Prepared for
Office of Civil Defense
Department of Army - OSA
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OCD Work Unit 1212A

FINAL REPORT SUMMARIZING
SIMULATED OCCUPANCY SHELTER
TESTS CONDUCTED DURING THE PERIOD OF
July 5, 1962 through November 5, 1964

ENGINEERING AND INDUSTRIAL EXPERIMENT STATION

College of Engineering

University of Florida

Gainesville

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GAINESVILLE, FLORIDA

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This report is a summary, covering pertinent information obtained during a series of tests on survival shelters. Each of these tests has been documented in an individual interim report and specific information with respect to any of these tests should be obtained from the individual test report. This is the terminal report of a series, summarizing the work done by the University of Florida on contracts OCD-OS-62-116 and SRI B-64225(4949A-17)-US.

OCD REVIEW NOTICE

This report has been reviewed in the Office of Civil Defense and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Office of Civil Defense.

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SUMMARY

OF

RESEARCH REPORT

FINAL REPORT SUMMARIZING SIMULATED OCCUPANCY SHELTER TESTS CONDUCTED DURING THE PERIOD OF July 5, 1962 through November 5, 1964

Frank M. Flanigan
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DECEMBER 1966

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SUMMARY OF REPORT

A series of tests using simulated occupants were conducted on 24 underground survival shelters located in various geographical areas of the United States. The purpose of this test program was to evaluate changes in shelter environment brought about by shelter occupants. These shelters were loaded with simulated occupants in a manner similar to the loading anticipated during a national emergency brought about due to radioactive fallout as the result of a nuclear attack. A second objective of this program was to determine the minimum amount of mechanical equipment necessary to control the shelter environment to a level suitable for human survival. In accord with guidelines established by the Office of Civil Defense most of the test shelters were loaded on the basis of one occupant per ten square feet of floor area. However, special shelters such as the St. Louis Command Center were tested at lower loadings and during the course of the program other shelter loadings were used to investigate the effect of shelter loading on the environment within the shelter. Ventilation air was conditioned to conform to typical values of effective temperature for the test locale. Shelters were tested under simulated summer and winter climatic conditions. Simulated occupants were used and adjusted so as to release sensible and latent heat to the shelter atmosphere in quantities equivalent to those that would be released by human occupants.

Suitable ventilation air flow rates were determined for the shelters tested. An equation was developed based on the relationship between shelter environment, surrounding earth temperature, and ambient air effective temperature. This equation can be used to predict quantities of shelter ventilation air needed for maintenance of effective temperatures tolerable for human occupants of survival shelters. An arbitrarily selected value of 85 F effective temperature was considered the upper limit of human tolerance and was used to evaluate shelter environmental conditions.

It was further concluded that: (1) In most sections of the United States, the 3 cfm per occupant of ventilation air needed to control the chemical environment in underground shelters was not adequate to control the thermal environment in these shelters during summer occupancy, but was adequate for both chemical and thermal environmental control during the winter; (2) Prior use requiring heating or cooling of the shelter space or occupancy by human beings or other animals would be detrimental to the shelter environment when the space was converted to shelter use under emergency conditions; (3) A fire storm burning above an underground shelter would not adversely affect the thermal environment of the shelter, but could disturb the chemical environment; (4) Thermal conductivity of the earth surrounding a shelter was dependent to a large degree on the moisture content of the earth surrounding the shelter. The range of variation in soil conductivity throughout the test program geographic locations was within a range of 0.45 to 0.96 Btu $HR^{-1}FT^{-1}F^{-1}$; (5) Well water used in conjunction with water coils was effective in controlling shelter environment; (6) Evaporative type air coolers could be effective in controlling shelter environment but required more energy for operation than the muscular power of the occupants in a shelter could provide; (7) Desiccants as a means of humidity control or the operation of mechanical dehumidifiers in shelters would increase the shelter effective temperature and, therefore, would be detrimental to the shelter environment; (8) Fans and blowers should be adapted so that during interruption of the power service to shelters, these devices could be operated by the muscular activity of the shelter occupants, and such fans and blowers should be selected on the basis of overall operating efficiency rather than their rated air delivery.

ABSTRACT

A series of tests using simulated occupants were conducted on 24 underground survival shelters located in various geographical areas of the United States. The purpose of this test program was to evaluate changes in shelter environment brought about by shelter occupants. These shelters were loaded with simulated occupants in a manner similar to the loading anticipated during a national emergency brought about due to radioactive fallout as the result of a nuclear attack. A second objective of this program was to determine the minimum amount of mechanical equipment necessary to control the shelter environment to a level suitable for human survival. In accord with guidelines established by the Office of Civil Defense most of the test shelters were loaded on the basis of one occupant per ten square feet of floor area. However, special shelters such as the St. Louis Command Center were tested at lower loadings and during the course of the program other shelter loadings were used to investigate the effect of shelter loading on the environment within the shelter. Ventilation air was conditioned to conform to typical values of effective temperature for the test locale. Shelters were tested under simulated summer and winter climatic conditions. Simulated occupants were used and adjusted so as to release sensible and latent heat to the shelter atmosphere in quantities equivalent to those that would be released by human occupants.

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FOREWORD

Early in 1962, the Office of Civil Defense instituted a research program to investigate environmental conditions in survival shelters when such shelters were occupied on the basis of one occupant per 10 square feet of floor area. As a part of this program, a research contract was negotiated between the Office of Civil Defense and the Florida Engineering and Industrial Experiment Station, the latter being the Research Division, College of Engineering, University of Florida. This contract envisioned a series of simulated occupancy tests to be conducted in underground shelters under summer weather conditions encountered in various geographic locations throughout the United States. The purpose of this test program was to determine the minimum amount of mechanical equipment necessary for the control of environmental conditions in survival shelters at a level suitable for extended human occupancy.

An individual simulated occupant had been developed and used in tests conducted by the Mechanical Division of the National Bureau of Standards in a survival shelter that had been constructed, under Office of Civil Defense sponsorship, on the grounds of the National Bureau of Standards in Washington, D.C.[1*] This simulated occupant served as a model for those used by the University of Florida for simulated occupancy tests. The cited National Bureau of Standards report served as a guide for setting up and conducting tests in survival shelters during 1962.

Concurrent with the University of Florida test program, the National Bureau of Standards under a contract with the Office of Civil Defense was investigating the use of mathematical models in a computer program as a means of predicting survival shelter responses for variations in ground thermal properties, shelter configuration, and ventilation rates. The University of Florida cooperated with the National Bureau of Standards by supplying physical data with respect to geographic location, soil conditions, shelter structure and weather conditions at shelters under test by the University of Florida. In addition, actual test data concerning environmental conditions and soil temperatures surrounding the shelter were supplied to the National Bureau of Standards for use in their computer program to serve as a means of testing the validity of results obtained using mathematical models. Physical data and test results were supplied by the University of Florida to the National Bureau of Standards for all shelters tested during 1962 and 1963.

Concurrent with the University of Florida program and the National Bureau of Standards program, the Mechanical Research Division of American Machine and Foundry Company of Niles, Illinois, was awarded a contract by the Office of Civil Defense to develop a single simulated occupant capable of releasing moisture and sensible heat in metered quantities sufficient to simulate the effect of from 5 to 60 human beings. Under a separate contract, this same division was to develop a mobile laboratory for use in testing survival shelters. This laboratory was to have the capability and equipment necessary to supply ventilation air to survival shelters in quantities sufficient for a wide range of ventilation air flows. The equipment was also designed to have the capabilities of conditioning the supply ventilation air with respect to temperature and humidity so that typical summer conditions could be simulated at test sites throughout the United States in order that tests could be conducted independently of minor climatic variations at these test sites. These laboratories were to contain instrumentation capable of measuring and recording environmental conditions in the

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*Superscript numerals in body of report refer to list of references at the end of this report.

ambient air surrounding the shelters, and at selected points within the survival shelter under test. In addition, temperature recording equipment suitable for measuring ground temperatures surrounding the shelter was to be included.

During the period February - May, 1962, the University of Florida developed and constructed a similar mobile laboratory and under a subcontract, had 100 simulated occupants for the individual National Bureau of Standards type fabricated. These occupants and the mobile laboratory were tested and modified during June, 1962, and the first simulated occupancy test was conducted on the Summerlin Shelter in Gainesville, Florida, during July, 1962. In August, 1962, the first multiple Simoc developed by the Mechanical Research Division was delivered and tested in the Napier Shelter in Gainesville, Florida. Delivery of additional multiple Simocs was made during the fall of 1962 and these were used in testing the Central Stores Shelter at Gainesville, Florida, and a designated area shelter in Houston, Texas, the latter two tests being a combined effort of the University of Florida and the Mechanical Research Division of the General American Transportation Company (the Mechanical Research Division of the American Machine and Foundry Company had been transferred by sale to the General American Transportation Company in August, 1962). All of the tests conducted during 1962, utilized the mobile environmental laboratory which had been developed and constructed by the University of Florida.

In June, 1963, the first mobile laboratory developed under previously mentioned contracts between the Office of Civil Defense and the Mechanical Research Division was delivered to the University of Florida and used in a simulated occupancy test of a Civil Defense Command Shelter located in St. Louis, Missouri. This laboratory along with the University of Florida laboratory was used during the summers of 1963 and 1964 to carry out simulated occupancy tests on shelters ranging from family size shelters to those designed for public occupancy with capacities up to 1,000 occupants. In addition to supplying simulated occupants and a mobile laboratory to the University of Florida, the Mechanial Research Division of General American Transportation Company had a contract to build additional test equipment and to use this equipment in simulated occupancy tests to be conducted on above ground shelters.

During the summer of 1963, and the winter of 1963-64, and the summer of 1964, the Mechanical Research Division conducted a series of simulated occupancy tests on above ground shelters at various geographic locations throughout the United States. Early in 1964, delivery of a third mobile laboratory was made by the Mechanial Research Division to Guy B. Panero, Inc., a firm of consulting engineers in New York City for the purpose of expanding the aboveground shelter test program during the 1964 calendar year. Such a program was conducted by Guy B. Panero, Inc. on a series of survival shelters located in the Northeast section of the United States and covered one winter test in an underground shelter and several aboveground tests in designated shelter areas of existing buildings. The University of Florida contract was continued during 1963 and 1964, with one major change, i.e., the scope of work was expanded in 1963 to include the investigation of parametric relationships that might exist between test data obtained at various locations in the United States and was to include an effort to correlate such data and develop an equation or a series of curves which would enable prediction of environmental conditions in shelters which had not been tested and permit a study of equipment needs of such shelters with the ultimate end being to predict the necessary equipment needed for satisfactory environmental control in shelters that had not been tested. In November, 1964, the function of monitoring the test programs being conducted by the University of Florida was transferred from the Office of Civil Defense to Stanford Research Institute of Menlo Park, California and to this end a subcontract was negotiated between SRI and the University of Florida, covering a simulated occupancy test at Lakeside, California, the completion of progress reports on all previous tests and the preparation of a final report on certain tests conducted by the University of Florida under previous contracts with the Office of Civil Defense. In March, 1965, a subcontract was negotiated with SRI by the University of Florida to cover the preparation of a comprehensive report dealing with all test programs conducted by the University of Florida under contracts with the Office of Civil Defense and SRI.

Under contracts with the Office of Civil Defense and Stanford Research Institute, the following experiments, located as shown in Figure No. 1, were conducted:

Simulated Occupancy Test - Summerlin Shelter
Gainesville, Florida
July 5, 1962 - July 18, 1962

Simulated Occupancy Test - Broyles Shelter
Gainesville, Florida
July 30, 1962 - August 19, 1962

Simulated Occupancy Test - Napier Shelter
Gainesville, Florida
August 25, 1962 - September 25, 1962

Simulated Occupancy Test - Basement of Central Stores Building
Gainesville, Florida
September 14, 1962 - September 25, 1962

Simulated Occupancy Test - Reading Shelter
Reading, Pennsylvania
February 25, 1963 - March 18, 1963

Second Simulated Occupancy Test - Summerlin Shelter
Gainesville, Florida
April 9, 1963 - April 20, 1963

Simulated Occupancy Test - Hershey Shelter
St. Louis, Missouri
June 5, 1963 - June 19, 1963

Simulated Occupancy Test - St. Louis Control Center
St. Louis, Missouri
June 7, 1963 - June 24, 1963

Simulated Occupancy Test - Abo School
Artesia, New Mexico
July 10, 1963 - July 22, 1963

Simulated Occupancy Test - Francis Family Shelter
Tucson, Arizona
July 5, 1963 - July 15, 1963

Simulated Occupancy Test - Airport Utility Tunnel Shelter
Tucson, Arizona
July 19, 1963 - July 31, 1963

Simulated Occupancy Test - Irvingdale Shelter
Lincoln, Nebraska
August 29, 1963 - September 9, 1963

Simulated Occupancy Test - Roberts' Dairy Company
Omaha, Nebraska
August 6, 1963 - August 20, 1963

Simulated Occupancy Test - Expedient Community Shelter
Fort Belvoir, Virginia
September 8, 1963 - September 15, 1963

Simulated Occupancy Test - 200 Man Shelter
Fort Belvoir, Virginia
September 22, 1963 - October 11, 1963

Simulated Occupancy Test - 1000 Man Shelter
Fort Belvoir, Virginia
October 14, 1963 - October 29, 1963

Simulated Occupancy Test
Bozeman, Montana
February 17, 1964 - March 7, 1964

Simulated Occupancy Test - Bureau of Yards and Docks Protective Shelter
National Naval Medical Center
Bethesda, Maryland
February 28, 1964 - March 11, 1964

Simulated Occupancy Test - North Arvada Junior High School
Arvada (Denver), Colorado
June 15, 1964 - July 6, 1964

Simulated Occupancy Test - Quonset-Type Structure
Mercury, Nevada
September 8, 1964 - September 25, 1964

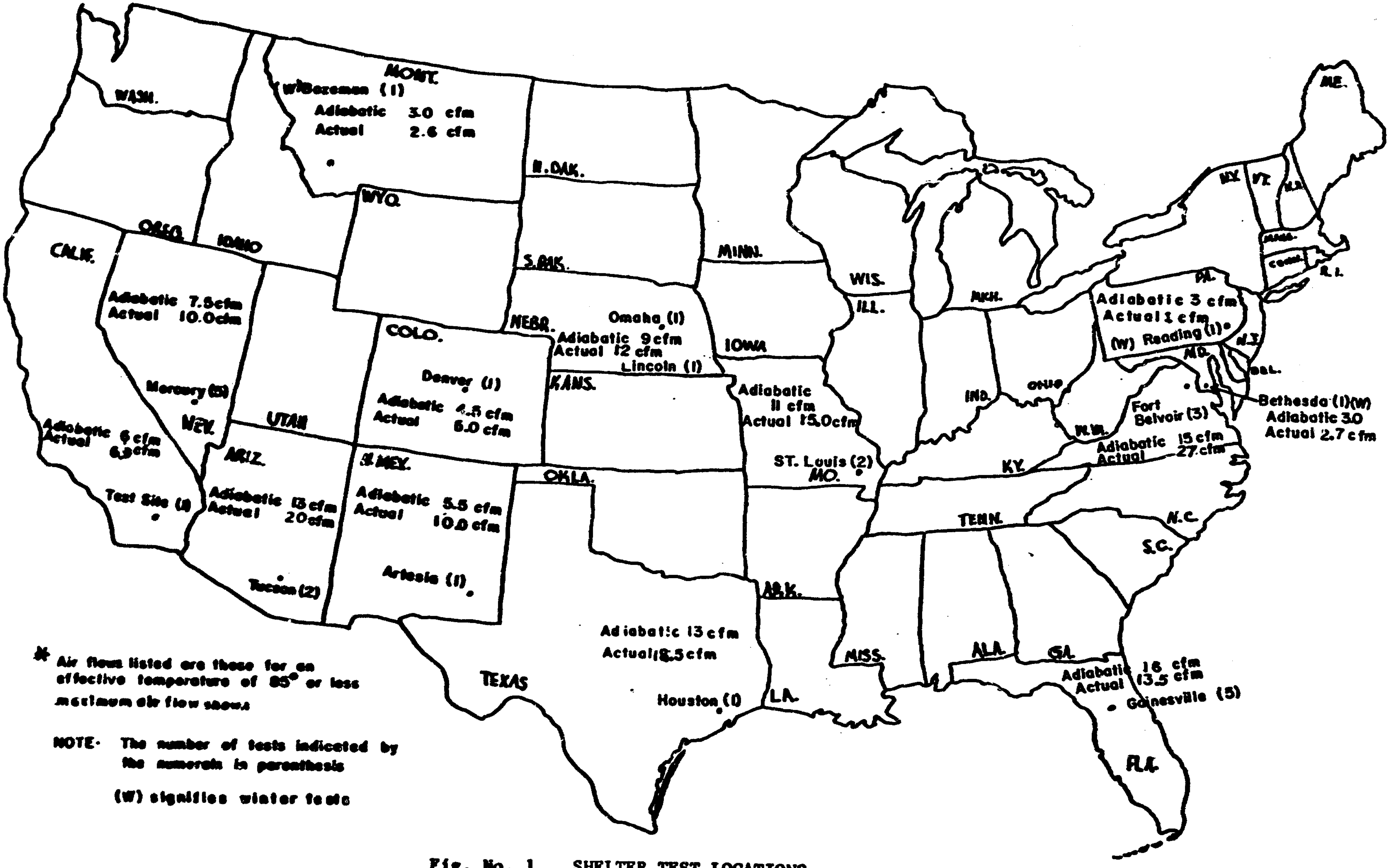
Simulated Occupancy Test - Underground Parking Garage
Mercury, Nevada
July 22, 1964 - September 3, 1964

Simulated Occupancy Test - Windowless Test Structure
Mercury, Nevada
August 18, 1964 - September 2, 1964

Simulated Occupancy and Thermal Response Tests of Three Identical Protective Structures
Nevada Test Site - Mercury, Nevada
July 10, 1964 - August 12, 1964

Simulated Occupancy Test - Underground Concrete Structure
Lakeside, California
October 14, 1964 - November 5, 1964

Each of the above tests was discussed in individual progress reports submitted to the Office of Civil Defense or to Stanford Research Institute as appropriate.



* Air flows listed are those for an effective temperature of 85° or less maximum air flow shown

NOTE· The number of tests indicated by the numerals in parenthesis

(W) signifies winter tests

Fig. No. 1. SHELTER TEST LOCATIONS

OBJECT

To conduct a series of summer and winter simulated occupancy tests on survival shelters ranging in size from a small (12 occupant) family shelter to a large (1000 occupant) community shelter, located at various geographic locations throughout the Continental United States and to measure the effect of such occupancy on the environmental conditions within the shelter under test.

To determine the minimum ventilation rate per occupant that would control both the chemical environment as to metabolic oxygen and carbon dioxide concentration in the shelter atmosphere and the thermal environment with respect to effective temperature within the shelter and to maintain these conditions at levels suitable for human occupancy in the shelter space for periods up to 14 days duration.

To study the test data obtained during this series of tests and to determine if a relationship could be developed between ambient environmental conditions, ground temperatures, shelter structural material and shelter configuration which would enable predictions to be made on untested shelters with respect to air flow requirements for maintaining desired effective temperature levels.

THEORY

For the purpose of this study of protective shelter environments, the human body may be considered as a "heat engine", and as such must dissipate heat to its surroundings. The ability of an individual to survive in an adverse thermal environment is related to the ability of the human body to secure energy and oxygen to maintain metabolism and to regulate the rate of heat dissipation from the body to maintain the body temperature within rather narrow limits. Heat may be dissipated by the mechanisms of conduction, convection, and radiation, and by the process of evaporating body moisture into the surrounding atmosphere. Thus, the body affects its environment, and under conditions where the energy storage capacities of the environment are limited, an adverse buildup of temperature or humidity or both may occur. The body, in order to continue to eliminate its waste heat, must then operate at a higher temperature, and this interaction between body and environment continuing, results finally in body temperatures which cannot long be sustained without permanent damage or death.

It is apparent that in many aspects, a study of shelter environments leads into the fields of psychology and physiology, as well as into the thermodynamics of heat sources and heat sinks. The authors, not versed in the former two fields, have of necessity taken many guide lines from the literature. Some of these are outlined below, others are cited throughout this discussion.

As a matter of considered policy, and in order to provide space for a large number of occupants at a minimum of cost, a criteria of 10 square feet of floor area per occupant has been selected as a minimum. Ceiling heights of 7 feet are usual. The resulting volume of 70 cubic feet is bounded at the minimum by 20 square feet of floor and ceiling and by a varying amount of wall area as determined by shelter configuration and size.

Previous work in the field of ventilating buildings and shelters indicates that 3 cubic feet per minute of ventilating air per occupant will supply sufficient oxygen to maintain a terminal carbon dioxide content of less than 0.5% by volume.[2] This percentage is considered below the threshold of undesirable reaction due to CO_2 gas. Thus, a minimum ventilation rate of 3 c.f.m./occupant has been established for protective shelters, and while it is possible that this rate will be sufficient for both ventilation and heat absorption in cold environments, the adequacy of this amount of ventilation air is one of the prime matters to be investigated in environmental studies under other climatic conditions.

Heat release rates of human bodies have been well established by previous investigations and are shown in Table 1 for the temperature range that might be expected in a survival shelter occupied during the summer months.

Table I

Observed Metabolic Heat Losses for Sedentary Adults*

Dry-Bulb Temperature F	Sensible Heat Loss, Btu/hr	Latent Heat Loss	
		Btu/hr	Lb water/hr
50	335	65	0.062
60	330	70	0.067
70	300	100	0.096
80	220	180	0.173
90	115	285	0.274
100	0	400**	0.384
110	-120	520	0.499

* Values taken from 1964 ASHRAE Guide and Data Book, Chapter 30, Page 338, Table 3

** 400 Btu/hr is equivalent to 117 Watts

It will be noted that as the temperature rises, the body dissipates more of its heat by evaporation and, thus, the latent heat load increases with an increase in the dry bulb temperature of the atmosphere surrounding the body. At, and above 100 F, all body cooling is taking place by means of evaporation.

The heat generated in a shelter by the occupants and other necessary equipment must be absorbed by the ventilation air or transferred through the boundaries of the shelter. If the rate of heat removal is not equal to the rate of heat production, then the temperature and/or humidity within the shelter will increase and in time the shelter will become uninhabitable.

The exact relationship which must exist between temperature and humidity to create conditions that cannot be tolerated by human occupants is open to some debate, and undoubtedly, varies to some degree from individual to individual and perhaps is related to the general state of health and age of a particular occupant. For the purposes of this report, it is assumed that the average occupant of the survival shelter cannot tolerate, for extended periods, conditions which are equivalent to a dry bulb temperature of 85 F and a relative humidity of 100%. In order to evaluate shelter conditions in terms of this tolerance limit, an effective temperature scale is used. Effective temperature may be defined as an empirical index of a human being's relative discomfort based on effects of temperature, humidity, and air motion. Thus, a dry bulb temperature in excess of 85 F, coupled with a relative humidity of less than 100%, can bring about a condition equivalent to 85 F and 100% relative humidity.

If the surroundings are hot, but at a low relative humidity, the body may not suffer undue discomfort and the same might be true of a cool but humid environment in which a larger proportion of metabolic heat would be lost by conduction or radiation. Various combinations of temperature and humidity might be expected to produce similar sensations or physiological responses within the body. The effective temperature index is a method of estimating the body's response to such varying conditions. Some effective temperatures are given in Table II; these values derived from a more complete presentation found in the literature.[3]

Indications were that environmental conditions in survival shelters would be most severe during summer occupancy. This followed from the fact that at this time, ventilation air temperature would be at its maximum, while ground temperatures would be approaching their maximum values. Generally, it was appropriate to conduct as many tests as possible during the periods of warm ground temperatures. In order that naturally occuring periods of atypical weather might not cloud the results, it was necessary to provide a source of ventilation air that had been conditioned as to temperature and moisture content. This was accomplished by the operation of an air washer and associated water chiller and heater as explained in the section entitled, "Air Handling Equipment". This equipment was adjusted each hour so that the ventilation air was caused to follow a synthetic "design day" whose temperature and humidity variations were constructed on the basis of a study of weather records for at least five years prior to the date of the test.[4]

In order that environmental conditions in a shelter be maintained at some predetermined value with respect to temperature and humidity, it is necessary to remove the sensible and latent heat released in the shelter at the same rate that such heat is being produced. Sensible heat may be removed by means of heat conduction through the walls of the shelter and by increasing the temperature of the ventilation air as it passes through the shelter. Thus, the dry bulb temperature of the entering ventilation air is a factor which controls the ability of the ventilation air to absorb heat and maintain a predetermined dry bulb temperature. In the case of underground shelters, the earth surrounding the shelter may provide a heat sink, provided that, the temperature level of the surrounding earth is lower than the temperature level being maintained within the shelter. In addition to being a heat bridge, the shelter structure and the earth surrounding the shelter structure may be porous enough to permit water vapor to migrate through the structure and into the earth surrounding the structure. At some point during such migration, dependent upon ambient climatic conditions, this migration will cease due to the fact that the water vapor will condense and give up its latent heat to the soil or to the structure and increase the moisture content at the point of condensation. Shelters constructed of concrete, wood, or other permeable material have a capacity for storing both sensible heat and moisture and if surrounded by earth, this storage capacity may be increased.

The ventilation air under certain conditions will have an ability to remove moisture from the shelter when such moisture is in vapor form. The amount of moisture that can be removed from the shelter by the ventilation air is dependent on the moisture content of the ventilation air as it enters the shelter, the quantity of ventilation air, the temperature of the ventilation air, and the path the ventilation air follows through the shelter. Since the ability of the ventilation air to remove sensible heat and moisture from a shelter is dependent on the dry bulb temperature of the air and the moisture content of the ventilation air, any test program that would be useful in determining occupied shelter conditions for a given geographic area should be conducted under climatic conditions which are typical of the geographic area. Since climatic conditions are subject to change from season to season, the

TABLE II EFFECTIVE TEMPERATURES
(Air Velocity 20 Feet/Minute)

Dry Bulb Temperatures, Degrees, Fahrenheit	Wet Bulb Temperatures, Degrees, Fahrenheit																										
	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62
110	92.9	92.4	91.8	91.3	90.8	90.2	89.8	89.4	89.0	88.5	88.0	87.6	87.2	86.8	86.4	86.0	85.6	85.3	85.0	84.6	84.2	83.8	83.5	83.1	82.8	82.5	82.2
109	92.7	92.3	91.7	91.2	90.6	90.0	89.6	89.3	88.8	88.3	87.8	87.4	87.0	86.6	86.2	85.8	85.5	85.1	84.8	84.4	84.0	83.6	83.3	83.0	82.6	82.2	81.9
108	92.6	92.1	91.5	90.9	90.4	89.8	89.5	89.1	88.6	88.1	87.6	87.2	86.8	86.4	86.0	85.6	85.3	84.9	84.6	84.2	83.7	83.4	83.1	82.8	82.4	82.0	81.6
107	92.5	91.9	91.3	90.7	90.2	89.7	89.3	88.9	88.4	87.9	87.4	87.1	86.6	86.2	85.8	85.4	85.1	84.7	84.3	83.9	83.5	83.2	82.9	82.5	82.1	81.8	81.3
106	92.3	91.7	91.2	90.5	90.0	89.5	89.2	88.7	88.3	87.7	87.3	86.8	86.4	86.0	85.6	85.2	84.9	84.4	84.1	83.7	83.3	83.0	82.6	82.2	81.9	81.5	81.1
105	92.1	91.5	90.0	90.3	89.8	89.3	89.0	88.5	88.0	87.5	87.0	86.6	86.2	85.7	85.4	85.0	84.7	84.2	83.8	83.4	83.1	82.7	82.4	82.0	81.6	81.3	80.8
104	91.9	91.3	90.7	90.0	89.6	89.2	88.8	88.2	87.7	87.2	86.8	86.4	86.0	85.5	85.2	84.8	84.4	84.0	83.5	83.2	82.8	82.4	82.2	81.8	81.4	81.0	80.6
103	91.7	91.1	90.5	89.8	89.4	89.1	88.5	88.0	87.5	87.0	86.5	86.2	85.7	85.3	84.9	84.5	84.1	83.7	83.3	82.9	82.5	82.2	81.9	81.5	81.1	80.7	80.3
102	91.5	90.8	90.2	89.6	89.3	88.8	88.3	87.7	87.3	86.7	86.3	85.9	85.5	85.0	84.6	84.3	83.8	83.4	83.0	82.6	82.3	81.9	81.6	81.2	80.8	80.4	80.0
101	91.2	90.6	89.9	89.5	89.0	88.6	88.0	87.5	87.0	86.5	86.0	85.7	85.2	84.8	84.4	84.0	83.5	83.1	82.7	82.4	82.0	81.7	81.3	80.9	80.6	80.1	79.7
100	91.0	90.4	89.7	89.4	88.8	88.3	87.7	87.2	86.7	86.2	85.8	85.4	85.0	84.5	84.1	83.7	83.2	82.8	82.5	82.0	81.7	81.4	81.0	80.6	80.2	79.8	79.5
99	90.8	90.2	89.5	89.2	88.5	88.0	87.4	86.9	86.4	86.0	85.5	85.2	84.7	84.3	83.8	83.4	82.9	82.5	82.1	81.7	81.4	81.1	80.6	80.3	79.9	79.5	79.2
98	90.6	89.9	89.4	88.9	88.3	87.7	87.2	86.8	86.2	85.7	85.3	84.9	84.5	84.0	83.5	83.1	82.6	82.2	81.8	81.5	81.1	80.7	80.3	79.9	79.6	79.3	79.0
97	90.3	89.7	89.2	88.6	88.0	87.4	86.9	86.4	85.9	85.5	85.0	84.6	84.1	83.7	83.2	82.7	82.4	81.9	81.6	81.2	80.7	80.3	80.0	79.6	79.3	79.0	78.6
96	90.1	89.5	89.0	88.3	87.7	87.1	86.7	86.1	85.6	85.2	84.8	84.3	83.8	83.3	82.8	82.5	82.1	81.7	81.3	80.8	80.4	80.0	79.7	79.3	79.0	78.7	78.3
95	89.8	89.3	88.6	88.0	87.4	86.8	86.3	85.8	85.3	84.9	84.4	84.0	83.5	83.0	82.6	82.2	81.8	81.4	80.9	80.5	80.0	79.7	79.3	79.0	78.6	78.3	77.9
94	89.6	89.1	88.3	87.7	87.1	86.5	86.0	85.5	85.1	84.6	84.1	83.6	83.2	82.7	82.3	81.9	81.5	81.0	80.6	80.1	79.7	79.3	79.0	78.6	78.3	78.0	77.6
93	89.4	88.8	88.0	87.4	86.8	86.3	85.7	85.3	84.7	84.3	83.7	83.3	82.8	82.4	81.9	81.6	81.1	80.7	80.2	79.8	79.3	79.0	78.6	78.3	78.0	77.6	77.2
92	89.2	88.5	87.8	87.1	86.5	86.0	85.4	84.9	84.4	83.9	83.4	82.9	82.5	82.0	81.6	81.2	80.8	80.3	79.8	79.4	79.0	78.6	78.2	77.9	77.6	77.2	76.9
91	88.9	88.2	87.5	86.8	86.2	85.7	85.1	84.6	84.0	83.5	83.0	82.6	82.1	81.7	81.3	80.9	80.4	79.9	79.4	79.0	78.6	78.2	77.8	77.5	77.2	76.8	76.5
90	88.6	87.9	87.2	86.5	86.0	85.3	84.9	84.2	83.7	83.1	82.7	82.3	81.8	81.4	81.0	80.5	80.0	79.5	79.1	78.6	78.2	77.8	77.5	77.2	76.8	76.6	76.2
89	88.3	87.6	86.9	86.2	85.6	85.0	84.5	83.9	83.3	82.8	82.4	81.9	81.5	81.1	80.6	80.1	79.6	79.1	78.6	78.3	77.8	77.5	77.1	76.8	76.6	76.2	75.8
88	88.0	87.3	86.6	85.9	85.3	84.7	84.2	83.5	83.0	82.5	82.1	81.5	81.2	80.6	80.2	79.7	79.2	78.7	78.2	77.9	77.5	77.1	76.8	76.5	76.2	75.8	75.5
87		87.0	86.3	85.7	85.0	84.4	83.8	83.2	82.6	82.2	81.7	81.2	80.7	80.2	79.8	79.3	78.7	78.3	77.8	77.5	77.1	76.8	76.4	76.1	75.8	75.4	75.2
86			86.0	85.3	84.7	84.0	83.4	82.8	82.3	81.8	81.3	80.8	80.3	79.8	79.4	78.8	78.3	77.9	77.5	77.1	76.8	76.4	76.0	75.7	75.4	75.1	74.9
85				85.0	84.3	83.7	83.0	82.4	81.9	81.4	80.9	80.5	79.4	79.4	78.9	78.4	77.9	77.5	77.1	76.7	76.4	76.0	75.6	75.3	75.1	74.8	74.5
84					84.0	83.3	82.7	82.1	81.6	81.0	80.6	80.1	79.5	79.0	78.5	78.0	77.6	77.1	76.7	76.3	76.0	75.6	75.3	75.0	74.8	74.4	74.2
83						83.0	82.3	81.8	81.2	80.7	80.2	79.6	79.1	78.6	78.1	77.6	77.2	76.7	76.3	76.0	75.6	75.3	74.9	74.7	74.4	74.1	73.7
82							82.0	81.5	80.9	80.3	79.8	78.2	78.7	78.2	77.7	77.3	76.8	76.4	76.0	75.7	75.3	75.0	74.6	74.3	74.0	73.7	73.3

* Tabular Values prepared from Effective Temperature Chart - ASHRAE Guide, 1963 - Page 111

proper selection of a typical day for use in connection with a shelter test is of utmost importance. The study of past Weather Bureau data for the test locality can be useful as a means of determining climatic trends and for anticipating climatic conditions in the future.

An examination of past Weather Bureau records for ambient temperature conditions for a given locality would reveal certain periods during a summer season when recorded wet bulb temperatures could be used to establish extremes in energy content (enthalpy) of the ambient air. Past experience in the air-conditioning field indicates that it is not good engineering practice to base typical design days on the maximum wet and dry bulb temperatures previously recorded for an area. It is common engineering practice to select wet and dry bulb temperatures which will not be exceeded for more than some arbitrarily selected percentage of the heating or cooling season. The same means as used in modifying the maximum temperature variations which result in a typical effective temperature day may be applied to modifying the maximum energy variations in the ambient air and would result in selecting values of wet and dry bulb temperatures which could be used as the basis for a typical ambient enthalpy day. The dry bulb temperatures selected in this manner would be coupled with an hourly variation in dew point for such a typical day.

Three possibilities for selecting typical ambient days are as follows:

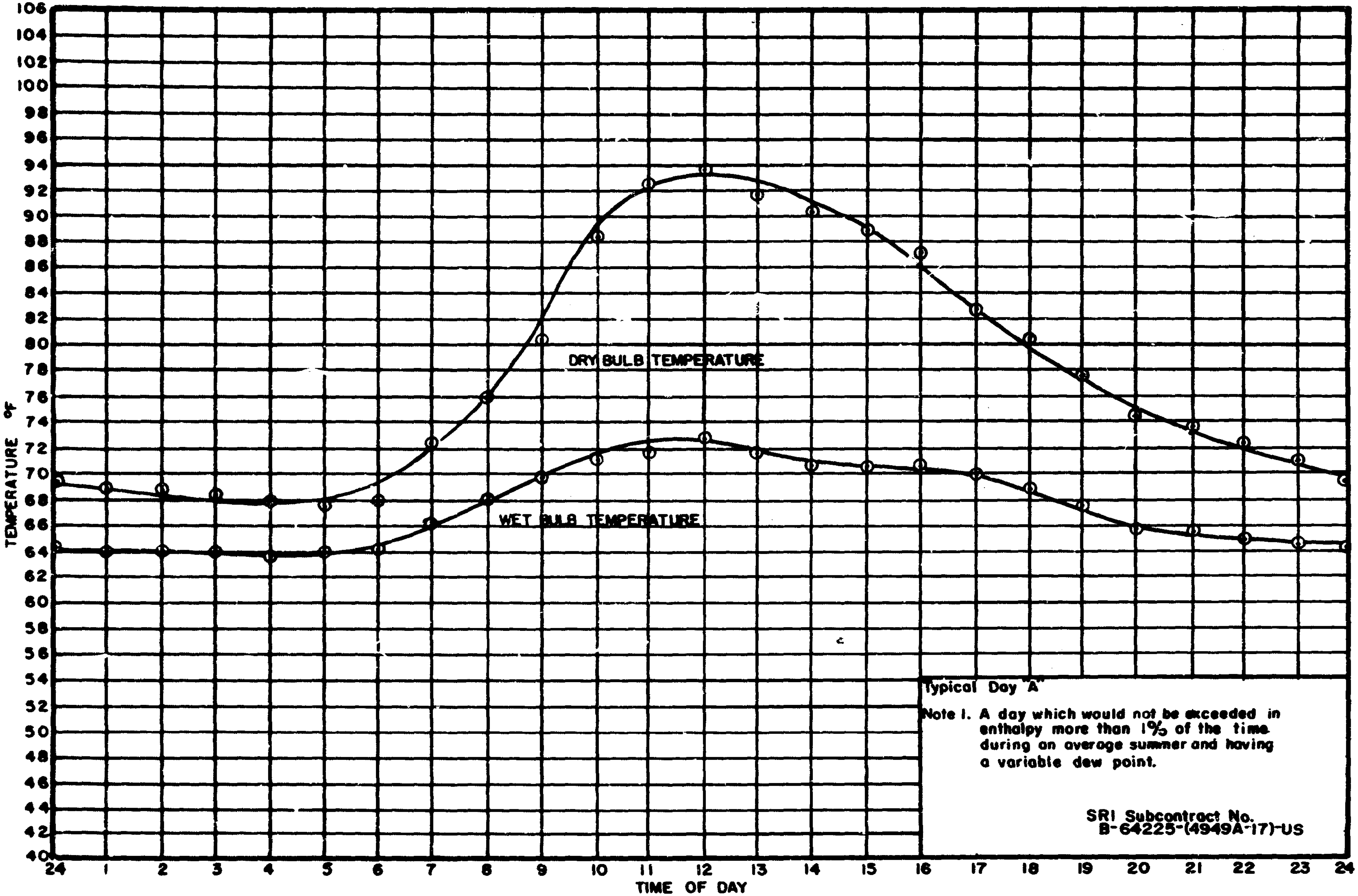
1. A typical enthalpy day using hourly variations in ambient dry bulb temperatures and hourly variations in dew point as a basis for conditioning shelter ventilation air.

2. A typical enthalpy day using hourly variations in ambient dry bulb temperatures and a constant dew point based on the average dew point for a typical day.

3. Selecting values of wet and dry bulb temperatures from past Weather Bureau records which give ambient effective temperatures that are not exceeded by more than some arbitrarily selected percentage for a given period of time and using these values of wet and dry bulb temperature as a standard for conditioning shelter ventilation air.

Figure Nos. 2a, 2b, and 2c are plots of wet and dry bulb temperatures which were used as typical days for a shelter test in Lakeside, California. These plots are based on the study of past Weather Bureau records for a 10-year period. The values of wet and dry bulb temperatures used to generate these curves represent temperature and humidity variations that would not be exceeded for more than 1% of the time during any summer season. The use of more than one design day may be necessary to properly test a shelter since an analysis of the Weather Bureau data indicates that in many cases the period of ambient climatic conditions in a given locality which are most severe with respect to energy content (enthalpy) are not always coincident with the periods of highest effective temperatures.

Since the soil surrounding underground shelters may serve as a heat sink for heat transferred from the shelter, the thermal conductivity of such soil is important since thermal conditions within the shelter are related to the rate of heat transfer through the shelter walls and through the soil. Figure No. 3 is a plot of thermal conductivity for various soils against moisture content

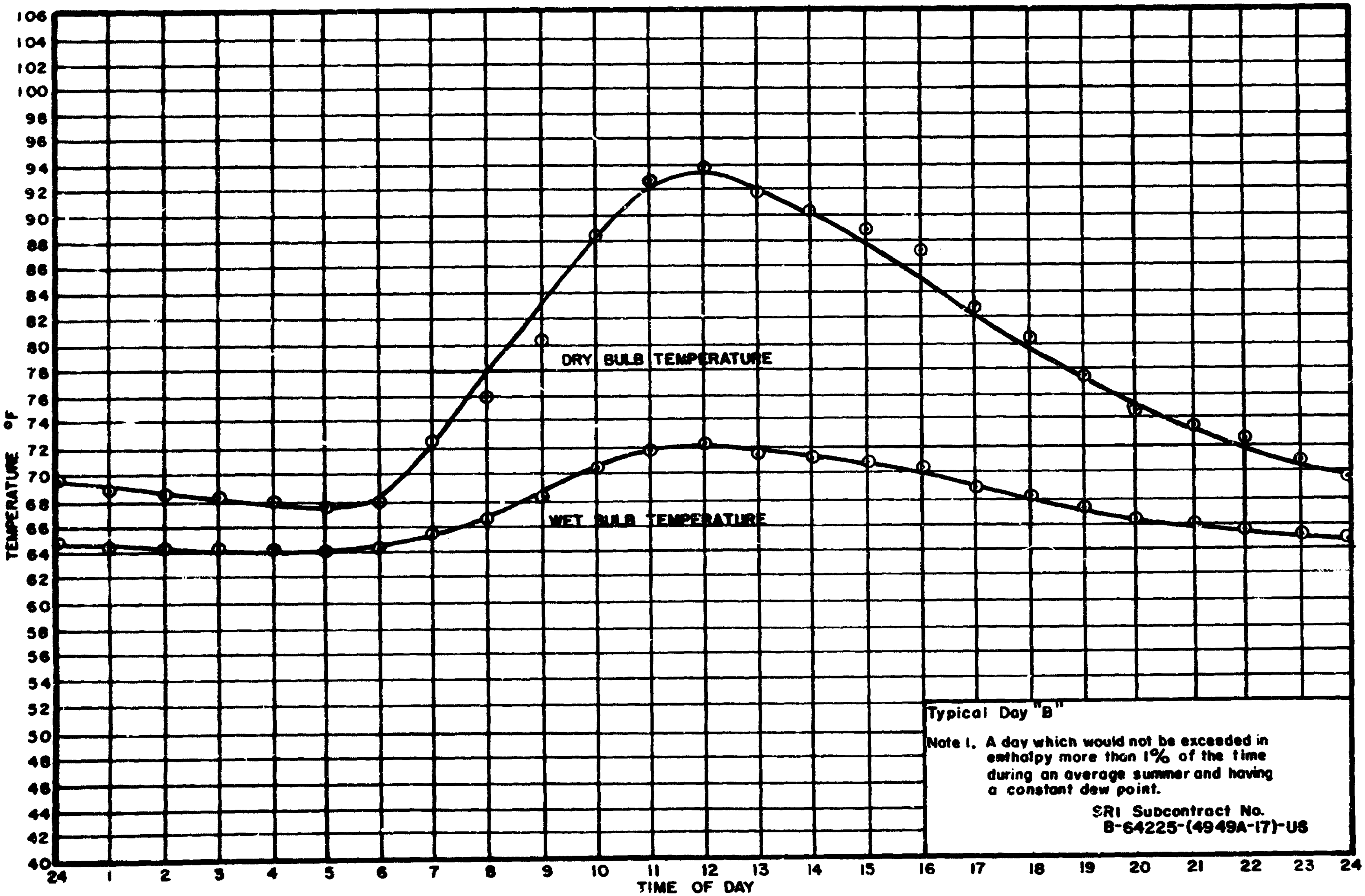


Typical Day "A"

Note 1. A day which would not be exceeded in enthalpy more than 1% of the time during on average summer and having a variable dew point.

SRI Subcontract No.
B-64225-(4949A-17)-US

Fig. 2a. TEMPERATURE VARIATION with TIME for HIGH DESIGN DAY,[1] LAKESIDE, CALIFORNIA

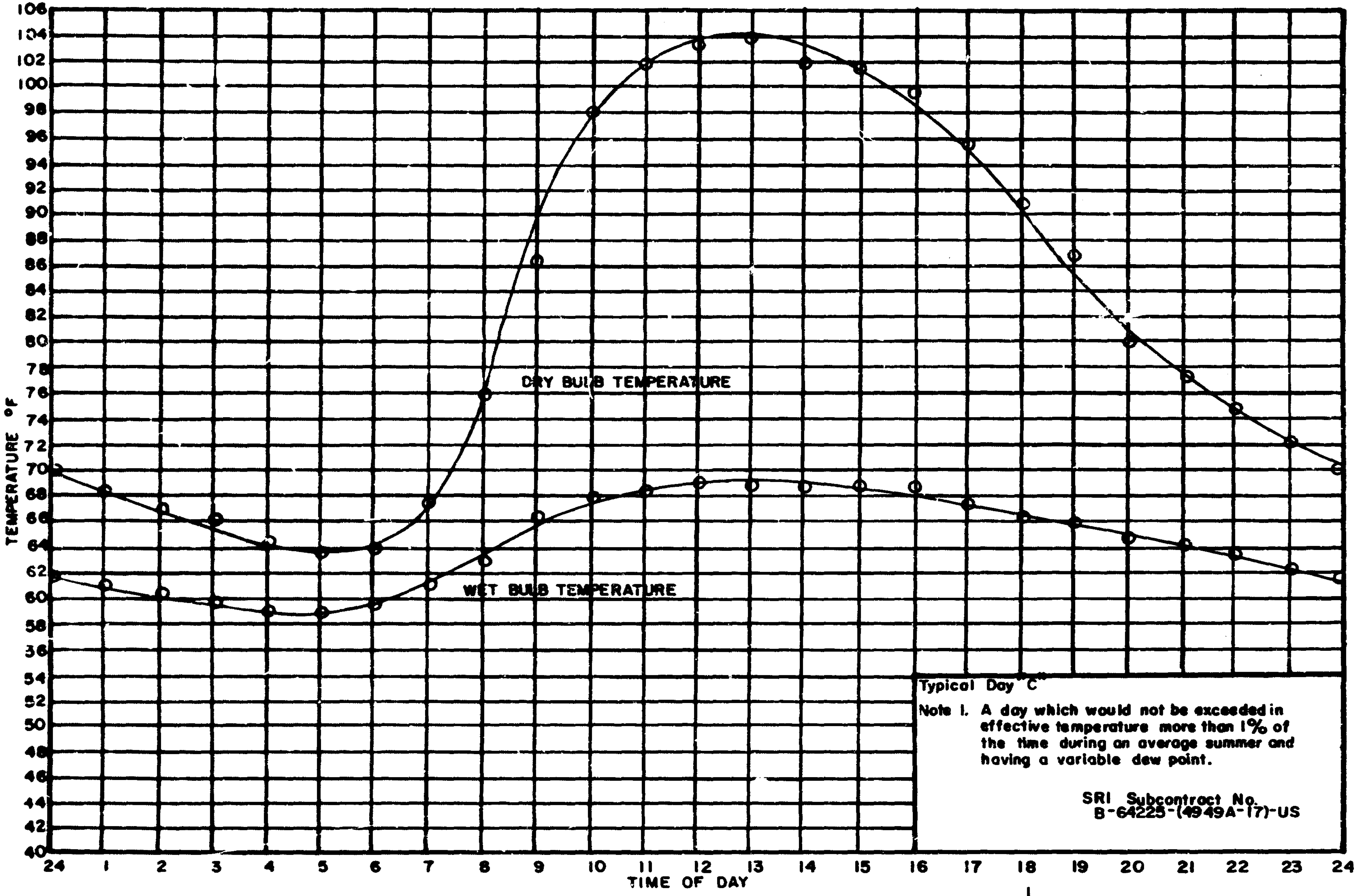


Typical Day "B"

Note 1. A day which would not be exceeded in enthalpy more than 1% of the time during an average summer and having a constant dew point.

SRI Subcontract No.
B-64225-(4949A-17)-US

Fig. 2b. TEMPERATURE VARIATION with TIME for HIGH DESIGN DAY,[1] LAKESIDE, CALIFORNIA

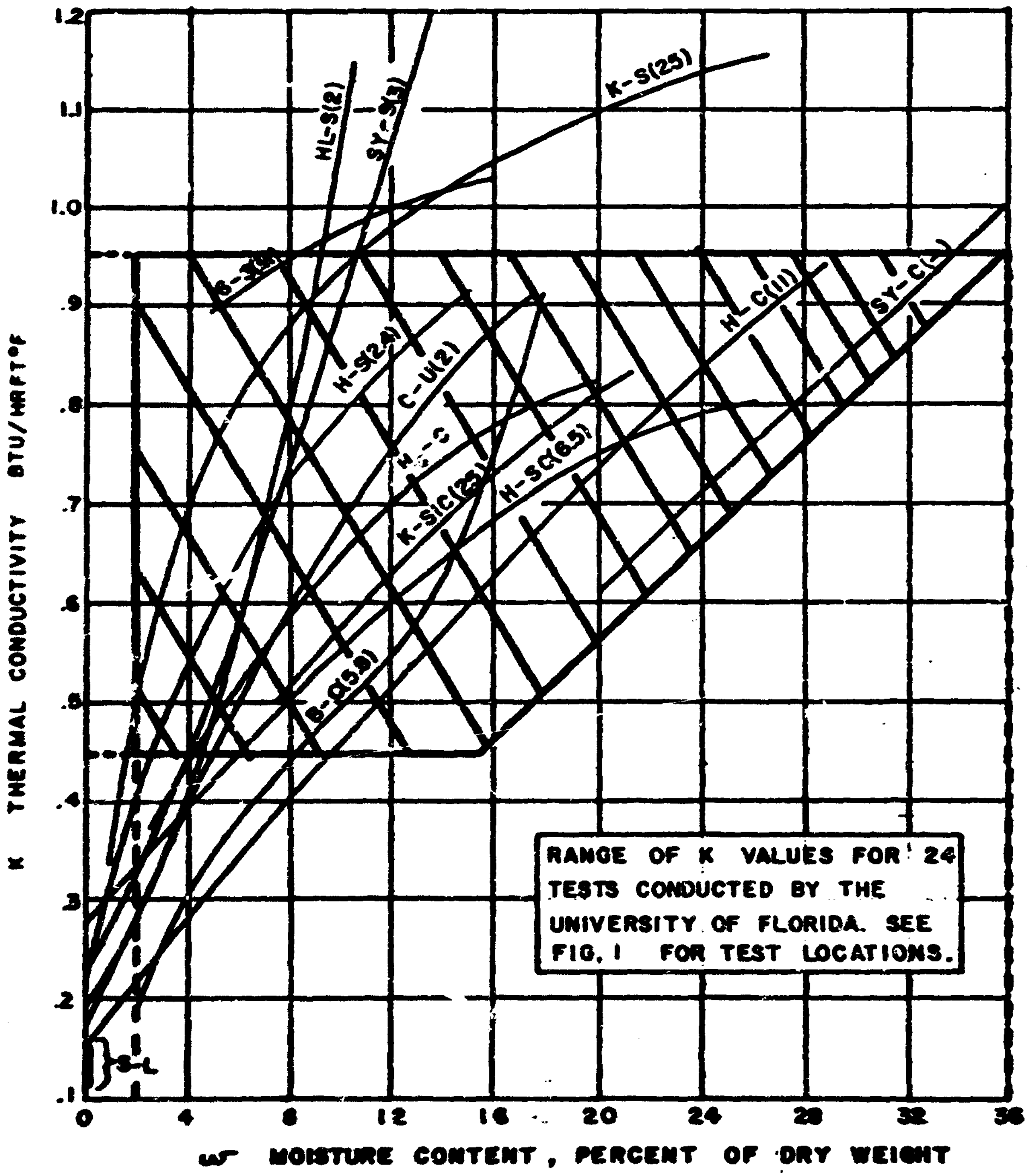


Typical Day "C"

Note 1. A day which would not be exceeded in effective temperature more than 1% of the time during an average summer and having a variable dew point.

SRI Subcontract No.
B-64225-(4949A-17)-US

Fig. 2c. TEMPERATURE VARIATION with TIME for HIGH DESIGN DAY[1], LAKESIDE, CALIFORNIA



SUMMARY OF THERMAL CONDUCTIVITY AS A FUNCTION OF MOISTURE CONTENT FOR VARIOUS SOILS AS MEASURED BY SEVERAL INVESTIGATORS (TAKEN FROM J.D.BOTTORF, PURDUE) UNIVERSITY THESIS, 1951

EXPLANATION OF SYMBOLS

FIRST SYMBOL, INVESTIGATOR

B- BOTTORF
C- COOGAN (9)
G- GEMANT (10)
H- HADLEY (7)
H_r- HARSEM (1)
HL- HOOPER & LEPPER (8)
K- KERSTEN (2)
SY- SMITH & YAMAUCHI (6)

SECOND SYMBOL, SOIL TYPE

S- SAND
SC- SAND CLAY
SIC- SILTY CLAY
C- CLAY
SL- SANDY LOAM
L- LOAM
U- UNSPECIFIED

THIRD SYMBOL

NUMBERS REPRESENT AVERAGE PERCENT DEVIATION OF DATA FROM THE MEAN CURVE SHOWN

"M" INDICATES CALCULATED VALUES BASED UPON A MODEL

Fig. 3. Soil thermal conductivity vs. moisture content taken from Bottorf's thesis

for the soils and indicates that the moisture content of soils is the prime controlling factor for soil thermal conductivity.[5] For this reason, the moisture content of the soil surrounding a shelter or in the locality where a shelter is proposed is a matter of prime importance if predictions are to be made concerning the ability of the soil surrounding a shelter to act as a heat sink.

If the assumption is made that the earth surrounding a shelter is not capable of absorbing or storing any of the heat released in a shelter, it would then become necessary to absorb all of the heat released within the shelter by means of the ventilation air passing through the shelter. For a given geographic location and a given set of Weather Bureau data covering such a location, it is possible to calculate the ventilation air required under adiabatic conditions to meet maximum predetermined environmental conditions within a shelter. Such calculations are based on assuming a series of maximum effective temperatures for the shelter interior, and calculating a corresponding air flow for each effective temperature. The resulting values of effective temperatures may be plotted against air flows. Such a curve could be used as a basis of comparison or prediction and as an indication of the effectiveness as a heat sink of the earth surrounding a real shelter. A typical adiabatic ventilation curve is shown in Figure No. 4.

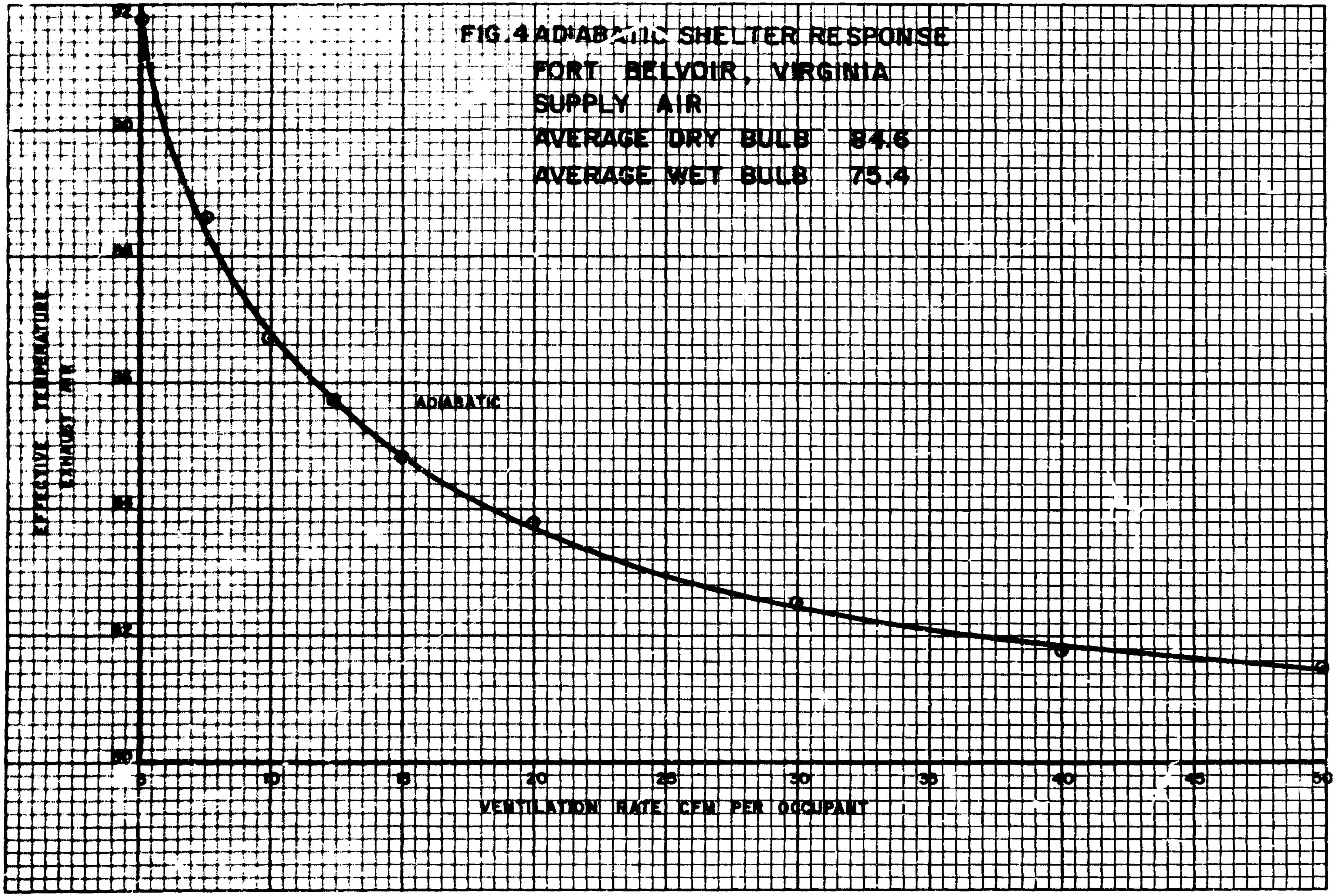


FIG. 4 ADIABATIC SHELTER RESPONSE
FORT BELVOIR, VIRGINIA
SUPPLY AIR
AVERAGE DRY BULB 84.6
AVERAGE WET BULB 75.4

SHELTERS

This report covers simulated occupancy tests conducted in 24 shelters located in various geographic areas of the Continental United States (See Figure No. 1 for the exact location for each test). In addition to the 24 tests covered in this report, the University of Florida assisted the Mechanical Research Division of the General American Transportation Corporation in a simulated occupancy test in a designated shelter in Houston, Texas. Of the 25 test shelters, one shelter was completely above ground and had no earth covering. Two shelters, the Central Stores Shelter, Gainesville, Florida, and the Police Garage, Houston, Texas, were partially below ground. All of the other test shelters were either completely below ground or else had earth mounded around them to afford a minimum of 36 inches of earth cover around the sides of the shelters. In two cases, the Abo School, Artesia, New Mexico, and the Irvingdale Shelter, Lincoln, Nebraska, the test shelters had concrete reinforced roofs but no earth cover on the roof. The test shelters varied in size from a family type shelter of 12 occupant capacity (Broyles Shelter, Gainesville, Florida) to a 2000 occupant community shelter (Irvingdale Shelter, Lincoln, Nebraska) and varied in configuration from vertical cylinders with spherical roofs (Francis Shelter, Tucson, Arizona) to long, narrow, tunnel like structures (Tucson Airport Utility Tunnel, Tucson, Arizona) with the majority being rectangular in shape (the Hershey Shelter, St. Louis, Missouri, and the Irvingdale Shelter, Lincoln, Nebraska). The majority of the shelters were made up of reinforced concrete, however, some of the shelters were constructed of concrete blocks with reinforcing rods passing through the voids in the blocks and the voids filled with mortar as the shelter was laid up. Some attempt had been made to waterproof either the exterior or the interior of all of the shelters that were constructed of concrete or concrete products. Three shelters were of steel construction. One, the Summerlin Shelter, Gainesville, Florida, was made up of welded steel plate treated with a protective coating to prevent rust and anchored in the ground by means of submerged screw type "dead men". The Navy Shelter at Bethesda, Maryland, and the Quonset Type Structure at Mercury, Nevada, were made up of arched, corregated steel plates reinforced with steel I-Beams and mounted on a concrete slab.

Several of the test shelters had had previous occupancy and some of the shelters were serving a dual purpose. For example: The Command Post, St. Louis, Missouri, was used as office space for Civil Defense personnel; the basement of the Arvada School, Denver, Colorado, was used as a recreation and dressing room area; and the Abo School, Artesia, New Mexico, served as a regular school and had the secondary purpose of a survival shelter.

In general, the shelters did not have mechanical equipment installed and with the exception of the Navy Shelter in Bethesda, Maryland, had not been occupied by human beings under survival shelter loading conditions. Where shelters did have ventilation equipment installed, the adequacy of such equipment was checked during the simulated occupancy tests. Such shelters were the Abo School, Artesia, New Mexico, the St. Louis Command Center, St. Louis, Missouri, and the Reading Shelter, Reading, Pennsylvania. In the 1000 man shelter, Fort Belvoir, Virginia, an attempt was made to evaluate the air distribution system within the shelter.

In the case of the underground shelters and those that were partially buried, soil samples were taken at various points surrounding the shelter. Records were maintained to determine the density of the soil and the moisture content. In some cases, the coefficient of heat transfer was computed for a particular soil.

An effort was made to select shelters in such a manner that the test program would cover a wide variation of climatic conditions and that tests would be conducted in localities where climatic conditions were severe with respect to temperature and humidity. In addition, an effort was made to select shelters that would give a cross section with respect to configuration, type of material and type of soil surrounding the shelter in order that some general conclusions on environment, with respect to typical shelters, could be defined. Shelters were tested under summer and winter conditions, the winter tests being conducted at Bozeman, Montana, and Reading, Pennsylvania, and in localities of high and low ground temperatures. With a single exception all tests were conducted using simulated occupants, the exception being Roberts' Dairy Test near Omaha, Nebraska, where an underground shelter designed for the protection of breed stock in the dairy industry was tested using live cattle.

Simulated Occupants In order to simulate the heat and moisture released by human beings that would normally occupy the shelters that were tested during the course of research work described in this report, it was necessary to use devices that simulated the metabolic heat release rates of human beings. Since the shelters tested under the research program covered by this report varied in size from small family shelters (12 occupants) to large community shelters (1,000 occupants), it was necessary to use two types of simulated occupants. One, an individual simulated occupant capable of releasing the heat and moisture typical of the metabolic heat release rate of a single human being and two, a Mass Simulator which consisted of a single device suitable for releasing the heat and moisture that would be associated with a group of shelter occupants. These devices were called Simocs and in the case of the device that simulated groups of human beings are referred to as Mass Simocs. In general, the individual Simoc was used for loading shelters that did not exceed 100 occupant capacity. It was found that the associated plumbing for metering the latent water to each Simoc and the electrical controls necessary for metering the electrical input to each Simoc became complicated and difficult to control where more than 100 Individual Simocs were used. In general, the Mass Simocs were used in shelters designed for more than 100 human occupants, however, on occasion, shelters designed for 50 occupants were tested using the Mass Simoc. Test experience indicated that the Mass Simoc could be used for simulation of shelter occupants as long as the volume of the shelter under test was such that the air currents created by the Mass Simoc fan did not disturb the air flow through the shelter and did not disturb the overall heat transfer coefficient through the shelter walls. Mass Simocs could probably have been used in shelters designed for 30-35 human occupants, but, in order to have a margin of safety, no tests were conducted where Mass Simocs were used in a shelter designed for less than 50 occupants. Each of the simulated occupants will be described in detail in the paragraph that follows.

Individual Simulated Occupant These devices hereafter referred to as Simocs were designed to approximate the metabolic heat release of an average adult human being. The individual type Simoc was copied from a design originated by the United States Bureau of Standards and used by them in a pioneer test of protective shelter environment under simulated occupancy conditions.[1] It consisted of two concentric cylinders of sheet metal, 38 inches high. The outer cylinder had a diameter of 22 inches and was closed at one end by a conical cap 5-1/2 inches high. Both the cylinder and cone were covered by a closely fitted sheath of toweling material of the type known as "huck" and commonly used for drying dishes. The inner cylinder had a diameter of 15 inches. This inner cylinder was insulated with 1/2 inch of glass fiber on its exterior surface and was open at top and bottom. The entire device rested on a two foot square sheet metal base with a retaining rim of 2 inches on all sides. At the center of this base, an electric socket was mounted and fitted with a 660-watt cone-type electric heating element. The entire assembly was supported on a base consisting of a sheet of 1/4 inch exterior type plywood resting on a layer of 2 inches (uncompressed thickness) of glass fiber insulation. The construction of the individual Simoc may be seen in Photograph No. 1. In the background may be seen the variable transformers employed to reduce the voltage impressed on the heater element.

The heating element was operated at a reduced voltage so that the heat output was 117 rather than 660-watts. In this manner, the surface temperature of the heating element was kept low, and it was considered that energy transfer by radiation was greatly reduced. The insulation of the inner of the two cylinders further served to reduce radiation. A thermal current was set up in the inner cylinder, rising through the center and returning through the annular

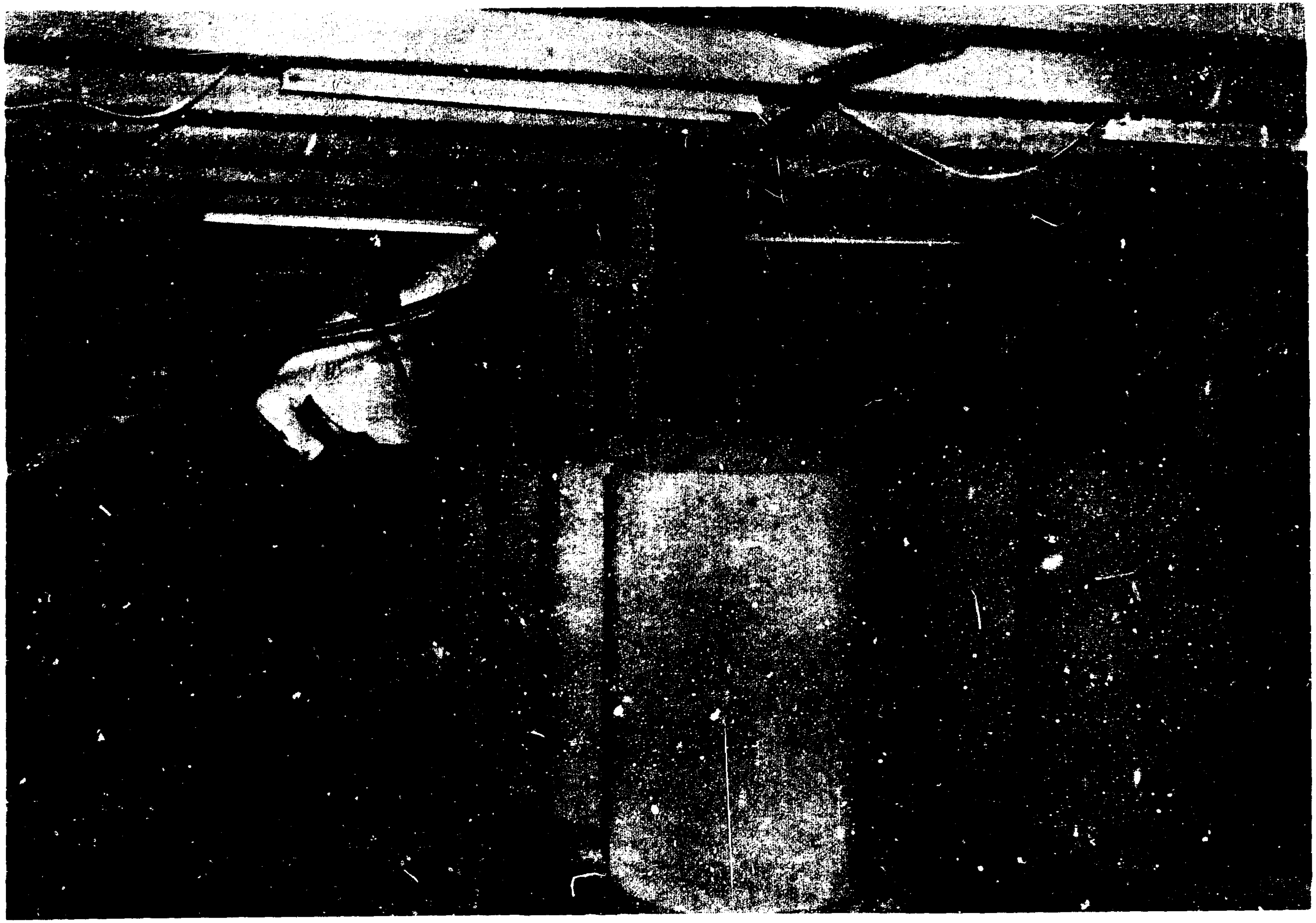
Photograph No. 1. Individual Simulated Occupant and Regulated Power Supply space between the inner cylinder and the outer cylinder. The Bureau of Standards evaluated surface temperatures between the outside metal surface and the surrounding cloth cover and found them to range from 90 to 95 F, so the "skin" of the Simoc very closely approximated the temperature of human skin. It might be mentioned here that the outside area of the Simoc, 21 1/2 square feet, is the same as the skin area of the average male adult.

By supplying water to the apex of the cone which made up the "head" of the Simoc, the entire top and a circumferential band of cloth could be wetted. The heat from the interior of the device caused the water to evaporate, thus simulating the latent heat release from the skin and lungs of a human occupant. Since the total heat output of the electric element was kept constant at 117 watts, or 400 Btu per hour, the latent heat fraction could be varied as more or less water was supplied. Although no exhaustive tests were conducted, it was determined that "huck" toweling was superior to "terry" cloth and to felt, as a surface on which to disperse and evaporate the water supplied to the Simoc. When "huck" toweling was employed, the Simoc would wet evenly from top to bottom under conditions of high humidity.

A typical installation of the Individual Simoc in a test shelter is shown in Photograph No. 2. Also shown in this view are two of the metering distributing devices that supplied water to each Simoc. Water supplied .the Simocs was first treated in the zeolite softener shown to prevent a buildup of insoluble salts on their cloth coverings.

Mass Occupant Simulator This device hereafter referred to as a Mass Simoc was designed to simulate the heat and moisture produced by the metabolic process of a group of human beings and was equipped with a heat and moisture source coupled and arranged in such a manner that a single unit could simulate the heat and moisture release of up to 60 human beings. An adjustment in the number of occupants to be simulated could be made by regulating the electrical energy input to the heating element which was a part of this device. Regulation of the moisture delivered by the atomizing section of the device was accomplished by varying the stroke of a sensitive metering pump. Moisture regulation was limited to the extent that the settings of moisture delivered by the pump were arranged in increments which simulated the moisture release equivalent to five human beings. Thus the capacity of this device could be adjusted to simulate from five to sixty occupants in increments of five occupants. The electrical adjustment available on this device permitted the heating element in the device to produce heat through a range of from 0 - 7 1/2 kilowatts. This device was developed under a research and development contract negotiated between the Office of Civil Defense in Washington, D. C. and the Mechanical Research Division of the American Machine and Foundry Company of Niles, Illinois, (this Division was transferred by sale to the General American Transportation Company as of August, 1962).

The Mass Simoc consisted of a whirling disc atomizer which supplied a mist of water droplets which were picked up in a stream of air that was produced by a propeller type fan. Before the air stream from this fan came into contact with the droplets, the air had been forced through a heating element. At the discharge side of the Mass Simoc there was formed an envelope which contained heated air in contact with water droplets and, depending upon the amount of water delivered by the atomizer and the amount of heat delivered by the electric heater, both latent and sensible heat were released into the shelter area. The fan, heater, and atomizer are shrouded and heated air and moisture are discharged through a circular



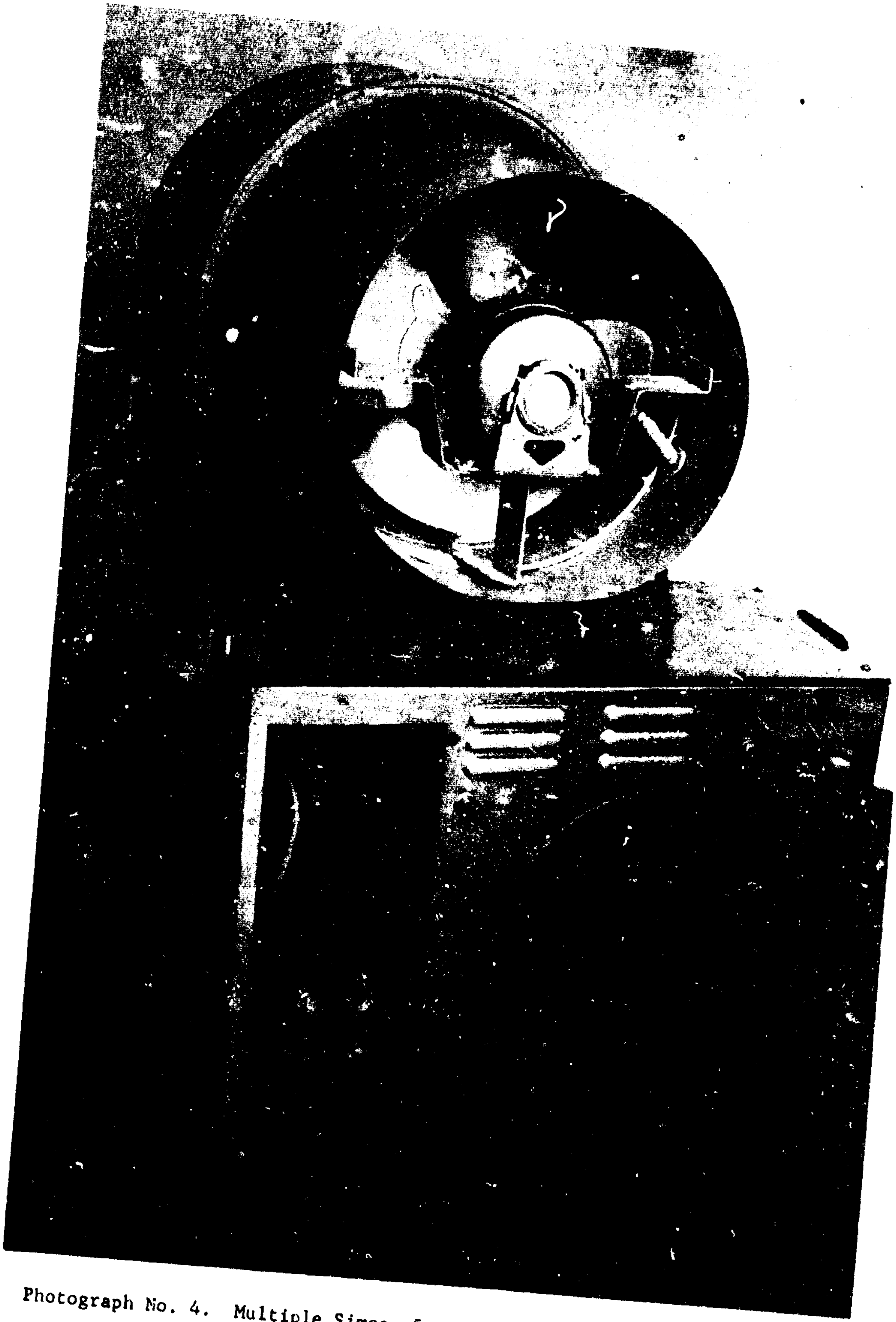
Photograph No. 2. Typical Installation of Individual Simocs and Metering-Distributing Devices for Water Delivery to Each Simoc opening. Photographs of Mass Simocs looking into the heater and shrouded discharge and a rear view are shown on the next pages. See Photograph Nos. 3 and 4.

The discharge from this type of Simoc is directional in character and care needed to be exercised to prevent water impingement upon the walls of the shelter and insure equal distribution of the heat released by the Simoc. The Mass Simoc contained a transducer which sensed dry bulb temperature in the shelter area and controlled a variable stroke metering pump which adjusted the water flow to the air stream in accordance with the ambient temperature in the shelter. Thus, the latent load within the shelter followed ambient temperature changes in the same manner that the latent load in a shelter would follow these changes if actual human beings were used as subjects. Photograph No. 5 shows a typical installation using Mass Simocs as a means of loading a test shelter.

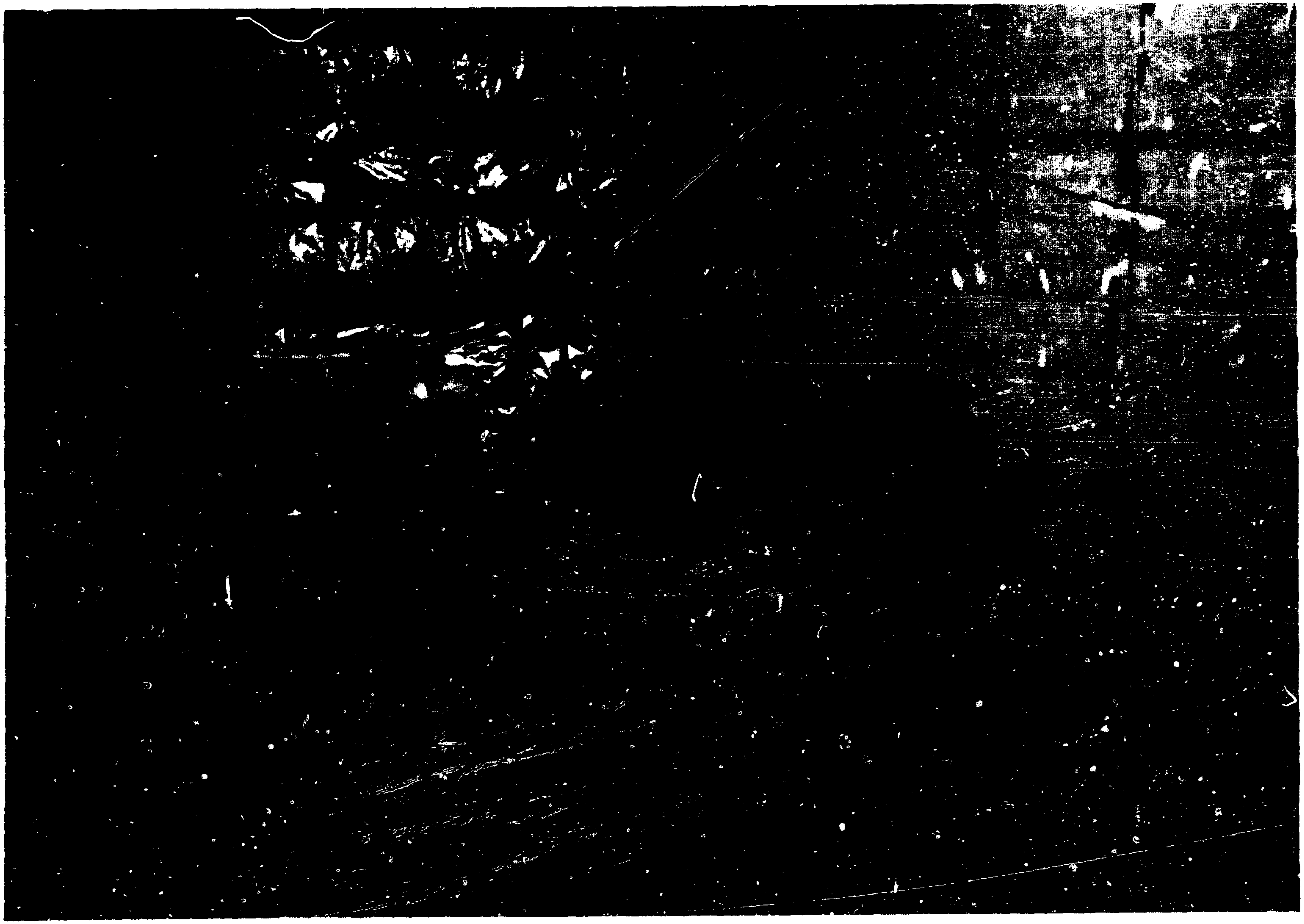
In order to check up on the validity of the use of simulated occupants and to test the accuracy of these occupants as substitutes for human occupants, a test was conducted in a shelter that had previously been occupied by human occupants. Environmental conditions with respect to ventilation air and surrounding soil were either controlled or selected in such a manner as to duplicate the tests conducted with the human beings so that the only variable was the substitution of the simulated occupant. As a result of this test, it was determined that the simulated occupants were a suitable replacement for human occupants. This test is described in detail in a progress report covering a simulated occupancy test of the Bureau of Yards and Docks Protective Shelter, National Naval Medical Center, Bethesda, Maryland.[6]

As a means of calibrating the Mass Simoc and comparing it to the Individual Simoc, a test was conducted in a shelter containing 1600 square feet of floor area. This test indicated that the Mass Simoc was capable of duplicating the effects brought about on the environment of an enclosed space in the same manner as an Individual Simoc. This test consisted of alternating the loading of a shelter between Individual Simocs and Mass Simocs and observing the results as recorded with respect to environment to determine if discontinuities existed. From an examination of the data, it was not possible to tell when the loading was changed from one type of Simoc to another type of Simoc and it was concluded that in shelters of this size that the Simocs could be used with complete interchangeability. For more details of this calibration test, refer to progress report covering simulated occupancy test, Napier Shelter, Gainesville, Florida.[7]

Photograph No. 3. Multiple Simoc—5 to 60 Occupant Capacity



Photograph No. 4. Multiple Simoc—5 to 60 Occupant Capacity (Rear View)



Photograph No. 5. Typical Test Shelter Using Mass Simocs

Air Handling Equipment

In order to maintain control of environmental conditions as related to ventilation air and to make test results for a particular shelter independent of minor climatic changes which might occur during the time that such a test program was in progress, it was deemed necessary to have equipment available for conditioning ambient air to meet the requirements of a typical high design day, for climatic conditions in the location where the test was to be conducted. Conditioning of the ventilation air was accomplished by means of a combination air washer and air reheater located in an equipment trailer. The ventilation air was passed through the air washer which could be supplied with chilled or heated spray water. In this manner the ventilation air could be heated, cooled, humidified, or dehumidified as needed to meet the conditions of the design day. The actual conditions of the ventilation air with respect to moisture content were controlled by sensing and controlling the dew point of the air as it left the air washer. After leaving the air washer, the ventilation air was passed through a reheat section which consisted of a series of finned coils with hot water passing through the inside of the coil and the ventilation air being forced across the finned side of the coil. Thus, any desired dry bulb temperature could be maintained within the limits of the water temperature available for the coils. The water temperature within the coils and the amount of water flow through the coils was controlled by a rotary cam whose profile was cut to reproduce the dry bulb temperature called for by the typical design day for the locality where a test was to be conducted. Figure Nos. 2a, 2b and 2c as discussed in the section on THEORY are typical of the type of curve used to control environmental conditions for the ventilation air supplied to a test shelter.

During periods when the desired conditions in the ventilation air supply differed greatly from outside ambient conditions, it was necessary to supplement the humidifying and/or heating capacity of the equipment. This was accomplished by returning a portion of the shelter exhaust air directly to the air handling equipment inlet, thus conserving the moisture or heat which had been added during its passage through the shelter. Photograph No. 6 shows a typical shelter test in process and shows the equipment trailer and associated air handling equipment along with the recirculating air duct which is attached to the side of the equipment trailer.

Control of the volume of ventilation air was accomplished by variable area louvers ahead of the main blower, and by a variable diameter pulley in the drive train of the blower. During periods of very low air flow, it was also possible to "dump" conditioned air and thus maintain a sufficient load on the equipment to ensure adequate control.

Photograph No. 6. Air Handling Equipment, Instrumentation Trailer and Recirculating Duct.

Instrumentation

As outlined in the section entitled THEORY, the study of the thermal behavior of a protective shelter being tested under simulated occupancy conditions involved both measurement and control. In such a test program, there are five energy and/or material flows of significance. They are listed as follows: supply ventilation air, exhaust air leaving the shelter, electrical energy for simulating heat release by Simocs, water for simulation of latent heat by Simocs and heat loss by conduction through the shelter to the surrounding earth. Temperature of the supply ventilation air and the exhaust air from the shelter were measured with copper constantan thermocouples and the output from these thermocouples was indicated and recorded by Brown Electronic Potentiometers. Psychrometric properties of the supply ventilation air and the exhaust air from the shelter were measured by similar thermocouples incorporated in an aspirating psychrometer developed for the purpose. Electrical energy supplied to the Simocs was computed as the product of electrical volts and amperes measured in the power supply circuit. Water supplied to the Simocs for the purpose of simulating the latent heat load was determined as the quantity which was needed to refill a calibrated tank after overflow had been collected and returned to the calibrated tank. Soil temperatures in the soil surrounding the shelters under test were determined at selected points by means of buried copper constantan thermocouples and these values were used as an indication of heat loss through the shelter structure.

In cases where it was possible, the automatic data-sensing and recording devices were supplemented and verified by independent measurements. For example, wet and dry bulb temperatures were taken with mercurial thermometers in a psychrometer at points adjacent to the atmosphere where wet and dry bulb recording psychrometers were monitoring environmental conditions and served as a means of checking the accuracy of these instruments and of the automatic data-sensing and recording equipment. A recording watt hour meter provided an integrated measurement of power consumed and this was used as a means of checking the product of the voltage times the amperage which was used to adjust the power input to each of the Simocs. The accuracy of the ground temperature sensing thermocouples could not be verified rectly. However, the recording potentiometers sensing these temperatures were periodically calibrated by causing one thermocouple attached to each instrument to measure the temperature of a reference thermocouple immersed in a water bath, along with an accurate mercurial thermometer. The temperature of the calibrating water bath was selected at approximately the mid range of the temperature being recorded by a particular potentiometer.

Summaries
of
Twenty-five Simulated Occupancy Tests

5 July 1962 - 5 November 1964

Summary

Simulated Occupancy Test

First and Second Summerlin Shelter Tests

Gainesville, Florida

5 July - 18 July 1962
9 April - 20 April 1962

The shelter is entirely below grade with a minimum of 30 inches earth cover. It is constructed of 1/8 inch steel plate with all joints welded. The floor has an area of 180 square feet. The shelter had not been previously occupied.

An adiabatic shelter model would require an air flow rate of 16 cfm per occupant ventilation air to maintain an average effective temperature below 85 °F. A shelter model with 25% heat loss through the structure would require an air flow rate of 10 cfm per occupant to maintain an average effective temperature below 85 °F.

