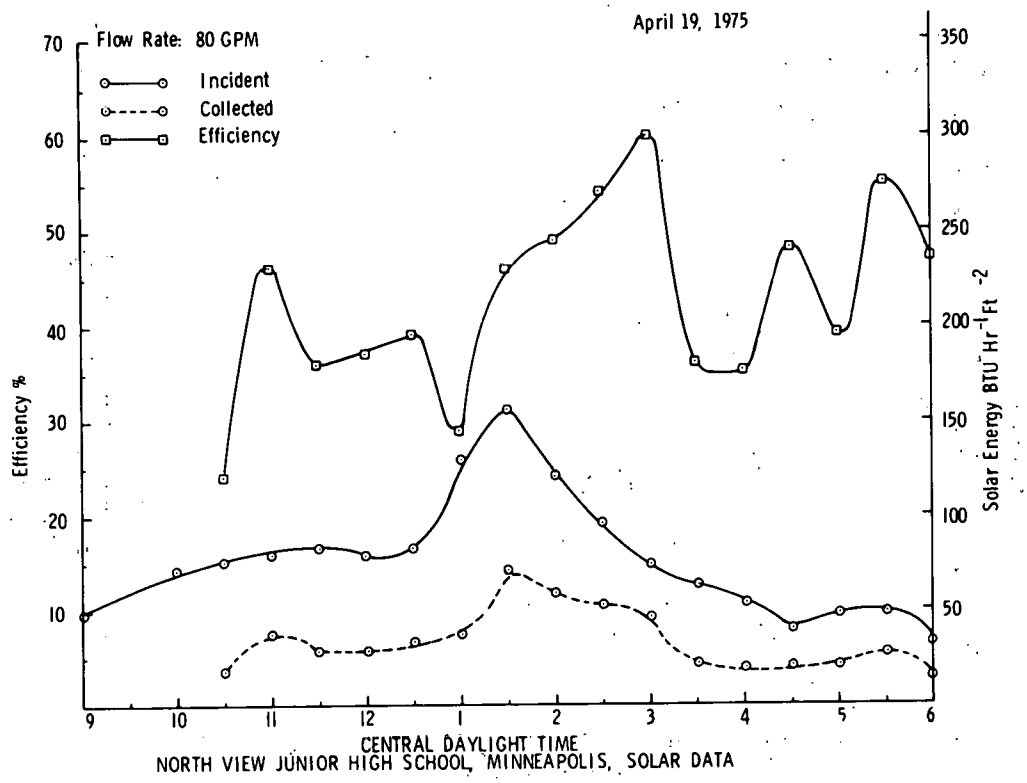
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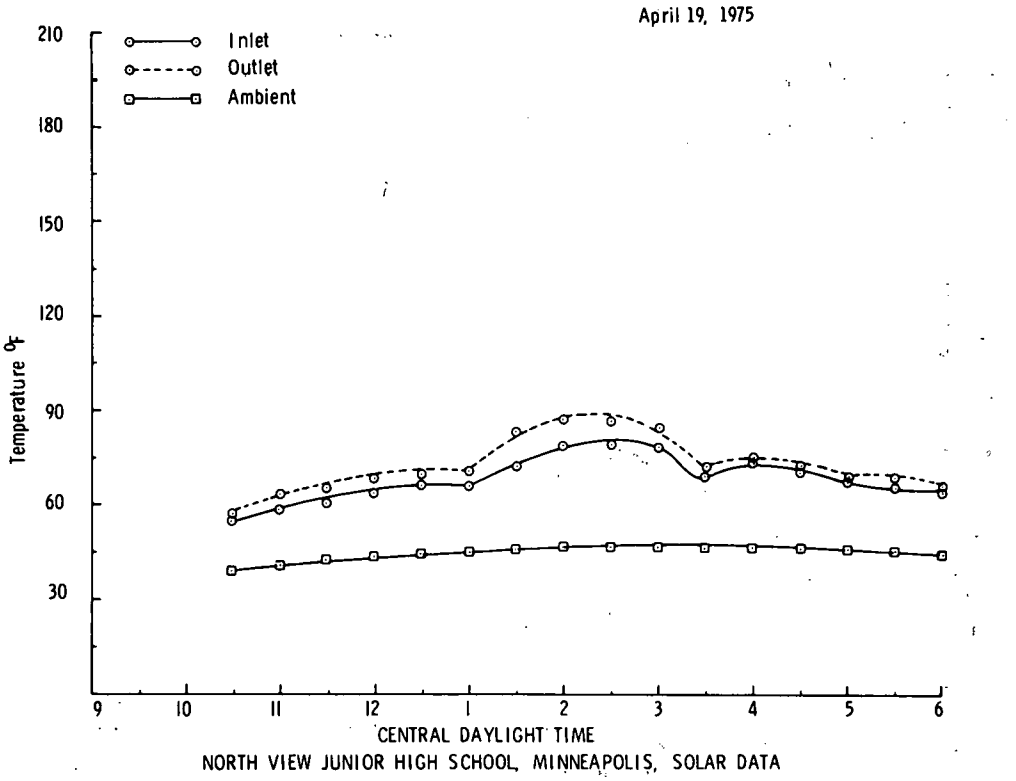
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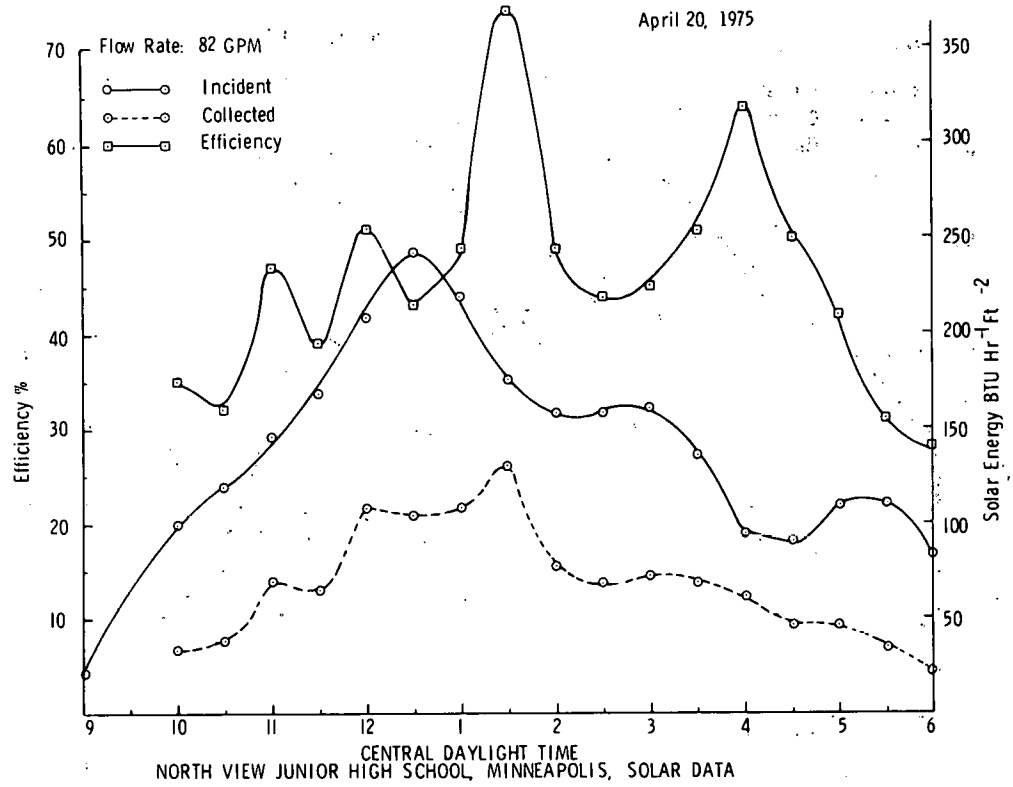
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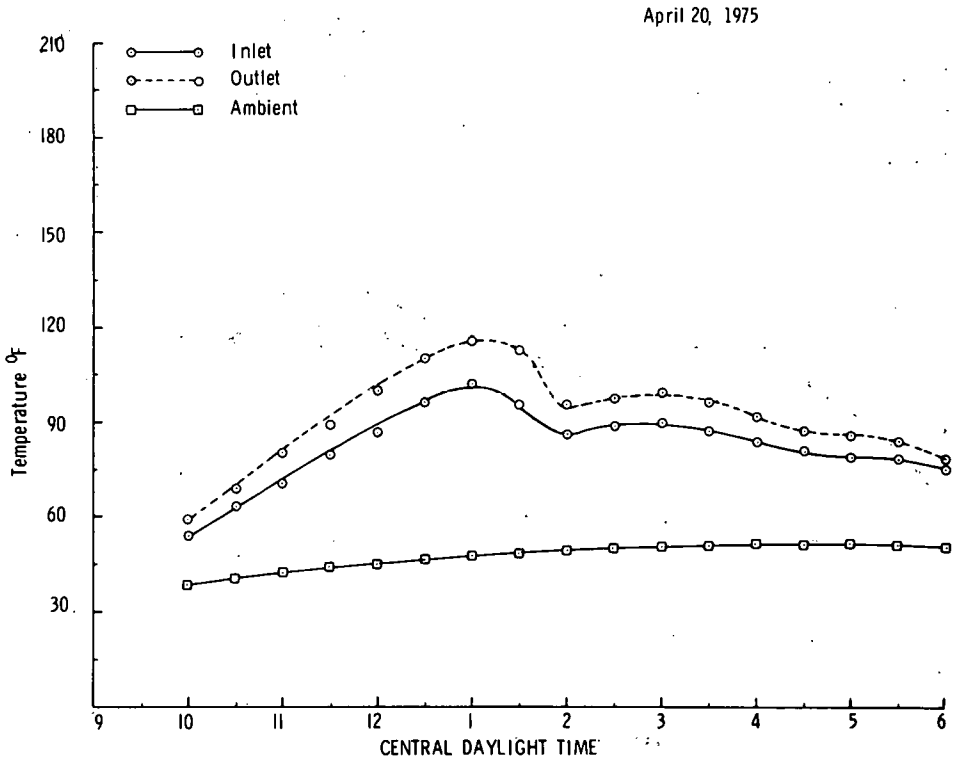
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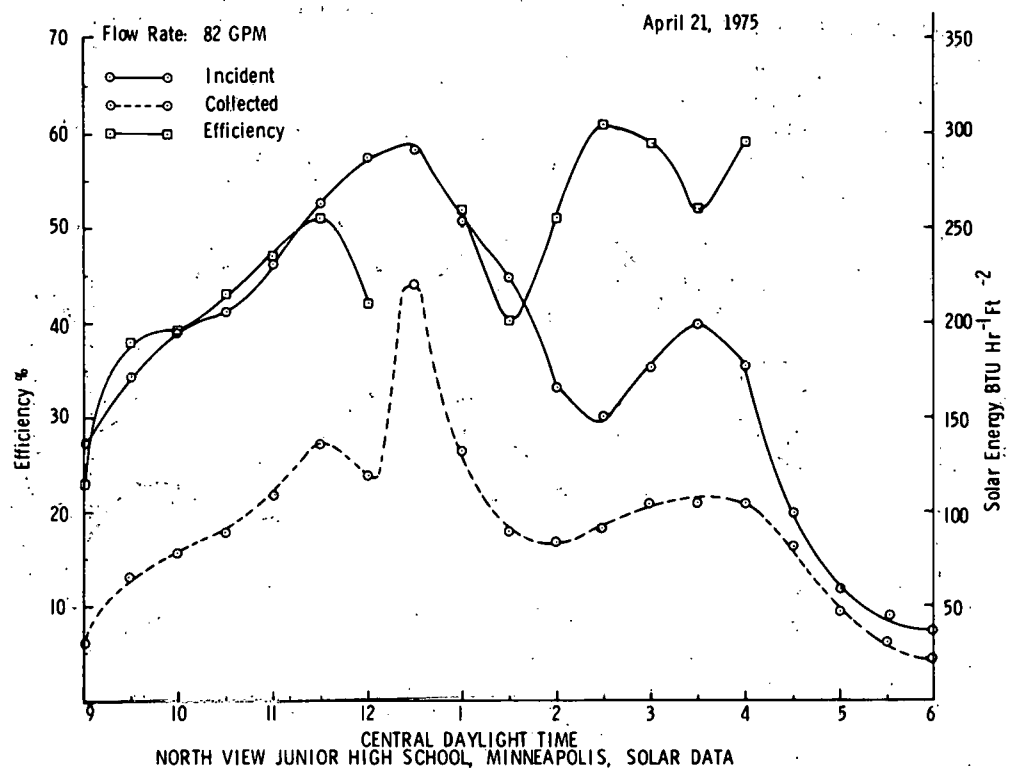
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



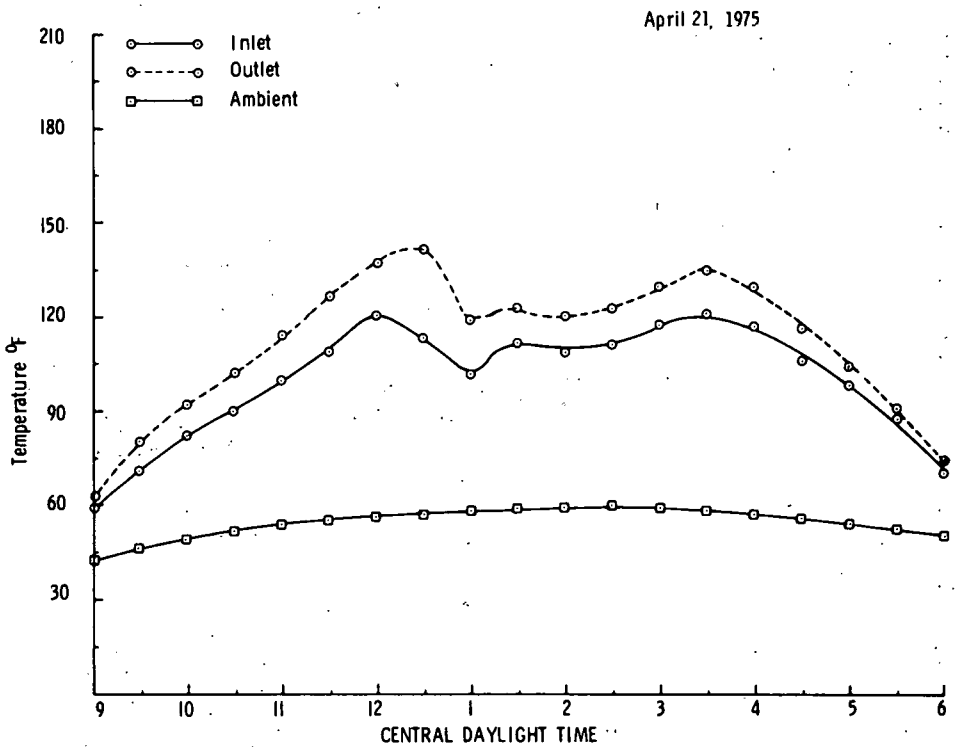
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



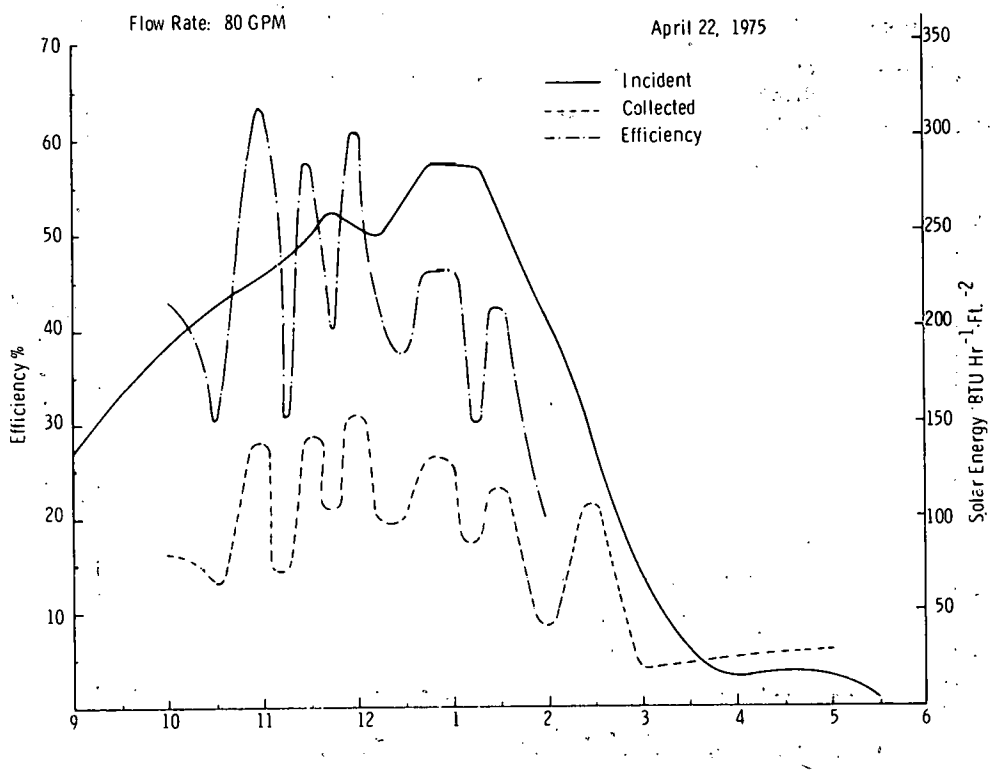
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

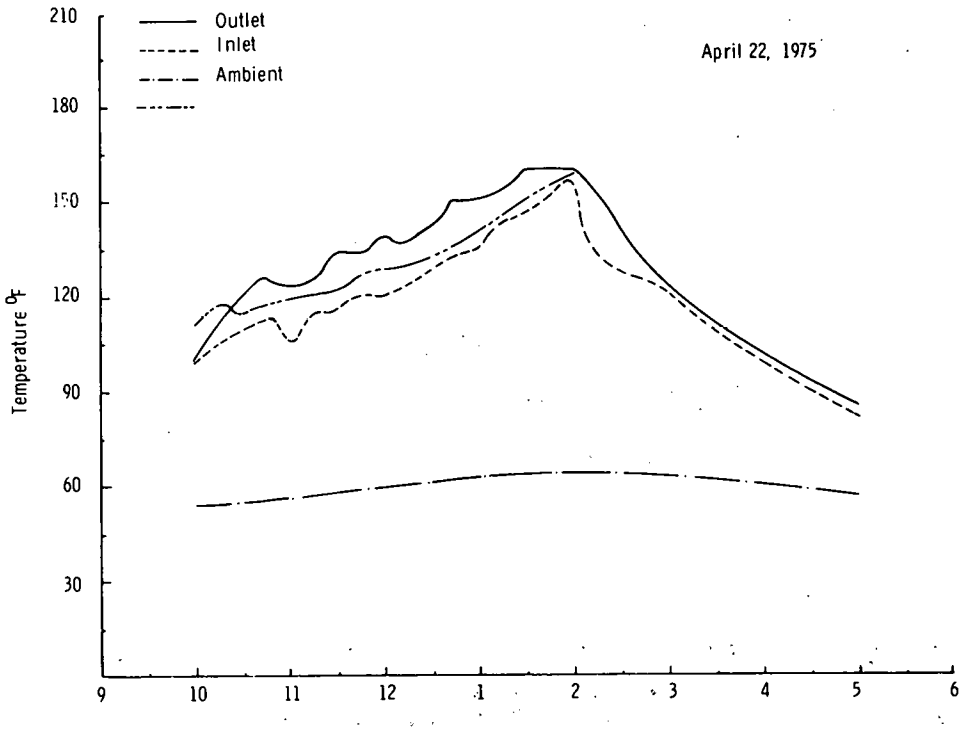


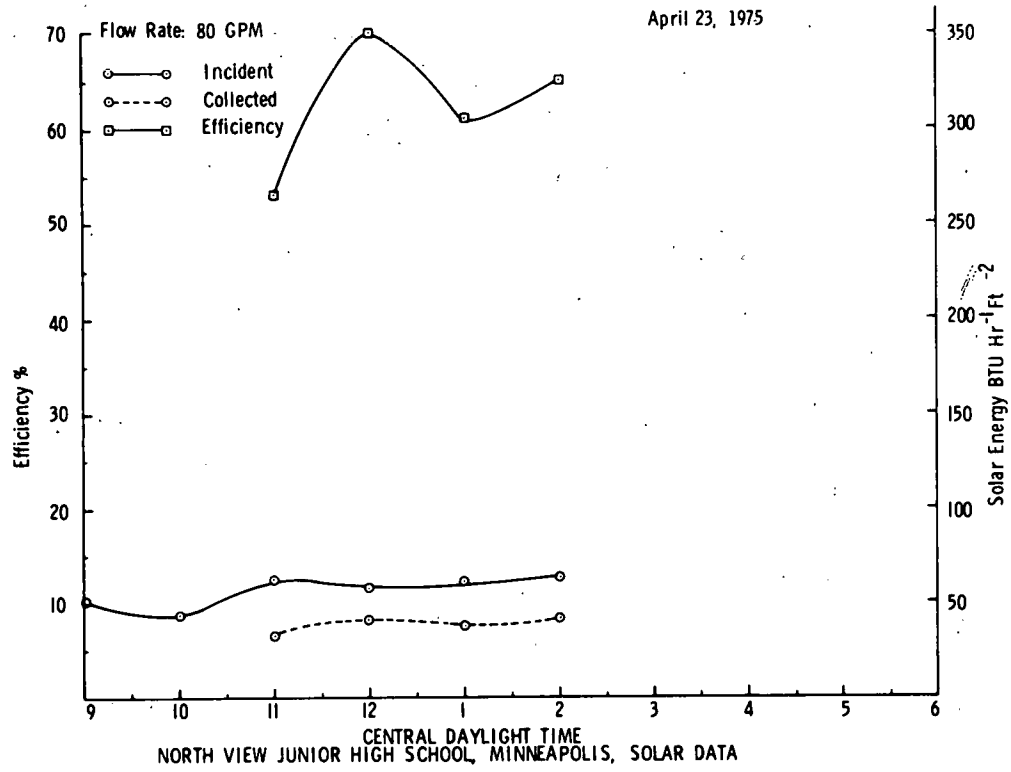
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