Occupants... NBS's Individual Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
			First Test		
I	11.1	89.9	86.5 11th Day	18	13 days
			Second Test		
I	3	81.1	80.8	18	3.96 days
II	12	75.0	74.0	18	2.83 days
III	12*	84.9	83.7	18	3.13 days

* August supply day

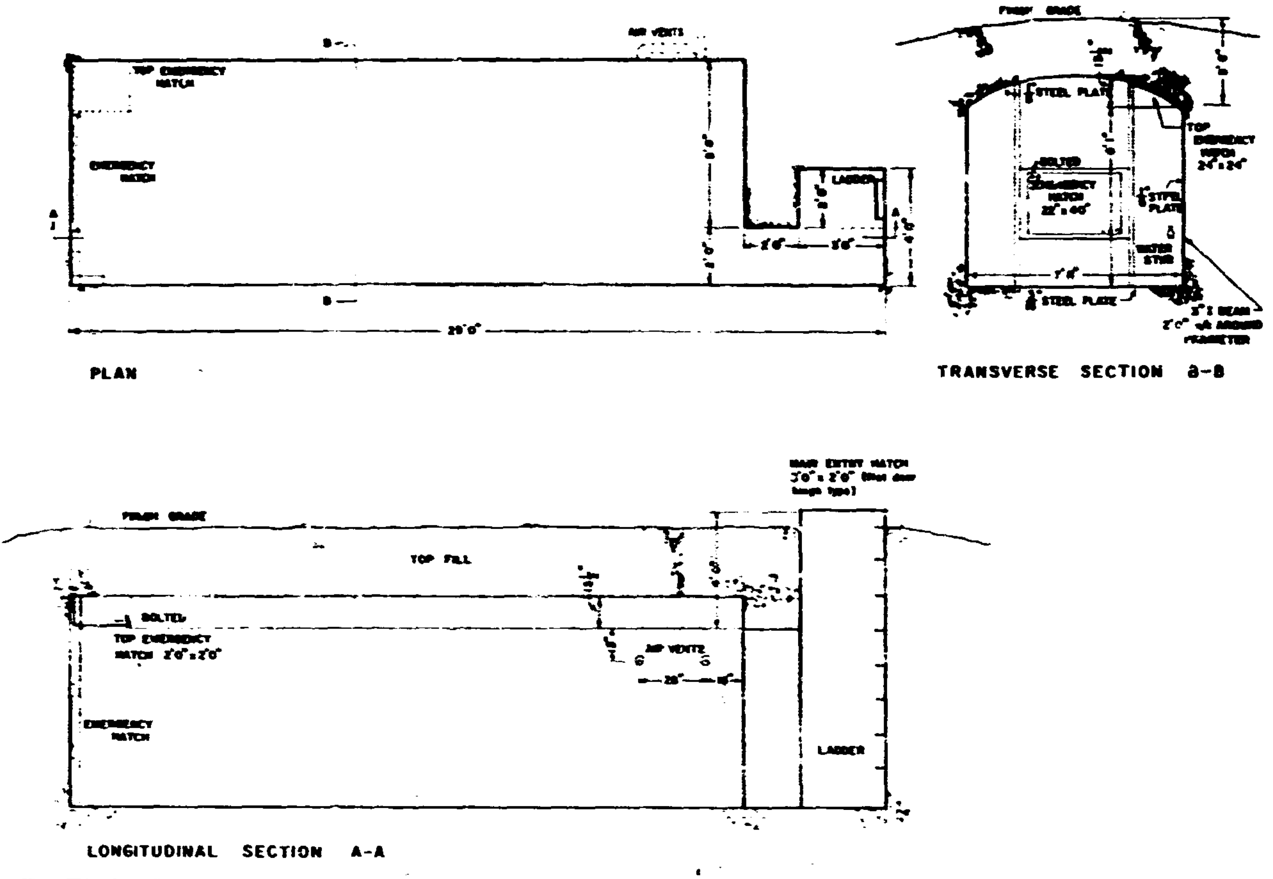
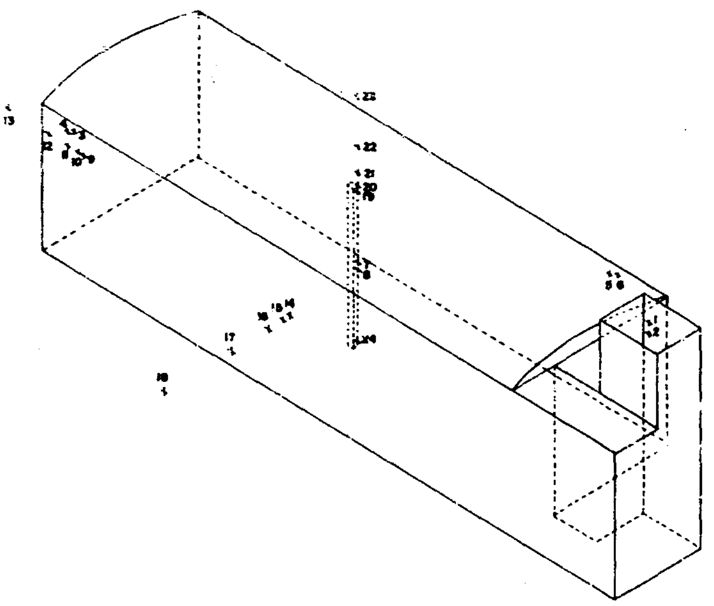

PLAN and ELEVATION VIEW
-Summerlin Shelter-

Fig. No. 5 SUMMERLIN FAMILY SHELTER, GAINESVILLE, FLORIDA

THERMOCOUPLE LOCATIONS
-Summerlin Shelter-



THERMO-COUPLE NUMBER	LOCATION		
	PSYCHROMETRY		
1	Dry Bulb	Supply Air	At end of sampling line inserted in supply duct.
2	Wet Bulb	Supply Air	At end of sampling line inserted in supply duct.
3	Dry Bulb	Exhaust Air	At exhaust outlet SE corner
4	Wet Bulb	Exhaust Air	At exhaust outlet SE corner
5	Dry Bulb	Exhaust Air	At exhaust outlet NW corner *
6	Wet Bulb	Exhaust Air	At exhaust outlet NW corner *
7	Dry Bulb	Shelter Air	At geometric center
8	Wet Bulb	Shelter Air	At geometric center
	TEMPERATURE GRADIENTS - SOUTH WALL OF SHELTER		
9	Air Temp.	½" out from wall	16" West of SE corner - 30" above floor
10	Wall Temp.	Touching Wall	16" West of SE corner - 30" above floor
11	Ground Temp.	6" South of Wall	16" West of SE corner - 6'3" below grade
12	Ground Temp.	24" South of Wall	16" West of SE corner - 6'3" below grade
13	Ground Temp.	60" South of Wall	16" West of SE corner - 6'3" below grade
	TEMPERATURE GRADIENTS - EAST WALL OF SHELTER		
14	Air Temp.	½" out from wall	On vertical centerline - 30" above floor
15	Wall Temp.	Touching Wall	On vertical centerline - 30" above floor
16	Ground Temp.	6" East of Wall	On vertical centerline - 6'3" below grade
17	Ground Temp.	24" East of Wall	On vertical centerline - 6'3" below grade
18	Ground Temp.	60" East of Wall	On vertical centerline - 6'3" below grade
	TEMPERATURE GRADIENTS - SHELTER CEILING AND EARTH COVER		
19	Air Temp.	½" Down from ceiling	On geometric centerline of ceiling
20	Wall Temp.	Touching Ceiling	On geometric centerline of ceiling
21	Ground Temp.	6" above ceiling	On geometric centerline of ceiling
22	Ground Temp.	18" above ceiling	On geometric centerline of ceiling
23	Ground Temp.	30" above ceiling	On geometric centerline of ceiling
	TEMPERATURE GRADIENT - WITHIN SHELTER		
24	Air Temp.	½" above floor	On geometric centerline of ceiling

* Shelter inlet used as exhaust for test purposes

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JUNE 1963

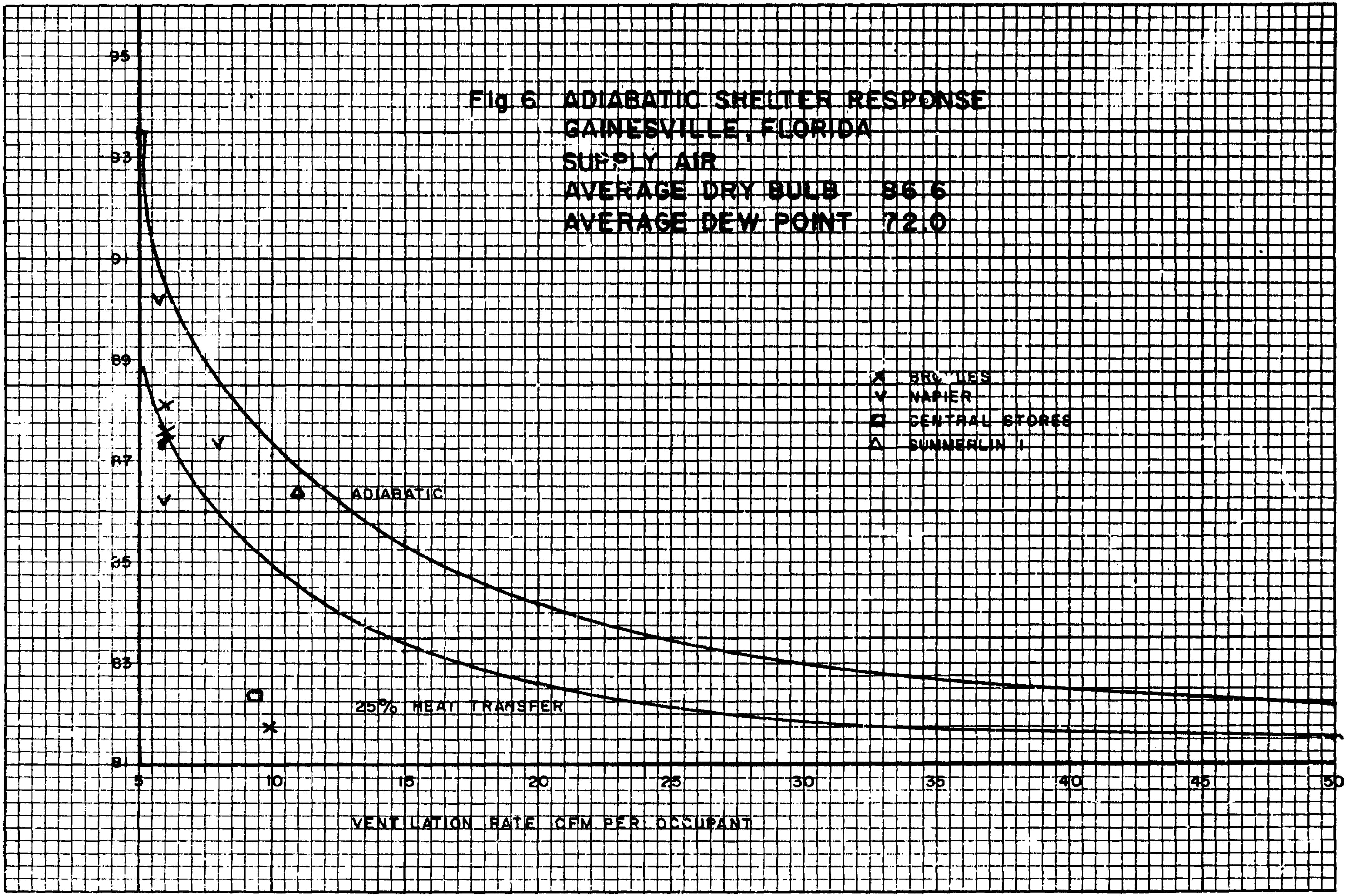


Fig 6 ADIABATIC SHELTER RESPONSE
GAINESVILLE, FLORIDA
SUPPLY AIR
AVERAGE DRY BULB 86.6
AVERAGE DEW POINT 72.0

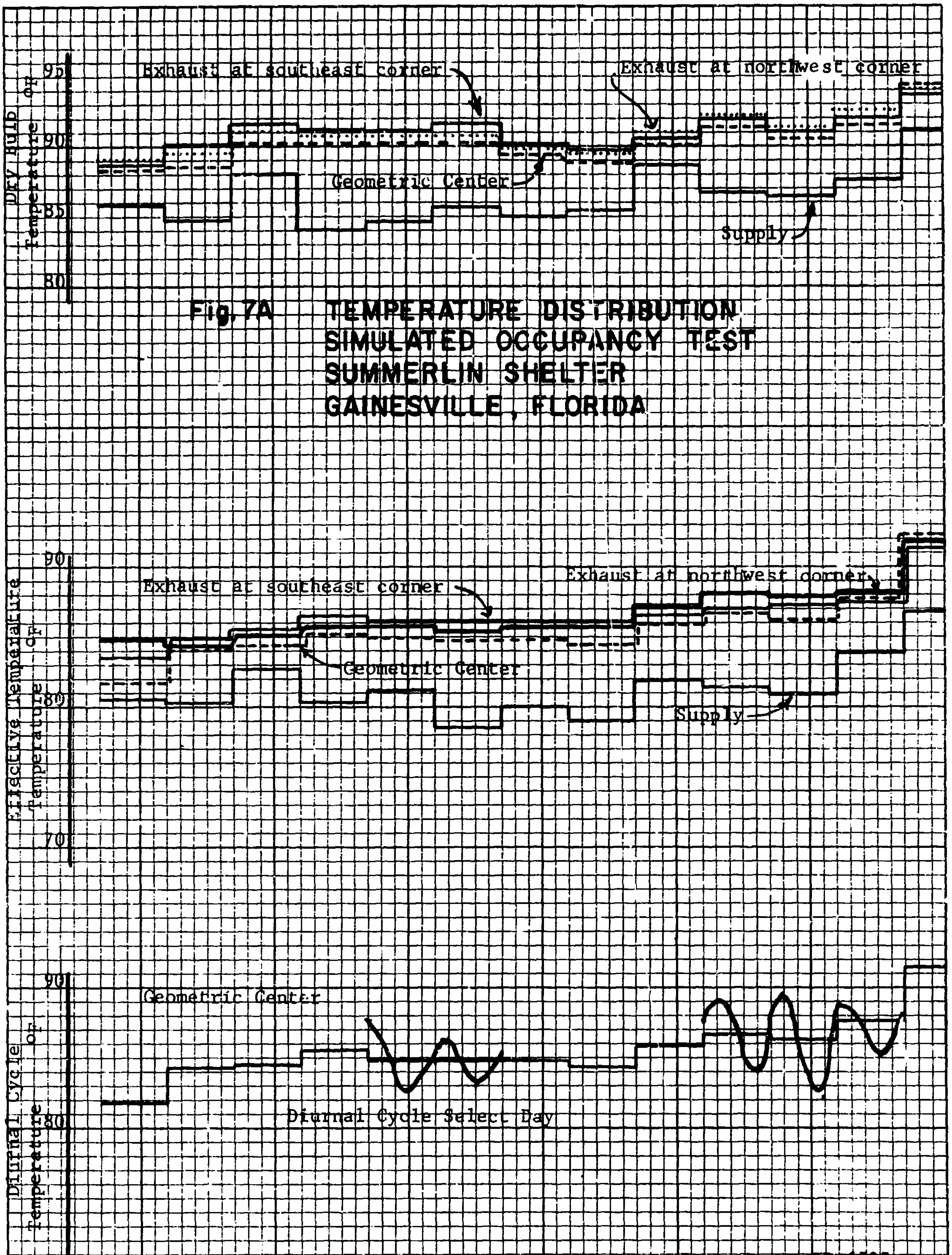


Fig. 7A TEMPERATURE DISTRIBUTION
SIMULATED OCCUPANCY TEST
SUMMERLIN SHELTER
GAINESVILLE, FLORIDA

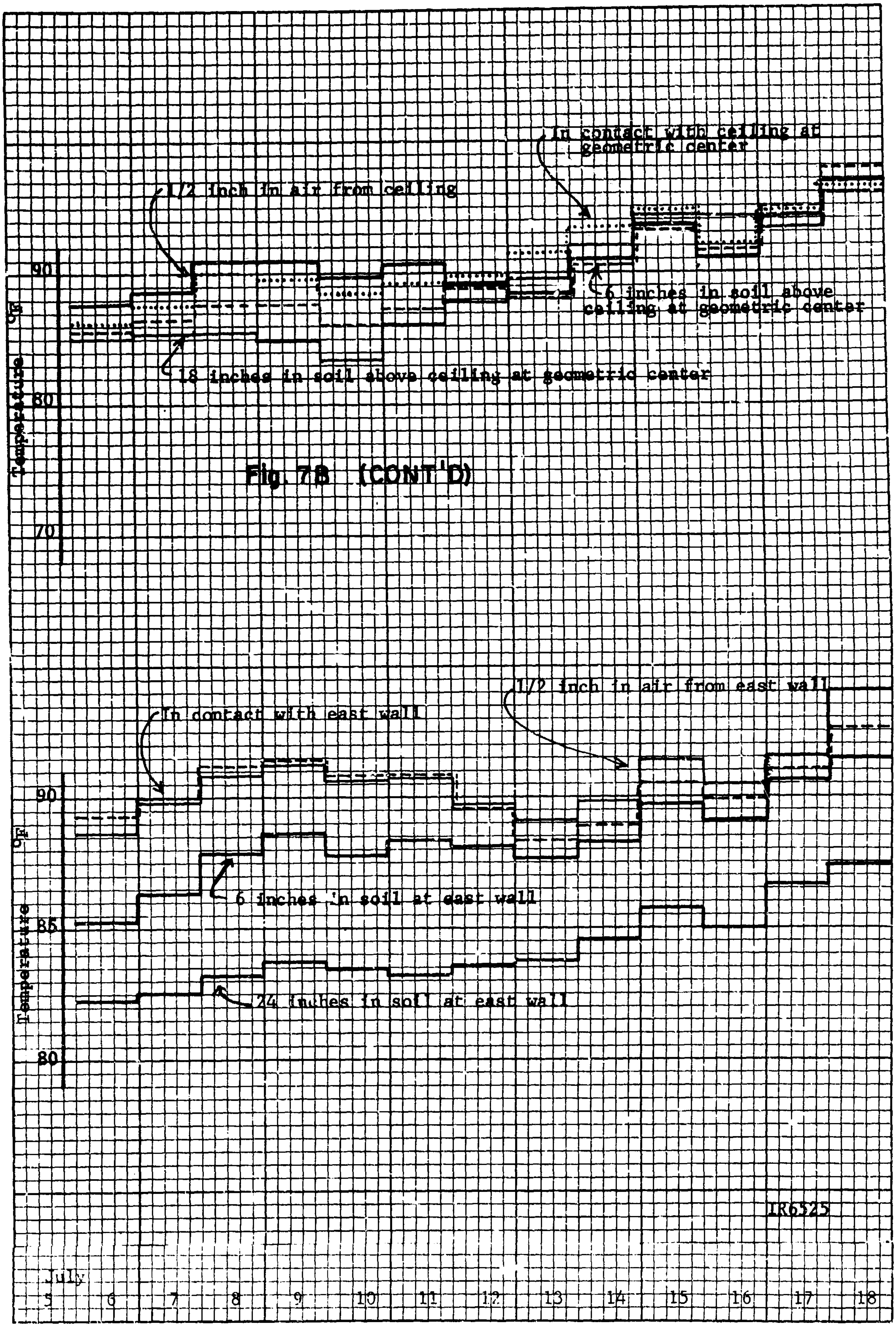

In contact with ceiling at geometric center
1/2 inch in air from ceiling
6 inches in soil above ceiling at geometric center
18 inches in soil above ceiling at geometric center
Temperature °F
90
80
70
1/2 inch in air from east wall
In contact with east wall
6 inches in soil at east wall
24 inches in soil at east wall
Temperature °F
90
85
80
IR6525
July
5
6
7
8
9
10
11
12
13
14
15
16
17
18

Fig. 7B (CONT'D)

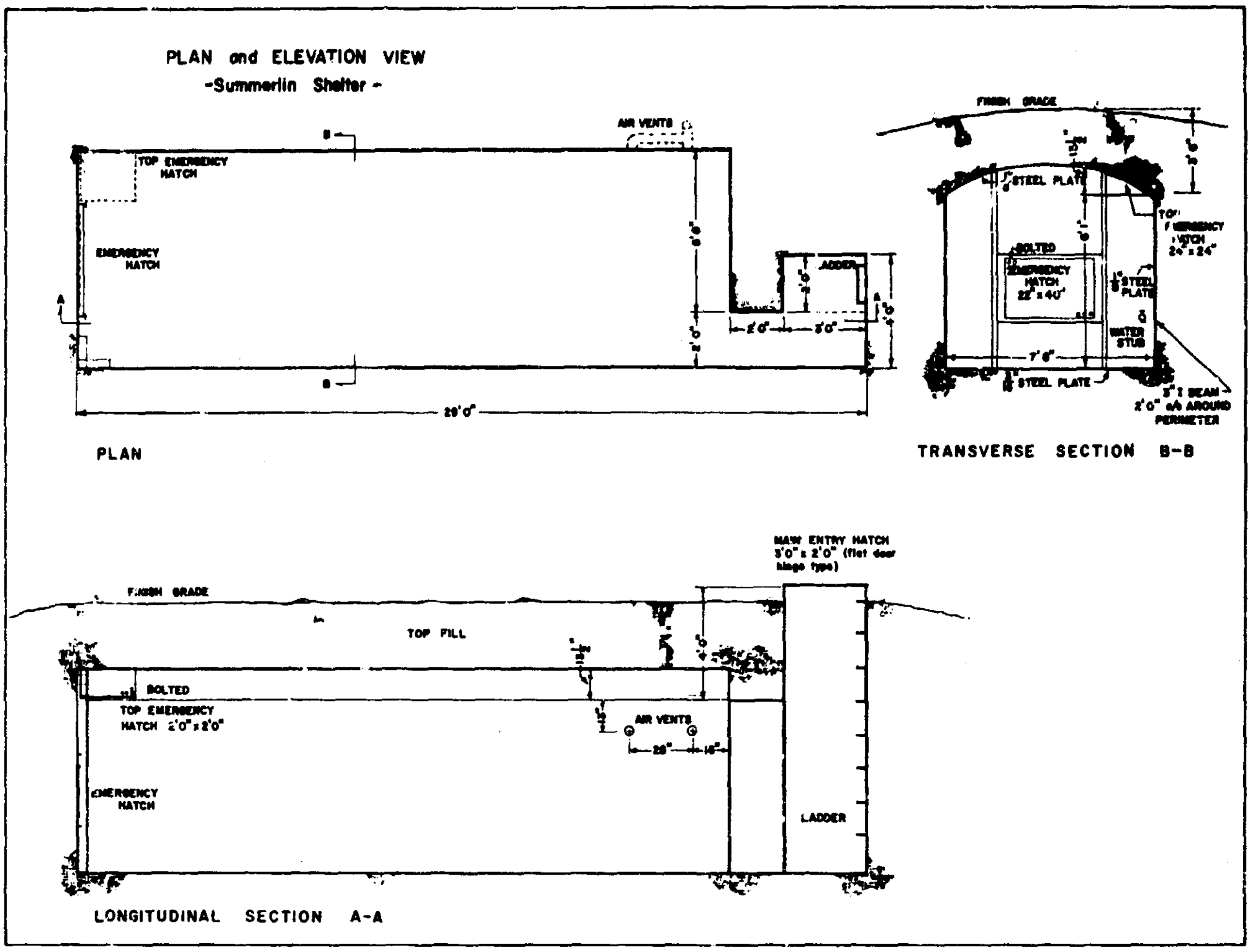
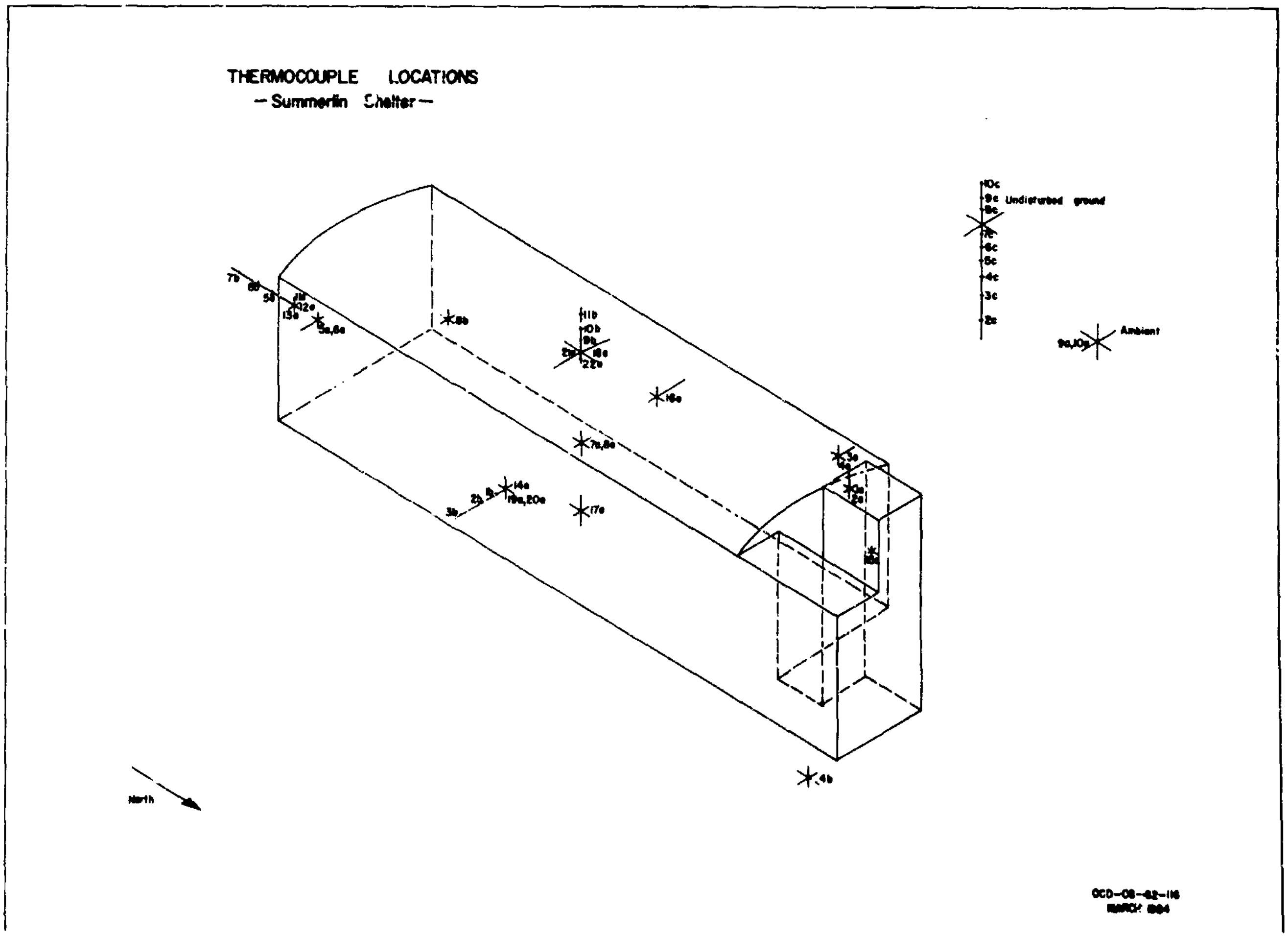


Fig. No. 8 SUMMERLIN FAMILY SHELTER, GAINESVILLE, FLORIDA (SECOND TEST)



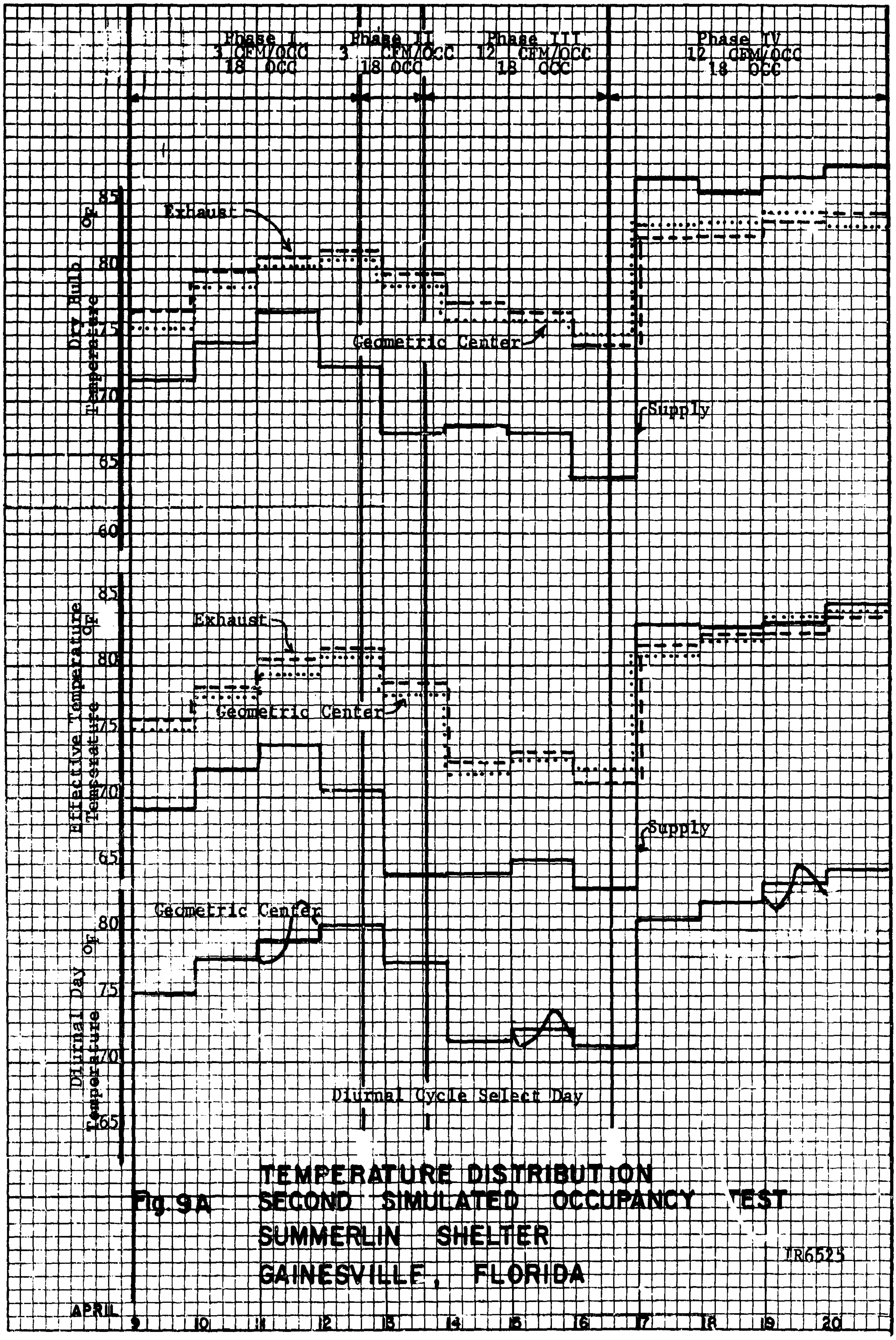


Fig.9A TEMPERATURE DISTRIBUTION
SECOND SIMULATED OCCUPANCY TEST
SUMMERLIN SHELTER
GAINESVILLE, FLORIDA

TR6525

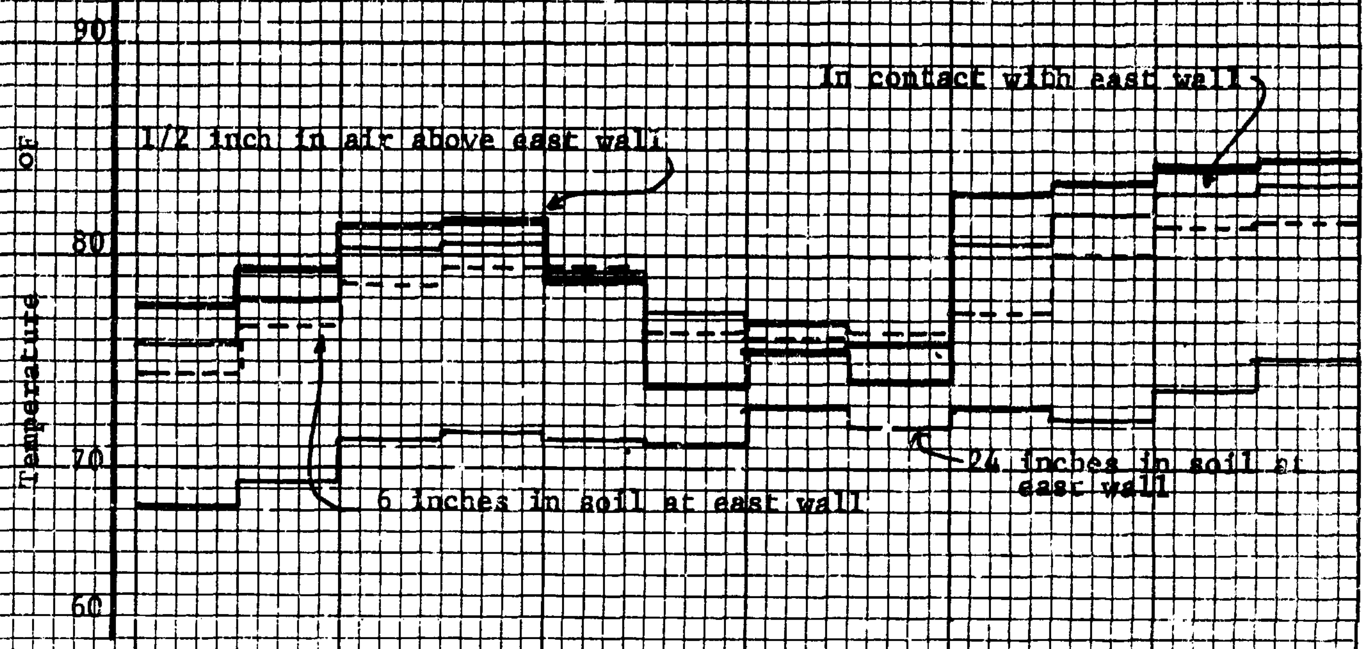
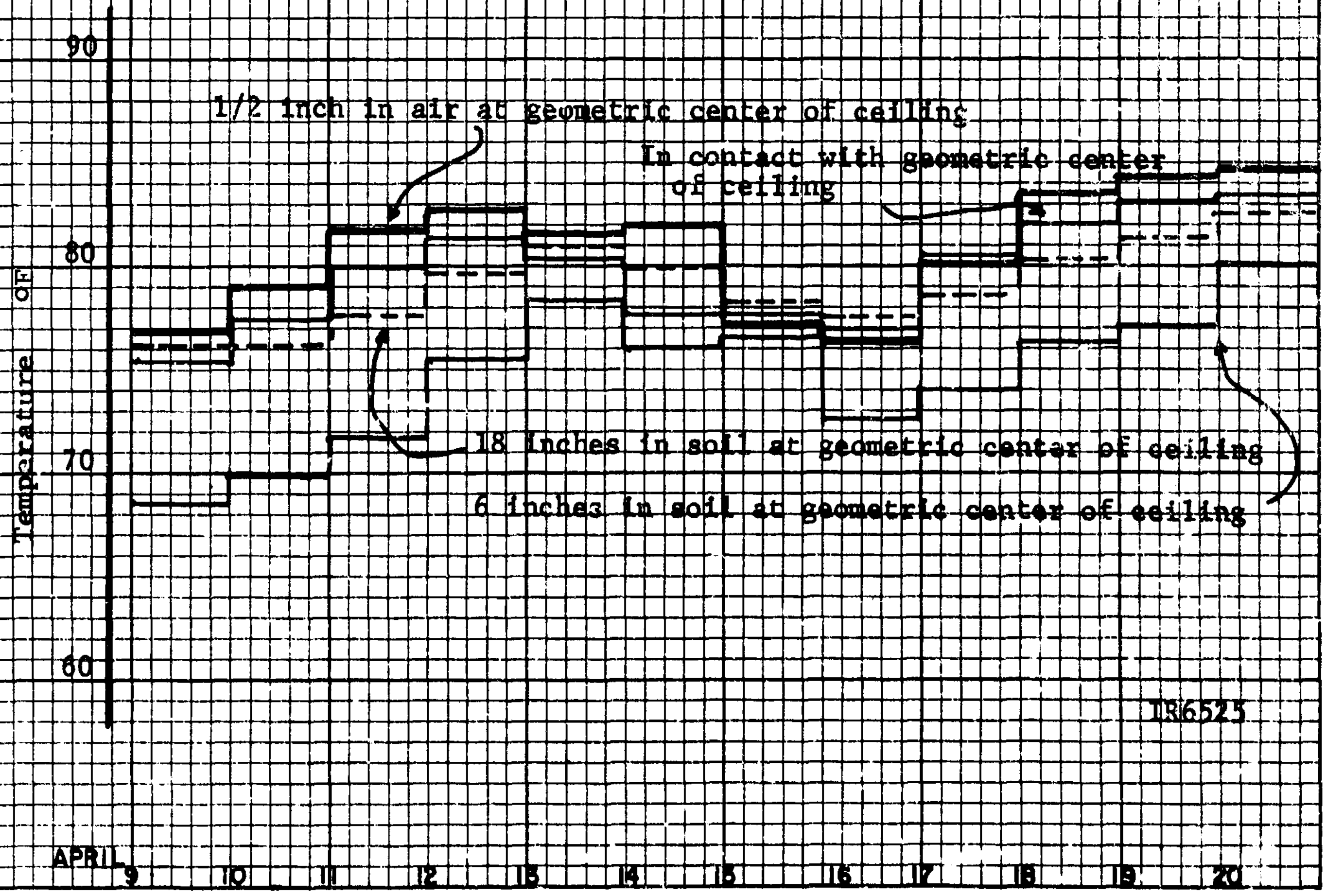

90
80
70
60
Temperature °F
1/2 inch in air above east wall
In contact with east wall
6 inches in soil at east wall
24 inches in soil at east wall

Fig. 9B (CONT'D)


90
80
70
60
Temperature °F
1/2 inch in air at geometric center of ceiling
In contact with geometric center of ceiling
18 inches in soil at geometric center of ceiling
6 inches in soil at geometric center of ceiling
IR6525
APRIL 9
10
11
12
13
14
15
16
17
18
19
20

Summary

Simulated Occupancy Test

Broyles Shelter

Gainesville, Florida

30 July - 19 August 1962

The shelter is approximately one-half below grade with earth mounded over the shelter to give an average 30 inch earth cover. The construction is waterproof concrete. The floor has a useable area of 120 square feet. Although the shelter had not been previously occupied, there had been extensive dehumidification of the shelter for several months. This was accomplished by means of a dehumidifier which removed moisture and increased the dry bulb temperature to a high of 98 °F.

An adiabatic shelter model would require an air flow rate of 16 cfm per occupant of ventilation air to maintain an average effective temperature of 85 °F. A shelter model with 25% heat loss would require an air flow rate of 10 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F.

Occupants.....GATC's Mass Simocs and NBS's Individual Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I *	3	79.3	78.5	12	2 days
II	10	83.4	81.7	12	12 days
III	6	85.3	87.4	12	2 days
IV	3	87.0	85.0	12	2 days
V	6	94.2	88.1	12	2 days

* Well water coil in operation during this phase.

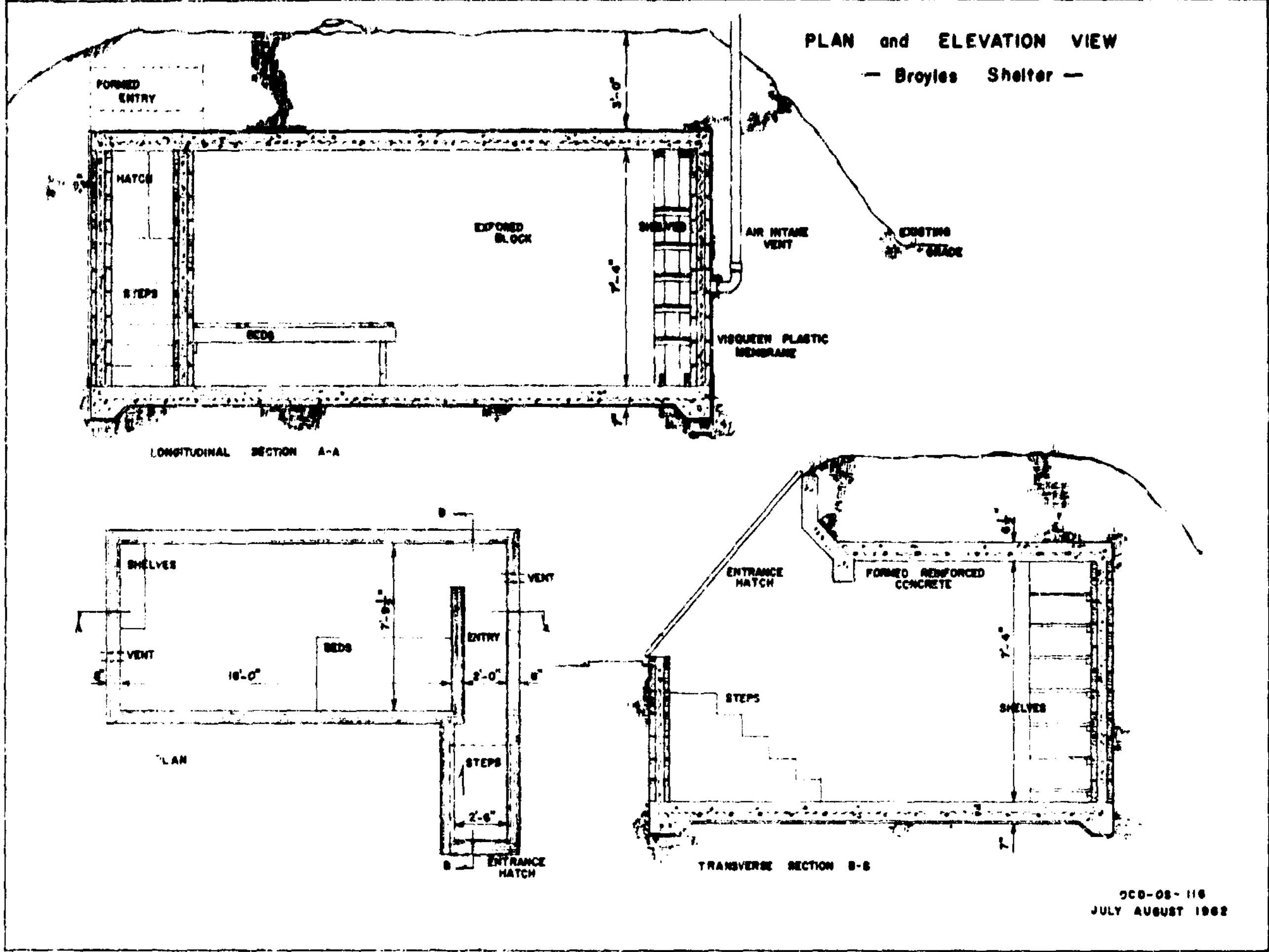
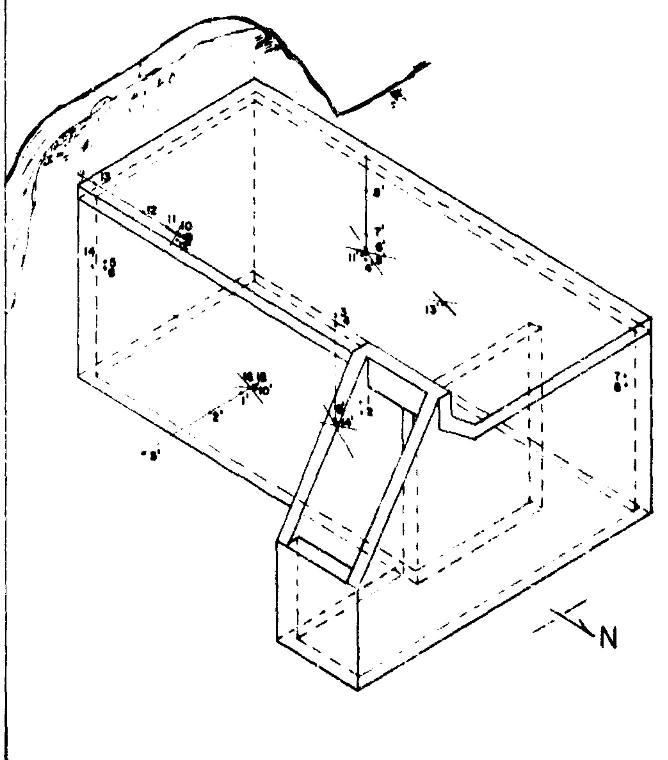


Fig. No. 10 BROYLES FAMILY SHELTER, GAINESVILLE, FLORIDA



Thermocouple Locations - Broyles Shelter

Position Number	Function	Location
1	Supply air-dry bulb	In shelter entrance
2	Supply air-wet bulb	In shelter entrance
3	Shelter air-dry bulb	At geo. center, 43 1/2" above floor
4	Shelter air-wet bulb	At geo. center, 43 1/2" above floor
5	Exhaust air-dry bulb	South exhaust vent
6	Exhaust air-wet bulb	South exhaust vent
7	Exhaust air-dry bulb	North exhaust vent
8	Exhaust air-wet bulb	North exhaust vent
9	Air temperature	1/2" from geo. center of south wall
10	Wall temperature	Pressed against geo. center of south wall
11	Ground temperature	6" out from geo. center of south wall
12	Ground temperature	24" out from geo. center of south wall
13	Ground temperature	60" out from geo. center of south wall
14	Ground temperature	60" out from geo. center of south wall, at depth of shelter floor
15	Air temperature	1/2" from geo. center of east wall
16	Wall temperature	Pressed against geo. center of east wall
1'	Ground temperature	6" out from geo. center of east wall
2'	Ground temperature	24" out from geo. center of east wall
3'	Ground temperature	60" out from geo. center of east wall
4'	Air temperature	1/2" from geo. center of ceiling
5'	Wall temperature	Pressed against geo. center of ceiling
6'	Ground temperature	On roof at geo. center of ceiling
7'	Ground temperature	6" above roof at geo. center of ceiling
8'	Ground temperature	28" above roof at geo. center of ceiling
9'	Air temperature	1/2" above geo. center of floor
10'	Heat meter temperature	Heat meter #5 (#271) geo. center, east wall
11'	Heat meter temperature	Heat meter #4 (#270) geo. center, ceiling
12'	Heat meter temperature	Heat meter #3 (#269) geo. center, south wall
13'	Heat meter temperature	Heat meter #2 (#266) geo. center, west wall
14'	Heat meter temperature	Heat meter #1 (#265) geo. center, floor
15'	Water temperature	Inlet water to cooling coil, 7/31/62 to 8/1/62
16'	Water temperature	Outlet water from cooling coil, 7/31/62 to 8/1/62

Note 1: On and after 8/2/62, positions 15' and 16' were removed from water coil and were left hanging in air in shelter. Their exact location is ambiguous and their readings should be ignored.

Note 2: Nos. 1 to 16 recorded on Instrument #930059.
Nos. 1' to 16' recorded on Instrument #760098.

OCD-OS-116
Broyles Shelter
July-August 1962

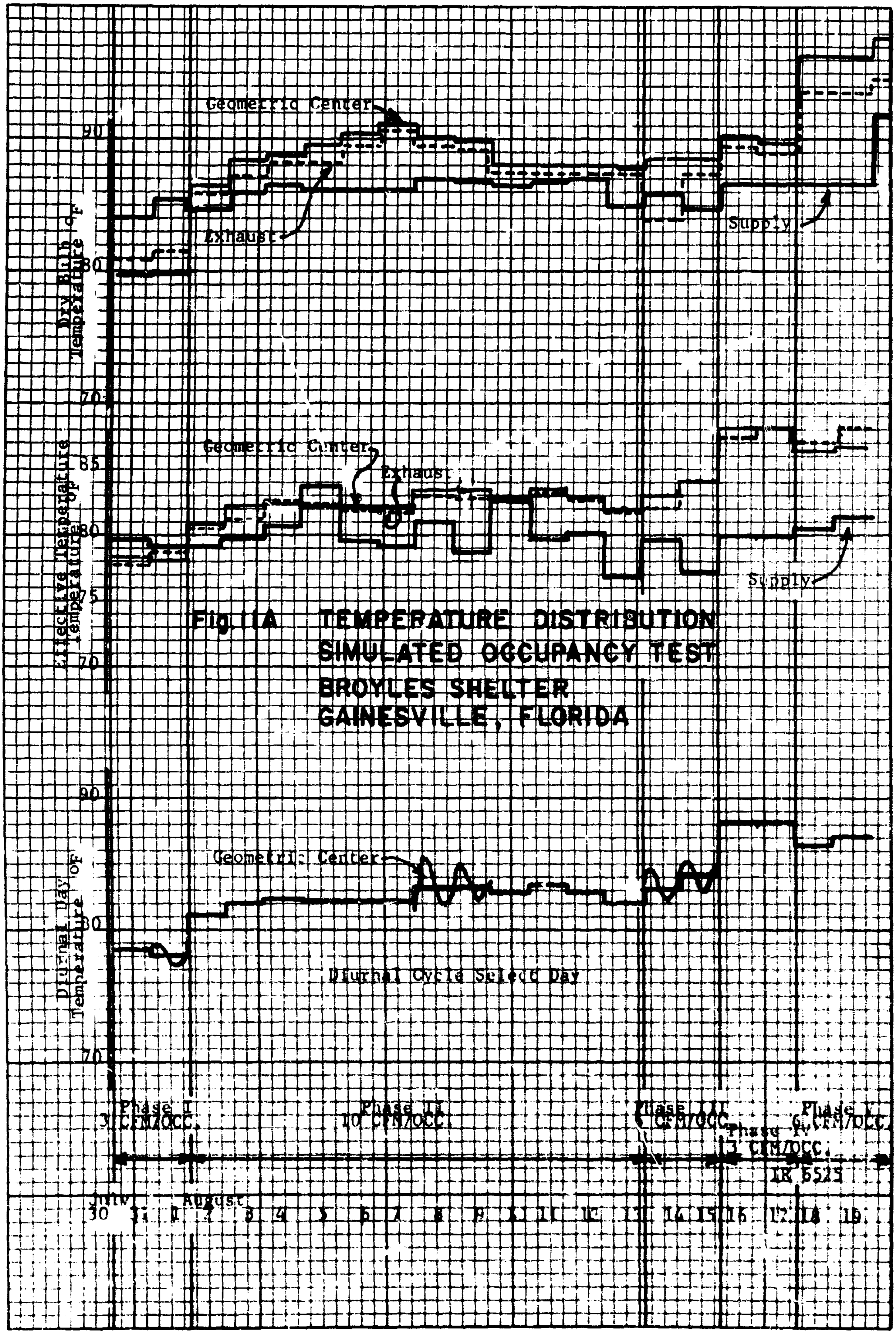
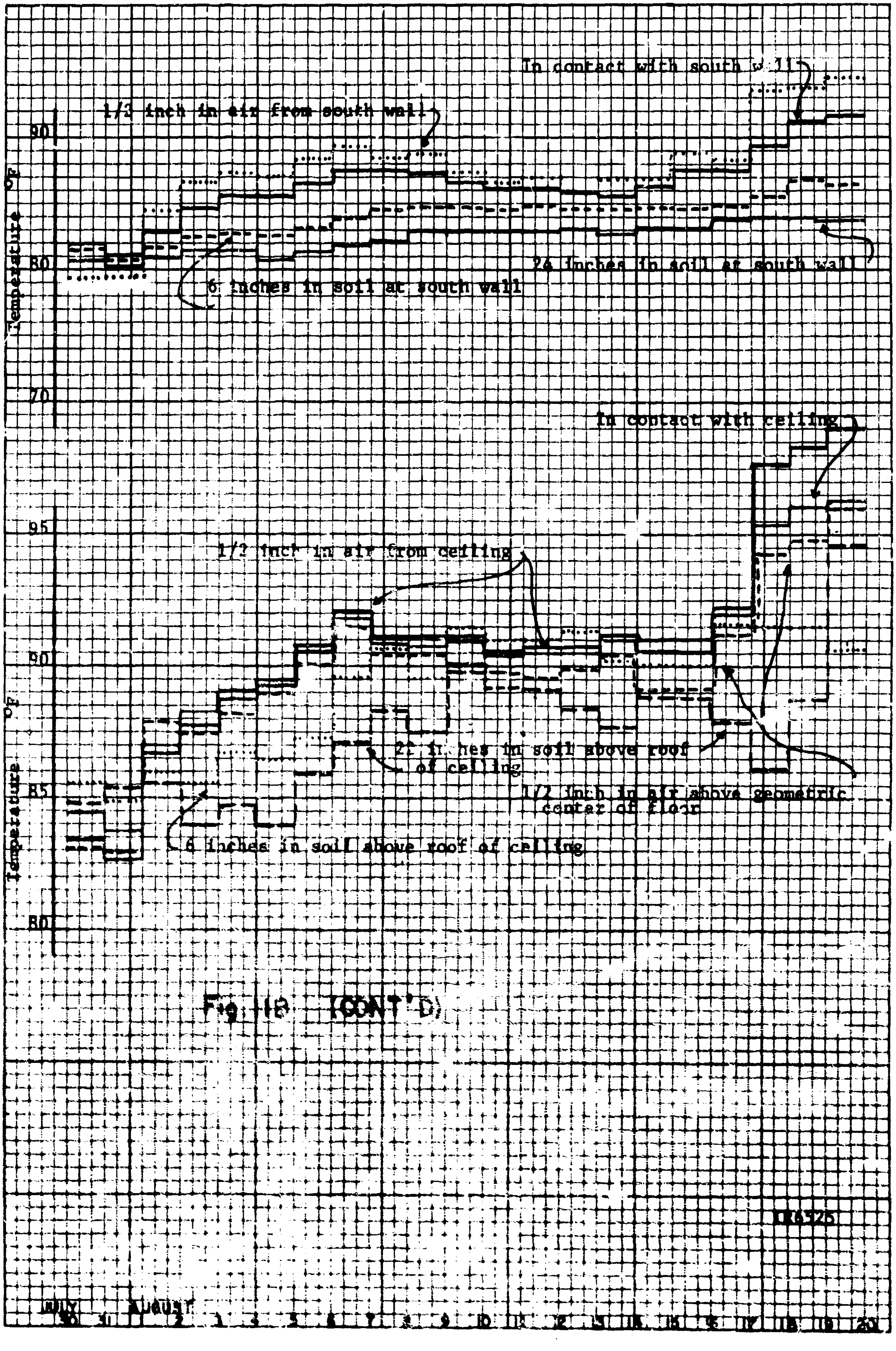


Fig. 11A TEMPERATURE DISTRIBUTION SIMULATED OCCUPANCY TEST BROYLES SHELTER GAINESVILLE, FLORIDA


In contact with south wall
1/2 inch in air from south wall
90
Temperature °F
80
70
24 inches in soil at south wall
6 inches in soil at south wall
In contact with ceiling
95
1/2 inch in air from ceiling
90
Temperature °F
24 inches in soil above roof of ceiling
85
1/2 inch in air above geometric center of floor
6 inches in soil above roof of ceiling
80
KR6525
JULY
AUGUST
30
31
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
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19
20

Fig 18 (CONT'D)

Summary

Simulated Occupancy Test

Napier Shelter

Gainesville, Florida

24 August - 10 September 1962

The shelter roof is approximately 32 inches above grade with a minimum of 30 inches earth cover. This underground concrete shelter has a floor area of 1561 square feet. The shelter had not been occupied previously.

An adiabatic shelter model would require an air flow rate of 16 cfm per occupant of ventilation air to maintain an average effective temperature of 85 °F. A shelter model with 25% heat loss through the structure would require an air flow rate of 10 cfm per occupant to maintain an average effective temperature below 85 °F.

Occupants.....NBS's Individual Simocs and GATC's Mass Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I*	3	84.0	83.1	100 NBS	2 Days
II	6	87.2	86.4	100 NBS	4 Days
III	6	88.9	87.3	70 NBS 30 GATC	1 5/6 Days
IV	6	89.3	88.1	100 NBS	2 1/6 Days
V	8.05	88.3	87.6	100 NBS	4 5/6 Days
VI	5.75	91.0	90.1	100 NBS 40 GATC	1 1/2 Days

*Well water coil in operation

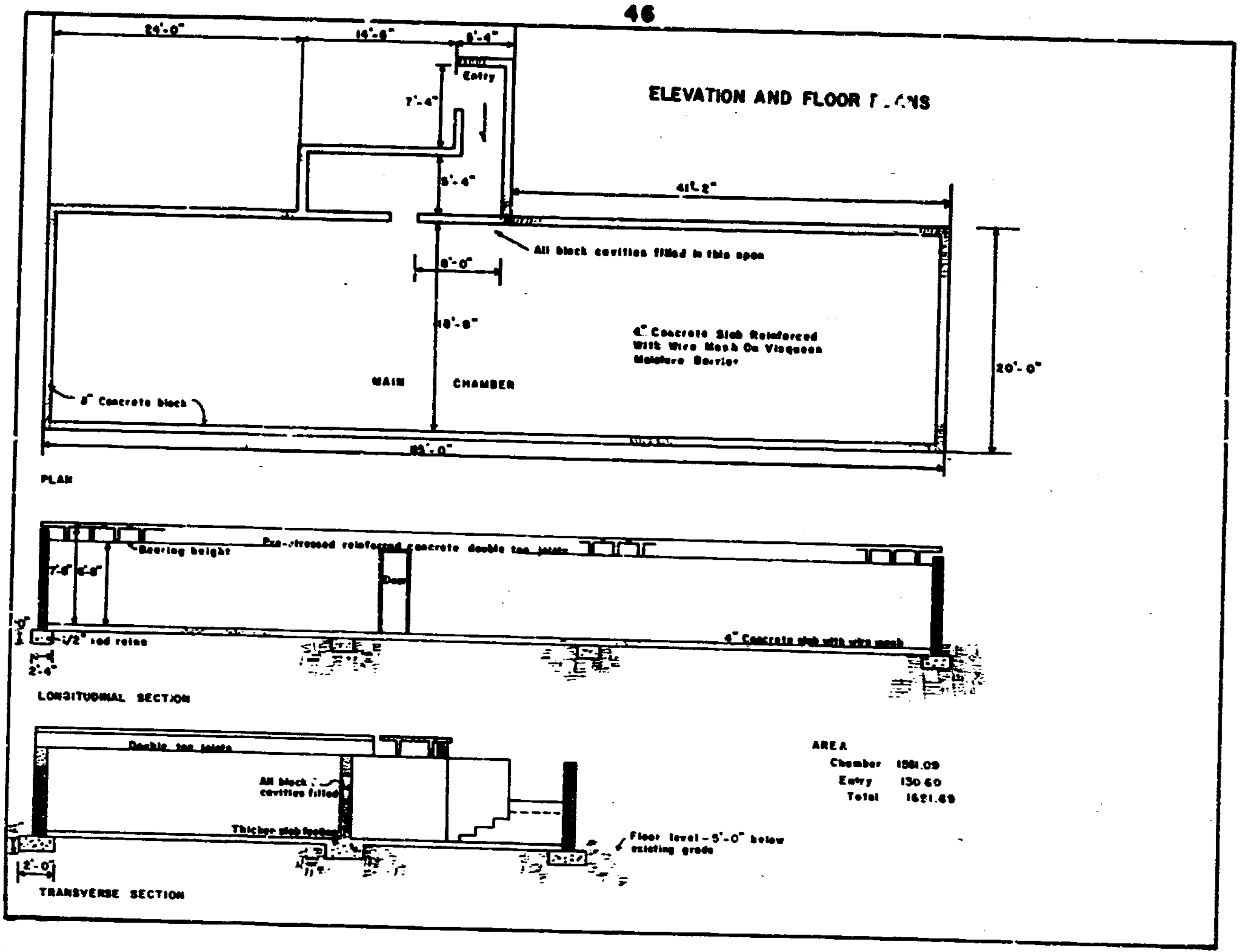
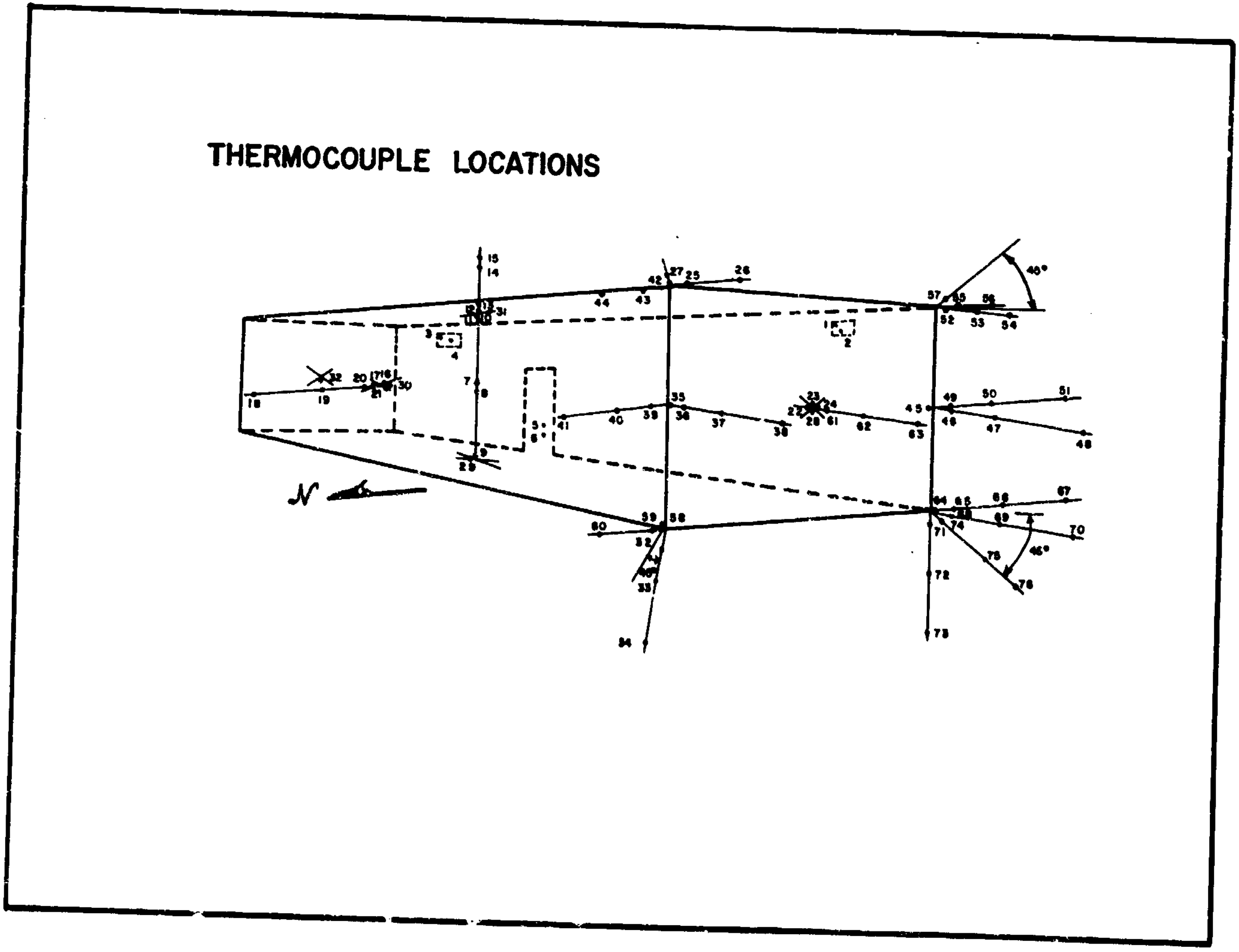


Fig. No. 12 NAPIER COMMUNITY SHELTER, GAINESVILLE, FLORIDA



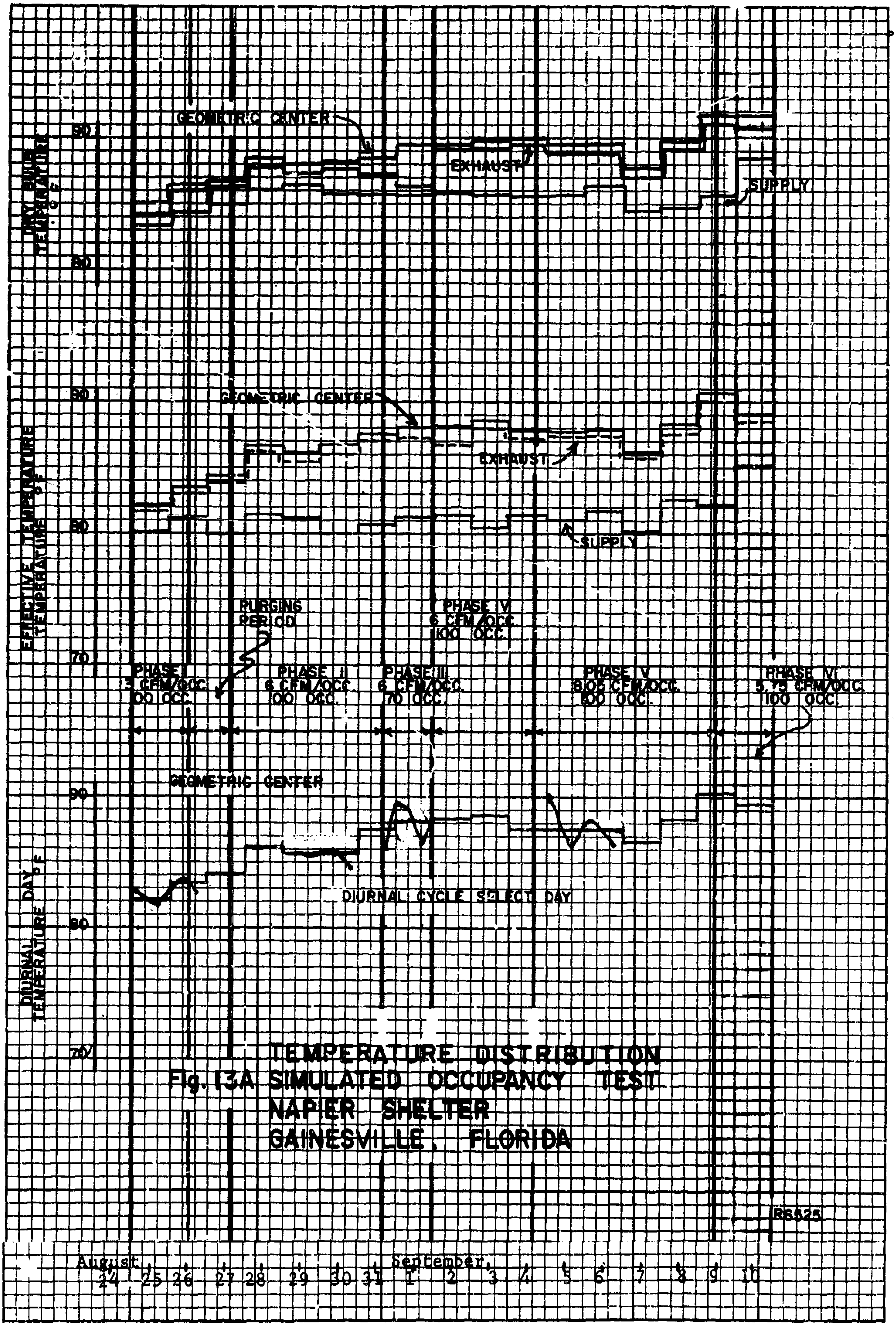


Fig. 13A TEMPERATURE DISTRIBUTION SIMULATED OCCUPANCY TEST NAPIER SHELTER GAINESVILLE, FLORIDA

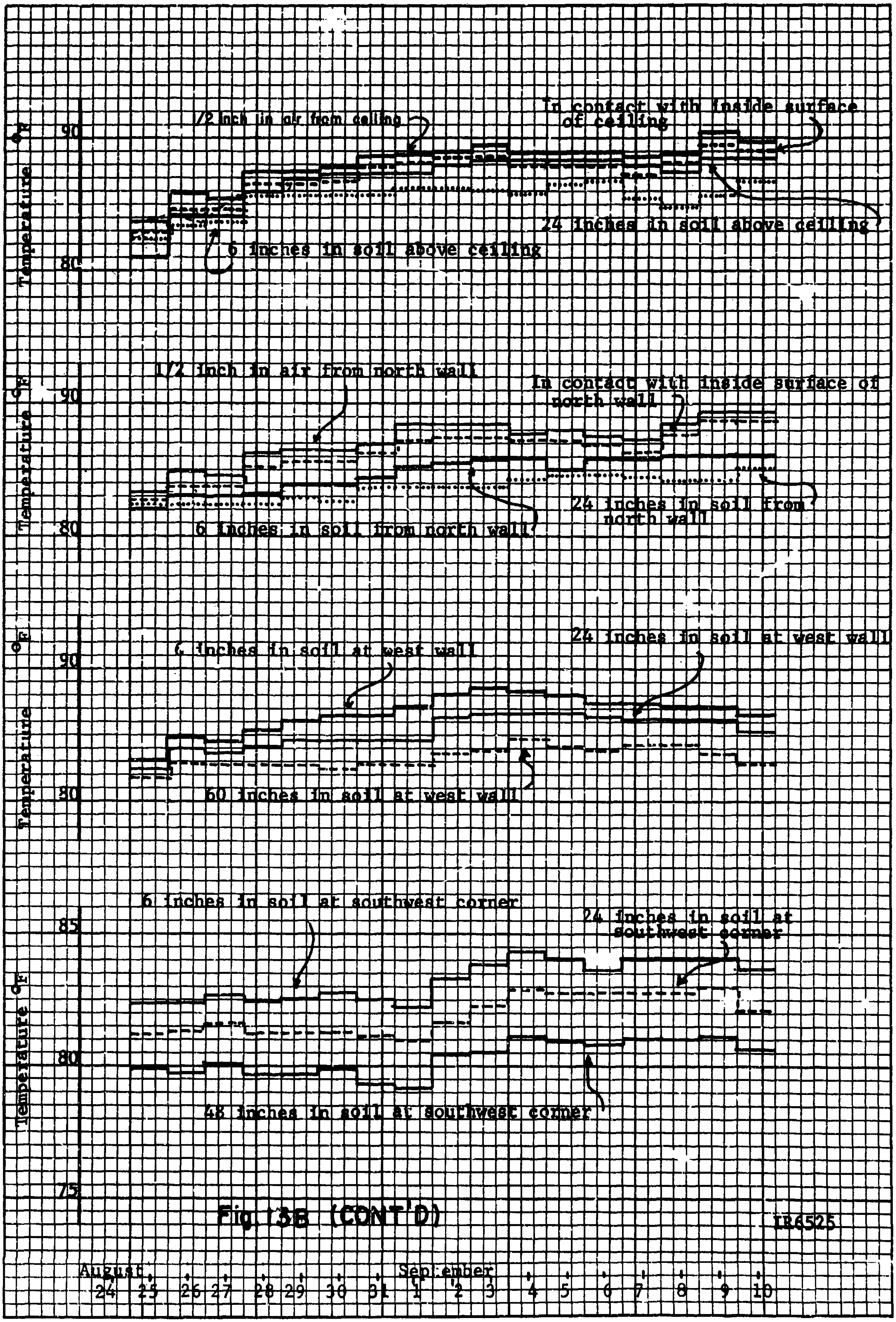


Fig. 13B (CONT'D)

IR6525

Summary

Simulated Occupancy Test

Basement of Central Stores Building

Gainesville, Florida

14 September - 25 September 1962

The shelter was constructed with approximately one quarter of the structure above the surrounding grade line. This steel reinforced concrete basement has a floor area of 3000 square feet of which 2500 were tested. The shelter had been occupied previously.

An adiabatic shelter model would require an air flow rate of 16 cfm per occupant of ventilation air to maintain an average effective temperature of 85 °F. A shelter model losing 25% of its heat through the structure would require an air flow rate of 10 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F.

Occupants.....GATC's Mass Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	3	93.0	92.2	170	5 days
II	4.33	91.2	89.1	170	1 2/3 days
III	20.5	82.1	80.2	170	2 1/2 days
IV	13.5	84.0	80.5	250	1 1/4 days
V	9.2	84.8	82.5	125	1 1/3 days

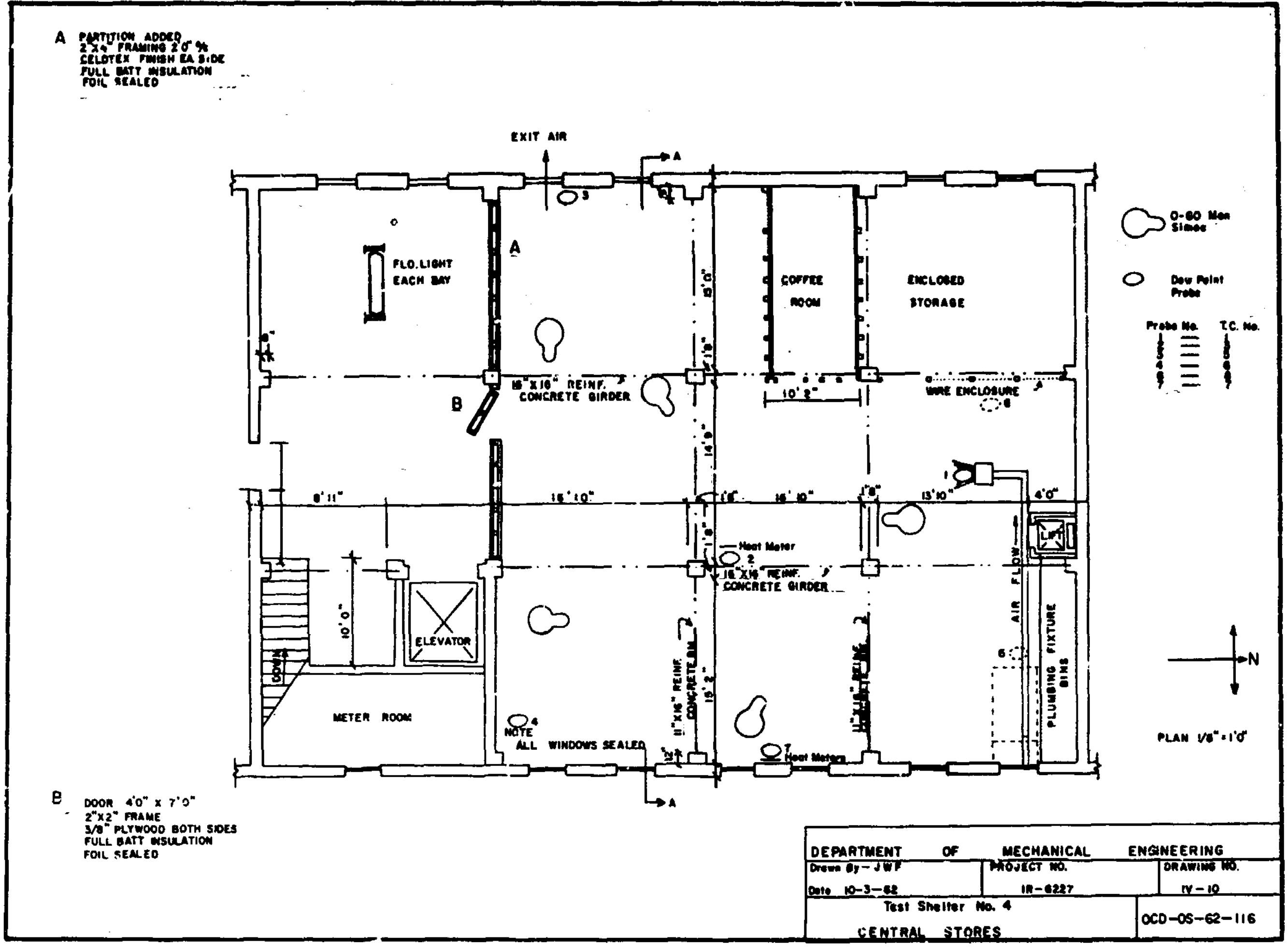
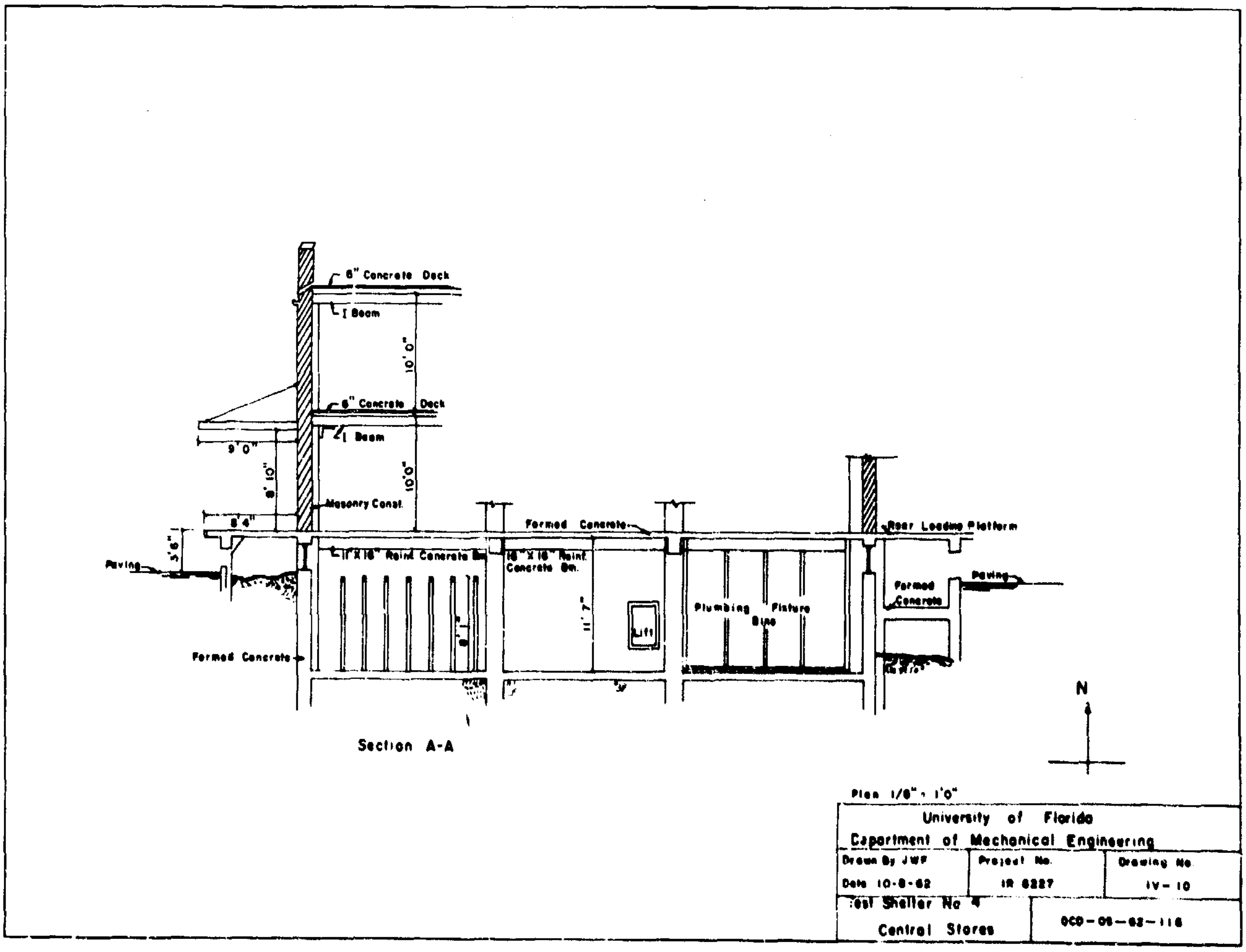


Fig. No. 14 CENTRAL STORES "DESIGNATED AREA" SHELTER, GAINESVILLE, FLORIDA



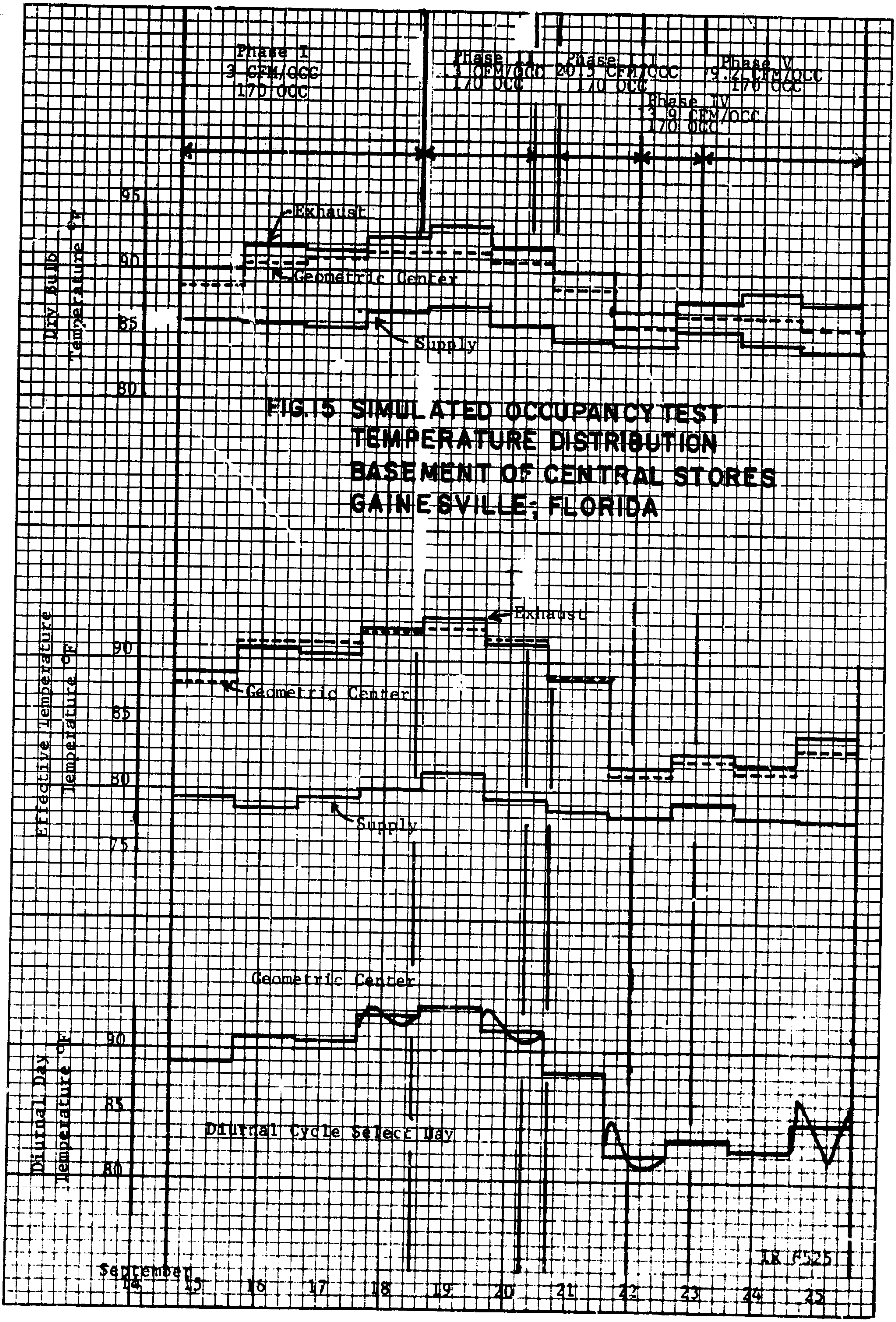


FIG. 5 SIMULATED OCCUPANCY TEST TEMPERATURE DISTRIBUTION BASEMENT OF CENTRAL STORES GAINESVILLE, FLORIDA

Summary

Simulated Occupancy Test

Identified Basement Shelter

Houston, Texas

10 October - 2 November 1962

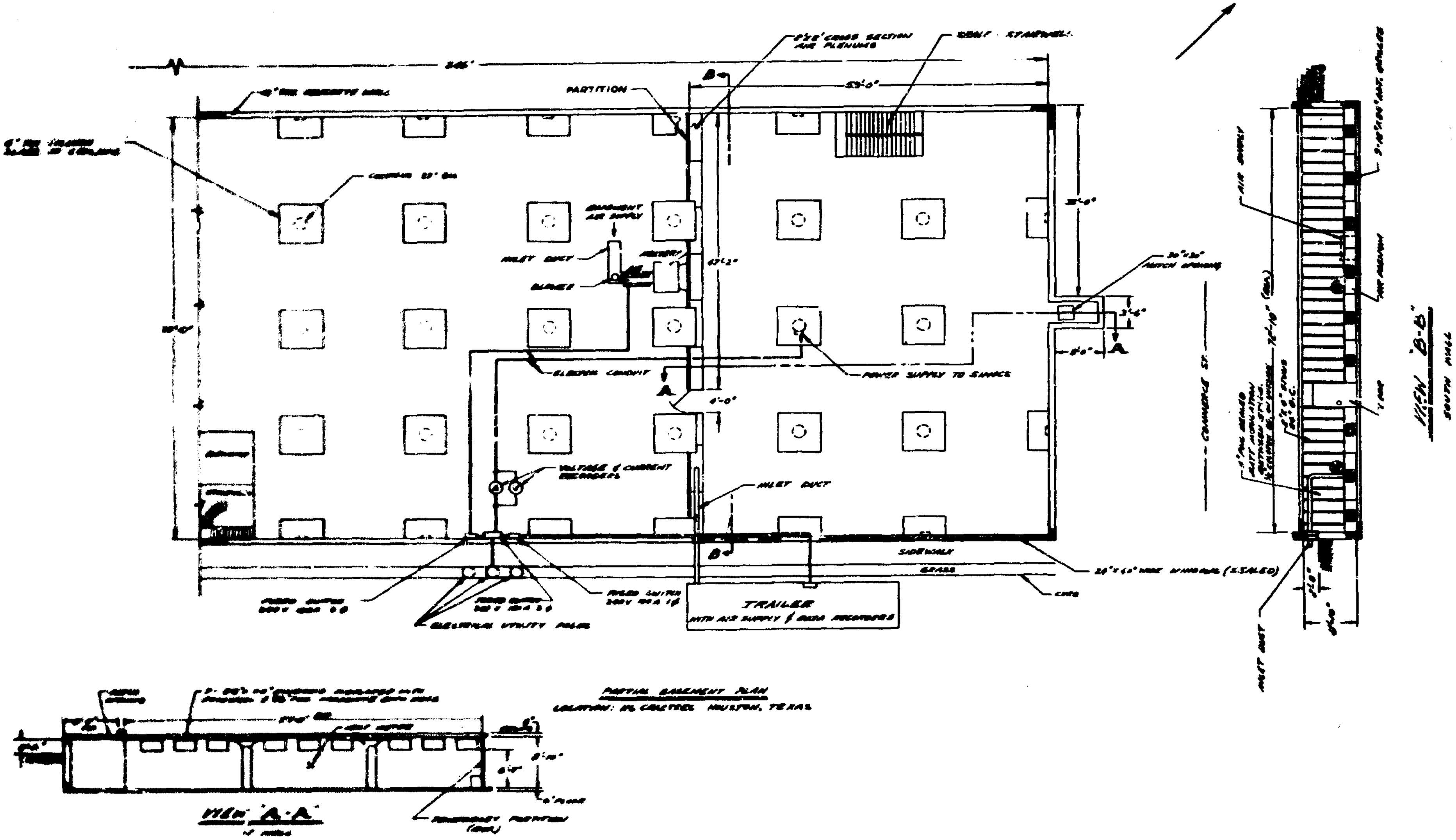
The shelter, which was constructed of reinforced concrete was three-quarters below grade. The floor had an area of 17,885 square feet, of which 4200 square feet were tested. The shelter had not been occupied prior to test.

An adiabatic shelter model would require an air flow rate of 13 cfm per occupant of ventilation air to maintain an effective temperature below 85 °F.

Occupants.....GATC's Mass Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	9.2	89.6	87.3	400	3 days
II	12.8	86.4	85.0	290	2 days
III	9.2	86.1	84.4	400	1 day
IV	18.5	81.5	80.7	200	1 day
V	18.5	85.4	81.5	200	3 days
VI	2.6	92.5	90.0	400	1 day
VII	5.2	87.1	86.9	200	1 day
VIII	2.8	87.0	85.8	200	1 day
IX	24.6	81.9	79.8	140	3 days

FIG.16 IDENTIFIED BASEMENT SHELTER
HOUSTON, TEXAS



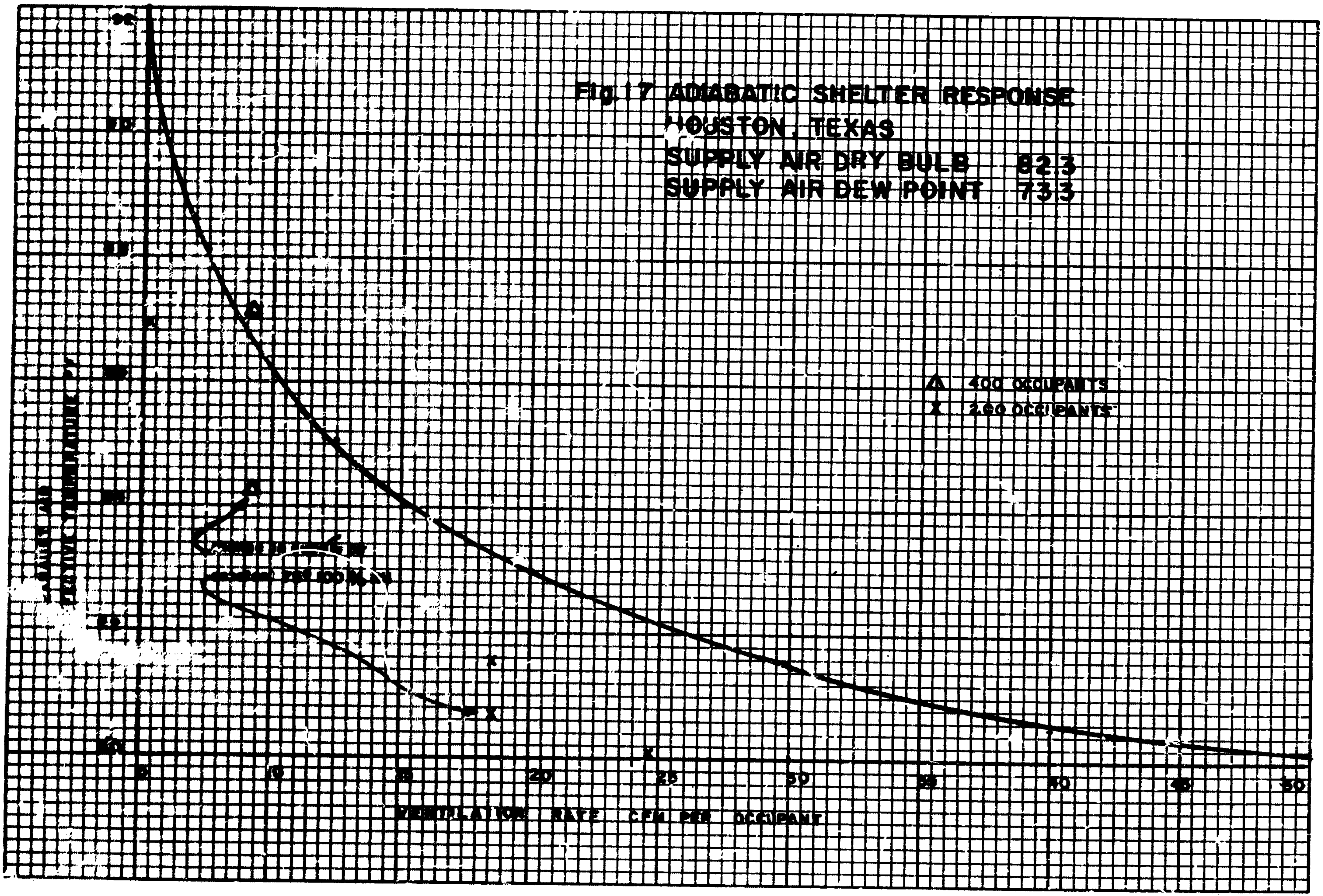


Fig.17 ADIABATIC SHELTER RESPONSE
HOUSTON, TEXAS
SUPPLY AIR DRY BULB 82.3
SUPPLY AIR DEW POINT 73.3

Summary

Simulated Occupancy Test

Reading Shelter

Reading, Pennsylvania

25 February - 18 March 1963

The shelter, constructed of reinforced concrete, is built into a hill, with the floor 4 1/2 feet below the existing grade. All parts of the 873 square foot structure have a minimum earth covering of 30 inches. The shelter had a past history of limited occupancy.

Occupants.....GATC's Mass Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	3.0	51.0	49.0	50	5.58 days
II	1.5	54.0	53.0	50	5.25 days
III	1.5	62.1	60.9	100	3.17 days
IV	16.6	-	42.7	50	2.67 days
V	14.4*	-	61.3	50	1.00 days
VI	0	64.9	64.0	50	1.00 days
VII	0	67.8	66.5	100	2.38 days

* Supply air was routed through equipment room.

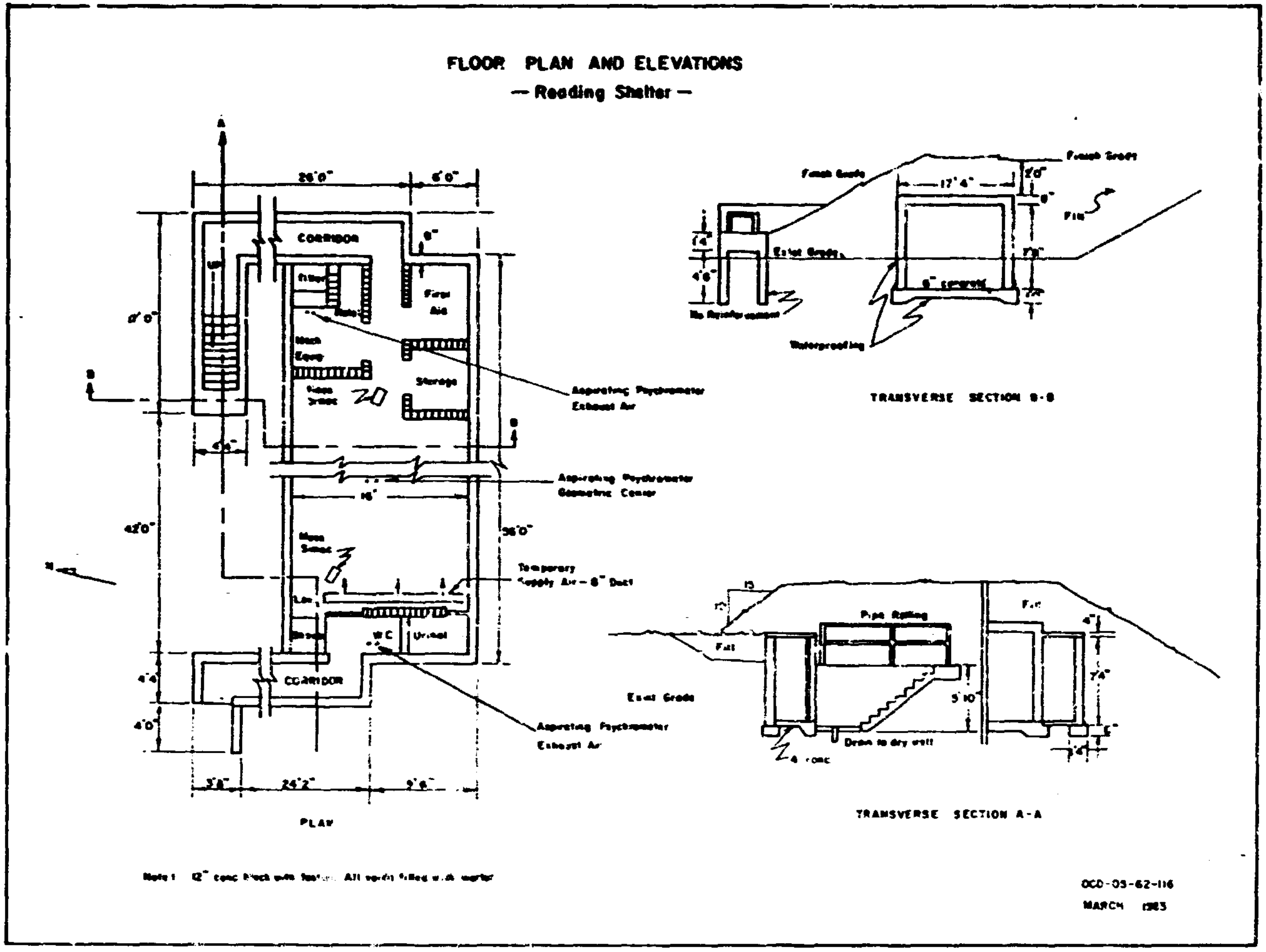
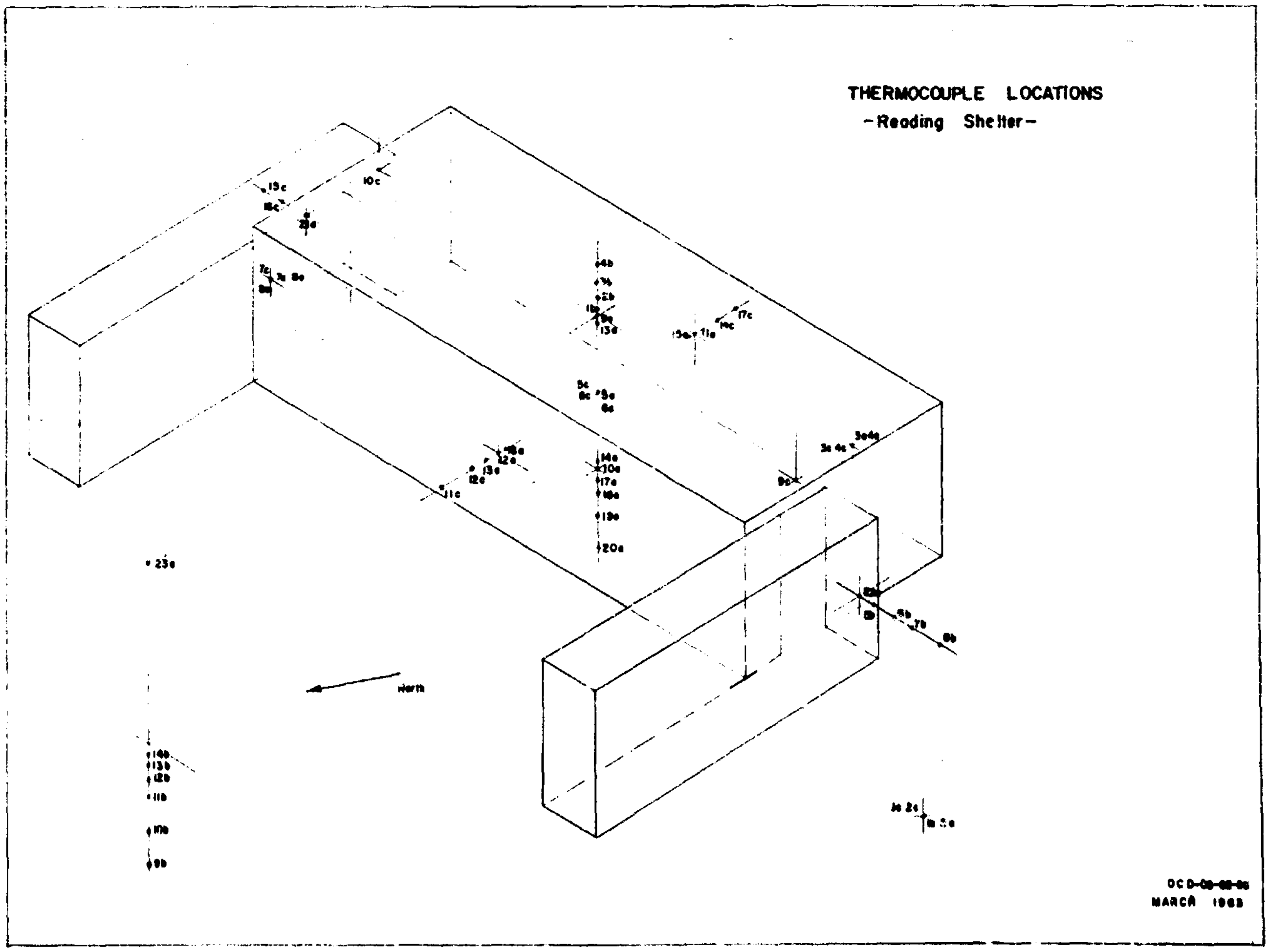


Fig. No. 18 MODEL COMMUNITY SHELTER (WINTER TEST), READING, PENNSYLVANIA



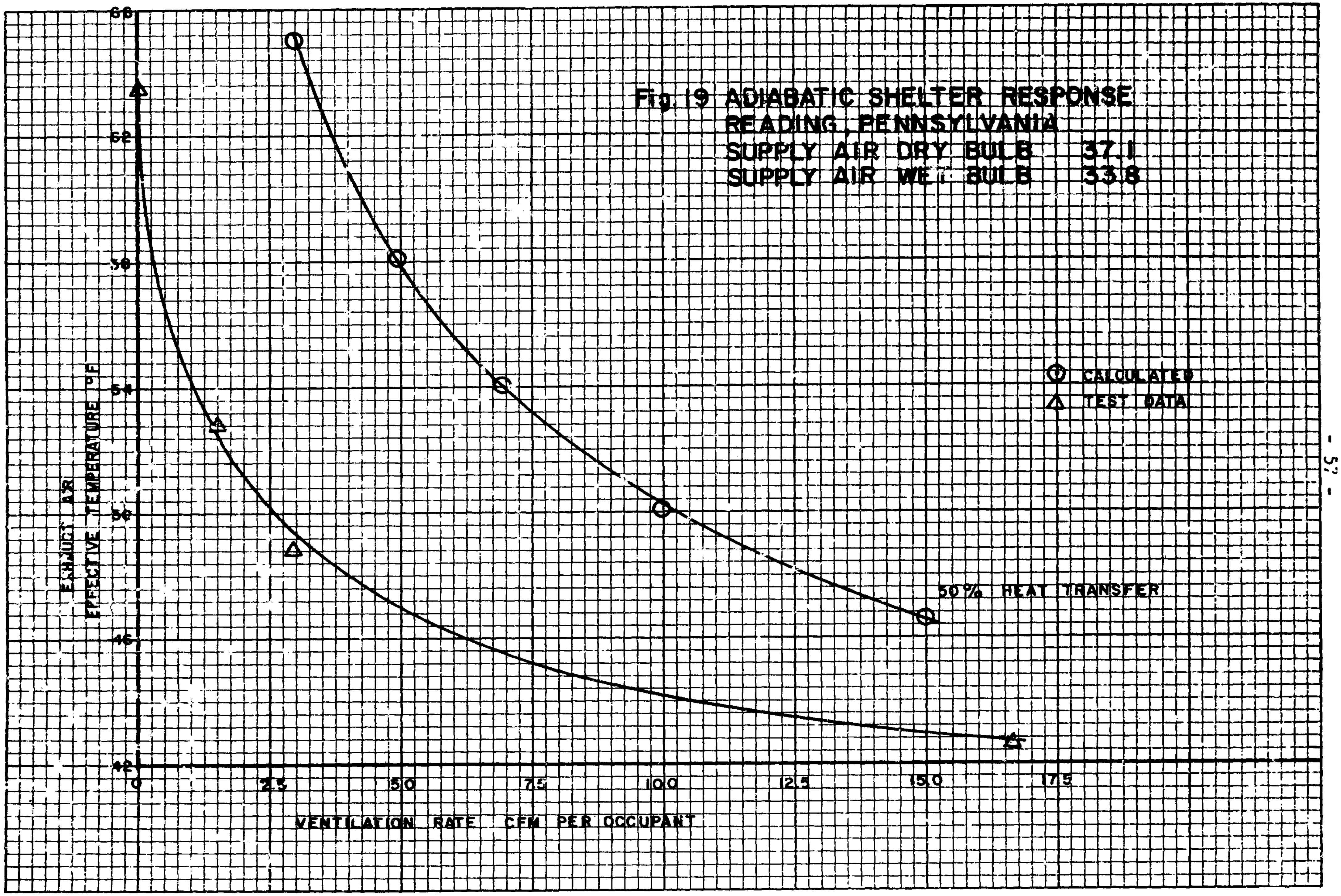


Fig. 19 ADIABATIC SHELTER RESPONSE
READING, PENNSYLVANIA
SUPPLY AIR DRY BULB 37.1
SUPPLY AIR WET BULB 33.8

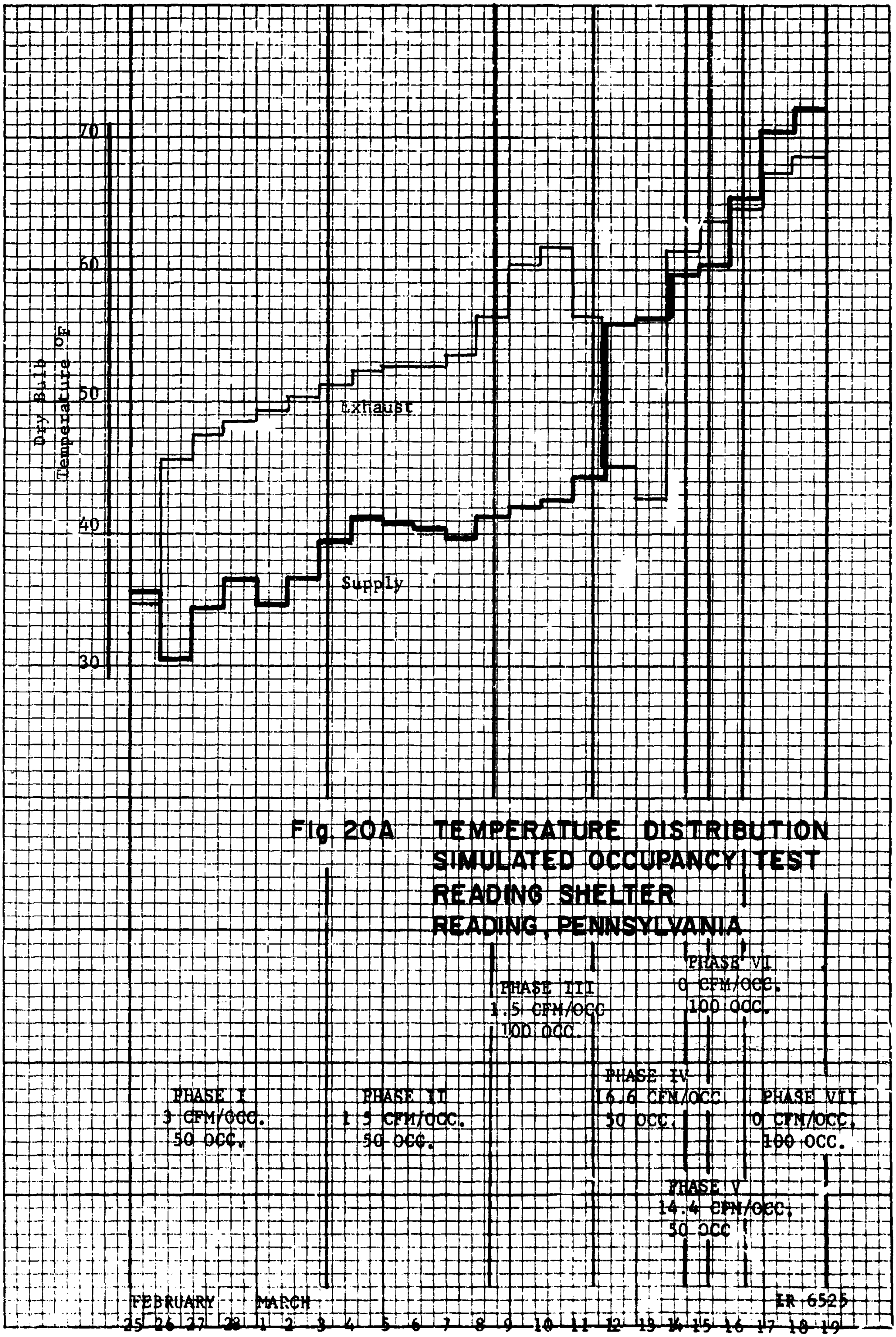


Fig. 20A TEMPERATURE DISTRIBUTION SIMULATED OCCUPANCY TEST READING SHELTER READING, PENNSYLVANIA

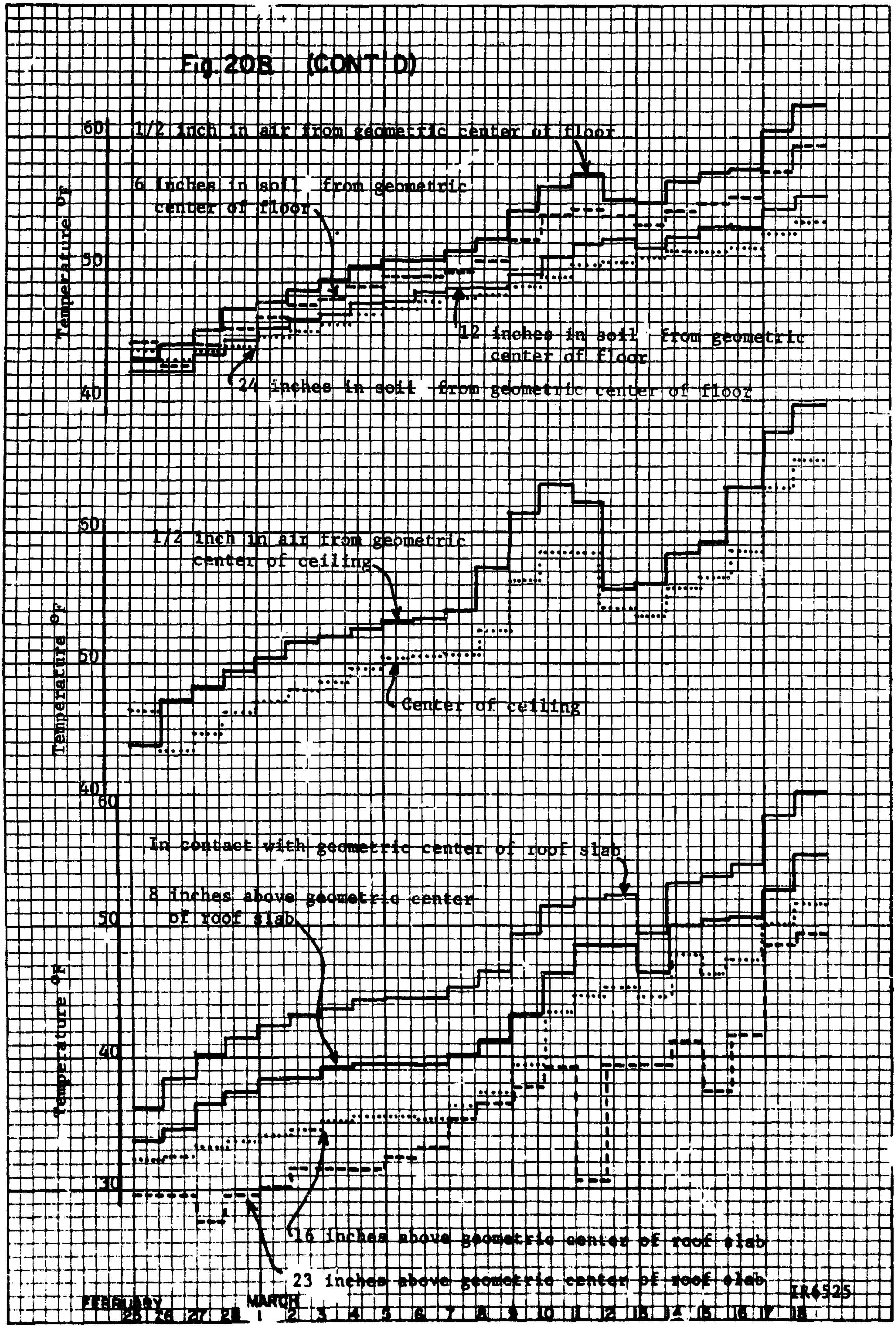


Fig.20B (CONT'D)

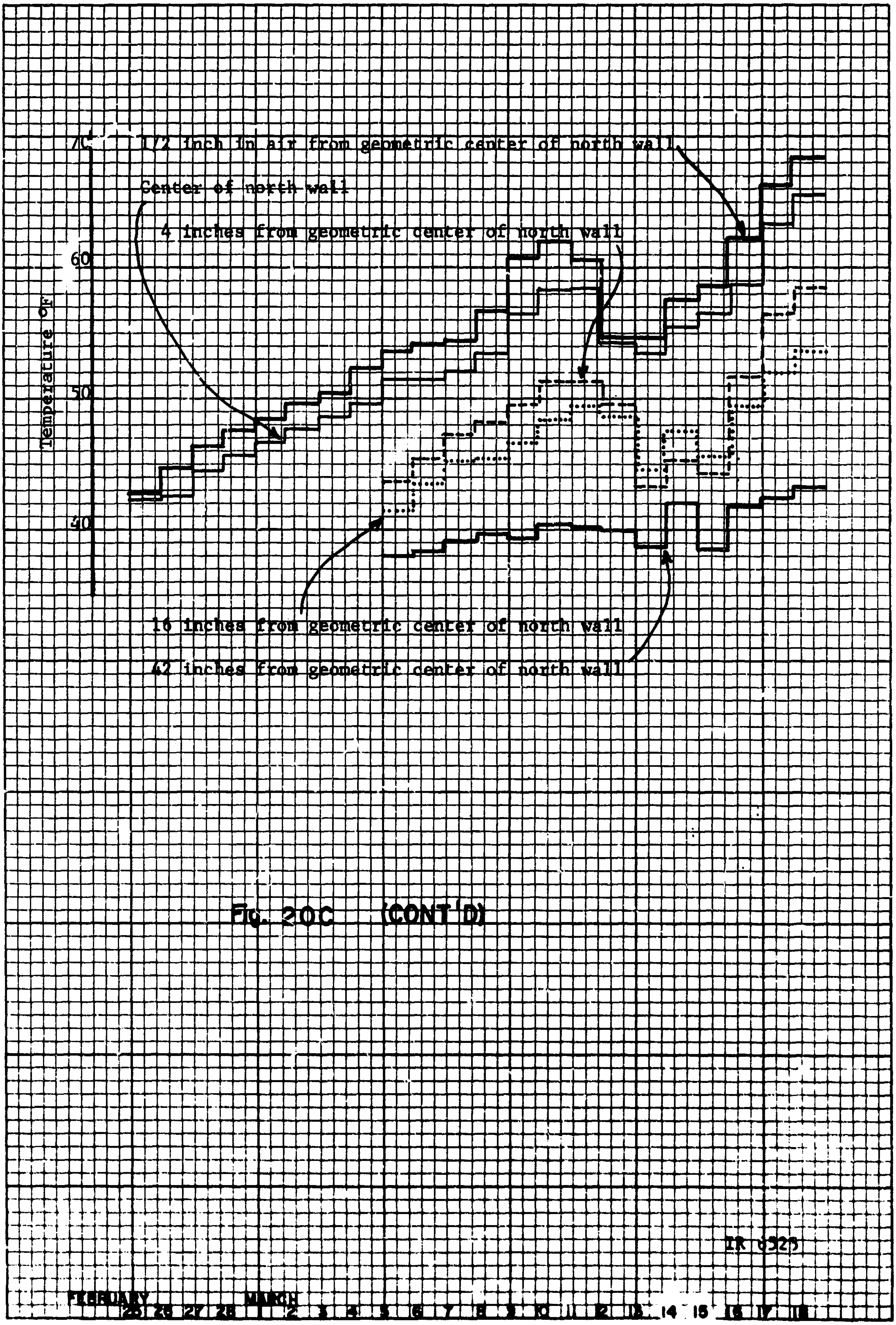


Fig. 20C (CONT'D)

Summary

Simulated Occupancy Test

Hershey Shelter

St. Louis, Missouri

5 June - 19 June 1963

The shelter was constructed of reinforced concrete. Despite attempts to waterproof the structure it had a long history of leakage and before the test could be started, eight inches of water were pumped out of the shelter. As the test progressed, approximately twenty gallons of water were pumped out of the shelter each day. The shelter has 150 square feet of floor space and has 4 feet of earth cover since it is entirely below grade. The shelter had no history of occupancy.

An adiabatic shelter model would require an air flow rate of 11 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F. A shelter model with 25% heat loss through the structure would require an air flow rate of 6.5 cfm per occupant of ventilation air to maintain an average effective temperature of 85 °F.

Occupants.....NBS's Individual Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	2.85	76.7	74.0	15	4.33 days
II	2.85	81.0	79.0	15	5.96 days
III	9.87	82.0	78.8	15	2.58 days
IV	*	82.0	80.0	15	1.42 days

* Ventilation rate alternated between 3 and 9.6 cfm per occupant to take advantage of ambient diurnal cycle.

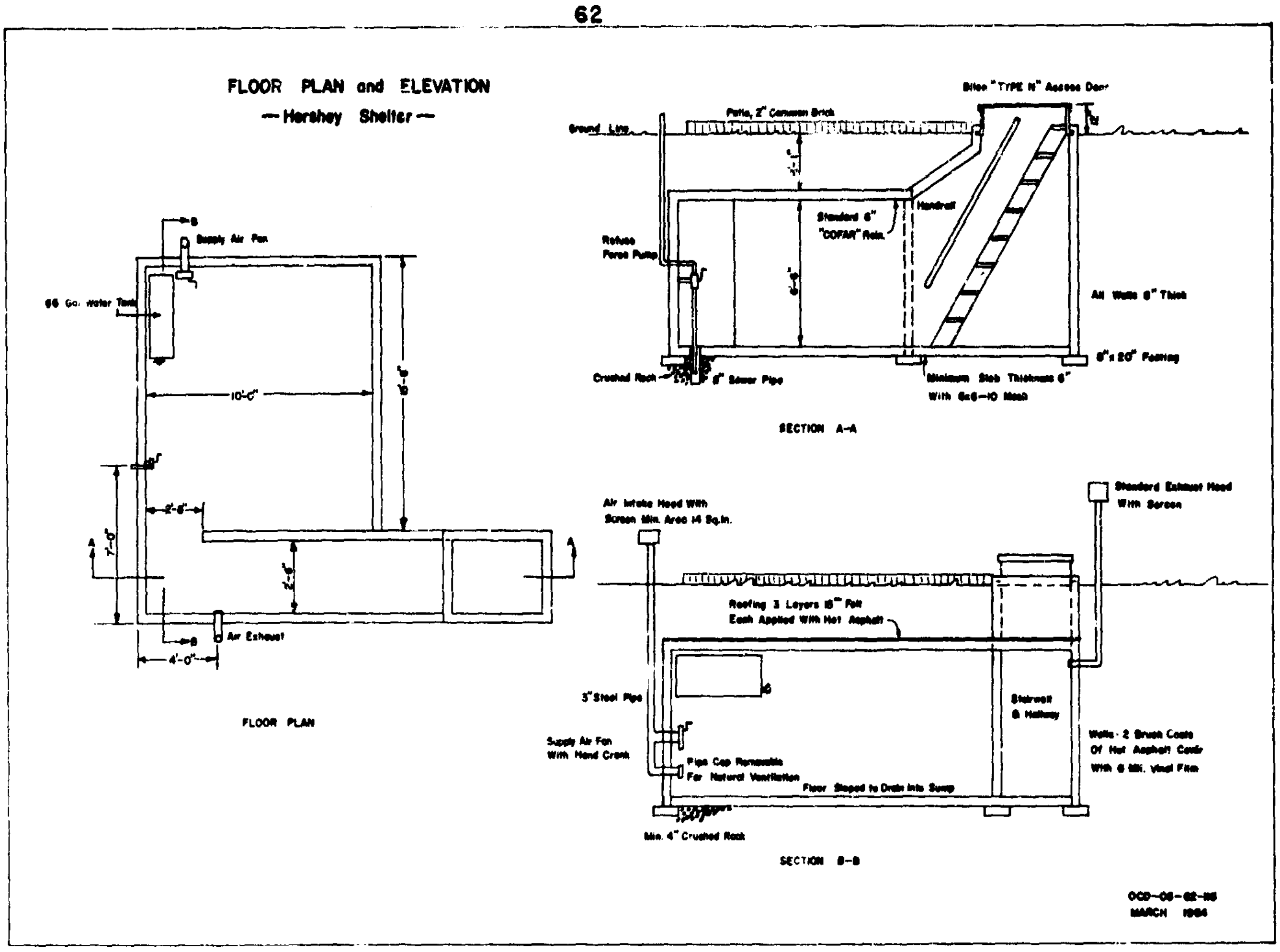
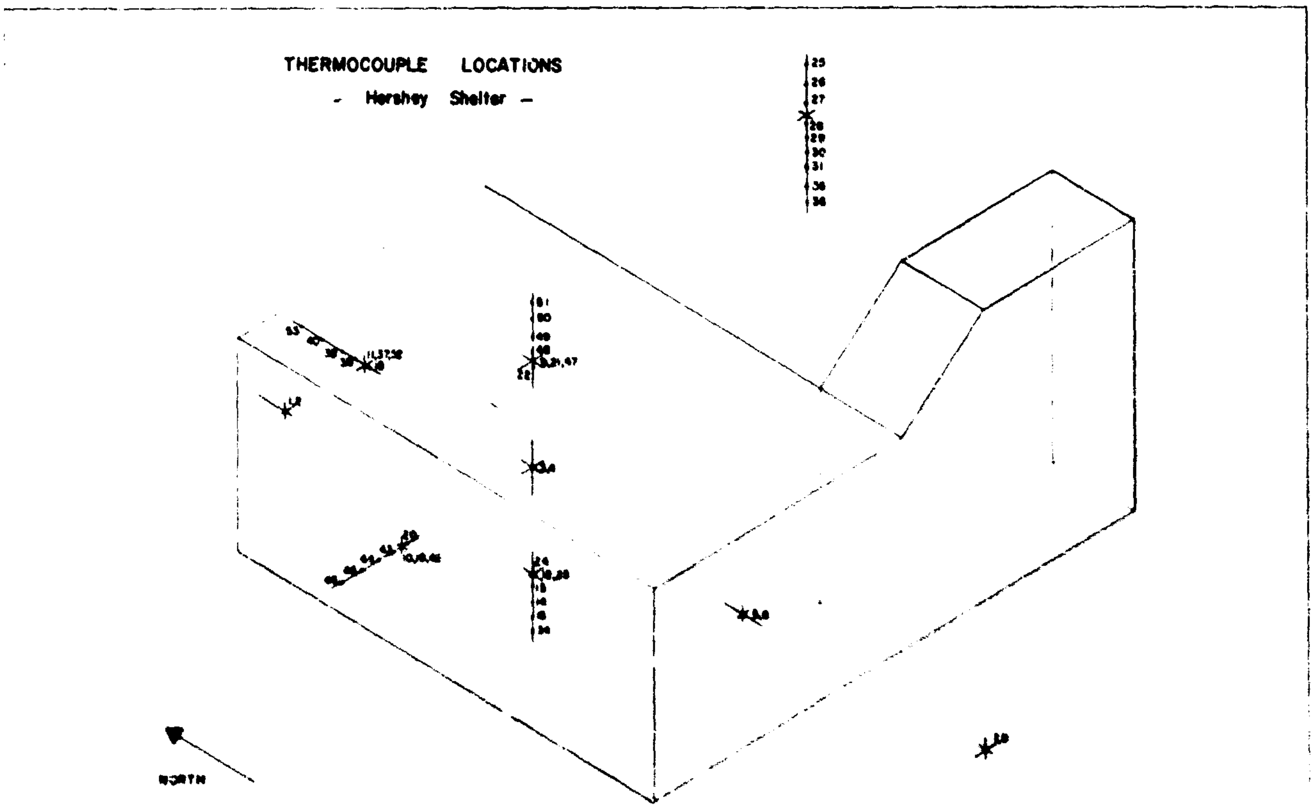


Fig. No. 21 HERSHEY FAMILY SHELTER, ST. LOUIS, MISSOURI



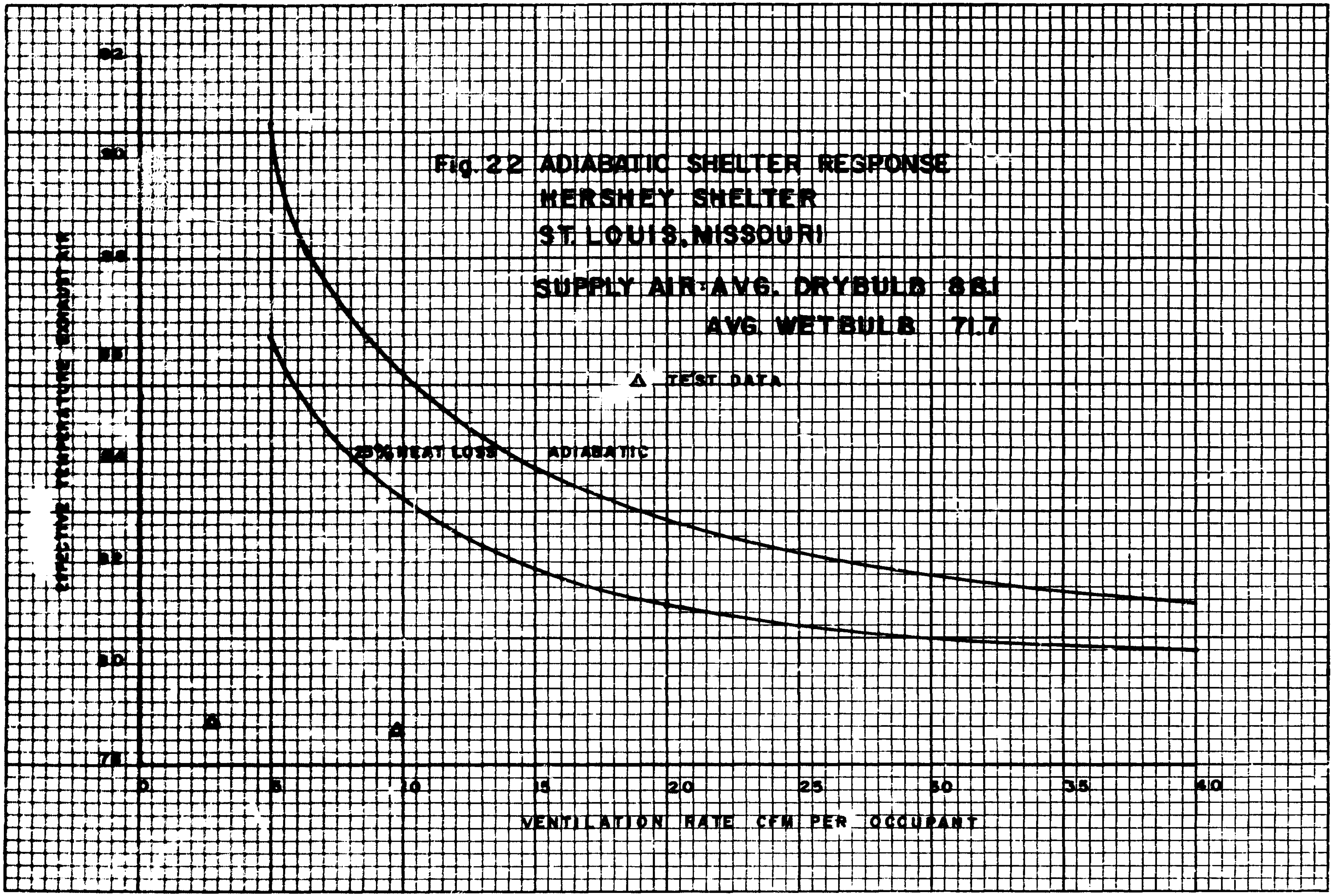


Fig. 22 ADIABATIC SHELTER RESPONSE
HERSHEY SHELTER
ST. LOUIS, MISSOURI
SUPPLY AIR: AVG. DRYBULB 88.1
AVG. WETBULB 71.7

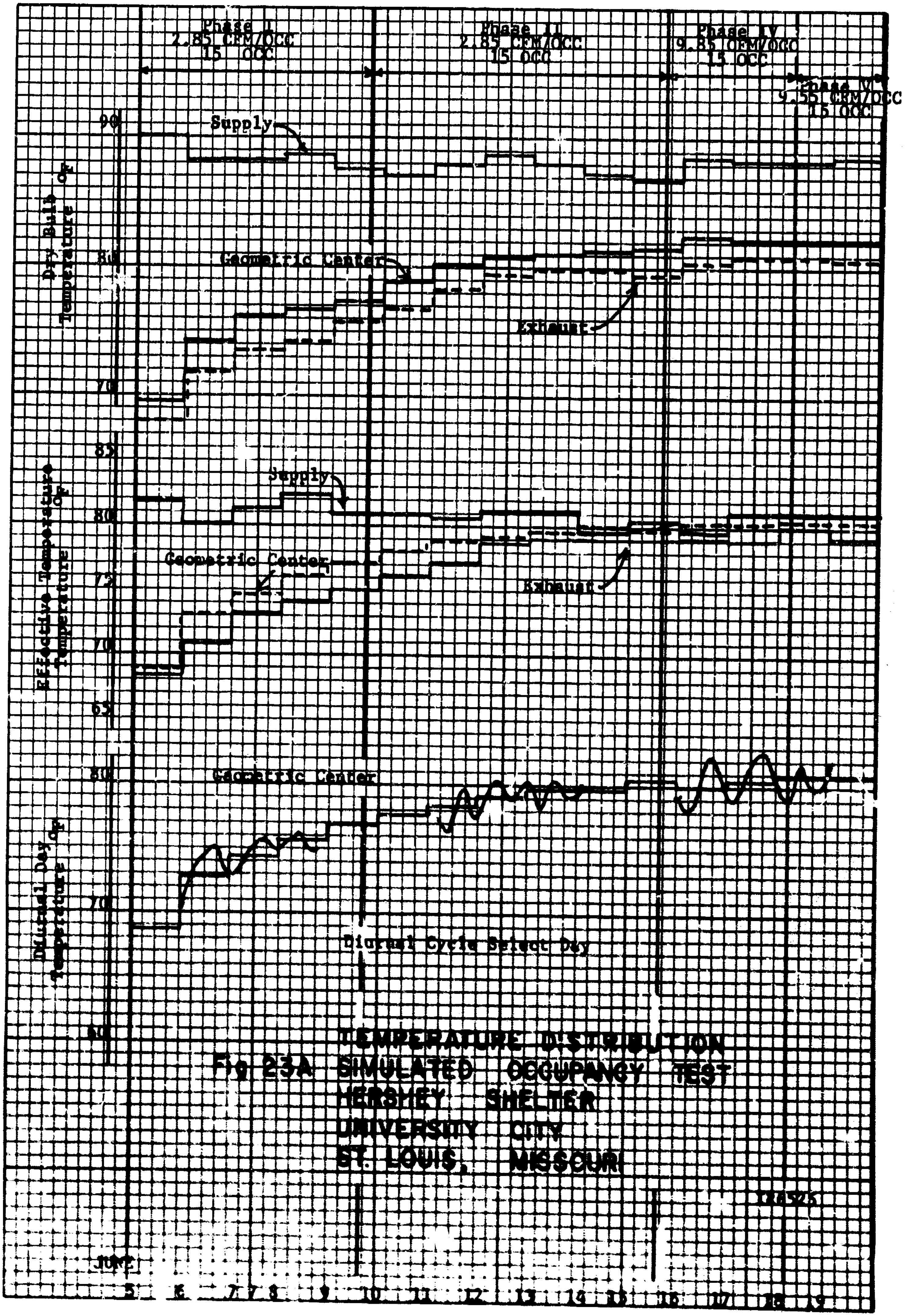


Fig 23A TEMPERATURE DISTRIBUTION SIMULATED OCCUPANCY TEST HERSHEY SHELTER UNIVERSITY CITY ST. LOUIS, MISSOURI

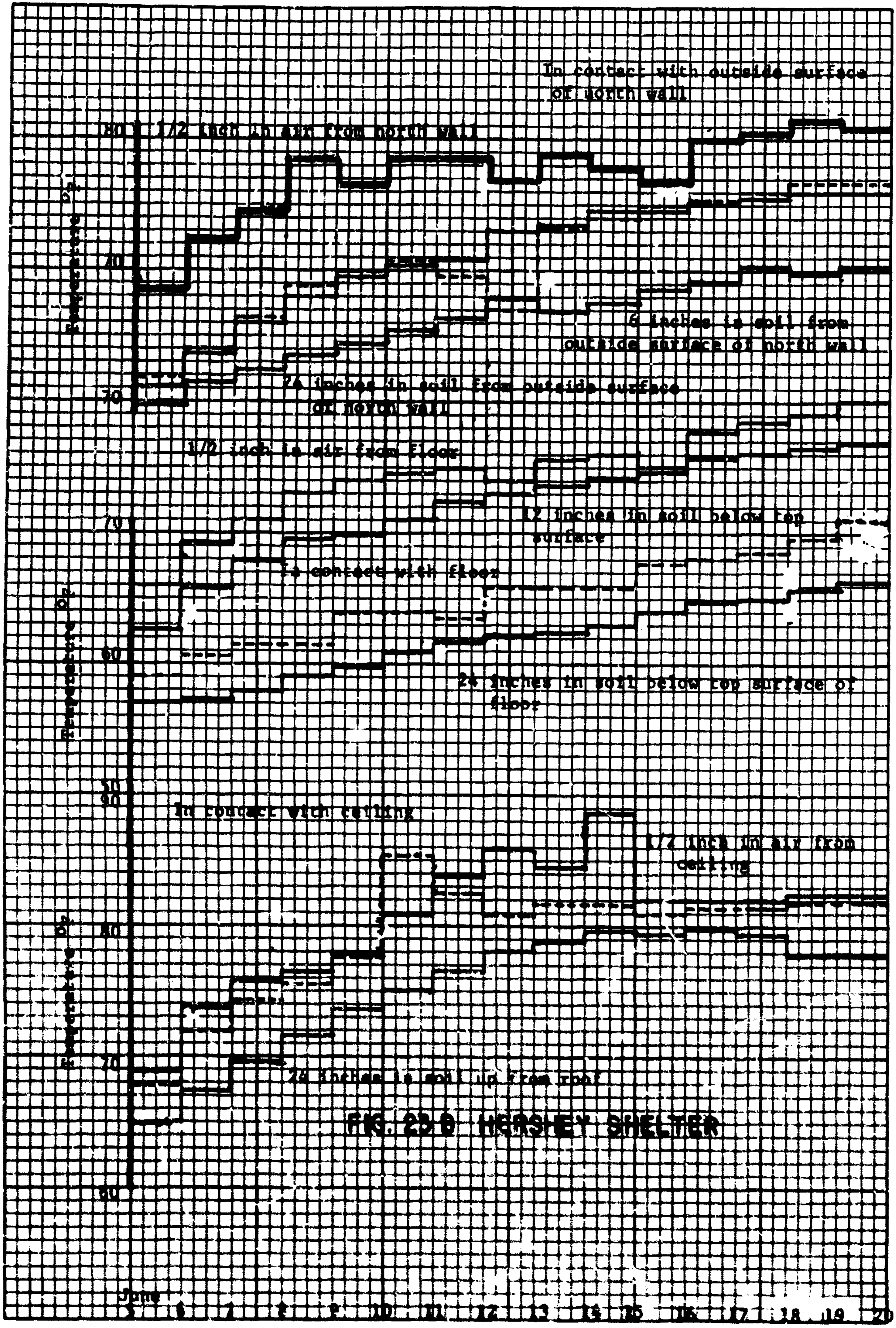


FIG. 23 B HERSHEY SHELTER

Summary

Simulated Occupancy Test

St. Louis Control Center

St. Louis, Missouri

7 June - 24 June 1963

The shelter, constructed of reinforced concrete, was entirely below grade with a minimum of 3 feet of earth cover. The floor has an area of 8400 square feet. The electrical equipment for the shelter releases 74,750 Btu's per hour. The shelter had been occupied previously.

When considering only metabolic heat, an adiabatic shelter model would require an air flow rate of 15.5 cfm per occupant of ventilation air to maintain an average effective temperature of 85 °F.

Occupants.....GATC's Mass Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I**	5	72.1	71.0	150	2 days
II**	5	75.1	72.2	150	1 day
III**	15	80.1	78.2	150	2 days
IV*	15	86.4	83.6	150	6 days
V*	25	86.4	85.0	150	3 days
VI*	4.33	88.3	86.5	150	.25 day (0100-0700)

* Simulated air conditioner failure
** Air conditioner in operation.

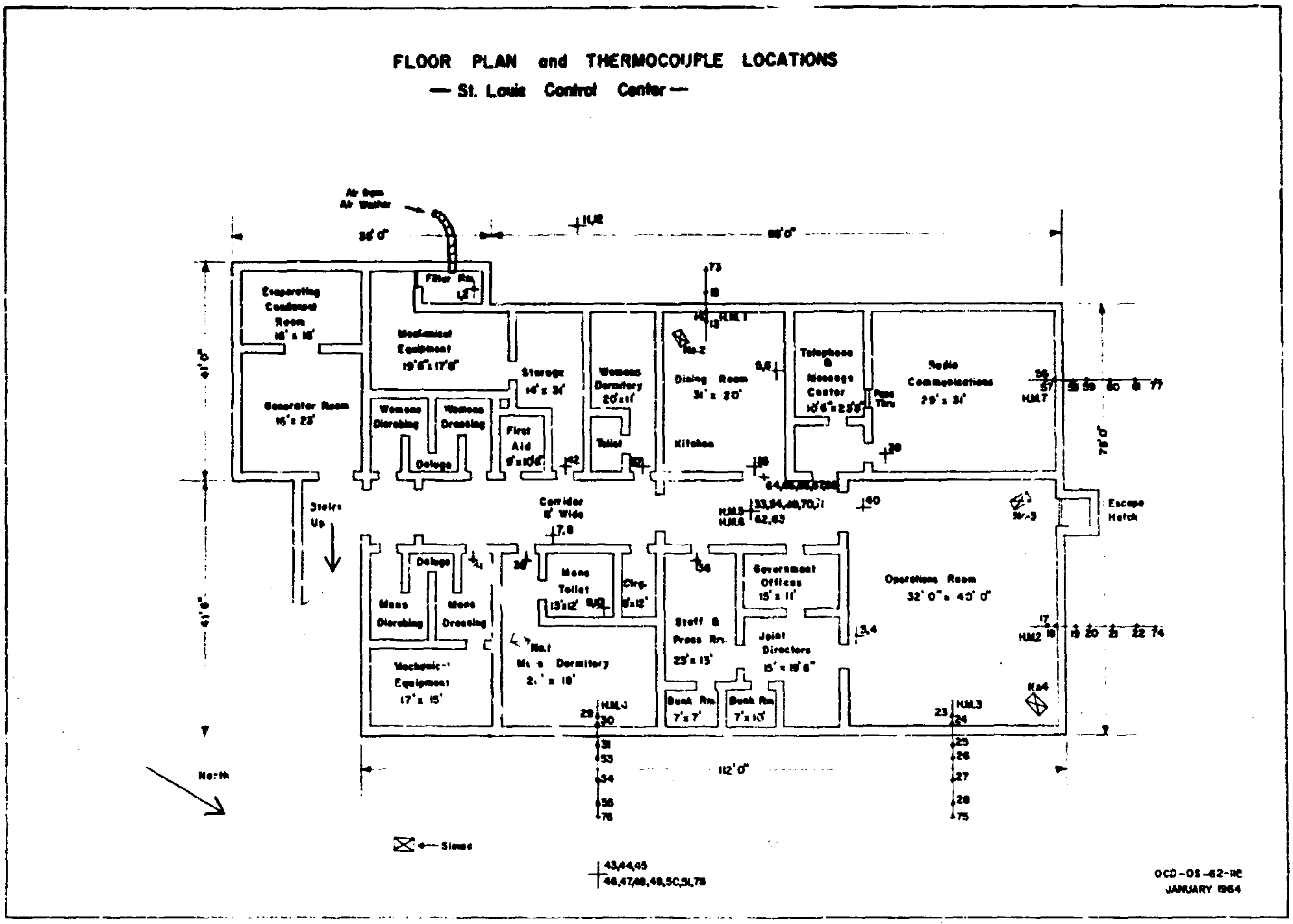
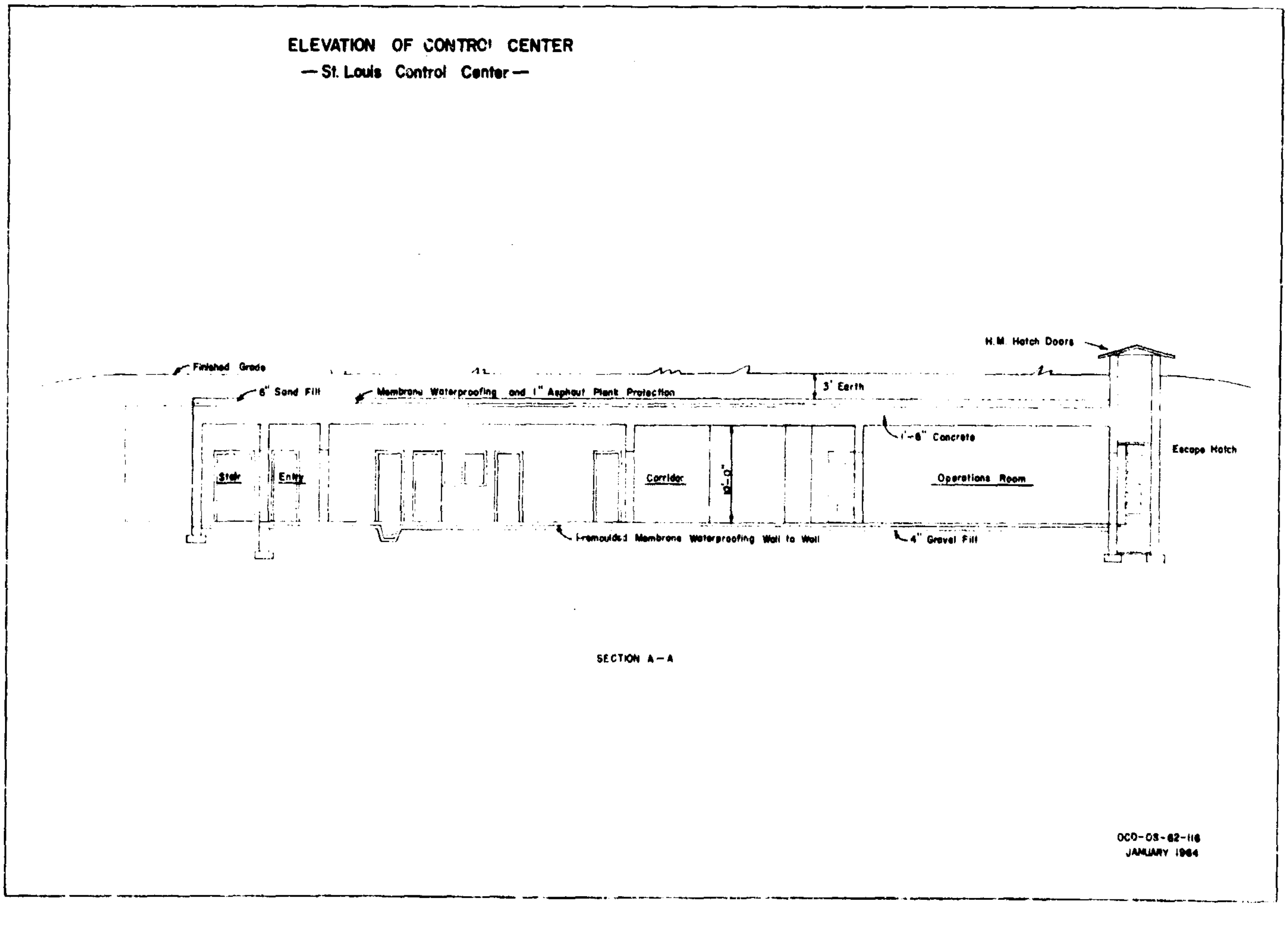


Fig. No. 24 COMMAND POST, ST. LOUIS and ST. LOUIS COUNTY CIVIL DEFENSE, ST. LOUIS, MISSOURI



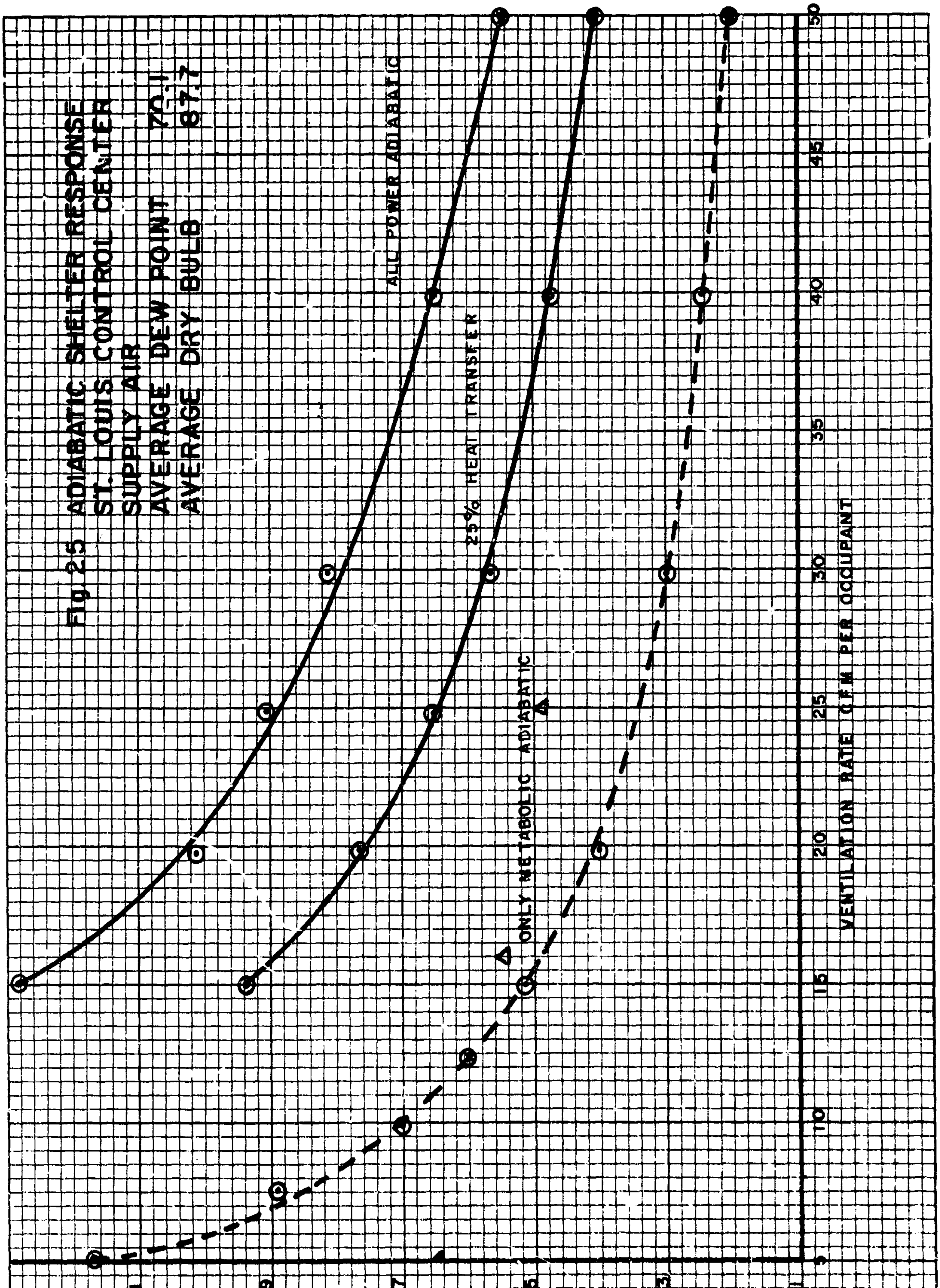


Fig. 25 ADIABATIC SHELTER RESPONSE
ST. LOUIS CONTROL CENTER
SUPPLY AIR
AVERAGE DEW POINT 70.1
AVERAGE DRY BULB 87.7

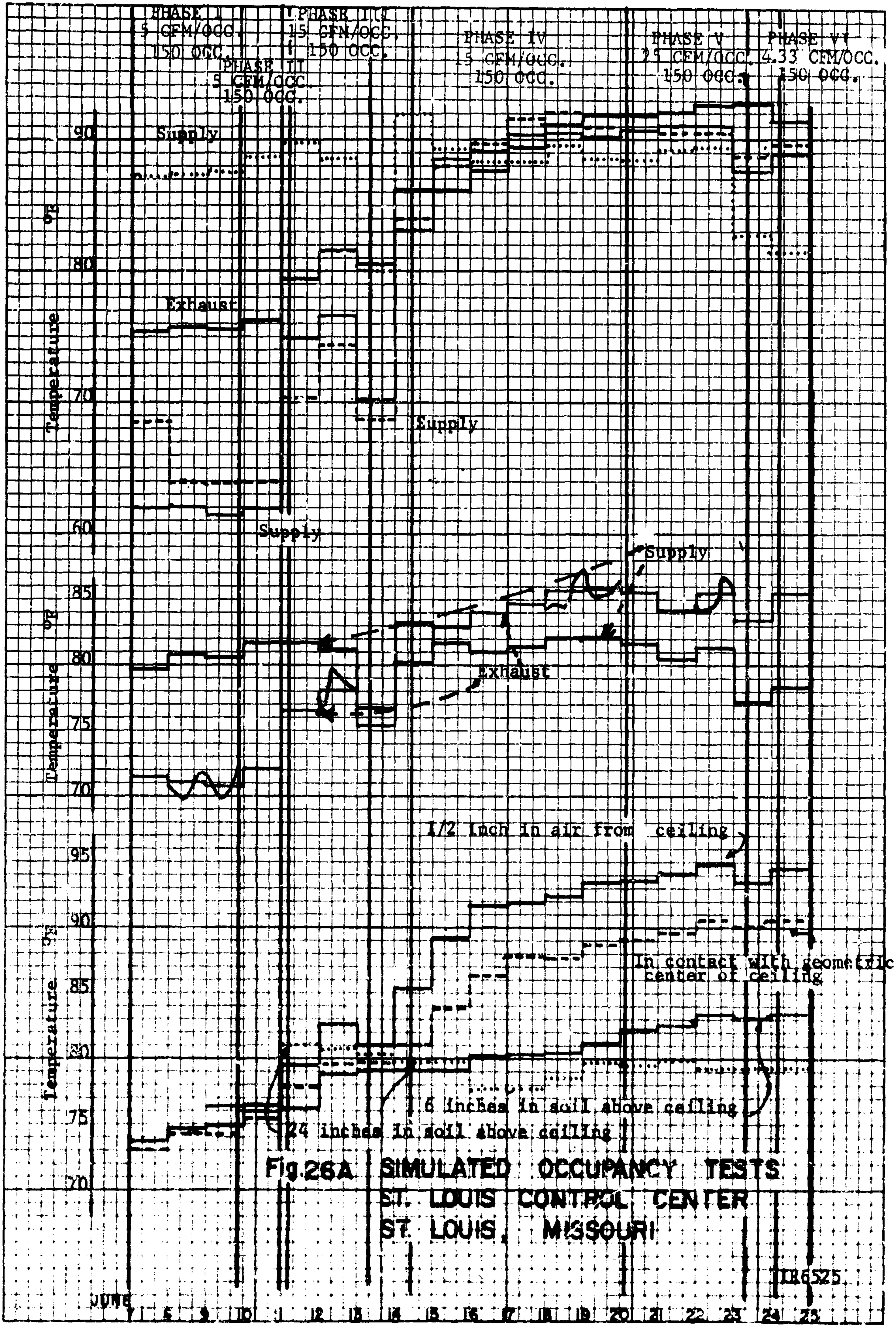


Fig.26A SIMULATED OCCUPANCY TESTS
ST. LOUIS CONTROL CENTER
ST. LOUIS, MISSOURI

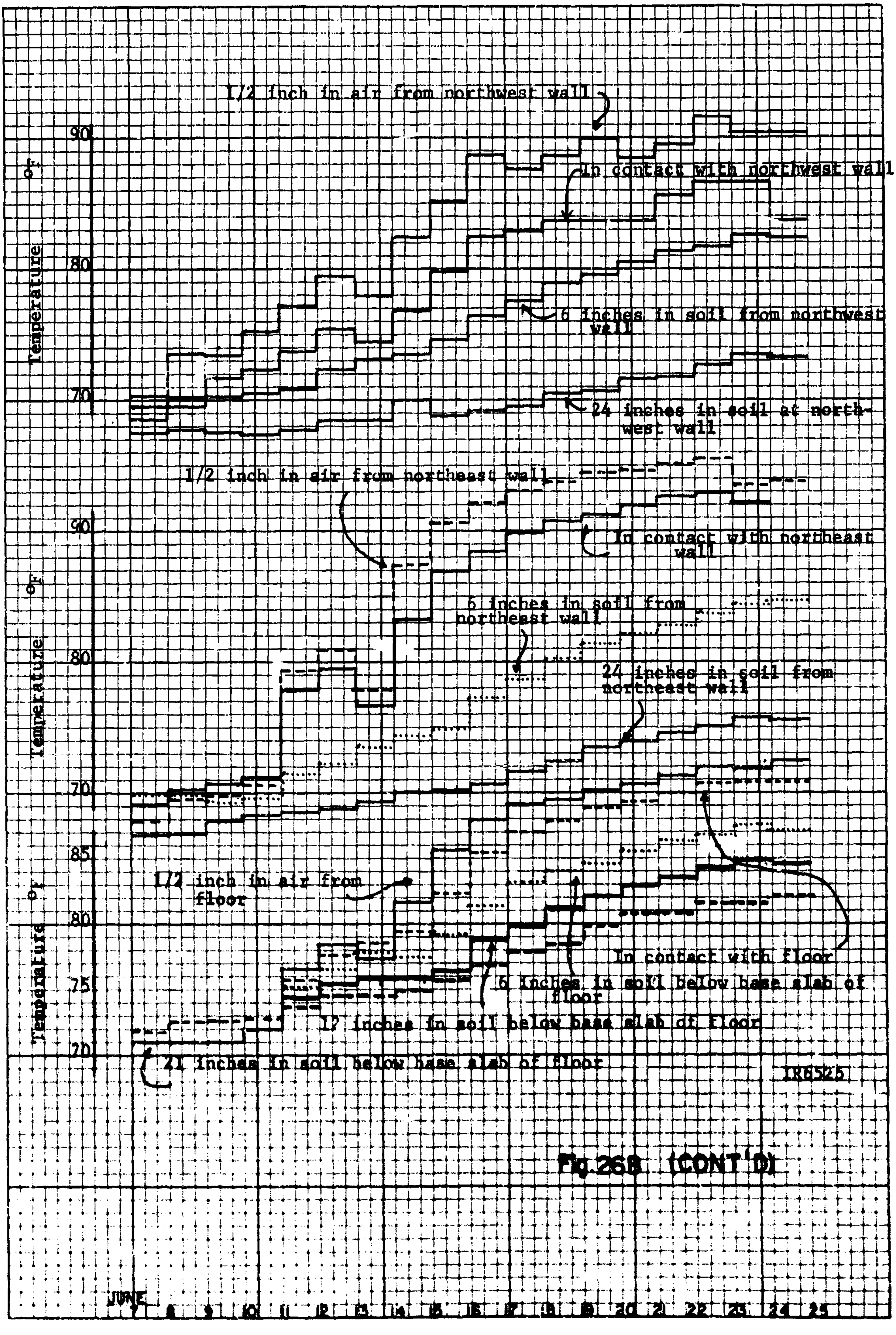


Fig.26B (CONT'D)

Summary

Simulated Occupancy Test

Francis Family Shelter

Tucson, Arizona

5 July - 15 July 1963

The shelter is cylindrical with a domed roof. It is concrete and lined with accoustical tile. The 201 square feet of concrete flooring are covered with asphalt tile. The shelter had not been occupied prior to the test.

An adiabatic shelter model would require an air flow rate of 13.3 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F. A shelter model with 25% heat loss through the structure would require an air flow rate of 6.7 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F.

Occupants.....NBS's Individual Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	3	86.1	85.5	20	4.0 days
II	10	86.0	85.2	20	3.0 days
III	3	86.8	85.7	8	1.17 days
IV	10	83.4	83.5	8	1.58 days

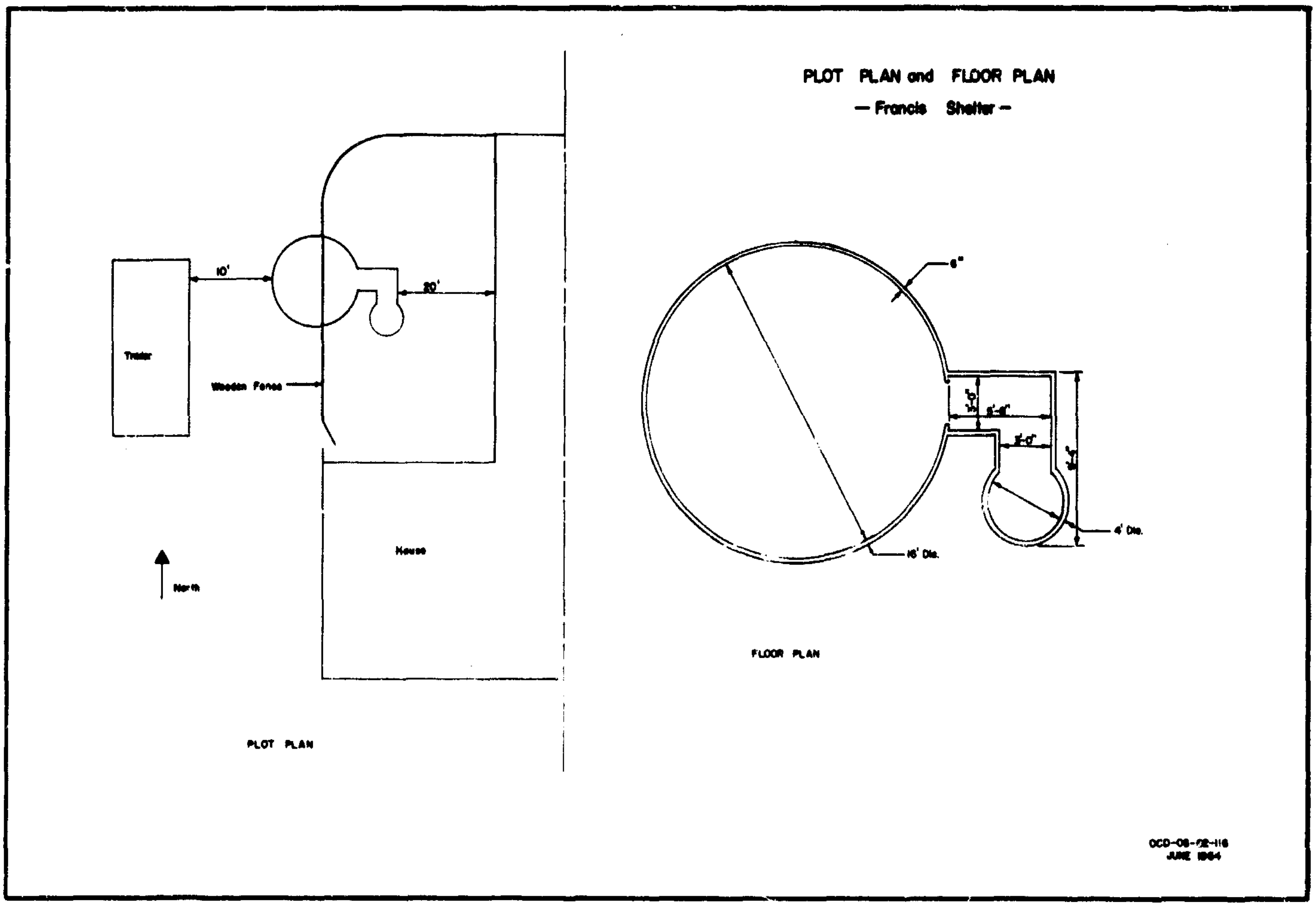
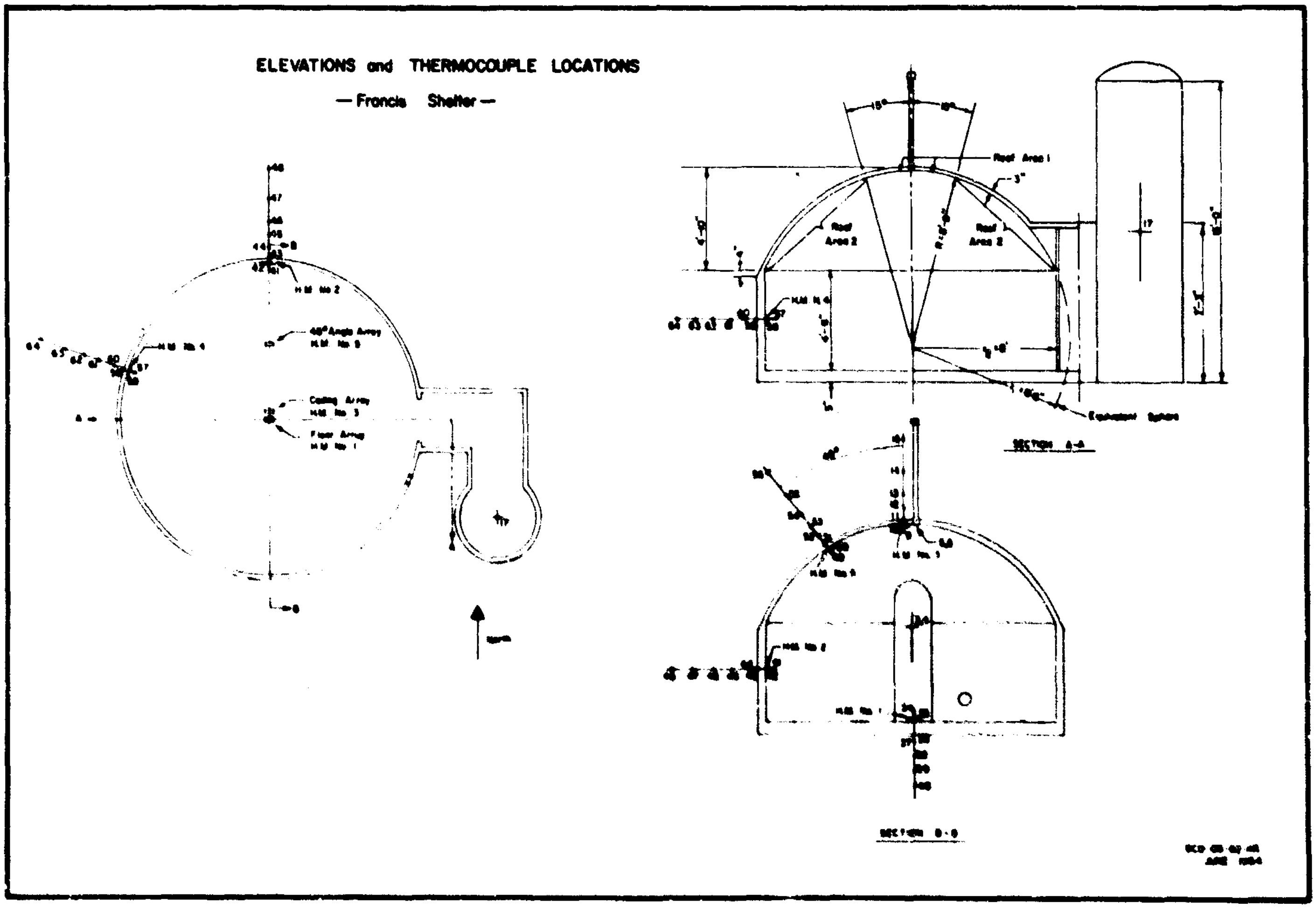


Fig. No. 27 FRANCIS FAMILY SHELTER, TUCSON, ARIZONA



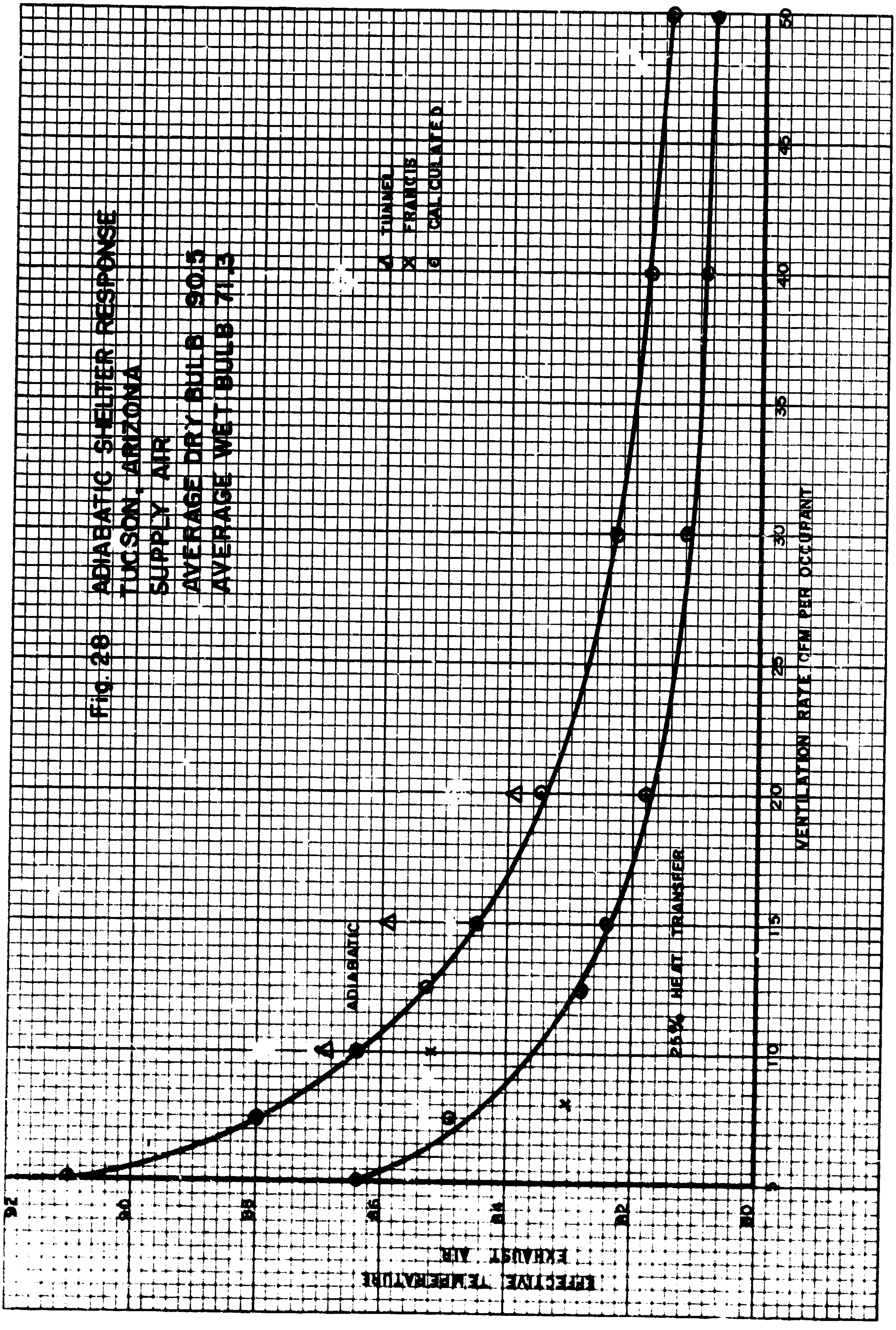


Fig. 28 ADIABATIC SHELTER RESPONSE
TUCSON, ARIZONA
SUPPLY AIR
AVERAGE DRY BULB 90.5
AVERAGE WET BULB 71.3

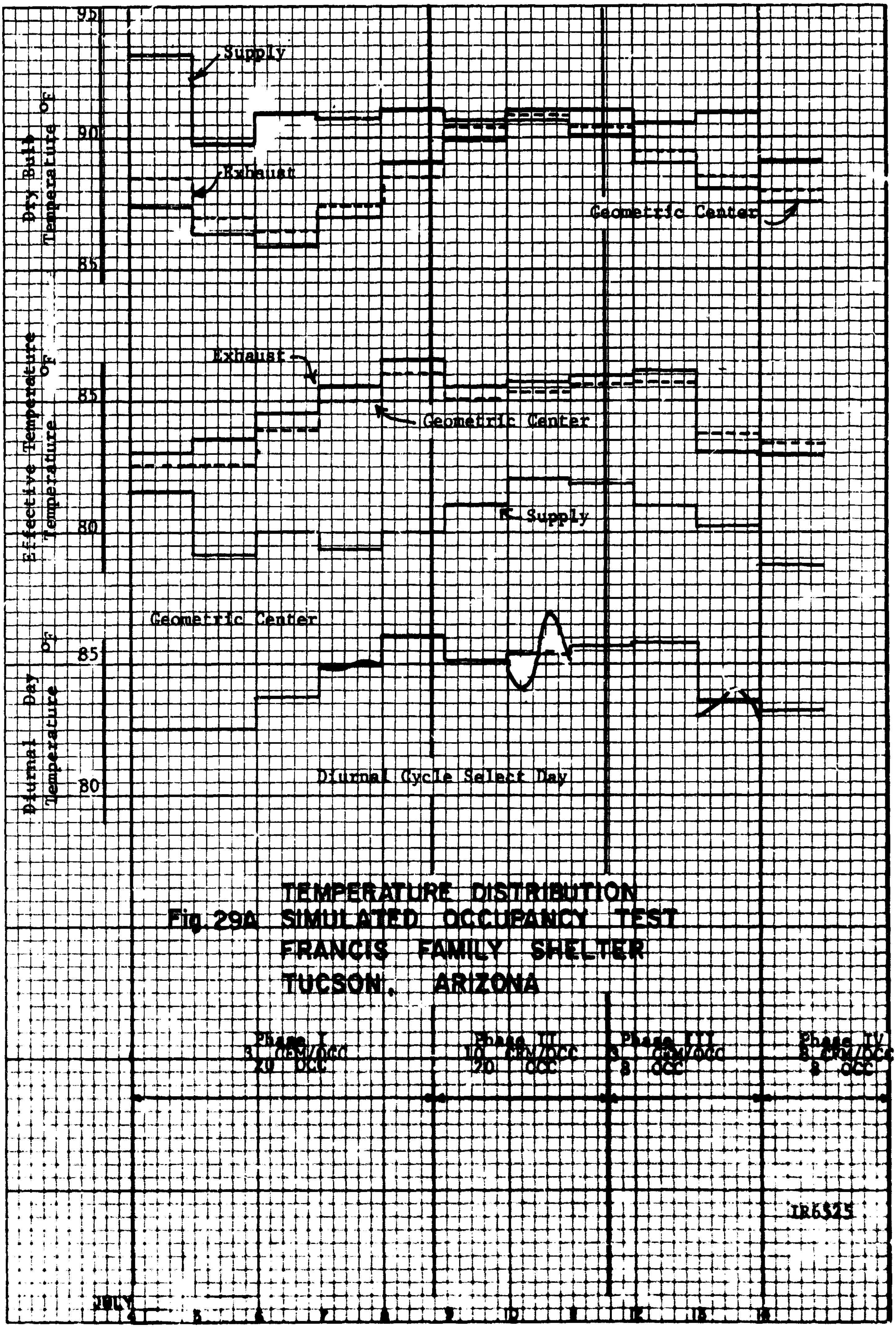


Fig. 29A TEMPERATURE DISTRIBUTION
SIMULATED OCCUPANCY TEST
FRANCIS FAMILY SHELTER
TUCSON, ARIZONA

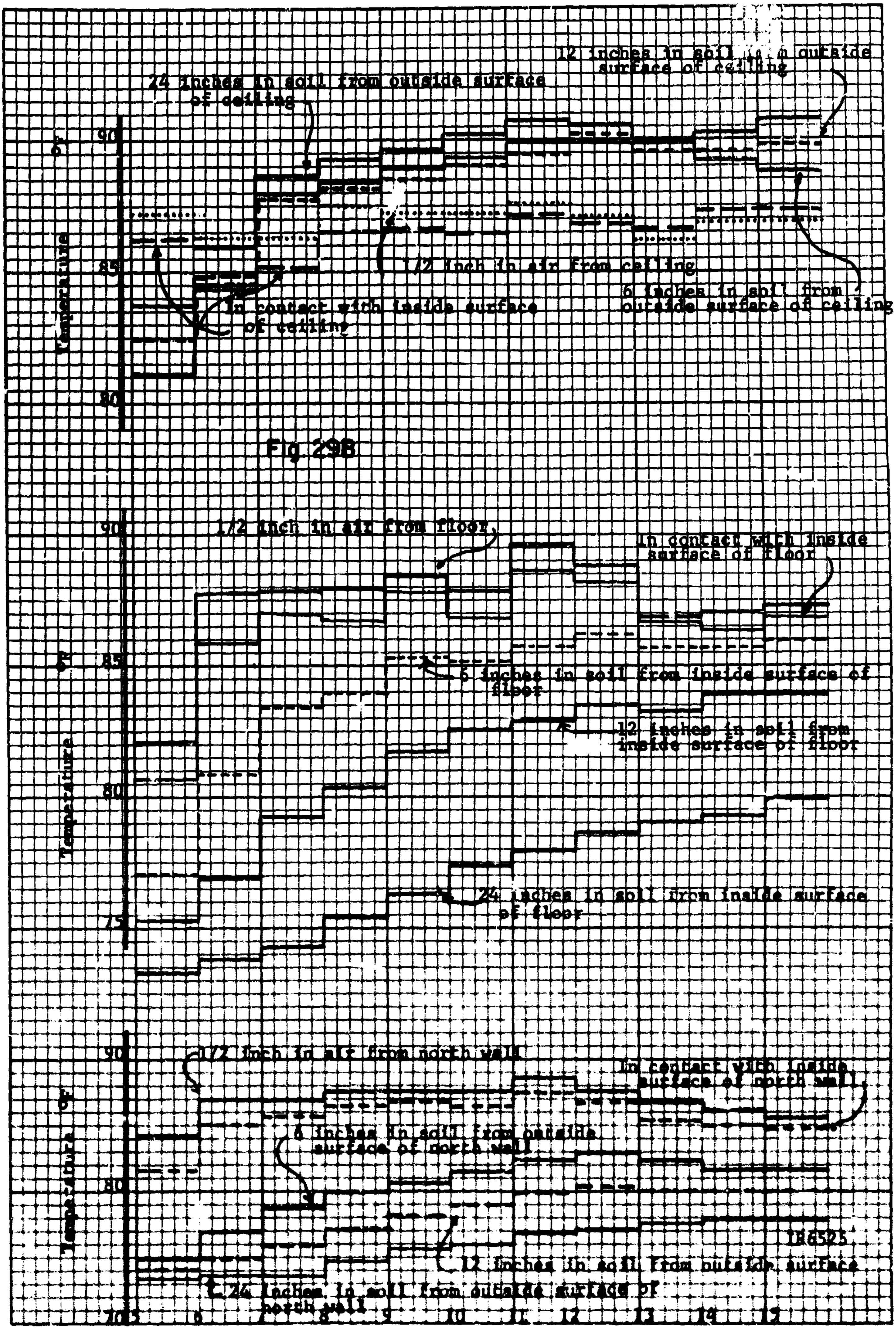


Fig 29B

12 inches in soil from outside surface of ceiling
24 inches in soil from outside surface of ceiling
1/2 inch in air from ceiling
In contact with inside surface of ceiling
6 inches in soil from outside surface of ceiling
Temperature °F
90
85
80
1/2 inch in air from floor
In contact with inside surface of floor
6 inches in soil from inside surface of floor
12 inches in soil from inside surface of floor
24 inches in soil from inside surface of floor
Temperature °F
90
85
80
75
1/2 inch in air from north wall
In contact with inside surface of north wall
6 inches in soil from outside surface of north wall
12 inches in soil from outside surface
24 inches in soil from outside surface of north wall
IR6525
Temperature °F
90
80
70
5
6
8
9
10
11
12
13
14
15
June

Summary

Simulated Occupancy Test

Airport Utility Tunnel Shelter

Tucson, Arizona

19 July - 31 July 1963

The shelter section tested was an 80 foot length of the tunnel. The tunnel was 2 to 3 feet below grade and was constructed of 0.10 Multiplate corrugated copper steel. The ellipsoidal cross-section of the shelter gave 400 square feet of floor space for the 80 foot length. The tunnel had not been occupied prior to the test.

An adiabatic shelter model would require an air flow rate of 13.3 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F. A shelter model with 25% heat loss through the structure would require an air flow rate of 6.7 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F.

Occupants.....NBS's Individual Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	3	91.5	90.1	40	.583 day
II	10	88.9	87.0	40	1.0 day
III	15	87.1	86.0	40	7.08 days
IV	20	86.2	85.2	40	2.42 days
V*	20	85.3	84.0	40	2.0 days

*"Desert cooler" in operation ΔT 6° dry bulb

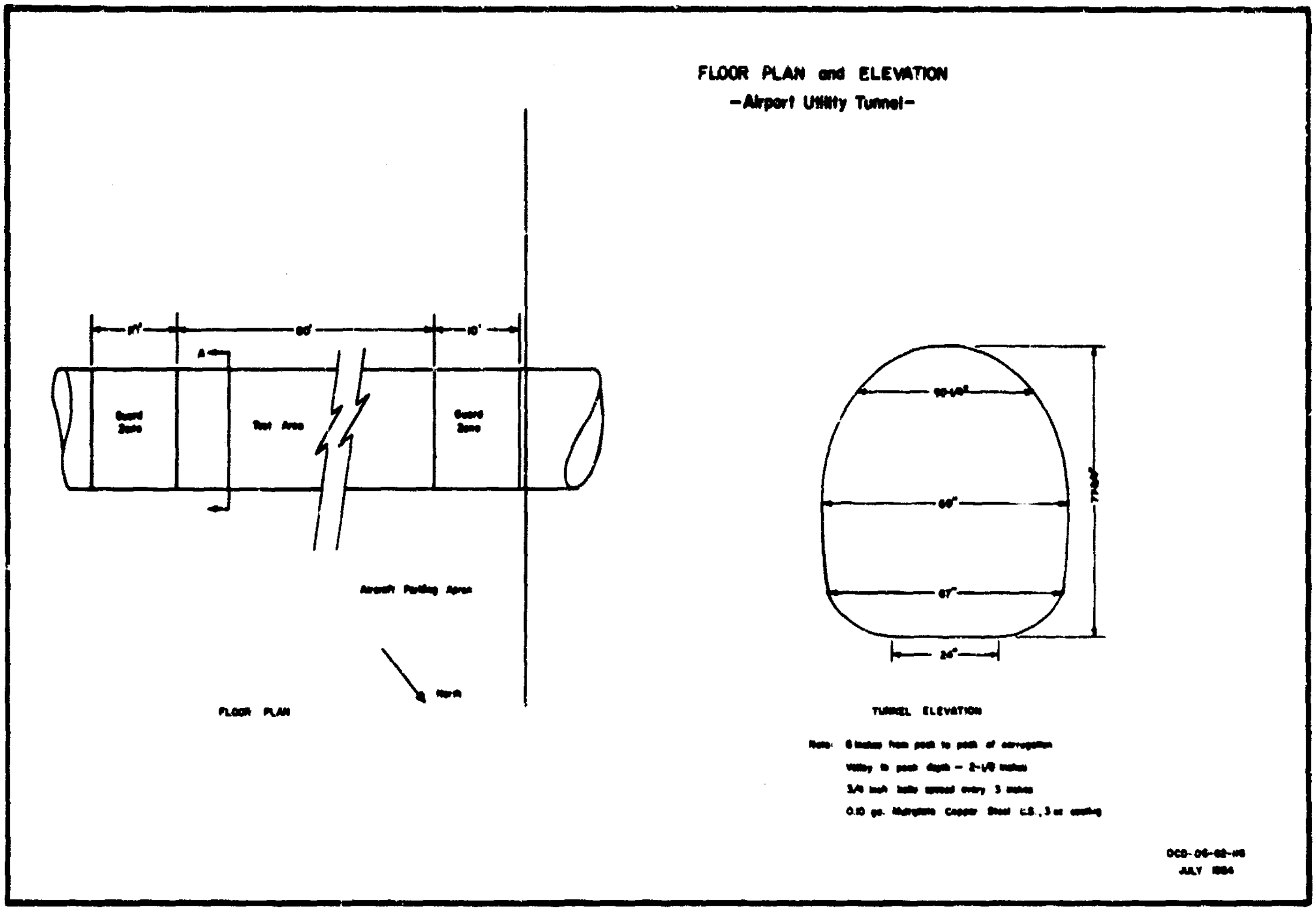
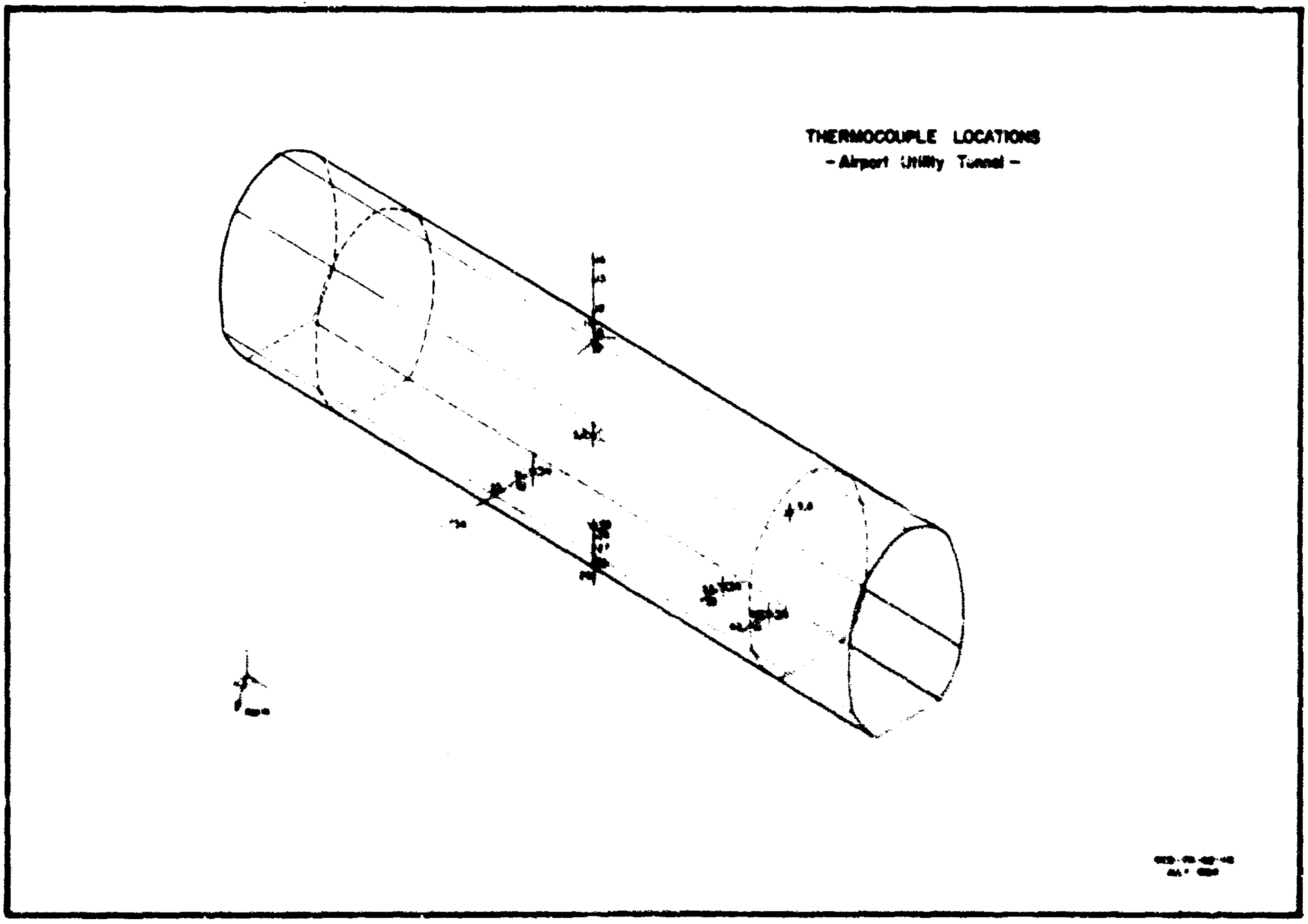


Fig. No. 30 AIRPORT UTILITY TUNNEL, TUCSON, ARIZONA



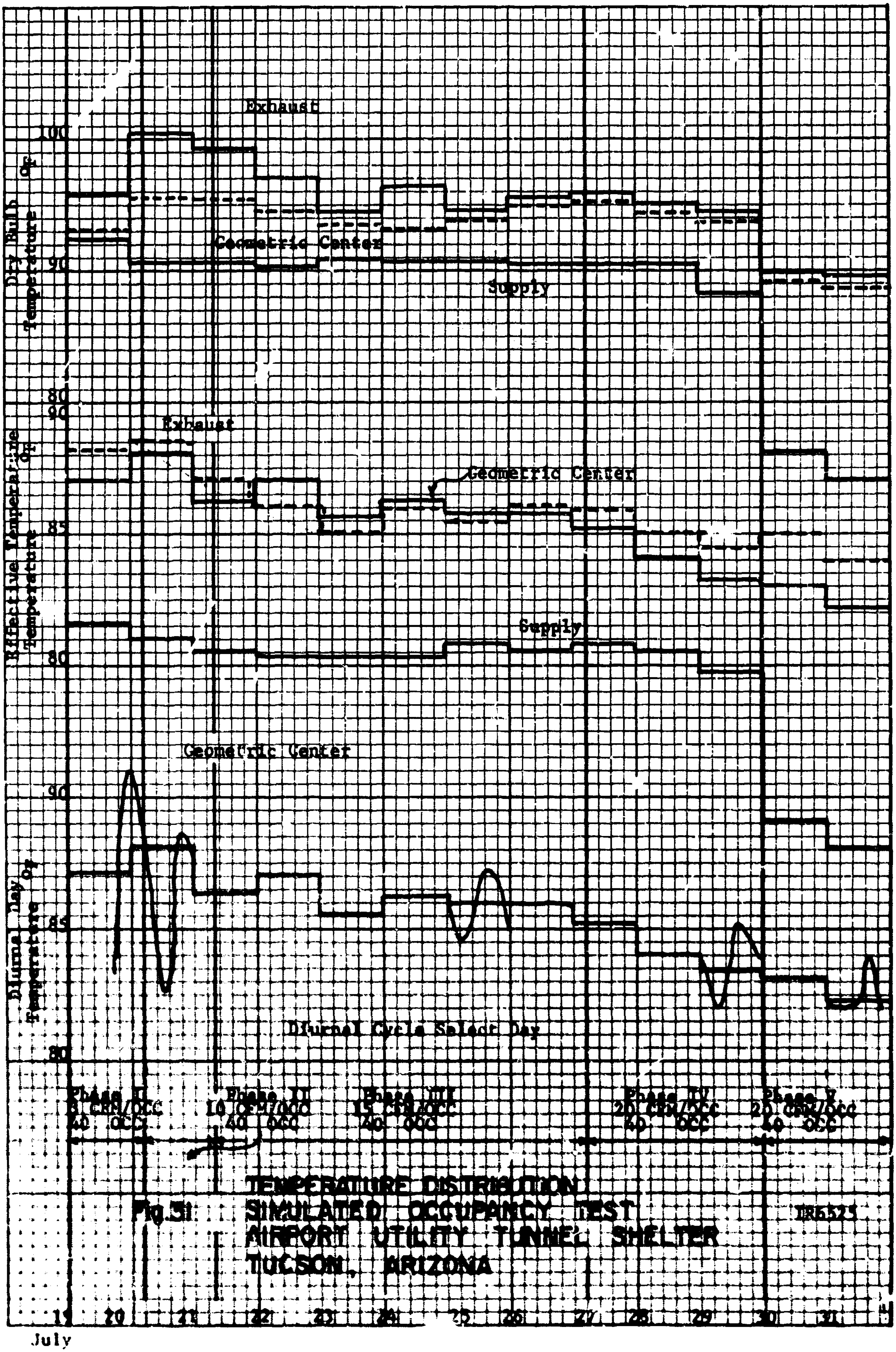


Fig.51 TEMPERATURE DISTRIBUTION
SIMULATED OCCUPANCY TEST
AIRPORT UTILITY TUNNEL SHELTER
TUCSON, ARIZONA

IR6523

Summary

Simulated Occupancy Test

Abo School

Artesia, New Mexico

10 July - 22 July 1963

The shelter is a basement-type reinforced concrete structure. The school has a useable floor space of about 24,000 square feet. This test, however, embraces only 2280 square feet. The shelter was occupied prior to the test.

An adiabatic shelter model would require an air flow rate of 5.5 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F. A shelter model with 25% heat loss through the structure would require an air flow rate of 2.5 cfm per occupant of ventilation air to maintain an average effective temperature of 85 °F.