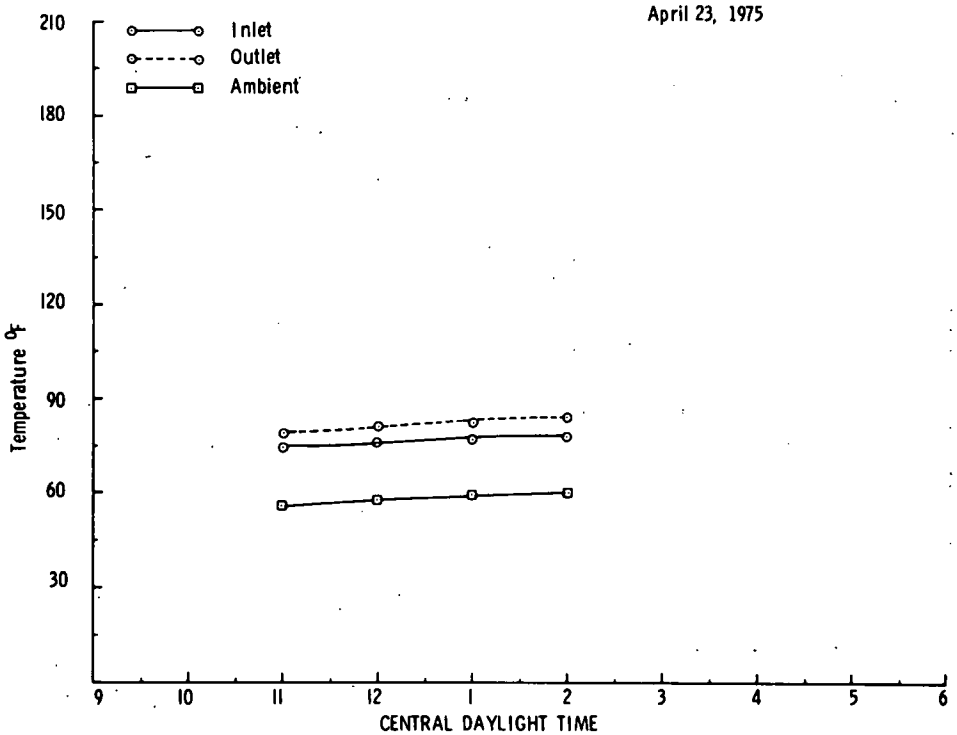
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA


Flow Rate: 80 GPM
April 22, 1975
Incident
Collected
Efficiency
Efficiency %
Solar Energy BTU Hr⁻¹.Ft.⁻²
70
60
50
40
30
20
10
350
300
250
200
150
100
50
9
10
11
12
1
2
3
4
5
6

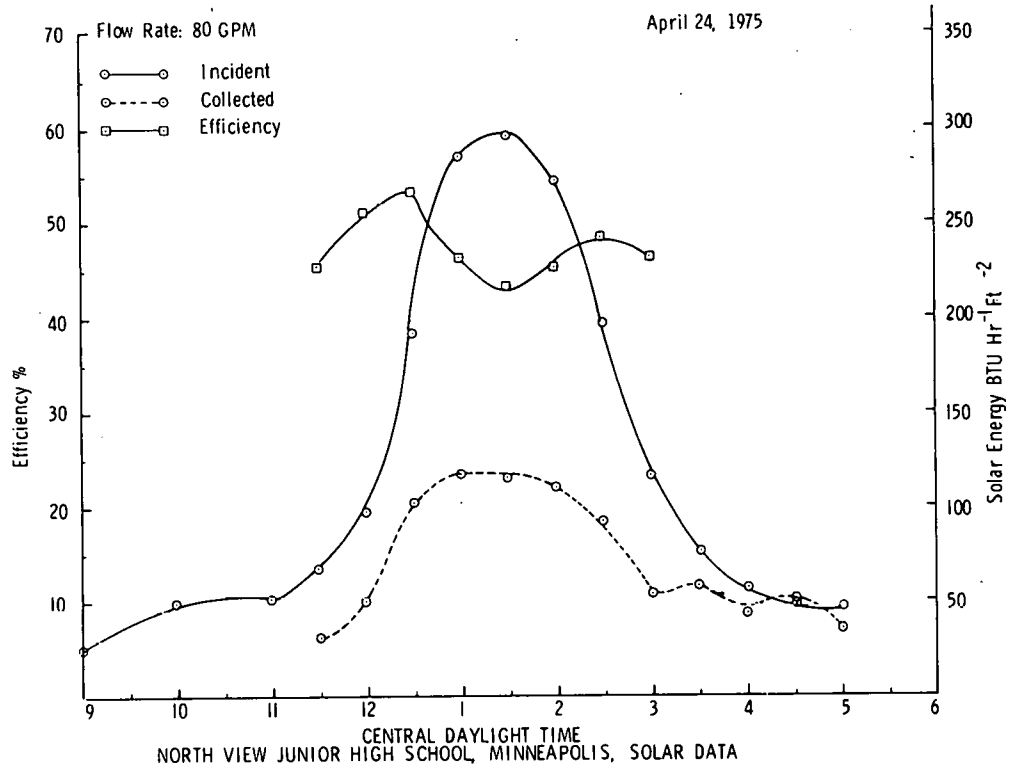

Outlet
Inlet
Ambient
April 22, 1975
Temperature °F
210
180
150
120
90
60
30
9
10
11
12
1
2
3
4
5
6



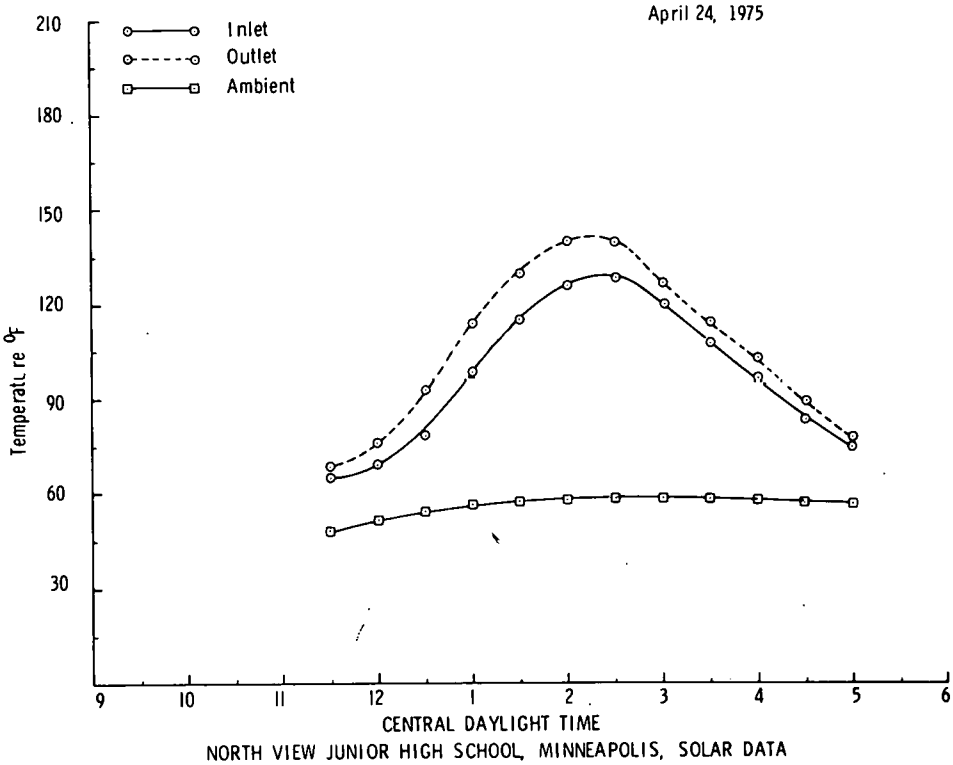
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



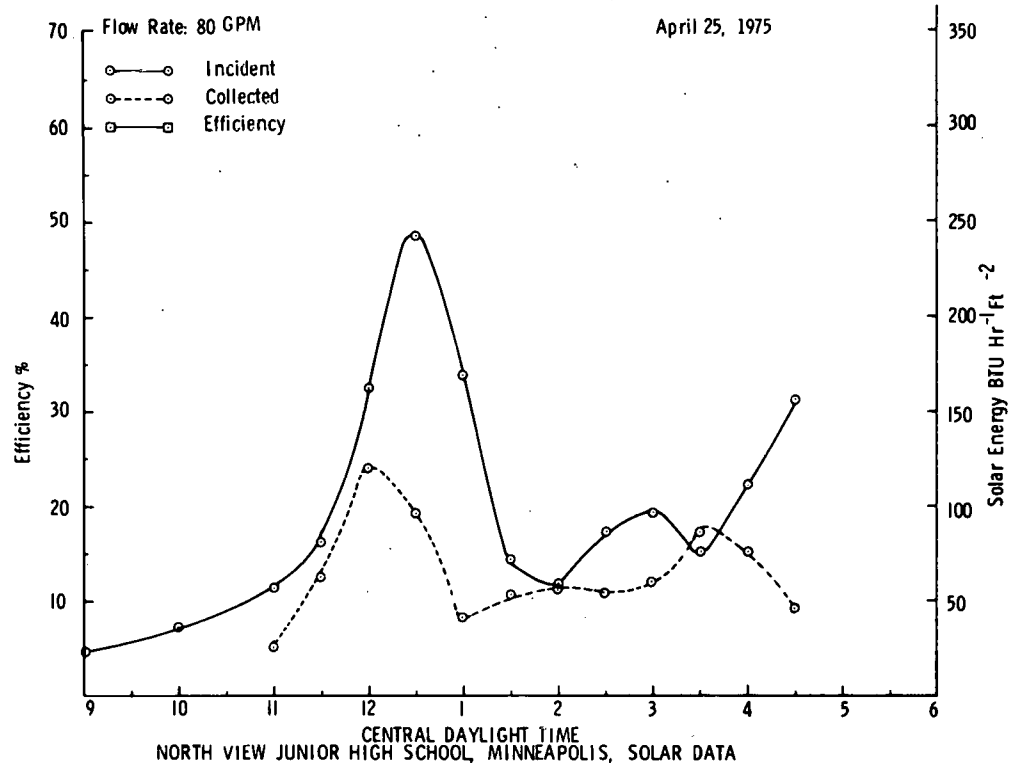
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



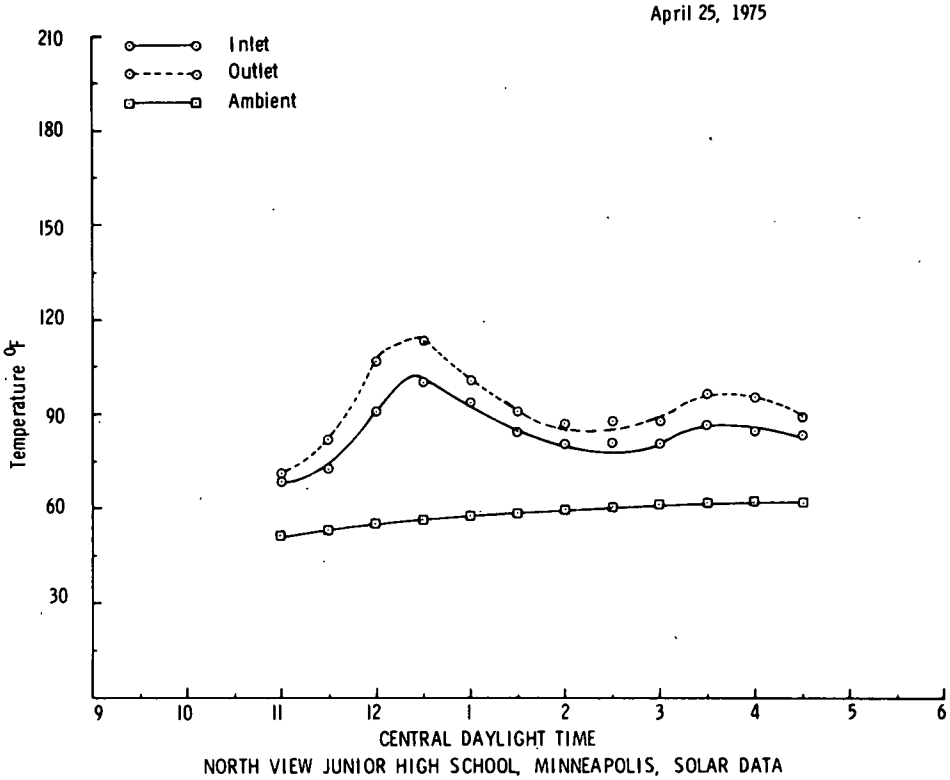
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



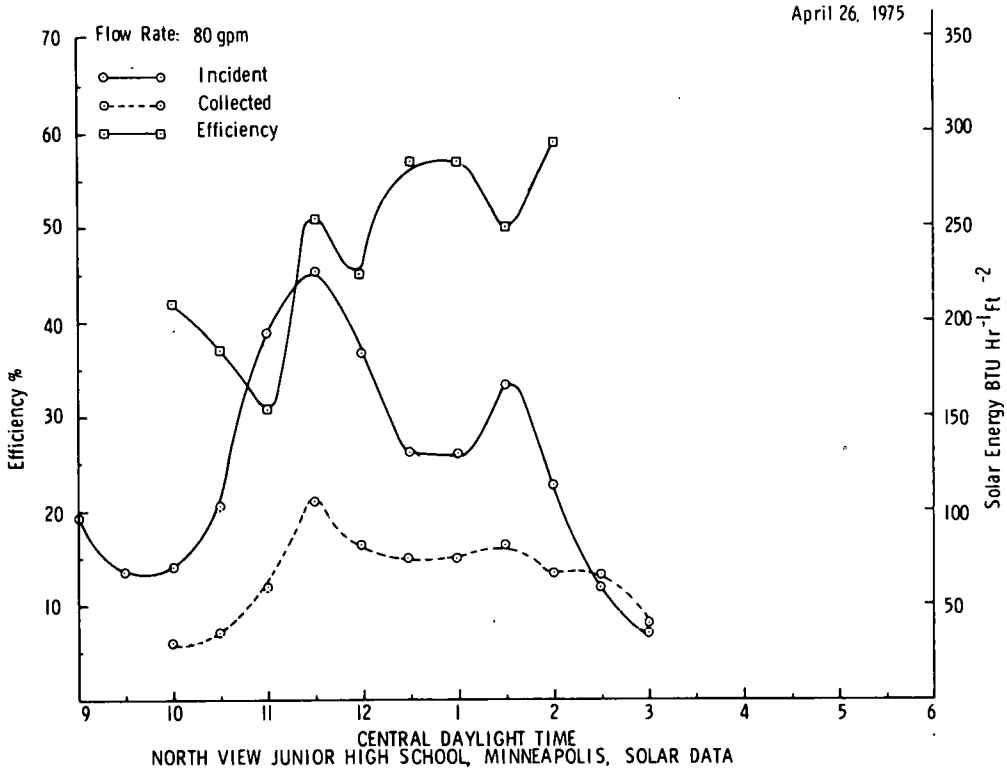
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



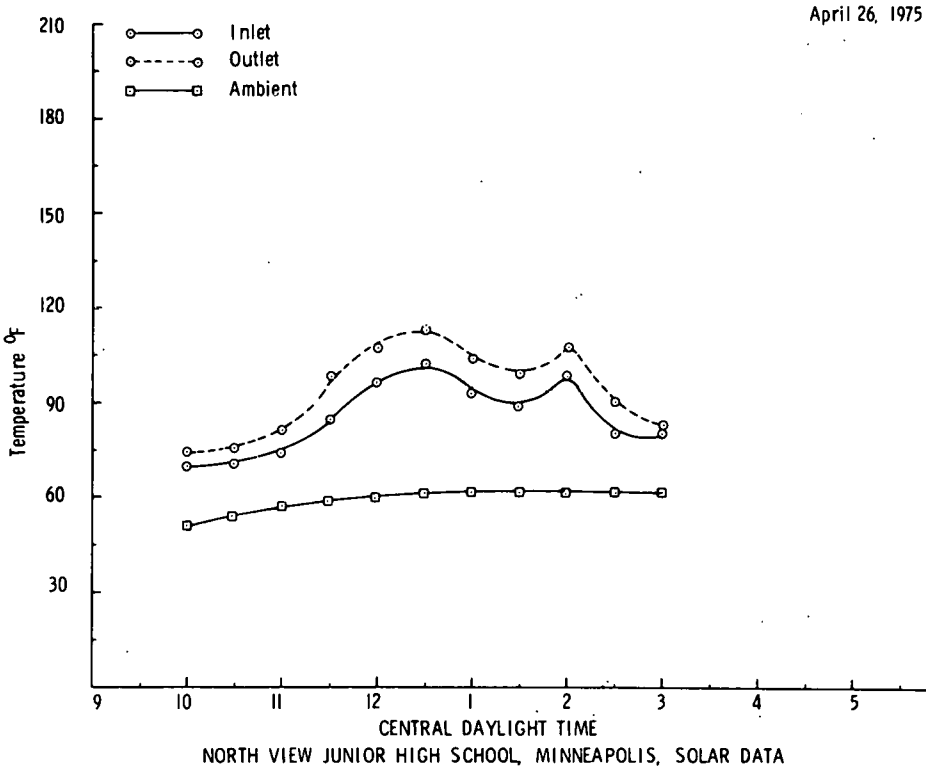
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

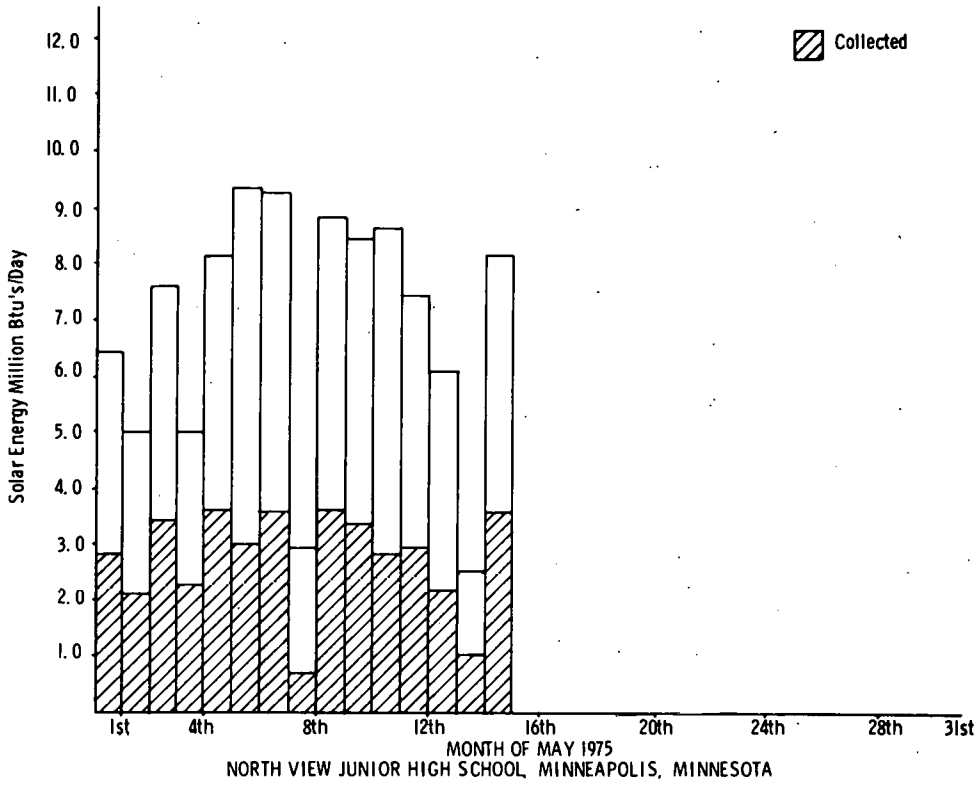


NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

MAY
1975

North View Junior High
Month of May 1975

Date	Mode of Operation	Eff. = $\frac{Q_{collected}}{Q_{incident}}$
May 1	Storage and Water Heating from Collector	45 %
May 2	Air and Water Heating from Collector	44 %
May 3	Air and Water Heating from Collector	46 %
May 4	Air and Water Heating from Collector	44.5 %
May 5	Storage and Pool Water Heating from Collector	45 %
May 6	Storage and Pool Water Heating from Collector	37 %
May 7	Cloudy, No Collection	---
May 8	Air and Water Heating from Collector	52 %
May 9	Storage and Domestic Water Heating	41 %
May 10	Air and Pool Water Heating	40 %
May 11	Water Heating from Collector	38 %
May 12	Pool Water Heating from Collector	32 %
May 13	Storage and Pool Water Heating from Collector	44 %
May 14	Air and Water Heating from Collector	39 %
May 15	Air and Water and Storage Heating from Collector	44 %
May 16	Storage from Collector	34 %