Occupants.....GATC's Mass Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	16.4	[illegible]	79.0	228	3 days
II	10.0	82.0	80.2	228	3 days
III	5.0	86.3	84.5	228	2.33 days
IV	7.5	86.5	82.5	228	2.16 days
V*	5.0	-	82.5	228	8 hrs. (1600-2400)

* DB - 48 °F } Supply Air
DP - 47 °F } (Air Conditioner Simulation)

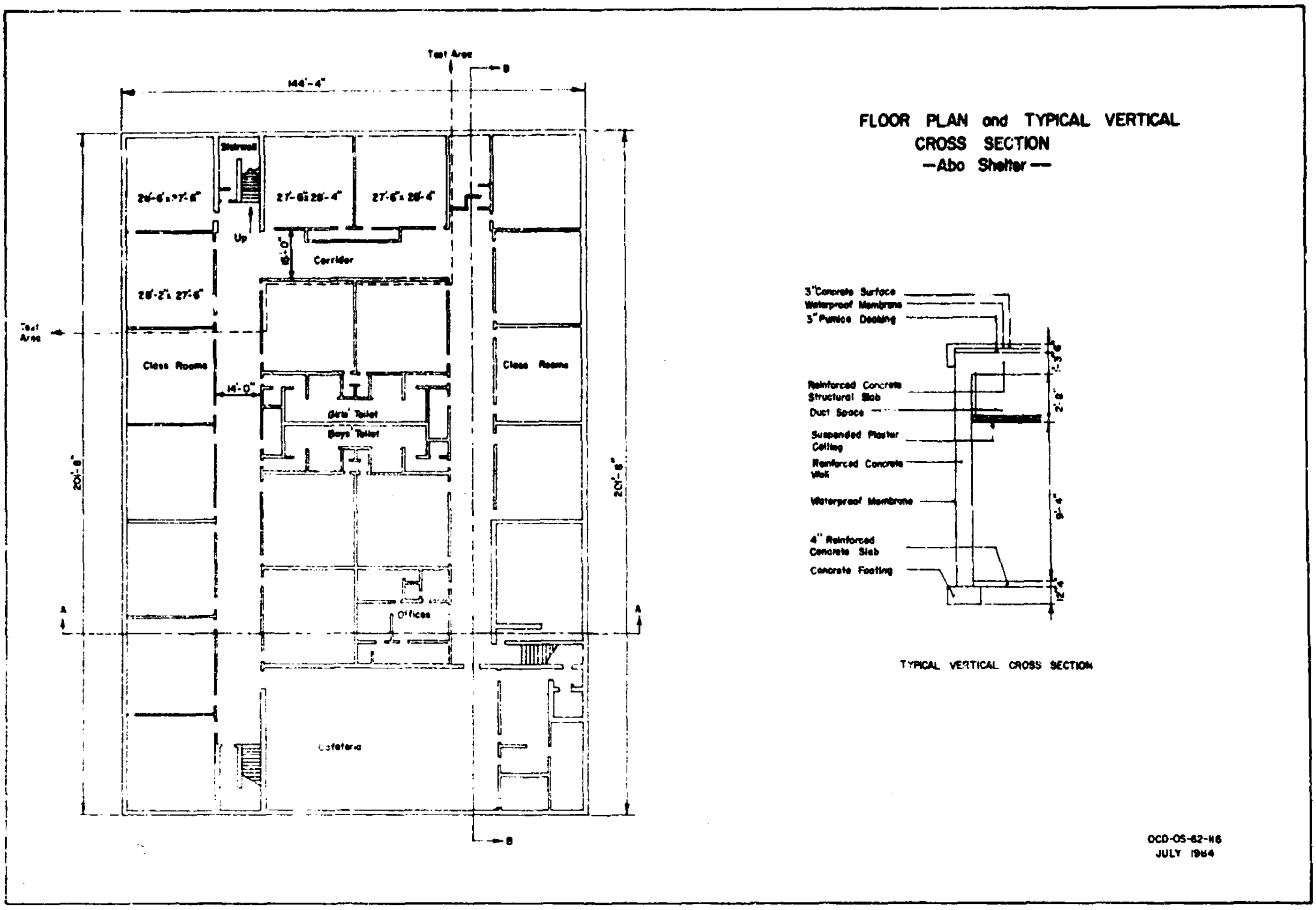
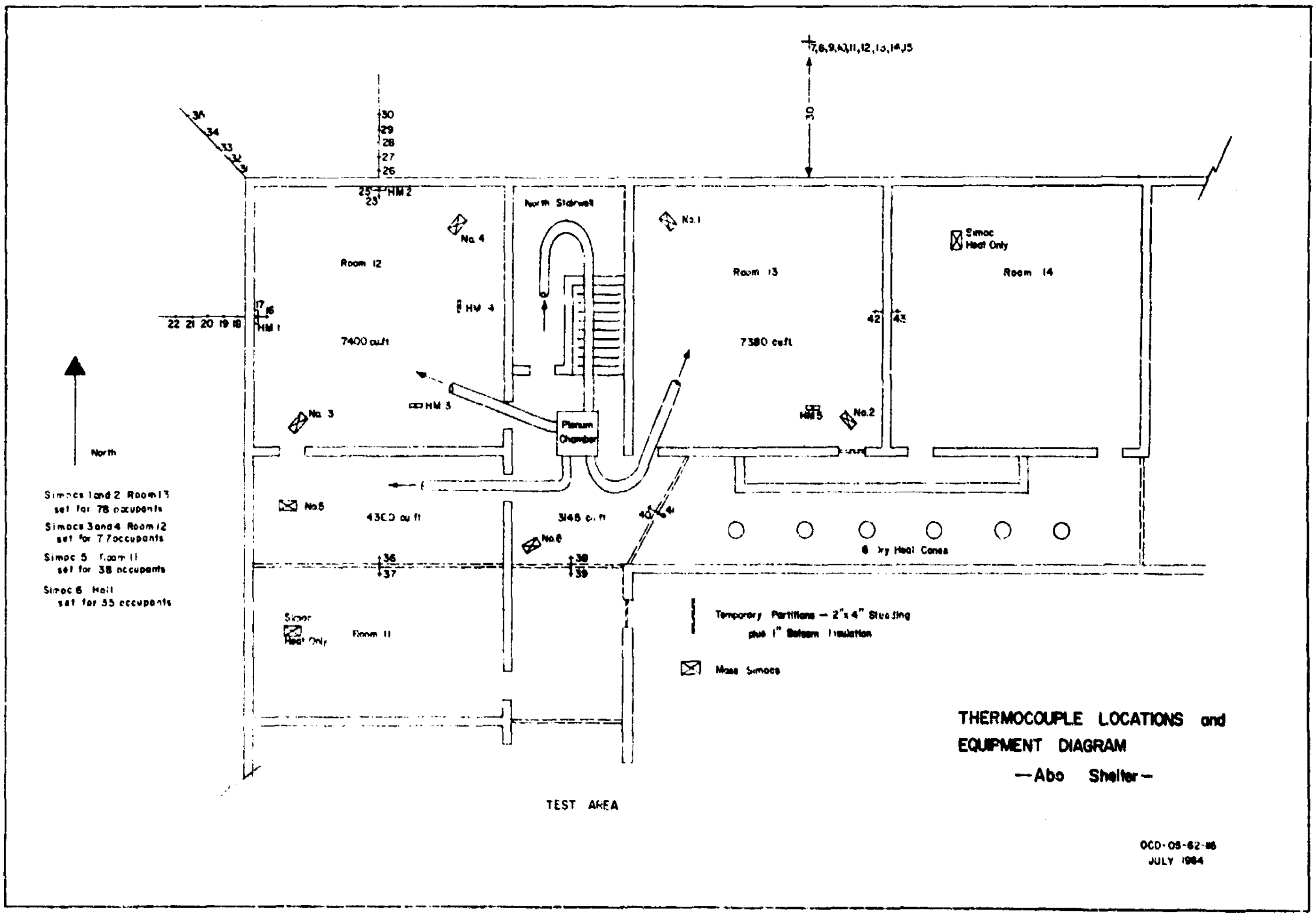


Fig. No.32 ABO SCHOOL SHELTER, ARTESIA, NEW MEXICO



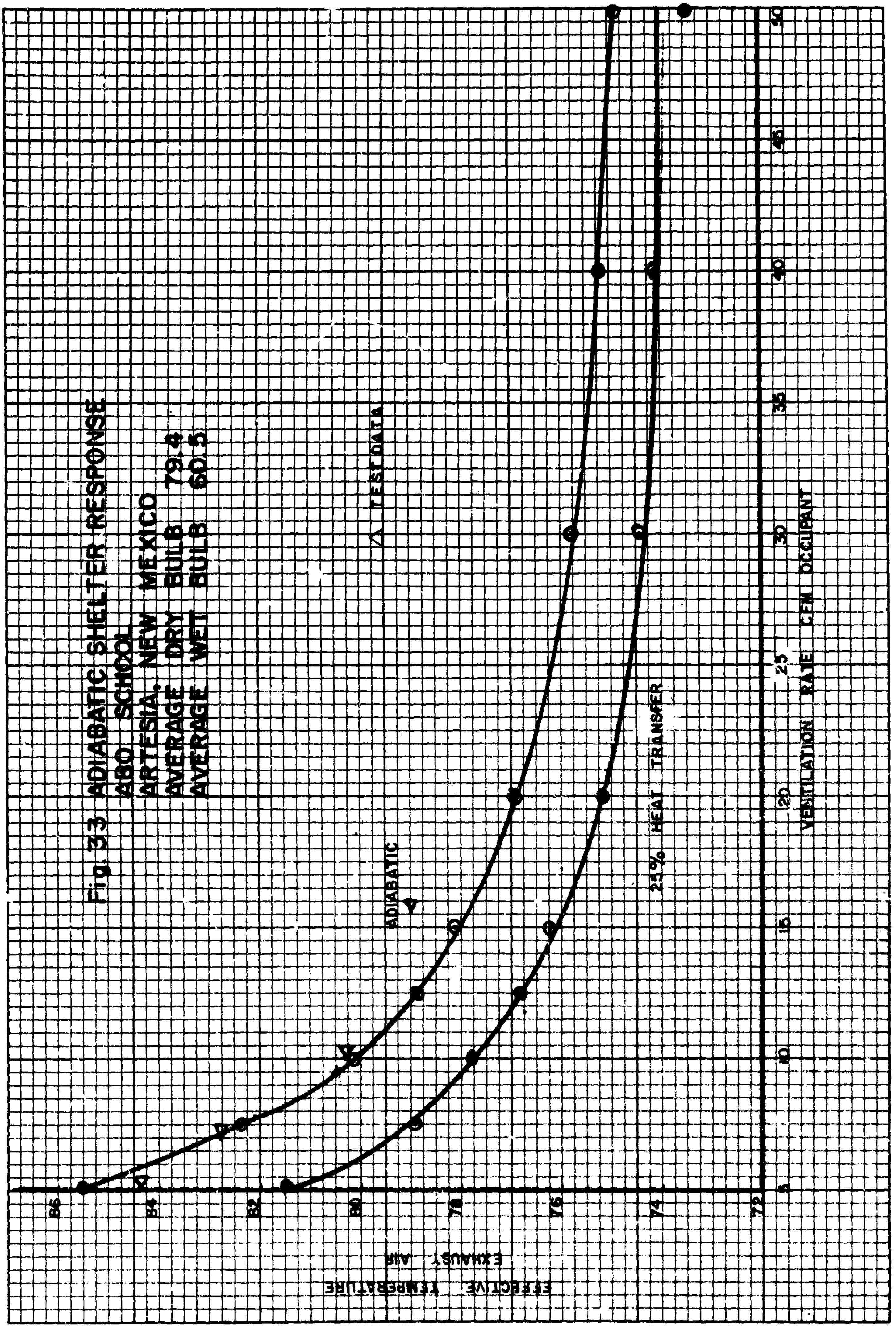


Fig 33 ADIABATIC SHELTER RESPONSE
ABO SCHOOL
ARTESIA, NEW MEXICO
AVERAGE DRY BULB 79.4
AVERAGE WET BULB 60.5

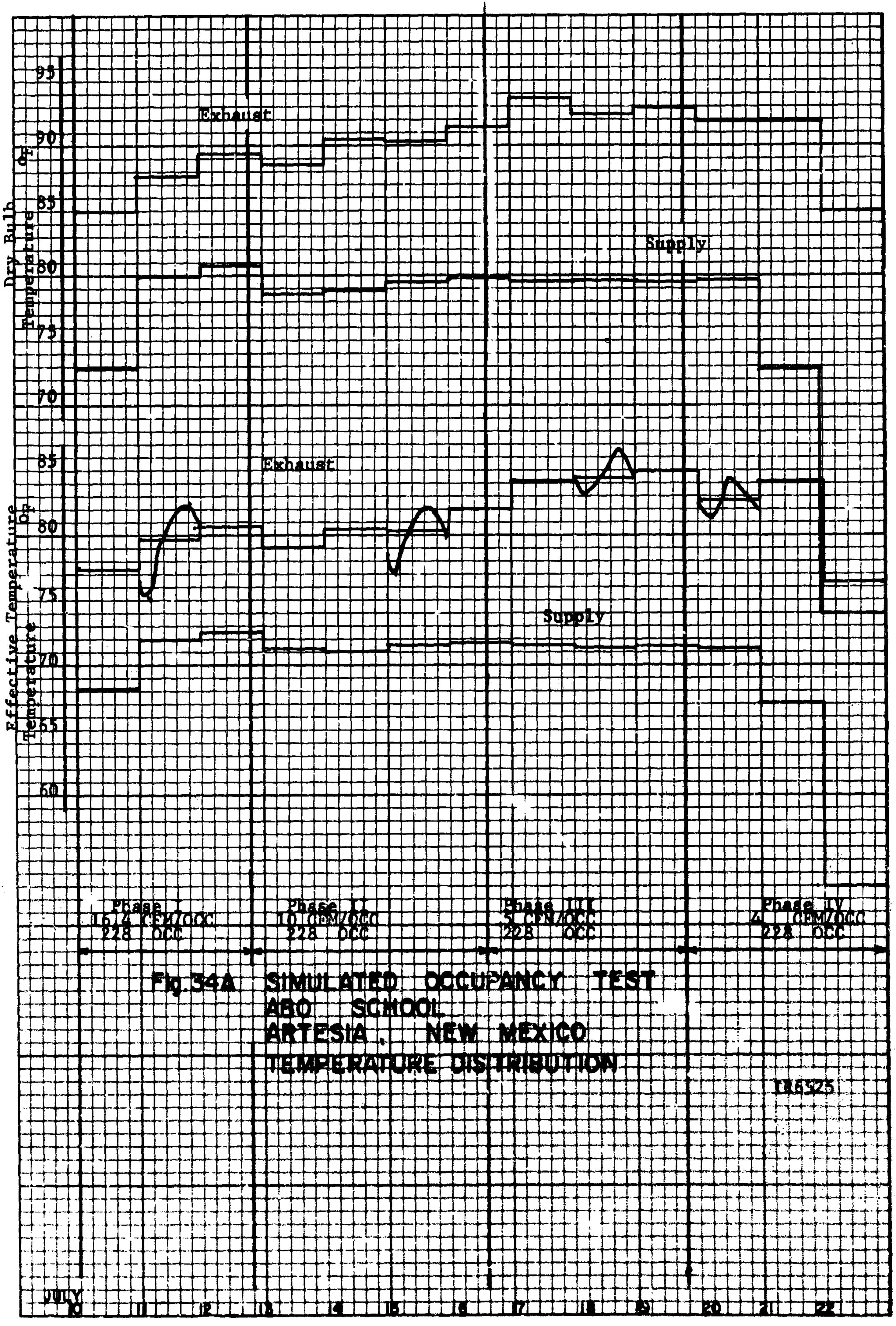


Fig.34A SIMULATED OCCUPANCY TEST
ABO SCHOOL
ARTESIA, NEW MEXICO
TEMPERATURE DISTRIBUTION

IR6325

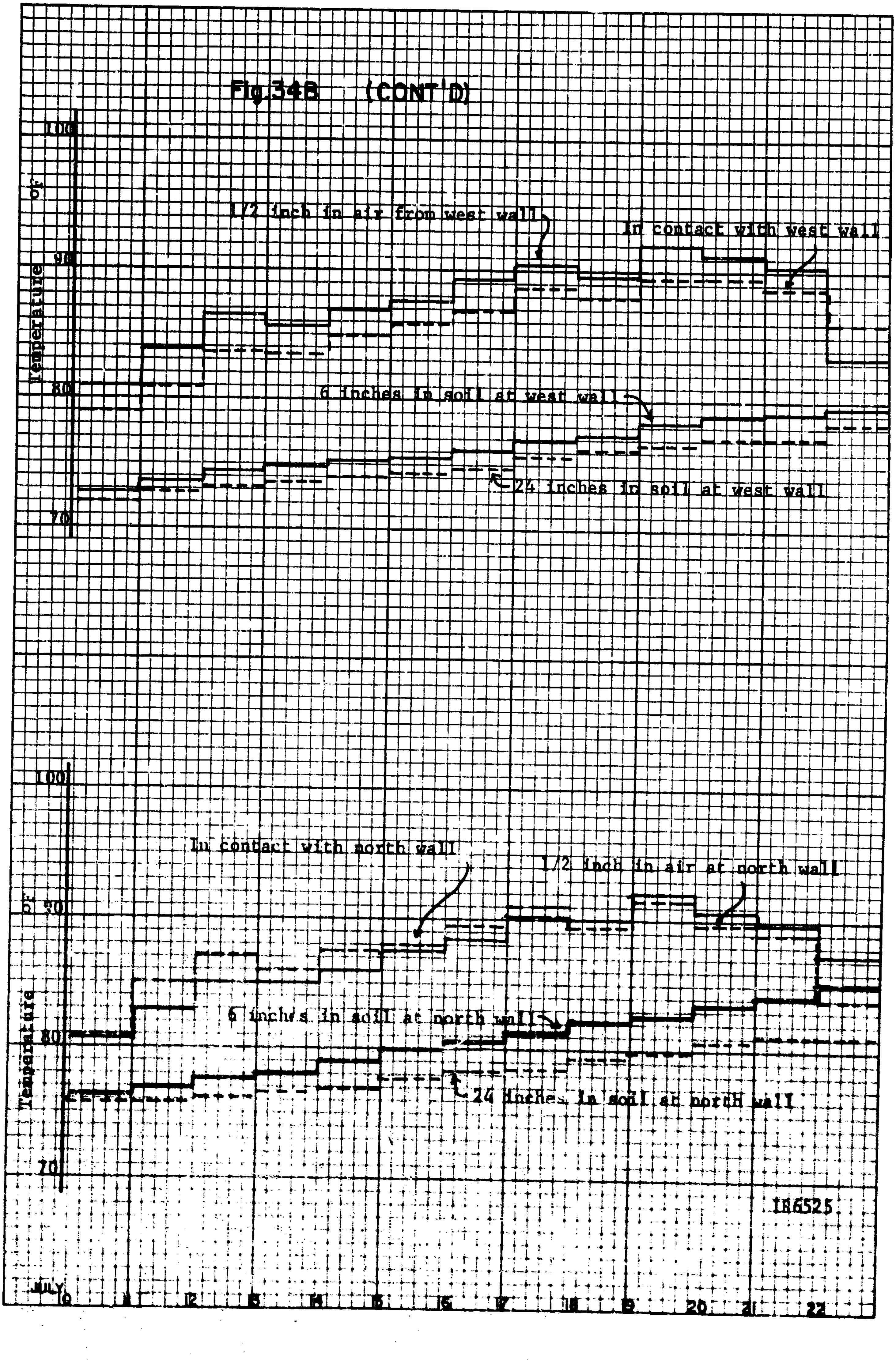


Fig.34B (CONT'D)

Summary

Simulated Occupancy Test
Robert's Dairy Company
Omaha, Nebraska
6 August - 20 August 1963

The shelter, which was designed to protect dairy cattle, is built into a hill. The roof had a minimum of 30 inches earth cover. The entry side was constructed of 24 inch thick reinforced concrete, the construction material for the entire structure. The test was conducted on 1778 square feet of floor space, rather than the entire 4860 square feet. The shelter had not been occupied prior to testing.

Occupants.....Guernsey heifers and a bull.

Phase Number	Air Flow Rate	Maximum ET Final Day	Average ET Final Day	Average Supply Air ET	Number of Occupants	Length of Phase
I	1200 cfm	84.5	82.4	74.1	30 cows 1 bull 2 men	5 days
II	1200 cfm	85.0	83.9	74.1	35 cows 1 bull 2 men	2 days
III	1200 cfm	85.5	83.8	83.6	35 cows 1 bull 2 men	4 days
IV	1200 cfm	88.5	83.8	83.7	35 cows 1 bull 2 men	1.46 days
V	1200 cfm	87.4	85.0	85.3	35 cows 1 bull 2 men	1.42 days

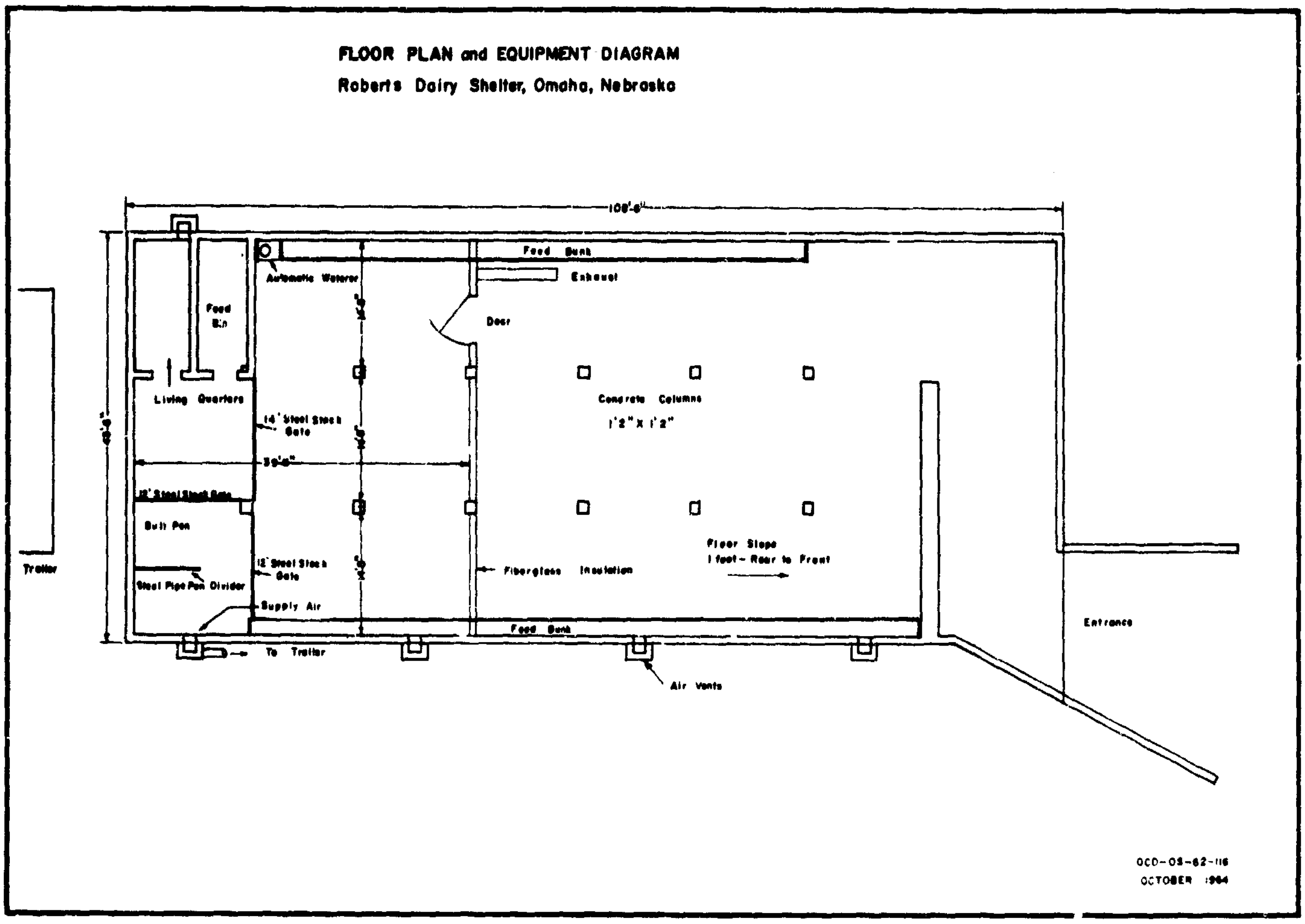
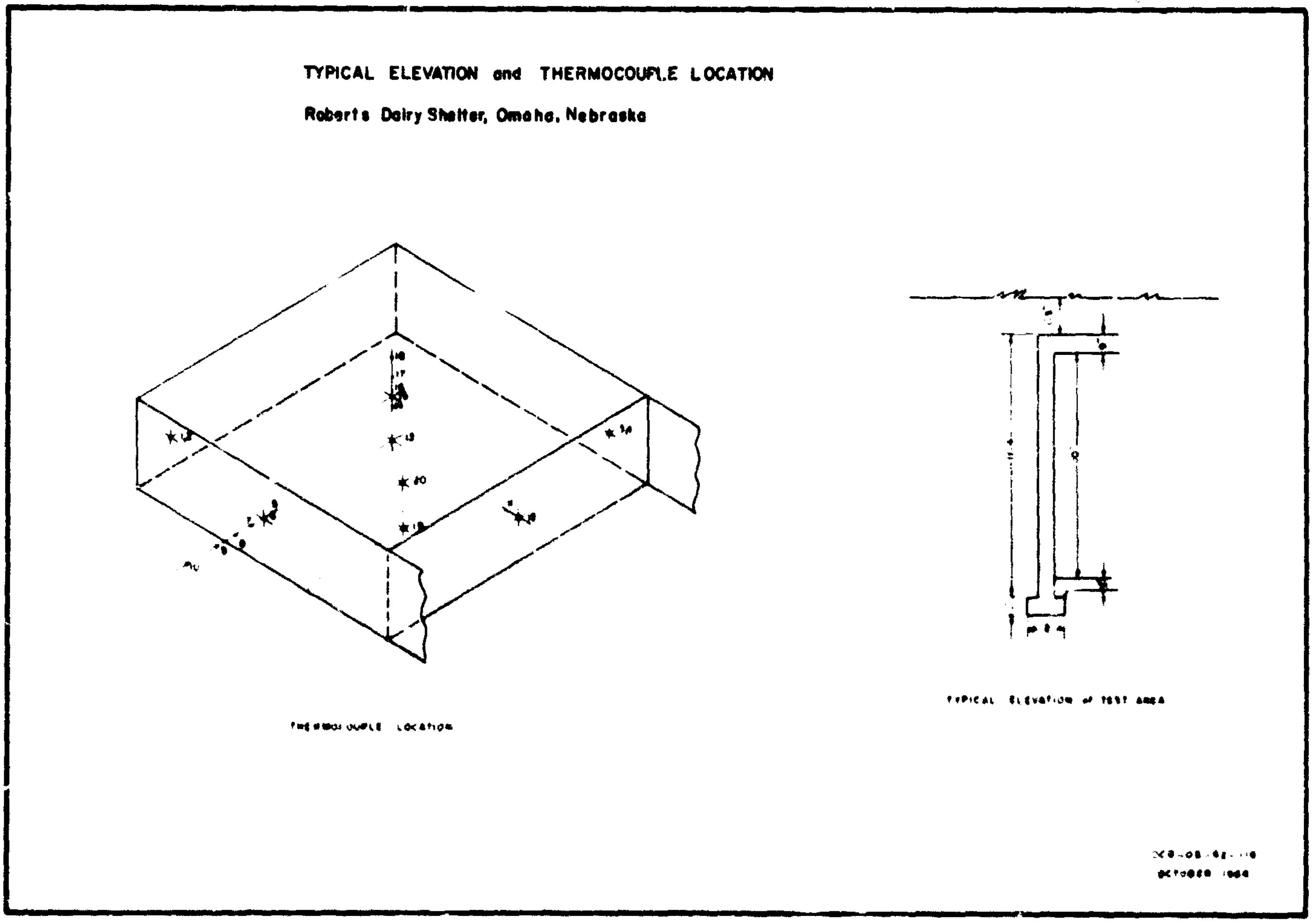


Fig. No. 35 CATTLE SHELTER, (ROBERTS DAIRY), OMAHA, NEBRASKA



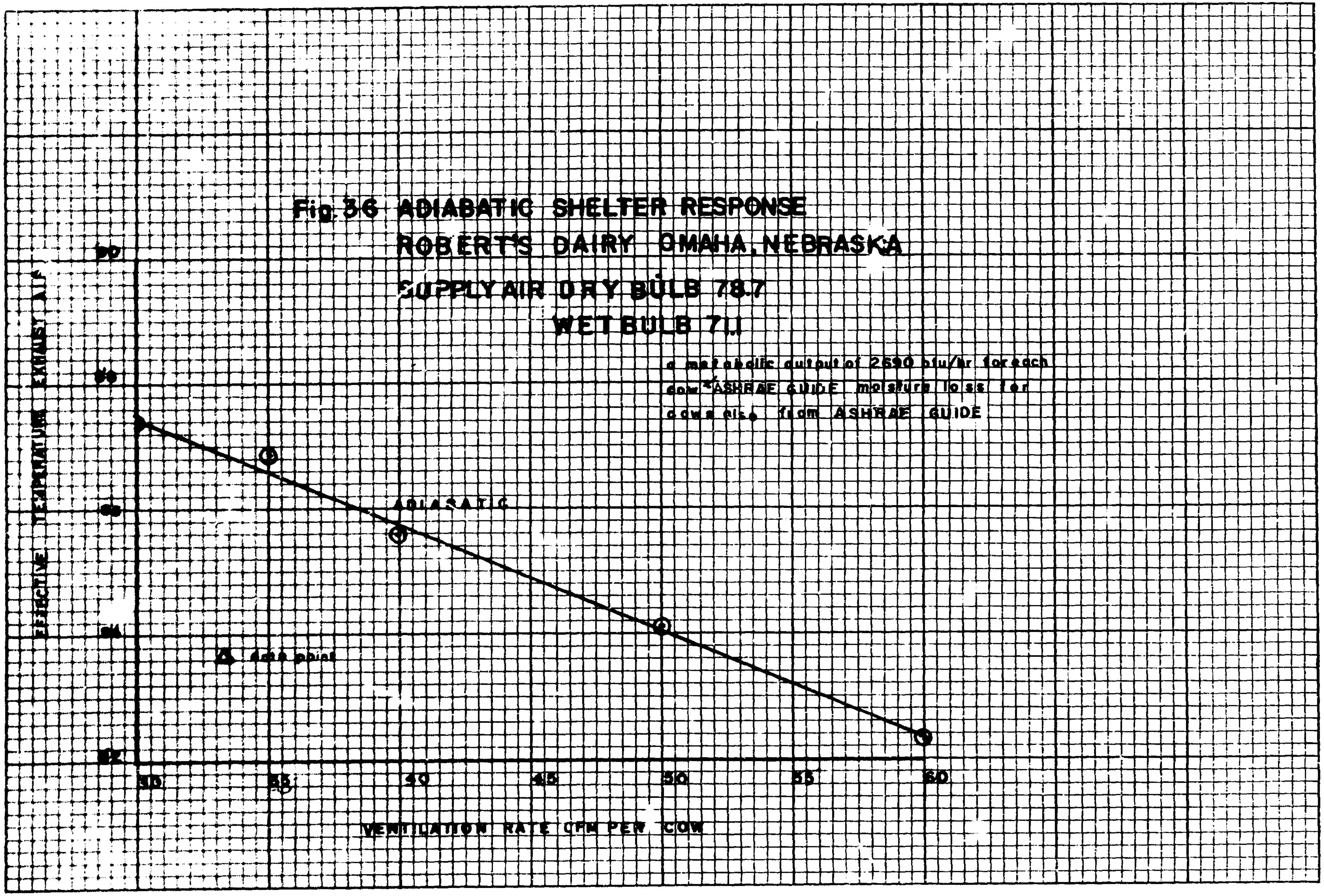


Fig. 36 ADIABATIC SHELTER RESPONSE
ROBERT'S DAIRY OMAHA, NEBRASKA
SUPPLY AIR DRY BULB 78.7
WET BULB 71.1

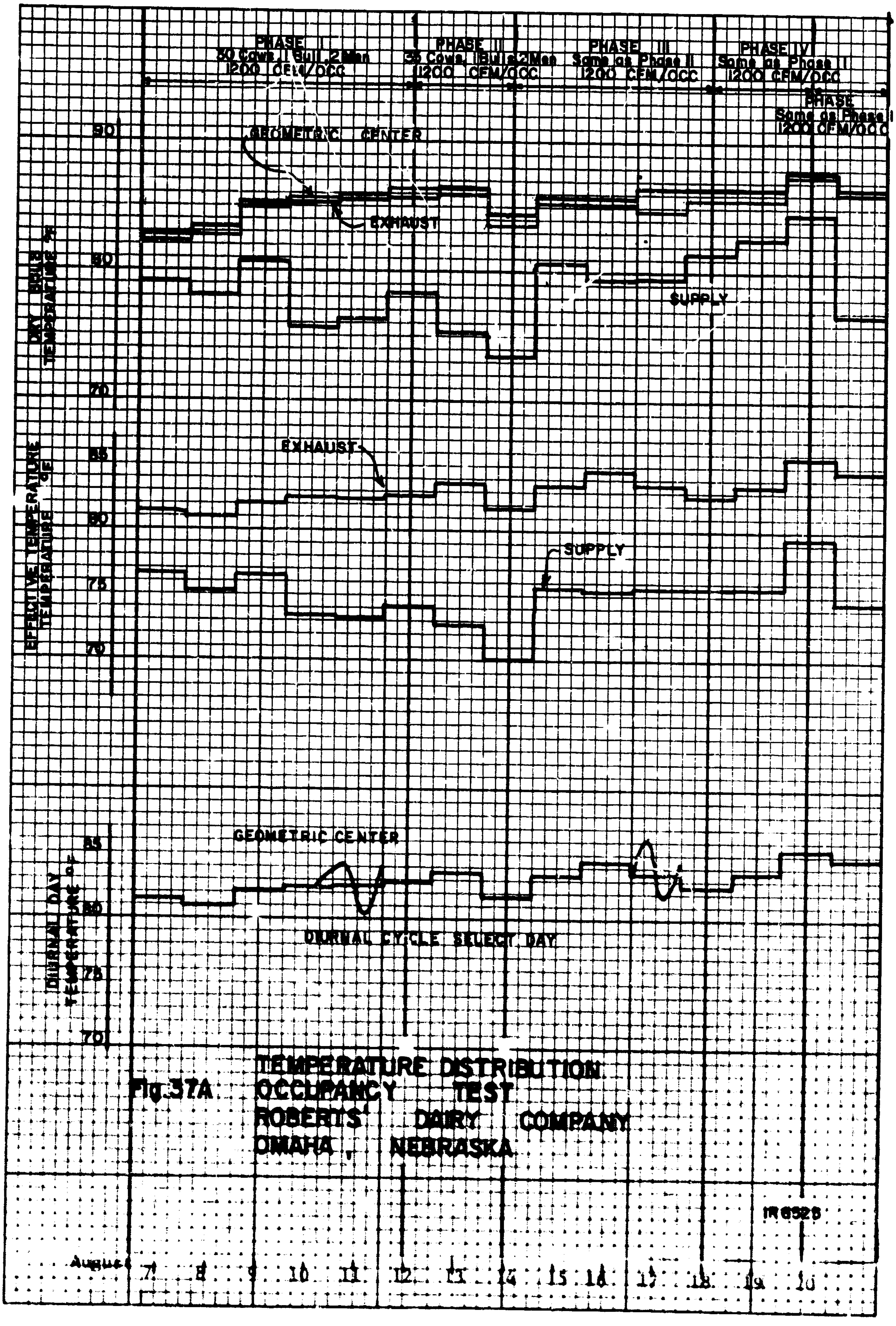


Fig. 37A TEMPERATURE DISTRIBUTION
OCCUPANCY TEST
ROBERTS' DAIRY COMPANY
OMAHA, NEBRASKA

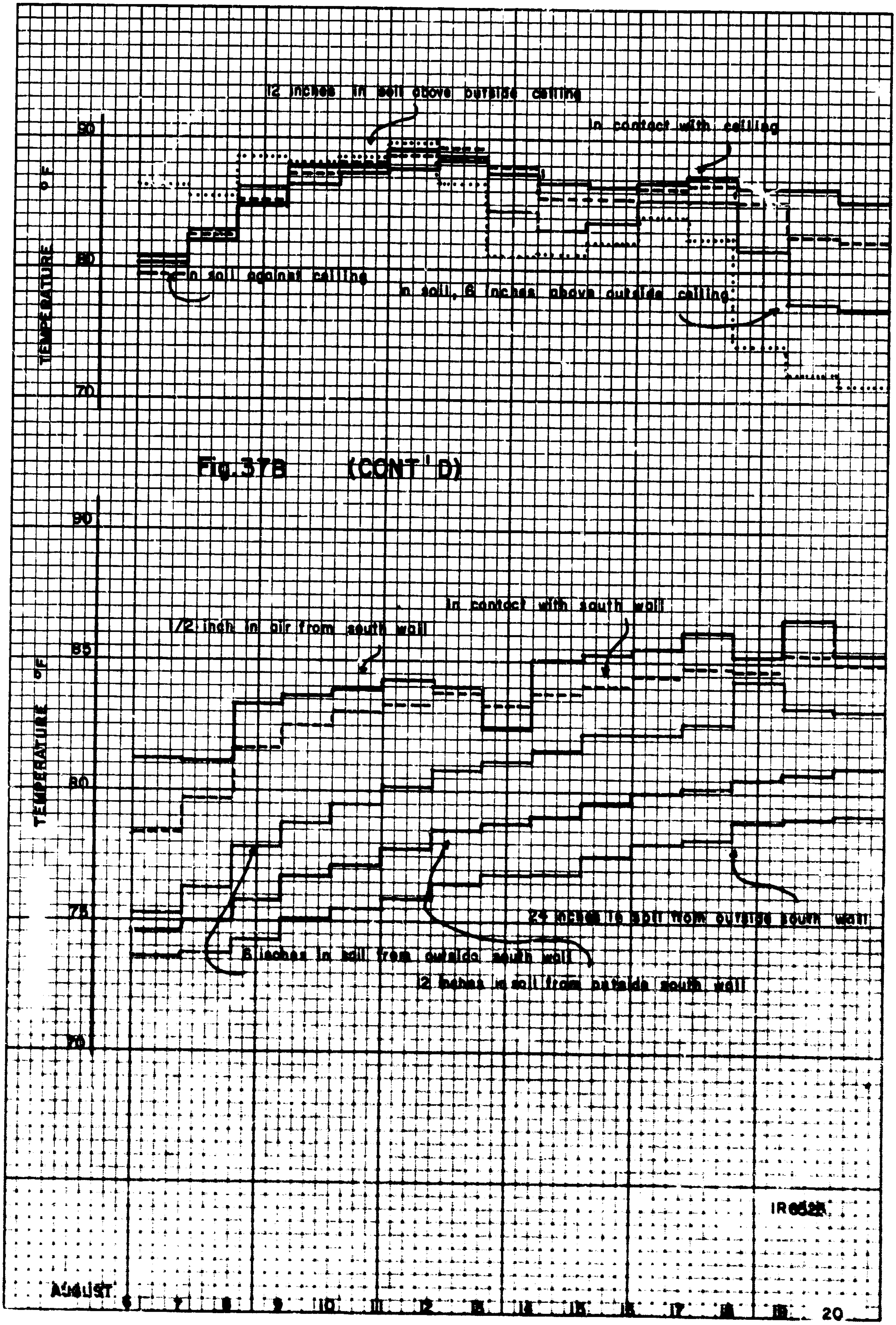


Fig. 37B (CONT'D)

Summary

Simulated Occupancy Test

Irvingdale Shelter

Lincoln, Nebraska

29 August - 9 September 1963

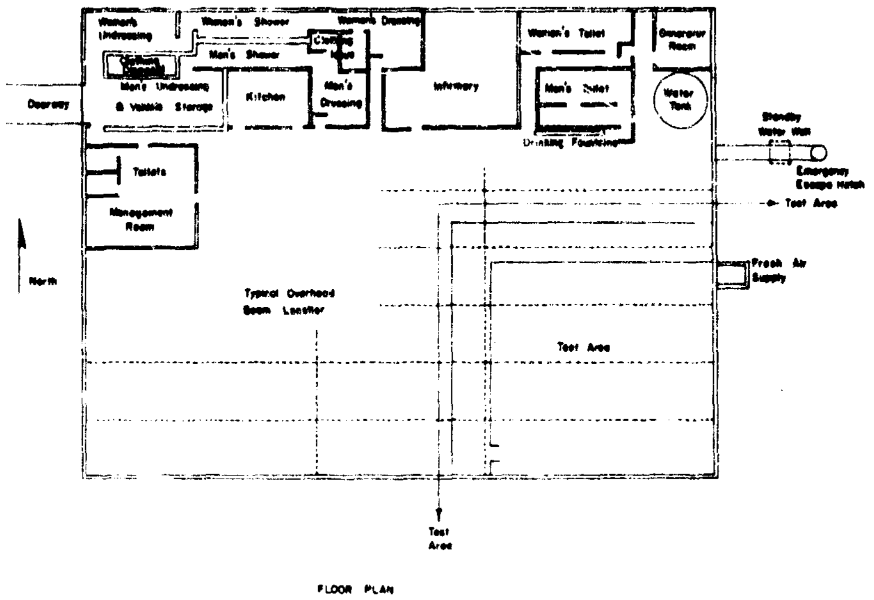
The shelter is a remodeled underground reinforced concrete water reservoir. There are 22,700 square feet of floor space, of which 3503 square feet were tested. The shelter had not been previously occupied.

An adiabatic shelter model would require an air flow rate of 9.5 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F. A shelter model with 25% heat loss to the structure requires an air flow rate of 5.5 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F.

Occupants.....GATC's Mass Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	15.0	84.3	82.0	350	7.33 days
II	12.0	85.5	83.2	350	2.08 days
III	3.0	90.9	89.1	350	0.75 days

FLOOR PLAN and SITE INFORMATION
—Irvingdale Shelter—



SITE INFORMATION

A. Type of Earth: Sandy, brown clay composed the soil samples taken for analysis. A soil test hole was drilled at the time the well was drilled. Layers of the following soils were recorded:

0-6 ft.	Fill dirt - silty clay
6-10 ft.	Grey clay
10-12 ft.	Brown, sandy clay
12-14 ft.	Gravel, pebbles and clay
14-20 ft.	Brown, sandy clay

B. Moisture Content and Density of Samples Taken

	% Moisture Dry Basis	Dry Density lb/cu. ft.
1 ft. deep	20.3	102.4
3 ft. deep	17.6	109.8
6 ft. deep	16.3	99.8

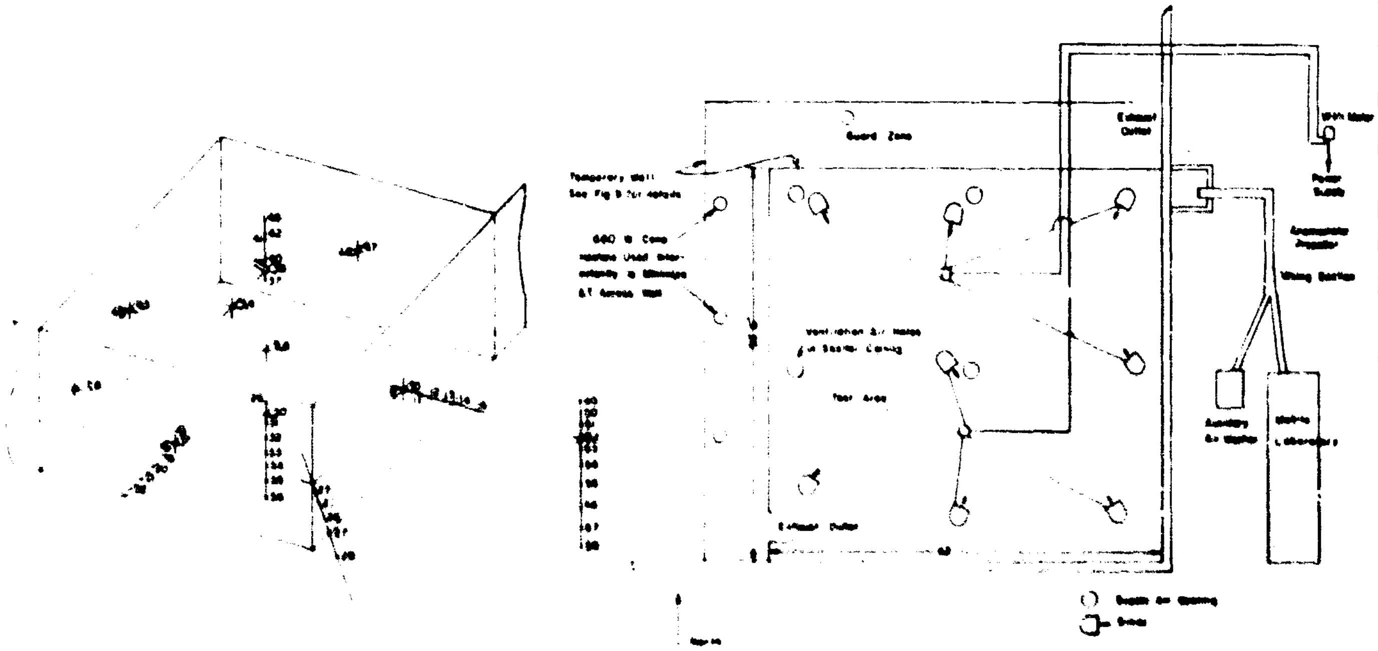
C. Type of Earth Cover: The roof, a concrete slab, is exposed and has no cover. Sod surrounds the shelter on all sides.

D. Solar Exposure: The trees in the area cast a shadow over about 10 % of the shelter from daylight until 9:00 a.m. After 9:00 a.m. the shelter had total exposure.

OCD-OS-62-115
JUNE 1964

Fig. No. 38 LINCOLN COMMUNITY SHELTER, LINCOLN, NEBRASKA

THERMOCOUPLE LOCATIONS and EQUIPMENT DIAGRAM
—Irvingdale Shelter—



OCD-OS-62-115
JUNE 1964

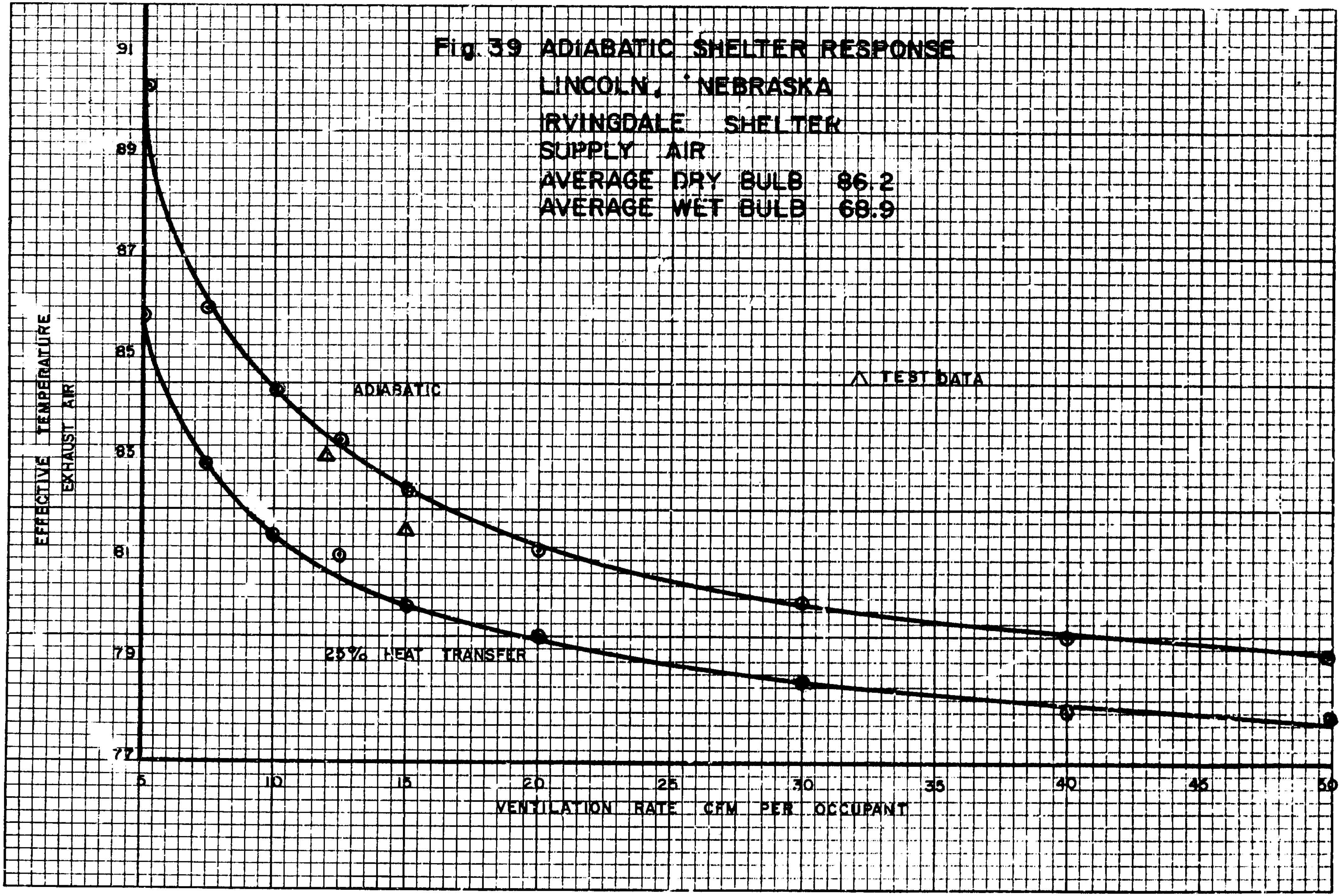


Fig. 39 ADIABATIC SHELTER RESPONSE

LINCOLN, NEBRASKA

IRVINGDALE SHELTER

SUPPLY AIR

AVERAGE DRY BULB 86.2

AVERAGE WET BULB 68.9

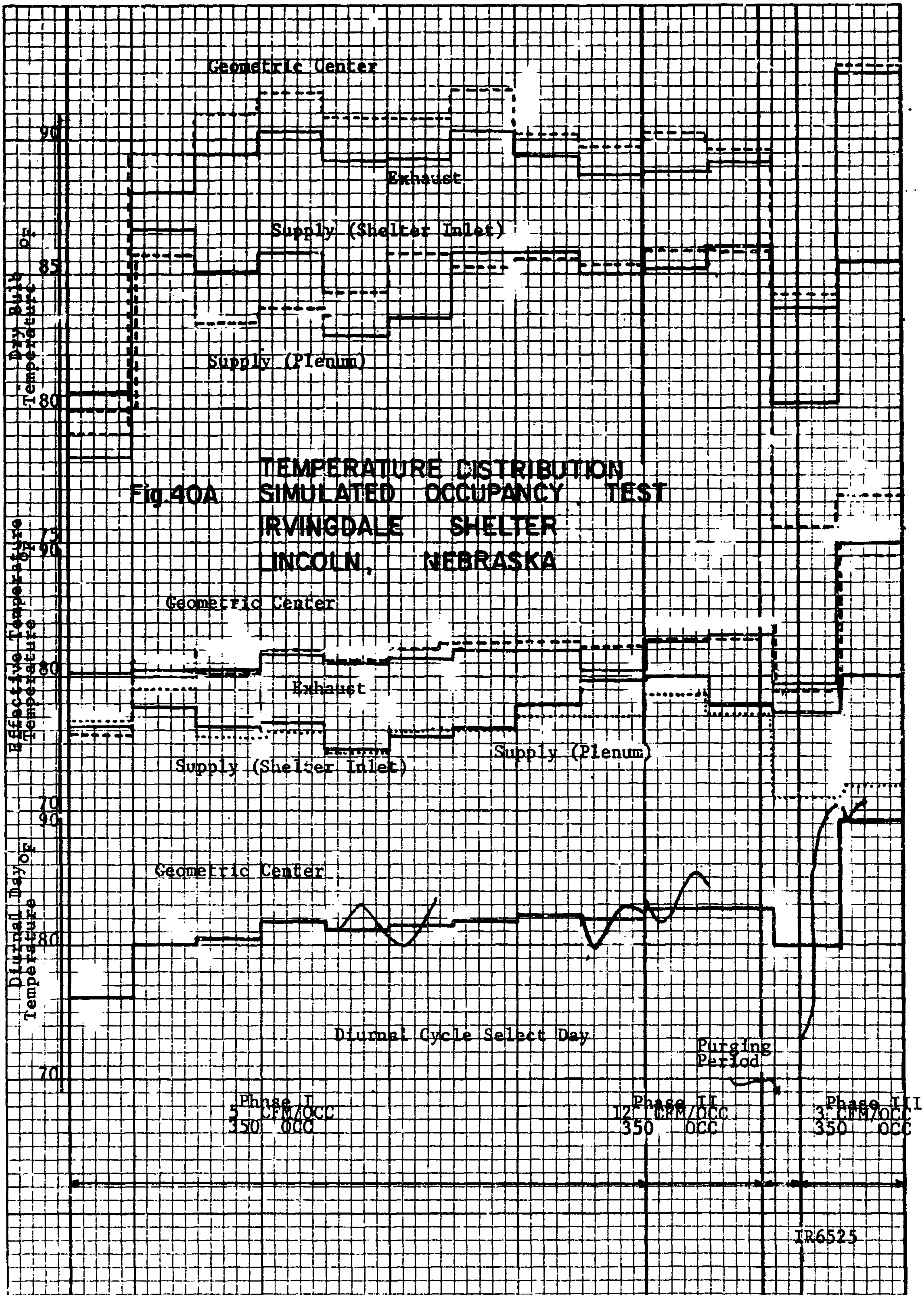


Fig 40A TEMPERATURE DISTRIBUTION SIMULATED OCCUPANCY TEST IRVINGDALE SHELTER LINCOLN, NEBRASKA

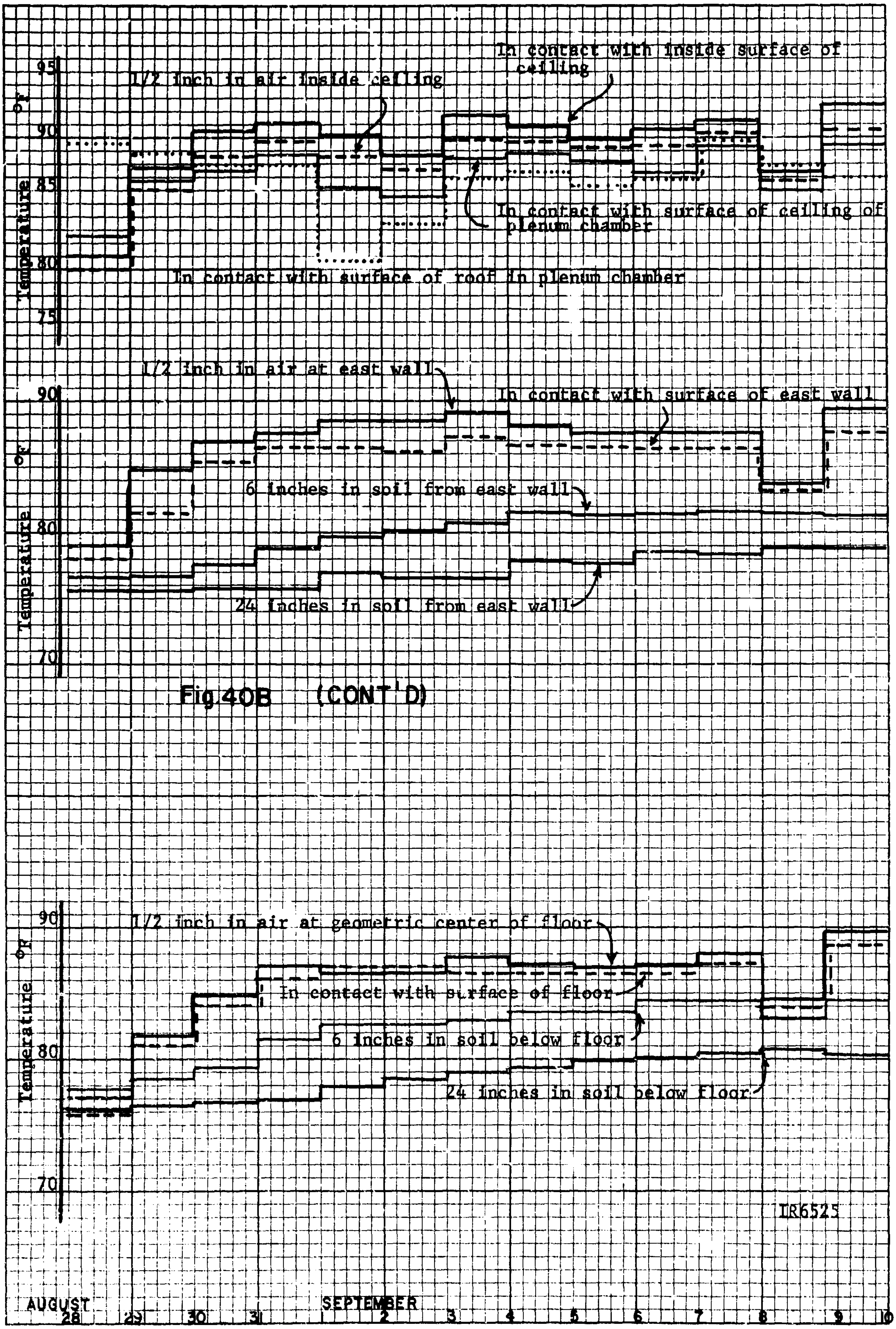


Fig.40B (CONT'D)

Summary

Simulated Occupancy Test

50 Man Expedient Shelter

Ft. Belvoir, Virginia

8 September - 16 September 1963

The shelter, which is entirely above grade, was constructed from earth-filled plywood forms. The walls were 30 inches thick and the roof joists were covered with 18 inches of earth. The floor has an area of 500 square feet. The shelter had not been previously occupied.

The test primarily determined that the natural flow of ventilation air under ambient conditions was 16 to 18 cfm per occupant. During the warm (70.5 ^{O}F average effective temperature) first four days of testing, the effective temperature of the shelter ranged from 68 to 82 ^{O}F. The final three days of cool (60.0 ^{O}F average effective temperature) ambient temperature resulted in shelter effective temperatures ranging downward from 75 ^{O}F. The average shelter effective temperature for warm ambient conditions was 77.40 ^{O}F, while for the period of cool ambient conditions it was 72.8 ^{O}F.

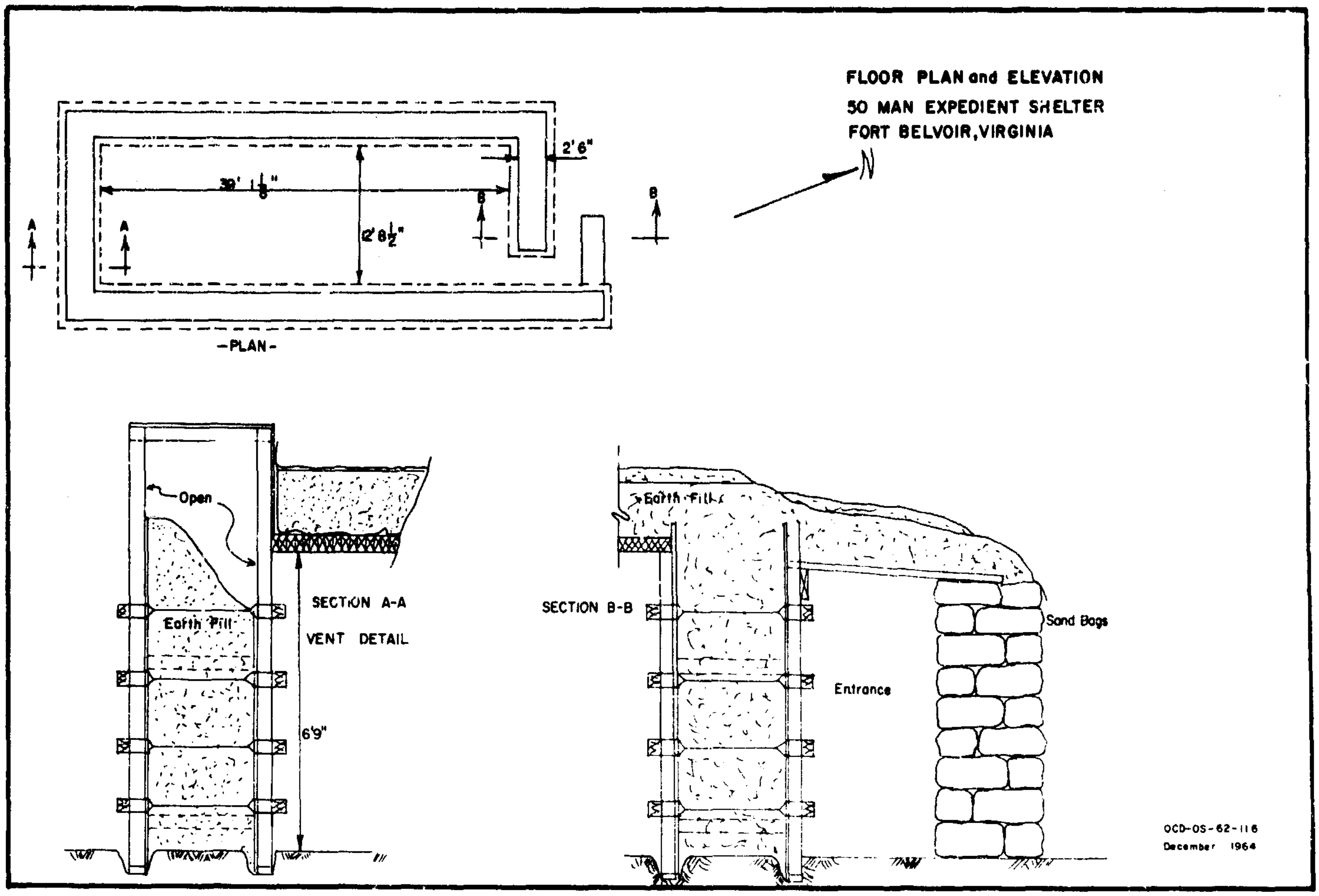
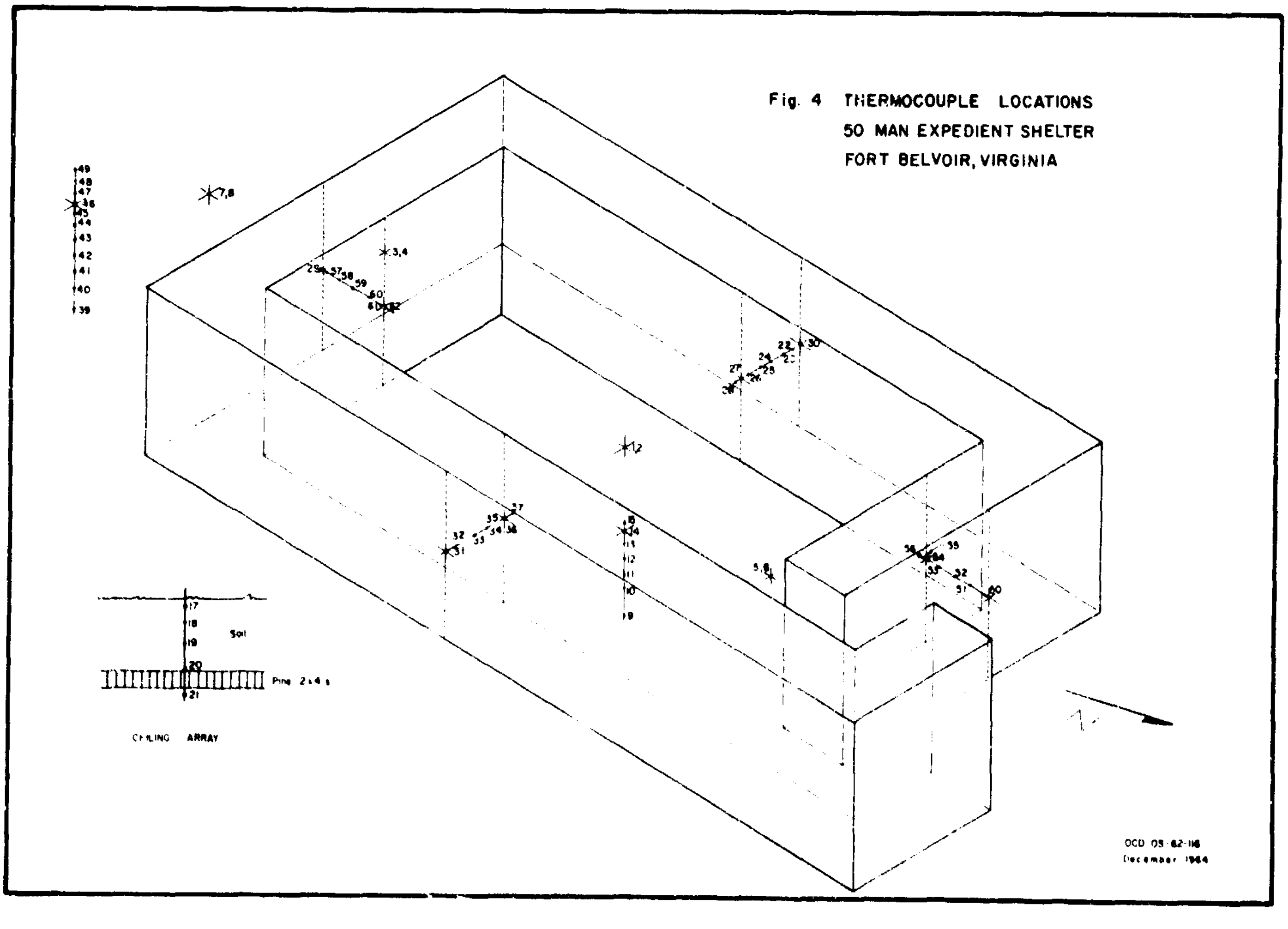


Fig. No. 41 EXPEDIENT, NATURALLY VENTILATED SHELTER, PROTECTIVE STRUCTURES DEVELOPMENT CENTER, FORT BELVOIR, VIRGINIA



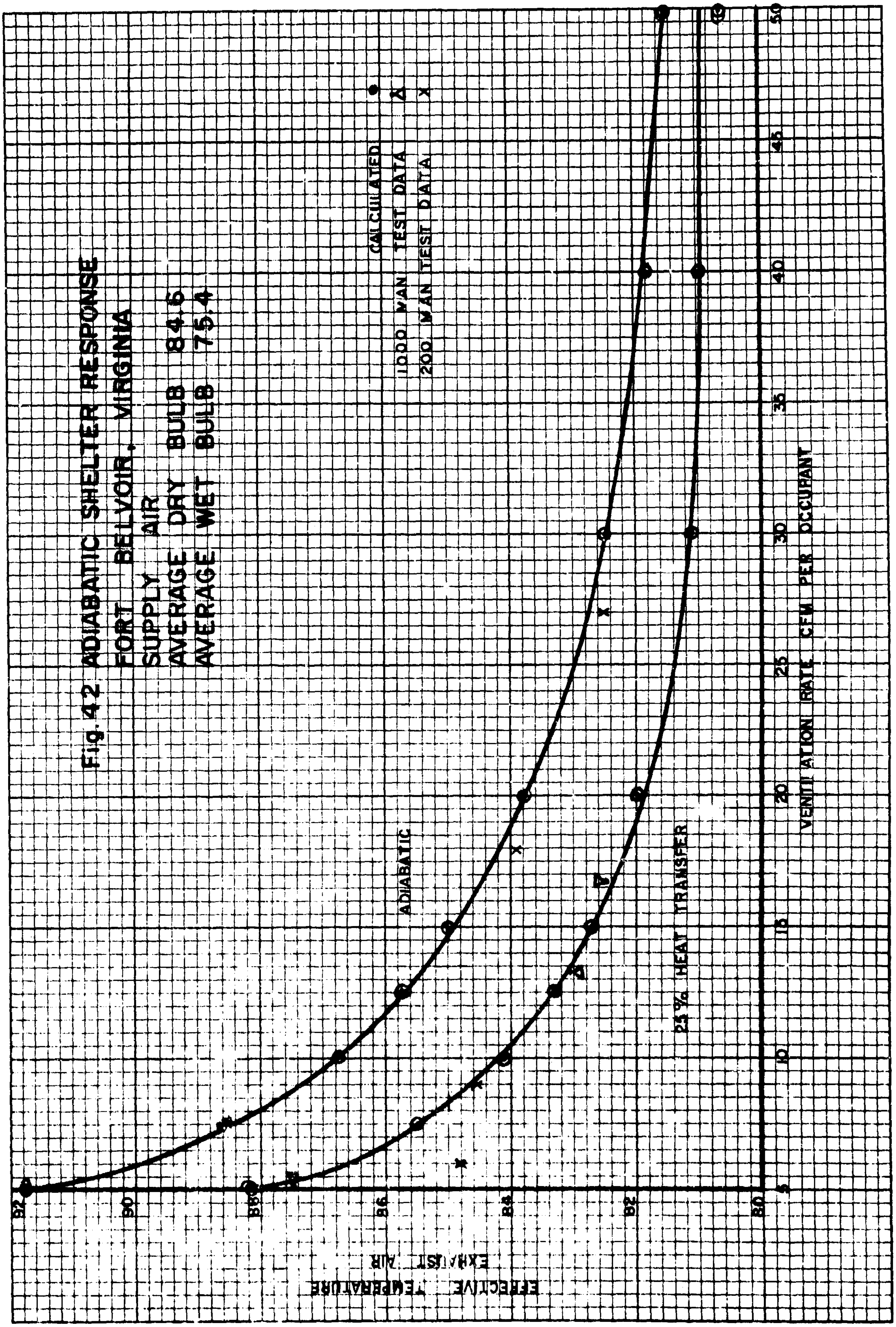


Fig. 4.2 ADIABATIC SHELTER RESPONSE
FORT BELVOIR, VIRGINIA
SUPPLY AIR
AVERAGE DRY BULB 84.5
AVERAGE WET BULB 75.4

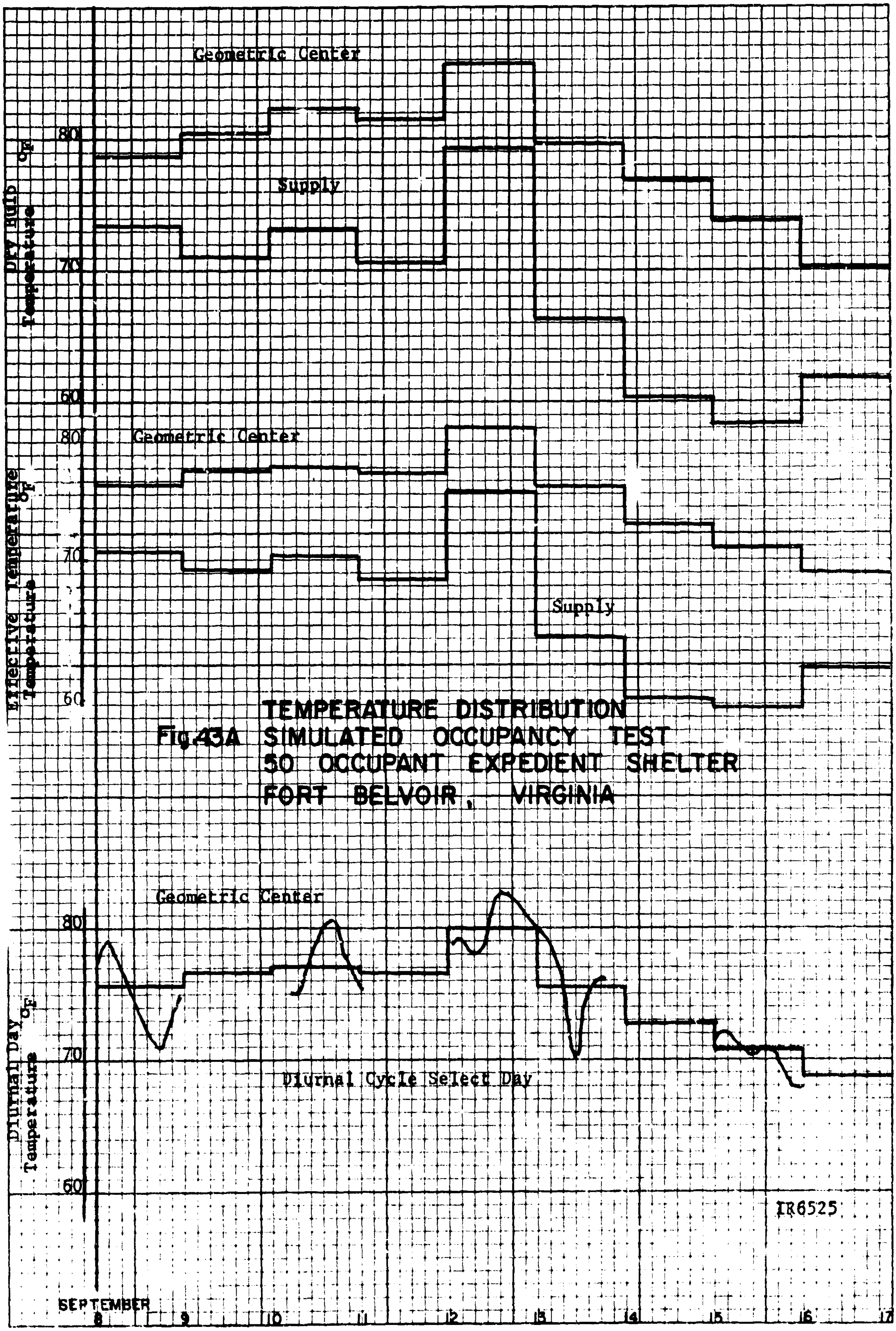


Fig.43A TEMPERATURE DISTRIBUTION
SIMULATED OCCUPANCY TEST
50 OCCUPANT EXPEDIENT SHELTER
FORT BELVOIR, VIRGINIA

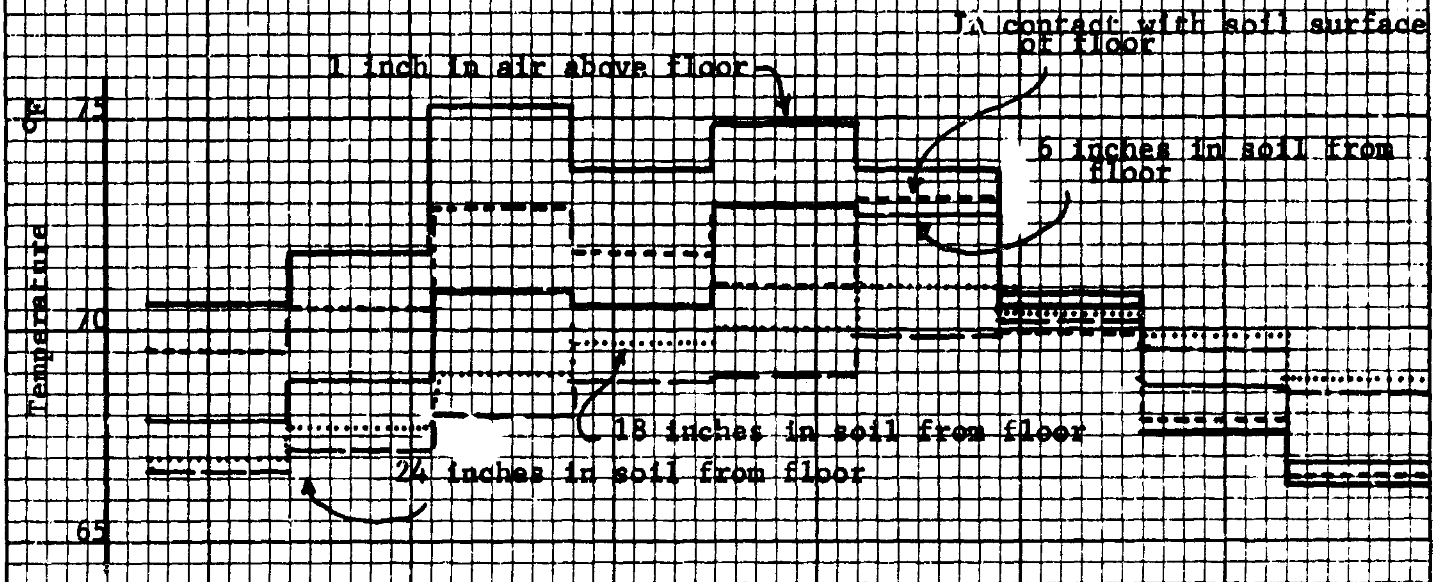
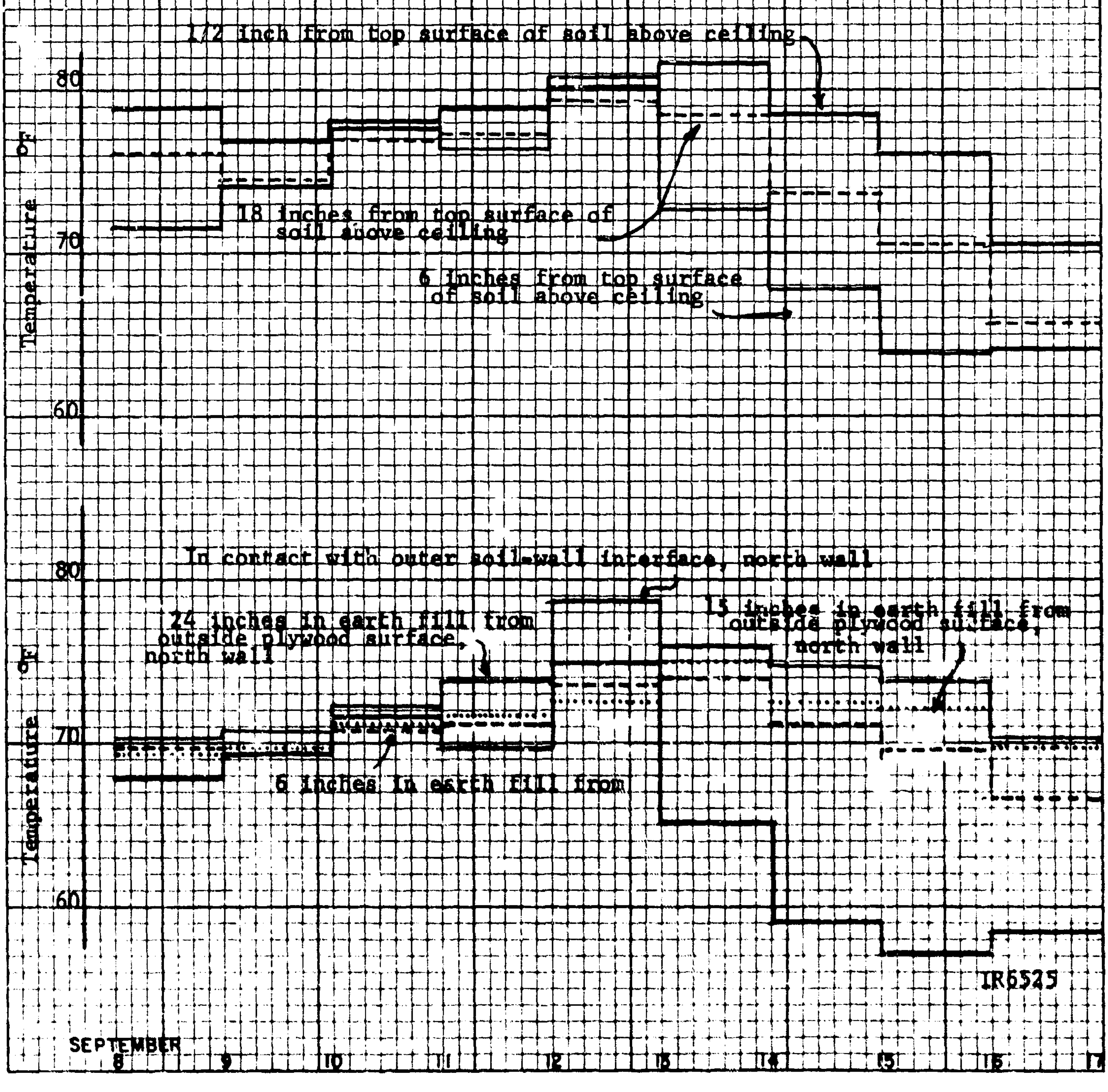


Fig.43B(CONT'D)



Summary

Simulated Occupancy Test

200 Man Shelter

Protective Structures Development Center

Ft. Belvoir, Virginia

22 September - 16 October 1963

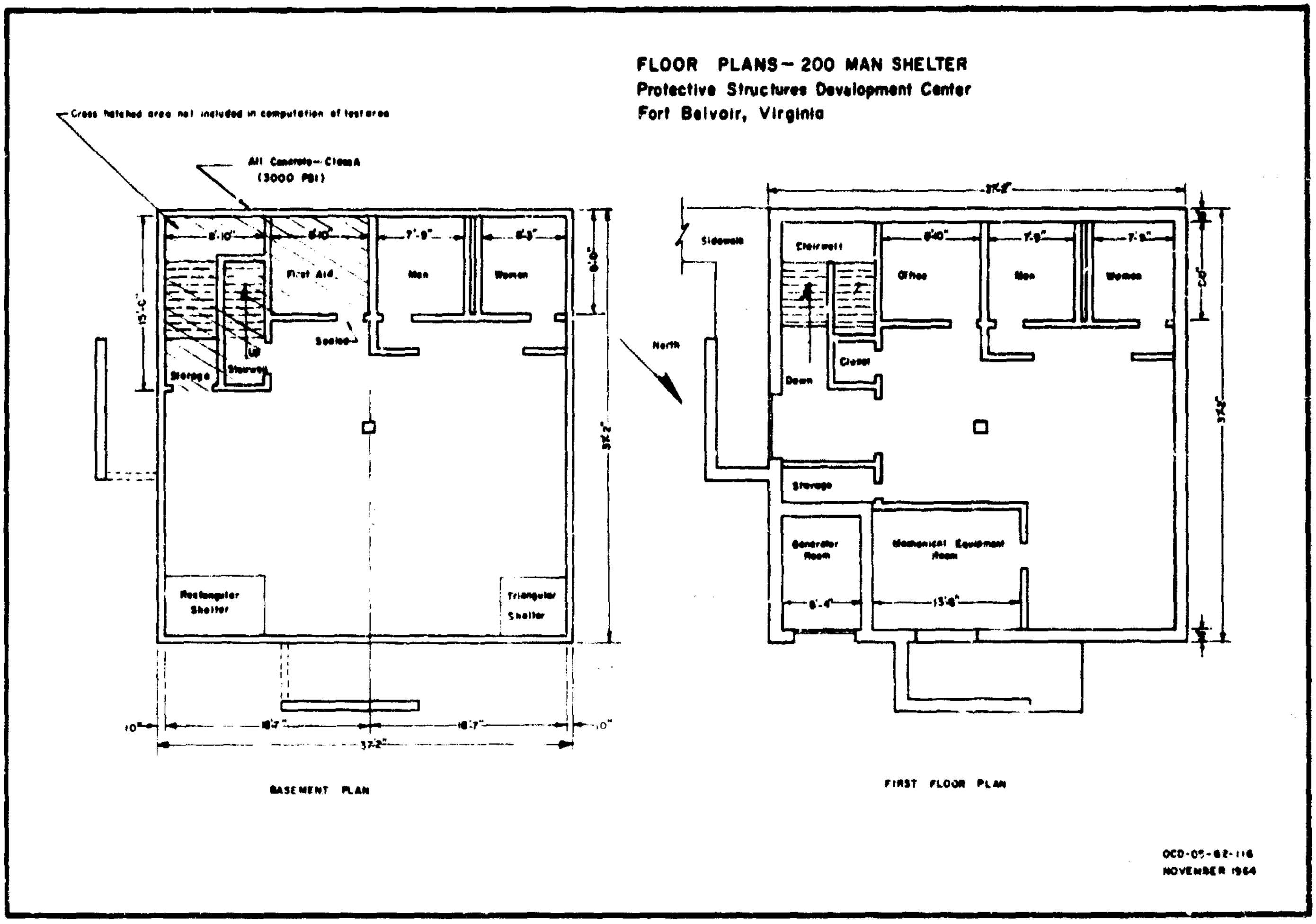
The shelter tested is the basement half of a two story shelter and was entirely below grade. The shelter is constructed of Class A concrete (3000 psi). The shelter has a floor area of 1032 square feet. The shelter had been occupied previously.

An adiabatic shelter model would require an air flow rate of 14.5 cfm per occupant of ventilation air to maintain an average effective temperature of 85 ^{o}F. A shelter model with 25% heat loss through the shelter would require an air flow rate of 8.3 cfm per occupant of ventilation air to maintain an average effective temperature below 85 ^{o}F.

Occupants.....NBS's Individual Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	3	86.4	84.7	100	6 days
II	6	87.5	84.8	100	2 days
III	9	86.2	84.5	100	2.75 days
IV	18	85.8	84.0	100	2.25 days
V	27	85.1	83.0	100	4.67 days
VI	3	89.5	87.0	100	1.33 days
VII*	3	91.2	89.5	100	1 day

* Different method of ventilation air distribution used.



FLOOR PLANS — 200 MAN SHELTER
Protective Structures Development Center
Fort Belvoir, Virginia

Fig. No.44 200 PERSON MODEL SHELTER, PROTECTIVE STRUCTURES DEVELOPMENT CENTER, FORT BELVOIR, VIRGINIA

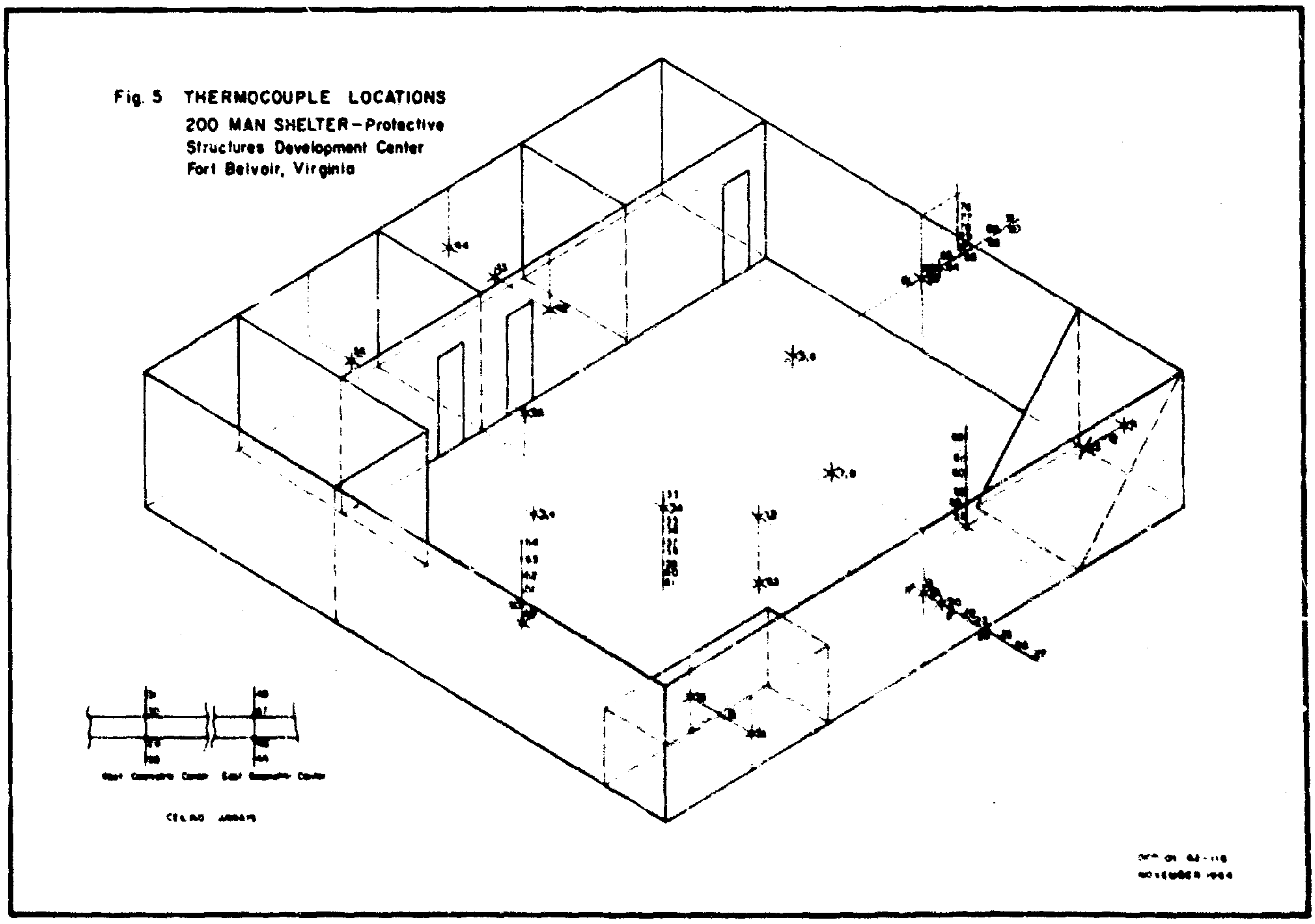


Fig. 5 THERMOCOUPLE LOCATIONS
200 MAN SHELTER — Protective
Structures Development Center
Fort Belvoir, Virginia

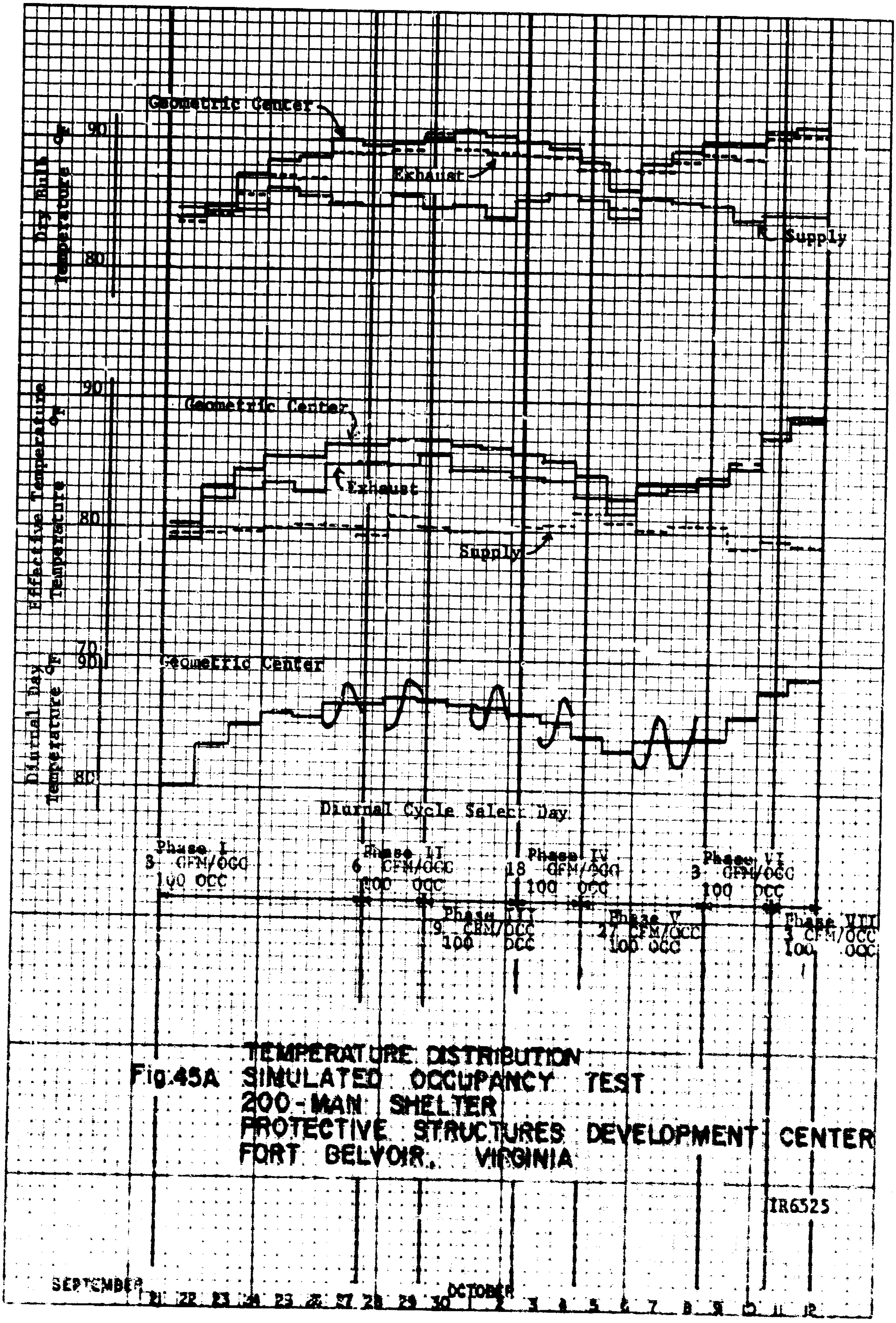


Fig.45A TEMPERATURE DISTRIBUTION
SIMULATED OCCUPANCY TEST
200-MAN SHELTER
PROTECTIVE STRUCTURES DEVELOPMENT CENTER
FORT BELVOIR, VIRGINIA

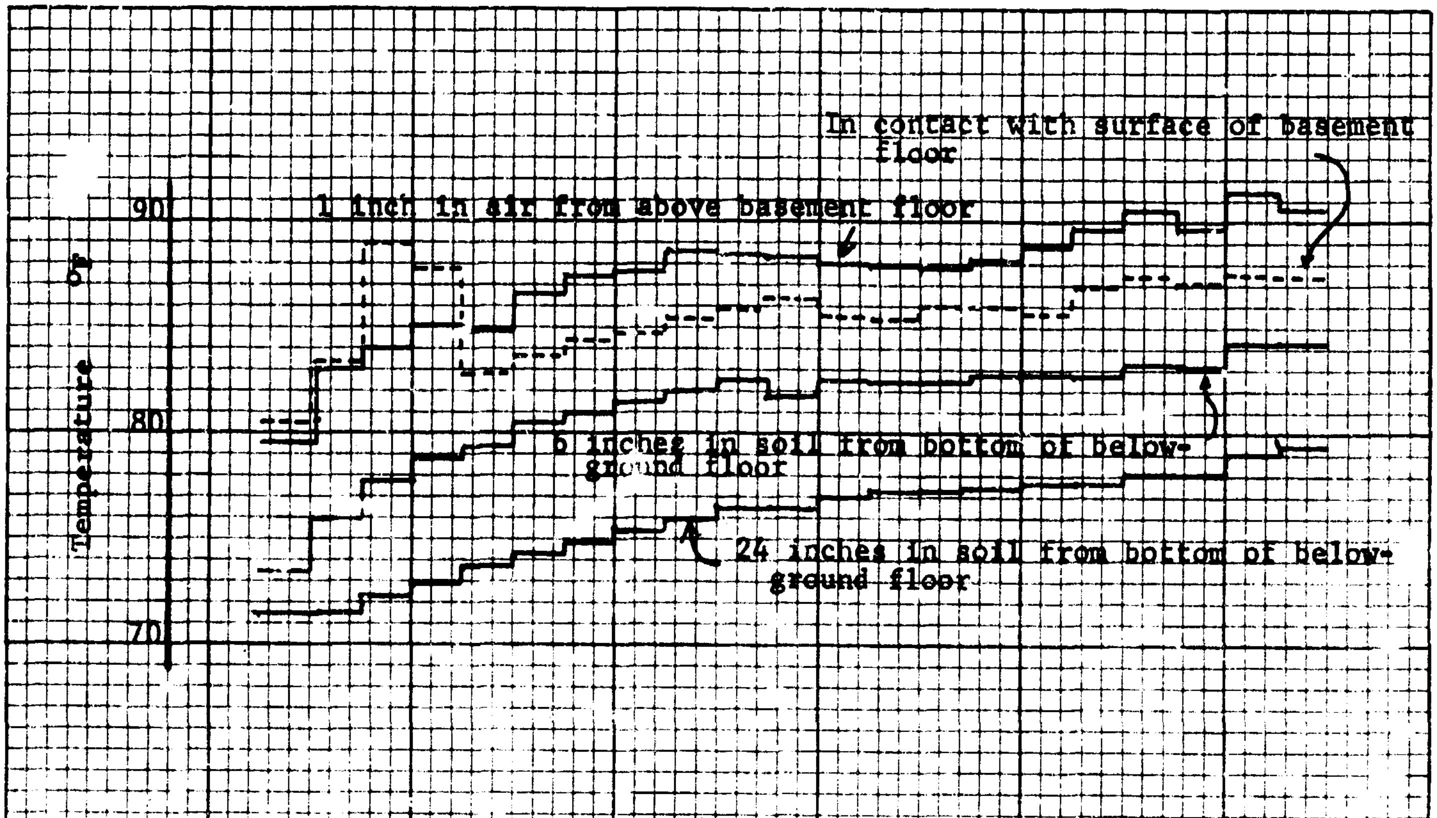
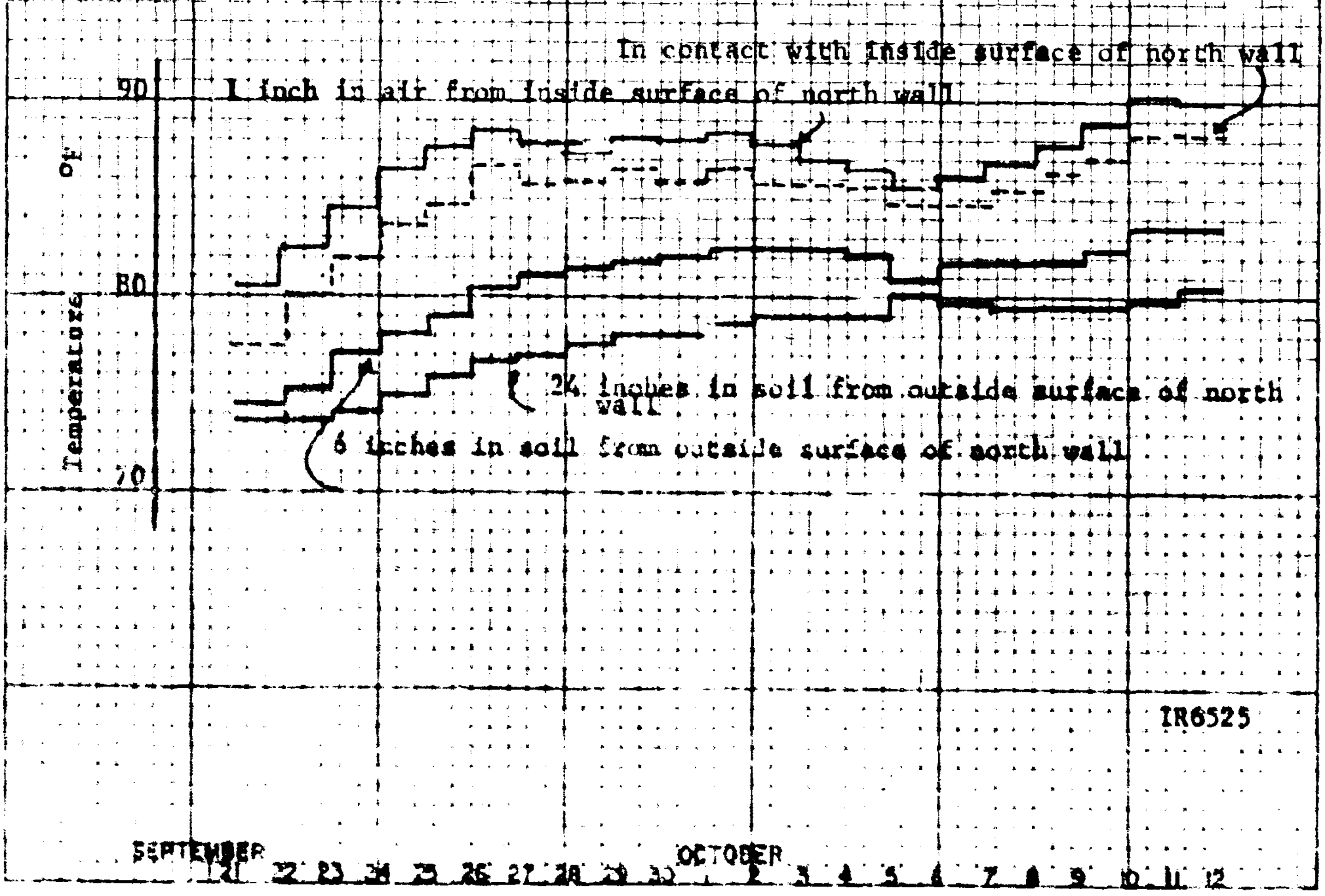


Fig.45B (CONT'D)



Summary

Simulated Occupancy Test

1000 Man Shelter

Ft. Belvoir, Virginia

14 October - 29 October 1963

The shelter is a two story reinforced concrete building with the portion tested below grade. The useable floor area was 5400 square feet. The shelter had been previously occupied.

An adiabatic model shelter would require an air flow rate of 14.5 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F. A shelter model with 25% heat loss through structure would require an air flow rate of 8.7 cfm per occupant of ventilation air to maintain an average effective temperature of 85 °F.

Occupants.....GATC's Mass Simocs

Phase Number	Air Flow Rate cfm/Occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	0	80.8(average - 1700-2300)		540	5 hrs.
II	16.8	84.8	82.5	540	9 1/2 days
III	13.3	85.0	83.0	540	3 1/2 days
IV	3.0	91.0	-	540	2 hrs.
V	5.0	89.2	87.5	540	1 day

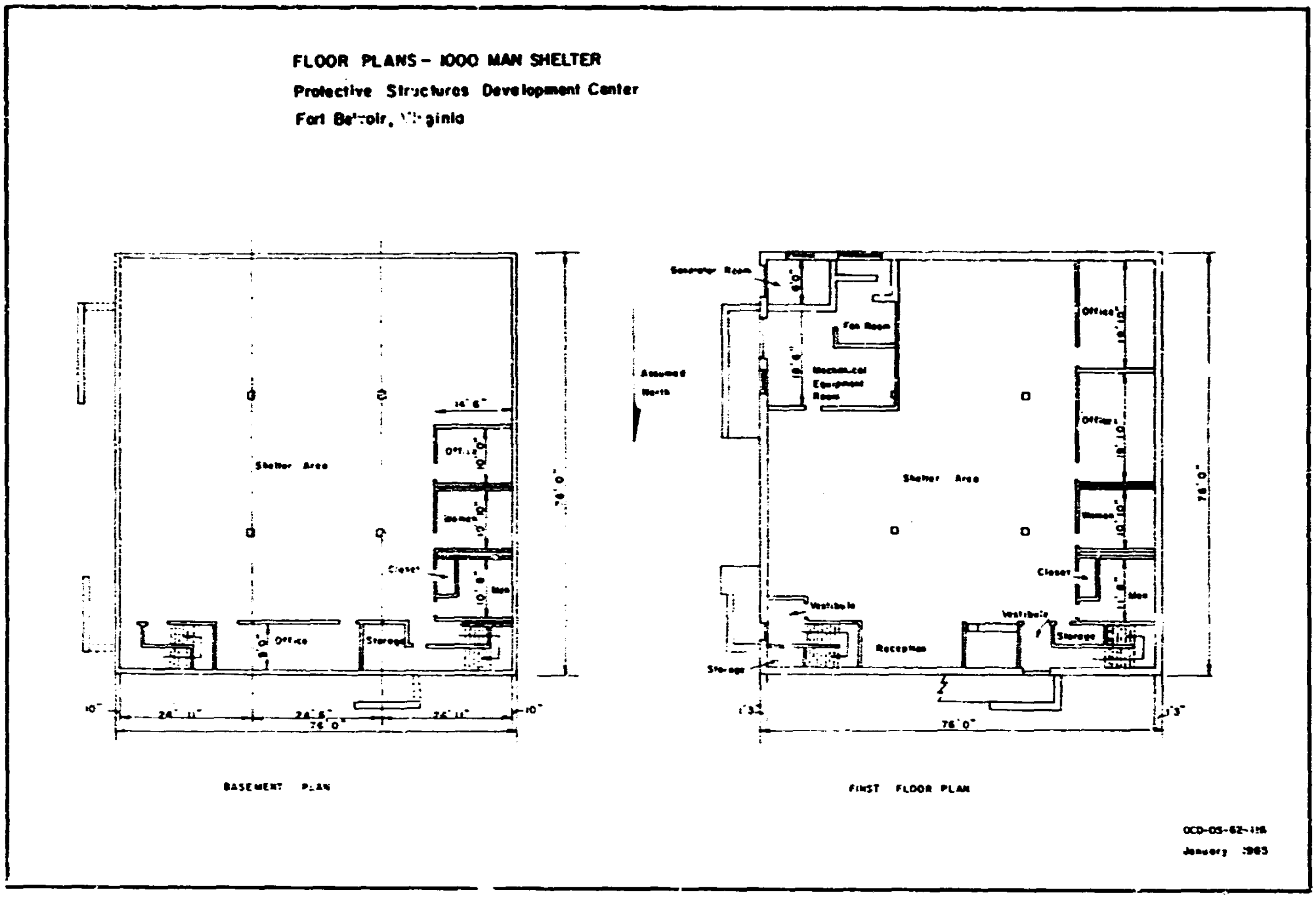
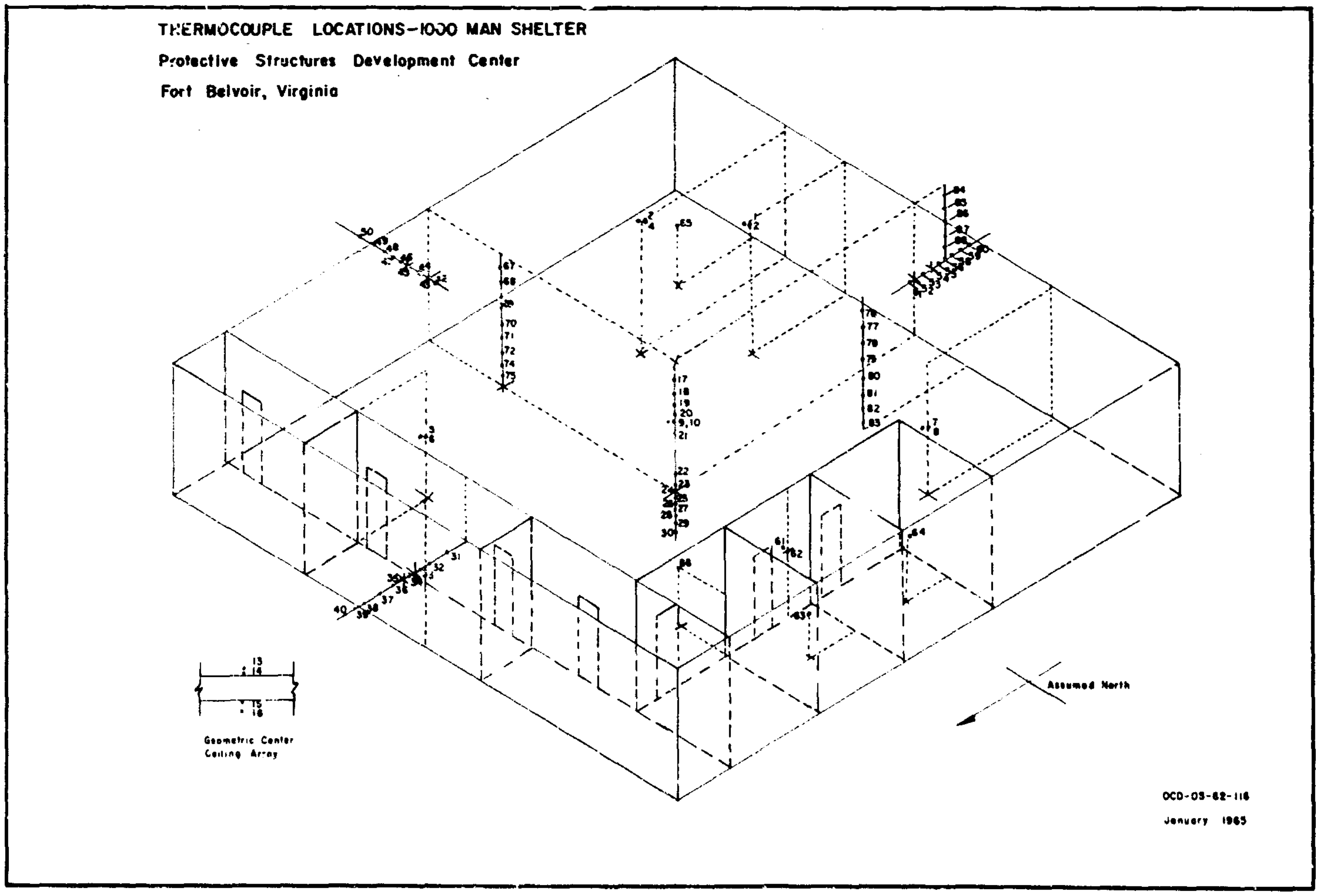


Fig. No.46 1000 PERSON MODEL SHELTER, PROTECTIVE STRUCTURES DEVELOPMENT CENTER, FORT BELVOIR, VIRGINIA



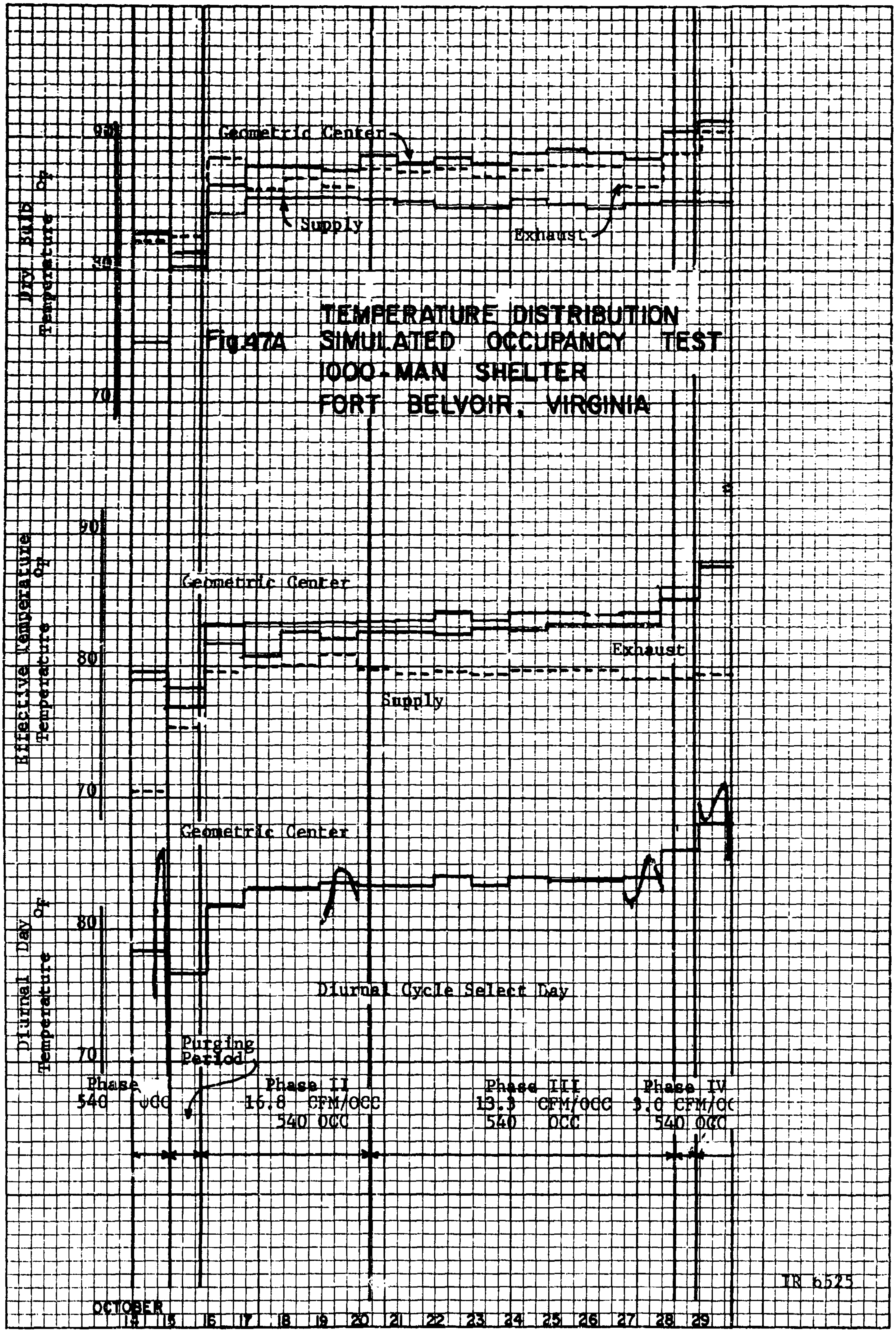


Fig 47A TEMPERATURE DISTRIBUTION SIMULATED OCCUPANCY TEST 1000-MAN SHELTER FORT BELVOIR, VIRGINIA

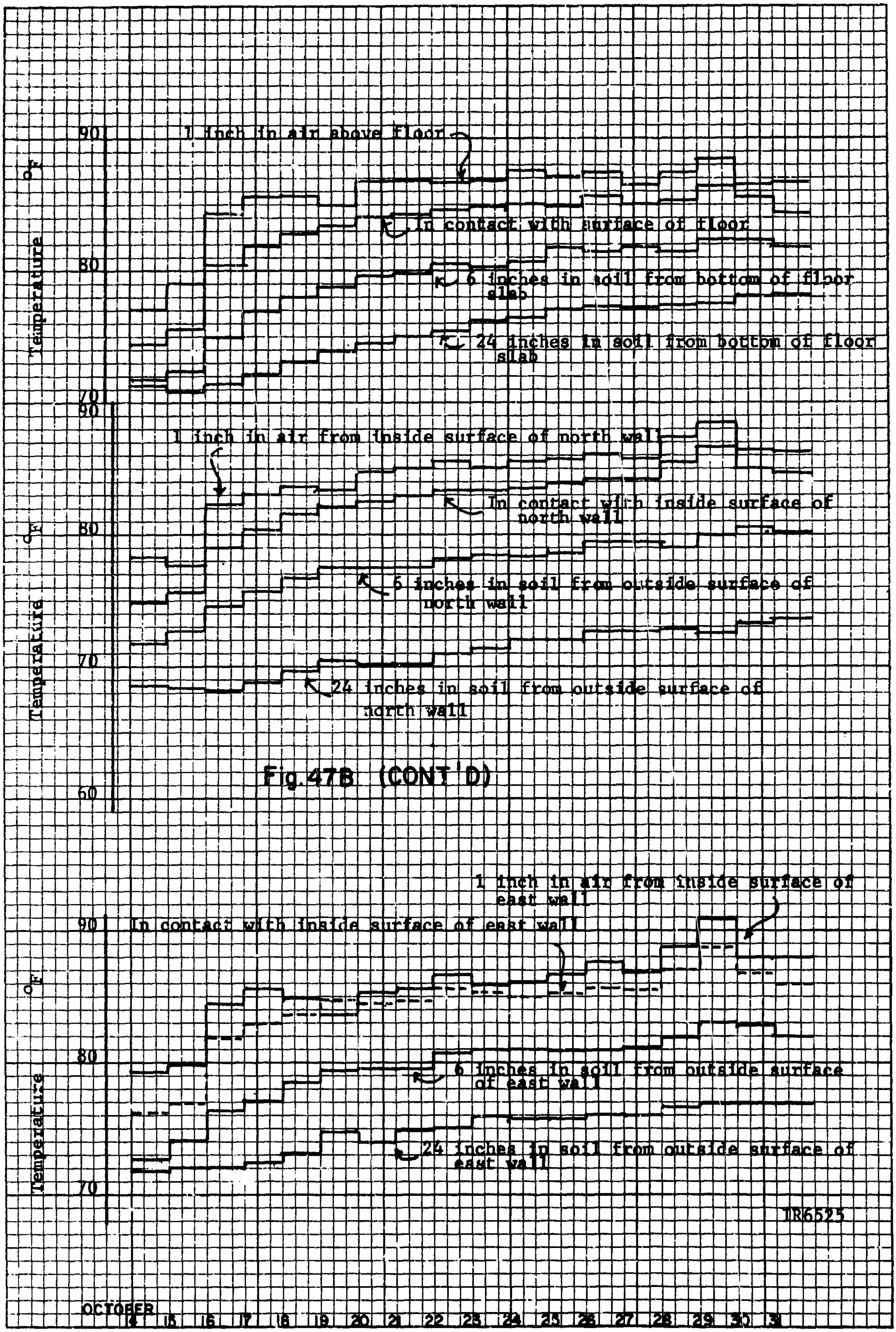


Fig. 47B (CONT'D)

Summary

Simulated Occupancy Test

Family Shelter

Bozeman, Montana

17 February - 7 March 1964

The shelter, which is constructed of concrete, is partially below grade. It is, however, mounded over by an earth covering of 15 inches minimum thickness. The floor has an area of 168 square feet. The shelter had not been previously occupied. A minimum air flow of 3 cfm per occupant is needed to meet environmental requirements.

Occupants.....NBS's Individual Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	3	58.5	57.5	16	7 days
II	10	51.0	48.5	16	4 days
III	0	67.5 DB	68.1 DB	16	3 days

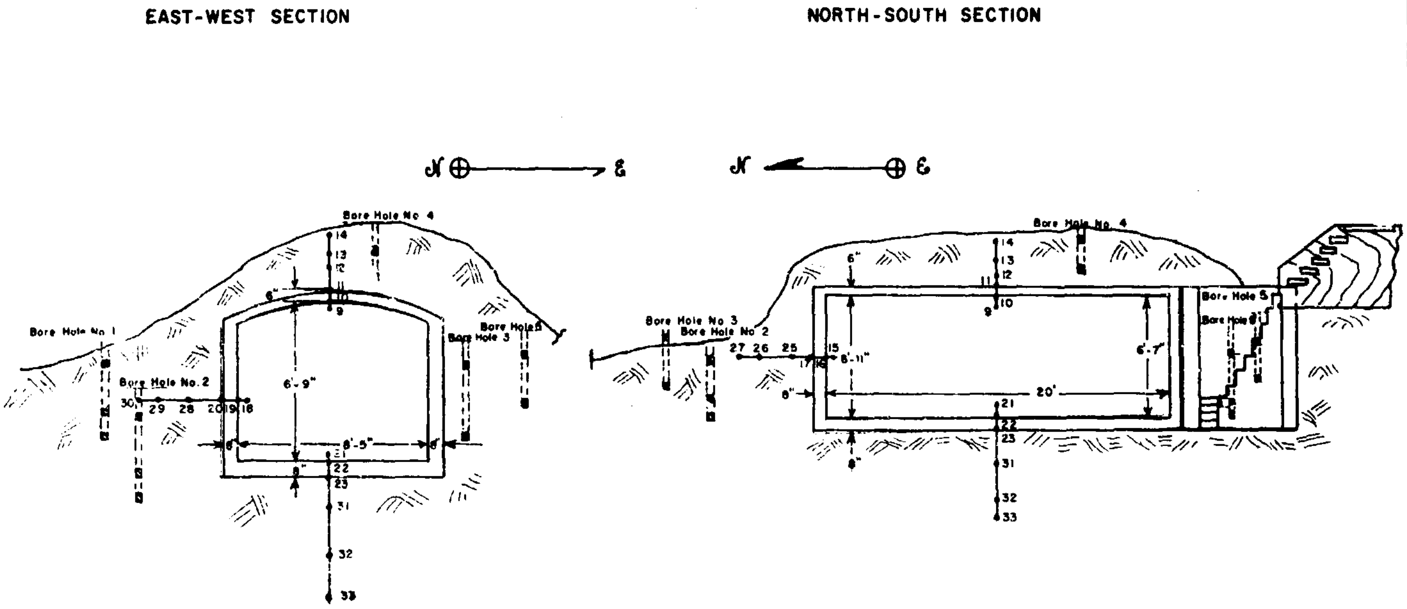
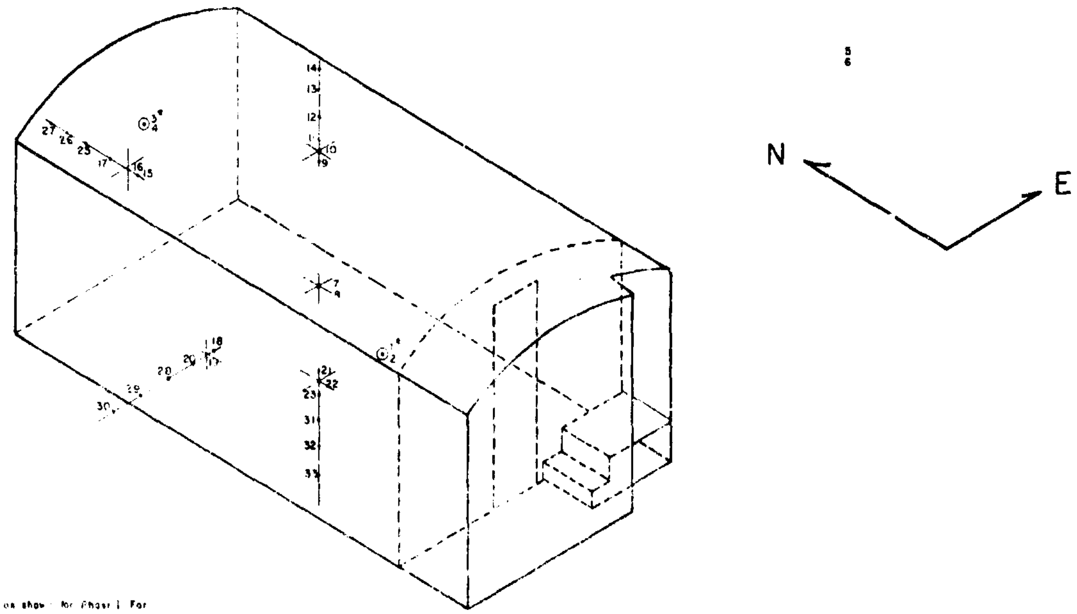


Fig. No. 48 MODEL FAMILY SHELTER (WINTER TEST), BOZEMAN, MONTANA

BOZEMAN SHELTER
THERMOCOUPLE LOCATIONS



NOTE Location of 1,2,3,4 as shown for Phase I. For Phase II, 1 & 2 were changed with 3 & 4 because [illegible] was moved in opposite direction to Phase I

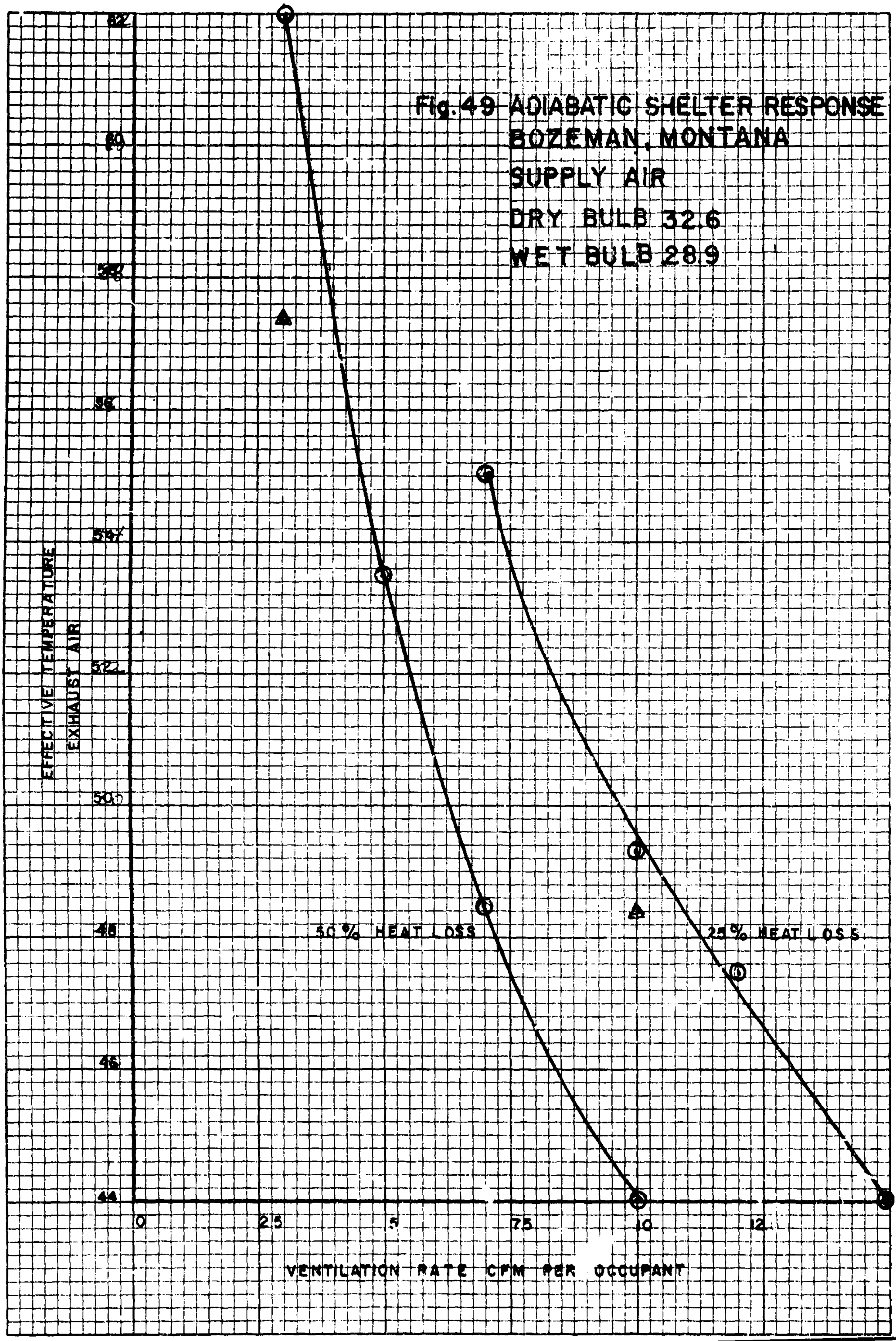


Fig. 49 ADIABATIC SHELTER RESPONSE
BOZEMAN, MONTANA
SUPPLY AIR
DRY BULB 32.6
WET BULB 28.9

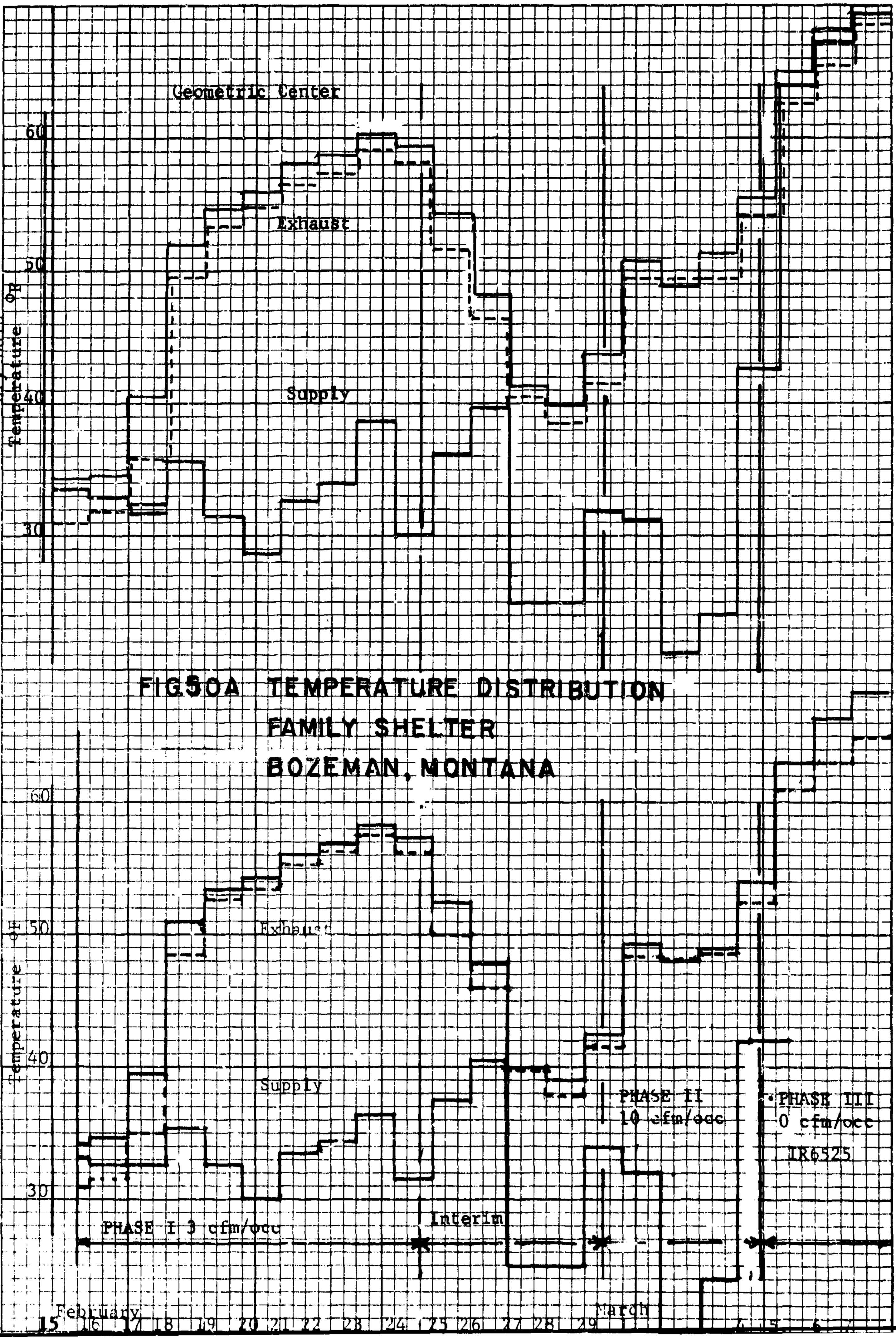


FIG.50A TEMPERATURE DISTRIBUTION
FAMILY SHELTER
BOZEMAN, MONTANA

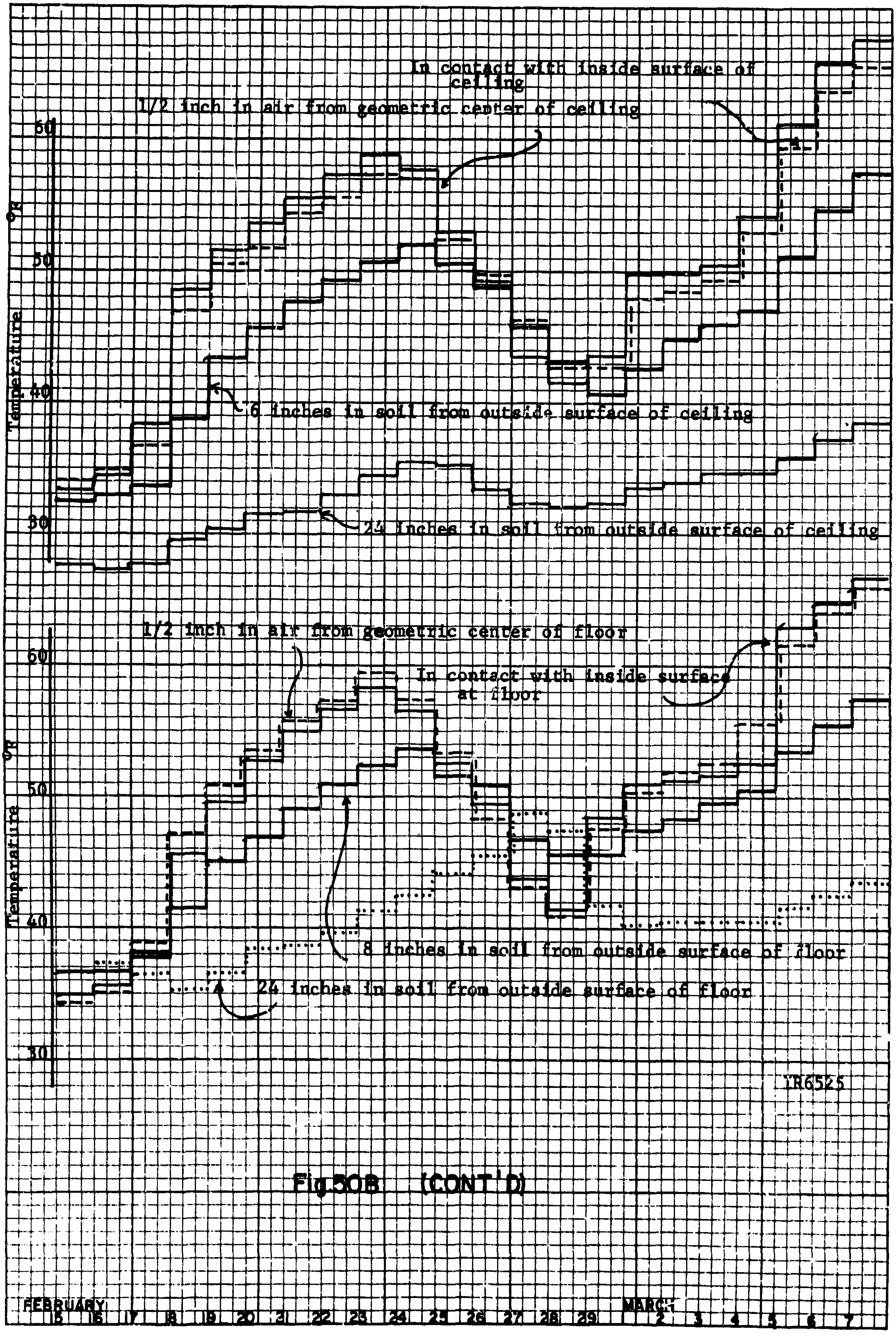


Fig.50B (CONT'D)

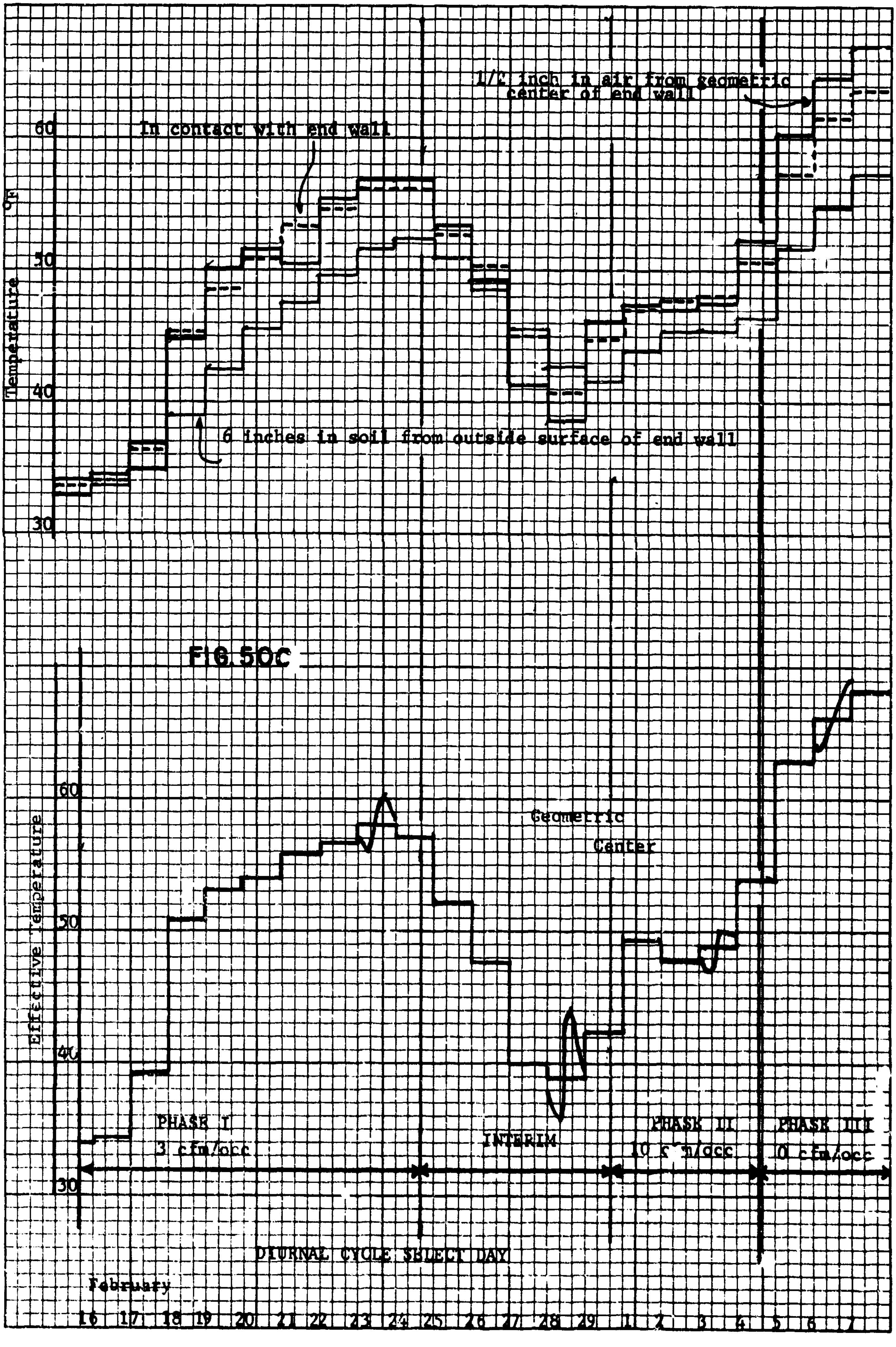


FIG.50C

1/2 inch in air from geometric center of end wall
In contact with end wall
6 inches in soil from outside surface of end wall
°F
Temperature
60
50
40
30
Effective Temperature
60
50
40
30
Geometric Center
PHASE I
3 cfm/occ
INTERIM
PHASE II
10 cfm/occ
PHASE III
0 cfm/occ
DIURNAL CYCLE SELECT DAY
February
16
17
18
19
20
21
22
23
24
25
26
27
28
29
1
2
3
4
5
6
7

Summary

Simulated Occupancy Test

Bureau of Yards and Docks Protective Shelter

Bethesda, Maryland

28 February - 11 March 1964

The shelter is a quonset-type structure constructed of ten gauge galvanized corrugated steel. The shelter is entirely below grade with 5 feet of earth covering. The floor area is 9600 square feet. The shelter had been previously occupied.

The Bethesda Test was primarily designed to determine the feasibility of using simulated occupants in place of human occupants. When discrepancies in supply air are accounted for, it was observed that the Simocs substitute very well for their human counterparts.

Occupants.....NBS's Individual Simocs and Humans for NRL Test

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	2.7 average (weighted)	77.3	75.6	100	7 days
II	4.5 average (weighted)	77.1	75.5	100	5.5 days
		Naval Research Laboratory Test			
I	2.7	-	77.4	100	7 days
II	4.5	-	73.9	100	5.5 days

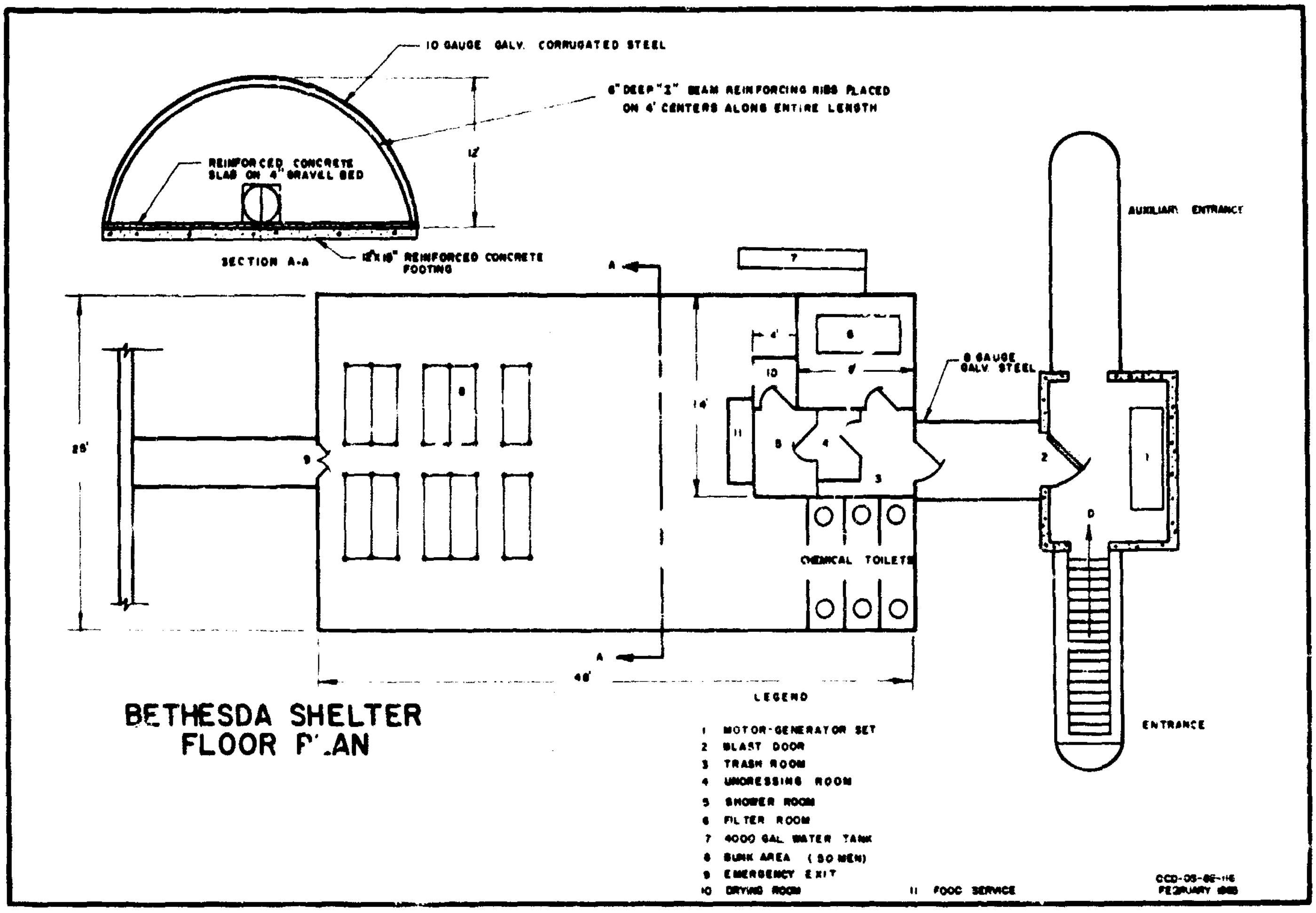
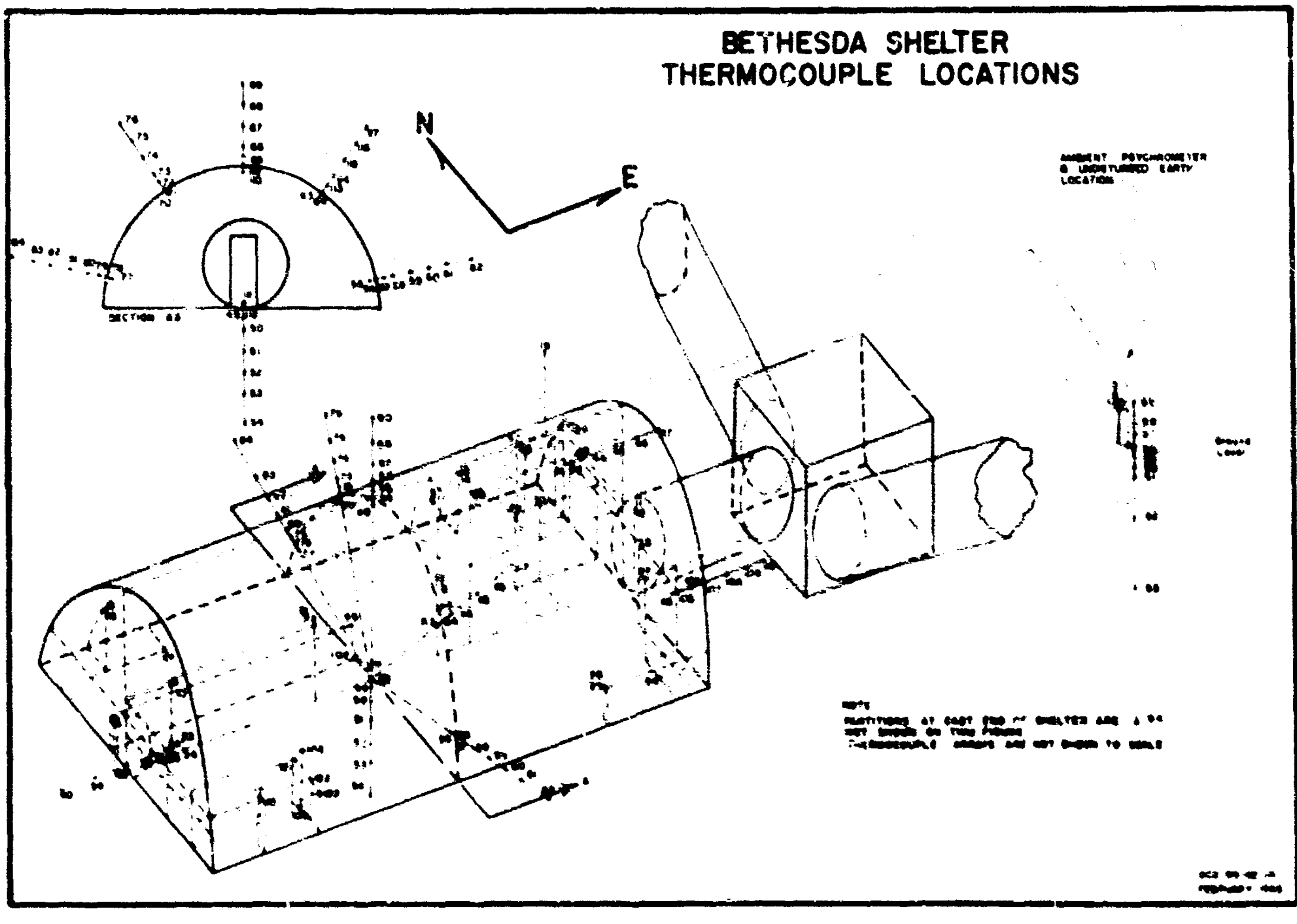


Fig. No. 51 BURIED QUONSET STRUCTURE (REPLICATION of HUMAN OCCUPANCY WINTER TEST), BETHESDA, MARYLAND



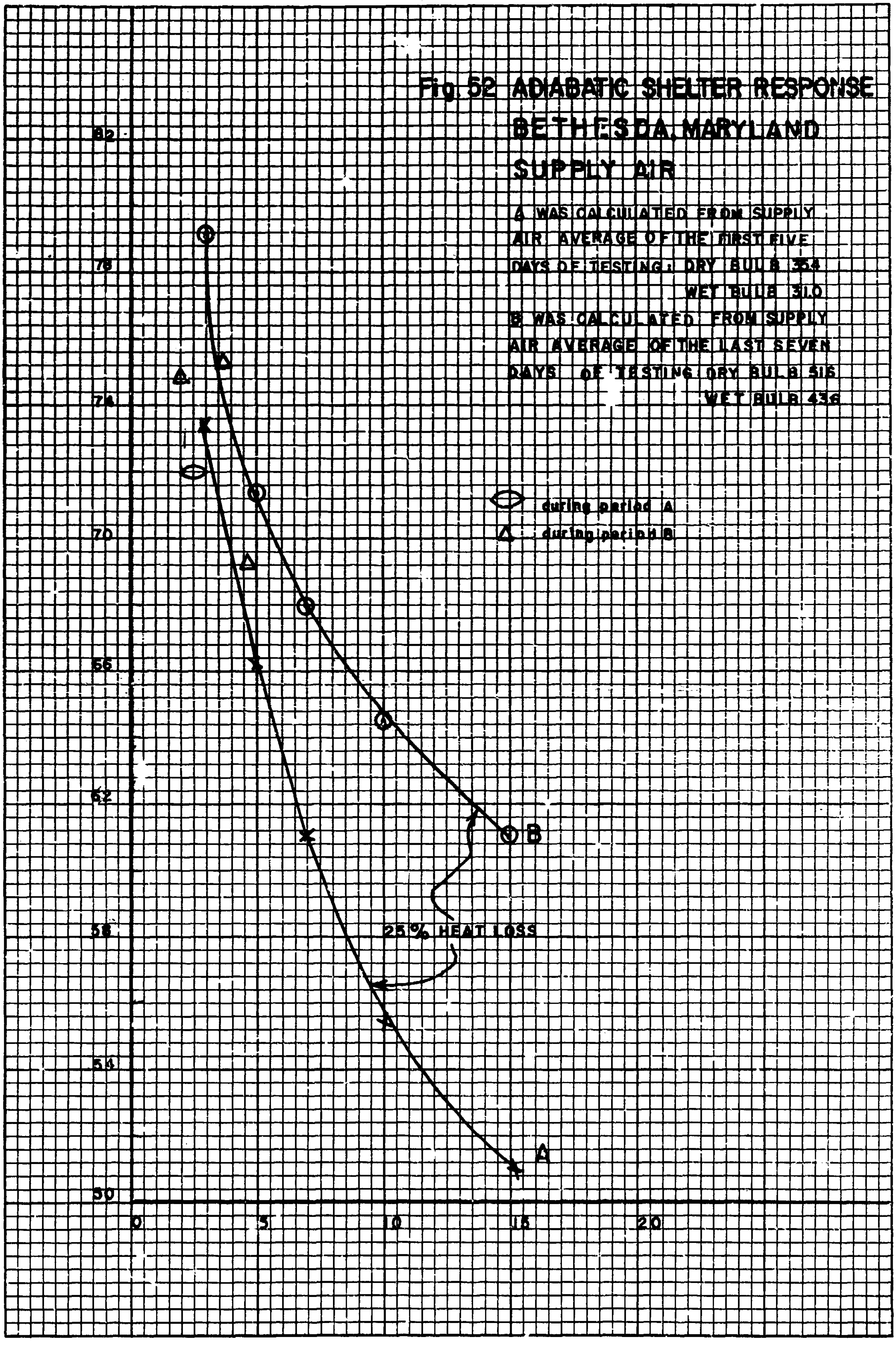


Fig. 52 ADIABATIC SHELTER RESPONSE
BETHESDA, MARYLAND
SUPPLY AIR

A WAS CALCULATED FROM SUPPLY AIR AVERAGE OF THE FIRST FIVE DAYS OF TESTING: DRY BULB 354
WET BULB 31.0

B WAS CALCULATED FROM SUPPLY AIR AVERAGE OF THE LAST SEVEN DAYS OF TESTING DRY BULB 516
WET BULB 436

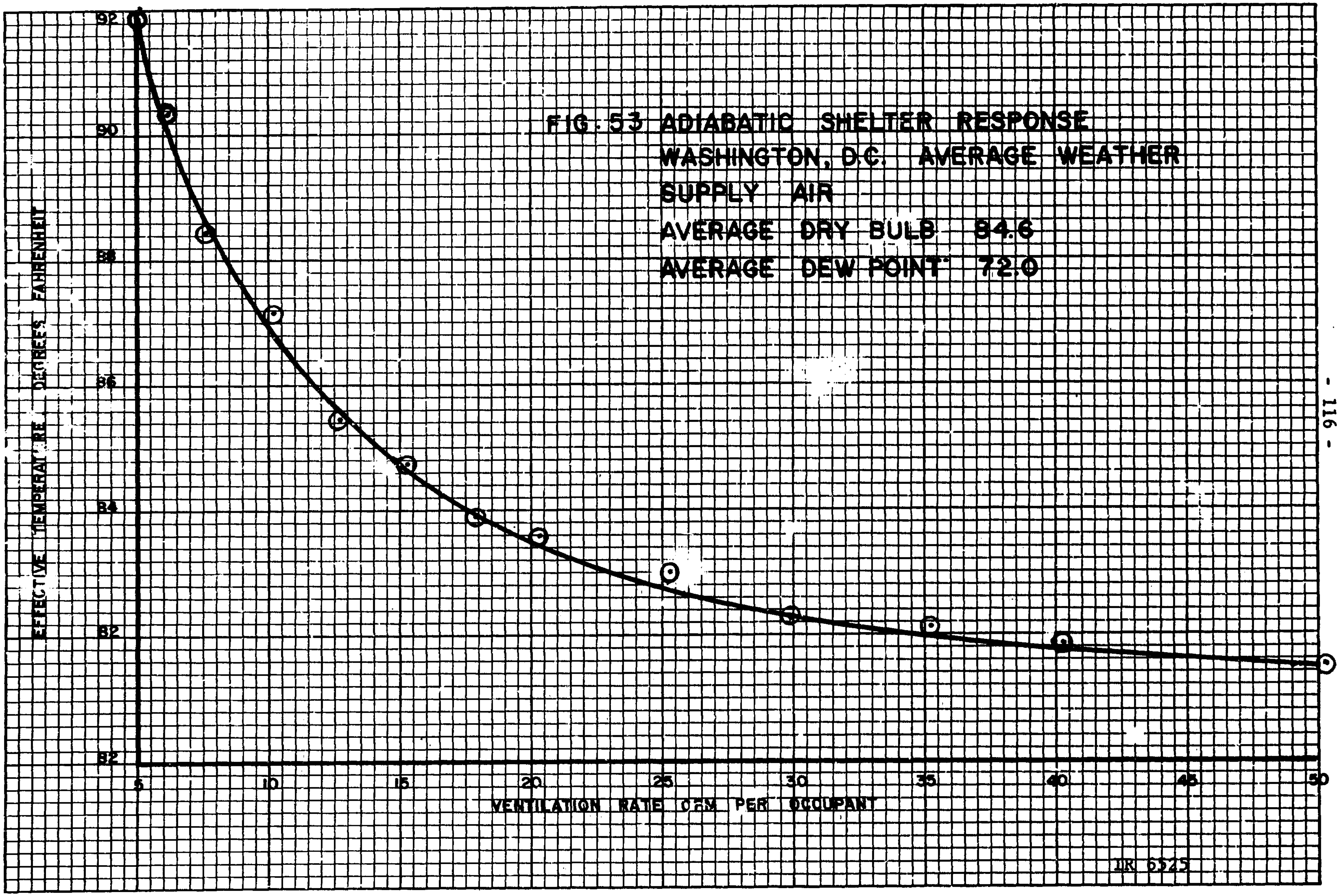


FIG. 53 ADIABATIC SHELTER RESPONSE
WASHINGTON, D.C. AVERAGE WEATHER
SUPPLY AIR
AVERAGE DRY BULB 84.6
AVERAGE DEW POINT 72.0

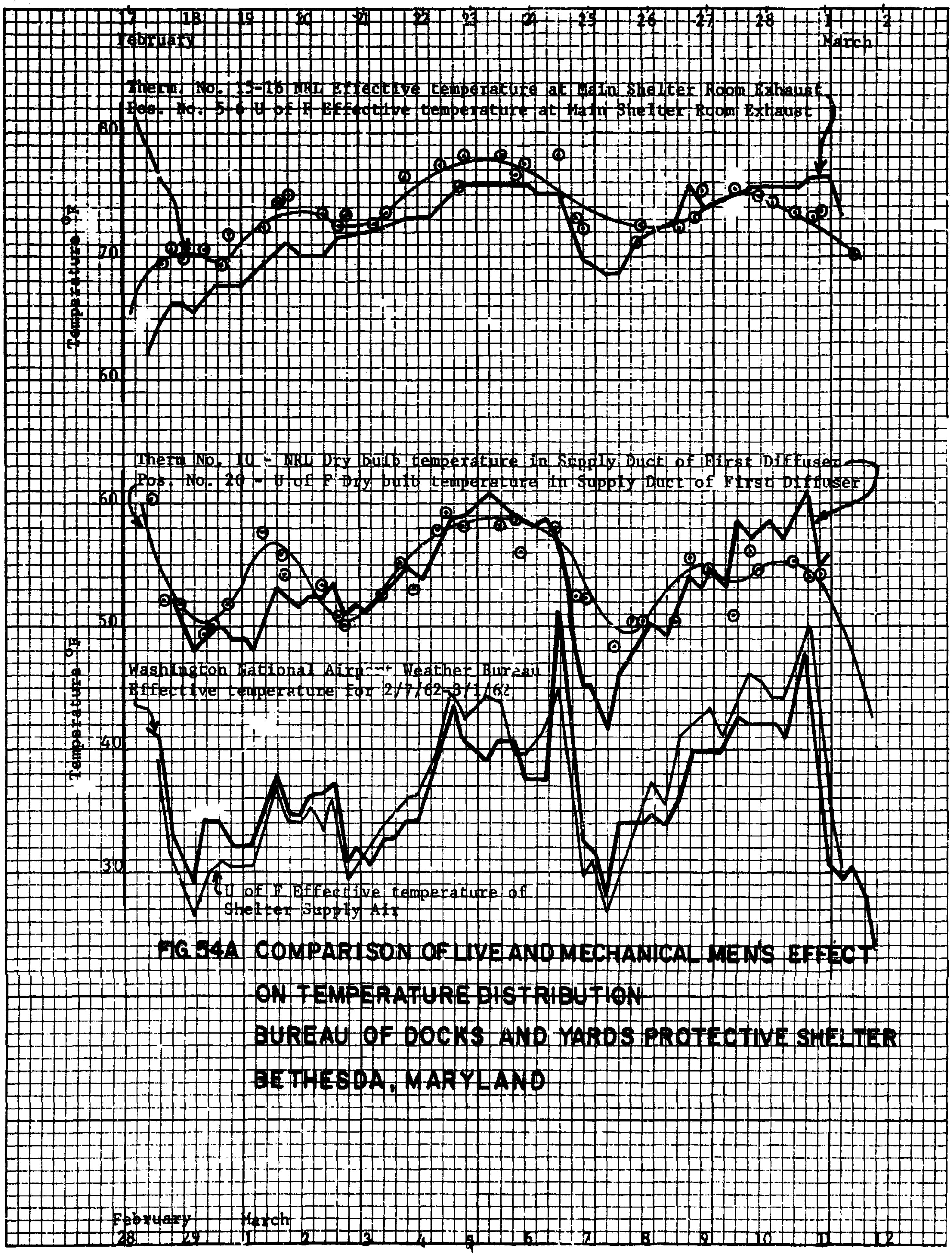


FIG 34A COMPARISON OF LIVE AND MECHANICAL MEN'S EFFECT ON TEMPERATURE DISTRIBUTION
BUREAU OF DOCKS AND YARDS PROTECTIVE SHELTER
BETHESDA, MARYLAND

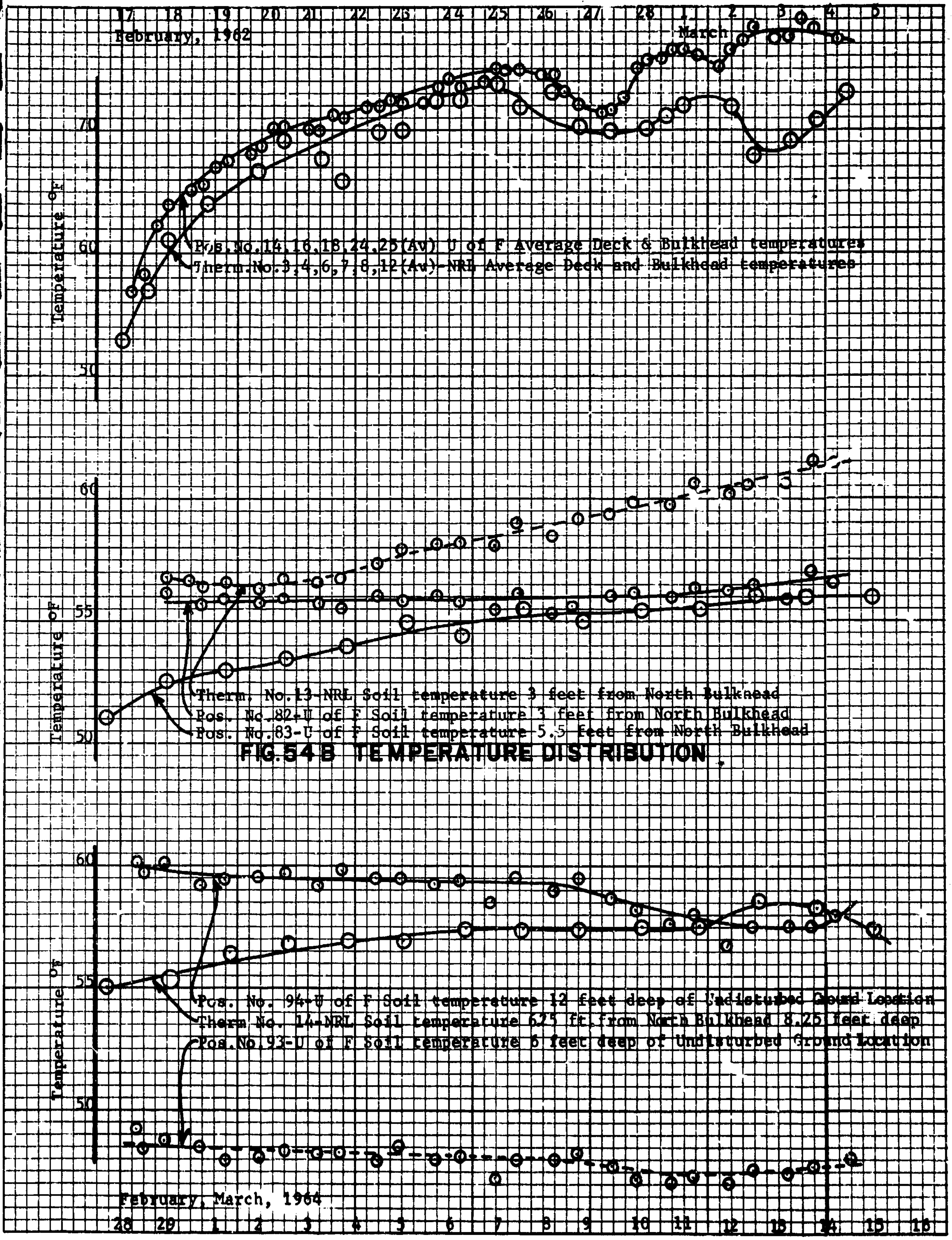


FIG. 54 B TEMPERATURE DISTRIBUTION

Summary

Simulated Occupancy Test

North Arvada Junior High School
Denver, Colorado
15 June - 6 July 1964

The shelter is constructed of steel reinforced concrete. It is below grade and has a floor area of 2430 square feet. The shelter area had been previously occupied.

An adiabatic shelter model would require an air flow rate of 4.5 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F. A shelter model with 25% heat loss through the structure requires negligible ventilation for meeting environmental temperature standards.

Occupants.....GATC's Mass Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	0	85.0	-	208	0.5 day
II	10	78.8	76.9	200	5.0 days
III	6.5	80.7	79.0	200	6.0 days
IV	5	83.2	82.2	200	3.0 days
V	4	85.5	85.0	200	3.0 days
VI	3	89.0	88.1	200	2.75 days

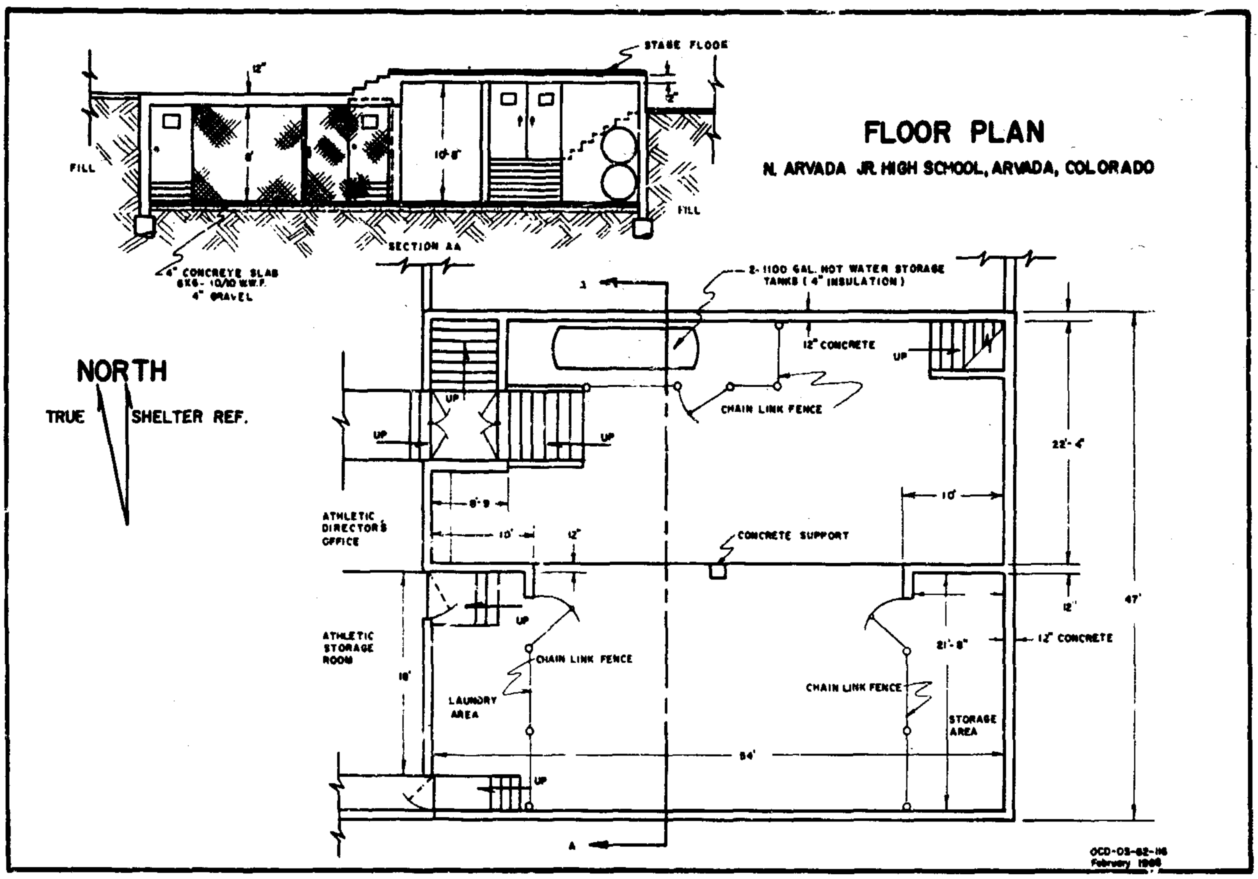
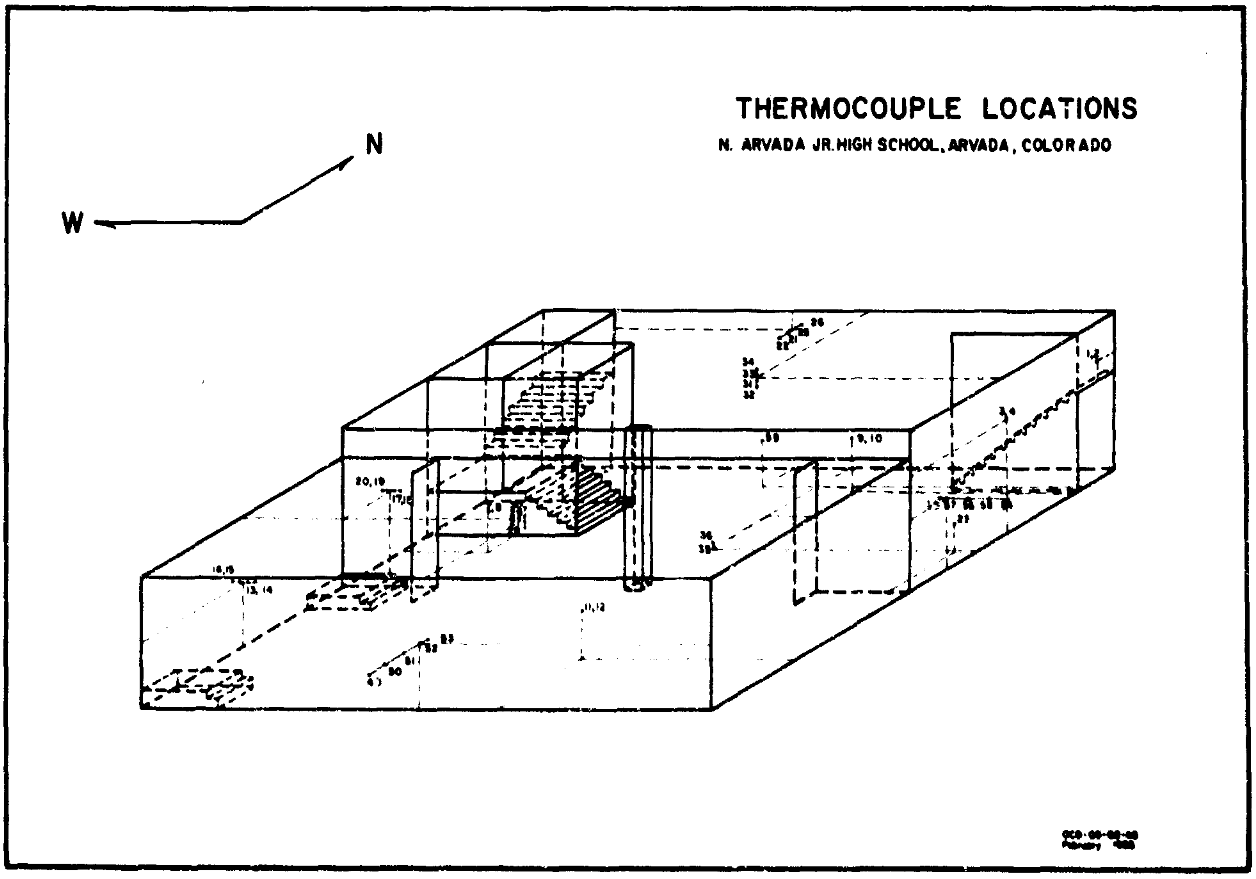


Fig. No. 55 NORTH ARVADA HIGH SCHOOL SHELTER, DENVER, COLORADO



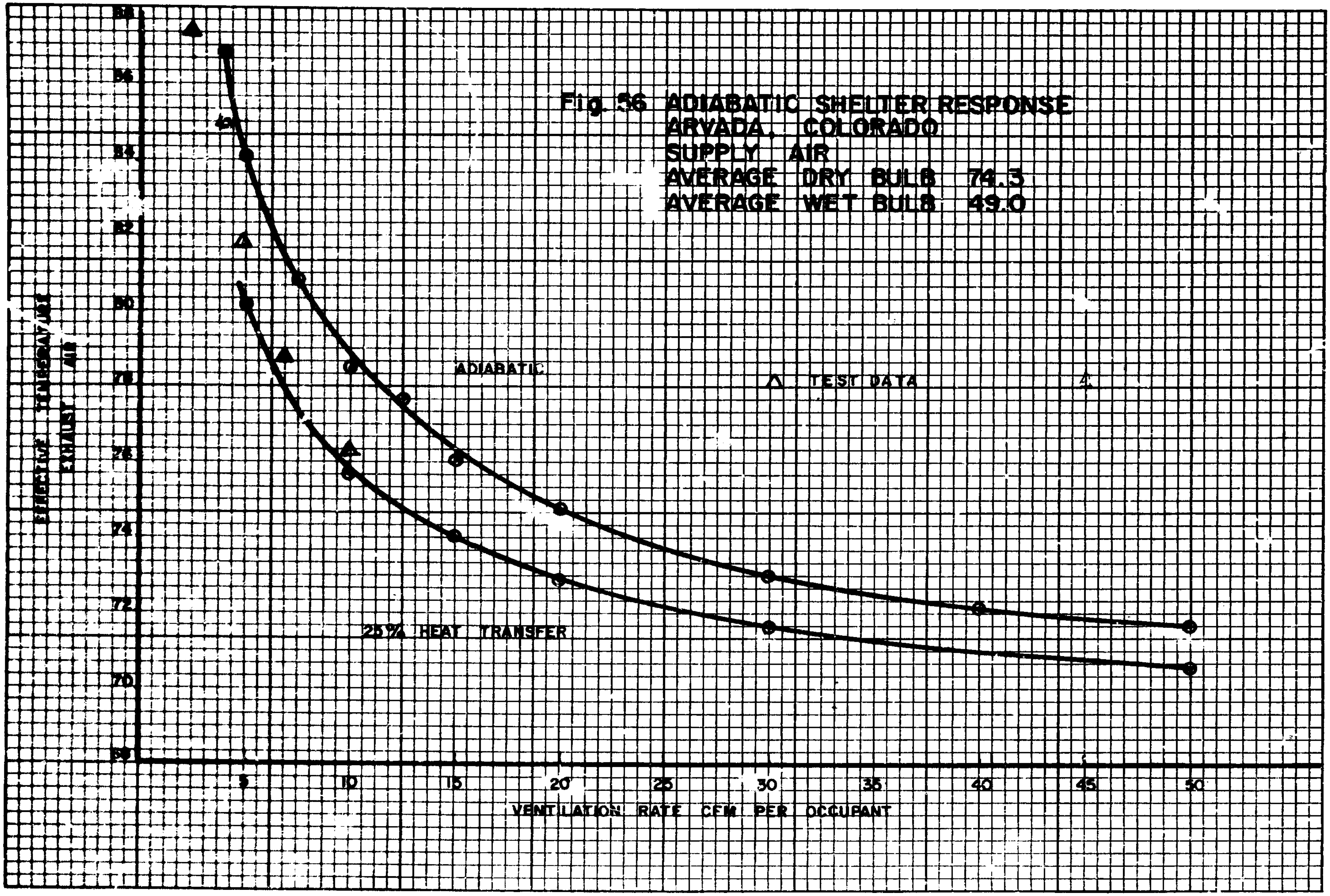


Fig. 56 ADIABATIC SHELTER RESPONSE
ARVADA, COLORADO
SUPPLY AIR
AVERAGE DRY BULB 74.3
AVERAGE WET BULB 49.0

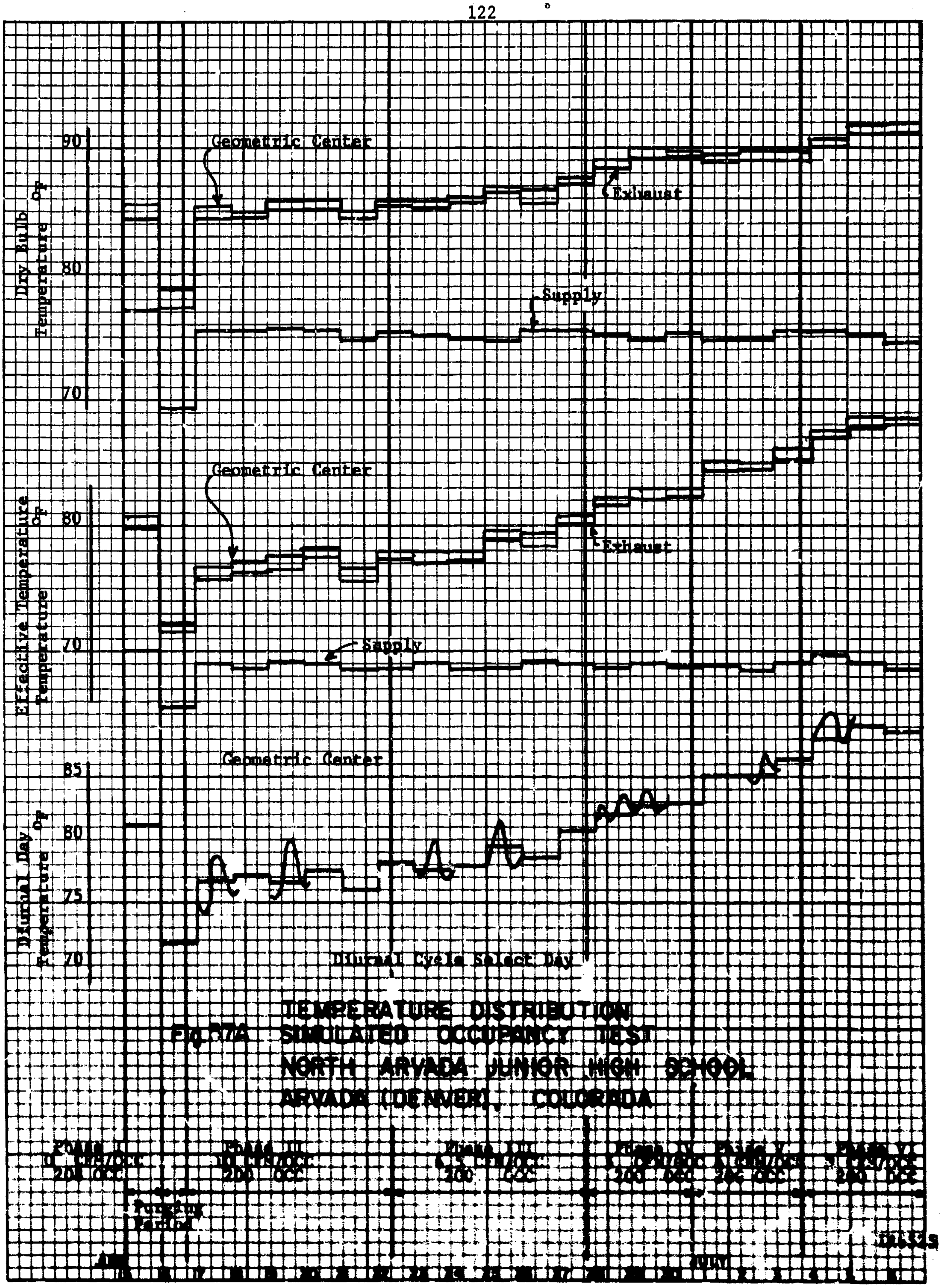


Fig. 77A TEMPERATURE DISTRIBUTION
SIMULATED OCCUPANCY TEST
NORTH ARVADA JUNIOR HIGH SCHOOL
ARVADA (DENVER), COLORADA

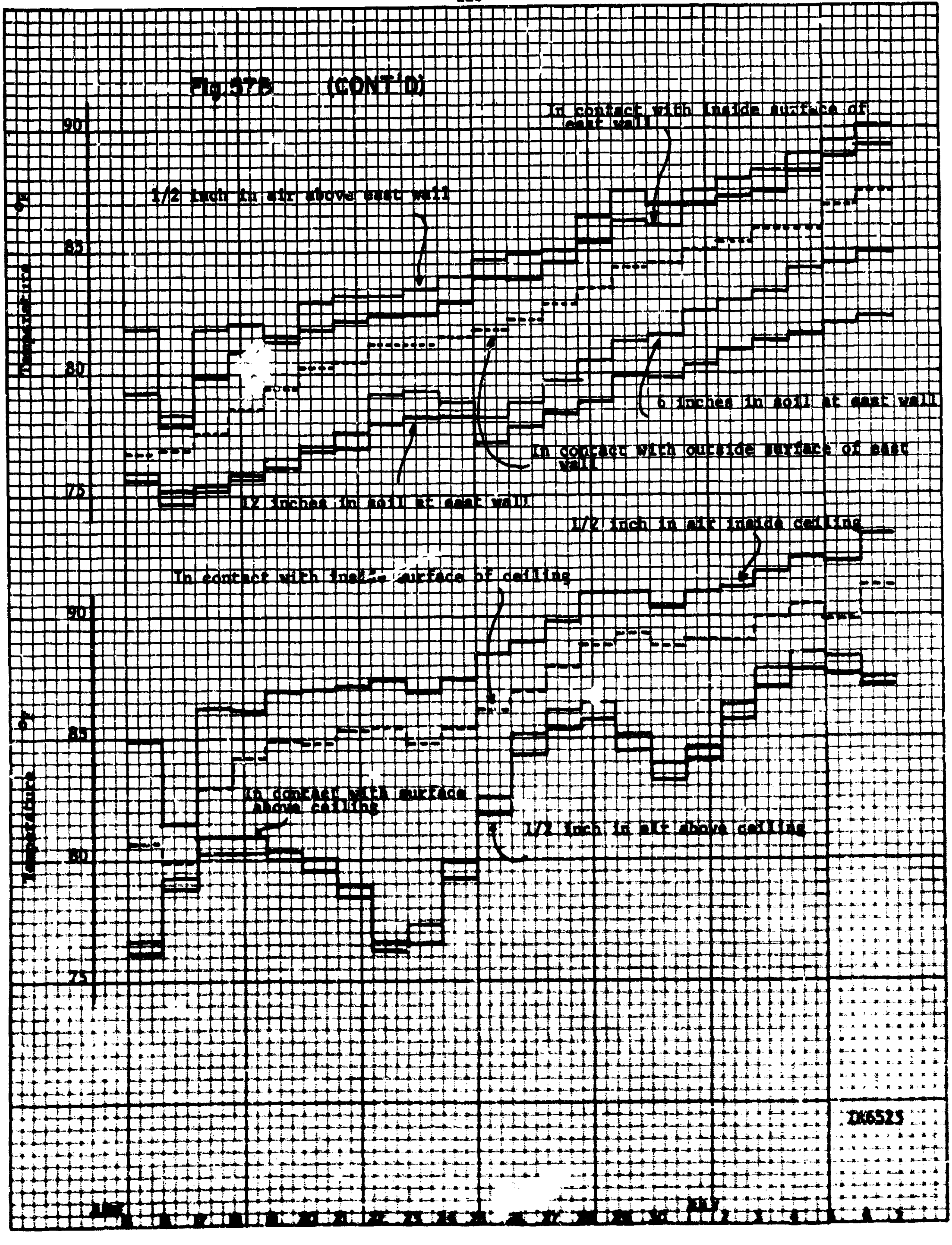


Fig. 57B (CONT'D)

Summary

Simulated Occupancy Test

Three Identical Protective Shelters
(German A, B, C Shelters)
Nevada Test Site - Mercury, Nevada

10 July - 12 August 1964

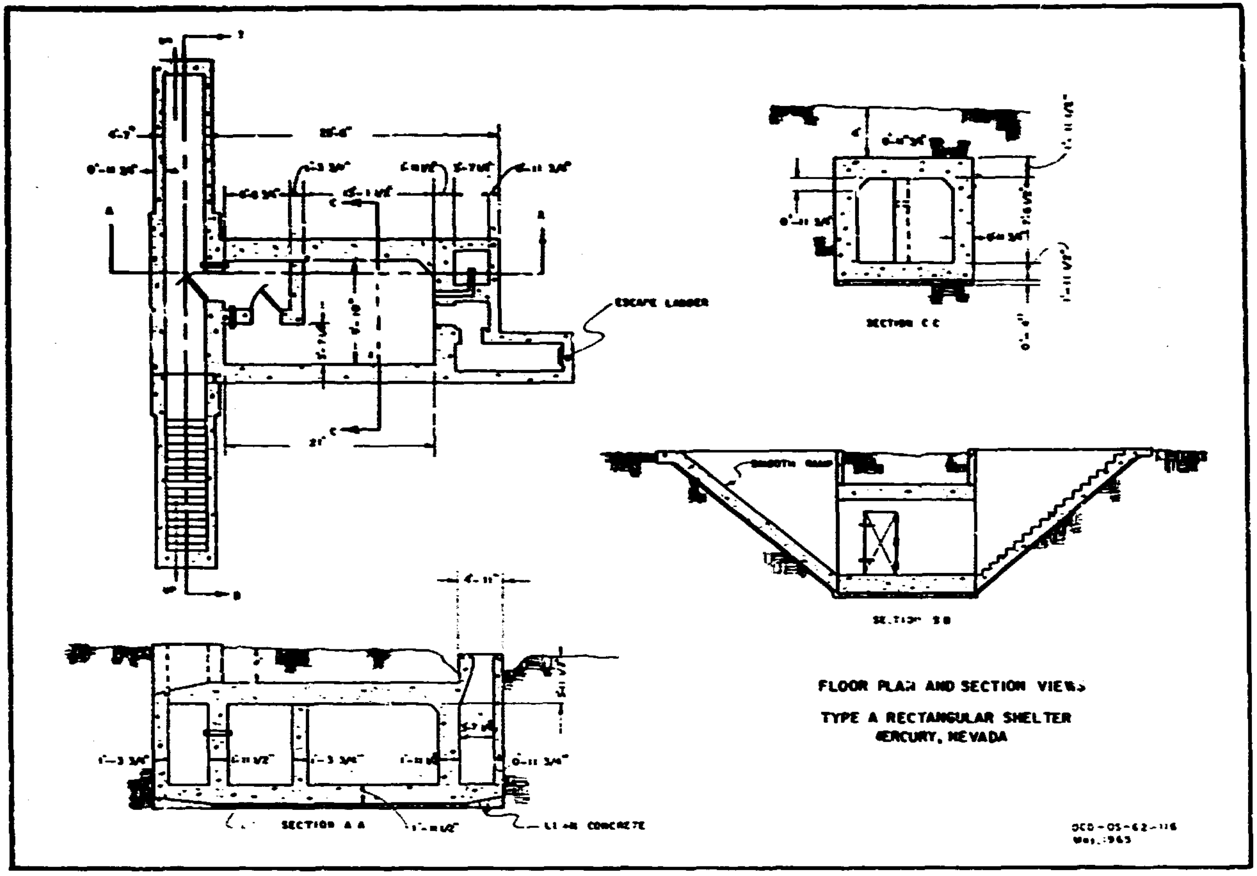
The shelters tested had overall dimensions of 13.75 feet x 35.42 feet, but had only 160.0 square feet of useable floor space. These shelters were of concrete construction and had an earth covering of 4 feet. The shelters had not been occupied before the test.

An adiabatic shelter would maintain an average effective temperature less than 85 °F with a ventilation rate of 6.5 cfm per occupant. A shelter model with 25% heat loss through the structure would require an air flow rate of 5 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F.

Occupants.....NBS's Individual Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
		"A" Shelter			
I	6.56	75.0	73.7	16	1.79 days
II	3.95	82.5	77.7	16	2.25 days
III	2.55	85.0	84.1	16	12.29 days
IV	2.46	86.0	85.2	16	3.25 days
V	3.10	8[illegible].5	84.5	24	4.25 days
VI	3.77	85.0	83.8	24	3.57 days
VII*	3.60	84.0	83.0	24	5.67 days
		"B" Shelter			
I	10.9	74.5	72.0	16	1.79 days
II	7.1	76.5	76.0	16	2.25 days
III	3.57	83.5	82.1	16	12.29 days
IV	2.41	85.0	84.0	16	3.25 days
V	3.76	85.4	84.0	32	4.25 days
VI	4.99	85.5	83.[illegible]	32	10.50 days

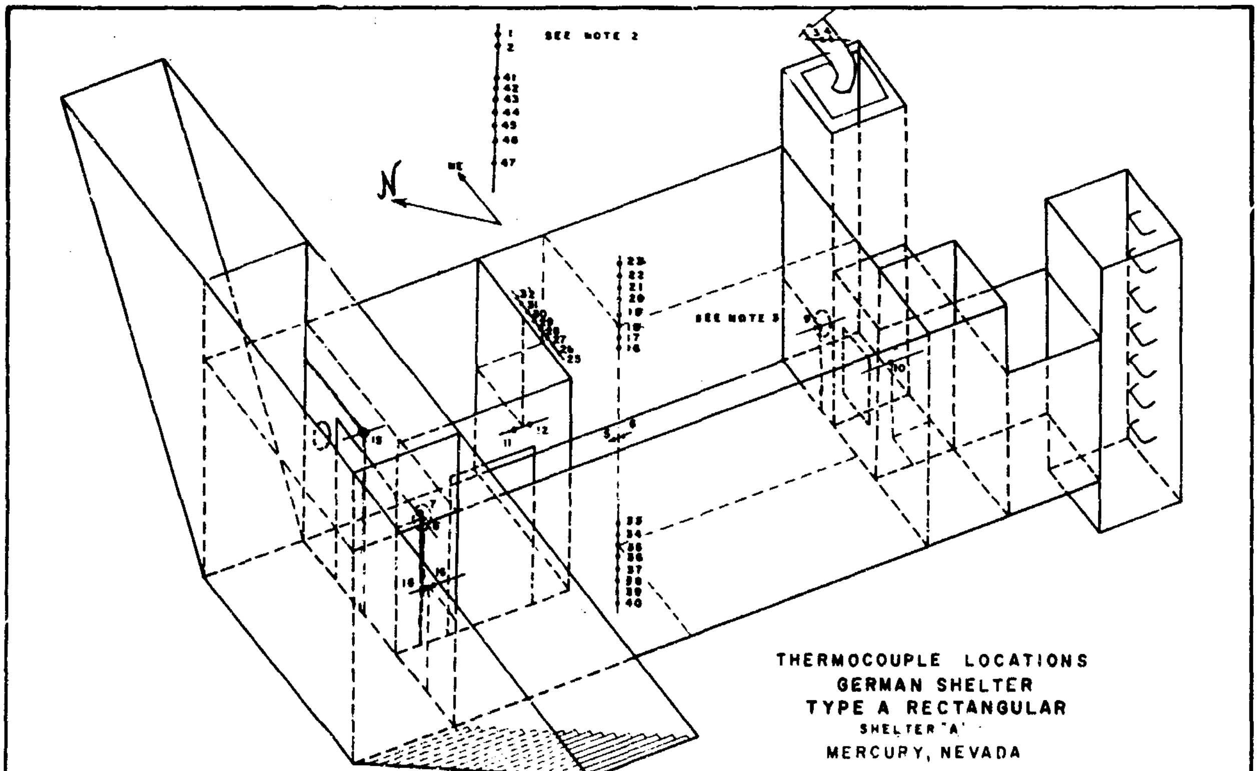
* Desert cooler in operation



FLOOR PLAN AND SECTION VIEWS
TYPE A RECTANGULAR SHELTER
MERCURY, NEVADA

OCD-OS-62-116
May, 1963

Fig. No. 58 MODEL BLAST and RADIATION SHELTERS of GERMAN DESIGN, NEVADA TEST SITE, AEC, MERCURY, NEVADA



THERMOCOUPLE LOCATIONS
GERMAN SHELTER
TYPE A RECTANGULAR
SHELTER "A"
MERCURY, NEVADA

NOTE 1: THERMOCOUPLE NO. 24-REFERENCE BATH IN EQUIPMENT TRAILER.
NOTE 2: SEE FIGURE 3 FOR THERMOCOUPLE LOCATIONS.
NOTE 3: LOCATION OF INLET AIR THERMOCOUPLE VARIED, SEE DISCUSSION AND RESULTS.
NOTE 4: THERMOCOUPLE LOCATIONS SHOWN FOR "A" SHELTER WERE IDENTICAL FOR "B" SHELTER.
NOTE 5: FOR THERMOCOUPLE LOCATIONS IN "C" SHELTER, REFER TO TABLE IV.