Collected
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
Solar Energy Million Btu's/Day
1st
4th
8th
12th
16th
20th
24th
28th
31st
MONTH OF MAY 1975
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, MINNESOTA

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

MINNEAPOLIS-ST.PAUL, MINNESOTA
NAT WEATHER SERVICE FCST OFC
INTERNATIONAL AIRPORT
MAY 1975

LATITUDE 44° 53′ N LONGITUDE 93° 13′ W ELEVATION (GROUND) 834 FT. STANDARD TIME USED: CENTRAL WBAN #14922

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING	COOLING	WEATHER TYPES ON DATES OF OCCURRENCE 1 FOG 2 HEAVY FOG * 3 THUNDERSTORM 4 ICE PELLETS 5 HAIL 6 GLAZE 7 DUSTSTORM 8 SMOKE, HAZE 9 BLOWING SNOW	SNOW, ICE PELLETS OR ICE ON GROUND AT 06AM IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESS- URE IN. ELEV. 838 FEET M.S.L.	WIND RESULTANT DIRECTION	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE HOURS AND TENTHS	PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DATE
1	56	33*	45*	-7	34	20	0		0	T	0	29.16	25	8.6	9.9	21	SW	11.4	80	6	5	1
2	63	36	49	-3	43	16	0		0	.04	0	29.15	16	5.2	6.2	15	SW	8.7	61	7	6	2
3	59	40	50	-3	41	15	0	1	0	0	0	28.98	31	7.5	7.9	17	NW	9.6	67	6	5	3
4	65	42	54	1	42	11	0		0	.04	0	28.90	14	7.5	8.6	10	S	6.9	48	8	7	4
5	72	44	58	5	43	7	0		0	0	0	28.88	08	12.2	12.8	22	E	12.9	90	5	4	5
6	68	48	58	4	40	7	0	3	0	T	0	29.01	09	16.3	16.7	25	SE	11.0	76	4	6	6
7	57	50	54	0	44	11	0	1	0	.48	0	29.13	10	14.6	14.7	24	SE	0.1	1	10	10	7
8	65	53	59	5	41	6	0		0	.03	0	29.24	08	8.1	9.6	23	SE	1.5	10	10	10	8
9	71	45	58	3	40	7	0		0	0	0	29.35	32	.4	4.9	11	E	13.9	95	5	4	9
10	73	46	60	5	41	5	0		0	0	0	29.25	27	3.2	4.0	10	W	11.3	77	5	5	10
11	71	51	61	6	48	4	0	1 3	0	.04	0	29.05	29	2.7	9.8	28	NE	8.0	54	8	7	11
12	67	41	54	-2	33	11	0		0	0	0	29.16	03	3.5	6.2	12	N	14.7	100	0	0	12
13	71	44	58	2	38	7	0		0	0	0	29.14	21	7.8	8.2	17	SW	11.7	79	9	7	13
14	62	50	56	0	44	9	0	3	0	.03	0	28.96	28	11.6	15.8	28	NW	6.6	45	8	9	14
15	65	46	56	-1	36	9	0		0	0	0	29.11	35	9.0	9.6	17	N	9.8	66	4	4	15
16	74	43	59	2	39	6	0		0	0	0	29.16	15	8.4	8.9	18	SW	14.9	100	0	0	16
17	84	54	69	12	45	0	4		0	0	0	28.98	18	13.3	13.8	24	SW	14.3	98	8	6	17
18	83	55	69	11	49	0	4		0	0	0	28.89	14	2.2	6.0	10	SW	14.0	93	8	6	18
19	88	61	75	17	57	0	10	3	0	.08	0	28.60	17	4.6	10.8	22	NW	9.3	62	10	9	19
20	91*	61	76*	18	60	0	11		0	T	0	28.65	15	8.1	13.5	32	W	12.0	80	9	9	20
21	84	64	74	15	61	0	9		0	0	0	28.88	16	4.2	6.5	14	SE	11.9	79	9	7	21
22	86	64	75	16	61	0	10	1 3 8	0	T	0	29.02	14	4.1	7.8	26	W	8.0	53	9	8	22
23	83	67	75	15	63	0	10	3 5	0	1.56	0	28.93	11	12.7	13.7	40	SW	8.4	56	9	9	23
24	79	56	68	0	54	0	3		0	0	0	28.97	17	7.1	9.2	19	SE	12.1	80	6	7	24
25	81	59	70	10	58	0	5	3	0	1.10	0	28.97	11	6.8	12.1	23	N	10.2	67	6	6	25
26	68	54	61	0	47	4	0		0	0	0	29.09	30	11.1	11.4	18	W	11.0	72	6	5	26
27	73	48	60	-1	42	5	0		0	0	0	29.16	18	3.2	5.8	10	SE	12.9	84	5	5	27
28	67	55	61	0	47	4	0		0	T	0	29.08	15	7.0	8.3	19	SW	5.2	34	10	10	28
29	66	54	60	-2	53	5	0	1	0	.41	0	28.99	06	8.3	7.3	12	SE	4.8	31	10	9	29
30	64	48	56	-6	41	9	0		0	0	0	28.89	34	10.7	11.7	18	N	12.0	78	10	8	30
31	68	42	55	-7	43	10	0		0	0	0	28.92	32	6.0	7.9	15	NW	12.5	81	5	5	31
	SUM	SUM				TOTAL	TOTAL			TOTAL	TOTAL	FOR THE MONTH:						TOTAL	%	SUM	SUM	
	2223	1551				188	66	NUMBER OF DAYS		3.81	0	29.02	13	2.0	9.7	40	SW	311.6	FOR	215	198	
	AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.	PRECIPITATION		DEP.						DATE:	23	POSSIBLE	MONTH	AVG.	AVG.	
	71.7	50.0	60.9	3.8	46	-83	40	.01 INCH	10	0.44								460.5	68	6.8	6.4	

NUMBER OF DAYS MAXIMUM TEMP. ≥ 90 °F	≤ 32 °F	MINIMUM TEMP. ≤ 32 °F	≤ 0 °F
1	0	0	0

SEASON TO DATE	TOTAL	TOTAL
DEP.	8216	66
	122	40

SNOW, ICE PELLETS	
≥ 1.0 INCH	0
THUNDERSTORMS	7
HEAVY FOG *	0
CLEAR 2	PARTLY CLOUDY 13

GREATEST IN 24 HOURS AND DATES		
PRECIPITATION	1.56	23
SNOW, ICE PELLETS		0
CLOUDY 16		

GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE
0

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1																	T	T	T						1
2																	T	.03	T	.01	T	T			2
3																									3
4			T	T	T	.01	T	T	.02	T	.01														4
5																									5
6		T	T	T																				T	6
7				T	T	T	T	T	.01	.02	.07	.20	.13	.02	.03	T	T	T	T	T					7
8		T	T												T	.03	T	T							8
9																									9
10																									10
11														.04											11
12																									12
13																									13
14					T	T	T			.03	T														14
15																									15
16																									16
17																									17
18																									18
19				.04											T	T	.03	T		T	.01	T	T		19
20																		T	T	T					20
21																									21
22												T	T										T	T	22
23												1.55	.01	T											23
24																									24
25														T	.01	T		T	.52	.36	.19	.02			25
26																									26
27																									27
28																								T	28
29	T	.04	.09	.16	.07	.02	.01	T	T	T	T	T	.02	T											29
30																									30
31																									31

MINNEAPOLIS-ST.PAUL, MINNESOTA

* EXTREME TEMPERATURES FOR THE MONTH, NOT BE THE LAST OF MORE THAN ONE OCCURRENCE.
\- BELOW ZERO TEMPERATURE OR NEGATIVE DEPARTURE FROM NORMAL.
: : 70° AT ALASKAN STATIONS.
\+ ALSO ON AN EARLIER DATE, OR DATES.
X HEAVY FOG RESTRICTS VISIBILITY TO 1/4 MILE OR LESS.
T IN THE HOURLY PRECIPITATION TABLE AND IN COLUMNS 9, 10, AND 11 INDICATES AN AMOUNT TOO SMALL TO MEASURE

THE SEASON FOR DEGREE DAYS BEGINS WITH JULY FOR HEATING AND JANUARY FOR COOLING.
DATA IN COLUMNS 6, 12, 13, 14, AND 15 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
WIND DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS.
RESULTANT WIND IS THE VECTOR SUM OF WIND DIRECTIONS AND SPEEDS DIVIDED BY THE NUMBER OF OBSERVATIONS.
FIGURES FOR DIRECTIONS ARE TENS OF DEGREES FROM TRUE NORTH: I.E., 09=EAST, 18=SOUTH, 27=WEST, 36=NORTH, AND 00=CALM. WHEN DIRECTIONS ARE IN TENS OF DEGREES IN COL. 17, ENTRIES IN COL. 16 ARE FASTEST OBSERVED 1-MINUTE SPEEDS. IF THE / APPEARS IN COL. 17, SPEEDS ARE GUSTS.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

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I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC CENTER, ASHEVILLE, NORTH CAROLINA, 28801

William H. Haggard

DIRECTOR, NATIONAL CLIMATIC CENTER

SUMMARY BY HOURS

HOUR LOCAL TIME	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE AIR °F	WET BULB °F	DEW PT. °F	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
00	5	29.02	57	51	45	66	7.4	10	1.9
03	6	29.02	53	48	45	74	7.1	12	1.4
06	7	29.04	53	48	46	77	7.5	12	1.9
09	6	29.05	62	54	48	61	10.5	17	1.6
12	7	29.03	67	56	47	51	12.3	16	3.5
15	7	29.00	69	56	46	47	13.1	14	2.3
18	7	28.99	68	56	46	48	11.4	14	2.3
21	6	29.02	62	53	45	56	8.0	11	2.7

USCOMM - NOAA - ASHEVILLE 750
06/23/75

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	SKY COVER TENTHS	CEILING HNDS. OF FT.	VISIBILITY MILES	WEATHER	TEMPERATURE DIS °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	REL. HUM. %	WIND DIR	WIND SPEED KNOTS
DAY 01										
00	1	UNL	20		38	34	31	83	32	4
03	8	100	15		36	33	30	83	21	8
06	1	UNL	25		37	34	33	89	23	10
09	1	UNL	25		47	40	32	55	27	13
12	8	90	25		61	45	31	46	25	14
15	8	80	25		66	48	35	45	26	12
18	10	80	25	RW	54	48	37	73	31	0
21	10	100	25		50	44	37	81	00	0
DAY 02										
00	0	UNL	25		43	40	37	79	00	0
03	0	UNL	25		38	36	33	93	00	0
06	0	UNL	12		38	36	36	89	07	4
09	0	UNL	12		53	47	42	66	20	4
12	8	80	25		59	52	48	80	14	8
15	10	70	25		61	53	48	78	18	10
18	10	70	15	RW	56	52	48	80	17	11
21	10	70	20		51	48	48	90	13	6
DAY 03										
00	10	10	7		51	48	48	90	00	0
03	8	40	6		47	46	46	93	30	4
06	10	8	6	GF	47	46	46	93	34	6
09	10	14	7		48	46	44	89	33	8
12	8	42	25		58	48	40	61	32	12
15	8	60	25		60	48	37	56	30	12
18	1	UNL	25		57	47	36	64	31	9
21	0	UNL	25		52	43	31	65	29	5
DAY 04										
00	0	UNL	25		43	40	37	79	00	0
03	10	90	20	RW	44	42	40	86	18	3
06	10	80	8	RW	48	43	41	80	14	8
09	10	80	8	RW	47	44	41	80	11	6
12	8	80	15		58	50	45	67	13	15
15	8	80	20		64	53	48	68	16	13
18	6	UNL	25		64	54	48	72	17	8
21	4	UNL	25		56	48	43	62	07	6
DAY 05										
00	0	UNL	25		50	47	44	80	08	8
03	0	UNL	25		48	44	40	74	05	6
06	2	UNL	25		48	43	41	86	03	5
09	2	UNL	20		57	51	45	64	07	14
12	9	UNL	25		67	58	47	49	10	14
15	9	UNL	25		70	56	48	41	09	14
18	8	80	25		68	55	45	44	09	14
21	3	UNL	25		62	51	41	46	07	14
DAY 06										
00	8	90	20		54	46	38	55	07	14
03	10	70	20	TRW	51	46	41	69	08	12
06	10	70	10		48	46	42	77	09	11
09	10	80	40		56	48	40	59	09	14
12	8	80	40		64	52	40	42	10	19
15	8	80	20		67	53	40	37	10	20
18	8	UNL	20		67	52	38	35	08	16
21	8	UNL	20		62	52	40	49	11	14
DAY 07										
00	8	250	25		57	48	41	55	10	14
03	10	80	25		53	47	41	64	10	15
06	10	40	10	RW	51	47	43	74	10	12
09	10	34	4	RW	50	47	43	83	10	15
12	10	8	3	RW	50	48	46	86	10	11
15	10	70	10	R	50	48	46	86	11	10
18	10	80	10	R	52	48	46	80	10	11
21	10	80	15		53	48	43	80	08	8
DAY 08										
00	10	55	15		53	48	43	69	06	9
03	10	90	15		53	47	41	64	08	10
06	10	70	15		53	47	40	62	08	7
09	10	70	15		56	48	40	55	08	12
12	10	80	20		60	51	42	52	07	9
15	10	80	15	RW	58	50	42	55	14	16
18	10	80	25		60	50	41	50	09	4
21	10	80	25		59	48	37	44	00	0
DAY 09										
00	10	100	25		53	48	43	69	32	3
03	9	150	25		51	47	43	74	00	0
06	6	130	12		48	46	43	83	32	3
09	1	UNL	10		54	52	40	42	08	6
12	7	250	20		58	53	38	33	09	4
15	6	250	25		67	53	40	37	10	20
18	3	UNL	20		70	58	41	39	10	18
21	0	UNL	20		59	49	39	48	30	6
DAY 10										
00	3	UNL	12		56	48	40	65	00	0
03	4	UNL	12		47	44	40	77	00	0
06	8	250	10		50	48	43	77	21	4
09	1	UNL	10		56	49	43	73	30	3
12	7	60	25		73	56	42	35	27	7
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18	9	UNL	25		72	58	41	33	28	6
21	3	UNL	15		63	51	40	43	26	5
DAY 11										
00	7	250	12		59	53	48	67	28	6
03	8	250	15		53	50	48	83	24	6
06	10	250	6	GF	54	52	50	86	26	4
09	9	250	10		61	56	51	70	24	13
12	10	UNL	10		68	58	51	53	26	9
15	9	UNL	10	T	70	61	47	44	05	15
18	9	90	25		63	54	47	56	13	5
21	7	90	25		59	48	39	46	04	10
DAY 12										
00	3	UNL	35		52	44	34	50	03	6
03	0	UNL	25		44	39	33	65	02	7
06	0	UNL	25		43	39	33	68	01	4
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18	0	UNL	25		69	50	35	33	31	6
21	0	UNL	25		58	46	31	38	24	4
DAY 13										
00	0	UNL	25		52	44	34	60	00	0
03	0	UNL	25		48	42	35	61	21	4
06	0	UNL	25		48	43	38	68	22	4
09	0	UNL	25		64	52	41	45	23	10
12	10	UNL	25		70	55	43	38	22	12
15	10	UNL	25		71	55	42	36	21	10
18	10	120	20		68	53	40	36	10	10
21	10	150	25		61	51	42	50	17	7
DAY 14										
00	7	250	15		57	50	45	60	17	5
03	8	250	15		56	53	48	70	23	11
06	8	65	12	RW	58	52	47	67	21	17
09	9	UNL	20		62	55	50	65	27	13
12	9	35	25		60	52	44	58	30	16
15	9	40	25		60	51	42	52	32	19
18	10	29	25		52	48	40	64	30	18
21	10	30	25		50	45	40	69	30	11
DAY 15										
00	10	28	25		50	45	39	66	34	15
03	10	24	25		47	43	38	71	33	12
06	10	22	25		46	41	36	66	36	9
09	10	25	25		46	42	37	71	34	9
12	0	UNL	25		54	48	37	53	36	6
15	0	UNL	25		62	50	37	40	32	7
18	0	UNL	25		69	50	35	30	03	6
21	0	UNL	25		58	46	32	37	04	3
DAY 16										
00	1	UNL	25		50	43	35	57	00	0
03	0	UNL	25		48	42	38	80	11	5
06	0	UNL	20		46	43	39	77	11	6
09	0	UNL	20		60	50	40	48	19	9
12	0	UNL	25		68	52	38	30	14	10
15	0	UNL	25		73	55	38	28	16	14
18	0	UNL	25		73	56	41	32	17	11
21	0	UNL	25		64	53	42	46	15	7
DAY 17										
00	0	UNL	20		60	52	44	66	15	10
03	0	UNL	20		56	50	45	67	17	8
06	6	UNL	15		56	51	46	69	16	10
09	10	UNL	20		68	57	48	61	18	14
12	10	UNL	25		78	60	48	32	19	16
15	10	UNL	25		82	61	46	26	19	15
18	8	UNL	25		82	61	44	26	20	13
21	5	UNL	15		74	57	42	32	19	10
DAY 18										
00	5	UNL	15		72	56	43	35	22	10
03	0	UNL	15		62	57	54	75	00	0
06	2	UNL	15		58	56	54	87	32	3
09	7	300	20		73	63	56	55	18	3
12	10	UNL	25		80	61	48	33	09	6
15	10	UNL	25		83	60	43	24	07	9
18	10	UNL	25		80	61	46	30	16	8
21	2	UNL	15		70	56	46	41	12	6
DAY 19										
00	8	UNL	15		66	57	49	54	12	3
03	4	UNL	15	T	63	57	52	68	17	11
06	10	UNL	15		64	59	56	75	36	3
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15	10	60	15	TRW	71	63	58	64	30	18
18	10	130	15		71	64	58	66	13	15
21	10	110	8	RW	71	61	55	57	17	9
DAY 20										
00	10	300	25		69	60	53	57	13	12
03	10	UNL	25		64	59	55	73	16	7
06	10	UNL	25		63	60	58	84	11	6
09	10	UNL	25		70	70	66	85	20	14
12	9	UNL	7		87	74	68	53	17	12
15	9	100	10		80	69	63	62	16	14
18	10	130	8	RW	82	69	62	51	16	13
21	10	75	15		68	61	57	68	36	16
DAY 21										
00	7	UNL	20		65	61	58	78	12	11
03	10	300	15		64	59	56	75	12	7
06	10	150	15		65	61	58	78	17	3
09	10	UNL	12		76	66	61	60	23	7
12	10	UNL	12		78	66	64	60	19	6
15	10	UNL	12		82	70	64	55	15	4
18	3	UNL	12		83	69	62	49	21	4
21	0	UNL	15		76	66	63	64	03	3
DAY 22										
00	0	UNL	7		70	66	64	81	13	6
03	0	UNL	6	GF	65	63	62	90	31	5
06	10	12	12		65	62	60	84	36	4
09	10	13	9	H	73	66	63	76	23	5
12	10	130	15	RW	72	64	59	64	11	12
15	9	UNL	25		84	68	59	43	18	6
18	10	250	15		83	68	60	46	19	9
21	10	250	15		76	68	63	64	14	7
DAY 23										
00	8	250	20		68	63	59	71	07	11
03	8	170	20		67	62	58	73	10	9
06	10	20	9		70	64	61	73	12	11
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18	10	UNL	15		74	68	64	71	11	15
21	10	170	10		71	67	65	81	13	8
DAY 24										
00	10	90	20		69	62	57	68	26	12
03	8	UNL	20		61	55	51	70	00	0
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18	10	250	25		77	64	55	47	14	15
21	7	UNL	25		70	60	53	56	16	7
DAY 25										
00	3	UNL	25		64	57	52	65	14	6
03	1	UNL	25		61	56	52	72	14	3
06	0	UNL	12		63	59	56	78	12	5
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15	8	70	10	TRW	86	62	59	76	00	16
18	10	31	10	TRW	68	61	56	66	34	18
21	10	16	10	RW	61	59	57	87	13	13
DAY 26										
00	8	300	25		60	58	56	87	29	5
03	8	100	25		60	54	50	70	29	10
06	10	55	25		59	52	46	62	30	7
09	3	UNL	25		61	53	46	58	31	12
12	5	UNL	25		69	56	48	56	31	14
15	7	65	25		68	55	44	42	28	15
18	6	UNL	25		66	53	42	42	30	11
21	1	UNL	25		60	50	41	50	29	5
DAY 27										
00	0	UNL	25		54	48	42	64	29	5
03	0	UNL	25		49	46	43	80	21	4
06	0	UNL	25		50	47	45	83	20	3
09	0	UNL	12		63	52	41	45	28	4
12	1	UNL	25		69	55	43	39	18	8
15	1	UNL	25		78	64	56	47	16	11
18	0	UNL	25		77	64	55	47	14	15
21	0	UNL	25		70	60	53	56	16	7
DAY 28										
00	10	130	25		62	52	42	48	11	5
03	10	130	25		59	51	44	58	15	4
06	10	110	25		58	52	47	67	16	4
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12	10	80	15		66	57	48	54	21	9
15	10	90	15		65	57	50	58	19	7
18	10	130	20		64	55	47	54	18	9
21	10	120	25		61	54	48	63	11	13
DAY 29										
00	10	30	20	RW	57	53	50	78	11	8
03	10	6	4	RW	57	55	53	87	07	8
06	10	5	2	RF	56	54	53	90	08	11
09	10	7	5	LF	57	55	53	87	09	8
12	10	8	5	LF	58	56	54	87	05	6
15	10	17	8		62	57	54	75	02	7
18	9	UNL	8		66	59	54	65	01	5
21	5	UNL	10		59	56	53	81	00	0
DAY 30										
00	7	250	20		54	49	45	72	32	8
03	10	250	25		56	47	38	51	36	12
06	10	UNL	25		52	46	40	64	36	11
09	10	UNL	25		59	50	42	54	35	9
12	10	50	25		61	50	42	46	35	11
15	10	75	25		64	53	42	45	30	12
18	10	75	25		62	50	38	41	34	12
21	0	UNL	25		54	47	39	57	30	8
DAY 31										
00	0	UNL	25		48	44	40	74	29	4
03	3	UNL	25		46	43	41	86	22	3
06	8	90	25		48	46	44	77	31	5
09	1	UNL	25		60	52	44	56	32	10
12	6	55	25		64	53	44	48	30	10
15	9	60	25		68	56	46	44	32	11
18	5	UNL	25		64	53	43	47	34	8
21	3	UNL	25		58	51	44	60	03	6

NOTES

CEILING COLUMN-
UNL INDICATES NO UNLIMITED CEILING

WEATHER COLUMN-

- * TORNADO
- T THUNDERSTORM
- Q SQUALL
- R RAIN
- RW RAIN SHOWERS
- ZR FREEZING RAIN
- L DRIZZLE
- ZL FREEZING DRIZZLE
- S SNOW
- SP SNOW PELLETS
- IC ICE CRYSTALS
- SW SNOW SHOWERS
- SG SNOW GRAINS
- IP ICE PELLETS
- A HAIL
- F FOG
- IF ICE FOG
- GF GROUND FOG
- BD BLOWING DUST
- BN BLOWING SAND
- BS BLOWING SNOW
- BY BLOWING SPRAY
- K SMOKE
- H HAZE
- D DUST

WIND COLUMNS-

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH: I.E., 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS; MULTIPLY BY 1.15 TO CONVERT TO MILES PER HOUR.