OCD-OS-62-116
May, 1963

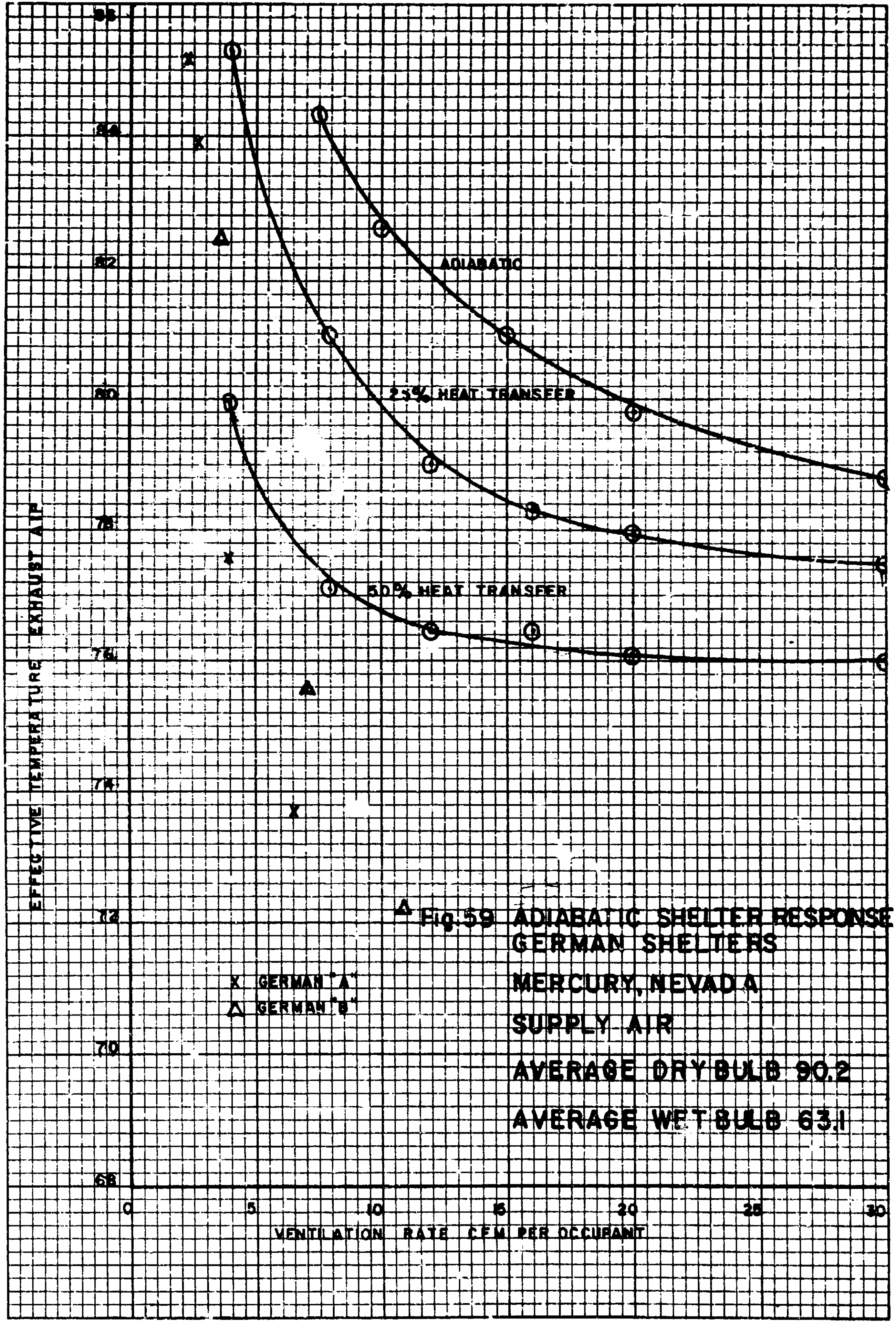


Fig. 59 ADIABATIC SHELTER RESPONSE
GERMAN SHELTERS
MERCURY, NEVADA
SUPPLY AIR
AVERAGE DRYBULB 90.2
AVERAGE WET BULB 63.1

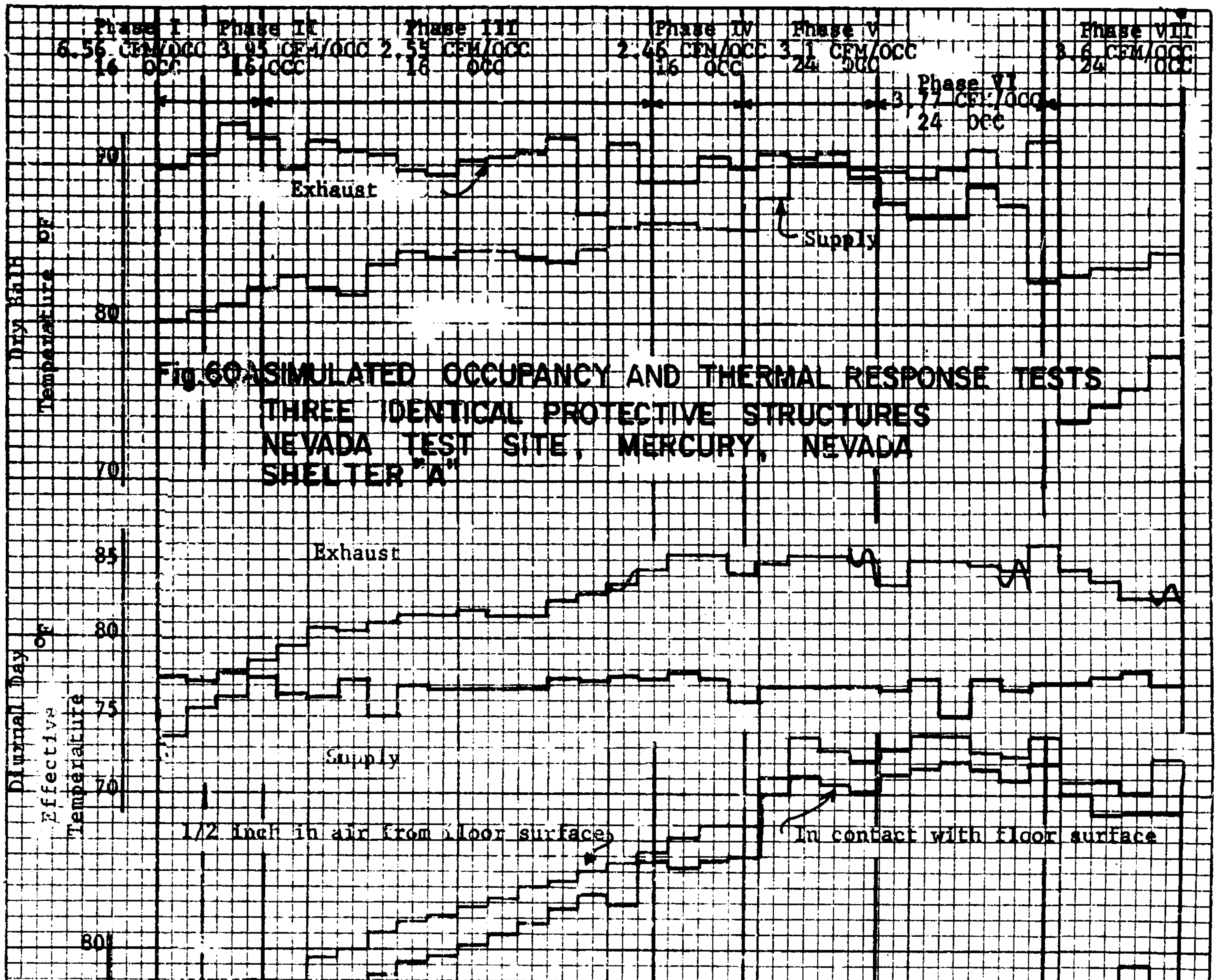


Fig. 60 SIMULATED OCCUPANCY AND THERMAL RESPONSE TESTS THREE IDENTICAL PROTECTIVE STRUCTURES NEVADA TEST SITE, MERCURY, NEVADA SHELTER "A"

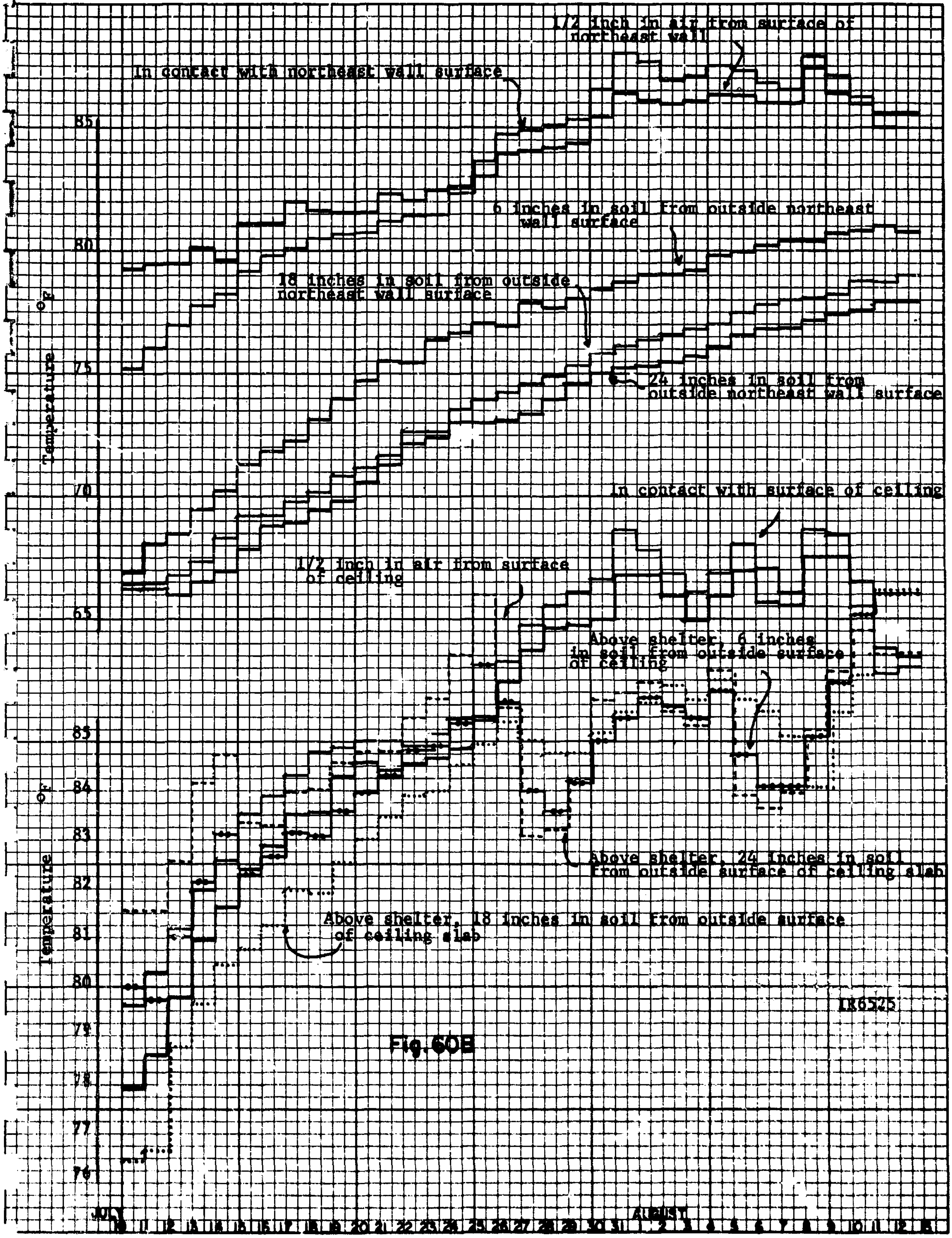
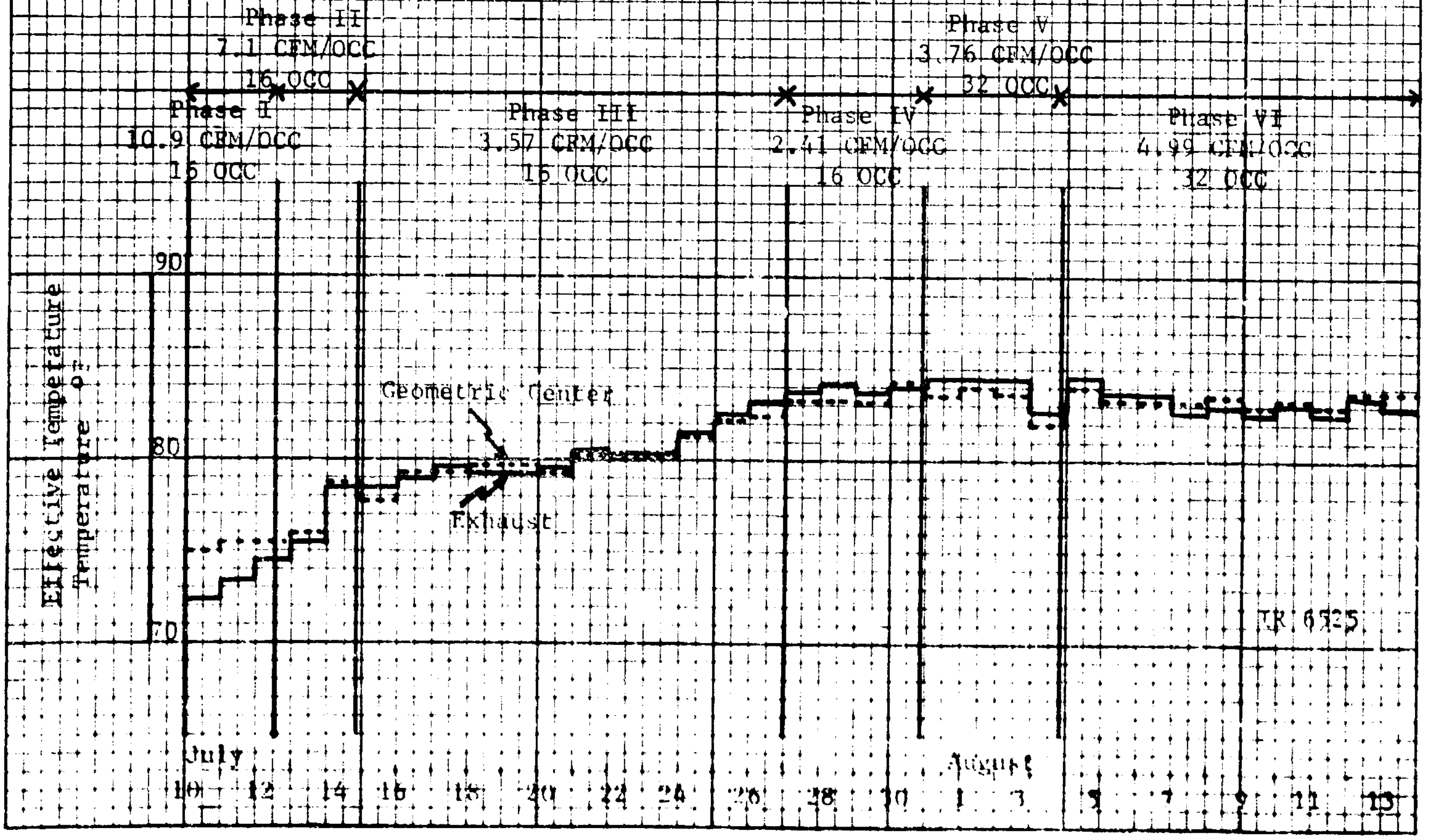

1/2 inch in air from surface of northeast wall
In contact with northeast wall surface
6 inches in soil from outside northeast wall surface
18 inches in soil from outside northeast wall surface
24 inches in soil from outside northeast wall surface
In contact with surface of ceiling
1/2 inch in air from surface of ceiling
Above shelter, 6 inches in soil from outside surface of ceiling
Above shelter, 24 inches in soil from outside surface of ceiling slab
Above shelter, 18 inches in soil from outside surface of ceiling slab
Temperature °F
85
80
75
70
65
Temperature °F
85
84
83
82
81
80
79
78
77
76
JULY
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
AUGUST
1
2
3
4
5
6
7
8
9
10
11
12
13
IR6525

Fig. 60B

FIG 6 A TEMPERATURE DISTRIBUTION
THREE IDENTICAL PROTECTIVE STRUCTURES
SHELTERS "B" AND "C"
NEVADA TEST SITE, MERCURY, NEVADA



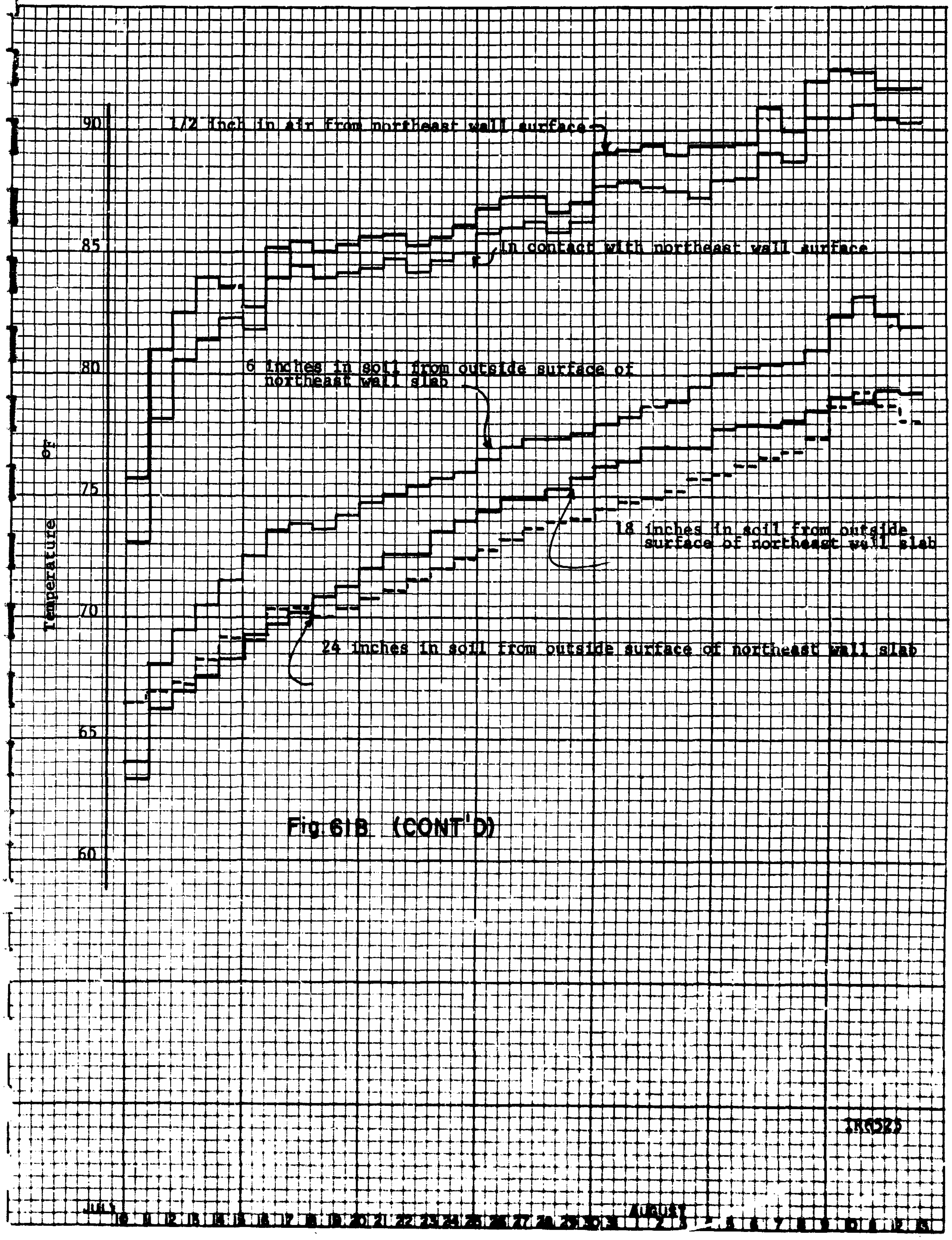


Fig 61B (CONT'D)

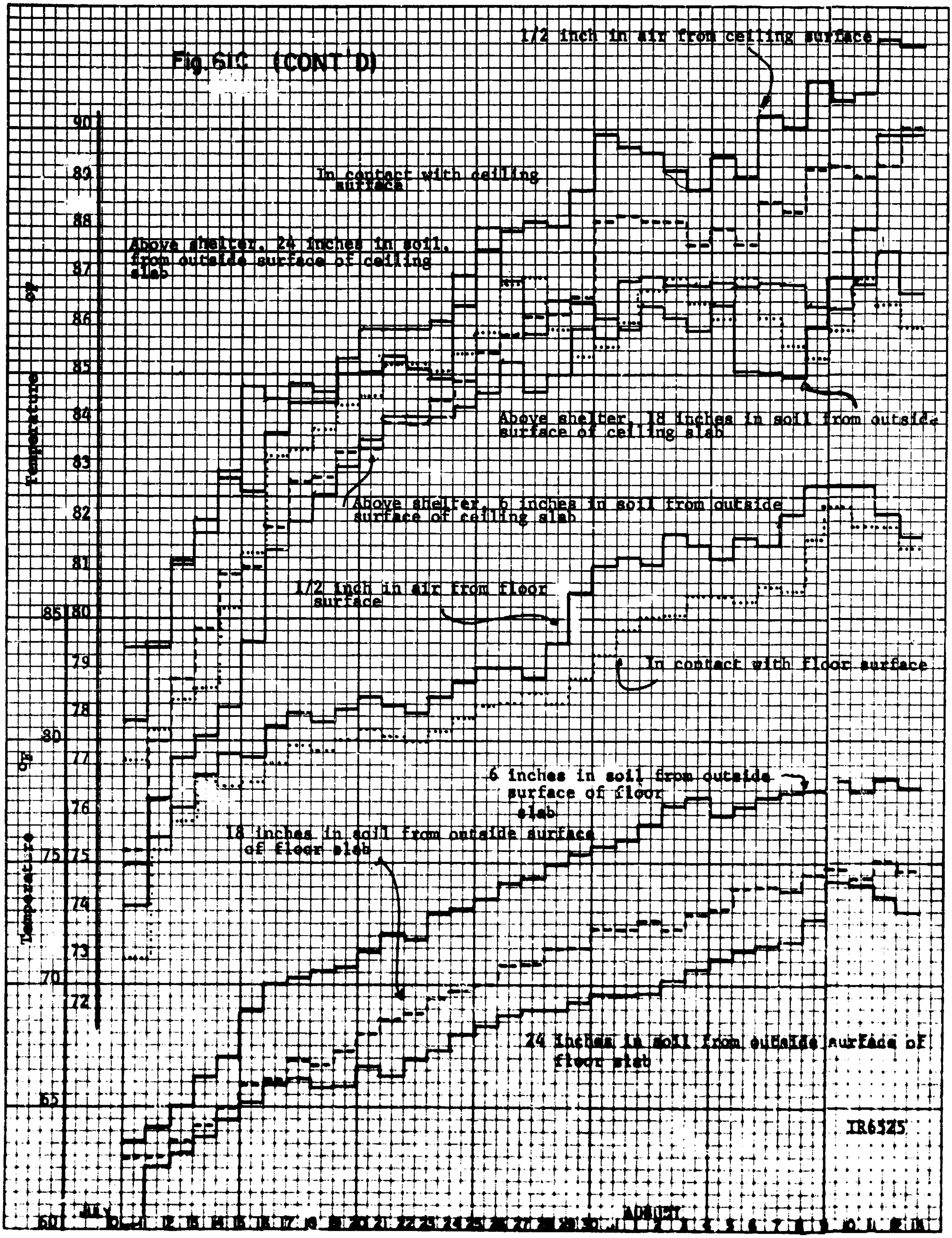


Fig 61C (CONT'D)

Summary

Simulated Occupancy Test
Underground Parking Garage
Frenchman's Flat, Mercury, Nevada
22 July - 3 September 1964

The shelter is heavily constructed with reinforced concrete. It is 3 feet below grade and has 7500 square feet of useable floor space, of which 3310 square feet were tested. The shelter had been occupied prior to the test.

An adiabatic shelter model would require an air flow rate of 7.5 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F. A shelter model with 25% heat loss through the structure would require an air flow rate of 4 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F.

Occupants.....GATC's Mass Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
II	12	83.0	81.3	331	3.16 days
I'	10	83.8	82.3	331	3.75 days
III	9	84.0	82.1	331	3.00 days
IV	7.5	85.0	82.8	331	3.00 days
IV'*	7.5	84.5	82.4	331	16 hrs.
V	5.5	86.7	85.7	331	3.25 days
VI	3.0	93.2	85.7	331	21 hrs.
VII**	0	84.0	81.0	117	5 hrs.
	6.5	81.0	79.9	117	15 hrs.
	5.0	84.9	83.0	117	2.16 days
	6.0	86.0	84.4	117	4 days

* Check test to determine validity of procedures during Phase IV.
** Fire test - also less floor space.

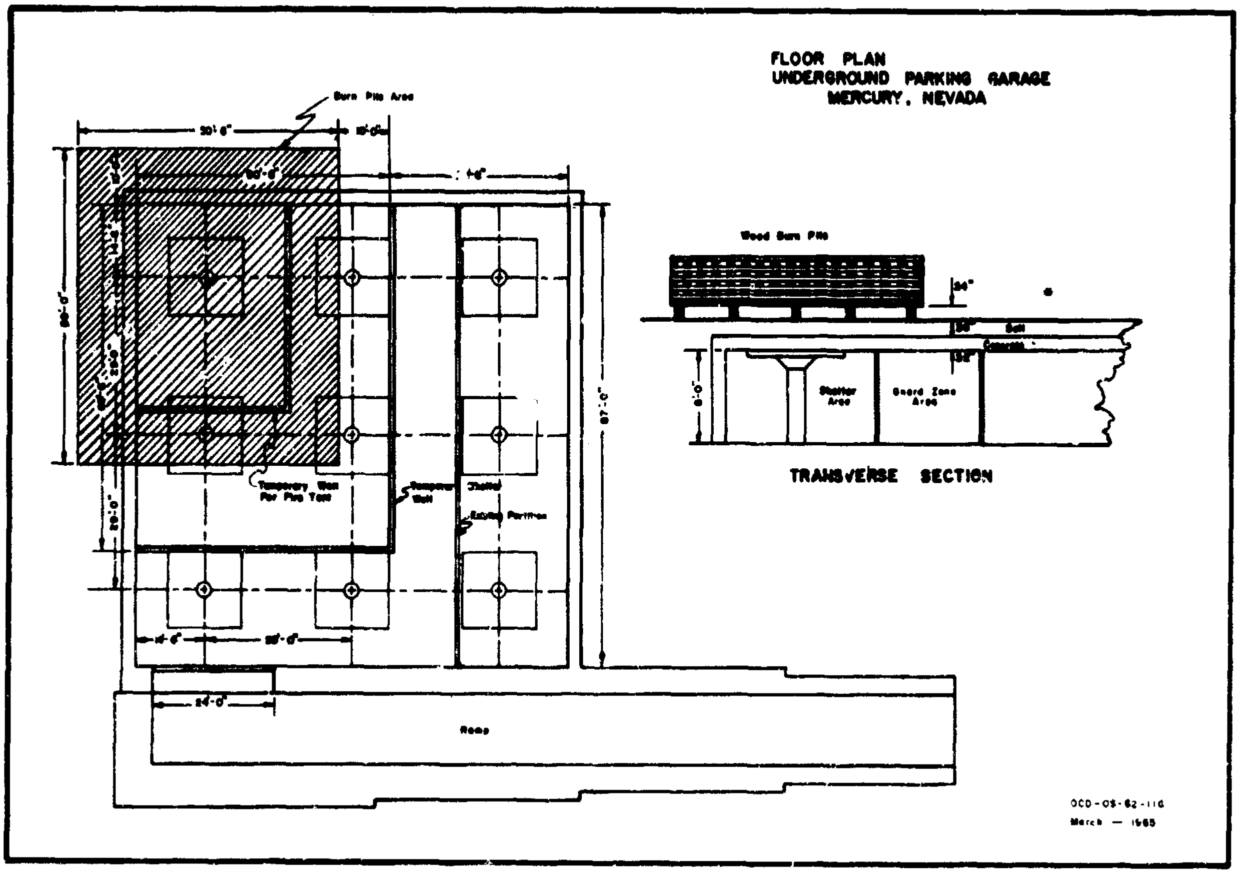
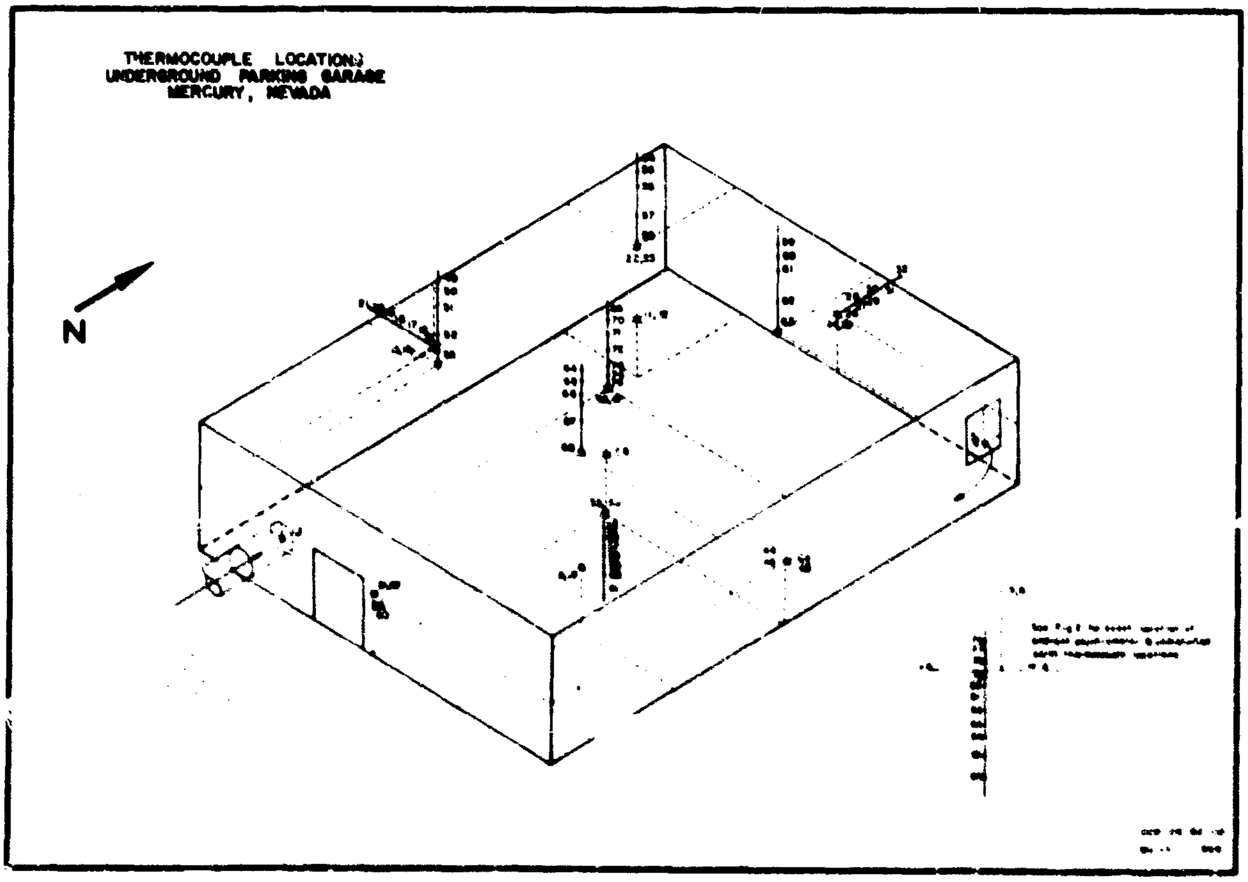


Fig. No.62 UNDERGROUND PARKING GARAGE, NEVADA TEST SITE, AEC, MERCURY, NEVADA



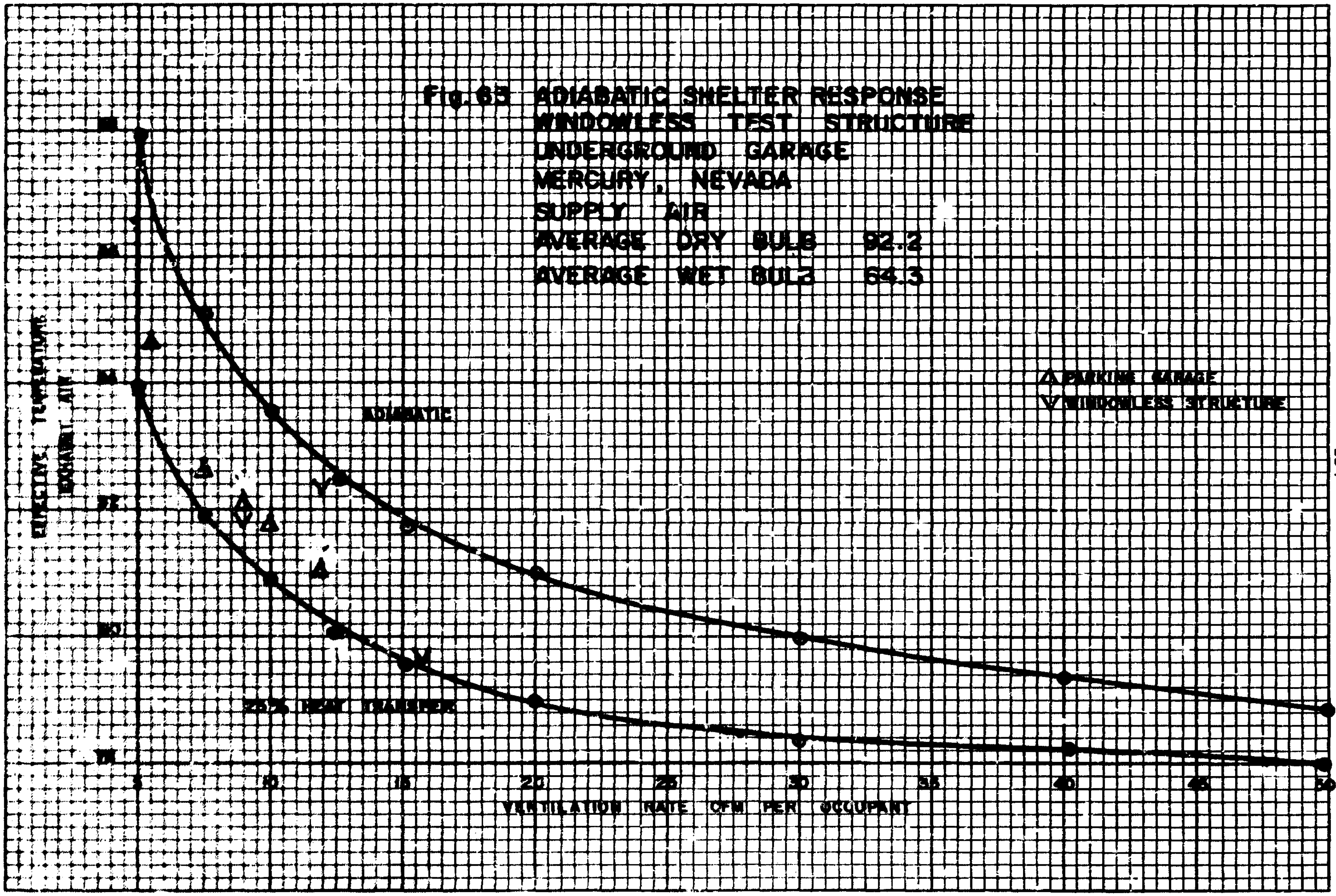


Fig. 65 ADIABATIC SHELTER RESPONSE
WINDOWLESS TEST STRUCTURE
UNDERGROUND GARAGE
MERCURY, NEVADA
SUPPLY AIR
AVERAGE DRY BULB 92.2
AVERAGE WET BULB 64.3

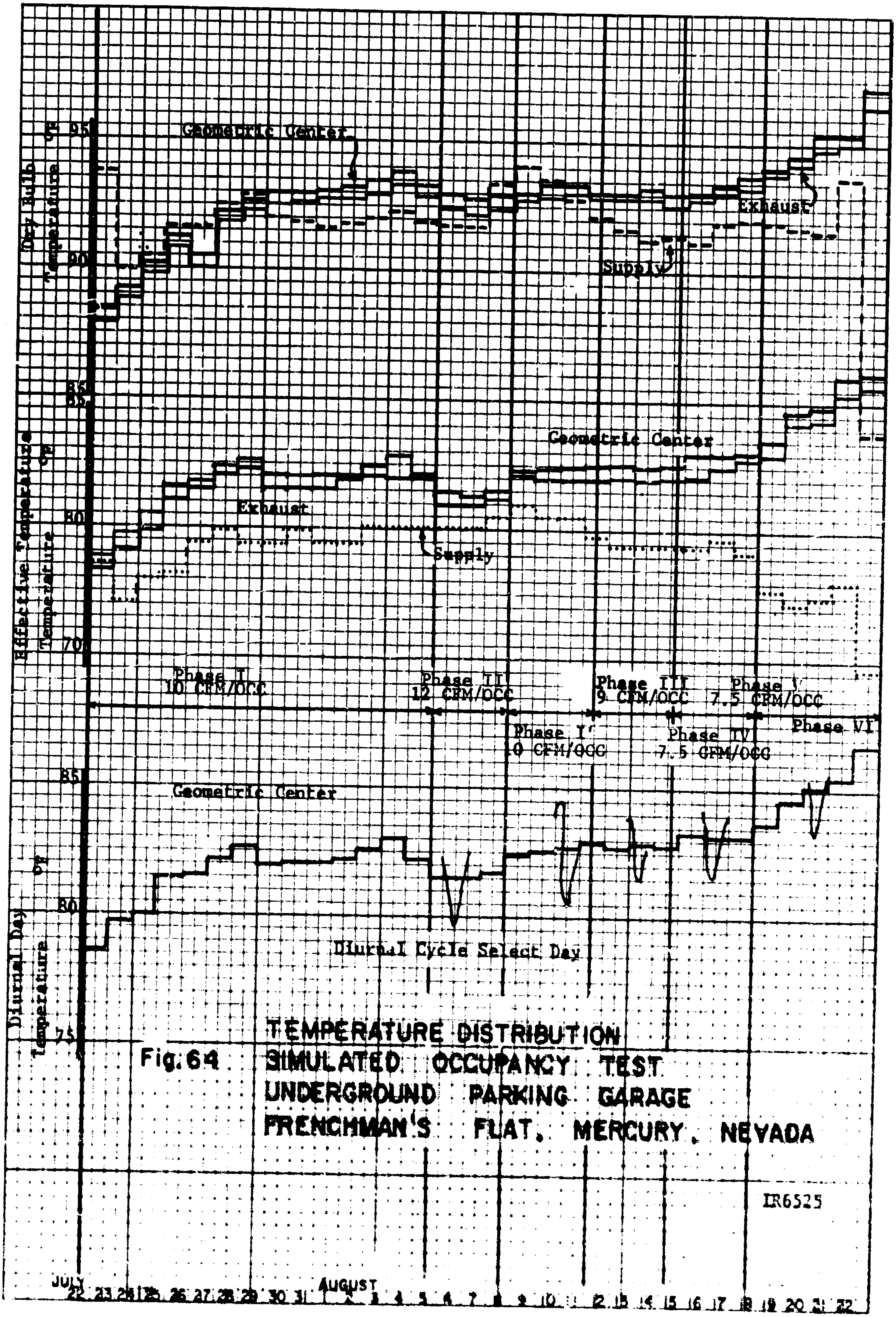


Fig. 64 TEMPERATURE DISTRIBUTION
SIMULATED OCCUPANCY TEST
UNDERGROUND PARKING GARAGE
FRENCHMAN'S FLAT, MERCURY, NEVADA

IR6525

Summary
Simulated Occupancy Test
Windowless Test Structure
Mercury, Nevada
18 August - 2 September 1964

The shelter was entirely above grade and had a composite wall construction. A poured concrete slab formed the floor and a steel reinforced slab made the structure roof. The outer wall is 3.75 inch brick backed up by 2.5 inches of pea gravel grout containing 1 inch vertical steel bars, and the inner wall was constructed of 3.75 inch brick. There are 800 square feet of floor space. The shelter has not been occupied before the test.

An adiabatic shelter model would require an air flow rate of 7.5 cfm per occupant of ventilation air to maintain an average effective temperature below 85 °F. A shelter model with 25% heat loss through the structure would require an air flow rate of 4 cfm per occupant of ventilation air to maintain an average effective temperature of 85 °F.

Occupants.....GATC's Mass Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	15.7	83.0	79.5	80	3.42 days
II	12.0	85.0	82.3	80	5.06 days
III	9.0	84.0	81.8	80	4.64 days
IV*	9.0	82.9	80.8	80	2.13 days
III'**	9.0	81.2	78.9	80	.75 days

* Desert cooler
** Change ambient weather

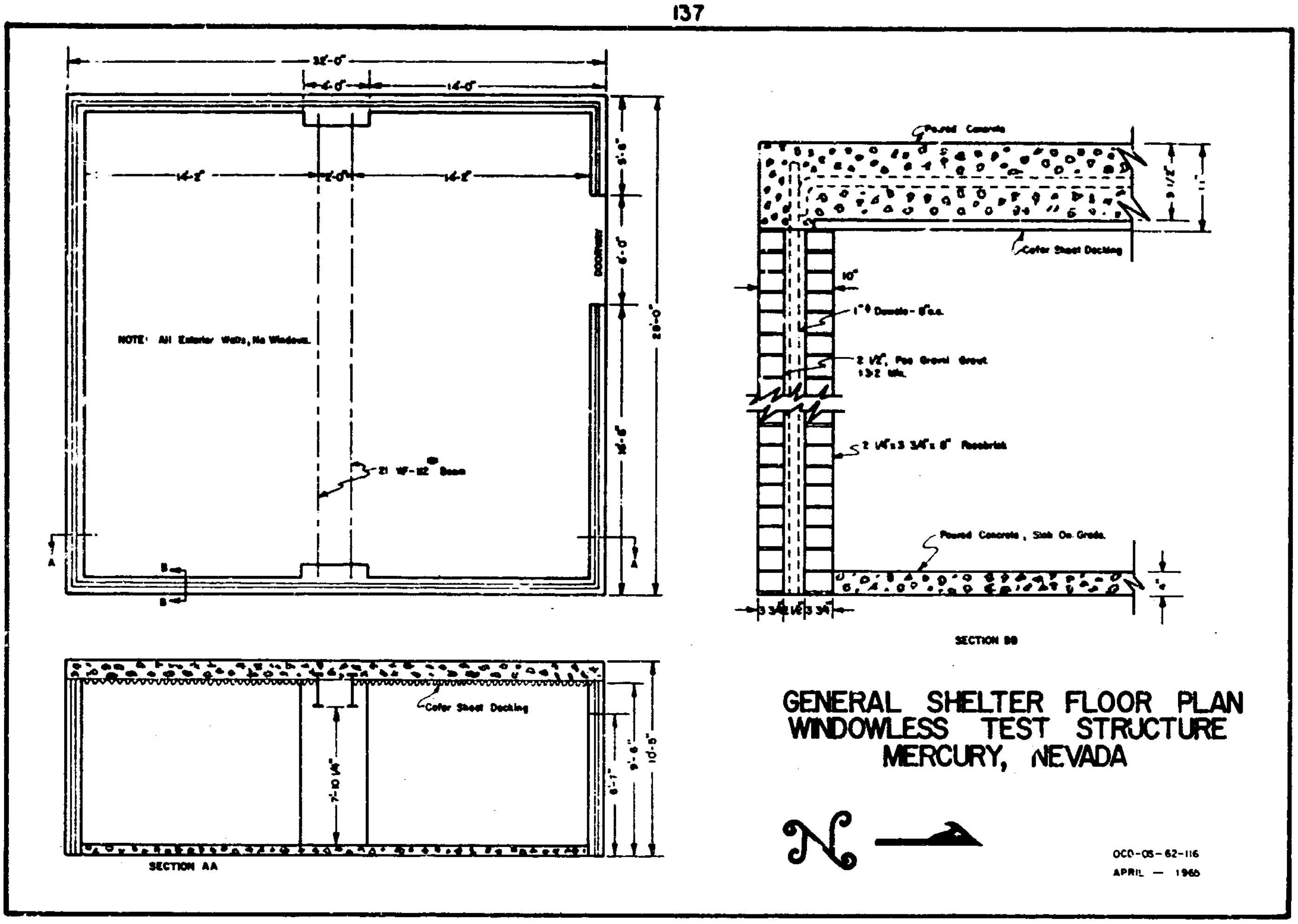
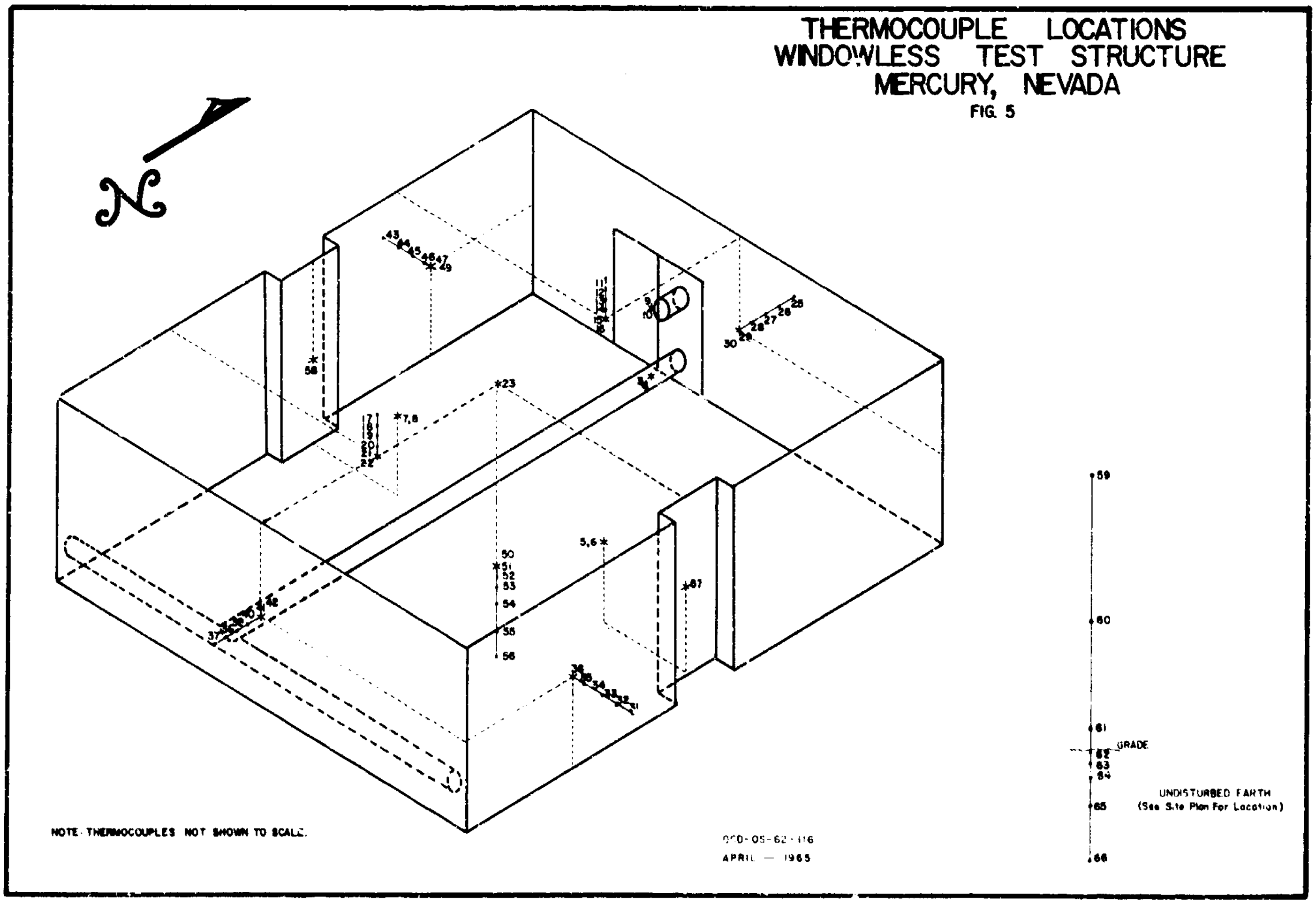


Fig. No. 65 ABOVEGROUND BRICK TEST STRUCTURE (BLOCKHOUSE) NEVADA TEST SITE, AEC, MERCURY, NEVADA



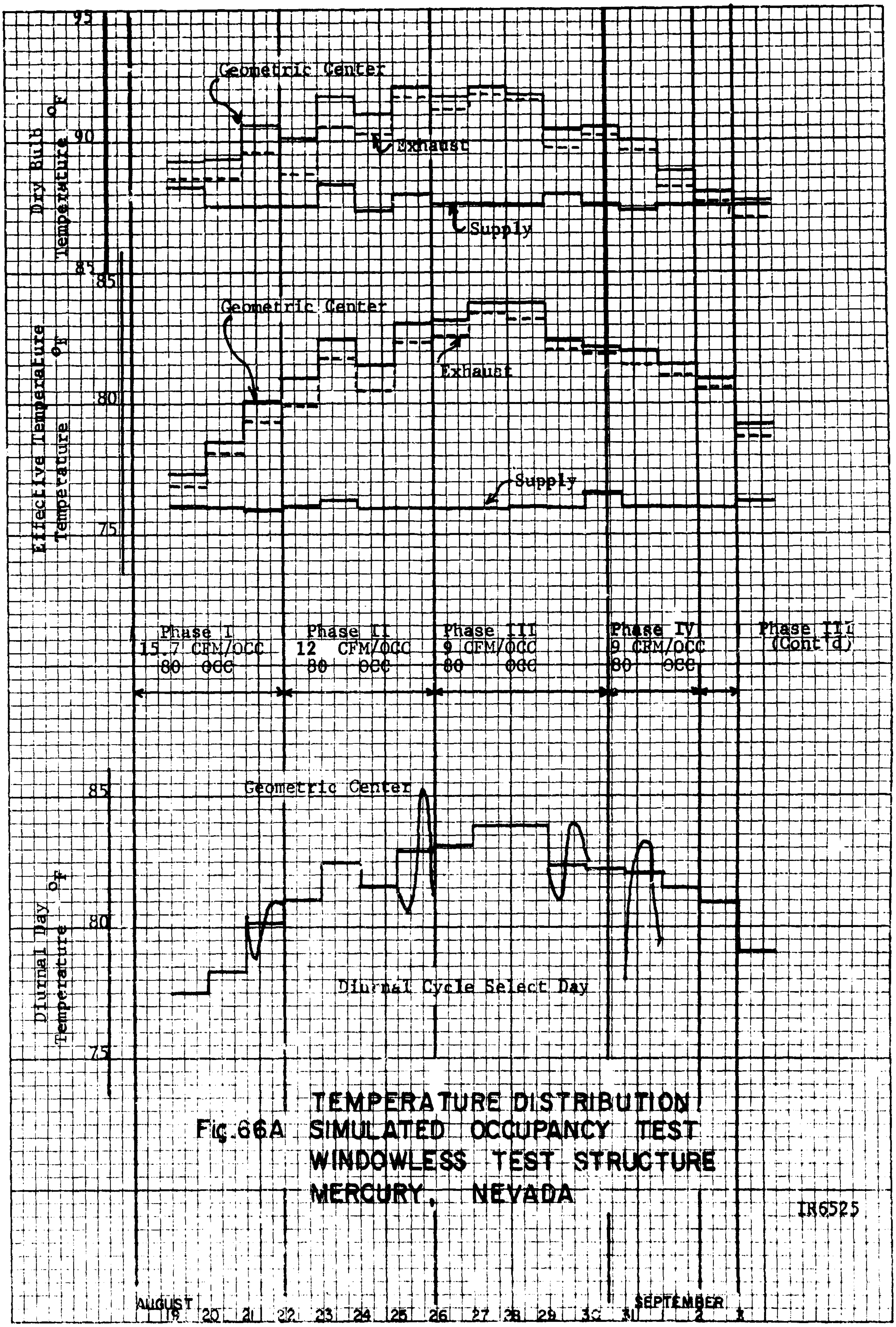


Fig. 66A TEMPERATURE DISTRIBUTION
SIMULATED OCCUPANCY TEST
WINDOWLESS TEST STRUCTURE
MERCURY, NEVADA

IR6525

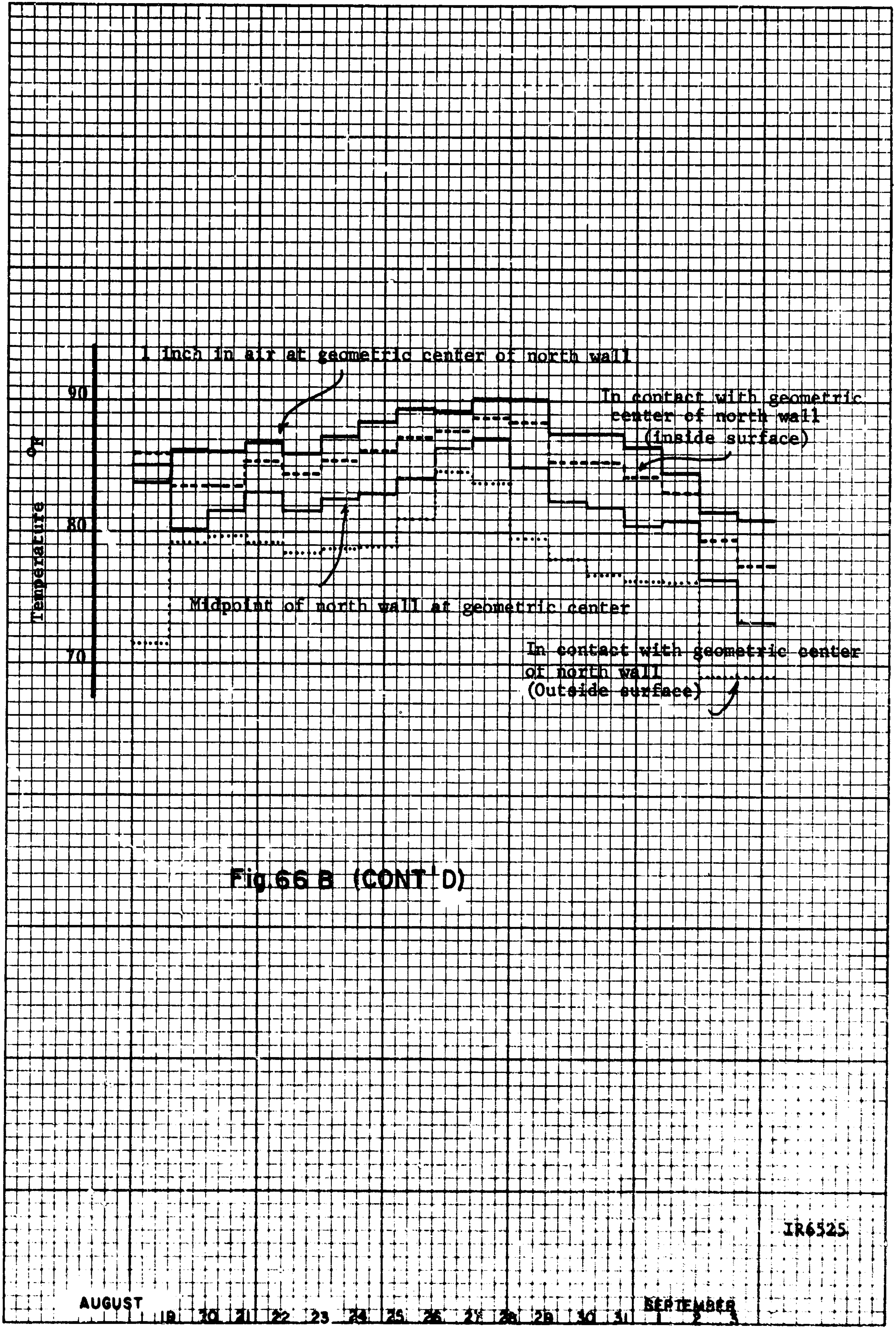


Fig.66 B (CONT'D)

IR6525

Summary
Simulated Occupancy Test
Quonset-type Structure
Mercury, Nevada
8 September - 25 September 1964

The shelter was constructed of arched corrugated galvanized ten gauge steel plate with the floor being reinforced concrete. This below grade shelter had a minimum of 5 feet of earth cover at the top of the roof. There are 1180 square feet of useable floor space. The shelter had not been previously occupied.

An adiabatic shelter model would require an air flow rate of 11 cfm per occupant of ventilation air to maintain an average shelter effective temperature of 85 °F. A shelter model with 25% heat loss would require an air flow rate of 6 cfm per occupant of ventilation air to maintain an average shelter effective temperature of 85 °F.

Occupants.....GATC's Mass Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	6	81.5	80.8	118	7.5 hrs.
II	8	85.5	84.0	118	10 days
III	10	84.9	83.1	118	3.16 days
IV	9	85.0	84.0	118	3.08 days
V	3	94.5	93.0	118	6 hrs.

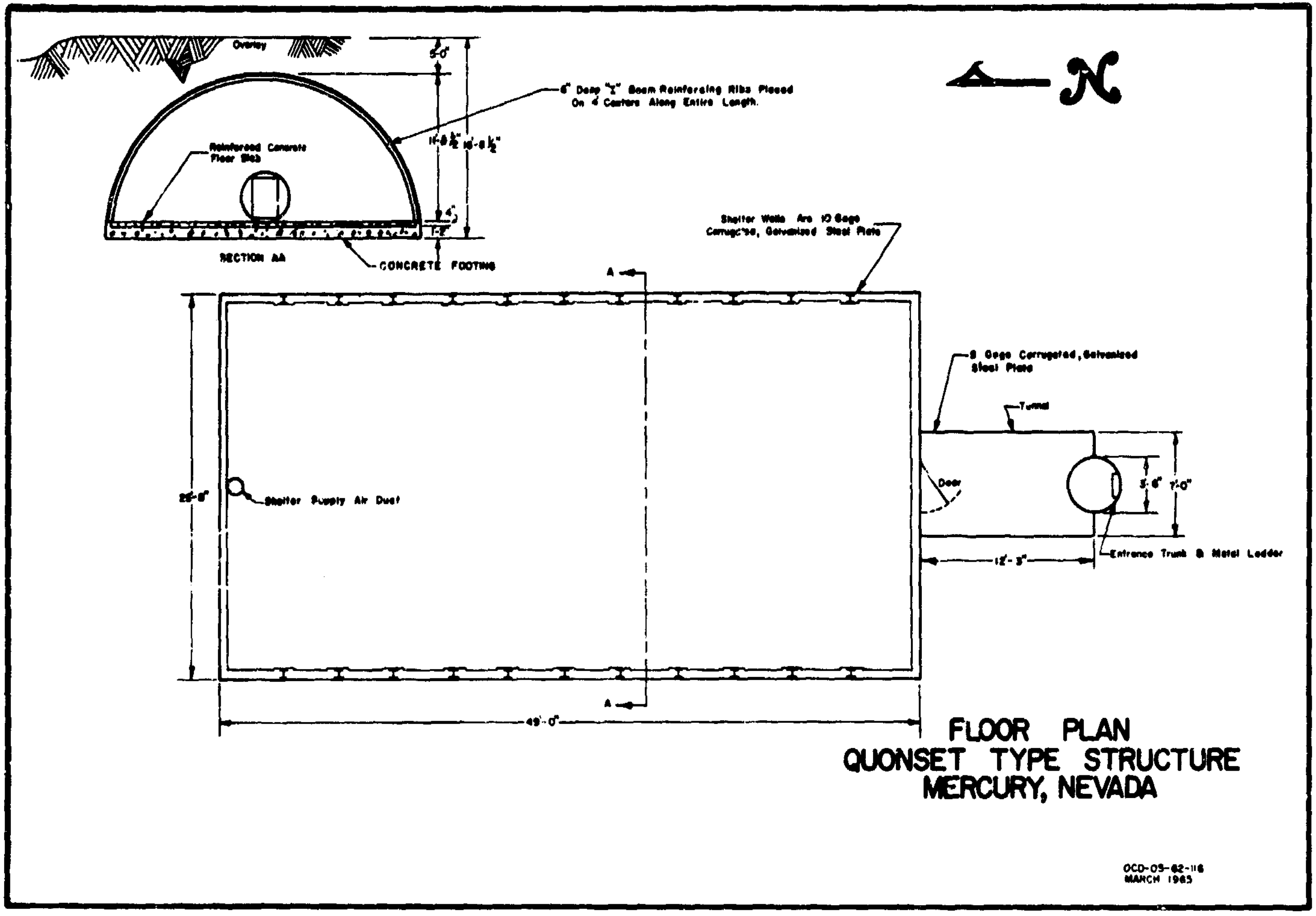
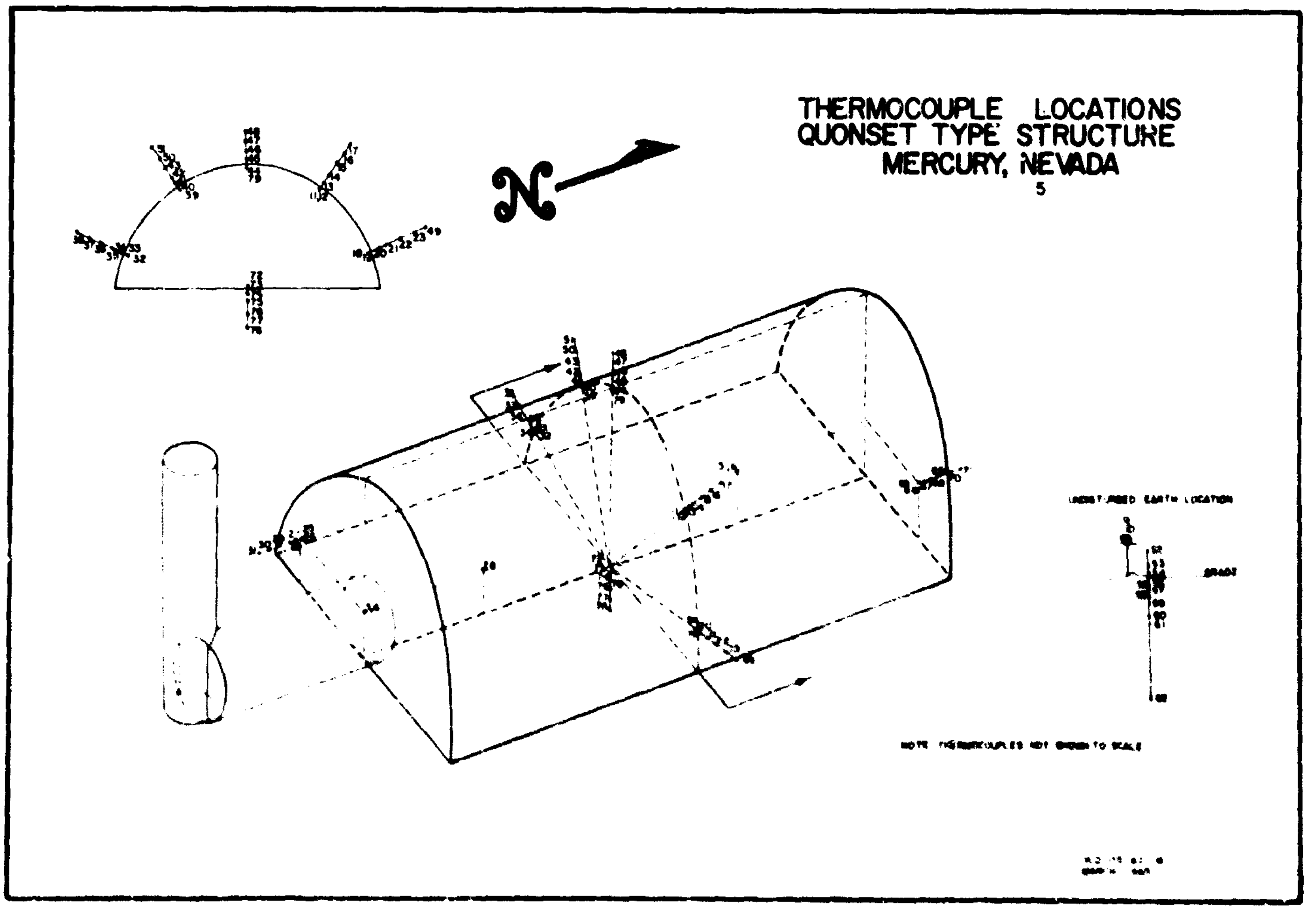


Fig. No. 67 BURIED QUONSET TYPE STRUCTURE, NEVADA TEST SITE, AEC, MERCURY, NEVADA



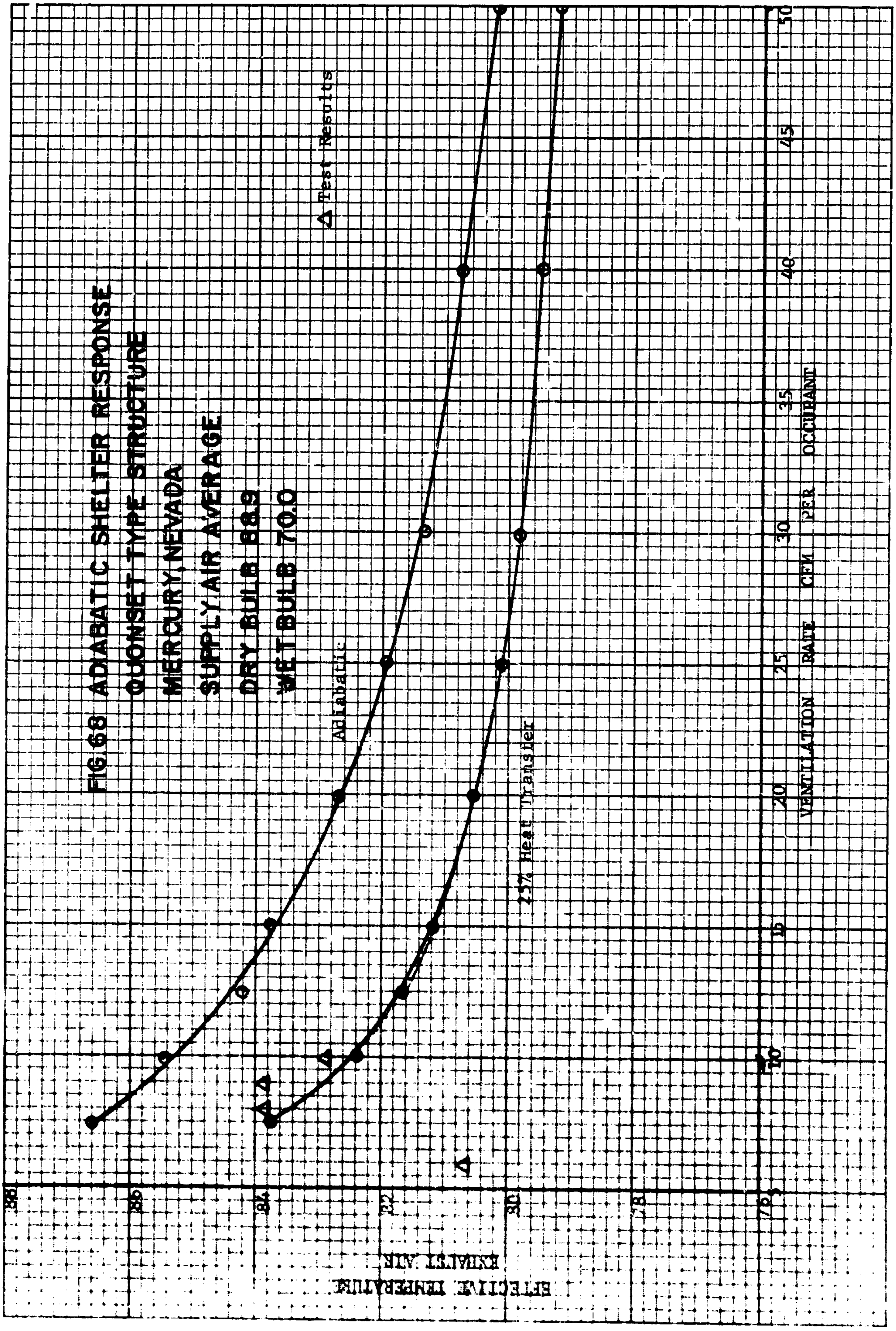
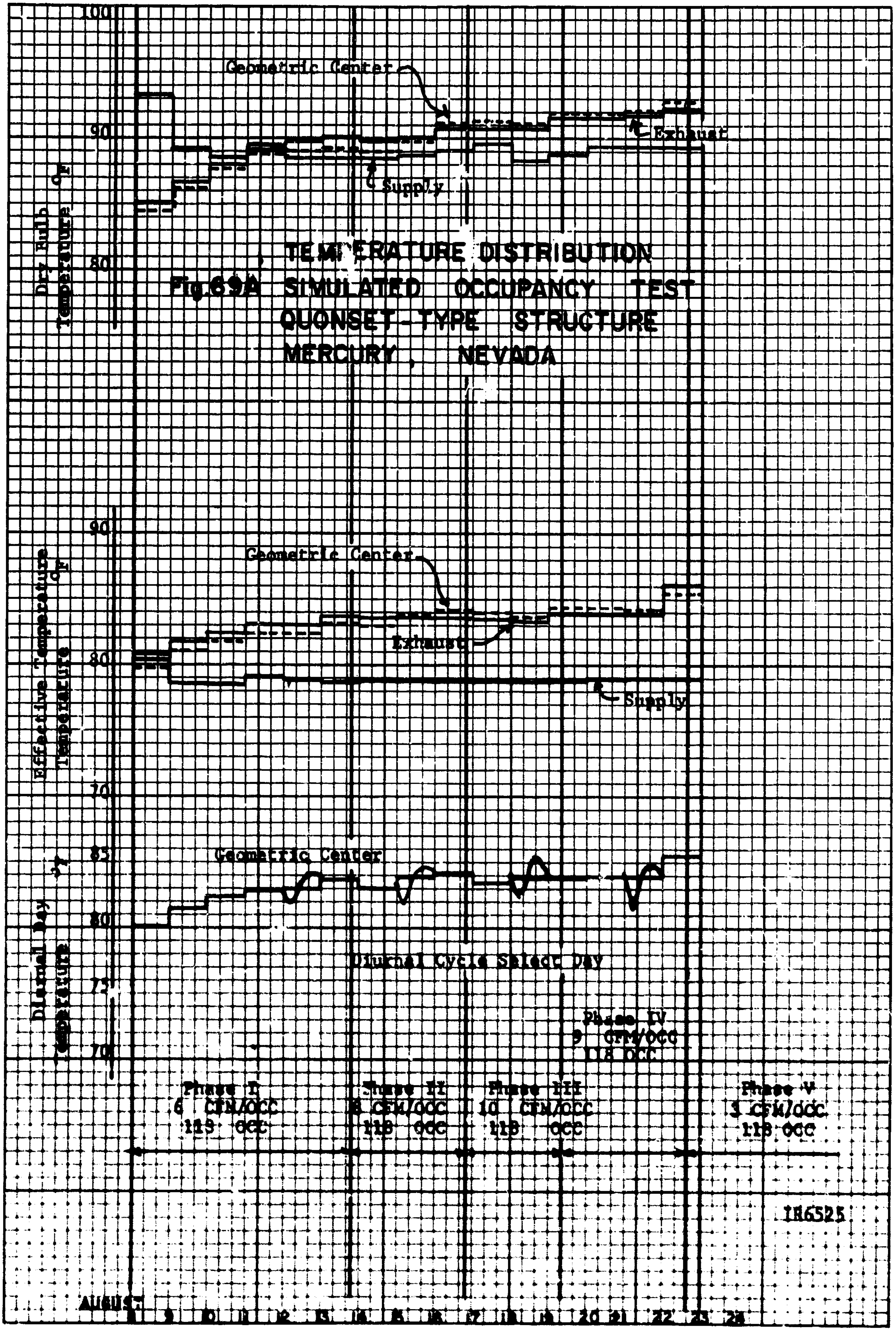


FIG.68 ADIABATIC SHELTER RESPONSE
QUONSET TYPE STRUCTURE
MERCURY, NEVADA
SUPPLY AIR AVERAGE
DRY BULB 88.9
WET BULB 70.0



TEMPERATURE DISTRIBUTION

Fig.69A SIMULATED OCCUPANCY TEST

QUONSET-TYPE STRUCTURE

MERCURY, NEVADA

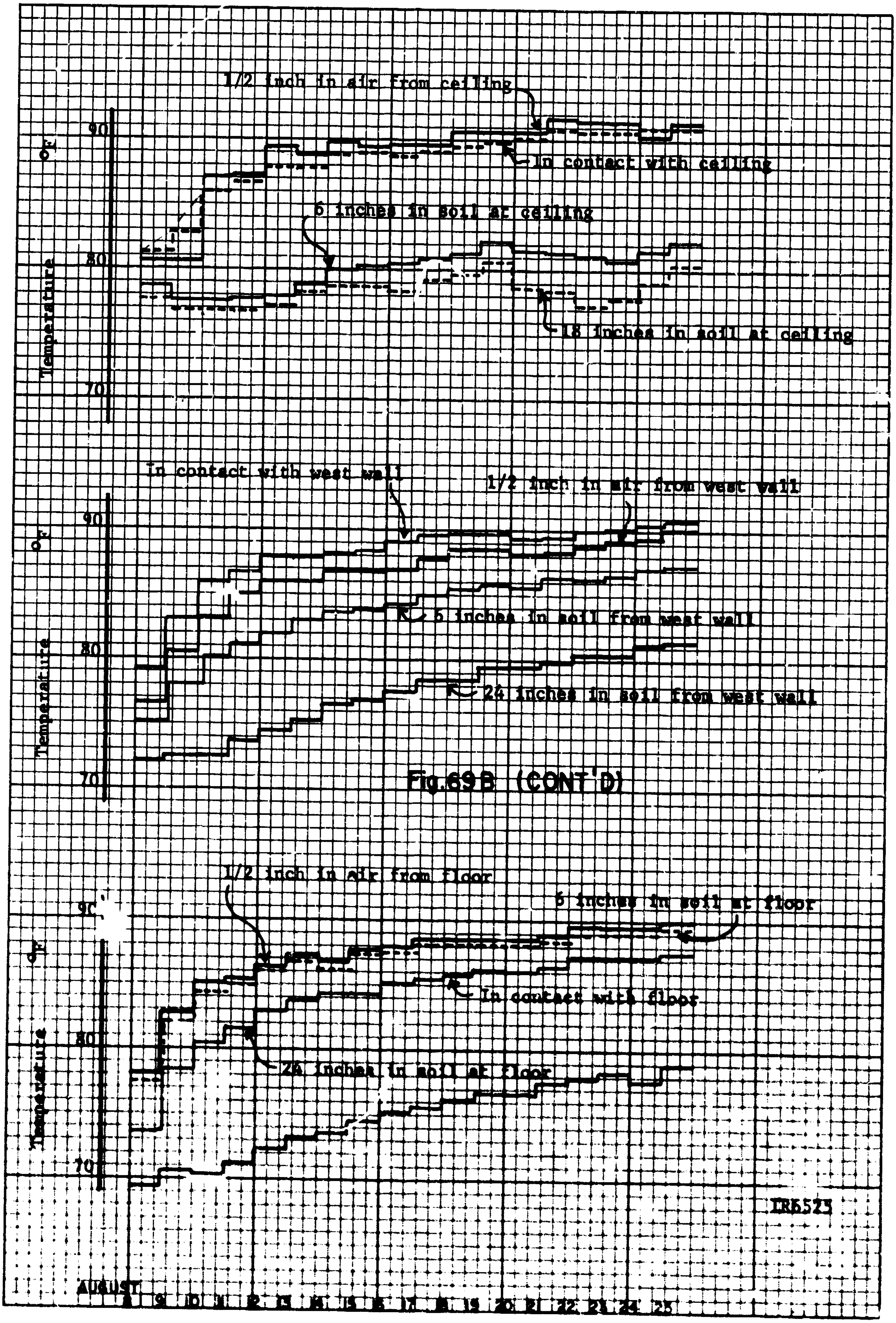


Fig.69B (CONT'D)

Summary

Simulated Occupancy Test

Underground Concrete Structure

Lakeside, California

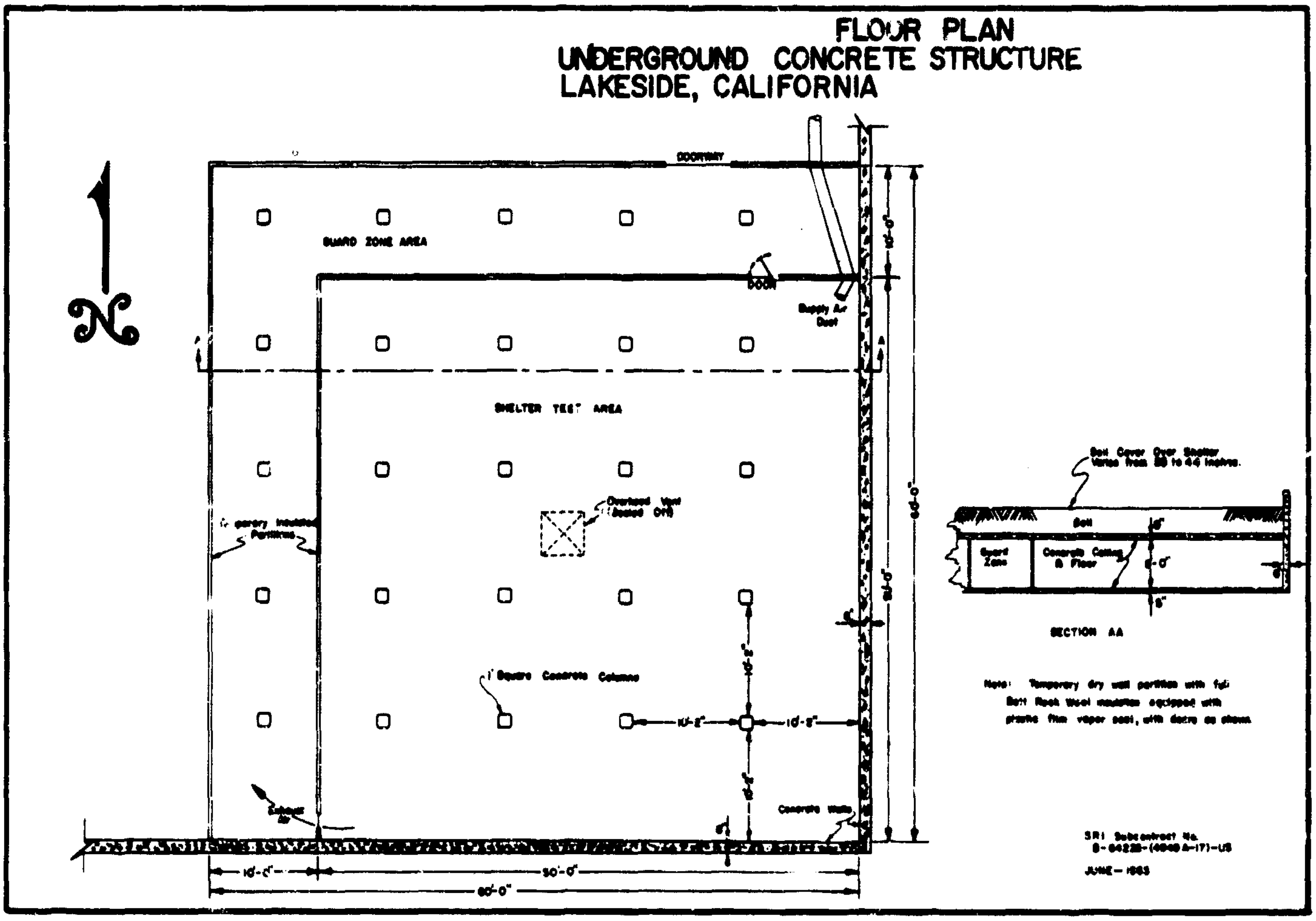
14 October - 5 November 1964

The shelter which is constructed of reinforced concrete was built into the base of a mountain. The sides and top have a 25 inch earth cover, while the front is exposed. The floor covers 10,000 square feet. The shelter had not been previously occupied.

An adiabatic shelter model would require an air flow rate of 6 cfm per occupant of ventilation air to maintain an average effective temperature of 85 °F. A shelter model with a 25% heat loss through the shelter structure would require an air flow rate of 4 cfm per occupant of ventilation air to maintain an average effective temperature of 85 °F.

Occupants.....GATC's Mass Simocs

Phase Number	Air Flow Rate cfm/occupant	Maximum ET Final Day	24 Hour Average ET Final Day	Number of Occupants	Length of Phase
I	14.85	81.9	78.5	250	10 days
II	8.13	83.0	81.5	250	7.91 days
III	6.9	84.9	82.8	250	4.0 days
IV	3	91.0	89.0	250	1.0 days



FLOOR PLAN
UNDERGROUND CONCRETE STRUCTURE
LAKESIDE, CALIFORNIA

Note: Temporary dry wall partition with full Batt Rock Wool insulation equipped with plastic film vapor seal, with doors as shown.

SRI Subcontract No.
B-64228-(4949A-17)-US

JUNE - 1963

Fig. No. 70 HILLSIDE SHELTER (FORMER REFRIGERATED CAVE) LAKESIDE, CALIFORNIA

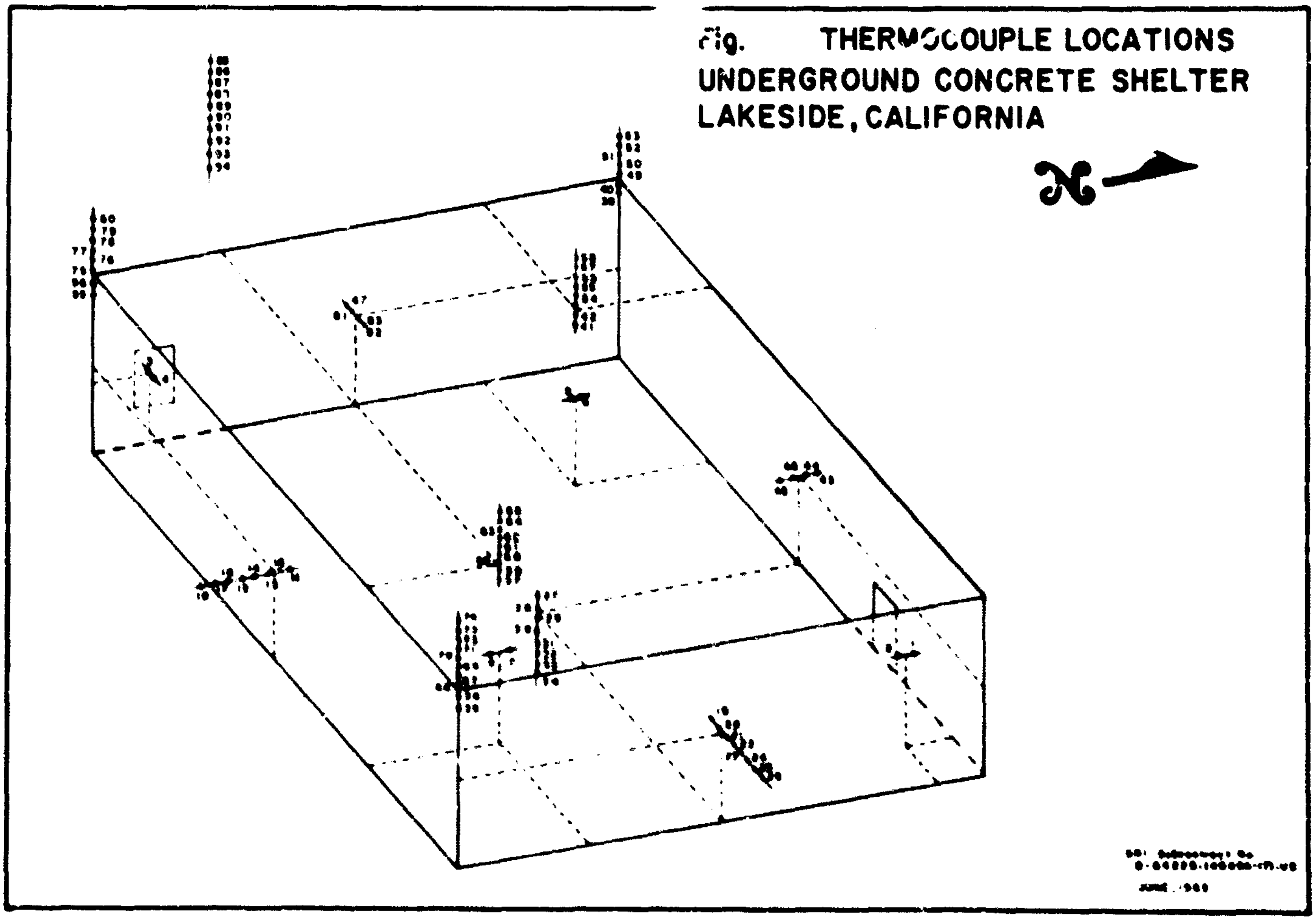


Fig. THERMOCOUPLE LOCATIONS
UNDERGROUND CONCRETE SHELTER
LAKESIDE, CALIFORNIA

SRI Subcontract No.
B-64228-(4949A-17)-US

JUNE, 1963

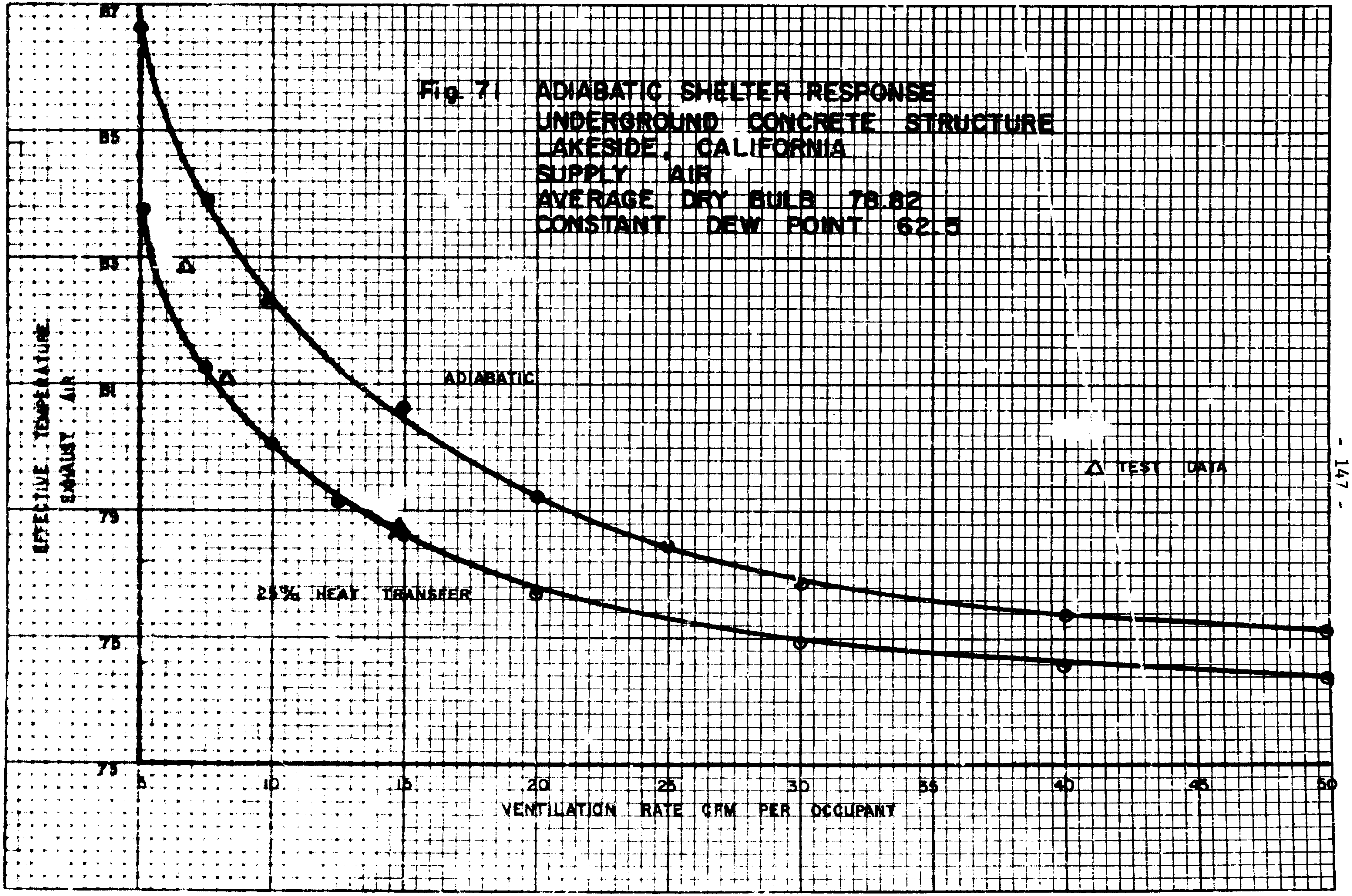


Fig. 71 ADIABATIC SHELTER RESPONSE
UNDERGROUND CONCRETE STRUCTURE
LAKESIDE, CALIFORNIA
SUPPLY AIR
AVERAGE DRY BULB 78.82
CONSTANT DEW POINT 62.5

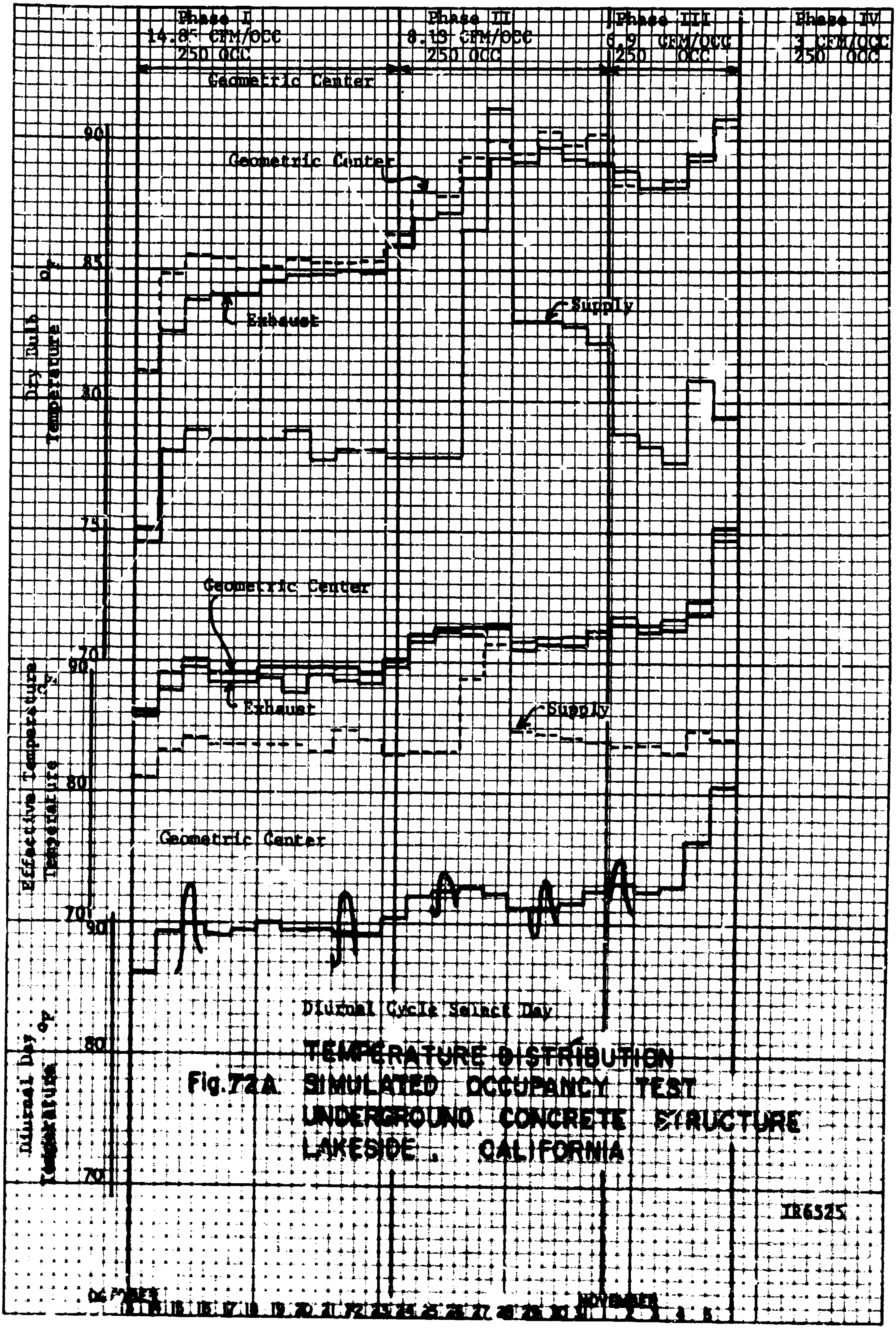


Fig.72A TEMPERATURE DISTRIBUTION
SIMULATED OCCUPANCY TEST
UNDERGROUND CONCRETE STRUCTURE
LAKESIDE, CALIFORNIA

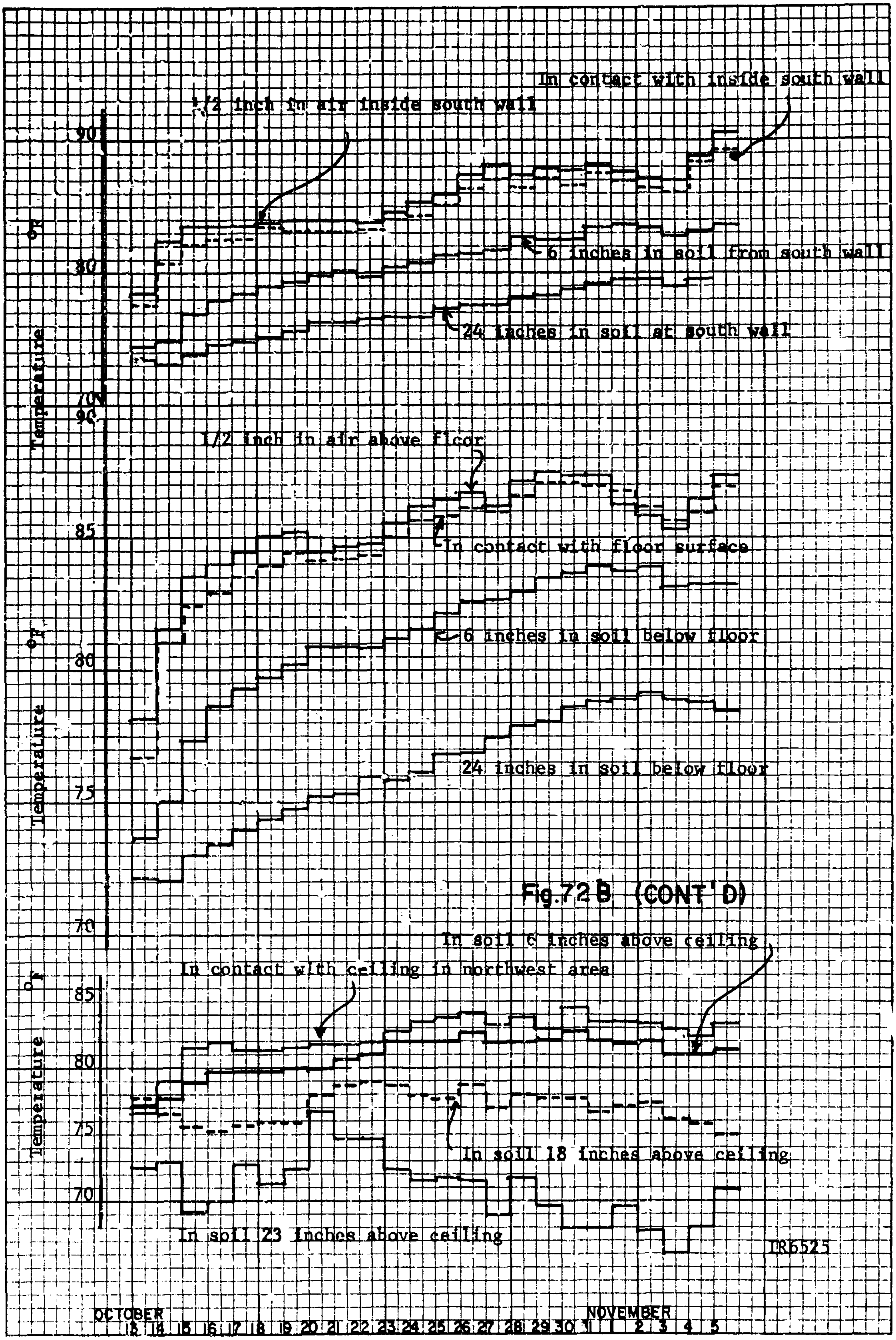


Fig.72 B (CONT'D)

FIRE TEST UNDERGROUND PARKING GARAGE, MERCURY, NEVADA

A fire storm similar to one that might accompany a bombing attack was simulated above the underground parking garage located at Frenchman's Flat, Mercury, Nevada. The purpose of the test was to investigate environmental conditions that would be brought about in the immediate area surrounding an underground survival shelter and in the interior of such a shelter. Three conditions were of particular interest during the course of such a fire and during the four days that followed the fire. These were: 1. The carbon monoxide concentration in the atmosphere in the immediate vicinity of the shelter during the time that the fire was actually in progress. 2. The carbon dioxide build-up in the shelter brought about by the metabolic process of the occupants during a period when no ventilation air could be supplied (due to the high temperature and carbon monoxide content in the air surrounding the shelter). 3. The effective temperature increase within the shelter due to the metabolic process of the occupants and due to the heat transfer (from the fire through the earth cover to the structure of the shelter).

Since the underground parking garage had been used as a test structure for simulated occupancy tests prior to the scheduling of the fire test, it was considered necessary to stabilize the temperature of the shelter structure and the earth surrounding the shelter structure to conditions which approximated temperatures that existed in the earth surrounding the structure prior to the start of the simulated occupancy test. This was accomplished by purging the shelter with ventilation air and observing temperatures at selected points in the structure and surrounding soil until these temperatures were in agreement with temperatures taken prior to the simulated occupancy test. In order to minimize fluctuations in heat transfer (due to edge effect), it was decided that the area of the earth exposed to the fire storm should extend ten feet in each direction past the roof of the area of the shelter to be tested. An area of 2,980 square feet was located above the shelter test area; combustible material was placed above this area in such a manner that the bottom layer of this material was 24 inches above the surface of the earth cover for the shelter. The combustible material was distributed so that there were thirty pounds of combustible material per square foot of ground surface exposed to the burn pile. Five tons of non-combustible debris were scattered and intermingled with the combustible material. The purpose of the debris was to simulate the plaster and masonry products that might normally be present in the debris from a burning building. The building that was simulated by the combination of combustible and non-combustible material was considered to be typical of a building that would be classified as a predominantly wooden structure. Photograph No. 7 is a picture of the assembled material as it appeared just prior to ignition.

In order that the fire area extend ten feet beyond the east and south walls of the shelter test area, a partition was constructed in the shelter, reducing the area to 1,170 square feet as compared to approximately 3,350 square feet which had been used for the previously mentioned simulated occupancy test. A corresponding reduction in simulated occupancy was made for the fire test using 117 simulated occupants on the basis of one occupant for ten square feet of floor area. Wall surfaces of the test area that were not adjacent to earth cover were maintained at a temperature equal to the dry bulb temperature within the test area by controlling the temperature in a guard corridor that was parallel to the interior walls of the test area. Temperature of the earth's

Photograph No. 7. General Construction View of Burn Pile.

surface under the fire test area were taken continuously until the rate of change permitted such temperatures to be recorded at regular intervals. During the time the fire was in progress, the shelter test area was sealed up and no ventilation air was admitted. These precautions were necessary since a fire storm around the shelter could increase the temperature of the air available for shelter ventilation to a point where its use would have an adverse effect on the shelter effective temperatures and could produce carbon monoxide in sufficient quantities to contaminate the shelter ventilation air. In order to determine when it would be safe to ventilate the shelter with ambient air, samples of air available for ventilation were analyzed for carbon monoxide content at approximately thirty minute intervals. When such samples indicated a carbon monoxide content of 0.01% by volume, it was considered safe to commence the ventilation procedure. Figure No. 73a is a plot of carbon monoxide concentration against time for the duration of the test fire. Superimposed upon the carbon monoxide-time curve are a family of curves, indicating the effects of given concentrations of carbon monoxide on human subjects with respect to exposure time.

Since simulated occupants were used in this test and, therefore, did not produce carbon dioxide, it was not possible to sample the shelter atmosphere and determine on an actual test basis what the carbon dioxide build-up in the shelter atmosphere would have been under test conditions. However, on the basis of previous experiments,[8] it is possible to predict the build-up of carbon dioxide within the shelter area and to relate this to the effects that were found by previous investigations to be associated with percentages of carbon dioxide in the atmosphere. Figure 73b gives a plot of expected carbon dioxide concentrations with respect to time for shelters containing eighty cubic feet and one hundred cubic feet per person. Also shown on Figure No. 73b is the effect of certain concentrations of carbon dioxide on the performance of human beings. An examination of Figure No. 73a would indicate that fire conditions surrounding a shelter would necessitate a "buttoned up" period, while a study of Figure No. 73b indicates need for a life support system in shelters subjected to mass fire effects. Such a system within the shelter would have to be capable of supplying the occupants with metabolic oxygen and absorbing a sufficient quantity of the carbon dioxide to maintain carbon dioxide concentration at a level below one-half of one percent by volume. The latter is necessary since the addition of oxygen alone will not overcome the effects brought about by carbon dioxide.

When samples of the ambient ventilation supply air indicated that ventilation air could be supplied to the shelter, it was supplied at the rate of 6 cfm per occupant. Later the flow rate was reduced to 5 cfm per occupant in an attempt to adjust the ventilation air flow rate to a quantity sufficient to control the shelter effective temperature in such a manner that it would peak at 85° F for approximately a one hour period daily. Temperatures at selected points in the shelter and surrounding earth were recorded on an hourly basis until examination of the data indicated that the effects of the surface fire had dissipated. At this point, it was considered that the fire test was concluded.

Figure No. 74a is a plot of earth temperatures against time from the start of the test at 1900 hours on August 27, 1964, through 0600 hours on September 3, 1964. It will be noted that Figure No. 74a is made up of two parts: One, an expanded scale covering the first seven hours of the fire

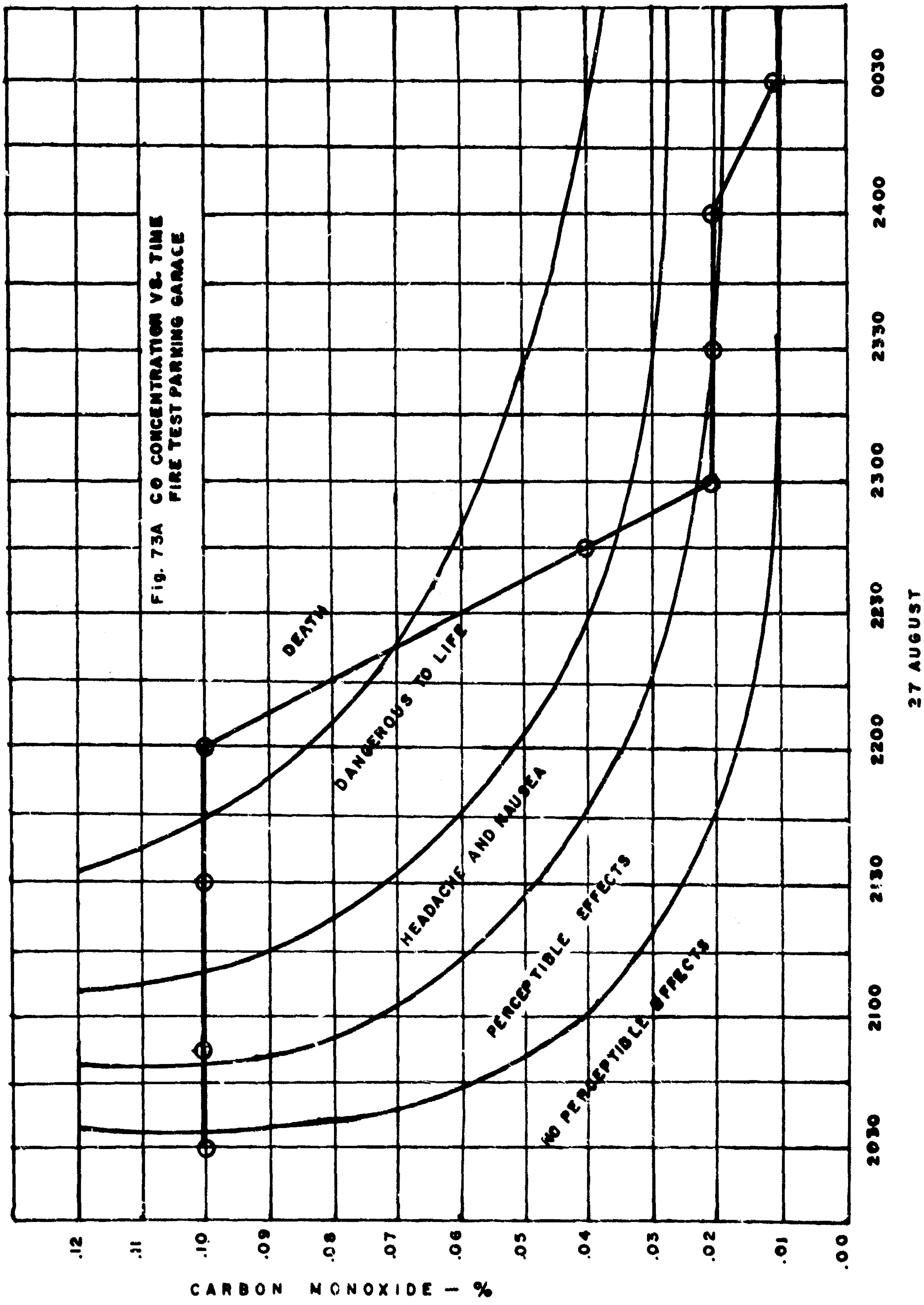


Fig. 73A CO CONCENTRATION VS. TIME FIRE TEST PARKING GARAGE

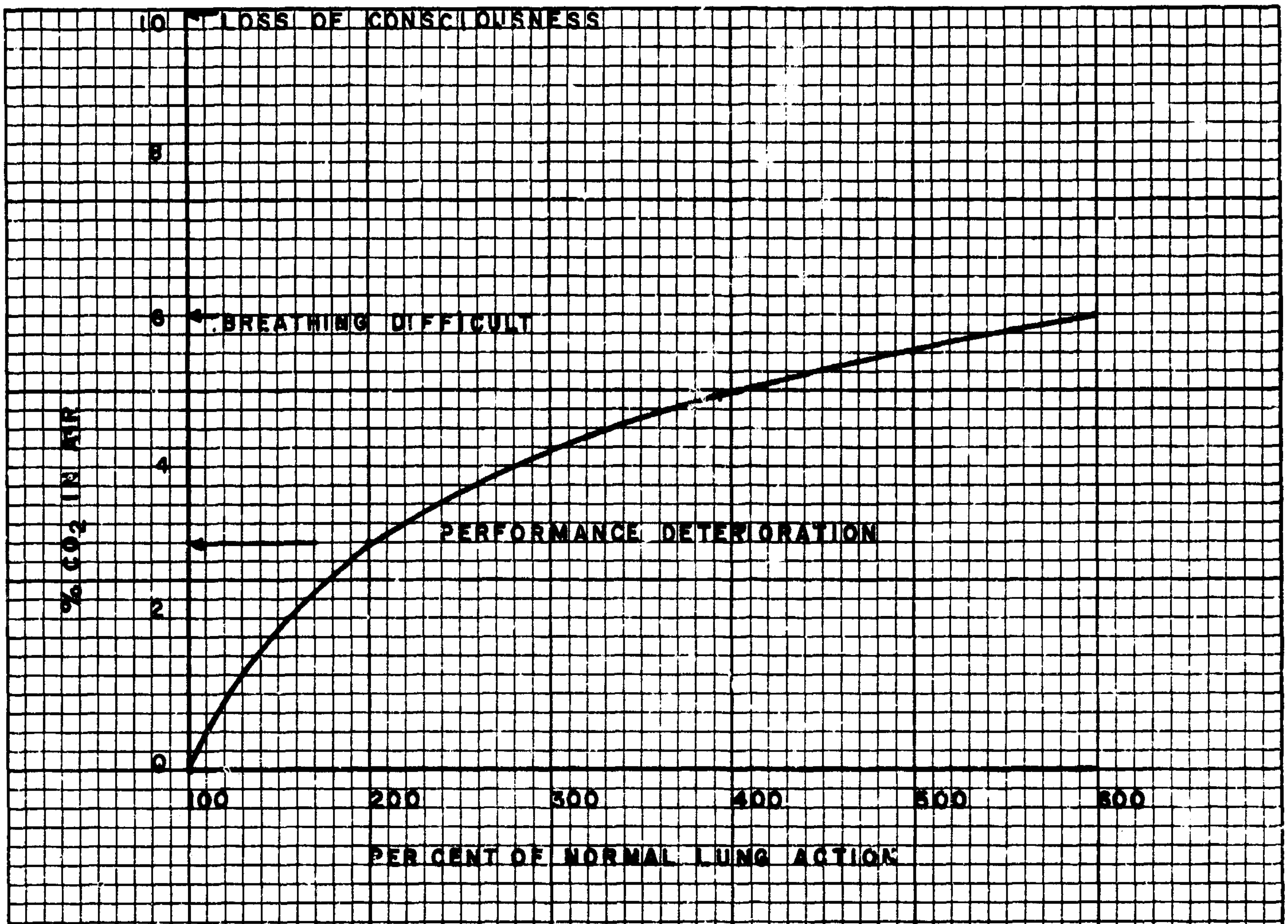
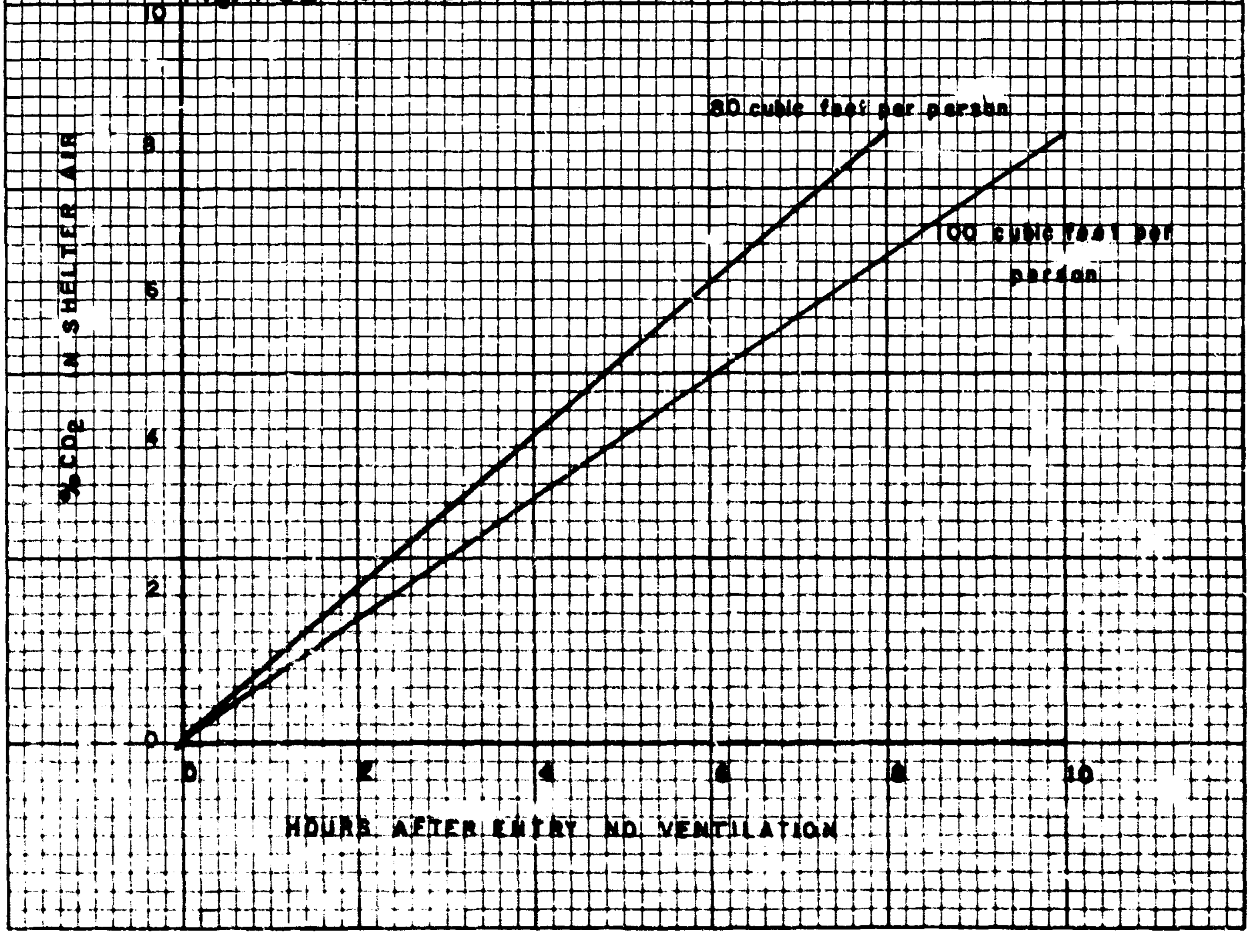


Fig. 73B CARBON DIOXIDE IN SHELTERS



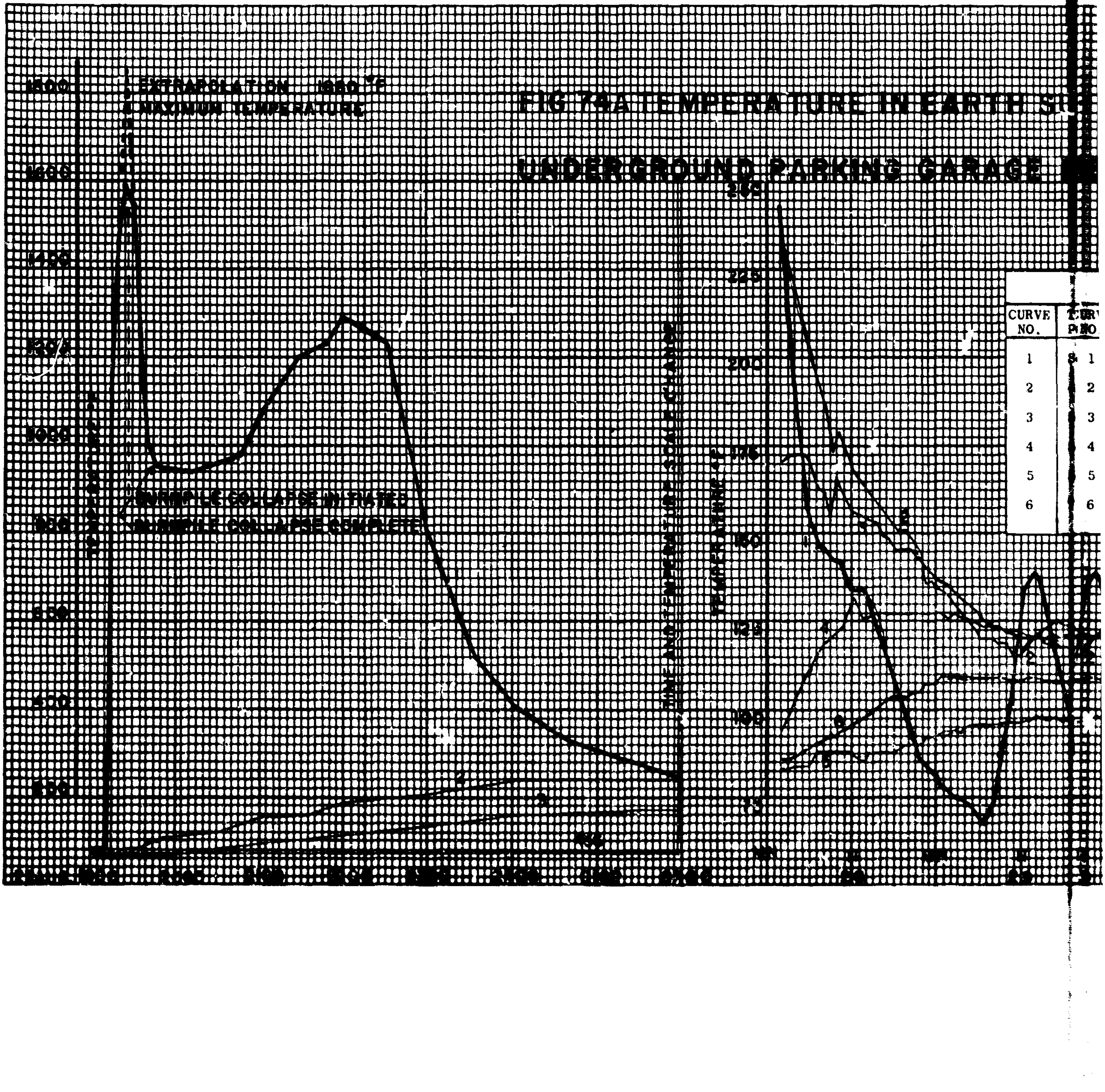
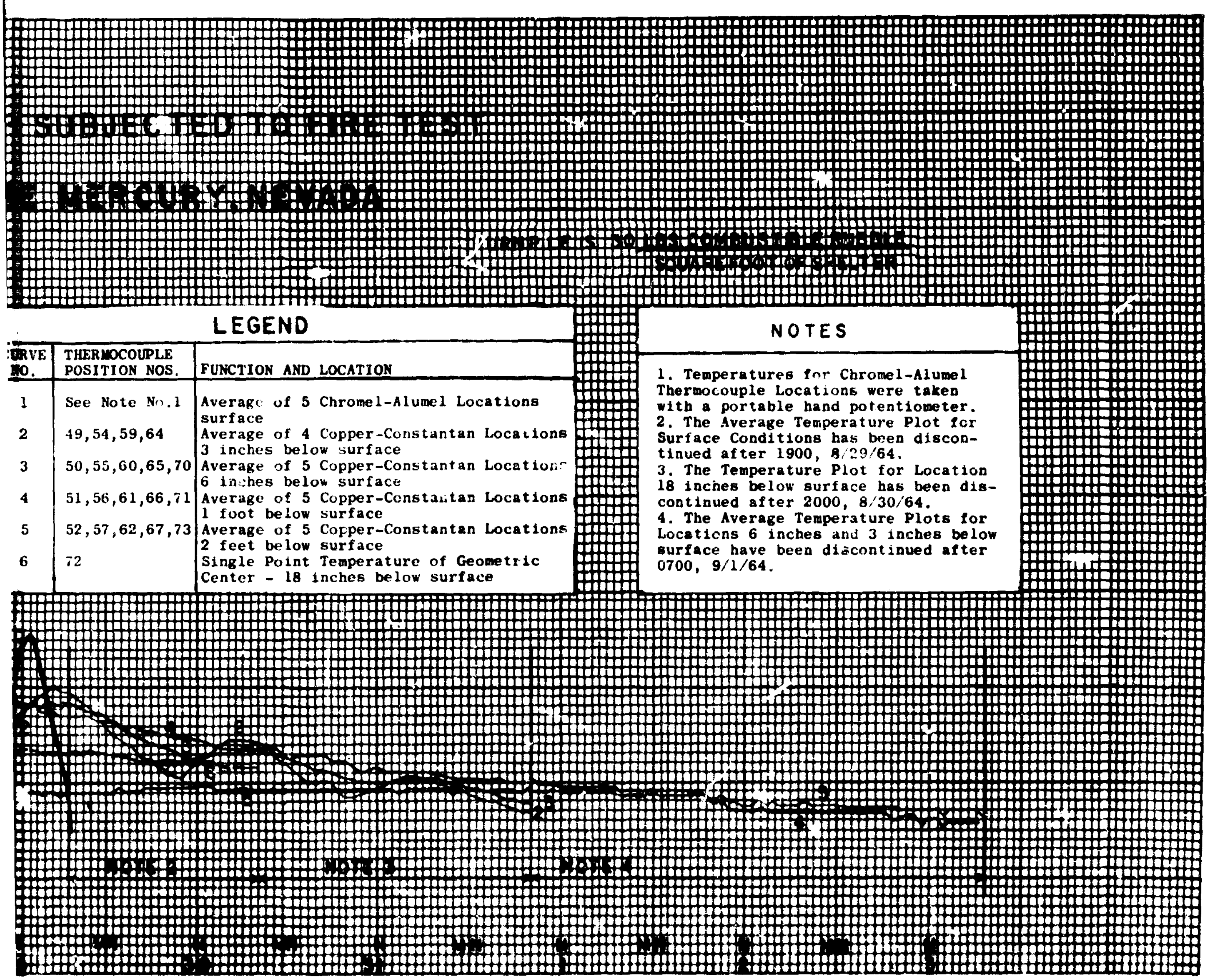


FIG 74A TEMPERATURE IN EARTH S
UNDERGROUND PARKING GARAGE
EXTRAPOLATION 1980 °F
MAXIMUM TEMPERATURE
BURNPILE COLLAPSE INITIATED
BURNPILE COLLAPSE COMPLETE
1800
1600
1400
1200
1000
800
600
400
200
250
225
200
175
150
125
100
75
CURVE NO.
1
2
3
4
5
6
1
2
3
4
5
6

A



LEGEND

RVE O.	THERMOCOUPLE POSITION NOS.	FUNCTION AND LOCATION
1	See Note No.1	Average of 5 Chromel-Alumel Locations surface
2	49,54,59,64	Average of 4 Copper-Constantan Locations 3 inches below surface
3	50,55,60,65,70	Average of 5 Copper-Constantan Locations 6 inches below surface
4	51,56,61,66,71	Average of 5 Copper-Constantan Locations 1 foot below surface
5	52,57,62,67,73	Average of 5 Copper-Constantan Locations 2 feet below surface
6	72	Single Point Temperature of Geometric Center - 18 inches below surface

NOTES

1. Temperatures for Chromel-Alumel Thermocouple Locations were taken with a portable hand potentiometer.
2. The Average Temperature Plot for Surface Conditions has been discontinued after 1900, 8/29/64.
3. The Temperature Plot for Location 18 inches below surface has been discontinued after 2000, 8/30/64.
4. The Average Temperature Plots for Locations 6 inches and 3 inches below surface have been discontinued after 0700, 9/1/64.

B

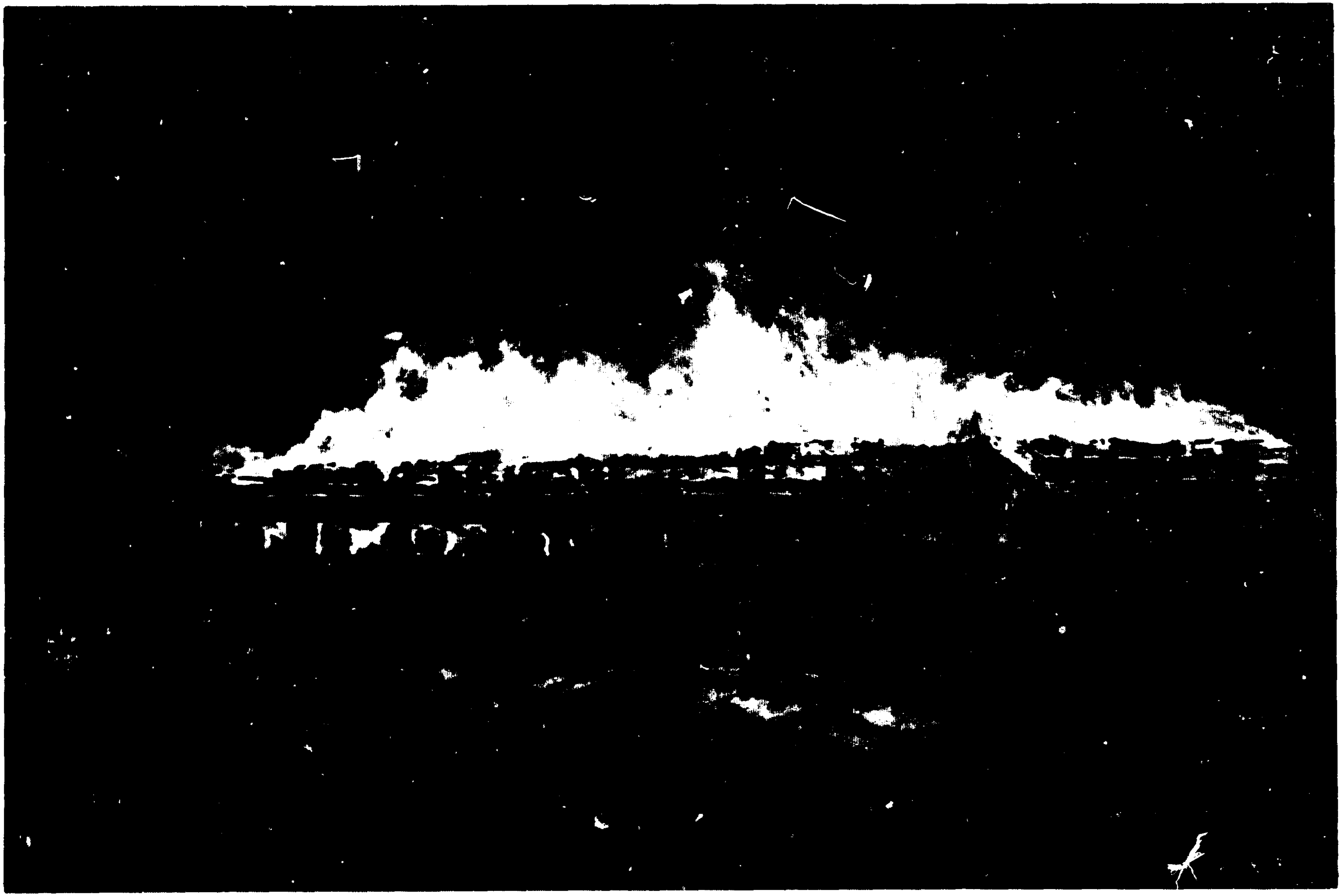
test; two, a plot on a reduced scale, covering the period from midnight, August 27th, to the termination of the test.

Ignition of the burn pile was started at approximately 1900 hours August 27th, 1964. Photograph No. 8 was taken approximately eight minutes after ignition and shows the intense flame envelope surrounding the burn pile. Examination of temperatures recorded at this time indicates that the earth's temperature directly beneath the fire was 1527° F.

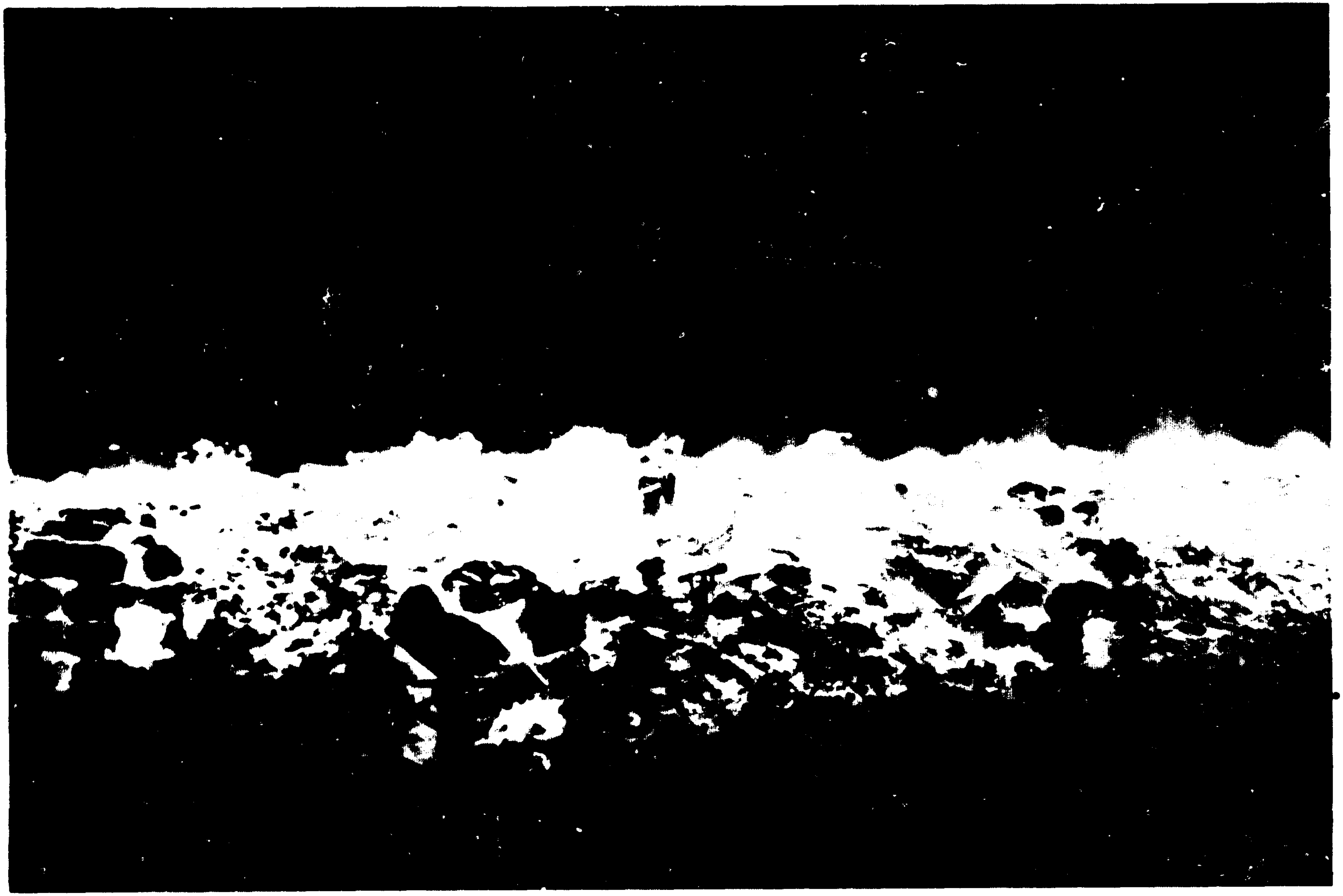
Since every section beneath the suspended burn pile would not necessarily reach a maximum temperature at precisely the same instant, it was concluded that the overall maximum temperature reached by the surface should be determined as the average of the maximum temperatures recorded for the five individual chromel-alumel thermocouple surface locations irregardless of when these maxima occurred. Using this criterion, a maximum temperature of 1811° F was calculated as the overall maximum surface temperature. A temperature of 1860° F can be extrapolated from Figure No. 74a, if the steepest slopes on either side of the maximum plotted temperature for curve no. 1 are projected upwards until they intersect.

According to visual reports from personnel at the fire site, the first signs of structural collapse began at 1927 hours and by 1945, August 27th, the burn pile had completely collapsed around the cribbing supports. Collapse is expressed graphically in Figure No. 74a as the negative slope which follows the maximum plotted temperature for curve no. 1. It is concluded that the maximum ground temperatures associated with the conflagration were limited by the duration of the uncollapsed burn pile, for once the structures started to cave in, the surface temperatures began to decrease. This reduction in surface temperature is due primarily to the fact that radiation from the suspended fire area created a more intense effect on the earth's surface than did the actual contact between the burning debris and the earth's surface. The reduction in the earth's surface temperature during the collapse period can also be attributed to the fact that the air which had been "feeding" the fire from beneath the suspended burn pile was cut off after the burn pile collapsed.

Due to the smothering effect of the collapsed structure the temperature of the earth's surface decreased to a minimum of 952° F at 2005 hours (i.e., 53 minutes after ignition). Following this, the surface temperature began to rise, first slowly, then at an increased rate, until it reached a second maximum of 1309° F at 2200, August 27th. This "second peak" was precipitated by ignition of previously unexposed materials which had been reoriented during the collapse period. The condition of the burn pile prior to this "second peak" is shown in Photograph No. 9 which was taken at approximately 2100 hours. The fire area was a complete bed of coals beginning at 2230 and this condition prevailed until the combustible material had been consumed. Photograph No. 10 shows the burn pile ruins as they looked approximately five hours after ignition. The remaining debris, except for a few small pieces of charred wood, were of non-combustible nature. The temperature of the surface at the time of Photograph No. 10 was such that test personnel were able to walk upon the fire area for extended periods without any discomfort to their person or damage to the soles of their shoes.



Photograph No. 8. The Flame Engulfed Burn Pile - 8 Minutes after Ignition.



Photograph No. 9. The Conflagration - 2 Hours after Ignition.

Photograph No. 10. The Fire Ruins - 5 Hours after Ignition.

Figure No. 74b and 74c are a plot of 24 hour average temperatures recorded at selected points within the shelter and at selected points in the ground surrounding the shelter. A comparison of the relative temperatures across the 32 inch concrete ceiling slab of the shelter test area was considered as a good indication as to the direction of heat flow through the ceiling section during, and for a period following, the fire burn period. Figure No. 74b shows a plot of surface temperatures of the inside surface and of the exterior surface of this slab. An examination of this plot indicates that, with the exception of the 24 hour period from September 1st to September 2nd, the ceiling interior surface was always at a higher temperature than the exterior surface. Excepting this 24 hour period, heat flow was from the shelter. The temperature difference across the ceiling slab during the period of September 1st was not considered of sufficient magnitude to affect, to an appreciable degree, heat flow from the shelter. Thus, it may be concluded that the presence of the elevated temperatures in the earth cover above the roof of the shelter which were brought about by the test fire would not cause an appreciable heat flow into the shelter but probably would retard the rate of heat transfer from the shelter. Other earth temperatures which were considered to be pertinent are also shown on Figure No. 74b. Figure No. 74c is a plot of 24 hour average temperatures at selected points within the shelter structure and indicates the manner that shelter environment varied during the fire test. It will be noted that the effective temperature in the geometric center of the shelter and in the air stream of the exhaust ventilation air were subject to a gradual increase as the test progressed and reached average values in the order of 86° F effective temperature. Such conditions would not have been tolerable for human occupancy. However, it must be understood that some build-up in temperature would have occurred, perhaps at a lesser rate, but nonetheless occurred, even without the presence of the temperatures brought about by the simulated fire storm.

An examination of the temperature gradient existing in the over-lay of earth above the shelter test area indicates that as of 0700 hours on September 2nd, the penetration of heat into the shelter over-lay as a result of the fire storm was reversed. It was also indicated that environmental conditions within the shelter would not be affected as a result of the fire storm after this time and date.

The peak effective temperature obtained in this same shelter interior during the fire test has been plotted on Figure No. 74d along with peak effective temperatures obtained in this same shelter during a test conducted under simulated occupancy conditions and with various flow rates for ventilation air. An examination of Figure No. 74d reveals that at a ventilation rate of 6 cfm per occupant, a peak effective temperature of 86° F was recorded. This peak is somewhat below the peaks obtained in other simulated occupancy tests during which the earth cover was not disturbed by a simulated fire storm, therefore, it is inferred that the presence of the fire storm would not have an adverse effect on the shelter environment and that the controlling factor with respect to underground shelter environment is the long time soil temperature near the shelter structure and the ventilation air flow rate. This inference is in complete agreement with a statement by Brodio and McMasters which is quoted as follows:

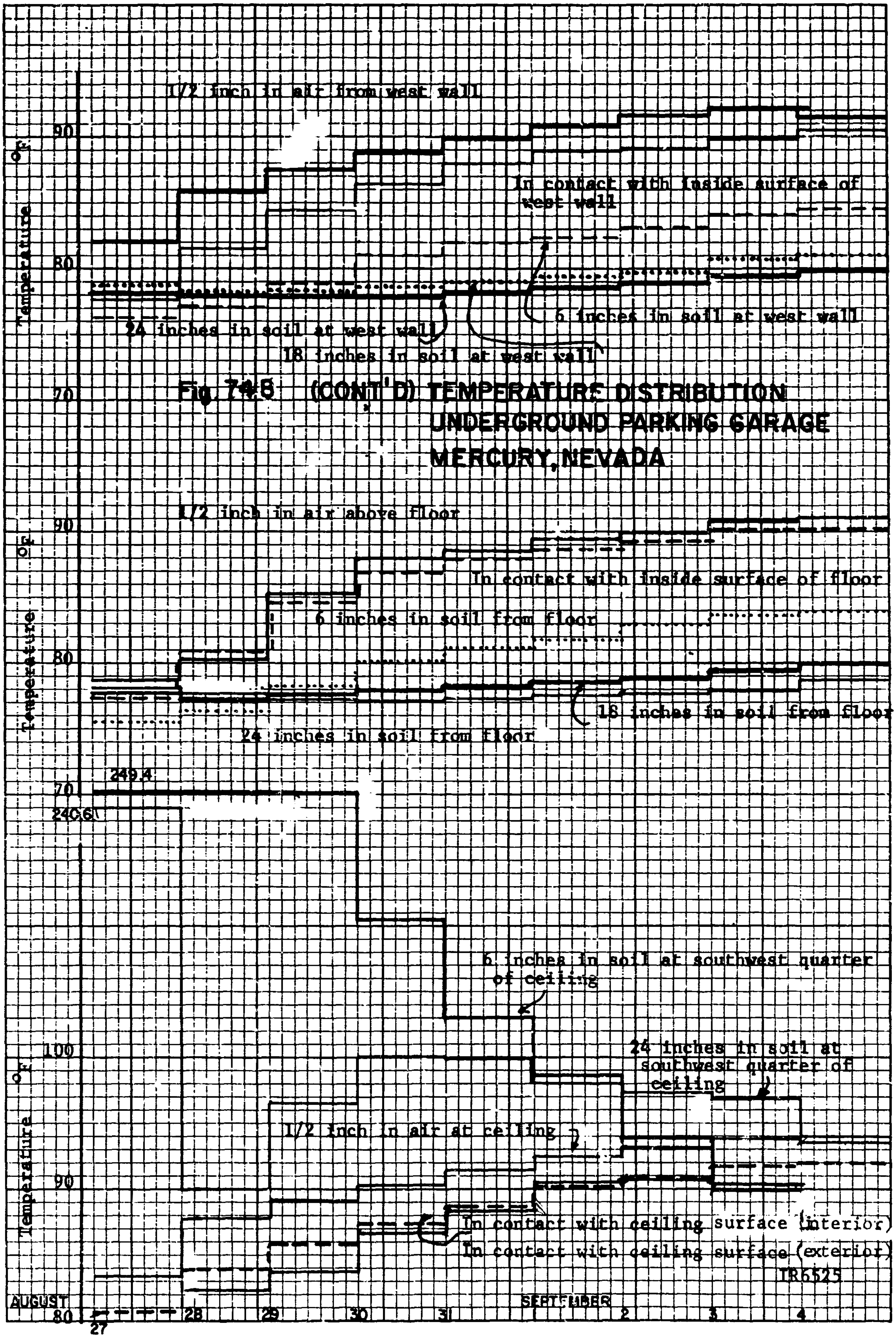
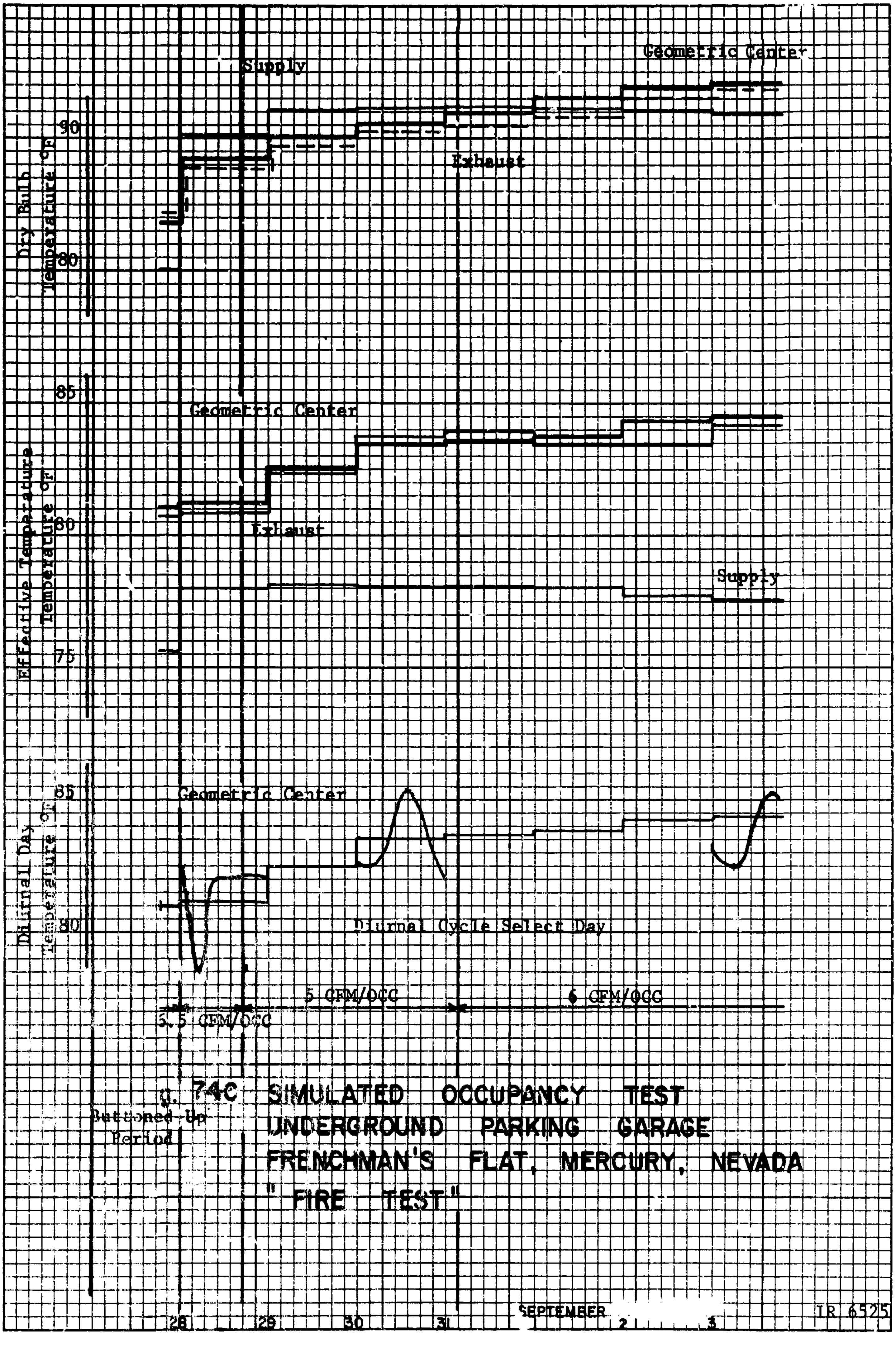


Fig. 7-8 (CONT'D) TEMPERATURE DISTRIBUTION UNDERGROUND PARKING GARAGE MERCURY, NEVADA



g. 74C SIMULATED OCCUPANCY TEST
UNDERGROUND PARKING GARAGE
FRENCHMAN'S FLAT, MERCURY, NEVADA
" FIRE TEST"

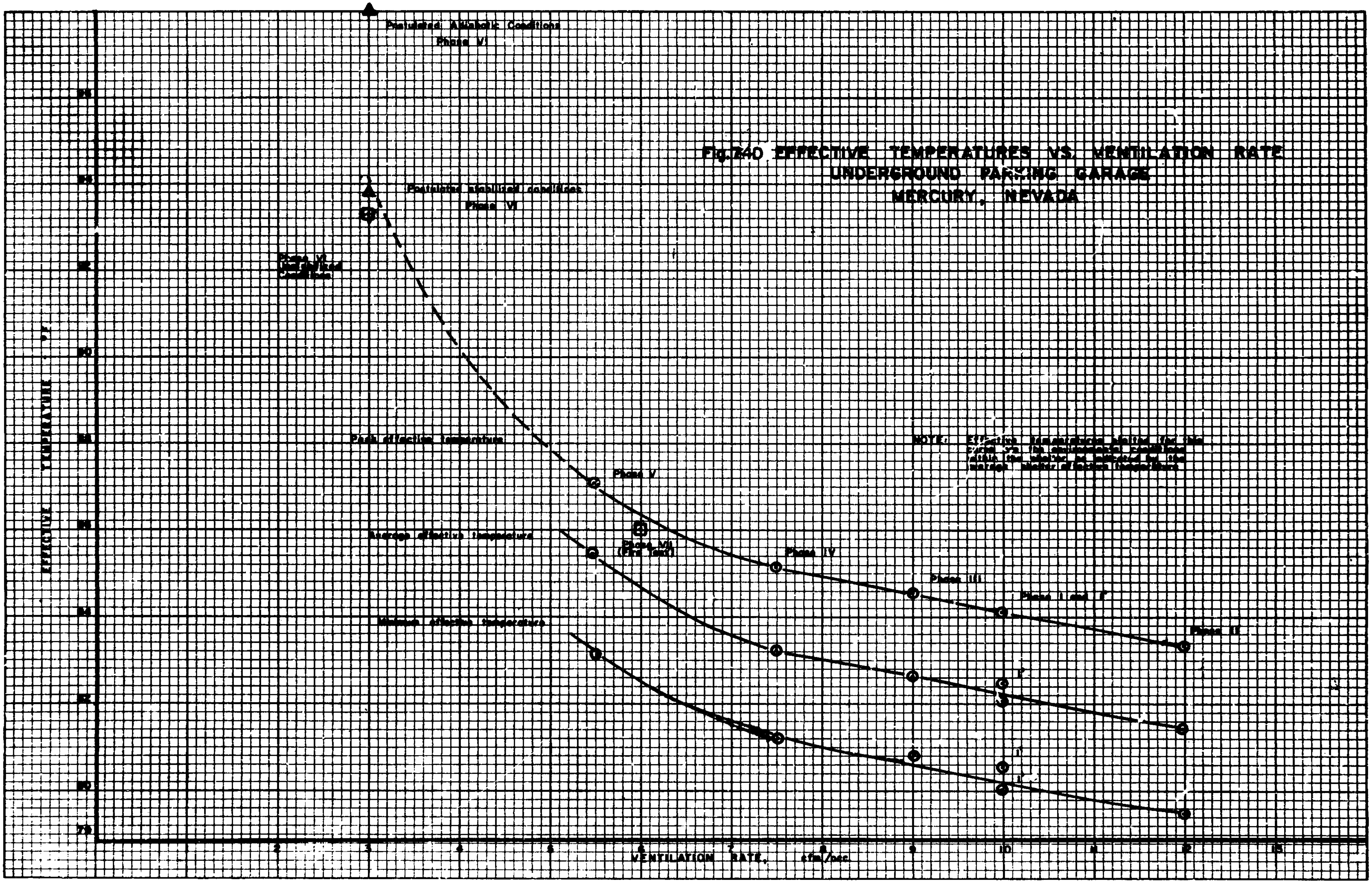


Fig. 7.40 EFFECTIVE TEMPERATURES VS. VENTILATION RATE
UNDERGROUND PARKING GARAGE
MERCURY, NEVADA

NOTE: Effective temperatures plotted for this curve vs. the environmental conditions within the shelter as indicated by the average shelter effective temperature

"As may be seen, a fire maintaining a temperature of 2000° F for two hours or so would not produce a significant temperature change inside a shelter which affords any reasonable fallout protection. In fact, unless essentially the entire surface of the shelter is covered with hot rubble for periods considerably longer than 24 hours, transfer by conduction through the walls into a shelter covered by 3 feet of earth or equivalent may be ignored."[9]

DEVELOPMENT
OF A
PARAMETRIC RELATIONSHIP

DEVELOPMENT OF A PARAMETRIC RELATIONSHIP

The selection of the twenty-five sites for conducting simulated occupancy tests in underground survival shelters were made so as to include a wide range of climatic conditions, soil types and shelter configurations. Environmental changes at selected locations in the shelter under test were noted when the shelter was subjected to typical loading and typical ambient environmental conditions. Ventilation air which had been conditioned to conform to typical ambient temperatures and humidity for the locale where the test was being conducted was supplied at various rates in an effort to determine the optimum air flow. The thermal response of the shelter structure and of the soil surrounding the shelter were measured.

The thermal response for each of the twenty-five test shelters and their surroundings have been tabulated in a previous section of this report. The purpose of this section of this report is to correlate these test results and to develop a relationship which will include the various parameters that affect the environment of a given shelter under emergency operating conditions. Such a relationship would be useful in evaluating the results obtained during the test program on the twenty-five shelters which were subjected to simulated occupancy in an effort to determine if any significant changes would have occurred had each phase of the test been conducted in a shelter which had not been thermally disturbed by a previous phase. A relationship of this type might also be used as a means of predicting environmental conditions for shelters which had not been tested and if the type of construction material were assumed along with a proposed shelter location it would be possible to predict environmental conditions in shelters which had not been constructed and thereby aid in the design of ventilation and cooling systems for such shelters.

Since the range of the ambient diurnal cycle from maximum to minimum amplitude varied widely for the numerous tests, the hourly records for each thermocouple position from all the tests were averaged for every 24 hour period. This permitted comparison for comparable tests.

Normally the initial phase of each test was conducted using high air flow rates of ventilation air. When the shelter effective temperature cycle repeated the previous day's cycle, the shelter was considered in equilibrium. If equilibrium at an effective temperature lower than 85° F was achieved, a new and lower air flow rate was used to supply ventilation air, thereby starting a new phase. Since the lower air flow rates supplied less air to remove the metabolic heat of the occupants, the shelter effective temperatures increased. It was observed that after the start of a phase the initial rise in shelter effective temperature was quite rapid, occurring within one to two hours after the phase was started. The shelter effective temperature then assumed a lower rate of increase but followed a cycle pattern which was associated with the ambient diurnal cycle. Examination of the tests' results revealed that the immediate response of shelter effective temperature following an air flow change was quite pronounced at both high and low air flow rates.

Two factors are important with respect to shelter effective temperature, the average ventilation air effective temperature, which essentially remains constant throughout a test, and the temperature of the earth surrounding the shelter. The temperatures of the earth surrounding the shelter achieve a large percentage of their total rise by the end of the first phase, when the temperature of the layer of earth near the shelter structure approached equilibrium with the shelter temperature. Thus the initial rise in earth temperature is much greater than subsequent temperature increases because the variations in shelter dry bulb temperature brought about by changes in ventilation air flow rate are lower than the temperature difference that existed at the start of the first phase.

Ventilation air flow into the shelter under test was always based upon some arbitrarily selected number of cubic feet of air per occupant per minute, and the shelters were usually loaded at the rate of one occupant per ten square feet of floor space. The usual ceiling height was from 7 to 10 feet, hence:

Shelter Volume Per Occupant =

10 feet x 10 square feet = 100 cubic feet.

With a minimum air flow rate of three cubic feet of ventilation air per minute per occupant based on the amount of ventilation air needed to achieve chemical control of the shelter atmosphere, the air change rate within the shelter space was:

$$\text{Shelter air changes per hour} = \frac{\text{cubic feet supply air/hr. occupant}}{\text{cubic feet shelter volume/occupant}}$$

$$= \frac{(3\ \text{ft}^3/\text{occ. min})\ (60\ \text{min/hr.})}{(100\ \text{ft}^3/\text{occ.})}$$

$$= 1.8$$

It can be shown that as the air flow rate increased, the time required for shelter response decreased, since the lag effect of the air within the shelter at the time of air flow rate change must proceed at a rate no slower than:

$$\text{Remaining Original Air Volume} = \frac{(\text{Shelter Volume})}{2^n}$$

Where:

n = number of air changes since change of air flow rate

Once stabilized environmental conditions have been achieved during the first phase of a test, only three to four days were required to establish succeeding phase stabilization. The rate of shelter effective temperature rise during the first few hours following each phase change was attributed to an increase in the shelter dry bulb temperature occasioned by the reduction in ventilation air flow rate, which, in turn, gradually brought about an increase in the temperature of the earth surrounding the shelter. As a means of ascertaining that stabilization had occurred, each phase was continued until the shelter exhaust air effective temperature curve essentially duplicated the previous day's diurnal cycle.

Ventilation air leaving the shelter through the exhaust duct was selected as a representative environment check point after examination of test data indicated that the exhaust air effective temperature was essentially equal to the average of the effective temperatures taken at two or three selected locations within the shelter test area.

In an effort to determine the effective temperature path that would have been followed by each phase had the air flow rate for the subsequent phases been used as a starting point for the test, a relationship expressed by an equation of the following form was used:

$$ET = A + BY + CF(t)$$

Where: ET = Shelter exhaust air effective temperature

A = Effective temperature of shelter air at the start of the test

B = Difference between shelter effective temperatures at start of test and after phase stabilization had been accomplished

Y = Factor which will approach unity as time increases

CF(t) = Expression which will reflect the effect of the diurnal cycle upon the average effective temperature curve

Examination of test data indicated that, in shelters which had not been previously occupied, and therefore were essentially isolated from ambient air, the dry bulb temperature of the shelter air closely approximated the temperature of the shelter interior walls. The relative humidity within these shelters was high even in dry climates due to the fact that the deep ground moisture did not vary greatly from one geographic location to another and was more a function of soil type than surface weather conditions. The shelters tested were usually constructed with concrete walls, floor and ceiling, thus permitting the earth moisture in vapor form to migrate to the air within the shelter, or vice-versa, until equilibrium conditions were reached. Since the environmental conditions within the shelter were disturbed prior to gathering psychrometric recorded data, the undisturbed earth temperature at the level of the shelter wall geometric center was used in the following equation as the dry bulb temperature that would have existed within the test structure in an undisturbed state. An examination of data taken during test program indicated that the initial relative humidity in the shelter atmosphere varied from 70% to 90% depending upon the moisture contained in the earth surrounding the shelter. The value of the initial wet bulb temperature was then determined by use of a psychrometric chart corrected for shelter elevation when necessary. With the initial wet and dry bulb temperatures established, the initial effective temperature of the shelter was determined from the expression

$$ET = 0.7\,(wb) + 0.3(db)$$

thus establishing the value of "A" for the shelter under consideration.

A comparison of a plot of environmental conditions obtained during low air flow rate tests with the curve generated by Dr. E. E. Drucker using an Analog Computer indicated good agreement, therefore the use of Dr. Drucker's information regarding rate of shelter effective temperature rise was considered to be justified. On the basis of Dr. Drucker's statement, "After four days, the temperature rise is 83 percent of its ultimate rise. After 10 days 95 percent of the rise had occurred and after 20 days, 99 percent has taken place,"[10] the following calculations were made:

$ET = A + B\ (1 - X^{-T^{a}}) + C\ \ (t)$

Since C F(t) refers only to diurnal cycle effect upon average effective temperature curve, it was initially ignored. The equation then reduces to:

$ET = A + B\ (1 - X^{-T^{a}})$

Where: T = Effective time in days from start of phase (This will necessarily vary from the actual number of test days after the first phase.)

a = Exponential value for "T" to be calculated

X = Constant to be calculated

Let: ET_o = Shelter effective temperature at start of test

ET_1 = Shelter effective temperature at the end of four days

ET_2 = Shelter effective temperature at the end of ten days

Then: $ET_o = A + B\ (1 - X^{-oa}) = A$

$ET_1 = A + B\ (1 - X^{-4a})$

$ET_2 = A + B\ (1 - X^{-10a})$

Therefore:

$ET_1 - ET_o = A + B\ (1 - X^{-4a}) - A = B\ (1 - X^{-4a})$

$ET_2 - ET_o = A + B\ (1 - X^{-10a}) - A = B\ (1 - X^{-10a})$

From Analog Solution When:[10]

$T = 4$ then $ET_1 = A + 0.83B$

$T = 10$ then $ET_2 = A + 0.95B$

Hence: $ET_1 - ET_o = A + 0.83B - A = 0.83B$

$ET_2 - ET_o = A + 0.95B - A = 0.95B$

Substituting equals:

$0.83B = B\ (1 - X^{-4a})$

$0.95B = B\ (1 - X^{-10a})$

Solving for unknowns:

$0.95 = 1 - X^{-10a}$ therefore $X^{-10a} = 0.05$

$0.83 = 1 - X^{-4a}$ therefore $X^{-4a} = 0.17$

Inverting: $X^{+10a} = 20$ and $X^{+4a} = 5.88$

By taking log of both equations:

$$1: \quad 10^{a} \log X = \log 20$$

$$2: \quad 4^{a} \log X = \log 5.88$$

Dividing equation 1 by equation 2:

$$\frac{10^{a} \log X}{4^{a} \log X} = \frac{\log 20}{\log 5.88} = 1.693$$

$$2.5^{a} = 1.693$$

$$a(\log 2.5) = \log 1.693 = 0.526$$

$$a = \frac{0.526}{\log 2.5} = \frac{0.526}{0.914} = 0.576$$

Substituting "a" into equation 2:

$$4^{0.576} \log X = \log 5.88 = 1.77$$

$$\log X = \frac{1.77}{2.22} = 0.798$$

$$X = e^{0.798} = 2.22$$

Then: $ET = A + B\ (1 - 2.22^{-T^{0.576}})$

Results obtained using this equation were checked against data generated during a test on the same shelter at air flow rates of from 3 to 7 cubic feet per minute per occupant and the calculated results closely approximated the experimental data. The calculated values were checked against the analog solution setting "T" equal to 4, 10 and 20 and the calculated results were the same as those of the analog.

The effect of the ambient diurnal temperature cycle was observed to be a function of the cycle amplitude and the time of day at which the effective temperature occurred. Since the amplitude of the effective temperature curve is essentially constant once an air flow rate is stabilized, it may be considered as a constant being operated upon by a time dependent function. An expression which satisfactorily expresses the diurnal effect is:

$$\text{diurnal effect} = \frac{C}{2} F(t) = -\ 0.707 \frac{C}{2} (\cos 15\ t + \sin 15\ t)$$

This expression did not result in exactly the type of distorted diurnal cycle that occurs during a typical day. However, the daily average temperature intercepts, as well as the maximum and minimum temperatures occurred at the correct time, and it was felt that the simplicity of the relationship justified its use instead of the more complicated expression which would produce a true temperature - time cycle. By combining the expression evaluating the average effective temperature, with the one reflecting the diurnal cycle effect, the value of the effective temperature at any time may be established if "T" in days and "t" in hours are known. Hence:

$$ET = A + B(1 - 2.22^{-T^{0.576}}) - 0.707 \frac{C}{2} (\cos 15 t + \sin 15 t)$$

Where: A = Effective temperature of the shelter at start of test

B = Difference between shelter effective temperature at start of test and after phase stabilization had been accomplished

C = Amplitude of shelter exhaust air effective temperature diurnal cycle

T = Time in days from start of test phase (this will necessarily vary from the actual number of test days after the first phase).

t = Time of day in hours from 0 to 24 hours (Example: 3 P.M. must be entered as 15 to generate correct sign in the trigonometric relationships.)

The value of "C" was obtained from examination of the test data for each phase checked and good results were obtained as long as the equation was used on family type shelters with moderate air flow rates. When the shelter size increased and the air flow rate exceeded eight cfm per occupant, the values calculated by the above equation for times during the first days of the test were consistently low due to the "immediate response" effect previously discussed. This tendency toward low initial calculated effective temperatures in no way changed the value of the maximum effective temperature which resulted when a state of equilibrium was established, since the value of "B" is the limiting factor for the maximum effective temperature under these conditions.

The foregoing discussion has dealt with the development of a procedure by which experimental data can be extrapolated to a point of origin. During the process of developing these relationships, it became apparent that these same methods would permit predictive calculations to be made when ground temperatures and ambient weather data are known. Since the primary concern is the shelter's maximum effective temperature after a state of thermal equilibrium has been established, rather than the path by which this effective temperature is reached, a method was developed for determining a shelter's maximum effective temperature, at any time "t", from a series of graphs based upon experimental data and accepted theoretical relationships. The data, upon which these graphs were based, were obtained from testing concrete shelters, therefore the effect of variation in moisture migration caused by differences in surface porosity should be considered when exterior walls are constructed from materials other than concrete.

Figure 75A is a graph of undisturbed shelter effective temperature vs undisturbed ground temperature when the relative humidity of the shelter air is held constant. Curves have been plotted for the range of relative humidities most likely to exist in underground fallout shelters that have been undisturbed for several weeks. Linear interpolation should be used for relative humidity values not plotted but within the range of the plotted curves.

The undisturbed shelter effective temperature vs the coefficient of temperature increment due to occupancy graph shown in Figure 75B contains curves plotted by holding the occupant air flow rate constant. These curves are based upon experimental data plotted in Figure 75D entitiled "Plotted Data of 'B' against CFM for given 'A' values," which was developed from analysis of experimental data gathered during the course of tests performed. The curves are general since the data were gathered over a widely varying geographic area.

The 24 hour average effective temperature vs the coefficient of temperature due to occupancy graph shown in Figure 75C contains curves generated with a constant air flow rate per occupant. These curves are based upon experimental data contained in the appendix data sheets. The 24 hour average effective temperature is read from the right hand ordinate of the graph and is the average effective temperature that may be expected to exist in an underground shelter after 14 days of occupancy. It is necessary to apply a correction for diurnal variation in order to obtain the effective temperature when a particular hour is being considered.

The amplitudes of the effective temperature diurnal cycles for shelter exhaust air and shelter supply air were determined for each test at the air flow rate per occupant producing 85 degrees F effective temperatures during peak load periods. The ratio of these amplitudes was plotted vs the shelter air flow rate per occupant required to produce such a ratio. The plot of these points is shown in Figure 75E. Examination of the distribution of these points suggested that a curve could be developed whose path would minimize the probable error at any given point. The data from which each point was plotted was supplied to a digital computer which employed the methods of Least Squares and Gauss Elimination to develop an equation with which the solid line curve was drawn. This equation was used to develop an identical curve shown in Figure 76A upon which the nomogram is based.

Figure 76B is based upon the fact that a predictable ratio exists between the effective temperature diurnal cycle amplitudes of shelter supply and exhaust air, and when this ratio is held constant a linear relationship exists between the shelter supply and exhaust air effective temperature amplitudes.

Since the amplitude of the ambient effective temperature diurnal cycle may be determined for any particular shelter site and some air flow rate per occupant must be chosen, the probable amplitude of the shelter's exhaust air diurnal cycle may be established through the use of Figure 76A and Figure 76B.

The variation of the shelter exhaust air from the 24 hour average value at any time of day may be established through the use of Figure 76C. These curves were developed by plotted values of the trigonometric function expressing diurnal cycle effect vs time of day. When these curves are used it is improtant to remember that the abscissa is a line of zero correction, and that the correction read from the right hand ordinate must be applied with the proper algebraic sign as shown at the top of Figure 76C.

The curves in Figure 76C are calculated for values of shelter effective temperature amplitude "C" from 1 to 16 degrees F. Interpolation may be used to determine appropriate corrections for values of "C" not plotted.

The graphs discussed above combine to form the two nomograms shown in Figure 75 and Figure 76. The shelter effective temperature may be graphically determined for any time of day through the use of these nomograms in conjunction with information concerning shelter site undisturbed earth temperature, ambient wet and dry bulb design temperatures for a 24 hour period, and a design ventilation rate expressed in cubic feet of air per minute per occupant. The shelter effective temperature (E.T.) is:

E.T. = Value read from right hand ordinate Figure 75C + Value read from right hand ordinate Figure 76C

It should be remembered that the use of the nomograms apply only to stabilized conditions which may be expected to exist within the shelter being considered after 14 days of continuous occupancy.

The use of the graphic method is illustrated by the following hypothetical problem:

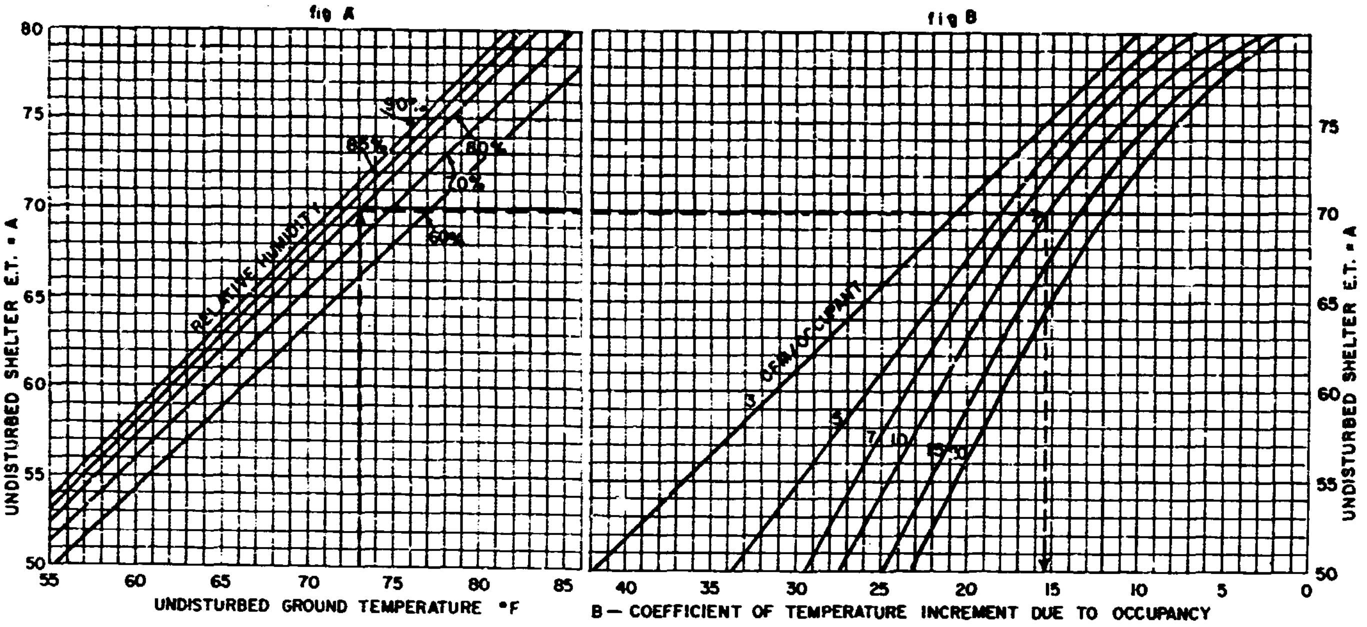
Statement of Problem: Determine the shelter effective temperature at 0730 hours that might be expected during the month of August in a concrete type shelter to be constructed at Someplace, U.S.A. This shelter will be equipped with a fan capable of delivering ambient supply air to the shelter at a rate of 10 cfm per occupant.

Solution:

1. Obtain August soil temperature from existing data or by measurement at a depth approximately equal to the planned geometric center of the shelter walls (e.g. 73° F).
2. Select the relative humidity that commonly exists in cellars or other underground structures located in the area of Someplace, U.S.A. (e.g. 80%).
3. From examination of existing August weather data, select a "typical day" during which the severity of the wet and dry bulb temperatures would not be exceeded more often than 1% to 3% of the time.
4. Calculate the maximum and minimum effective temperatures produced by this day. (Assume no wind velocity).

Then: Supply air amplitude = Maximum ambient ET - Minimum ambient ET

5. Starting with Figure No. 75a from the 73° F point of the "Undisturbed Ground Temperature" axis, move upward to the 80% relative humidity line. From the point of intersection of the 73° F line and 80% relative humidity line move right until the 10 cfm per occupant curve is met, then proceed downward until the next 10 cfm per occupant curve is intersected in the lower right hand section of the graph. Now move right from this point until the "A + B" axis is met and read the numerical value and record it (85° F). This is the value of the shelter's 24 hour average effective temperature that will occur after stabilization of the shelter environment.
6. Now turn to Figure No. 76 and locate the 10 cfm per occupant point on figure a. From this point move upward until the ratio line is intersected, then move right to the point of entry of figure b; draw a line from this point to the origin of the center graph. Select the point where this line intersects the appropriate "Supply Air Amplitude" line found to be 15° F from Weather Bureau Records for Someplace, U.S.A., then move horizontally to the right edge of figure b and read the value (4) of the shelter effective temperature amplitude. This identifies the curve from which the diurnal effect correction will be read.
7. Move to the right across the graph until the 0730 line is met, then move upward or downward (in this case downward) until the desired curve is intersected. From the sign at the top of the graph, read



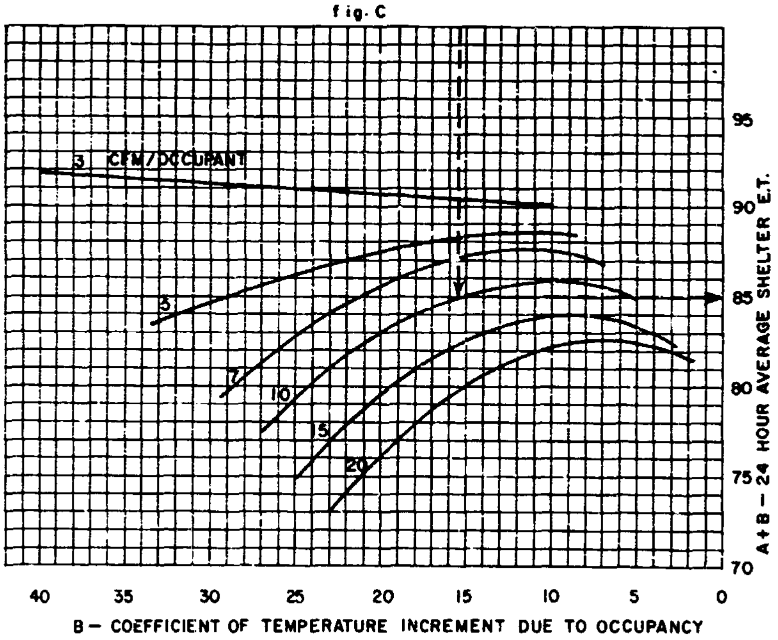
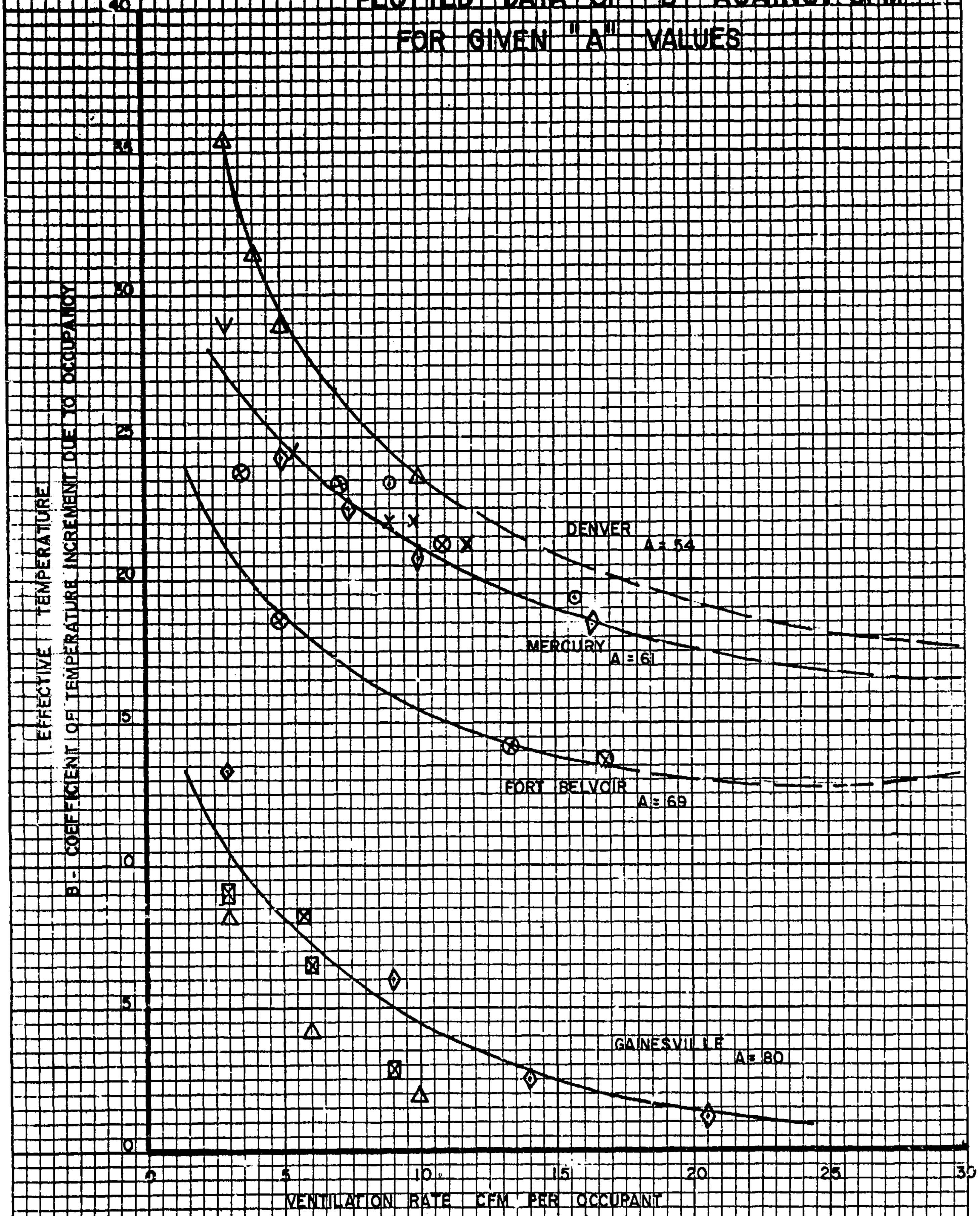


FIG. 75

24 HOUR AVERAGE SHELTER EFFECTIVE TEMPERATURE AFTER 14 DAY OCCUPANCY

NOTE: VALUES READ FROM THIS CHART MUST BE CORRECTED FOR DIURNAL CYCLE EFFECT AT TIME "t"

FIG. 75D
PLOTTED DATA OF "B" AGAINST CFM FOR GIVEN "A" VALUES



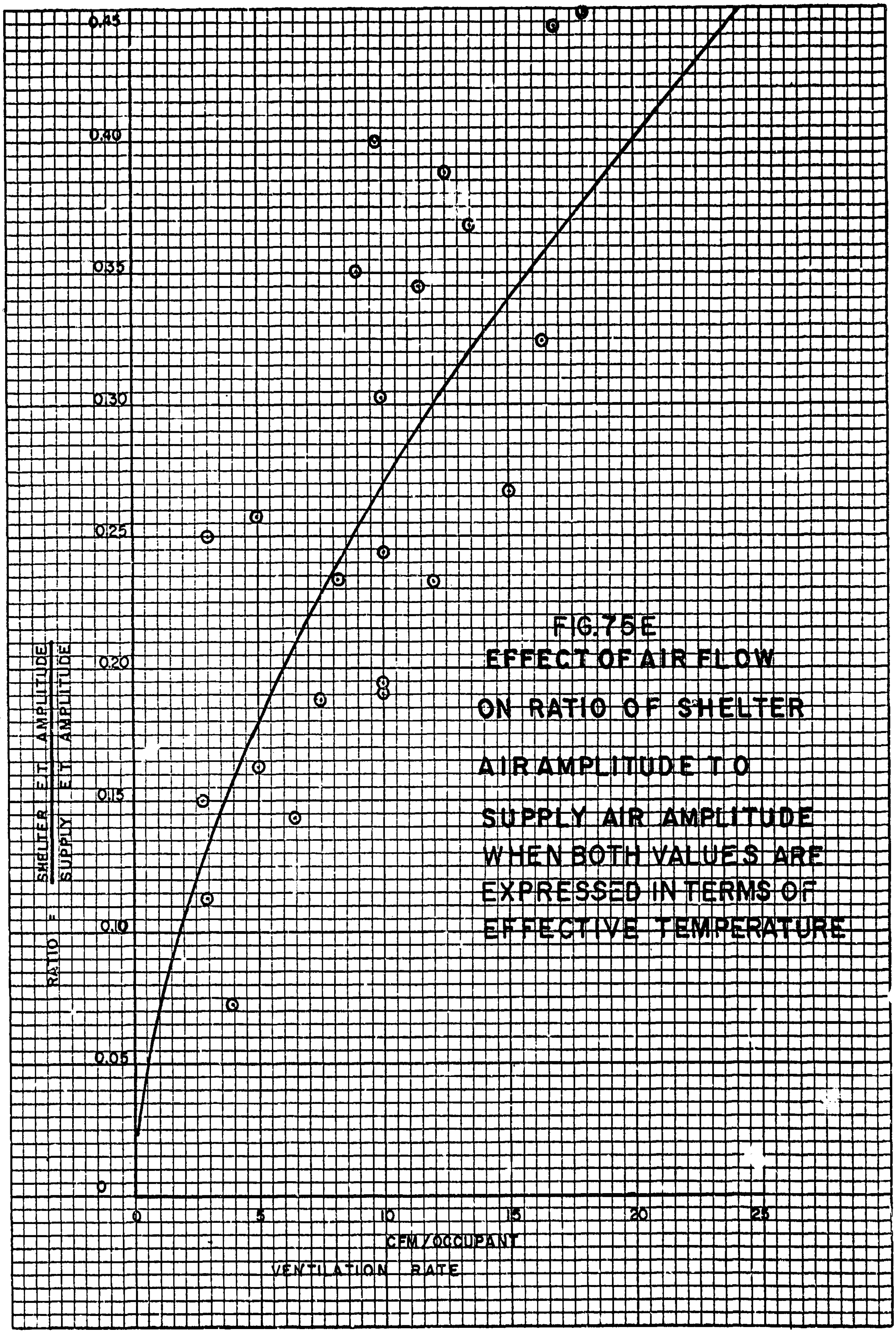
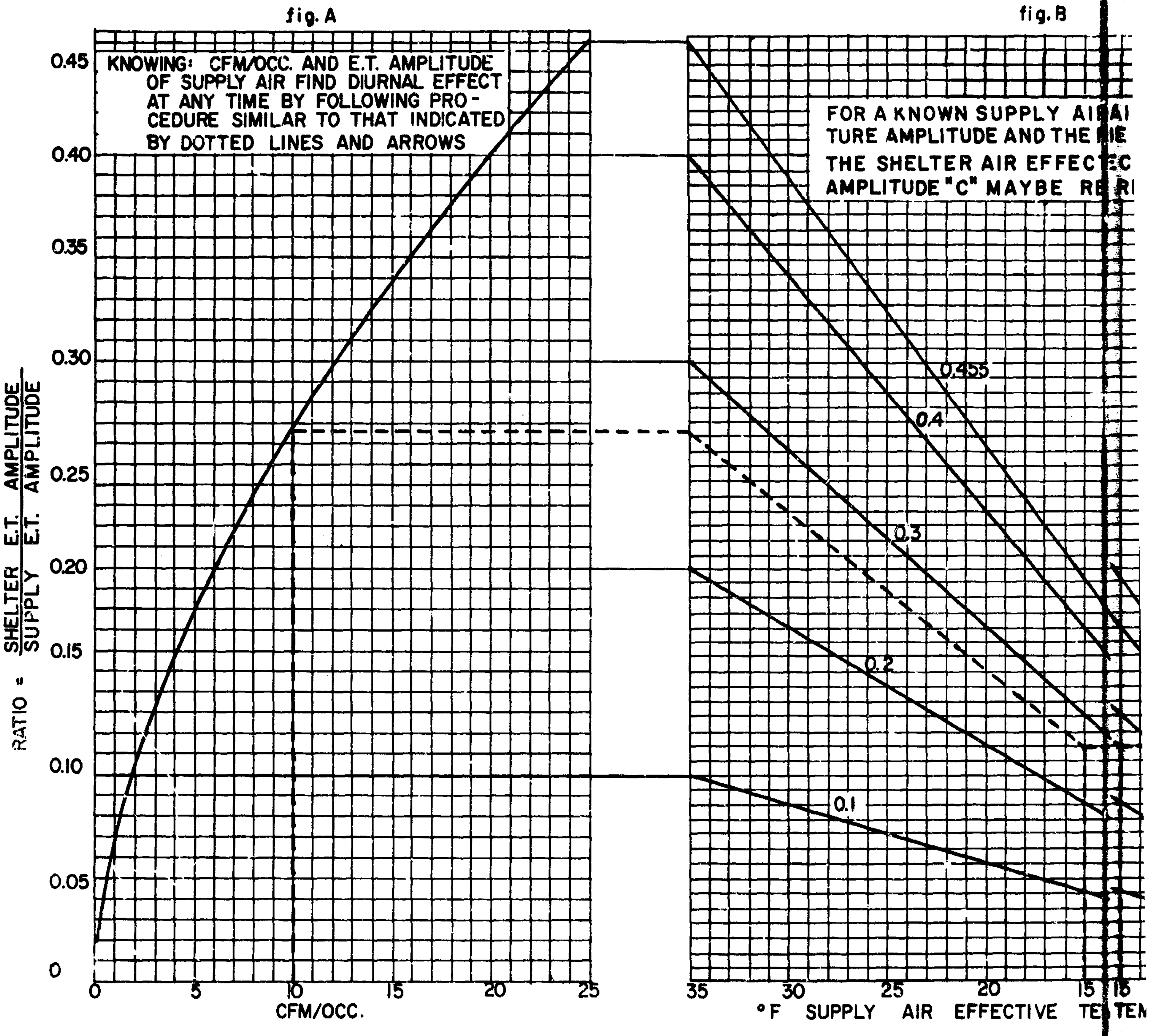


FIG.75E
EFFECT OF AIR FLOW ON RATIO OF SHELTER AIR AMPLITUDE TO SUPPLY AIR AMPLITUDE WHEN BOTH VALUES ARE EXPRESSED IN TERMS OF EFFECTIVE TEMPERATURE



KNOWING: CFM/OCC. AND E.T. AMPLITUDE OF SUPPLY AIR FIND DIURNAL EFFECT AT ANY TIME BY FOLLOWING PROCEDURE SIMILAR TO THAT INDICATED BY DOTTED LINES AND ARROWS

FOR A KNOWN SUPPLY AI
TURE AMPLITUDE AND THE
THE SHELTER AIR EFFEC
AMPLITUDE "C" MAYBE RE

FIG. 76 DIURNAL EF
SHELTER EFFECTI

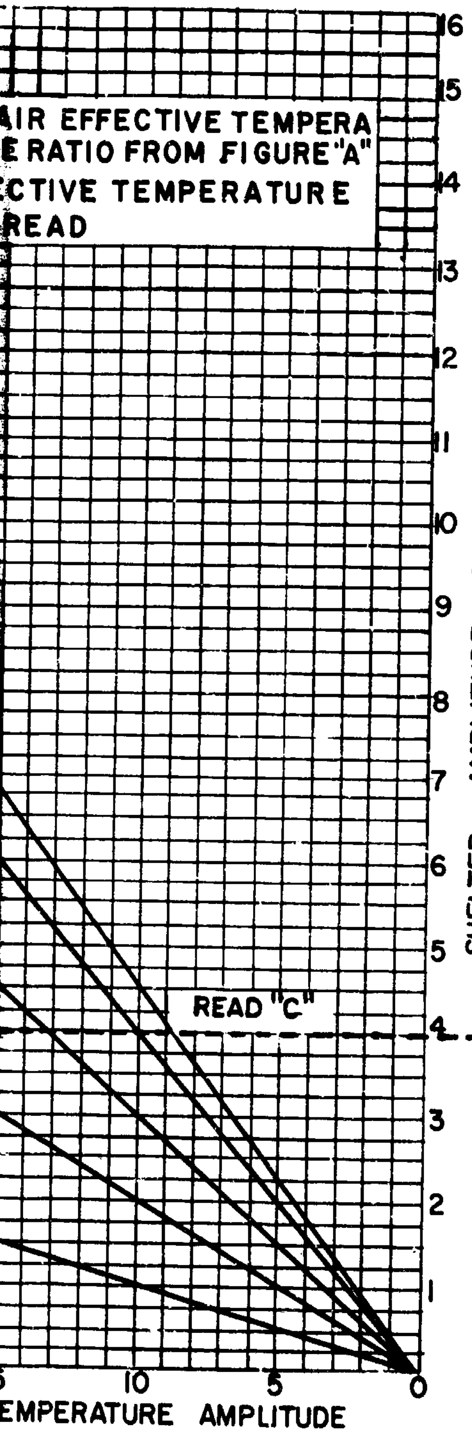
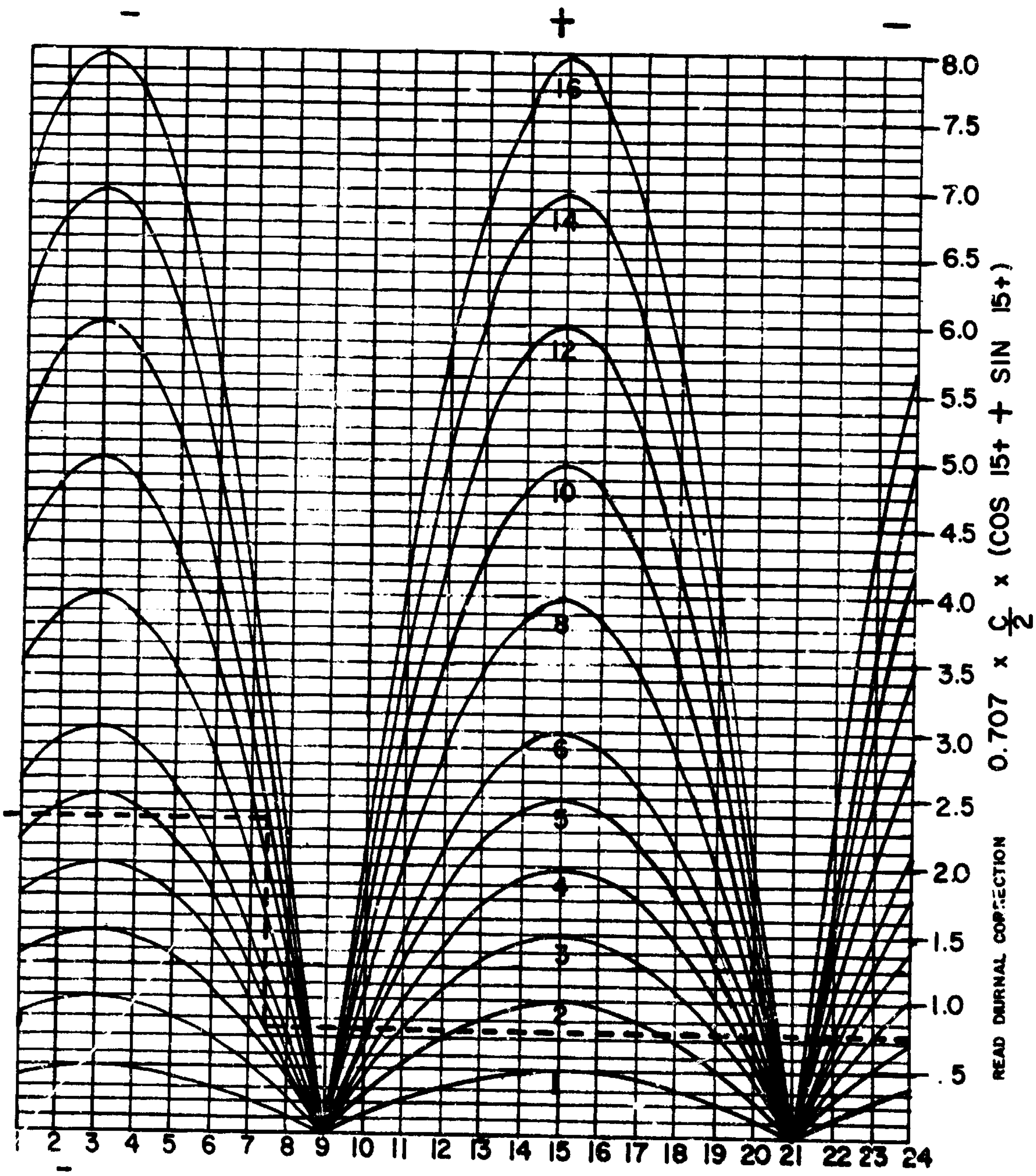


fig. C

NOTE: CURVE NUMBERS ARE VALUES OF C.
CARE SHOULD BE TAKEN IN APPLYING CORRECT ALGEBRAIC SIGN TO VALUE OF $.707\frac{(C)}{2}(\text{SIN } 15t + \text{COS } 15t)$



FFECT ON THE
VE TEMPERATURE

the algebraic sign that is in effect at the point of intersection, then move horizontally from the point of intersection to the right hand side of the graph; read the value of the diurnal correction, and apply the correct algebraic sign (in this case negative). Record the value read (-0.8° F).