ADDITIONAL DATA

OTHER OBSERVATIONAL DATA CONTAINED IN RECORDS ON FILE CAN BE FURNISHED AT COST VIA MICROFILM, MICROFICHE, OR PAPER COPIES OF THE ORIGINAL RECORDS. INQUIRIES AS TO AVAILABILITY AND COSTS SHOULD BE ADDRESSED TO: DIRECTOR, NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

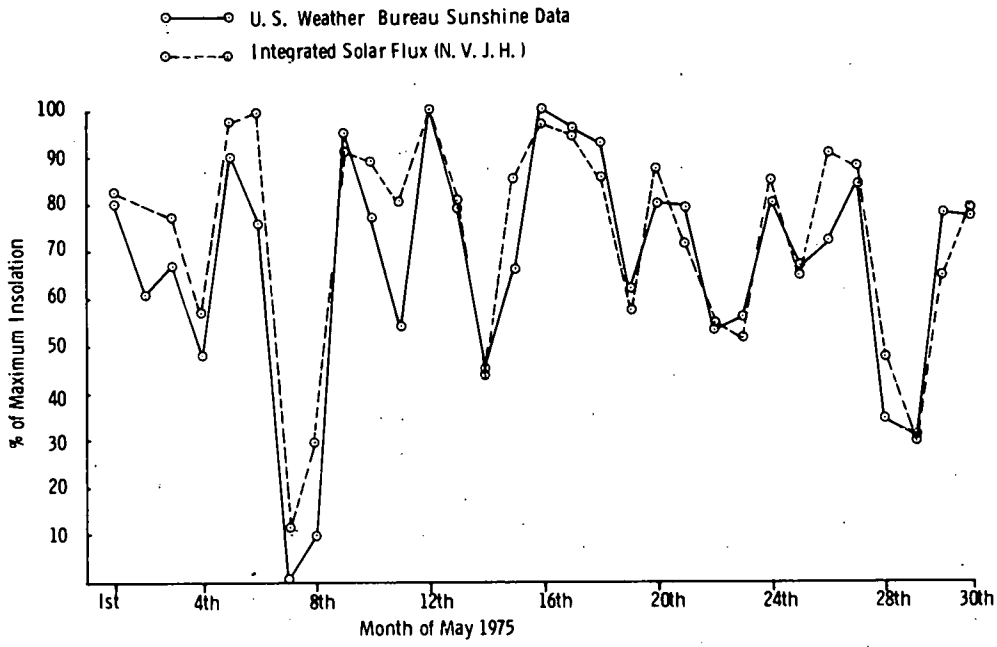
STATION: MINNEAPOLIS MINN YEAR & MONTH: 75 05

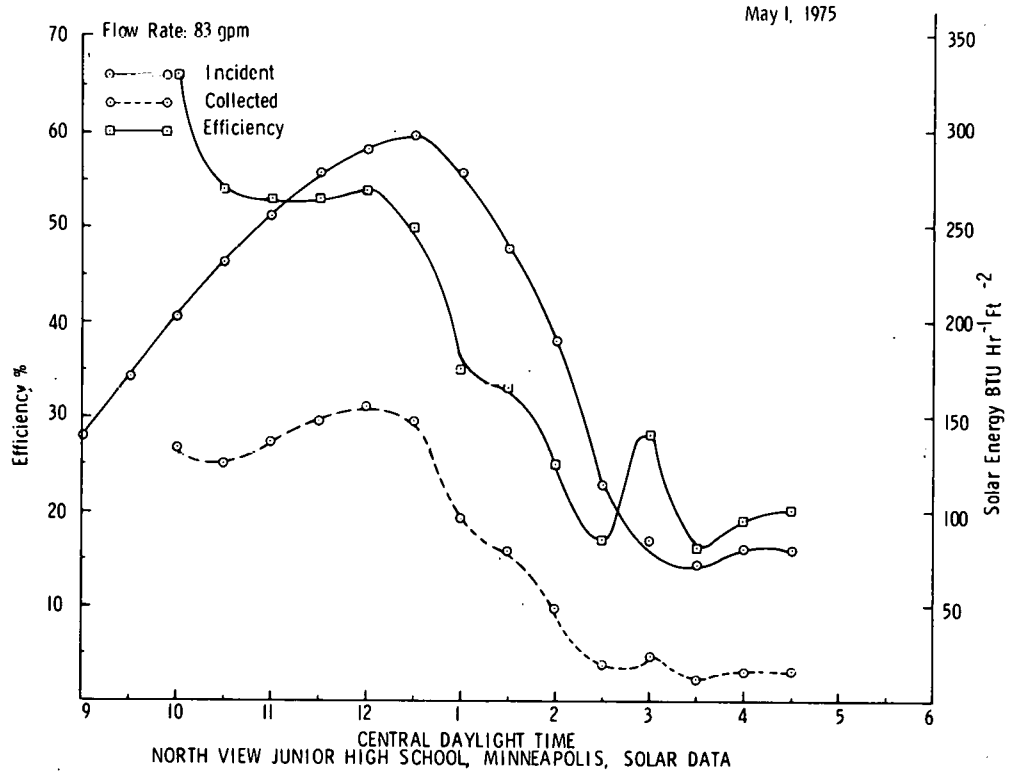
U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

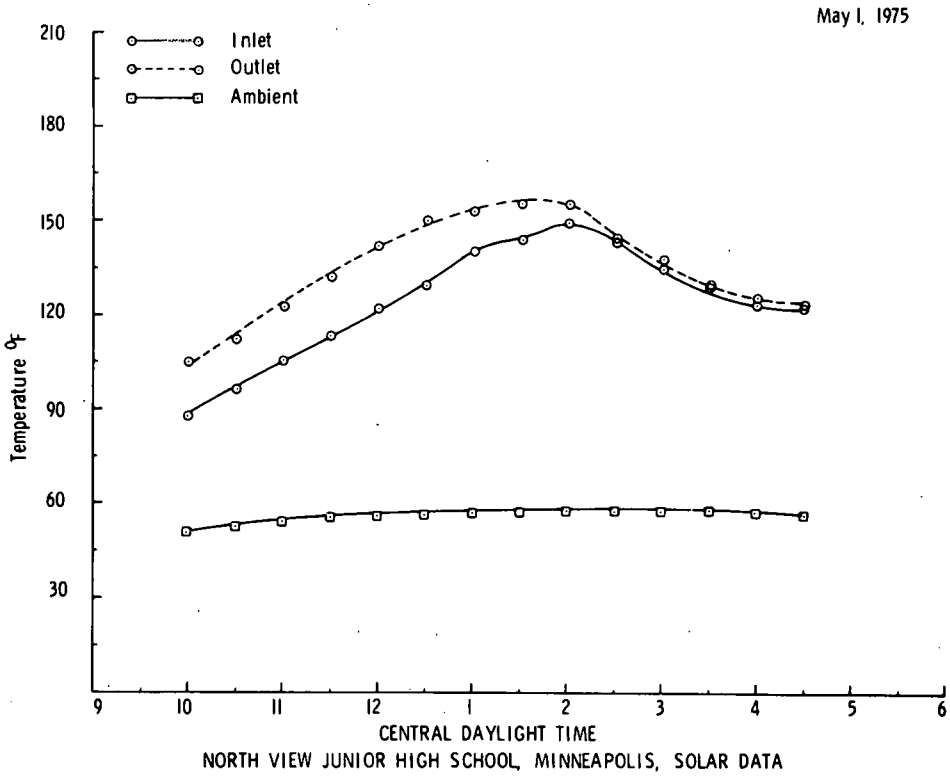
POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
210

FIRST CLASS

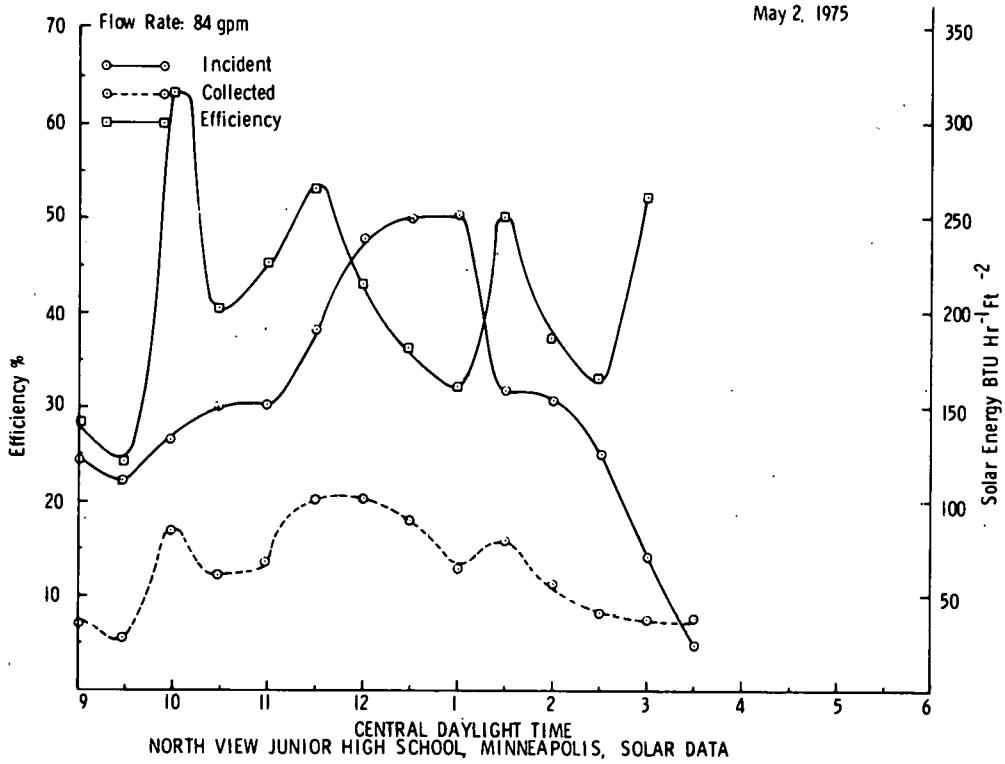

U. S. Weather Bureau Sunshine Data
Integrated Solar Flux (N. V. J. H.)
% of Maximum Insolation
100
90
80
70
60
50
40
30
20
10
1st
4th
8th
12th
16th
20th
24th
28th
30th
Month of May 1975



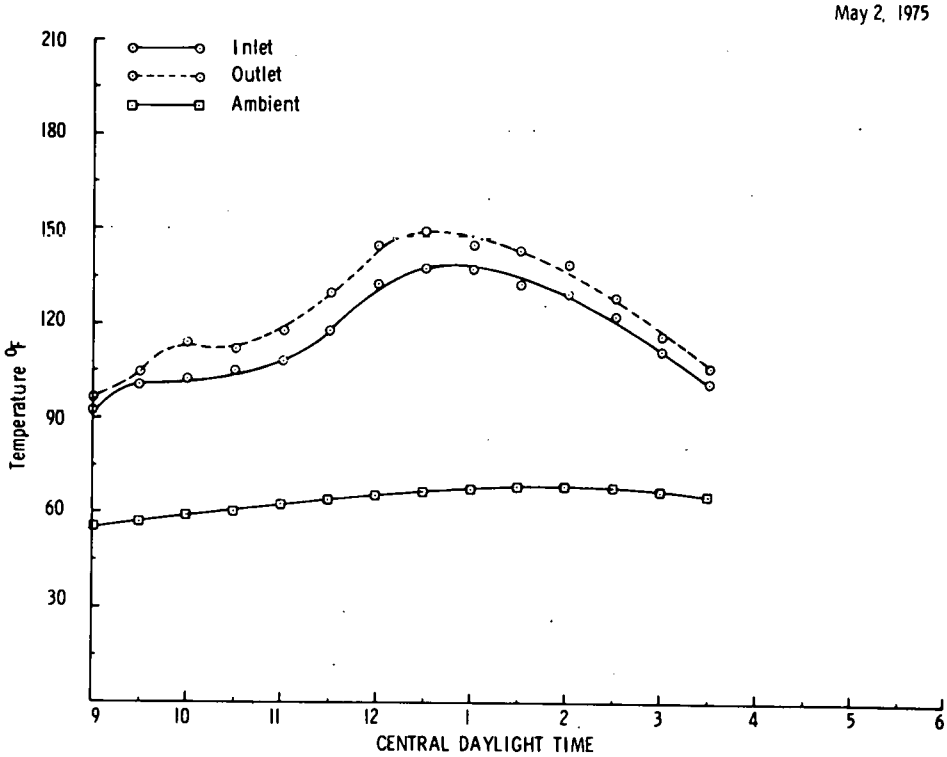
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



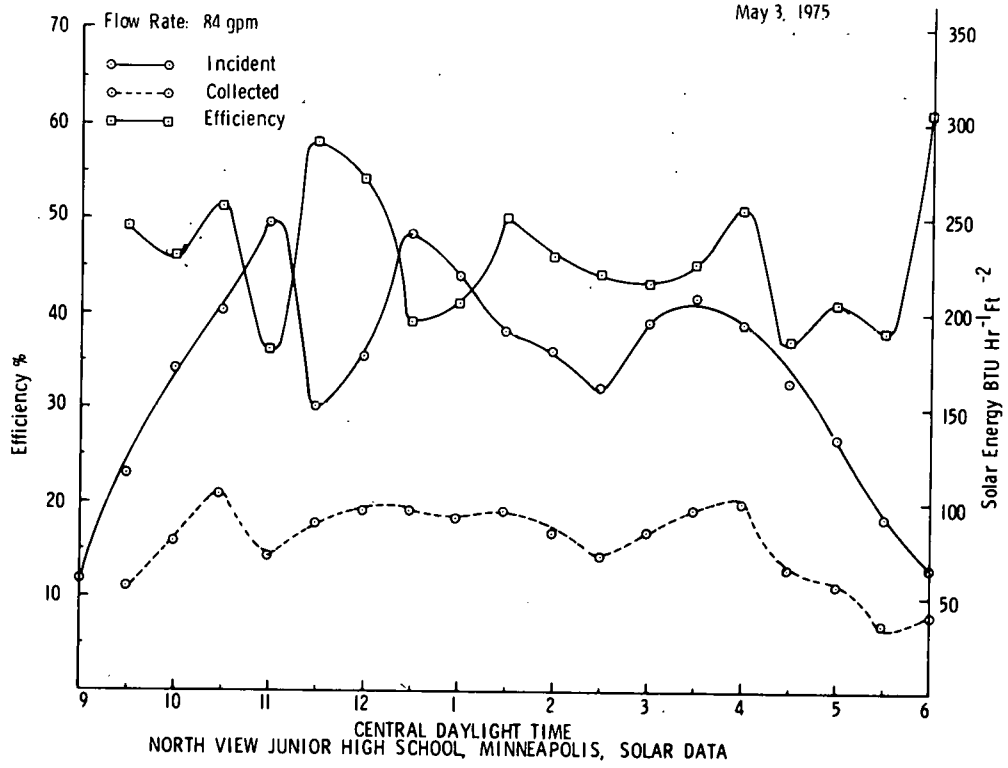
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



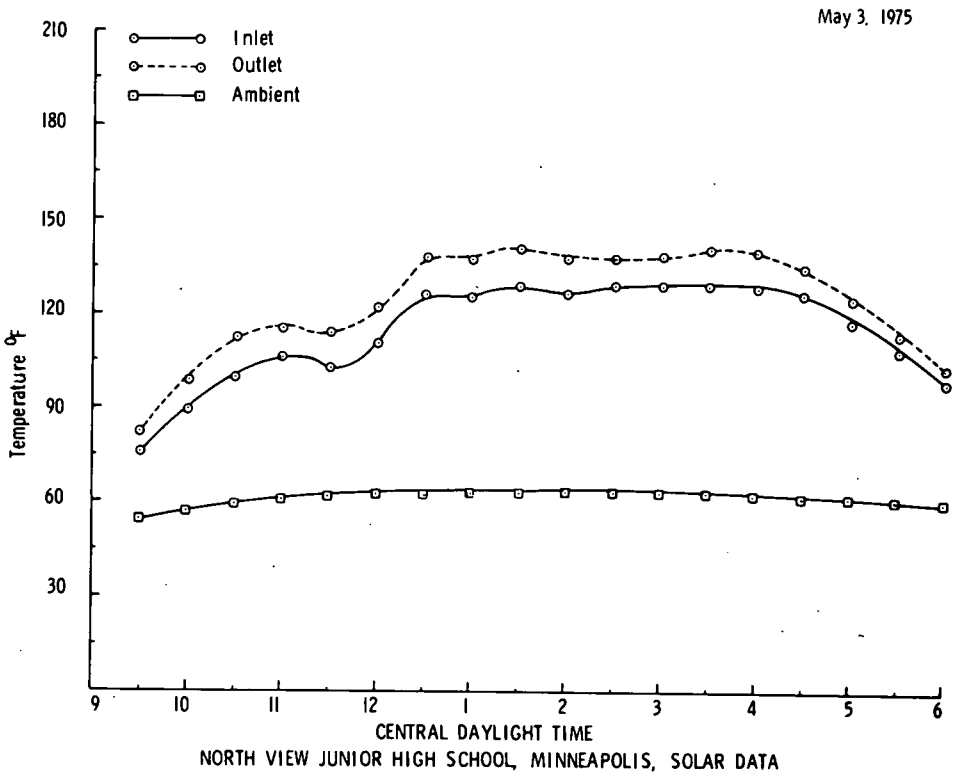
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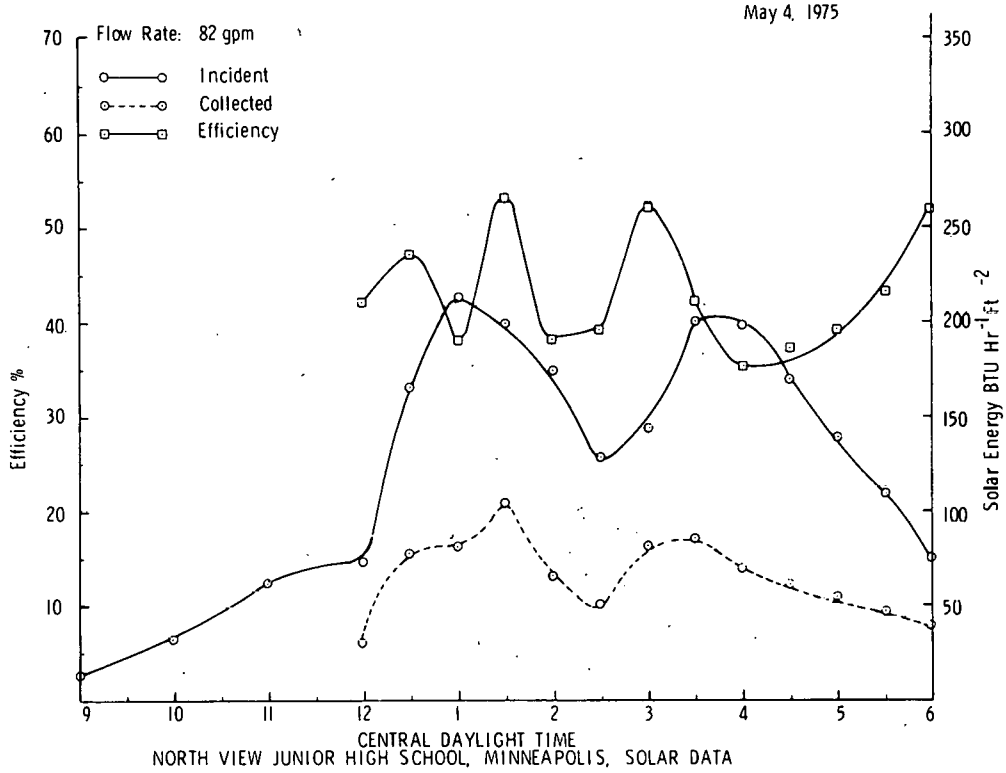
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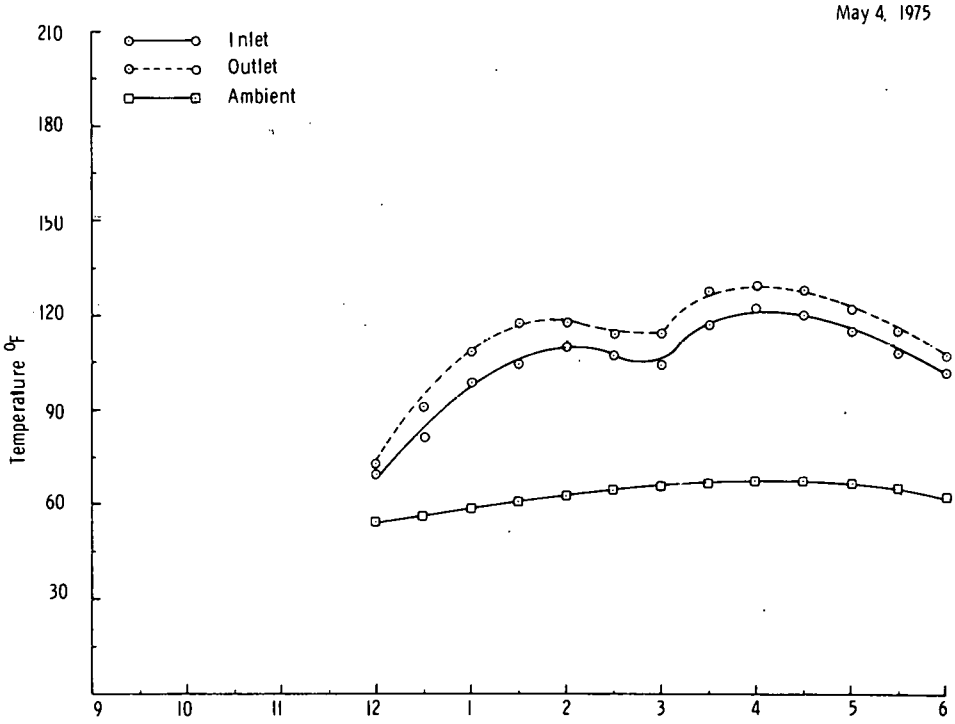
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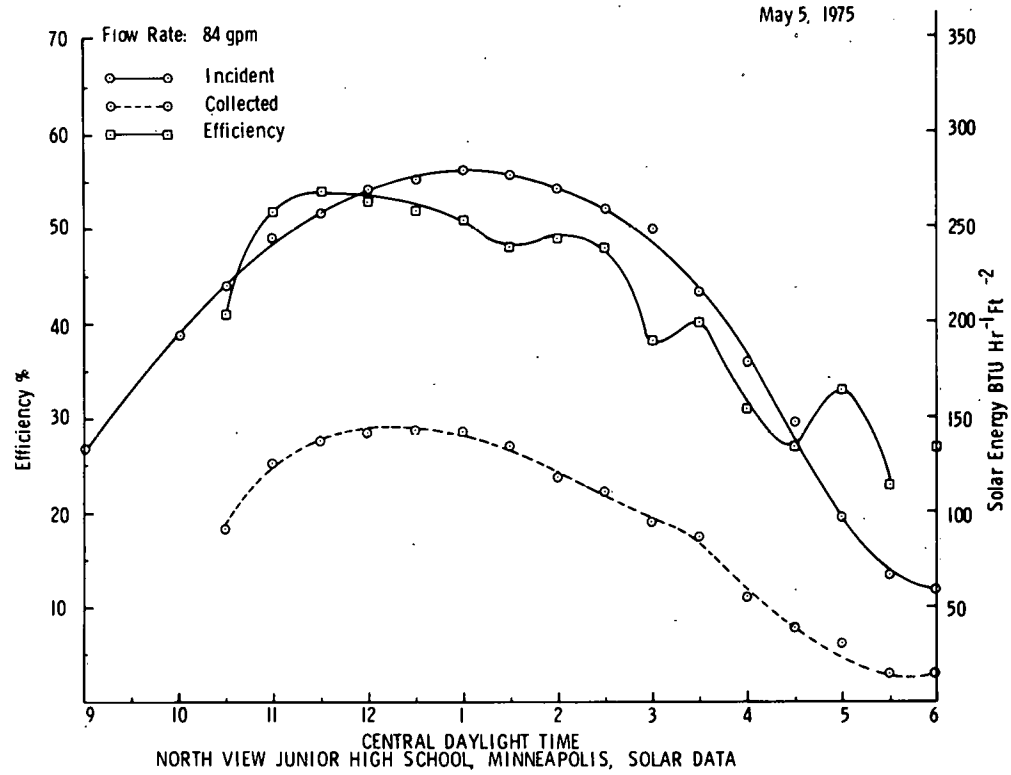
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



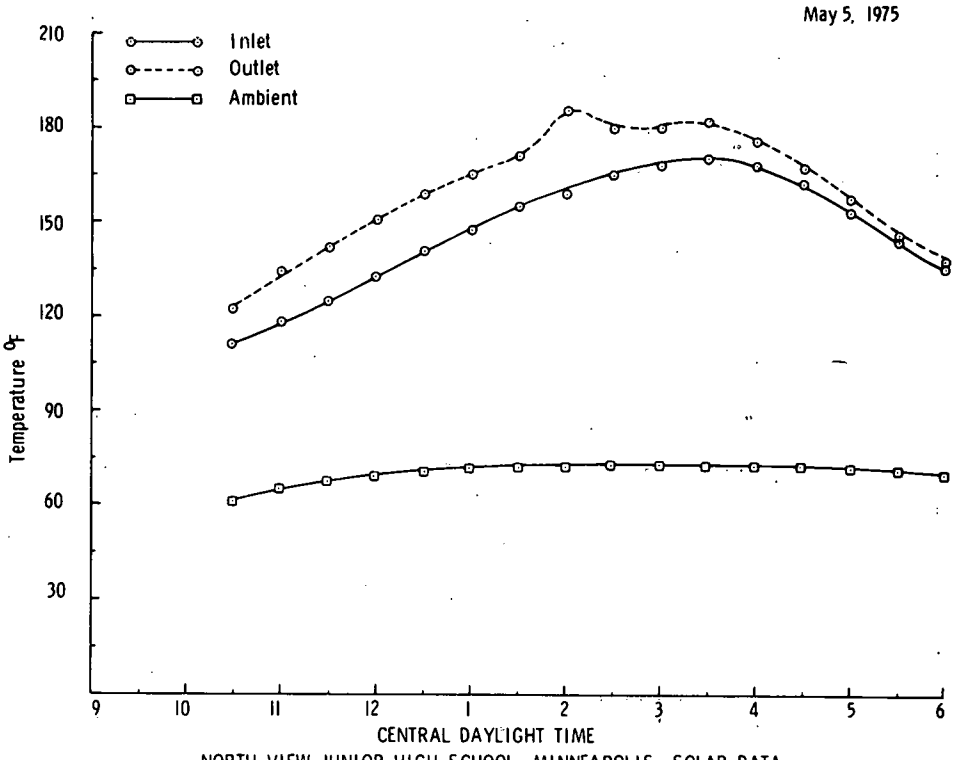
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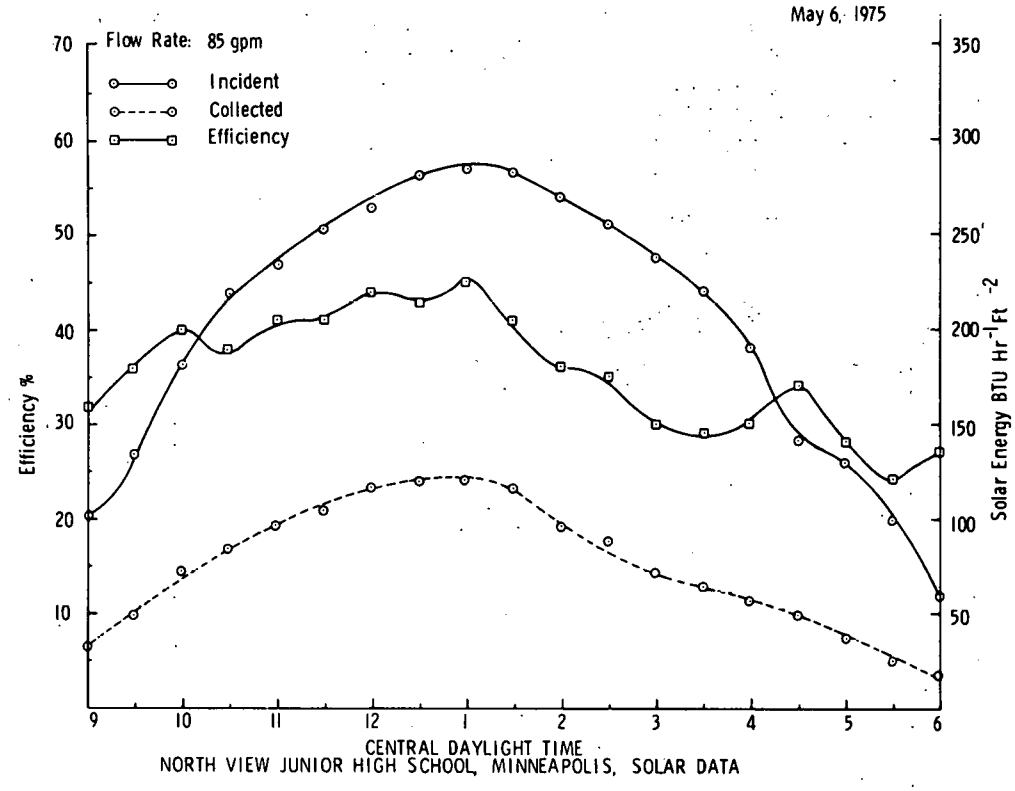
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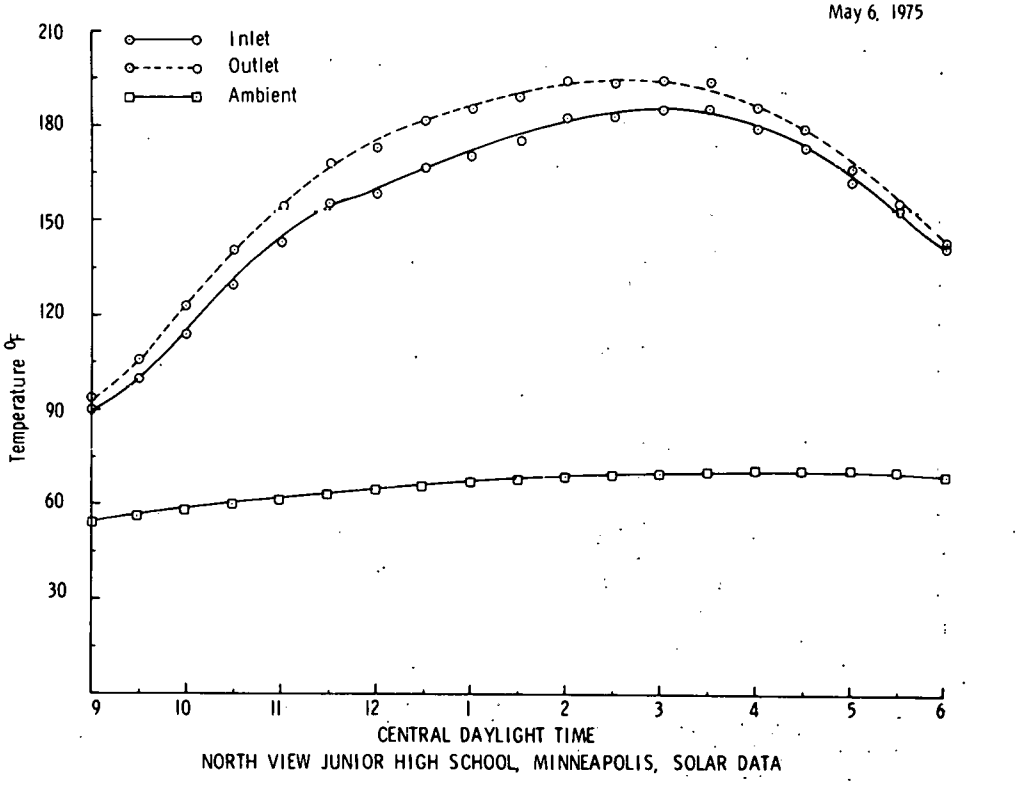
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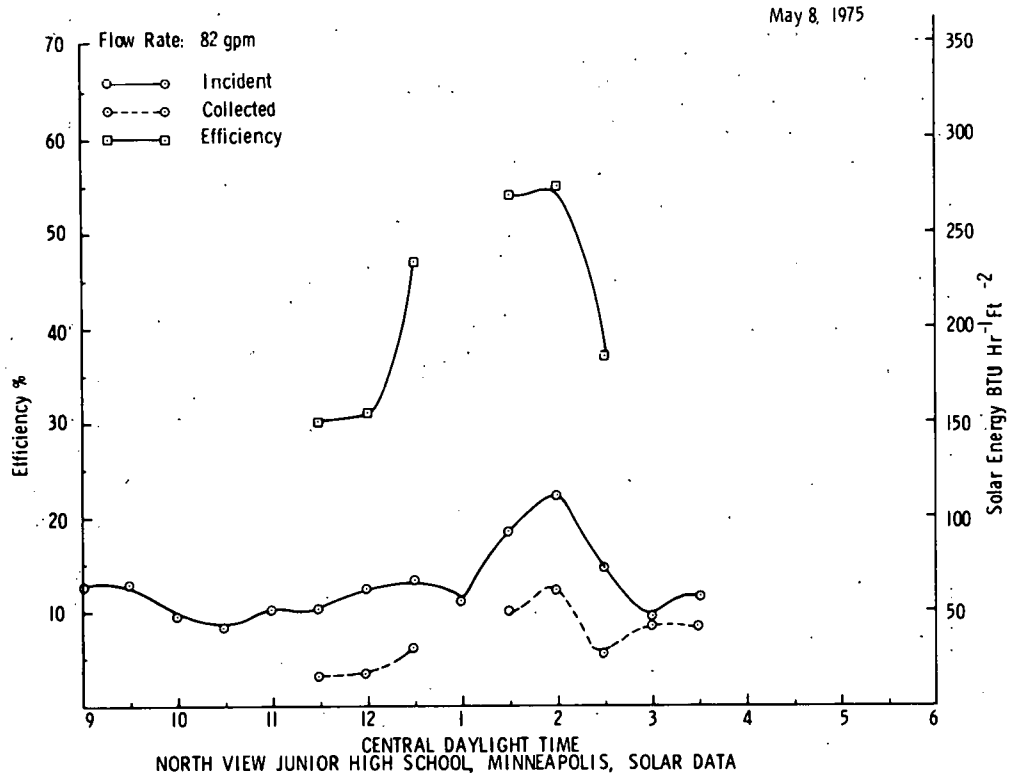
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



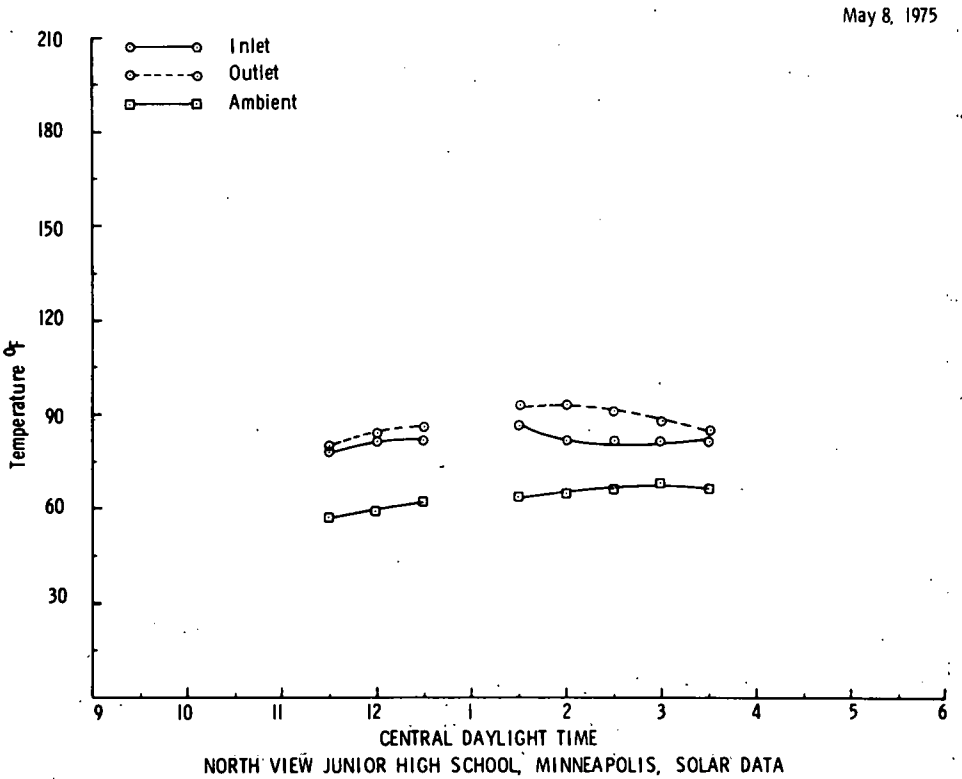
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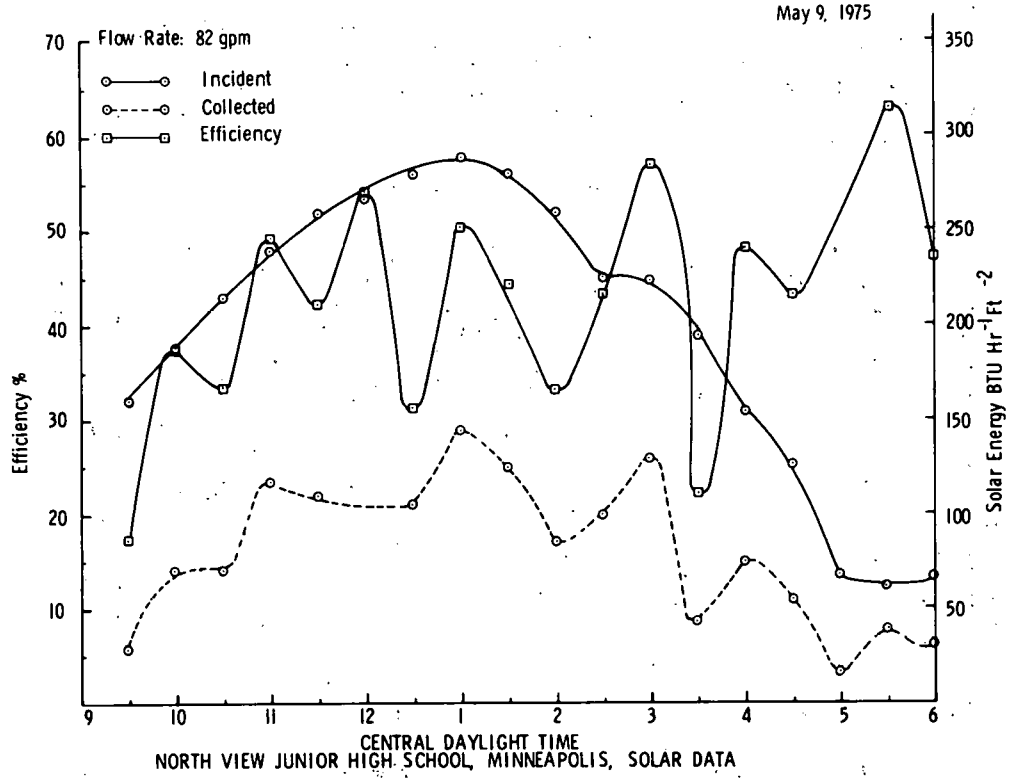
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

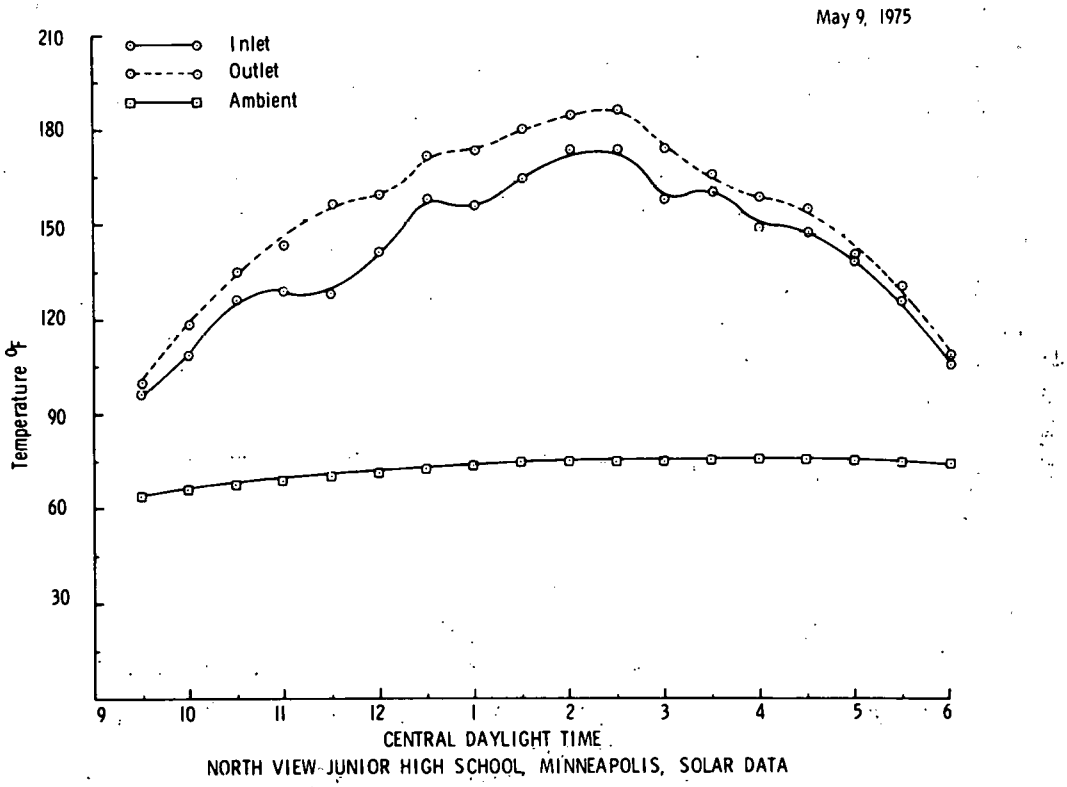


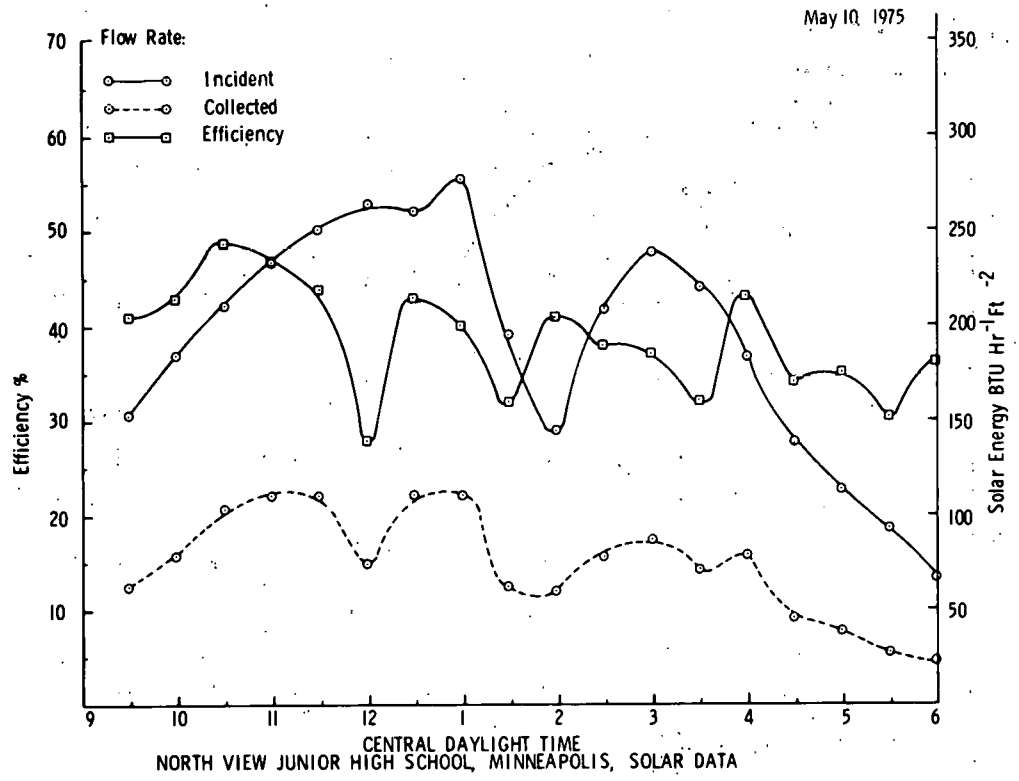
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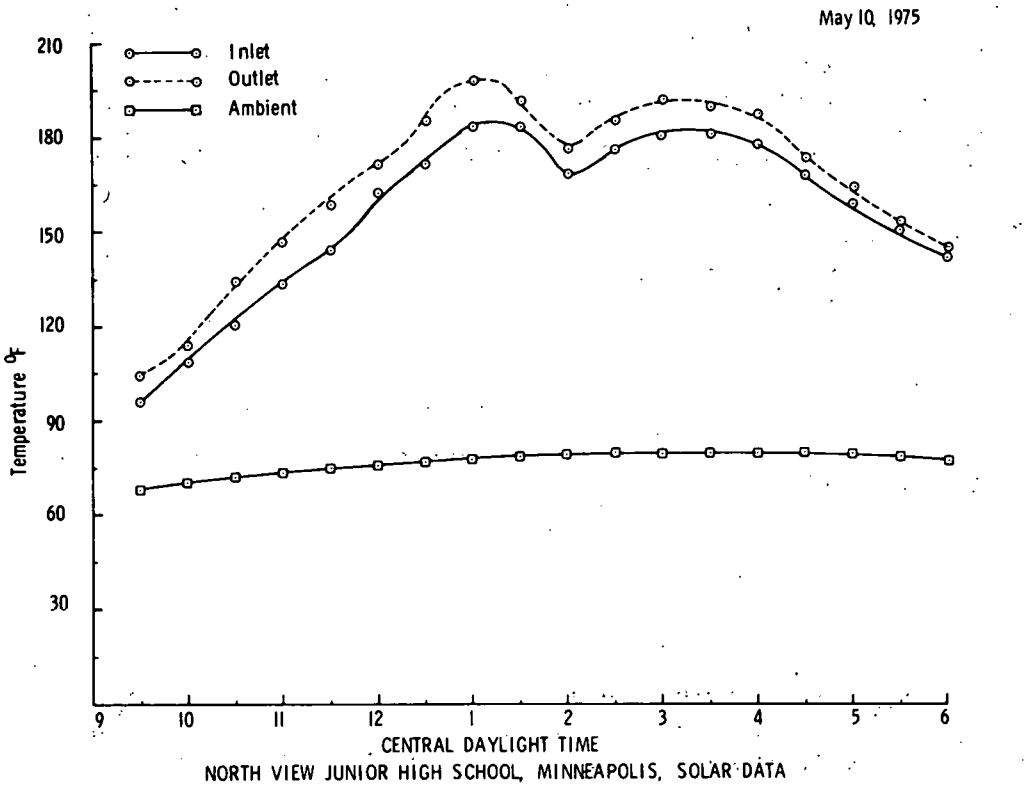
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA


May 9, 1975
Flow Rate: 82 gpm
Incident
Collected
Efficiency
Efficiency %
Solar Energy BTU Hr^{-1}Ft^{-2}
70
60
50
40
30
20
10
350
300
250
200
150
100
50
9
10
11
12
1
2
3
4
5
6
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

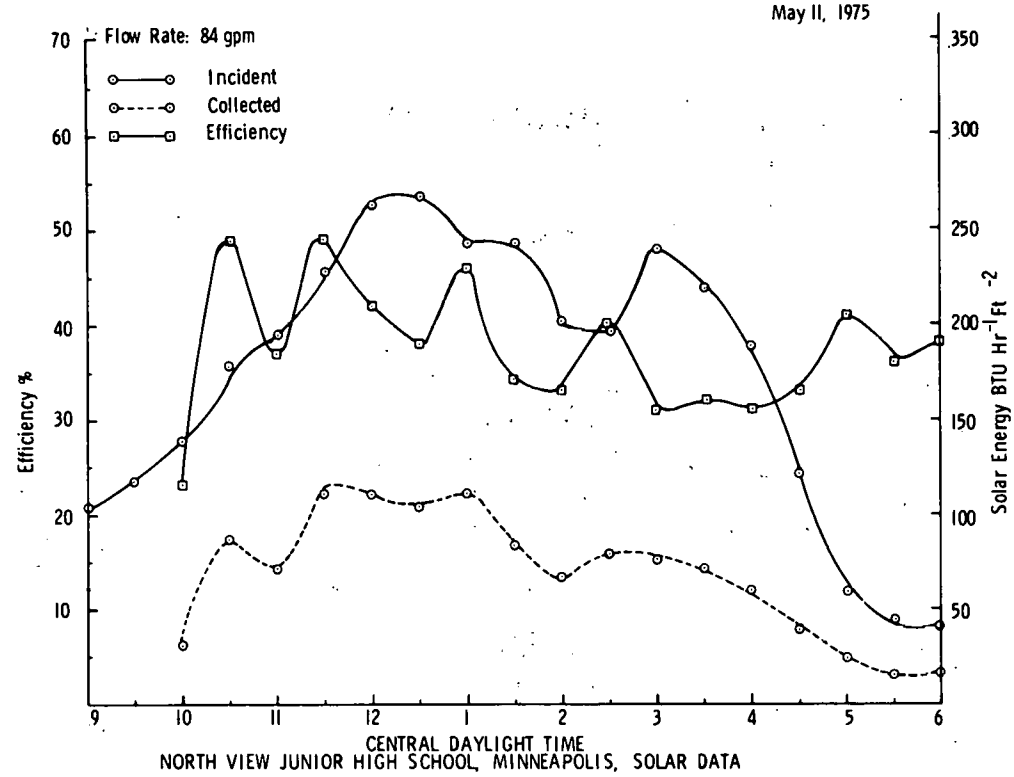

May 9, 1975
Inlet
Outlet
Ambient
Temperature °F
210
180
150
120
90
60
30
9
10
11
12
1
2
3
4
5
6
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



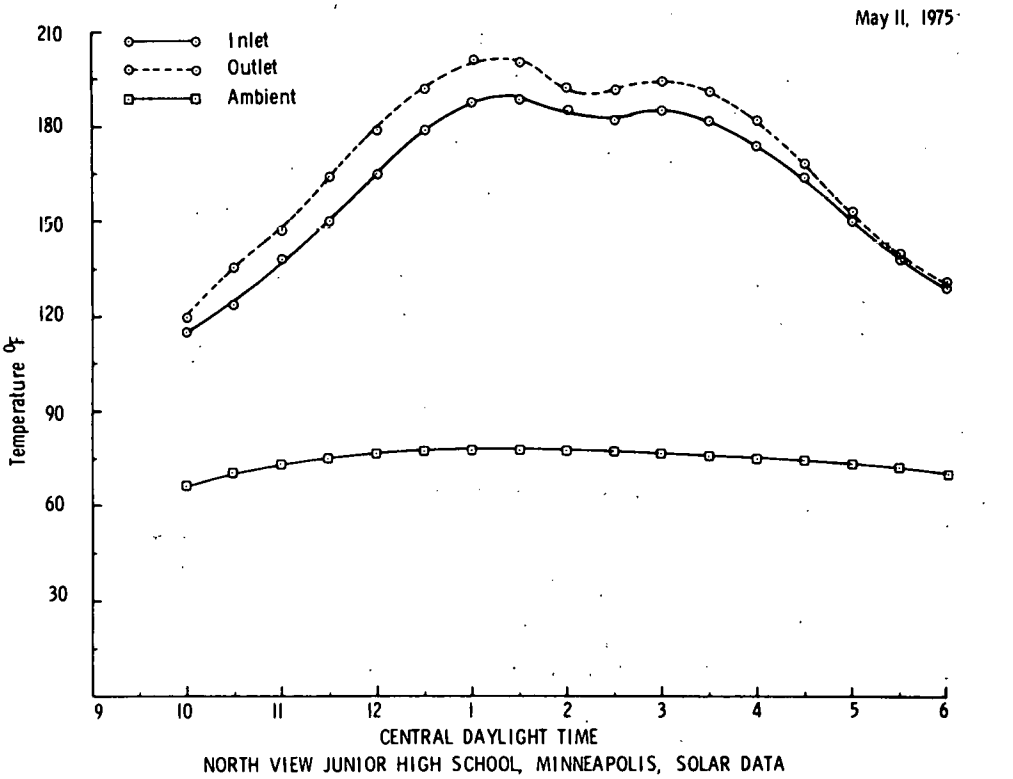
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



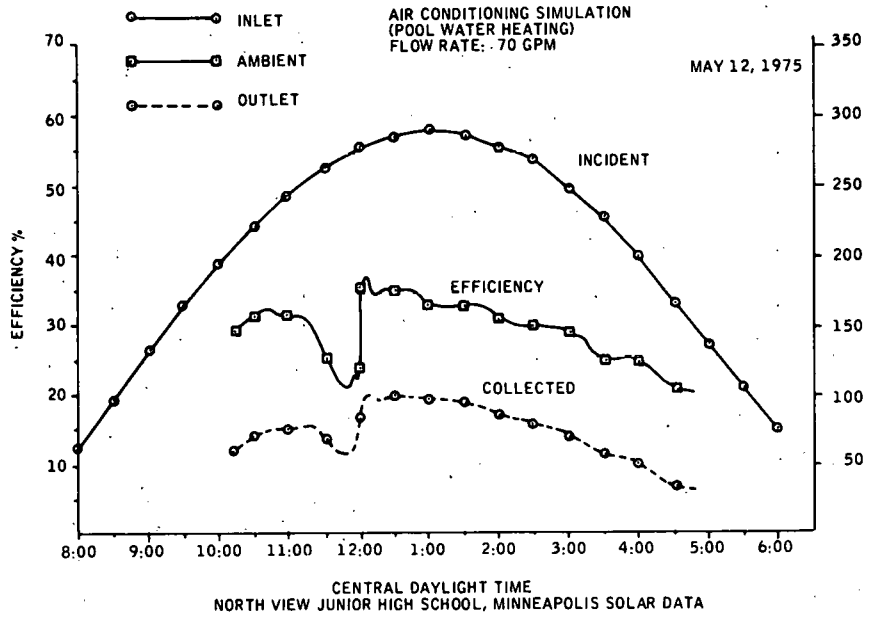
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

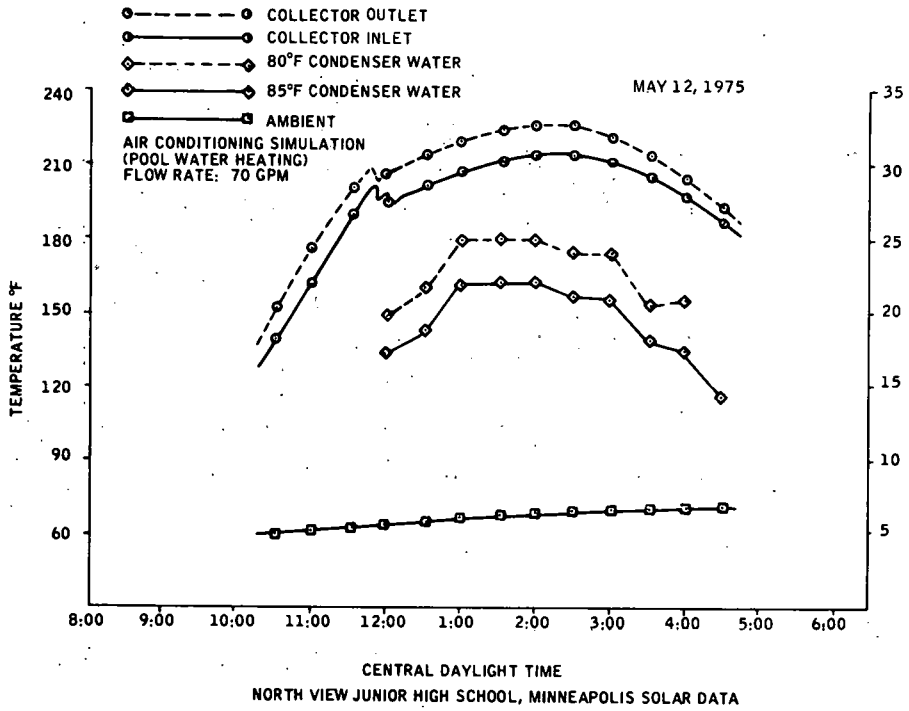


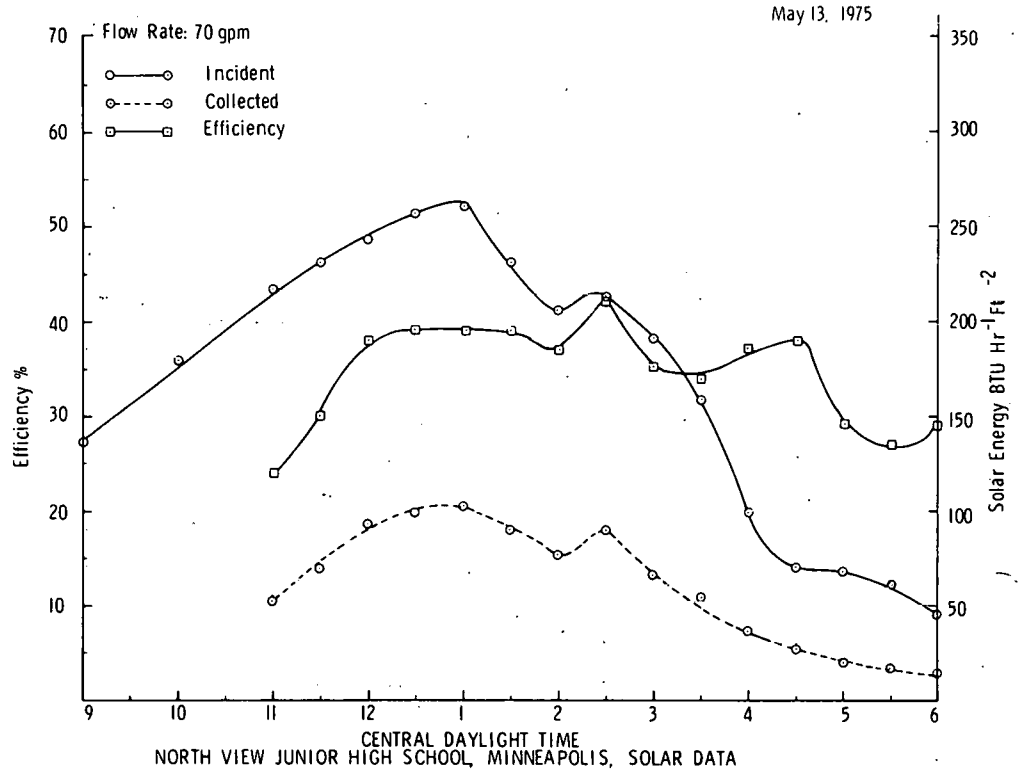
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



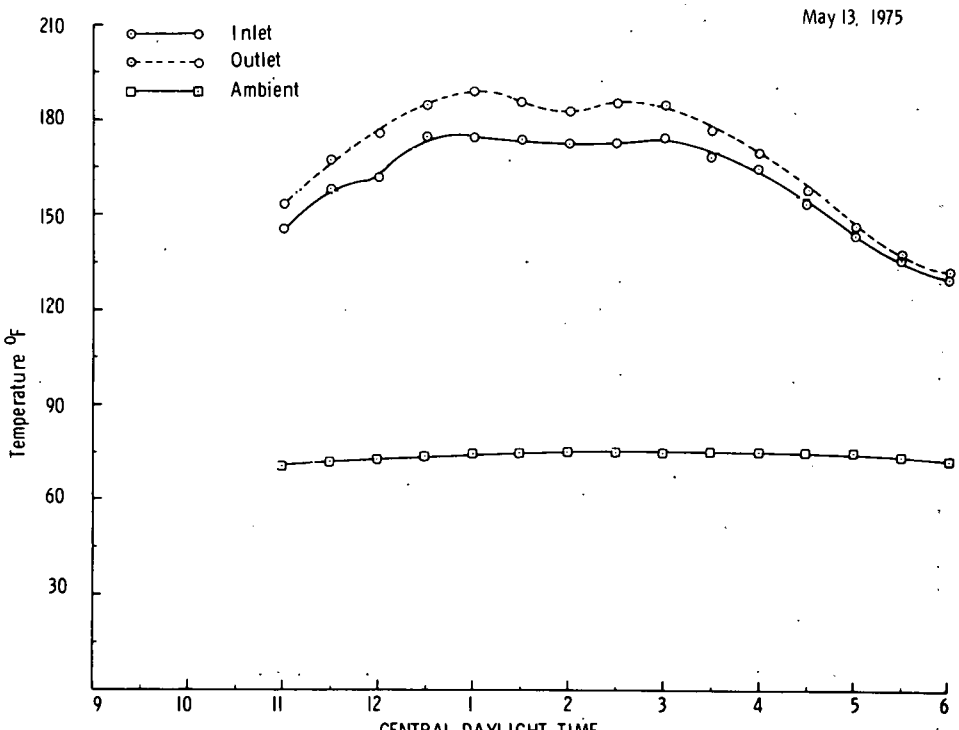
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA


INLET
AMBIENT
OUTLET
AIR CONDITIONING SIMULATION
(POOL WATER HEATING)
FLOW RATE: 70 GPM
MAY 12, 1975
INCIDENT
EFFICIENCY
COLLECTED
EFFICIENCY %
70
60
50
40
30
20
10
350
300
250
200
150
100
50
8:00
9:00
10:00
11:00
12:00
1:00
2:00
3:00
4:00
5:00
6:00
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS SOLAR DATA

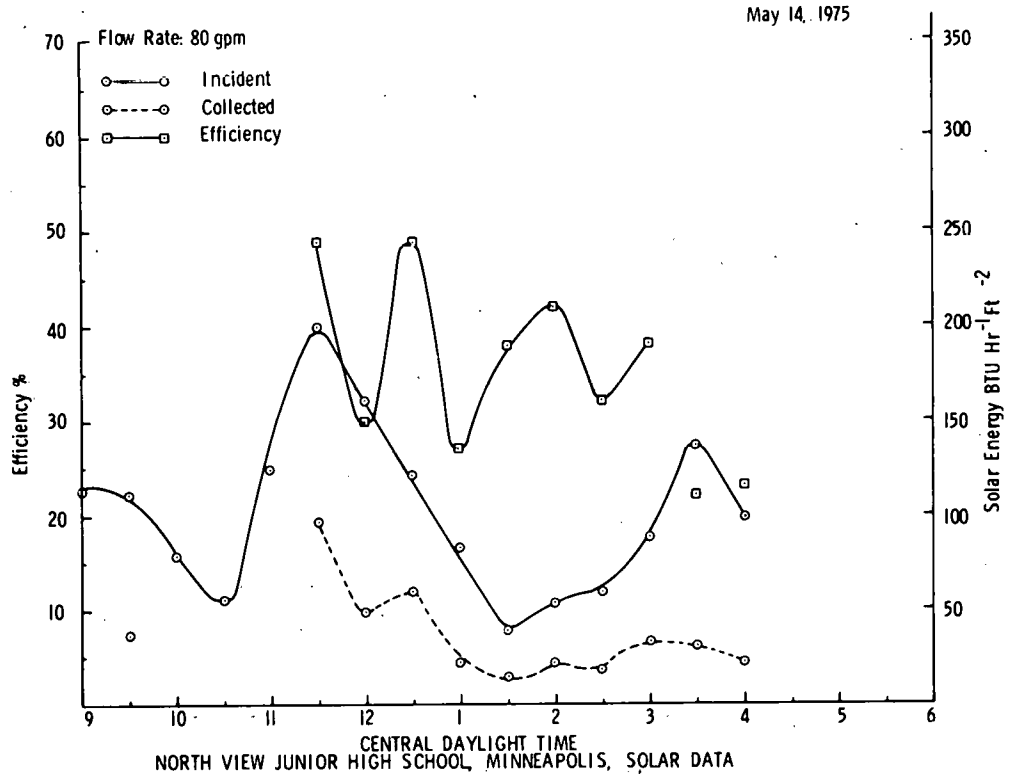

COLLECTOR OUTLET
COLLECTOR INLET
80°F CONDENSER WATER
85°F CONDENSER WATER
AMBIENT
AIR CONDITIONING SIMULATION
(POOL WATER HEATING)
FLOW RATE: 70 GPM
MAY 12, 1975
TEMPERATURE °F
240
210
180
150
120
90
60
35
30
25
20
15
10
5
8:00
9:00
10:00
11:00
12:00
1:00
2:00
3:00
4:00
5:00
6:00
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS SOLAR DATA

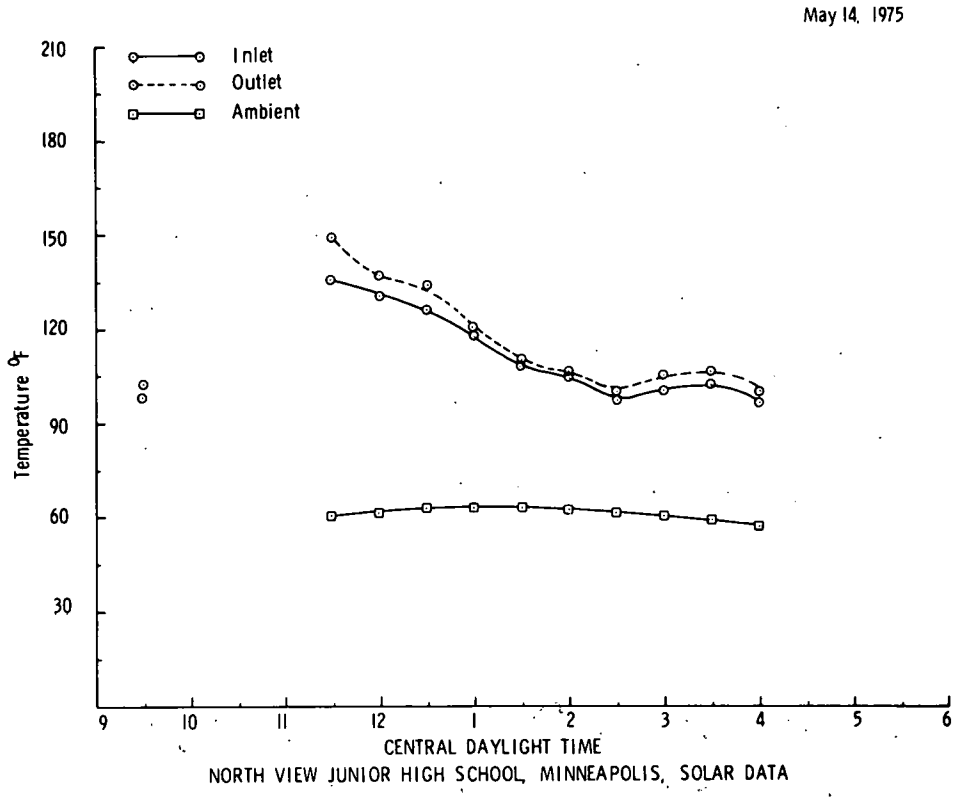


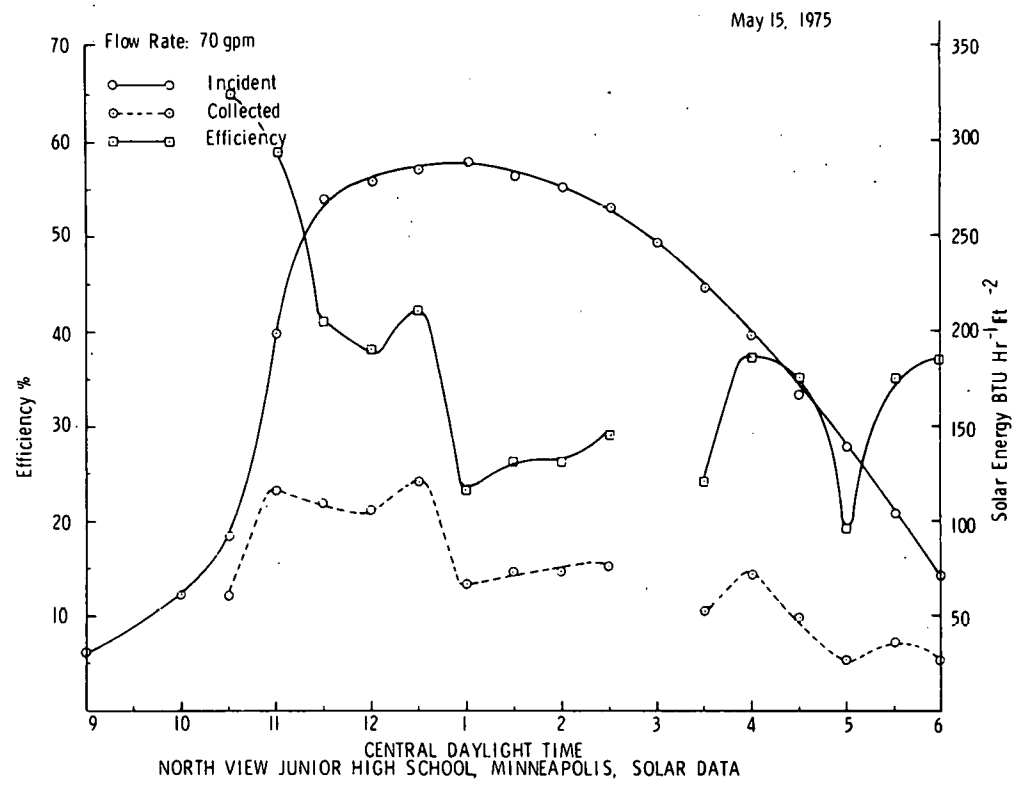
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



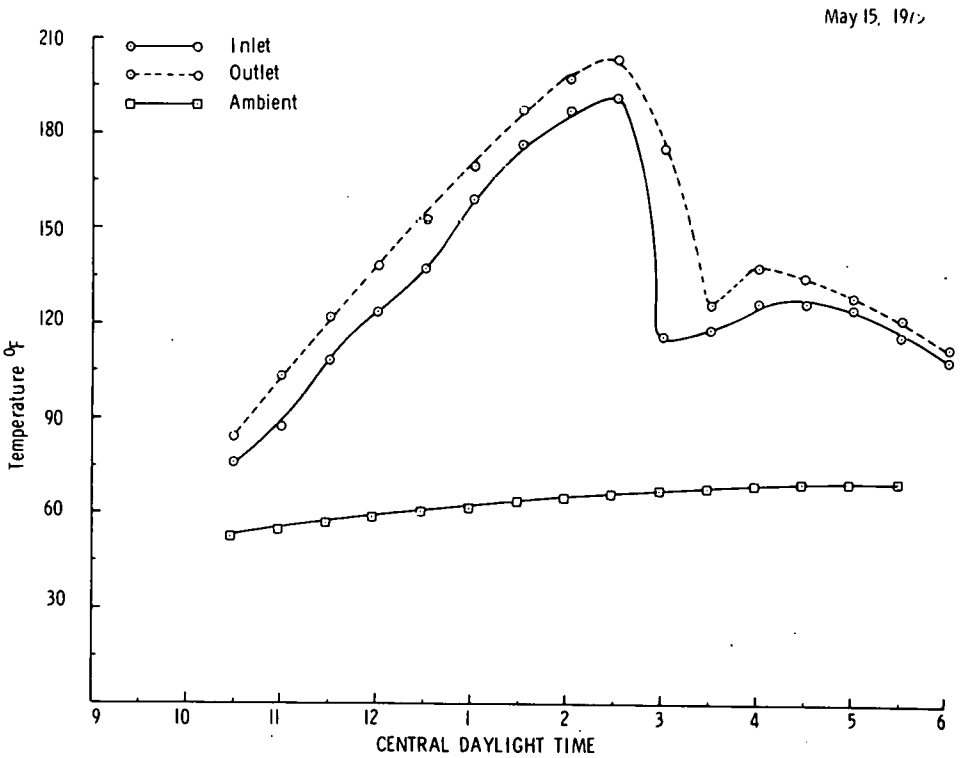
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA


May 14, 1975
Flow Rate: 80 gpm
Incident
Collected
Efficiency
Efficiency %
Solar Energy BTU Hr^{-1}Ft^{-2}
70
60
50
40
30
20
10
350
300
250
200
150
100
50
9
10
11
12
1
2
3
4
5
6
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

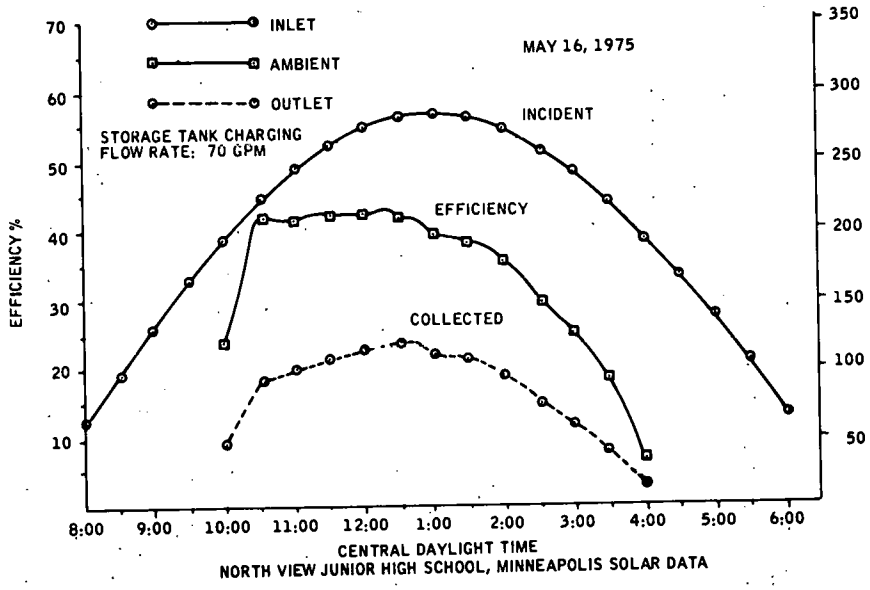

May 14, 1975
Inlet
Outlet
Ambient
Temperature °F
210
180
150
120
90
60
30
9
10
11
12
1
2
3
4
5
6
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA

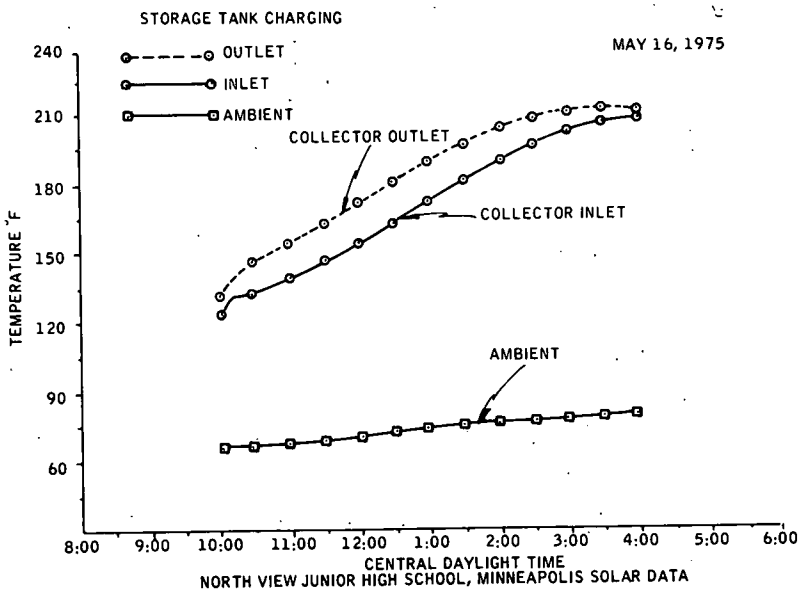


NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA



NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS, SOLAR DATA


INLET
AMBIENT
OUTLET
MAY 16, 1975
INCIDENT
STORAGE TANK CHARGING
FLOW RATE: 70 GPM
EFFICIENCY
COLLECTED
EFFICIENCY %
70
60
50
40
30
20
10
350
300
250
200
150
100
50
8:00
9:00
10:00
11:00
12:00
1:00
2:00
3:00
4:00
5:00
6:00
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS SOLAR DATA


STORAGE TANK CHARGING
MAY 16, 1975
OUTLET
INLET
AMBIENT
COLLECTOR OUTLET
COLLECTOR INLET
AMBIENT
TEMPERATURE °F
240
210
180
150
120
90
60
8:00
9:00
10:00
11:00
12:00
1:00
2:00
3:00
4:00
5:00
6:00
CENTRAL DAYLIGHT TIME
NORTH VIEW JUNIOR HIGH SCHOOL, MINNEAPOLIS SOLAR DATA

JUNE

1975

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

MINNEAPOLIS-ST.PAUL, MINNESOTA
NWS WEATHER SERVICE FCST OFC
INTERNATIONAL AIRPORT
JUNE 1975

LATITUDE 44° 53′ N LONGITUDE 93° 13′ W ELEVATION (GROUND) 834 FT. STANDARD TIME USED: CENTRAL WBAN 14922

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING	COOLING	WEATHER TYPES OR DATES OF OCCURRENCE (1 FOG, 2 HEAVY FOG *, 3 THUNDERSTORM, 4 ICE PELLETS, 5 HAIL, 6 GLAZE, 7 DUSTSTORM, 8 SMOKE, HAZE, 9 BLOWING SNOW)	SNOW, ICE PELLETS OR ICE ON GROUND AT 0600 IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. ELEV. 830 FEET M.S.L.	WIND RESULTANT DIRECTION	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE HOURS AND TENTHS	PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DATE
1	71	45*	57*	-6	41	8	0		0	0	0	29.09	29	4.8	9.2	13	NW	15.1	98	3	3	1
2	78	48	63	0	44	2	0		0	.02	0	29.09	21	5.3	6.3	21	ENE	11.5	75	9	8	2
3	81	51	66	3	48	0	1		0	T	0	28.88	21	5.9	7.1	15	W	12.0	78	4	9	3
4	76	60	68	4	57	0	3	3	0	1.06	0	29.67	13	6.1	7.9	17	SE	8.3	54	10	8	4
5	75	59	67	3	48	0	2		0	T	0	28.89	27	12.4	12.8	28	W	12.6	81	4	9	5
6	70	52	61	-3	43	4	0		0	0	0	29.90	32	13.9	14.6	25	NW	14.7	96	4	3	6
7	71	48	60	-5	44	5	0		0	0	0	29.96	35	9.4	7.8	16	NE	15.4	99	1	2	7
8	72	52	62	-3	48	3	0		0	T	0	29.18	13	6.4	8.6	13	S	11.8	76	10	9	8
9	69	57	61	-4	50	4	0	1	0	.08	0	29.10	11	11.3	11.7	18	SE	0.0	0	10	10	9
10	70	56	64	-2	56	1	0	1 6	0	T	0	29.11	14	8.3	8.8	19	SE	6.8	42	10	10	10
11	64	57	61	-6	57	4	0	1	0	2.86	0	28.88	33	4.4	6.8	12	NW	0.2	1	10	10	11
12	74	57	66	0	53	0	1	1	0	.14	0	29.76	29	13.3	13.8	24	W	9.8	61	8	8	12
13	74	57	66	0	55	0	1		0	T	0	29.62	27	9.7	8.3	20	W	12.3	78	6	6	13
14	67	53	60	-7	53	5	0		0	.23	0	29.79	12	3.4	9.2	11	E	4.0	26	10	8	14
15	67	56	62	-6	52	3	0		0	.38	0	29.70	01	0.5	9.2	17	N	6.2	40	9	8	15
16	73	58	66	-1	56	0	1		0	.01	0	29.78	14	4.0	4.8	10	SE	7.9	51	8	7	16
17	76	61	68	0	59	0	3	2	0	.22	0	29.74	32	1.0	10.8	24	W	8.5	54	8	7	17
18	72	58	65	-3	56	0	0		0	T	0	29.03	08	6.0	7.9	21	E	6.0	38	10	8	18
19	66	63	76	8	66	0	11	1	0	T	0	29.12	12	8.8	10.4	22	S	0.5	54	9	9	19
20	89	71	80	12	70	0	15	3 6	0	.54	0	29.11	16	8.3	11.1	21	S	11.0	71	10	10	20
21	88	70	79	11	67	0	14	3	0	.70	0	29.04	16	6.3	8.8	38	SW	10.4	67	10	10	21
22	82	69	76	7	63	0	11	3	0	.08	0	29.02	22	11.9	13.8	23	SW	11.9	76	9	9	22
23	84	63	74	5	61	0	9		0	0	0	29.21	19	4.3	6.9	9	SE	14.5	93	6	8	23
24	84	66	75	6	62	0	10		0	0	0	29.30	12	6.6	9.8	13	SE	14.7	95	9	8	24
25	84	69	77	8	67	0	12	1 6	0	0	0	29.24	13	11.7	11.8	18	SE	12.6	80	4	3	25
26	88	68	78	8	67	0	13	1 3 6	0	.22	0	29.08	15	9.8	10.4	37	SW	7.9	51	8	8	26
27	84	63	74	4	63	0	9	2	0	0	0	29.15	10	3.3	6.0	10	SE	15.6	100	0	1	27
28	90X	71	81*	11	69	0	16		0	0	0	29.18	13	9.8	10.1	17	SE	13.0	83	8	7	28
29	86	70	78	8	69	0	13	3 6	0	.81	0	29.27	15	7.2	10.1	31	SW	6.0	38	8	7	29
30	89	68	79	9	68	0	14	3 6	0	1.04	0	29.30	16	4.8	7.6	48	NW	10.4	67	4	8	30
	SUM 2329	SUM 1788				TOTAL 39	TOTAL 158	NUMBER OF DAYS		TOTAL 7.99	TOTAL 0	29.01	18	2.3	8.9	48	NW	TOTAL 288.8	% FOR MONTH	SUM 219	SUM 208	
	AVG. 77.6	AVG. 59.6	AVG. 68.8	DEP. 1.8	AVG. 57	DEP. -28	DEP. 37	PRECIPITATION .01 INCH OR MORE	15	DEP. -4.09								POSSIBLE 468.8	64	AVG. 7.3	AVG. 6.9	

SEASON TO DATE	TOTAL	TOTAL
	8255	225
	DEP.	DEP.
	98	77

NUMBER OF DAYS	MAXIMUM TEMP. ≥ 90°	≤ 32°	MINIMUM TEMP. ≤ 32°	≤ 0°
	1	0	0	0

SNOW, ICE PELLETS ≥ 1.0 INCH 0
THUNDERSTORMS 7
HEAVY FOG * 2
CLEAR 3 PARTLY CLOUDY 7 CLOUDY 20

GREATEST IN 24 HOURS AND DATES
PRECIPITATION 2.69 11-12
SNOW, ICE PELLETS 0

GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE
0

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1																									1
2																									2
3															.02	T	T				T	T	T	T	3
4	.05	.02	.03	.04	.03	T	T				T	T				.89	T								4
5																		T							5
6																									6
7																									7
8																					T	T	T	T	8
9					T	T	T	T	T	.01	T	T		T	.01	T	.01	.02	T	T	.01	.02	T	T	9
10	T	T	T				T	T																	10
11			.31	.18	.08	.06	.30	T	.18	.08	.06	T	T	T	.25	.38	.23	.11	.07	.09	.07	.08	.08	.08	11
12	.03	.04	.02	.01	.02	T	T	.01	.01	T	T														12
13	T	T					T	T																	13
14												T	T	T	.04	.04	.05	.01	.03	.03	.02	T	T	.01	14
15	.06	.09	.05	.03	.03	.01	.01	T				T													15
16								.01	T	T		T													16
17							T	.13	.05						.04										17
18										T	T	T													18
19			T	T	T																				19
20																			T	.10	.22	.09	.13	T	20
21	T															.69	.01						T	T	21
22	.08	T																							22
23																									23
24																									24
25																									25
26																.02	.02	.06	.12	T					26
27																									27
28																									28
29												.47	T	T	.34	T				T	T				29
30																	.02				.31	.03	.01	.67	30

* EXTREME TEMPERATURES FOR THE MONTH. MAY BE THE LAST OF MORE THAN ONE OCCURRENCE.
- BELOW ZERO TEMPERATURE OR NEGATIVE DEPARTURE FROM NORMAL.
; ≥ 70° AT ALASKAN STATIONS.
+ ALSO ON AN EARLIER DATE, OR DATES.
X HEAVY FOG RESTRICTS VISIBILITY TO 1/4 MILE OR LESS.
T IN THE HOURLY PRECIPITATION TABLE AND IN COLUMNS 9, 10, AND 11 INDICATES AN AMOUNT TOO SMALL TO MEASURE.

THE SEASON FOR DEGREE DAYS BEGINS WITH JULY FOR HEATING AND JANUARY FOR COOLING.
DATA IN COLUMNS 8, 15, 19, 14, AND 15 ARE BASED ON 8 OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
WIND DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. RESULTANT WIND IS THE VECTOR SUM OF WIND DIRECTIONS AND SPEEDS DIVIDED BY THE NUMBER OF OBSERVATIONS. FIGURES FOR DIRECTIONS ARE TENS OF DEGREES FROM TRUE NORTH: 1-E., 09-EAST, 18-SOUTH, 27-WEST, 36-NORTH, AND 00-CALM. WHEN DIRECTIONS ARE IN TENS OF DEGREES IN COL. 17, ENTRIES IN COL. 18 ARE FASTEST OBSERVED 1-MINUTE SPEEDS. IF THE / APPEARS IN COL. 17, SPEEDS ARE GUSTS.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

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William H. Haggard

DIRECTOR. NATIONAL CLIMATIC CENTER

SUMMARY BY HOURS

HOUR (LST)	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE AIR °F	WET BULB °F	DEW PT. °F	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
00	6	29.01	65	60	56	78	8.2	17	1.8
03	6	29.00	62	58	54	81	6.8	14	2.6
06	7	29.03	63	58	53	80	7.4	14	2.2
09	7	29.02	69	62	56	68	11.0	16	3.1
12	8	29.01	74	64	56	60	10.9	15	3.1
15	8	29.00	74	64	56	58	11.6	19	3.6
18	8	28.99	73	64	56	60	9.6	16	2.2
21	6	29.01	68	62	57	68	7.3	12	1.4

USCOMM - NOAA - ASHEVILLE 750
07/18/75

MINNEAPOLIS-ST.PAUL, MINNESOTA

OBSERVATIONS AT 3-HOUR INTERVALS

HOUR	SKY COVER TENTHS	CEILING HUNDREDS OF FEET	VISIBILITY WHOLE MILES	VISIBILITY FRACTION OF MILE	WEATHER	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	TEMPERATURE REL. HUM. %	WIND DIR	WIND SPEED KNOTS
DAY 01											
00	1	UNL	25			53	48	38	68	00	0
03	4	UNL	25			44	43	41	91	00	0
06	3	UNL	25			48	45	41	84	00	0
09	0	UNL	25			54	52	43	71	00	0
12	0	UNL	25			64	56	47	67	00	0
15	0	UNL	25			70	58	47	54	00	0
18	1	UNL	25			70	58	47	54	00	0
21	0	UNL	25			63	55	47	68	00	0
DAY 02											
00	0	UNL	25			63	48	38	58	00	0
03	7	UNL	25			52	47	41	84	00	0
06	10	UNL	25			54	50	43	79	21	4
09	10	80	25			60	54	48	74	23	8
12	8	300	25			65	54	47	64	23	8
15	10	80	25			64	54	47	64	26	11
18	10	80	25			64	54	47	64	18	10
21	7	80	25			64	54	48	68	21	8
DAY 03											
00	0	UNL	25			0	UNL	25			
03	0	UNL	25			0	UNL	25			
06	0	UNL	25			0	UNL	25			
09	3	UNL	25			0	UNL	25			
12	10	250	25			0	UNL	25			
15	10	250	25			0	UNL	25			
18	10	80	25			0	UNL	25			
21	10	250	25			0	UNL	25			
DAY 04											
00	10	100	25			67	58	51	67	18	9
03	10	100	25		RE	63	58	51	71	13	4
06	10	80	25		RE	63	58	51	71	13	4
09	10	250	25			70	64	56	68	12	13
12	9	100	25			73	64	56	62	12	15
15	10	34	20		T	72	64	56	64	12	9
18	9	100	25			71	58	48	53	73	27
21	0	UNL	25			64	58	48	68	70	23
DAY 05											
00	7	UNL	25			62	56	51	67	23	8
03	8	250	25			61	55	50	67	28	7
06	0	UNL	25			62	55	48	63	28	8
09	4	UNL	25			67	56	48	57	28	13
12	3	UNL	25			71	58	50	48	27	17
15	3	UNL	25			73	57	48	58	28	20
18	9	UNL	25			71	58	48	63	28	15
21	3	UNL	25			66	58	48	78	28	8
DAY 06											
00	8	80	25			61	52	44	64	32	8
03	0	UNL	25			58	48	42	64	31	14
06	0	UNL	25			58	50	42	68	31	13
09	4	UNL	25			58	50	42	68	30	19
12	3	UNL	25			64	53	44	58	30	19
15	3	UNL	25			68	56	48	58	32	15
18	3	UNL	25			68	56	48	58	33	15
21	3	UNL	25			66	51	43	58	30	9
DAY 07											
00	0	UNL	25			53	48	44	72	32	8
03	7	80	25			51	48	48	90	30	6
06	0	UNL	25			59	51	47	78	36	8
09	3	UNL	25			62	53	44	62	33	10
12	1	UNL	25			67	58	44	64	34	8
15	1	UNL	25			71	57	48	58	36	8
18	1	UNL	25			68	55	43	63	04	5
21	3	UNL	25			64	53	43	67	06	3
DAY 08											
00	0	UNL	25			58	53	48	70	00	0
03	4	UNL	25			54	50	47	77	10	5
06	10	UNL	25			57	52	50	78	13	4
09	3	UNL	25			67	57	48	63	18	7
12	10	40	25			70	57	47	64	13	10
15	10	UNL	25			70	58	48	68	12	10
18	10	UNL	25			68	57	47	68	14	7
21	10	130	25			68	56	48	68	19	3
	10	100	20		R	65	56	48	74	19	3
DAY 09											
00	10	100	25			55	50	48	86	00	0
03	10	100	25			53	50	48	88	11	10
06	10	100	19			51	52	44	84	12	10
09	10	80	19		R	60	53	47	82	13	13
12	10	80	20		R	61	54	48	83	11	12
15	10	80	20		R	58	55	52	91	12	10
18	10	80	8		RF	58	55	53	87	11	12
21	10	30	4		RW	58	56	55	90	12	8
DAY 10											
00	10	10	6		LF	58	56	55	90	13	8
03	10	6	3		F	60	58	56	87	18	8
06	10	10	2	0	F	60	57	55	84	16	9
09	10	12	3		F	61	58	55	80	14	9
12	10	40	7			66	62	56	78	13	9
15	8	60	10			70	64	60	73	13	13
18	10	70	9			68	63	60	73	14	7
21	10	10	7			68	63	60	78	17	3
DAY 11											
00	10	250	3	1	BF	64	62	60	84	00	0
03	10	6	1	0	BF	62	61	60	90	00	0
06	10	8	1		BF	62	60	58	84	04	0
09	10	12	4		BF	60	58	56	87	35	10
12	10	8	2	1	BF	61	58	57	87	08	6
15	10	9	1		BF	61	58	57	87	28	4
18	10	9	1		BF	58	56	54	90	31	11
21	10	8	3		BF	58	56	53	84	28	10
DAY 12											
00	10	11	6		RF	57	56	53	87	29	11
03	10	13	10		R	57	56	53	87	28	10
06	10	60	15		R	58	55	53	84	28	12
09	10	60	12		R	60	57	55	84	28	12
12	10	70	12			66	61	59	81	26	14
15	10	80	25			71	58	51	48	30	14
18	10	250	25			74	62	53	48	30	11
21	10	250	25			70	60	53	55	27	10
DAY 13											
00	10	110	25			68	58	50	53	28	8
03	1	UNL	25			60	55	51	72	22	5
06	7	120	15			61	58	53	78	25	5
09	8	110	20			66	58	54	68	23	10
12	10	80	25			70	63	58	61	27	9
15	4	UNL	25			73	63	57	57	28	12
18	5	80	15			68	60	51	63	26	11
21	0	UNL	25			63	58	51	67	23	5
DAY 14											
00	3	UNL	25			58	55	51	78	00	0
03	1	UNL	25			58	55	50	80	00	0
06	10	120	25			57	56	53	87	12	3
09	10	80	25			63	58	54	81	15	8
12	10	80	25		RW	65	58	53	68	11	6
15	8	80	9			65	60	57	78	20	9
18	8	80	7			61	57	54	81	10	8
21	8	70	8			58	56	54	84	08	8
DAY 15											
00	10	27	7			10	27	7			
03	10	9	7			10	9	7			
06	10	12	7			10	12	7			
09	10	90	25			10	90	25			
12	9	70	15			9	70	15			
15	9	UNL	23			9	UNL	23			
18	7	45	25			7	45	25			
21	3	UNL	25			3	UNL	25			
DAY 16											
00	4	UNL	20			61	58	56	84	26	4
03	7	UNL	20			58	57	55	87	18	3
06	10	UNL	8			60	58	56	87	08	9
09	10	100	12			61	58	56	84	06	7
12	10	100	10			62	58	55	81	02	8
15	10	250	15			63	58	56	78	10	11
18	10	28	19			63	62	57	81	07	8
21	3	UNL	19			64	60	56	81	06	8
DAY 17											
00	9	UNL	10			63	60	56	87	12	4
03	10	0	0	3	F	62	61	60	93	10	7
06	10	1	0	2	F	63	61	60	90	08	8
09	10	8	5		F	64	62	61	90	06	13
12	8	20	15			73	68	61	68	18	9
15	7	31	25			73	64	58	62	27	16
18	7	40	25			71	62	56	68	27	13
21	6	UNL	25			68	61	56	78	31	8
DAY 18											
00	4	UNL	20			61	58	56	84	26	4
03	7	UNL	20			58	57	55	87	18	3
06	10	UNL	8			60	58	56	87	08	9
09	10	100	12			61	58	56	84	06	7
12	10	100	10			62	58	55	81	02	8
15	10	250	15			63	58	56	78	10	11
18	10	28	19			63	62	57	81	07	8
21	3	UNL	19			64	60	56	81	06	8
DAY 19											
00	4	UNL	20			63	60	56	84	08	7
03	10	27	20			63	62	57	87	08	8
06	10	33	7			64	63	58	87	10	10
09	10	12	7			72	67	59	78	11	10
12	8	250	8			68	66	58	78	19	11
15	8	70	8			66	64	58	78	17	10
18	10	70	8			66	63	58	83	16	7
21	3	UNL	8			61	59	56	83	17	8
DAY 20											
00	8	70	7			70	68	64	83	17	8
03	8	50	7			70	68	64	83	17	7
06	10	40	6		H	70	68	64	83	18	7
09	10	250	7			68	66	62	83	16	7
12	10	250	12			68	66	62	83	16	10
15	10	250	8			66	64	62	87	16	10
18	10	38	6			67	66	62	87	18	11
21	10	40	7		TRW	68	66	62	87	18	13
DAY 21											
00	10	43	12		TRW	71	67	65	81	08	8
03	9	70	12			70	66	64	81	13	9
06	10	250	7			72	68	66	87	18	8
09	10	250	8			71	68	66	87	18	9
12	10	UNL	10			68	66	64	87	24	7
15	10	60	10			71	67	65	81	20	6
18	10	300	19			74	68	66	78	19	6
21	10	UNL	20			73	68	66	78	19	8
DAY 22											
00	10	18	8		TRW	73	68	66	78	23	14
03	10	130	20			68	66	63	87	14	11
06	10	12	25			71	67	65	81	22	9
09	7	80	25			74	68	63	68	21	16
12	10	34	25			76	68	63	68	23	14
15	8	45	25			81	68	60	49	23	15
18	10	UNL	25			81	68	61	51	24	11
21	8	UNL	25			71	68	61	71	18	4
DAY 23											
00	3	UNL	25			72	66	62	71	23	8
03	0	UNL	25			68	63	61	84	00	0
06	0	UNL	15			68	64	63	81	20	4
09	4	UNL	15			68	66	63	84	26	6
12	4	UNL	25			69	68	66	90	14	7
15	10	UNL	25			64	67	58	38	21	8
18	10	250	25			63	68	60	48	18	9
21	8	UNL	25			74	66	63	68	14	9
DAY 24											
00	8	UNL	20			71	69	63	73	13	4
03	4	UNL	20			68	64	61	78	14	4
06	3	UNL	20			71	68	63	78	00	0
09	3	UNL	12			78	70	68	62	18	4
12	10	250	12			84	71	64	61	12	7
15	10	UNL	12			84	67	57	40	11	10
18	10	UNL	20			82	70	63	53	11	8
21	10	UNL	18			77	68	64	64	10	8
DAY 25											
00	0	UNL	20			73	67	64	74	12	7
03	0	UNL	20			68	65	63	81	13	7
06	4	UNL	10			72	67	64	78	12	7
09	10	11	7		F	70	68	66	87	18	12
12	8	UNL	7			81	72	70	68	12	14
15	3	UNL	7			84	74	70	63	12	14
18	2	UNL	7			83	74	70	68	12	10
21	0	UNL	8		H	78	71	67	68	14	13
DAY 26											
00	0	URL	8		H	74	68	67	78	13	10
03	10	11	5		H	73	68	67	83	13	9
06	10	12	2		H	77	68	66	78	18	10
09	10	11	2		H	77	70	67	71	18	14
12	8	UNL	7			84	74	70	63	14	14
15	3	UNL	7			88	78	68	53	18	18
18	10	40	10		TRW	73	68	67	82	00	0
21	9	100	12			71	68	66	84	00	0
DAY 27											
00	6	UNL	3		OF	60	58	55	87	00	0
03	0	UNL	12			64	62	61	90	22	8
06	0	UNL	19			68	65	61	78	08	6
09	0	UNL	20			78	67	63	66	08	6
12	0	UNL	25			81	68	63	64	12	7
15	0	UNL	25			82	68	61	48	14	7
18	0	UNL	25			84	70	63	53	14	8
21	1	UNL	25			79	67	63	64	11	7
DAY 28											
00	8	UNL	15			72	68	63	73	12	7
03	7	UNL	15			71	68	64	78	13	7
06	9	UNL	10			72	67	65	78	13	8
09	7	UNL	10			80	74	71	74	13	10
12	9	UNL	10			88	77	72	68	18	7
15	10	UNL	10			80	77	71	74	13	7
18	10	UNL	10			87	78	74	68	12	12
21	0	UNL	10			83	78	75	73	11	8
DAY 29											
00	0	UNL	7			80	74	72	77	14	7
03	2	UNL	8		H	78	74	72	82	15	7
06	2	UNL	7		H	77	72	71	82	19	10
09	2	70	3		H	81	76	72	74	18	12
12	10	80	7		TRW	79	71	68	62	36	9
15	10	80	7		T	73	68	66	78	11	7
18	10	100	7		RW	70	68	66	71	15	10
21	10	150	7			76	68	66	71	15	8
DAY 30											
00	3	UNL	7			74	68	64	71	18	9
03	7	130	7			71	68	64	78	14	7
06	7	UNL	6			72	67	64	78	14	4
09	2	UNL	6		H	78	73	70	74	18	6
12	1	UNL	5		H	87	76	72	61	00	0
15	1	UNL	2	0	H	87	77	73	65	13	10
18	2	UNL	2	0	H	86	76	72	65	17	8
21	10	31	6		TRW	72	68	65	75	36	8

NOTES

CEILING COLUMN-
UNL INDICATES NO UNLIMITED CEILING

WEATHER COLUMN-

+ TORNADO
T THUNDERSTORM
Q SQUALL
R RAIN
RW RAIN SHOWERS
ZR FREEZING RAIN
L DRIZZLE
ZL FREEZING DRIZZLE
S SNOW
SP SNOW PELLETS
IC ICE CRYSTALS
SW SNOW SHOWERS
SG SNOW GRAINS
IP ICE PELLETS
A HAIL
F FOG
IF ICE FOG
GF GROUND FOG
BD BLOWING DUST
BN BLOWING SAND
BS BLOWING SNOW
BY BLOWING SPRAY
K SMOKE
H HAZE
D DUST

WIND COLUMNS-

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH: I.E., 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS: MULTIPLY BY 1.15 TO CONVERT TO MILES PER HOUR.

ADDITIONAL DATA

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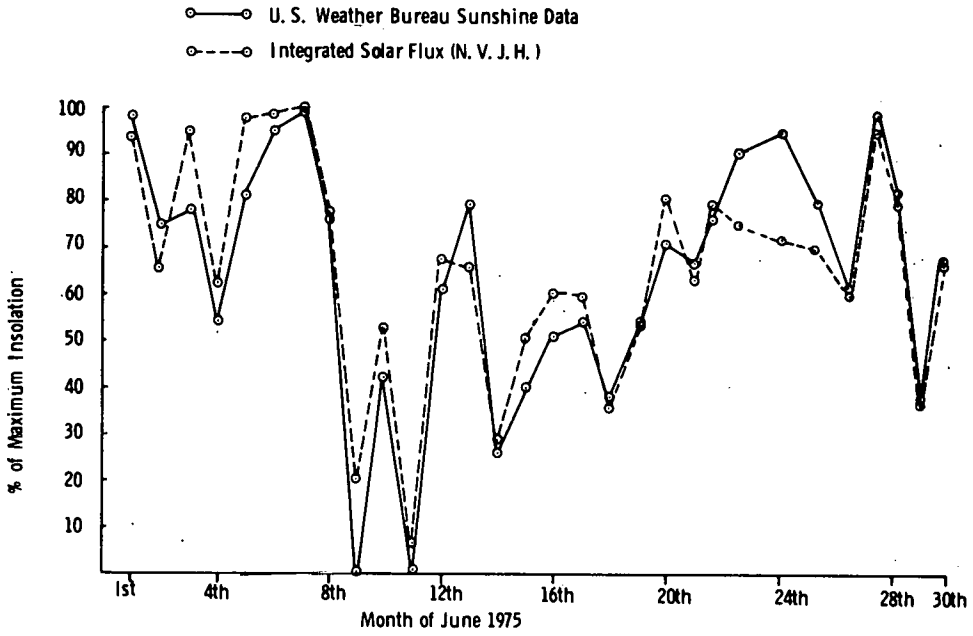
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