8. The effective temperature is:

ET = (A + B value) + (diurnal correction value)

Therefore: at 0730 hours

$ET = 85^{\circ} F - 0.8^{\circ} F = 84.2^{\circ} F.$

By following the "4" curve to its maximum point, it is evident that at approximately 0300 hours the shelter minimum effective temperature will be:

$ET\ Min. = 85^{\circ} F - 2^{\circ} F = 83^{\circ} F.$

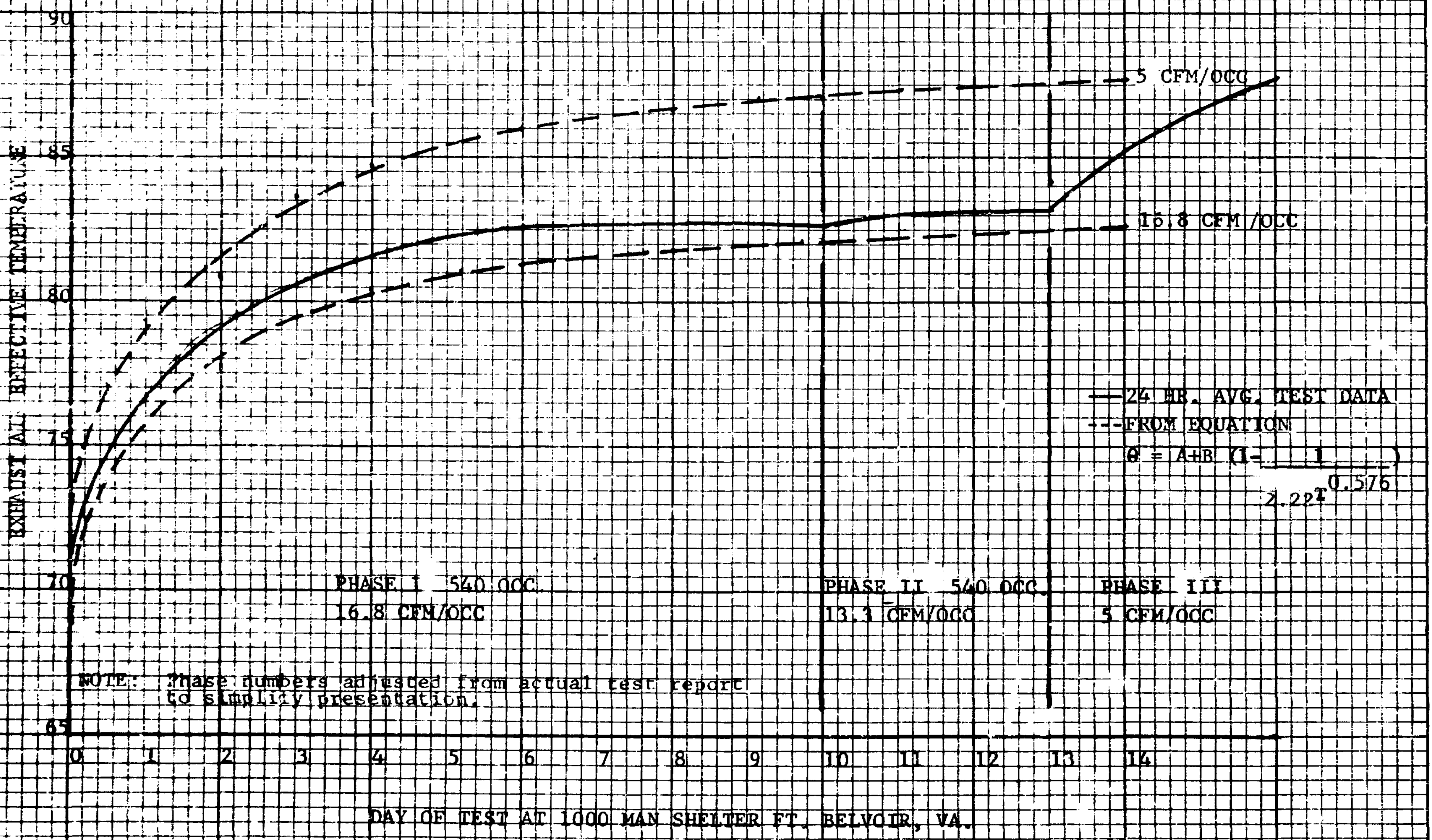
The shelter maximum effective temperature will occur around 1500 hours and will be:

$ET\ Max. = 85^{\circ} F + 2^{\circ} F = 87^{\circ} F.$

It is felt that the judicious use of these parametric relationships will produce fairly reliable results for most locations within the continental United States. The accuracy is necessarily dependent upon the quantity and quality of raw data which were available for the development of these relationships. The quantity of data available, while seemingly rather large in volume, is small for the area being considered; however, it is felt that the results obtained by the above methods will be accurate within reasonable limits.

The simulated occupancy test conducted at Ft. Belvoir, Virginia, on the 1000 occupant protective shelter building was broken down into several phases. The first phase was conducted using 540 simulated occupants (one for each 10 square feet of shelter floor area) with a ventilation air flow rate of 16.8 cfm per occupant. This phase was conducted for a period of nine days. At the end of the ninth day, an examination of temperatures recorded in the shelter exhaust indicated that the shelter structure and the earth surrounding the shelter structure were thermally stable. This phase was followed by a phase using the same number of occupants but with a ventilation air flow rate of 13.3 cfm per occupant. This phase continued for three days, and, at the end of the third day, recorded data indicated that the shelter and the surrounding earth were thermally stable. Phase three followed using the same number of occupants and a ventilation air flow rate which had been reduced to 5 cfm per occupant. This phase was terminated when test results indicated that thermal equilibrium had been achieved. Figure No. 77 shows a curve obtained by plotting the 24 hour average effective temperatures which existed in the ventilation air exhaust duct of the Ft. Belvoir, Virginia, shelter against time expressed in days of test duration.

FIG. 77 COMPARISON OF TEST RESULTS AND AVERAGE DAILY PREDICTED RESULTS



NOTE: Phase numbers adjusted from actual test report to simplify presentation.

IR 6525

Since the 1000 occupant shelter located at Ft. Belvoir, Virginia, was considered typical of the type of shelter which might be constructed for public use, it was decided to use the test data collected during the simulated occupancy tests of this shelter as a means of checking the validity of the previously discussed equation. Also shown on Figure No. 77 is a plot of average effective temperature against days of occupancy (14 days being used for this calculation) which were obtained by using the previously described equation for predicting shelter environmental conditions in the Ft. Belvoir, Virginia, area. Average effective temperatures were predicted for a ventilation air flow rate of 16.8 cfm per occupant. With actual and theoretical predictions of environmental conditions for the same shelter plotted on a single graph, it is possible to compare the results obtained by the two methods. It will be noted that the predicted and actual results for the 16.8 cfm per occupant ventilation rate shows a reasonable degree of correlation for the nine days that the test data were collected. Comparison of test data after the nine day period with predicted results obtained using the theoretical equation with a ventilation air flow rate 16.8 cfm per occupant was not possible since test conditions were changed on the tenth day of the test program. However, it is possible to compare the results predicted for the fourteenth day by means of the theoretical equation with results predicted for the fourteenth day using the graphic solutions previously described. These results were found to be identical.

Since the data collected with a ventilation air flow rate of 5 cfm per occupant was obtained on a shelter which had been thermally disturbed by a previous test phase, it is possible to compare such test results with the predicted results for an identical condition in a shelter that had not been previously tested. Some indication of the path that phase,three shown on Figure No. 77, would have followed had it been conducted in a shelter not previously tested may be obtained from the predicted plot. A comparison of the end results that would be expected with an air flow rate of 5 cfm per occupant and the actual test results obtained during the test using simulated occupants with 5 cfm per occupant would indicate that there is not a significant difference in the test results due to the test program which preceeded the third phase.

The following calculations are based on conditions as they were found to exist in the 1000 occupant protective shelter located at Ft. Belvoir, Virginia, prior to the start of the simulated occupancy test and are based on an occupancy time of fourteen days. These may also be considered sample calculations for the theoretical values which are plotted in Figure No. 77.

<u>1000 Man Shelter, Ft. Belvoir, Virginia</u>

$$\theta = A + B\left(1 - \frac{1}{2.22T^{0.576}}\right) - \frac{C}{2}(.707)(\sin 15t + \cos 15t)$$

θ = Effective temperature for desired time

A = 68.8° F initial shelter air ET using Figure No. 75a with 71.8 db (recorded undisturbed earth temperature opposite geometric center of shelter) and an assumed relative humidity of 80%.

B = 14° F temperature increment due to occupancy which was found from Figure No. 75b, using an air flow rate of 16.8 cfm per occupant and the above value for A.

T = 14 days length of occupancy

$$\theta = 68.8 + 14.0\left(1 - \frac{1}{2.22^{14^{0.576}}}\right)$$

$\theta = 82.5$

Average temperature 24 hour period for shelter at end of 14 days occupancy:

$\theta = 82.5$ calculated

$\theta = 82.5$ graphic

In order to have means for evaluating the ability of the theoretical equation to predict hourly values of environmental conditions in survival shelters under occupancy conditions, the curve plotted as a solid line in Figure No. 78 was generated through a series of points representing hourly values of shelter effective temperatures obtained during the simulated occupancy test of the 1000 occupant shelter at Ft. Belvoir, Virginia, for the ninth day of the test with a ventilation air flow rate of 16.8 cubic feet per occupant. Also shown in Figure No. 78 are hourly predicted values of effective temperature obtained using the previously described theoretical equation. It will be noted that the actual results and the theoretical results are in substantial agreement, and at no time do they differ more than 1 1/4 degree effective temperature. The calculations which follow support the calculated values which are shown in Figure No. 78.

To correct the diurnal cycle the term $\left[- C(.707)(\sin 15t + \cos 15t)\right]$ is used. In order to compare mathematical predictions with actual data, the ninth day of the test was chosen.

$$\theta = 68.8 + 14\left(1 - \frac{1}{2.22^{9^{0.576}}}\right) = 82.0; \text{ data shows } 82.5$$

C = 0.325 the shelter ET amplitude which is read from Figure No. 76b using a supply air ET amplitude of 9.2° F obtained from weather bureau records and a ratio of 0.36 (taken from Figure No. 76a using supply air ET 16.8 cfm per occupant).

t = time of day in hours and varies from 1 to 24

for $t = 15$

$$\theta = 82.0 - \frac{0.325}{2}(.707)(\sin 225 + \cos 225)$$

Since some of the constants used in the theoretical equation used as a means of predicting shelter conditions were based on test data obtained in a

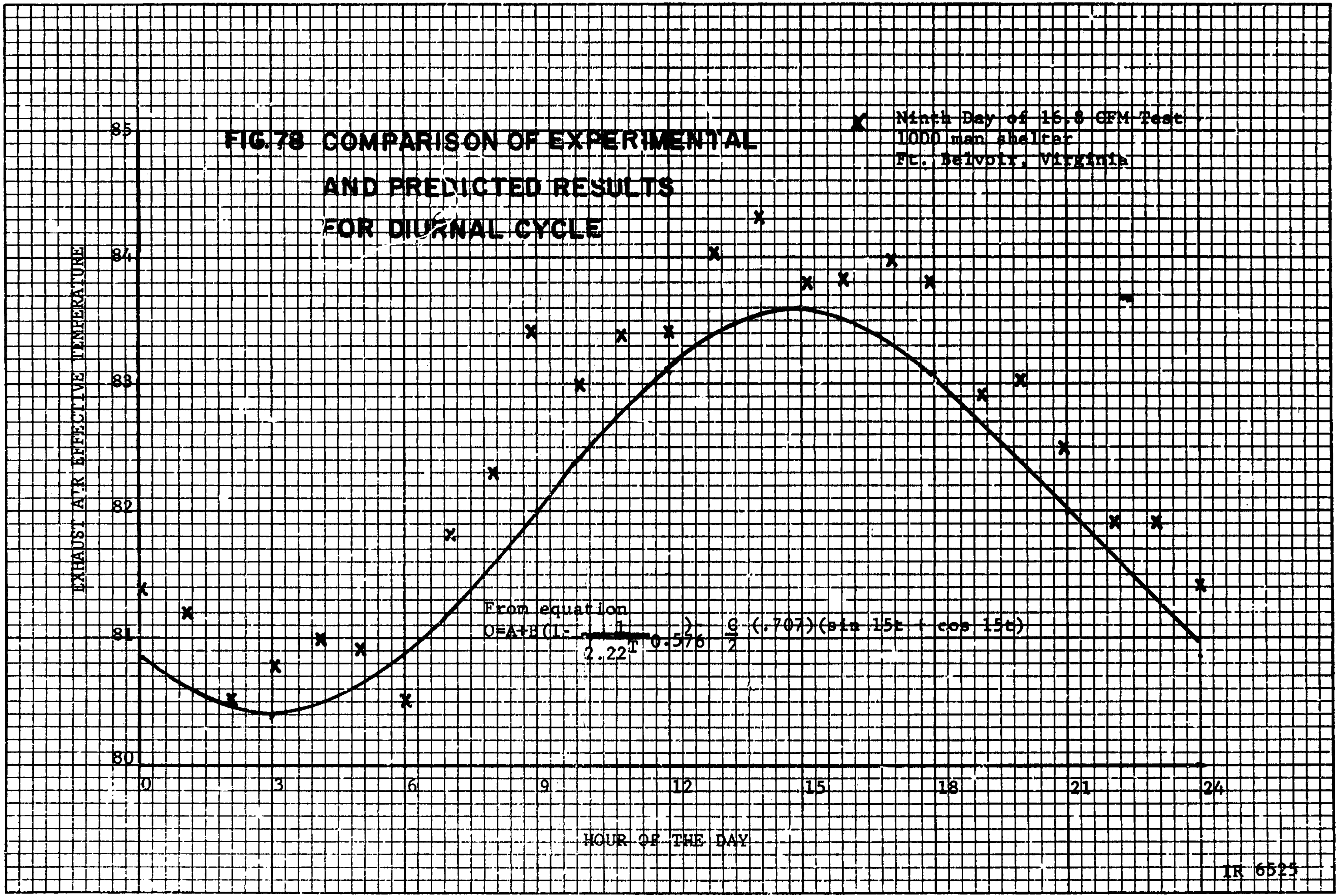


FIG.78 COMPARISON OF EXPERIMENTAL AND PREDICTED RESULTS FOR DIURNAL CYCLE

test program which included the Ft. Belvoir, Virginia, shelter, it was felt that this equation should be tested on test results which were obtained independently of the University of Florida test program. Since the National Bureau of Standards in Washington, D. C., had conducted simulated occupancy tests in a concrete shelter which was located underground in the Washington area, data recorded during this test were used to plot a curve representing average effective temperature on a daily basis; this plot is shown as a solid line in Figure No. 79. Also shown in Figure No. 79 is a dotted curve which represents predicted average daily temperature based on climatic conditions and expectant soil temperatures in the Washington area. Values for these conditions obtained from recorded data were used in connection with the previously described theoretical equation to predict shelter environmental conditions for a shelter in the Washington area. The correlation between these two curves is considered to be acceptable. On the basis of the previously described comparison of test and theoretical results, it is concluded that the theoretical equation is capable of predicting with a reasonable degree of accuracy environmental conditions that might be expected in an underground shelter either on a daily or hourly basis.

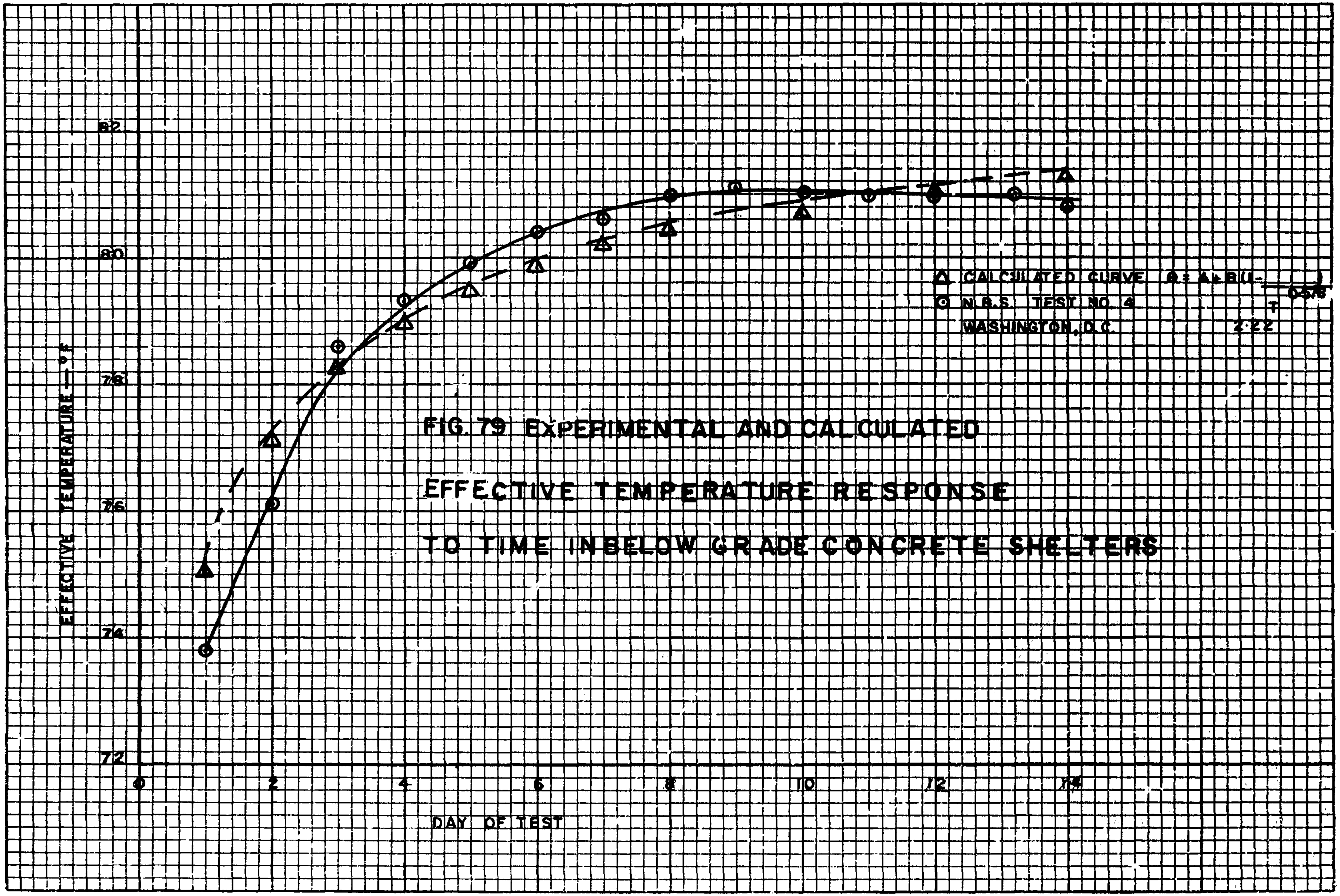


FIG. 79 EXPERIMENTAL AND CALCULATED EFFECTIVE TEMPERATURE RESPONSE TO TIME IN BELOW GRADE CONCRETE SHELTERS

UNACCOUNTED FOR LOSSES AND GAINS
IN THE
SHELTER VENTILATION AIR EXHAUST STREAM

UNACCOUNTED FOR LOSSES AND GAINS IN THE SHELTER VENTILATION AIR EXHAUST STREAM

A discrepancy was noted in the results obtained during certain of the previously described simulated occupancy tests when an attempt was made to compute a moisture balance on the shelter ventilation air as it passed through certain shelters. Examination of the test data revealed that this discrepancy was usually apparent in cases involving shelters constructed of either poured concrete or concrete products. For example, the Summerlin Shelter, Gainesville, Florida, which was a welded steel tank did not lose or gain moisture in the ventilation air stream that could not be accounted for as either coming from the occupants or by condensation on the walls, ceiling, or floor of the shelter.

The humidity ratio of the ventilation air leaving the shelter should be equal to the humidity ratio of the ventilation air entering the shelter plus the moisture that was released within the shelter in vapor form by either the occupants of the shelter or by other vapor producing equipment. Since the test program previously discussed was designed to evaluate the effects of human occupants on shelter environment, the shelters under test were selected and operated during the test period so that vapor producing equipment, other than simulated occupants (simocs), was not used. Under test conditions, the moisture produced by the simocs plus the moisture contained in the entering ventilation air should have equalled the moisture contained in the ventilation air as it was exhausted from the shelter. A review of data collected on shelters constructed of concrete products revealed that in practically all cases the shelters' exhaust air contained either more or less moisture than could be accounted for by summing up the moisture in the entering ventilation air and the moisture released by the simulated occupants.

In certain shelters, such as the Napier Shelter, Gainesville, Florida, the Hershey Shelter, St. Louis, Missouri, the Irvingdale Shelter, Lincoln, Nebraska, and Francis Shelter, Tucson, Arizona, there existed a history of either moisture seepage through the walls of the shelter or periodic flooding of the shelters due to entrance of surface water or faulty plumbing. In such cases, it has been assumed that the addition of moisture from such sources would in these cases cloud the results obtained by means of a moisture balance. There were certain shelters included in the test program that had no serious history of leakage or flooding that might effect a calculated moisture balance. These shelters were the Broyles Shelter, Gainesville, Florida, Abo School, Artesia, New Mexico, 200 Occupant Shelter, Ft. Belvoir, Virginia, 1000 Occupant Shelter, Ft. Belvoir, Virginia, and the Underground Concrete Structure, Lakeside, California. These shelters were considered representative of a cross section of the shelters included in the entire test program and were selected as representative of what might occur with respect to losses and gains of moisture from the ventilation air stream as it passed through the test structure.

During the simulated occupancy tests conducted on these shelters, there were two sources of moisture, i.e., moisture contained in the supply ventilation air and moisture released by the simulated occupants; three means of removal of moisture existed, i.e., an increase in moisture content in the exhaust ventilation air, condensation of moisture on the walls, floor and ceiling of the structure which could be collected and pumped from the shelter, and vapor migration through the materials used to construct the shelter. From the records kept during the tests, it was possible to calculate a material balance on all these quantities. Such material balance was computed for the five shelters listed above for each test phase associated with the simulated occupancy tests conducted in these shelters. Results of these material balances are tabulated in Table III.

The values tabulated in Table III are based on the measurement of the wet and dry bulb temperature of the entering air, the metering of the ventilation air and the measurement of a quantity of water supplied to the simulated occupants which represented the latent heat load of shelter occupants. The temperature measurements were made using thermocouples which were accurate to plus or minus one-quarter of a degree Fahrenheit. The air flow measurements were made using a Velometer which had been calibrated against an ASME standard Pitot and static tube. The water supplied to simulate the latent load was measured in calibrated tanks and is the only one of the above values that was subject to a high degree of accurate measurement under field experimental techniques. Under the conditions that the tests were operated, it is entirely possible that temperature measurement errors could have combined along with air measurement errors to give a total error of as much as five per cent in the moisture balance. Thus, only in cases such as phase one for the Abo School, where the discrepancies between moisture added and moisture lost is large can any real significance be attached to the recorded values. In cases such as existed during phase four of the Abo School test, the tabulated value of 96 pounds of moisture lost has no real significance.

The Broyles Shelter tabulation as shown in Table III indicates that a moisture migration was occurring through the walls of the shelter during all phases of the simulated occupancy test. Since this shelter had been subjected to a prior test which consisted of evaluating the effect of long term dehumidification,[11] it may be assumed that structure of this shelter had been dehydrated to such an extent that this shelter would constitute a special case. However, the other four test structures listed in Table II had not been subjected to a planned dehumidification test program, and it will be noted that discrepanices exist with regard to the moisture balance conducted in these cases.

The Abo School, Artesia, New Mexico, which had been constructed approximately 18 months prior to the simulated occupancy test was equipped with year round environmental control equipment, designed to maintain comfort conditions in the shelter atmosphere independent of ambient climatic changes. It will be noted that during the first phase of the simulated occupancy test, conducted in this shelter, that almost twice as much moisture appeared in the exhaust ventilation air stream as had been supplied to the simulated occupants in the shelter. During the second phase, approximately one-third more moisture appeared in the ventilation exhaust stream than had been supplied to the simulated occupants. During the third and fourth phases, slightly less moisture appeared in the exhaust stream than was supplied to the simulated occupants during these phases. During the fifth phase, the ventilation air stream contained slightly more moisture than was supplied to the simulated occupants.

A critical examination of the data recorded during the simulated occupancy test and of climatic conditions in the Artesia, New Mexico, area was made in an effort to support the results obtained as tabulated in Table III. Since this shelter had been occupied and operated as a school for one season prior to the test program and since the environment within the school was maintained in the comfort range during these periods, a comparison of the moisture content of the atmosphere in the shelter and the ambient atmosphere

TABLE III

Average Daily Moisture Gains and Losses in Selected Shelters

SHELTER	Phase I	Phase II	Phase III	Phase IV	Phase V
Broyles Shelter, Gainesville, Florida					
Moisture losses lb/day	10.8	36.4	19.5	38.2	58.0*
Moisture supplied to simocs lbs/day	52	73	71	76	89
Ventilation rate cfm/occupant	3	10	3	6	3
12 simulated occupants (shelter loading)					
Abo School, Artesia, New Mexico					
Moisture losses (gains) lb/day	(1130)	(319)	254	96	(537)
Moisture supplied to simocs lbs/day	1134	1303	1580	1580	1680
Ventilation rate cfm/occupant	16.5	10	5	7.5	5
228 simulated occupants					
200 Man Shelter, Fort Belvoir, Virginia					
Moisture loss lb/day	344	188	152	148	192
Moisture supplied to simocs lbs/day	527	604	602	585	564
Ventilation rate cfm/occupant	3	6	9	18	27
100 simulated occupants					
1000 Man Shelter, Fort Belvoir, Virginia					
Moisture losses lb/day	---	318	700	---	856
Moisture supplied to simocs lbs/day	2680	3240	3560	---	3570
Ventilation rate cfm/occupant	0	16.8	13.3	3	5
540 simulated occupants					
Underground Concrete Structure, Lakeside, California					
Moisture losses (gains) lb/day	(3)	37	63.3	350	
Moisture supplied to simocs lbs/day	1260	1440	1530	1670	
Ventilation rate cfm/occupant	14.85	8.13	6.9 or 7.5	30	
250 simulated occupants					

*Mass simocs in shelter

( ) indicates unaccounted for gains in moisture revealed that there existed a higher humidity in the shelter atmosphere than in the ambient atmosphere which would tend to drive vapor into the pores of the surrounding structure. Since the earth surrounding the structure was relatively cool, there existed at some points either in the structure or in the earth adjacent to the structure a point where this moisture changed from the vapor state to a liquid state. Thus, over a period of 18 months, it was possible that the shelter structure had absorbed moisture and had stored it in liquid form in the pores of the structure. When the simulated occupancy tests were started, typical ambient air was pumped through the shelter and thereby introduced an atmosphere within the shelter which had a lower humidity ratio than that which existed during normal school room operation, resulting in a lower vapor pressure within the structure atmosphere. Thus, moisture in liquid form which had been stored in the shelter structure would tend to vaporize and migrate to the shelter atmosphere where the vapor would be picked up and carried to the exhaust duct by the ventilation air stream. It will be noted in Table III that as the ventilation air flows varied through the shelter, the moisture content in the exhaust air stream varied. Thus, the variation of ventilation rate had an effect upon the ability of the ventilation air to absorb moisture from the shelter structure. Furthermore, the quantity of moisture that the structure could contain was limited, and as this quantity was decreased, the amount that it would contribute was decreased until conditions within the shelter reached a point which was sufficient to reverse the vapor migration that occurred during phases one and two. During phases three and four, the air flow per occupant was low and permitted humidity conditions to build-up in the shelter space, thereby creating conditions conducive to moisture migration into the shelter structure which had been subjected to a drying cycle during phases one and two. During phase five, ventilation air was supplied to the shelter at a low dry bulb temperature and low dew point in order to simulate supply air that would normally be introduced into the shelter from the existing air conditioning system. Ventilation air supplied in this manner had a lower humidity ratio than the humidity ratio that existed during phases three and four, and therefore, set up a condition suitable for moisture release from the shelter structure to the ventilation air passing through the structure.

A material balance similar to those previously described was completed, using data recorded during the test of the 200 man shelter at Ft. Belvoir and the 1000 man shelter at Ft. Belvoir, Virginia. These structures were constructed for experimental protective shelters development experimentation and are buildings two stories in height, one story below ground and one story aboveground. Due to a shortage of simocs and available power for operating the simocs, simulated occupancy tests were conducted on the lower floor in both of these structures and the dry bulb temperature of the upper floor of both structures was controlled so as to follow the dry bulb temperature that existed in the lower floor for the duration of the tests. Thus, heat transfer through the ceiling of the lower floor into an area above the test shelter was reduced to zero. The temperatures in the upper stories were maintained using dry heat and did not contribute to the moisture loading of the shelter. These structures had been completed in November, 1962, and air conditioning and heating equipment had been in operation for almost a year prior to the date of the simulated occupancy tests. Designed conditions for environmental control in the shelters called for the maintenance of a 78 degree dry bulb temperature and a relative humidity of fifty per cent. Thus, environmental conditions in the shelter atmosphere had been maintained in such a manner as to produce a humidity ratio less than the normal humidity ratio that existed in the ambient air surrounding the shelter. This situation was the reverse of the conditions previously described for the Abo School which was located in desert country and which was maintained at environmental conditions that brought about an atmosphere in the shelter with a humidity ratio higher than the ambient atmosphere surrounding the Abo School. Thus, it might be expected that the Ft. Belvoir shelters would react in a manner different than the Abo School Shelter. That a discrepancy with respect to moisture content would appear in the exhaust ventilation air stream indicates that all of the water going into the shelter atmosphere in the form of vapor released by the simulated occupants would not appear in the exhaust ventilation air. References to Table III indicates that this is exactly what was taking place. The 200 man shelter data indicated a deficiency of 344 pounds of moisture the first day, this value decreased until the final phase when 192 pounds per day was absorbed by the shelter. A similar moisture loss occurred in the 1000 man shelter. Observers on the scene of these tests reported a change in color of the walls of the shelters as the test progressed and some condensation was noted in the toilet area of the 200 man shelter. An attempt was made to seal off the toilet area of the 200 man shelter in an effort to prevent this condensation from forming. It is considered that the condensation forming in this one area was not sufficient to bring about the discrepancies shown in the moisture balances in Table III for the 200 man shelter. It was concluded that the Abo School was giving up moisture in the air and that the Ft. Belvoir shelters were absorbing moisture from the air.

The underground concrete shelter at Lakeside, California had been unoccupied for at least two years prior to starting the test program. Not only had it been unoccupied, but one end of the shelter had been open to ambient conditions in such a manner that the atmosphere within the structure had had an opportunity to stabilize with the atmospheric conditions surrounding the shelter. Therefore, when this shelter was ventilated with ambient air, it would be expected to neither absorb nor give off any great quantity of moisture to the ventilation air. With the exception of the final test phase, this structure followed the expected pattern. No satisfactory explanation as to why 350 pounds of moisture were gained by the ventilation air during this final phase has been achieved. It is possible that a thin film of condensation had formed on the walls of the shelter during test three and were re-evaporated during phase four. No test record indicates that any condensation formed during any phase of this test, but it might be possible that the amount of condensation formed during phase three did not reach a point where it was detected by the observers at the test site.

Since the latent load due to moisture produced by shelter occupants is an important factor in the environmental control of a shelter and since the type of structure, the geographic location, climatic conditions surrounding the shelter, and the prior use of the shelter seem to effect the behavior of the moisture load, it is considered pertinent to recommend that additional study be given this problem. It is also recommended that during the study, particular attention be paid to temperature variations in the walls during the time that these studies are conducted since the absorption of moisture by a wall accompanied by a phase change from vapor to liquid could cause an increase in temperature of the wall which would be detrimental to the overall environment within the shelter. Whereas, the vaporization of moisture stored in a wall might add to the moisture load that the ventilation air would need to remove from the shelter; it could bring about a reduction in temperature of the wall that would be beneficial to the overall environment of the shelter.

The amount of data collected during this test program which were suitable for analyzing on the basis of a moisture balance was limited. However, it points to considerations that could have an effect on shelter environment and as such merits further investigation.

CONCLUSIONS

1. A review of the rates of ventilation air supplied to test shelters and the resulting effective temperatures in these shelters, as listed in the 25 summaries covering tests conducted under this contract (see summary section of this report), indicates that the 3 cfm per occupant of ventilation air needed for control of the chemical constituents in the shelter atmosphere are not always adequate for the control of the thermal environments in shelters of the type tested. These tests were conducted, assuming that an effective temperature of 85° F is the upper tolerance limit for human beings and further assuming that protection must be afforded during typical summer climatic conditions existing in the ambient atmosphere surrounding the shelter. A review of the 25 tests conducted under this contract reveals that, excepting the winter tests, in only two cases did the quantity of air needed to control the chemical environment also satisfy the conditions imposed on the shelter by the occupants with respect to the thermal environment.

   In shelters that were tested under winter conditions, it was found that it was possible to operate these shelters from a thermal environmental standpoint under "buttoned up" conditions (no ventilation air, all openings closed) without any ventilation air. Such operations, in certain climates, might be desirable from the standpoint of increasing the shelter effective temperature to a more comfortable level. However, in such cases, there would be a need to maintain oxygen in quantities sufficient to support the human metabolic process and to limit the build-up of carbon dioxide to a point where psychological and physiological reactions of the shelter occupant would not be adversely affected. Therefore, the chemical atmosphere must be controlled with a minimum ventilation rate of 3 cfm per occupant or a life support system which would supply oxygen and absorb carbon dioxide.

   Since, in most cases, during summer occupancy, 3 cfm per occupant of ventilation air was not sufficient to satisfy the thermal loads imposed by the occupants in the shelter, consideration was given as to the quantity of ventilation air that would be needed to control the thermal environment to a maximum of 85° F effective temperature. To this end, a series of curves has been developed, covering the various localities where simulated occupancy tests were conducted and which can be used to predict the ventilation air flow rates necessary to maintain certain effective temperatures within the test shelter. These curves are based on the assumption that the air used to ventilate the structures would be available at effective temperatures similar to those recorded in past weather bureau records for the test locality and that the earth surrounding the shelters did not receive heat from the shelters or contribute heat to the shelters. Thus, these curves may be classed as adiabatic ventilation rate curves, and as such are subject to one major limitation. This limitation is that, irrespective of the amount of air used to ventilate a shelter, the effective temperature within the shelter can approach, but will always be greater than, the effective temperature of the supply ventilation air. Since climatic conditions that exist in the locality from which the supply ventilation air is drawn control the ventilation air temperature and moisture content, this means that under adiabatic conditions, the shelter atmosphere must always be somewhat higher as to temperature and moisture content than the ambient atmosphere. After examining the adiabatic curves (see summary section of this report) which were developed for the various geographic locations where simulated occupancy tests were conducted, it will be noted that, in most cases, where actual test results have been plotted, along with the theoretical adiabatic curves, the soil surrounding the shelter was able to absorb an appreciable percentage of the total heat released within the shelter. One exception to this general pattern was the St. Louis Command Post in St. Louis, Missouri. This exception will be covered in part two of conclusions.

Using the adiabatic ventilation rate curves as a basis for the design of the shelter ventilation system would result, in most cases, in the selection of over-size equipment. These curves are not intended to be used as design criteria but rather as a guideline to aid the designer in evaluating and judging the capabilities of a shelter's ventilation system. They do, however, point out the need for more than the 3 cfm per occupant of ventilation air required for chemical control of the shelter atmosphere if thermal control of the shelter's atmosphere is to be obtained.

2. Test data taken during simulated occupancy tests in shelters which had been subject to prior use, whether as shelters, office buildings, schools, etc., when compared with shelters that had not been previously occupied indicates that the dual use of shelters is detrimental to the ability of the shelter to perform thermally when loaded and used as a survival shelter. This condition is attributed to the fact that the earth surrounding the shelter may be capable of absorbing heat released in the shelter. If the heat in the shelter is released prior to using the structure as a survival shelter, then the earth surrounding the shelter may be elevated in temperature and the ability of the surrounding earth to store heat released by shelter occupants will be either reduced or eliminated. Under such conditions, the actual shelter environmental response would follow an adiabatic relationship as discussed in the previous section and sufficient air must be provided for ventilating the shelter to assure environmental control. Therefore, shelters serving dual purposes are not as effective in dissipating heat as are shelter areas which are to be used only during an emergency. In cases such as the St. Louis Command Post where large quantities of sensible heat are released by communication equipment, the problem becomes even more acute. Air conditioning of shelter space is not a solution for this problem since air conditioning systems should create a shelter dry bulb temperature that would be in the comfort zone. This temperature is normally higher than the temperature of the surrounding undisturbed earth. Thus, surrounding earth temperatures will subsequently be raised until they are in equilibrium with the shelter. When this occurs, much of the advantage of having the potential to transfer heat through the shelter walls is lost should the air conditioning system for any reason become inoperative.

   If adequate protection is to be achieved in shelters which are air conditioned, spare parts, refrigerant, and a dependable auxiliary power supply should be provided, and personnel should be trained to service the air conditioning equipment and auxiliary power system. The best solution from a shelter environmental standpoint would be to limit the use of the shelters to the status of stand-by survival shelters and to permit only the most necessary activity in the shelter. The operation of any environmental control equipment should be limited to periodic testing of the equipment from an operational standpoint. Thus, the structure of the shelter and the earth surrounding the shelter would have the capacity for heat storage in the event that the shelter is placed in use during an emergency.

3. Several means of controlling shelter environment were tested in addition to the use of ambient ventilation air. These means will be discussed in their order of effectiveness.

   (a) Water was pumped from a non-thermal well from a depth of approximately 30 feet and was passed through a finned serpentine coil located in the shelter space. A circulating fan was used to move air from the shelter space across this coil in a flow pattern counter to the direction that the water was flowing. Two tests (under typical summer conditions) of this type were conducted in Gainesville, Florida, using the Napier and Broyles Shelters. Florida was selected for testing the ability of ground water to be used as a cooling media since the ground water temperature from non-thermal wells in Florida is approximately 72° F. It was assumed that if satisfactory results could be obtained using well water as a coolant in Florida, that even better results could be achieved in other localities, since ground water temperatures decrease in geographic locations north of the Gainesville, Florida, latitude. Results obtained from both tests were satisfactory. In the case of the Broyles Shelter, conditions were maintained in the comfort zone for a 48 hour period with the shelter loaded on the basis of one occupant for each 10 square feet of floor area. In the case of the Napier Shelter, environmental conditions were greatly improved and approximately one-half of the heat released by the simulated occupants was absorbed by the water passing through the coil. Additional coil capacity, accompanied by additional water flow, could have handled the entire heat load in the Napier Shelter. Each pound of water, passing through the water coil absorbed approximately 3.5 Btu from the shelter atmosphere, and the total work input was approximately one-third the amount of energy that would have been expended for a like heat removal using a conventional air conditioning system. The use of ground water, as a cooling agent, would be limited by two factors, one, the temperature of the available water, and two, the depth from which such water would need to be pumped. A depth of approximately 100 feet would be the maximum distance that water could be pumped, since from a power consumption consideration at depths greater than 100 feet, it would be cheaper to use a conventional air conditioning system. The use of ground water has certain advantages, the simplicity of the system, the absence of special refrigerants, the lack of special tools for maintaining such a system, and the fact that water from such a source could be used for drinking and sanitary purposes.

   It is concluded that in localities where an abundant supply of cool water (72° F and lower) is available at depths of from 30 to 100 feet, such water can be satisfactorily used for shelter environmental control.

   (b) In localities where the relative humidity of the ambient atmosphere is low, air coolers, using the evaporation of water, have been employed for environmental control in buildings for a number of years. These devices are commonly referred to as "desert coolers." Such a device was tested in two instances during the test program, covered by this contract. One test was conducted on the utility tunnel in Tucson, Arizona, and another in the German Shelters at Mercury, Nevada. Both of these tests indicated that environmental conditions could be improved in shelters by using a "desert cooler" to condition the shelter ventilation air. However, this device, in order to operate effectively, requires that a relatively large volume of air flow across a wet surface and requires some means of supplying water to this surface. The power requirements for operation of such a device would probably be beyond the muscular capacity of shelter occupants in the event that electric service to the shelter should become inoperative.

(c) While no performance tests were conducted using mechanical refrigeration devices in the form of air conditioning systems, it was concluded that such systems, when properly installed, could bring about environmental control in shelters. Such devices have been tested by manufacturers of such equipment, and their performance characteristics are available to the general public. For this reason, a test program was not conducted. In most localities, a heat removal rate of 12,000 Btu per hour (one ton of refrigeration) can be obtained for an expenditure of one horsepower hour of energy with an electrical input of approximately one kilowatt hour. Twenty occupants of a shelter, each releasing 400 Btu per hour, would release a total of 8,000 Btu per hour. If such a shelter were equipped with a one ton air conditioner, the heat released by the occupants could be removed from the shelter and some capacity for removing the heat released by necessary mechanical equipment in a shelter would be provided. Thus, an electrical capacity of at least one kilowatt would need to be provided for climatic control for each 20 occupants of a shelter. Such a power requirement is far above the power capacity of human beings using muscular effort and would require dependable power service from a public utility, supported by some type of auxiliary power system.

(d) The use of desiccants for absorbing water vapor from the shelter atmosphere was investigated. The most common desiccant is calcium chloride which has the ability to absorb approximately three pounds of water for each pound of dry calcium chloride. Experiments conducted with calcium chloride indicated that the relative humidity within a shelter could be lowered by the use of this material. However, the effective temperature within the shelter was adversely affected when the relative humidity was lowered, since the heat of reaction for this chemical and the latent heat of vaporization of moisture condensed were released in the shelter atmosphere and increased the dry bulb temperature at a rate sufficient to have a detrimental effect on the shelter effective temperature. In a companion study, mechanically operated refrigeration-type dehumidifiers brought about an increase in the effective temperatures when used to lower the shelter relative humidity. The power input to drive the dehumidifier and the latent heat of vaporization of the condensed moisture were released to the shelter atmosphere in the form of sensible heat by the dehumidifier condenser and brought about an increase in the effective temperature of the shelter atmosphere.

It was concluded that devices (mechanical or chemical) which will cause a phase change from vapor to moisture must be located and arranged in such a manner that they release the energy required for the operation of the device plus the energy related to the latent heat load to a point outside the shelter atmosphere; if this is not the case, the device will be detrimental rather than beneficial.

(e) Under emergency conditions, the only power available for the operation of mechanical equipment within a shelter may need to originate with the muscular effort of the shelter occupants. The muscular activity for a healthy male is limited to approximately one-tenth of a horsepower for a two hour period. Therefore, it is necessary to conserve the energy available from the shelter occupants and install efficient machinery in cases where the shelters are to be ventilated by some means of mechanical devices, such as fans and blowers. A study of the operational characteristics of such devices reveals that most fans and blowers have a relatively high efficiency (70 to 80 per cent) when operated within the range of 30 to 40 per cent of their rated capacity.

It was concluded that ventilation devices in the form of blowers and fans should be installed in shelters equipped with auxiliary drive mechanisms suitable for muscular operation and that such equipment should permit the occupants' leg muscles to be used as a means for operating the device. It was also concluded that fans and blowers should be selected and operated on the basis of overall efficiency rather than on the basis of maximum capacity.

4. It was concluded that the effective temperature of the shelter interior was related to the effective temperature of the air above and the temperature of the earth surrounding the shelter. A mathematical relationship was developed which can be used to predict the effective temperature in a given shelter under occupied conditions for a selected period of occupancy. This mathematical relationship is based on a knowledge of weather bureau data taken over a period of years in the area where the shelter is to be located, coupled with a knowledge of the expected ground temperatures at a level in the vicinity of the midpoint of the walls of the shelter under consideration. For a more complete description of this relationship, see the section of this report entitled, "Development of a Parametric Relationship."

5. A review of the data taken with respect to the moisture content of the earth surrounding the previously described test shelters indicated that the moisture content of the surrounding earth varied from a low of approximately three per cent by weight to a high of approximately 36 per cent by weight. When this moisture content was related to the type of earth associated with a particular percentage of moisture and reviewed with respect to the manner in which such moisture variation affected the thermal conductivity of the earth, it was found that the variation in thermal conductivity for the 25 test sites was approximately between 0.45 and 0.96 Btu per hour per square foot per foot of thickness. Thus, it was concluded that over a wide geographical range, the thermal conductivity for earth surrounding the shelter constitutes a relatively minor variable in the overall problem of heat transfer from shelter to soil.

6. On the basis of information obtained during a full scale fire test conducted above an underground shelter during a simulated occupancy test, it was concluded that if sufficient earth cover is present to afford radiation protection, there is little likelihood of the shelter atmosphere being thermally disturbed as a result of a fire storm above an underground shelter. However, fire storms do create sources of carbon monoxide which could contaminate the shelter supply ventilation air stream, and, in the previously

described fire storm test, did generate sufficient quantities of carbon monoxide to bring about toxic conditions within the shelter space. For this reason, unless ventilation air can be drawn from an area far removed from the fire area, it would be necessary to operate the shelter under "buttoned up" conditions during the time the fire storm was in progress. Operating the shelter under "buttoned up" conditions would create two problems. The metabolic process of the occupants would generate and release carbon dioxide in quantities sufficient to contaminate the shelter atmosphere from a chemical standpoint, as well as sensible and latent heat which would tend to increase the effective temperature of the shelter space. During this "buttoned up" period, the thermal capacity of the shelter structure and the ground surrounding the shelter would need to be sufficient to absorb the heat released by the occupants. The chemical atmosphere would need to be controlled by a life support system as previously described.

7. It was concluded that the following items are in need of further study before meaningful conclusions can be drawn:

    (a) The ability of certain structures to absorb and dissipate moisture, when subjected to simulated occupancy conditions, needs further investigation under controlled experimental conditions to determine the quantities of moisture that can be stored and removed from such structures and to determine the effect that such storage and removal would have upon the shelter effective temperature.

    (b) In testing the German Shelters at Mercury, Nevada, it was noted that a temperature drop of approximately 15° F occurred in the ventilation air as it passed through an underground concrete conduit used to route the ventilation air into the shelter. This drop in temperature decreased as the test progressed, but at the end of 14 days, there was still a reduction in the temperatures of the ventilation air stream of approximately 4° F as it flowed through this conduit. Thus, it would appear that in regions where soil temperatures are moderate, the location of supply air ducts below ground might serve the purpose of removing sensible heat from the ventilation air and could have the additional advantage of drawing from an area remote from possible fire sources. Such a procedure requires testing under conditions where variables can be controlled and results accurately evaluated.

    (c) Since climatic conditions from approximately 2200 hours to 0600 hours are always the most favorable conditions with respect to ventilation air temperature, it is recommended that a series of tests be performed whereby the activities of shelter occupants are regulated to coincide with these periods so that a maximum of activity occurs during the coolest portion of the diurnal cycle. In conjunction with these tests, a study should be made of the effects of supplying maximum quantities of ventilation air during these more favorable diurnal cycle periods and supply minimum quantities of ventilation air during the less favorable portion of the diurnal cycle. Such tests would need to be conducted under controlled conditions whereby the variation in activity and the variation in air flow could be properly evaluated to determine the respective effect on shelter environment.

    (d) During the 25 previously described simulated occupancy tests, ventilation air was supplied and exhausted either through existing facilities or through the most expedient facilities. It is recommended that a study be made to determine optimum means of supplying, routing, and exhausting ventilation air to, through, and from a shelter and that such a program contain sufficient alternate methods so that evaluation of the effect on shelter environment for each method may be examined.

(e) Due to the limitations of the climatic control equipment in the mobile shelter test laboratories, it was necessary at times to simulate a portion of the occupant heat and moisture load on the shelter in the form of moisture evaporation and sensible heat released at the point of origin for the shelter ventilation air. No discontinuities in test results were noted when tests were conducted in this manner. Thus, the question was raised as to whether simulated occupants were necessary in order to test shelters. During one phase of a simulated occupancy test conducted at Lakeside, California, no simulated occupants were used; instead, moisture and sensible heat in amounts equivalent to that which would have been produced by human occupants were added to the ventilation air as it entered the shelter. After this phase had operated for a period of 24 hours, simulated occupants, releasing the same amount of sensible heat and moisture, were placed in operation in the shelter. The test results for the duration of this phase were compared and found to be coincident within the limit of experimental error. Therefore, it is recommended that a test program be developed to evaluate the merits of releasing sensible heat and moisture to simulate the sensible and latent heat load of shelter occupants at the point of origin of the ventilation air. These tests should be conducted under various climatic and geographic conditions in order to evaluate the validity of this procedure. Such a test procedure if feasible would serve to facilitate future test programs and make them more economical.

(f) Of the 25 shelters tested in the previously described section of this report, one shelter was tested using live cattle as occupants. Since the metabolic requirements for animals is a function of the weight of the animal, and since a majority of our food producing animals weigh more than human beings, it is recommended that certain air flow rates be established for these animals by experimental means using either real animals or simulated heat releasing rates similar to those employed in the previously described test program.

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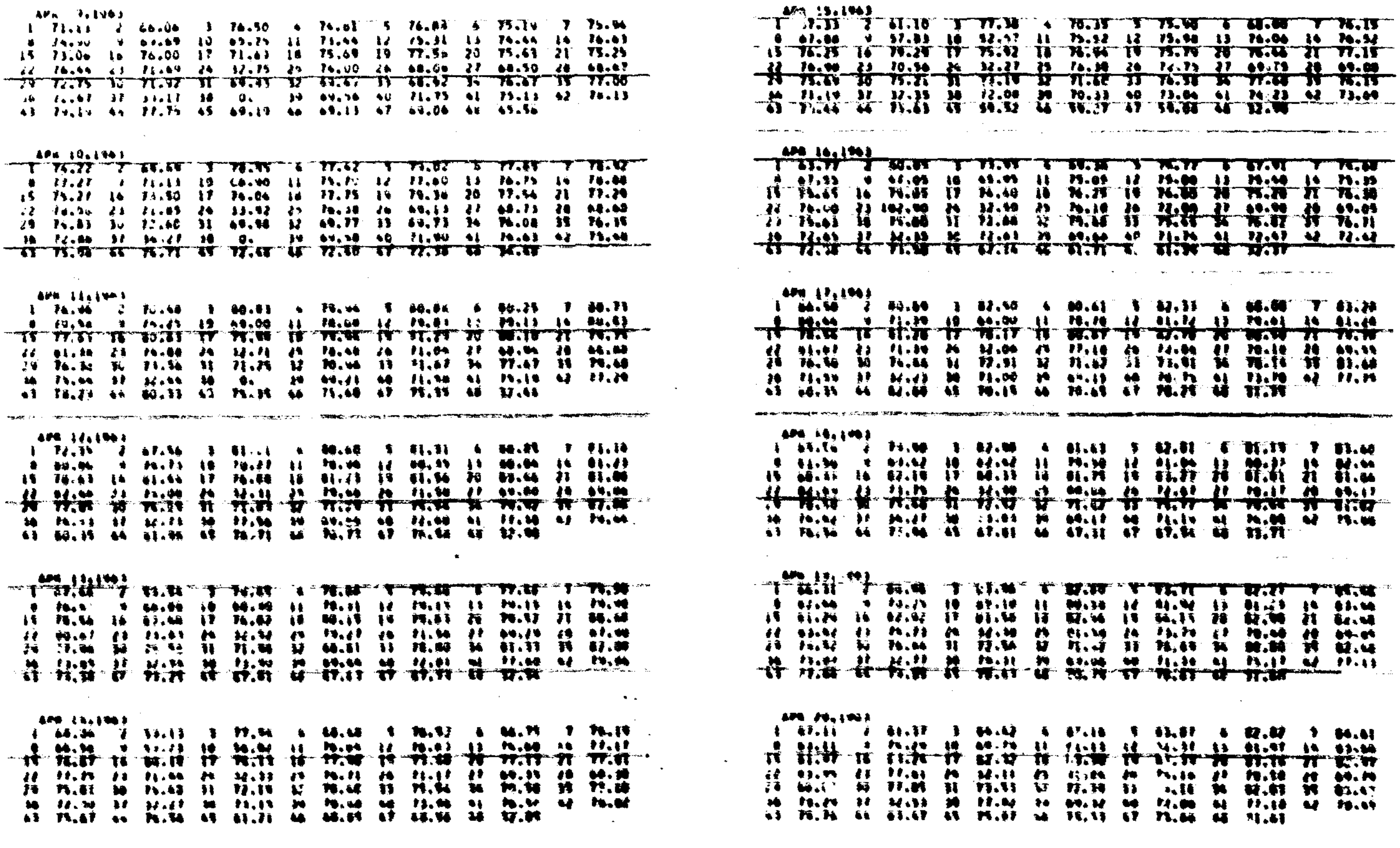
APPENDIX

Summerlin Family Shelter

Gainesville, Florida



SUMMERLIN FAMILY SHELTER
GAINESVILLE, FLORIDA

```
July 5, 1962 -1000  - July 6, 1962 -1000

 1  85.7   2  76.6   3  88.8   4  88.6   5  89.3   6  83.1   7  88.8   8  74.2
 9  86.5  10  86.6  11  85.1  12  82.2  13  88.3  14  88.5  15  89.4  16  85.3
17  82.3  18  81.4  19  88.7  20  88.2  21  87.6  22  87.6  23  88.2  24  87.6

July 6, 1962 -1000 - July 7, 1962 -1000

 1  86.8   2  76.9   3  89.1   4  81.6   5  89.3   6  81.0   7  88.9   8  81.6
 9  85.7  10  87.8  11  86.3  12  82.3  13  88.1  14  89.7  15  89.8  16  86.4
17  84.5  18  81.2  19  89.1  20  88.8  21  88.7  22  87.8  23  87.8  24  88.5

July 7, 1962 -1000 - July 8, 1962 -1000

 1  87.9   2  78.0   3  91.5   4  81.6   5  90.9   6  81.1   7  90.3   8  81.0
 9  87.1  10  89.3  11  87.5  12  83.8  13  86.1  14  90.7  15  91.1  16  87.8
17  83.3  18  81.8  19  90.4  20  89.7  21  88.9  22  87.8  23  86.8  24  89.6

July 8, 1962 -1000 - July 9, 1962 -1000

 1  83.8   2  77.2   3  91.2   4  83.3   5  90.8   6  82.6   7  90.4   8  82.3
 9  89.2  10  89.4  11  88.2  12  83.6  13  82.8  14  91.4  15  91.2  16  88.6
17  83.6  18  82.0  19  90.4  20  89.8  21  88.9  22  87.5  23  86.6  24  85.9

July 9, 1962 -1000 - July 10, 1962 -1000

 1  86.9   2  78.3   3  90.8   4  82.6   5  90.7   6  82.2   7  90.0   8  81.8
 9  88.9  10  90.6  11  87.4  12  83.2  13  80.2  14  90.5  15  90.6  16  87.9
17  83.3  18  81.6  19  89.8  20  89.1  21  88.0  22  86.9  23  87.0  24  90.0

July 10, 1962 -1000 - July 11, 1962 -1000

 1  82.2   2  75.4   3  91.1   4  82.3   5  90.8   6  81.7   7  90.3   8  81.2
 9  89.3  10  90.0  11  87.6  12  83.2  13  80.0  14  90.9  15  90.8  16  86.4
17  83.3  18  81.6  19  90.2  20  89.6  21  88.5  22  88.2  23  89.1  24  89.8
```

```
July 11, 1962 -1000 - July 12, 1962 -1000

 1  86.6   2  75.2   3  89.9   4  85.5   5  89.7   6  82.9   7  89.2   8  82.2
 9  88.6  10  88.4  11  87.7  12  86.0  13  88.2  14  89.6  15  89.6  16  88.2
17  83.6  18  81.8  19  89.5  20  89.6  21  89.2  22  86.7  23  90.7  24  88.5

July 12, 1962 -1000 - July 13, 1962 -1000

 1  86.9   2  76.3   3  88.2   4  83.1   5  89.3   6  82.5   7  88.9   8  81.7
 9  88.1  10  88.1  11  87.6  12  83.9  13  88.3  14  89.0  15  88.4  16  87.9
17  83.9  18  82.0  19  88.3  20  89.8  21  88.9  22  90.8  23  92.1  24  88.1

July 13, 1962 -1000 - July 14, 1962 -1000

 1  88.4   2  76.8   3  90.8   4  85.6   5  90.6   6  83.7   7  86.7   8  82.8
 9  90.1  10  88.9  11  88.1  12  86.5  13  81.1  14  89.8  15  88.9  16  88.3
17  86.5  18  87.7  19  90.5  20  90.8  21  90.9  22  91.7  23  90.5  24  88.9

July 14, 1962 -1000 - July 15, 1962 -1000

 1  88.5   2  77.6   3  91.6   4  86.6   5  91.9   6  89.1   7  91.3   8  86.6
 9  90.3  10  90.2  11  89.6  12  85.9  13  92.6  14  91.2  15  90.5  16  90.7
17  85.8  18  86.1  19  91.7  20  92.1  21  92.2  22  91.0  23  91.0  24  90.5

July 15, 1962 -1000 - July 16, 1962 -1000

 1  [illegible]   2  76.7   3  [illegible]   4  88.2   5  [illegible]   6  86.8   7  [illegible]   8  83.8
 9  [illegible]  10  [illegible]  11  88.7  12  [illegible]  13  [illegible]  14  [illegible]  15  88.7  16  [illegible]
17  85.9  18  [illegible]  19  [illegible]  20  [illegible]  21  [illegible]  22  [illegible]  23  [illegible]  24  [illegible]

July 16, 1962 -1000 - July 17, 1962 -1000

 1  [illegible]   2  [illegible]   3  [illegible]   4  85.7   5  [illegible]   6  [illegible]   7  [illegible]   8  [illegible]
 9  [illegible]  10  [illegible]  11  [illegible]  12  [illegible]  13  [illegible]  14  [illegible]  15  [illegible]  16  [illegible]
17  [illegible]  18  [illegible]  19  [illegible]  20  [illegible]  21  [illegible]  22  [illegible]  23  [illegible]  24  [illegible]
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July 17, 1962 -1000 - July 18, 1962 -1000

 1  90.8   2  86.6   3  93.4   4  90.6   5  93.5   6  90.2   7  94.0   8  90.6
 9  91.7  10  91.6  11  90.5  12  87.9  13  86.0  14  94.1  15  92.7  16  91.5
17  87.6  18  87.6  19  93.8  20  93.8  21  93.2  22  93.3  23  93.1  24  92.9
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BROYLES FAMILY SHELTER
GAINESVILLE, FLORIDA

```
July 30, 1962 -1100 -  July 31, 1962 -1000

 1 84.0   2 75.7   3 79.6   4 76.7   5 79.0   6 76.2   7 82.9   8 73.6
 9 79.4  10 80.6  11 81.5  12 81.5  13 80.4  14 76.3  15 81.1  16 81.9
17 83.6  18 83.7  19 83.1  20 83.5  21 86.3  22 83.1  23 85.3  24 84.8
25 83.6  26 83.2  27 84.0  28 81.5  29 81.5  30 81.8  31 71.6  32 74.9
```

```
July 31, 1962 -1100 - August 1, 1962 - 1000

 1 85.0   2 74.9   3 79.7   4 76.9   5 78.0   6 76.3   7 82.7   8 77.5
 9 79.2  10 80.0  11 80.6  12 80.8  13 80.6  14 78.3  15 80.8  16 87.3
17 82.7  18 82.6  19 82.4  20 87.5  21 83.3  22 84.0  23 84.6  24 85.3
25 82.7  26 82.5  27 83.1  28 81.1  29 82.1  30 82.2  31 71.5  32 74.0
```

```
August 1, 1962 -1100 - August 2, 1962 -1000

 1 84.4   2 75.9   3 86.5   4 77.7   5 85.6   6 77.1   7 86.1   8 80.3
 9 84.4  10 85.4  11 81.2  12 81.0  13 81.0  14 78.3  15 84.6  16 84.3
17 83.6  18 83.4  19 82.6  20 84.9  21 86.9  22 85.7  23 85.7  24 85.6
25 88.1  26 85.6  27 86.4  28 84.1  29 84.8  30 86.7  31 87.5  32 87.4
```

```
August 2, 1962 -1100 - August 3, 1962 -1000

 1 85.9   2 76.7   3 88.2   4 77.9   5 87.5   6 73.9   7 87.7   8 79.0
 9 86.5  10 86.5  11 82.1  12 81.2  13 81.3  14 78.4  15 86.4  16 84.2
17 83.7  18 83.1  19 82.0  20 87.9  21 88.0  22 85.9  23 85.5  24 83.9
25 87.5  26 86.8  27 87.9  28 85.6  29 88.6  30 85.6  31 87.9  32 88.0
```

```
August 3, 1962 -1100 - August 4, 1962 -1000

 1 86.3   2 84.3   3 88.9   4 78.3   5 88.1   6 77.4   7 88.4   8 79.3
 9 87.1  10 85.6  11 82.8  12 81.3  13 80.6  14 78.2  15 87.2  16 87.1
17 84.2  18 83.1  19 81.7  20 88.7  21 88.7  22 86.6  23 86.1  24 86.6
25 88.2  26 87.9  27 88.4  28 86.4  29 89.5  30 86.3  31 88.6  32 88.8
```

```
August 4, 1962 -1100 - August 5, 1962 -1000

 1 86.3   2 82.7   3 89.1   4 77.6   5 88.1   6 77.4   7 88.0   8 79.4
 9 87.0  10 85.7  11 82.6  12 80.8  13 79.3  14 76.3  15 87.0  16 87.0
17 84.6  18 83.2  19 81.4  20 89.4  21 89.4  22 87.2  23 86.4  24 83.8
25 89.1  26 89.0  27 89.3  28 87.3  29 90.2  30 87.0  31 89.3  32 89.7
```

```
August 5, 1962 -1100 - August 6, 1962 -1000

 1 86.1   2 70.7   3 90.2   4 77.2   5 89.2   6 76.2   7 89.3   8 76.7
 9 88.1  10 86.2  11 83.0  12 81.0  13 79.6  14 77.1  15 88.2  16 88.2
17 83.0  18 83.5  19 82.6  20 90.6  21 90.6  22 87.6  23 87.0  24 89.9
25 90.0  26 89.9  27 90.4  28 88.2  29 91.6  30 87.9  31 90.4  32 90.6
```

```
August 6, 1962 -1100 - August 7, 1962 -1000

 1 86.0   2 71.9   3 91.2   4 74.8   5 90.3   6 73.6   7 90.2   8 75.9
 9 89.1  10 87.2  11 83.9  12 81.6  13 80.5  14 77.6  15 89.2  16 89.1
17 87.4  18 86.2  19 84.0  20 92.0  21 92.0  22 90.5  23 89.6  24 86.7
25 92.6  26 91.6  27 91.6  28 89.6  29 93.6  30 88.5  31 91.9  32 92.0
```

```
August 7, 1962 -1100 - August 8, 1962 -1000

 1 86.7   2 76.6   3 89.9   4 79.2   5 89.2   6 78.3   7 89.7   8 78.7
 9 88.4  10 87.7  11 86.6  12 82.0  13 80.5  14 77.6  15 88.7  16 88.7
17 88.9  18 87.3  19 86.9  20 91.0  21 91.0  22 91.0  23 90.6  24 88.1
25 90.6  26 90.5  27 90.8  28 89.[illegible]  29 92.5  30 89.2  31 90.9  32 91.1
```

```
August 8, 1962 -1100 - August 9, 1962 -1000

 1 86.[illegible]   2 77.6   3 89.8   4 79.7   5 88.9   6 78.2   7 89.4   8 78.7
 9 88.1  10 87.2  11 84.6  12 82.5  13 80.7  14 77.9  15 88.4  16 88.3
17 87.1  18 85.6  19 83.9  20 90.5  21 90.6  22 89.9  23 89.3  24 87.6
25 90.3  26 90.4  27 90.9  28 89.2  29 91.3  30 89.0  31 90.8  32 91.0
```

```
August 9, 1962 -1100 - August 10, 1962 -1000

 1 86.6   2 71.1   3 87.4   4 80.1   5 87.5   6 79.3   7 88.3   8 88.6
 9 87.1  10 86.8  11 84.6  12 82.4  13 81.3  14 77.8  15 87.4  16 87.4
17 88.8  18 87.2  19 86.6  20 90.3  21 91.9  22 91.4  23 91.2  24 89.6
25 90.0  26 90.4  27 91.1  28 85.6  29 91.5  30 89.1  31 90.5  32 90.7
```

```
August 10, 1962 -1100 - August 11, 196_ -1000

 1 87.0   2 73.5   3 87.6   4 81.4   5 87.0   6 88.1   7 87.8   8 81.4
 9 86.5  10 86.3  11 84.5  12 85.8  13 81.[illegible]  14 77.9  15 86.8  16 86.7
17 88.9  18 87.7  19 85.1  20 90.2  21 90.2  22 91.0  23 90.9  24 89.6
25 89.0  26 89.4  27 90.1  28 88.9  29 90.2  30 88.3  31 90.2  32 90.3
```

```
August 11, 1962 -1100 - August 12, 1962 -1000

 1 87.1   2 74.5   3 82.8   4 88.6   5 87.3   6 79.6   7 90.0   8 80.1
 9 86.7  10 86.1  11 84.5  12 88.9  13 81.9  14 80.0  15 86.3  16 86.0
17 88.5  18 87.6  19 86.7  20 90.7  21 90.3  22 90.9  23 93.6  24 88.7
25 88.3  26 85.0  27 88.4  28 81.4  29 88.6  30 86.7  31 85.0  32 88.9
```

```
August 12, 1962 -1100 - August 13, 1962 -1000

 1 86.8   2 88.3   3 87.4   4 78.9   5 88.0   6 77.3   7 87.6   8 80.5
 9 88.3  10 85.9  11 86.4  12 85.0  13 81.0  14 80.3  15 86.6  16 86.3
17 89.3  18 88.7  19 85.2  20 90.5  21 90.5  22 88.4  23 91.2  24 88.2
25 88.7  26 84.9  27 90.7  28 88.9  29 90.6  30 88.9  31 90.1  32 90.0
```

```
August 13, 1962 -1100 - August 14, 1962 -1000

 1 [illegible]   2 [illegible]   3 88.3   4 88.6   5 87.0   6 88.7   7 [illegible]   8 80.3
 9 86.0  10 [illegible]  11 88.6  12 88.9  13 88.7  14 80.3  15 88.6  16 87.1
17 80.3  18 [illegible]  19 [illegible]  20 [illegible]  21 88.9  22 80.3  23 78.1  24 87.3
25 88.3  26 90.1  27 90.7  28 [illegible]  29 91.8  30 86.0  31 88.0  32 91.3
```

```
August 14, 1962 -1100 - August 15, 1962 -1000

 1 [illegible]   2 [illegible]   3 [illegible]   4 [illegible]   5 [illegible]   6 [illegible]   7 [illegible]   8 [illegible]
 9 [illegible]  10 [illegible]  11 [illegible]  12 [illegible]  13 [illegible]  14 [illegible]  15 [illegible]  16 [illegible]
17 [illegible]  18 [illegible]  19 [illegible]  20 [illegible]  21 [illegible]  22 [illegible]  23 [illegible]  24 [illegible]
25 [illegible]  26 [illegible]  27 [illegible]  28 [illegible]  29 [illegible]  30 [illegible]  31 [illegible]  32 [illegible]
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August 15, 1962 -1100 - August 16, 1962 -1000

 1 [illegible]   2 [illegible]   3 [illegible]   4 [illegible]   5 [illegible]   6 [illegible]   7 [illegible]   8 [illegible]
 9 [illegible]  10 [illegible]  11 [illegible]  12 [illegible]  13 [illegible]  14 [illegible]  15 [illegible]  16 [illegible]
17 [illegible]  18 [illegible]  19 [illegible]  20 [illegible]  21 [illegible]  22 [illegible]  23 [illegible]  24 [illegible]
25 [illegible]  26 [illegible]  27 [illegible]  28 [illegible]  29 [illegible]  30 [illegible]  31 [illegible]  32 [illegible]
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```
August 16, 1962 -1100 - August 17, 1962 -1000

 1 [illegible]   2 [illegible]   3 [illegible]   4 [illegible]   5 [illegible]   6 [illegible]   7 [illegible]   8 [illegible]
 9 [illegible]  10 [illegible]  11 [illegible]  12 [illegible]  13 [illegible]  14 [illegible]  15 [illegible]  16 [illegible]
17 [illegible]  18 [illegible]  19 [illegible]  20 [illegible]  21 [illegible]  22 [illegible]  23 [illegible]  24 [illegible]
25 [illegible]  26 [illegible]  27 [illegible]  28 [illegible]  29 [illegible]  30 [illegible]  31 [illegible]  32 [illegible]
```

```
August 17, 1962 -1100 - August 18, 1962 -1000

 1 86.5   2 76.1   3 90.6   4 88.1   5 90.2   6 88.1   7 90.5   8 79.6
 9 93.3  10 89.2  11 85.2  12 83.5  13 81.1  14 79.6  15 [illegible]  16 91.0
17 90.6  18 88.3  19 86.3  20 97.3  21 95.2  22 92.6  23 91.4  24 89.9
25 96.2  26 93.4  27 96.6  28 92.3  29 93.5  30 93.7  31 93.0  32 96.3
```

```
August 18, 1962 -1100 - August 19, 1962 -1000

 1 86.7   2 77.6   3 96.0   4 88.0   5 96.8   6 89.0   7 92.6   8 87.2
 9 91.8  10 91.2  11 84.4  12 89.6  13 91.2  14 [illegible]  15 [illegible]  16 91.6
17 90.5  18 88.5  19 86.7  20 97.8  21 91.7  22 92.4  23 91.2  24 90.3
25 96.5  26 96.3  27 96.5  28 95.8  29 96.0  30 90.4  31 93.0  32 96.0
```

```
August 19, 1962 -1100 - August 20, 1962 -1000

 1 91.9   2 70.9   3 87.4   4 [illegible]   5 93.0   6 88.2   7 93.6   8 [illegible]
 9 [illegible]  10 [illegible]  11 [illegible]  12 [illegible]  13 [illegible]  14 [illegible]  15 [illegible]  16 [illegible]
17 [illegible]  18 [illegible]  19 [illegible]  20 [illegible]  21 [illegible]  22 [illegible]  23 [illegible]  24 [illegible]
25 [illegible]  26 [illegible]  27 [illegible]  28 [illegible]  29 [illegible]  30 [illegible]  31 [illegible]  32 [illegible]
```

NAPIER COMMUNITYSHELTER
GAINESVILLE, FLORIDA

August 24, 1962 -1200 - August 25, 1962 -1100

1	84.8	2	77.2	3	84.0	4	78.2	5	83.5	6	81.1	7	84.2	8	80.8
9	80.6	10	81.0	11	82.9	12	83.0	13	83.0	14	82.3	15	82.7	16	83.2
17	82.6	18	82.3	19	82.2	20	82.0	21	82.1	22	86.0	23	85.3	24	83.6
25	80.3	26	80.9	27	79.9	28	85.0	29	[illegible]	30	82.7	31	82.2	32	84.2
33	77.9	34	77.7	35	81.6	36	81.5	37	82.1	38	81.9	39	82.2	40	82.1
41	83.2	42	81.1	43	80.5	44	78.2	45	83.7	46	83.6	47	83.9	48	83.8
49	83.9	50	84.0	51	84.0	52	84.0	53	83.6	54	82.8	55	83.1	56	83.4
57	83.4	58	82.4	59	81.9	60	82.3	61	82.5	62	82.3	63	82.6	64	80.7
65	80.8	66	80.4	67	80.7	68	80.7	69	80.5	70	81.3	71	80.2	72	79.2
73	77.9	74	80.4	75	79.5	76	78.7								

August 25, 1962 -1200 - August 26, 1962 -1300

1	86.7	2	77.1	3	85.4	4	78.6	5	84.9	6	82.0	7	86.0	8	81.6
9	81.7	10	85.8	11	84.5	12	84.5	13	84.4	14	83.6	15	83.3	16	84.4
17	83.7	18	82.2	19	82.2	20	82.5	21	82.8	22	88.2	23	87.7	24	86.0
25	80.6	26	80.3	27	80.2	28	87.7	29	81.2	30	83.9	31	84.3	32	86.7
33	78.2	34	77.4	35	82.6	36	82.6	37	82.2	38	81.7	39	82.7	40	81.9
41	81.7	42	81.0	43	80.4	44	78.8	45	83.8	46	85.6	47	85.1	48	[illegible]
49	85.0	50	85.0	51	85.1	52	85.2	53	85.0	54	83.9	55	84.1	56	84.4
57	84.5	58	83.5	59	83.0	60	83.1	61	84.6	62	83.1	63	82.6	64	81.1
65	81.1	66	80.6	67	80.9	68	81.0	69	80.6	70	81.3	71	80.3	72	79.3
73	77.9	74	80.6	75	79.6	76	78.9								

August 26, 1962 - August 27, 1962

No data was taken.

August 27, 1962 -1400 - August 28, 1962 -1100

1	85.3	2	75.3	3	84.9	4	75.0	5	86.1	6	82.4	7	86.3	8	82.5
9	82.8	10	85.4	11	84.3	12	84.5	13	84.2	14	84.0	15	84.1	16	84.3
17	83.4	18	82.4	19	82.3	20	82.3	21	82.4	22	87.2	23	86.5	24	85.1
25	82.1	26	82.6	27	82.2	28	86.7	29	82.2	30	83.5	31	84.2	32	85.9
33	78.5	34	77.6	35	82.5	36	82.5	37	82.2	38	82.0	39	82.5	40	82.0
41	81.8	42	82.0	43	81.6	44	81.5	45	84.2	46	84.3	47	84.0	48	84.2
49	84.2	50	84.2	51	84.4	52	84.4	53	84.3	54	83.4	55	83.8	56	34.4
57	84.4	58	83.5	59	83.0	60	82.2	61	84.1	62	83.0	63	82.6	64	81.3
65	81.1	66	80.8	67	80.7	68	81.1	69	81.1	70	81.4	71	80.5	72	79.5
73	78.0	74	80.8	75	79.8	76	78.9								

August 28, 1962 -1200 - August 29, 1962 -1100

1	85.0	2	76.6	3	85.9	4	77.0	5	87.9	6	85.6	7	88.1	8	85.6
9	85.2	10	87.5	11	86.2	12	86.5	13	85.9	14	84.6	15	85.0	16	86.5
17	85.5	18	82.3	19	82.6	20	83.3	21	84.3	22	88.8	23	88.4	24	87.2
25	82.9	26	83.7	27	85.0	28	88.3	29	83.5	30	85.3	31	86.0	32	87.4
33	78.2	34	77.3	35	82.9	36	82.9	37	82.0	38	82.0	39	82.8	40	81.8
41	81.6	42	83.1	43	82.8	44	83.1	45	84.6	46	84.7	47	84.8	48	84.8
49	84.8	50	84.9	51	84.9	52	84.9	53	84.9	54	84.8	55	84.0	56	85.2
57	85.1	58	84.7	59	84.4	60	83.6	61	85.4	62	89.7	63	82.5	64	81.7
65	81.5	66	80.7	67	80.6	68	81.0	69	81.0	70	81.1	71	80.4	72	79.2
73	77.8	74	80.6	75	79.5	76	78.7								

August 29, 1962 -1200 - August 30, 1962 -1100

1	86.4	2	80.7	3	86.1	4	73.7	5	87.3	6	84.9	7	87.8	8	85.7
9	84.9	10	87.3	11	86.7	12	87.1	13	86.8	14	85.5	15	85.1	16	86.3
17	85.7	18	82.4	19	82.7	20	83.8	21	84.5	22	88.4	23	88.2	24	87.3
25	84.3	26	84.5	27	84.3	28	88.1	29	83.8	30	85.6	31	84.6	32	87.3
33	78.4	34	78.4	35	83.9	36	83.8	37	82.8	38	82.9	39	83.6	40	82.4
41	82.4	42	84.4	43	83.3	44	82.6	45	86.6	46	86.8	47	86.3	48	86.2
49	86.7	50	86.4	51	86.5	52	86.6	53	86.5	54	85.0	55	86.1	56	86.1
57	86.4	58	85.0	59	84.6	60	83.8	61	86.0	62	84.2	63	82.5	64	81.8
65	81.6	66	80.7	67	80.5	68	81.3	69	81.1	70	80.9	71	80.6	72	79.3
73	77.7	74	80.7	75	79.6	76	78.7								

August 30, 1962 -1200 - August 31, 1962 -1100

1	85.8	2	74.5	3	85.8	4	75.6	5	87.8	6	85.8	7	88.1	8	85.6
9	85.5	10	87.7	11	87.0	12	87.3	13	87.1	14	85.7	15	84.3	16	86.7
17	83.9	18	82.5	19	82.8	20	84.0	21	84.8	22	89.2	23	88.8	24	87.7
25	84.5	26	84.7	27	84.4	28	89.2	29	84.8	30	84.6	31	87.5	32	87.9
33	78.8	34	77.5	35	84.1	36	84.4	37	83.5	38	83.6	39	84.3	40	83.0
41	82.4	42	84.4	43	83.4	44	82.6	45	86.6	46	86.8	47	86.3	48	86.2
49	88.2	50	87.9	51	88.0	52	88.0	53	87.7	54	86.7	55	87.4	56	87.6
57	87.3	58	86.1	59	85.6	60	85.7	61	86.3	62	84.5	63	82.9	64	81.8
65	81.6	66	80.8	67	80.6	68	81.3	69	81.0	70	80.8	71	80.7	72	79.4
73	77.8	74	80.8	75	79.7	76	78.6								

August 31, 1962 -1200 - September 1, 1962 -1100

1	85.7	2	76.1	3	86.0	4	77.5	5	88.4	6	86.0	7	89.5	8	86.6
9	86.1	10	88.4	11	87.7	12	87.7	13	87.3	14	85.7	15	83.8	16	87.6
17	86.7	18	82.8	19	83.3	20	84.5	21	85.5	22	90.3	23	89.4	24	88.7
25	83.7	26	82.5	27	82.9	28	90.5	29	85.1	30	86.7	31	88.0	32	88.1
33	78.6	34	77.4	35	84.6	36	84.6	37	83.7	38	83.6	39	84.6	40	83.4
41	83.2	42	84.3	43	83.3	44	80.5	45	87.6	46	87.7	47	87.1	48	86.2
49	86.9	50	86.9	51	86.9	52	86.9	53	86.4	54	85.2	55	85.8	56	85.7
57	85.7	58	84.4	59	83.9	60	83.2	61	86.5	62	84.5	63	82.7	64	81.7
65	81.3	66	80.5	67	80.4	68	81.2	69	80.7	70	80.5	71	80.5	72	79.1
73	77.4	74	80.5	75	79.3	76	78.2								

September 1, 1962 -1200 - September 2, 1962 -1100

1	85.6	2	76.5	3	85.8	4	78.8	5	89.1	6	86.4	7	89.4	8	87.9
9	86.8	10	88.9	11	88.2	12	88.2	13	87.7	14	86.3	15	85.1	16	88.2
17	87.4	18	83.1	19	83.8	20	85.1	21	85.9	22	90.2	23	90.1	24	89.2
25	83.7	26	81.4	27	83.4	28	90.0	29	85.8	30	87.7	31	88.5	32	88.7
33	78.[illegible]	34	77.5	35	85.1	36	84.9	37	80.3	38	83.3	39	84.8	40	83.5
41	82.9	42	84.5	43	83.6	44	82.1	45	86.5	46	86.6	47	85.9	48	85.1
49	85.8	50	85.8	51	85.5	52	85.5	53	85.0	54	83.1	55	84.1	56	83.9
57	83.9	58	83.0	59	82.6	60	81.8	61	87.0	62	84.7	63	82.6	64	81.8
65	81.5	66	80.4	67	80.3	68	81.3	69	80.7	70	80.3	71	80.4	72	79.0
73	77.3	74	80.5	75	79.2	76	77.9								

September 2, 1962 -1200 - September 3, 1962 -1100

1	85.7	2	77.2	3	86.1	4	77.9	5	89.2	6	87.6	7	89.5	8	87.8
9	87.0	10	89.0	11	88.4	12	88.5	13	88.5	14	86.0	15	84.5	16	88.2
17	87.6	18	83.1	19	83.8	20	85.5	21	86.1	22	90.3	23	90.2	24	89.2
25	84.1	26	82.9	27	83.7	28	90.5	29	86.0	30	84.1	31	88.7	32	89.1
33	79.4	34	77.9	35	85.8	36	85.5	37	84.5	38	83.9	39	85.6	40	84.3
41	83.7	42	85.3	43	84.2	44	82.4	45	88.1	46	88.2	47	88.2	48	87.8
49	88.9	50	87.9	51	87.9	52	87.9	53	87.8	54	86.7	55	86.9	56	87.0
57	87.0	58	86.5	59	86.3	60	85.7	61	88.0	62	86.0	63	83.6	64	83.0
65	82.6	66	81.4	67	81.1	68	82.4	69	81.4	70	81.4	71	81.3	72	79.9
73	78.3	74	81.5	75	80.3	76	79.2								

September 3, 1962 -1200 - September 4, 1962 -1100

1	86.1	2	76.5	3	85.6	4	76.6	5	89.1	6	87.7	7	89.4	8	87.9
9	87.0	10	89.1	11	88.5	12	88.7	13	88.6	14	86.2	15	84.3	16	88.2
17	87.8	18	83.1	19	84.0	20	85.8	21	86.5	22	89.9	23	90.1	24	89.2
25	83.5	26	82.3	27	83.2	28	89.7	29	86.3	30	88.1	31	88.8	32	89.3
33	79.8	34	78.8	35	86.2	36	86.1	37	84.9	38	83.9	39	86.0	40	84.7
41	84.1	42	84.7	43	83.8	44	81.3	45	88.3	46	88.5	47	88.3	48	87.5
49	87.8	50	87.8	51	87.7	52	87.7	53	87.6	54	85.8	55	86.1	56	86.2
57	86.3	58	85.7	59	85.5	60	84.9	61	88.2	62	86.4	63	83.9	64	83.4
65	83.0	66	81.8	67	81.4	68	82.8	69	81.7	70	81.6	71	81.7	72	80.3
73	78.6	74	81.7	75	80.7	76	79.7								

September 4, 1962 - 1200 - September 5, 1962 - 1100

1	85.6	2	77.9	3	85.7	4	77.9	5	88.7	6	86.9	7	89.0	8	86.9
9	86.7	10	88.7	11	[illegible]	12	88.5	13	88.5	14	85.8	15	84.0	16	87.9
17	87.5	18	83.3	19	[illegible]	20	86.0	21	86.6	22	89.4	23	89.5	24	89.1
25	83.9	26	82.2	27	[illegible]	28	89.4	29	86.[illegible]	30	88.0	31	88.6	32	88.9
33	79.7	34	78.4	35	86.[illegible]	36	86.2	37	85.3	38	83.8	39	86.2	40	85.0
41	84.3	42	84.6	43	83.6	44	81.5	45	87.8	46	88.0	47	88.1	48	87.3
49	87.5	50	87.6	51	87.5	52	87.5	53	87.3	54	85.7	55	85.8	56	86.0
57	86.1	58	85.6	59	85.3	60	84.6	61	88.5	62	86.8	63	84.4	64	83.8
65	83.5	66	82.3	67	81.7	68	83.3	69	82.3	70	82.1	71	82.3	72	80.8
73	79.1	74	82.2	75	81.1	76	79.7								

September 5, 1962 - 1200 - September 6, 1962 - 1100

1	85.8	2	77.9	3	85.6	4	77.1	5	88.9	6	86.8	7	89.3	8	86.8
9	86.8	10	88.8	11	88.3	12	88.4	13	88.3	14	86.4	15	85.5	16	88.0
17	87.4	18	83.[illegible]	19	84.7	20	86.0	21	86.6	22	89.1	23	89.2	24	88.9
25	84.2	26	82.5	27	83.3	28	89.6	29	86.3	30	87.8	31	88.4	32	88.6
33	79.7	34	78.0	35	85.8	36	85.6	37	84.8	38	83.1	39	85.7	40	84.8
41	83.9	42	84.0	43	83.6	44	82.1	45	89.0	46	89.3	47	88.5	48	86.8
49	88.8	50	88.3	51	87.4	52	87.5	53	87.2	54	85.5	55	86.6	56	85.9
57	86.4	58	85.3	59	85.4	60	84.2	61	83.0	62	86.5	63	84.1	64	83.3
65	83.1	66	82.0	67	81.4	68	83.0	69	82.1	70	81.6	71	82.0	72	80.7
73	78.8	74	82.0	75	80.9	76	79.5								

September 6, 1962 -1200 - September 7, 1962 -1100

1	86.1	2	78.6	3	86.0	4	77.0	5	88.9	6	86.6	7	89.2	8	86.7
9	86.7	10	88.9	11	88.3	12	88.4	13	88.4	14	86.8	15	86.8	16	88.1
17	87.5	18	83.3	19	84.9	20	86.1	21	82.9	22	89.5	23	89.4	24	88.6
25	84.3	26	84.6	27	83.7	28	89.8	29	86.4	30	87.7	31	88.3	32	88.5
33	78.8	34	78.1	35	85.8	36	85.6	37	84.8	38	83.2	39	85.6	40	84.6
41	84.1	42	84.3	43	83.6	44	82.4	45	89.8	46	88.[illegible]	47	88.6	48	87.0
49	89.2	50	88.6	51	87.6	52	87.8	53	87.5	54	85.6	55	86.9	56	86.6
57	87.3	58	85.4	59	85.0	60	83.6	61	87.9	62	86.4	63	83.9	64	83.2
65	83.0	66	81.9	67	81.3	68	82.8	69	82.0	70	81.5	71	81.9	72	80.6
73	78.7	74	82.0	75	80.9	76	79.4								

September 7, 1962 -1200 - September 8, 1962 -1100

1	84.9	2	77.4	3	84.3	4	75.8	5	87.2	6	84.4	7	87.6	8	84.3
9	85.7	10	88.2	11	87.9	12	88.1	13	88.0	14	85.2	15	81.7	16	87.2
17	86.8	18	83.5	19	84.8	20	86.0	21	86.5	22	88.5	23	88.7	24	88.7
25	85.0	26	81.9	27	83.5	28	91.2	29	88.2	30	89.1	31	90.2	32	89.8
33	81.8	34	80.6	35	88.1	36	87.9	37	87.0	38	85.3	39	87.9	40	86.8
41	86.1	42	85.2	43	84.2	44	80.4	45	90.2	46	90.3	47	89.8	48	87.0
49	89.5	50	80.9	51	87.0	52	87.3	53	86.5	54	83.0	55	85.6	56	84.0
57	85.1	58	85.2	59	84.9	60	83.8	61	87.8	62	86.5	63	84.1	64	83.3
65	83.1	66	82.2	67	81.4	68	83.1	69	82.2	70	81.6	71	82.1	72	80.8
73	79.0	74	82.2	75	81.1	76	79.6								

September 8, 1962 -1200 - September 9, 1962 -1100

1	84.9	2	82.8	3	84.4	4	78.7	5	89.0	6	87.1	7	89.6	8	87.4
9	87.3	10	88.8	11	88.1	12	88.1	13	87.7	14	84.8	15	85.0	16	86.2
17	87.8	18	83.2	19	84.6	20	85.8	21	86.4	22	88.5	23	88.5	24	88.1
25	84.6	26	83.1	27	83.8	28	91.2	29	88.4	30	90.2	31	90.3	32	90.5
33	82.2	34	80.6	35	87.9	36	87.8	37	86.9	38	84.7	39	87.7	40	86.8
41	85.6	42	84.7	43	83.5	44	80.9	45	89.3	46	89.4	47	88.6	48	86.3
49	88.4	50	88.2	51	87.0	52	86.7	53	86.1	54	84.1	55	84.8	56	84.7
57	84.8	58	85.0	59	84.2	60	83.5	61	87.5	62	86.5	63	84.1	64	83.3
65	83.1	66	82.3	67	81.4	68	83.1	69	82.5	70	81.7	71	82.1	72	80.9
73	79.2	74	82.3	75	81.2	76	79.[illegible]								

September 9, 1962 -1200 - September 10, 1962 -1100

1	85.6	2	78.5	3	85.6	4	80.0	5	91.0	6	89.7	7	91.5	8	89.7
9	89.1	10	90.0	11	89.3	12	89.2	13	88.3	14	85.5	15	84.9	16	89.7
17	89.2	18	83.2	19	84.8	20	86.3	21	87.2	22	89.5	23	89.5	24	88.7
25	85.0	26	84.6	27	84.8	28	92.0	29	89.9	30	91.4	31	91.2	32	91.9
33	82.2	34	80.6	35	87.7	36	87.7	37	86.6	38	84.5	39	87.6	40	86.5
41	85.4	42	85.1	43	84.4	44	83.6	45	88.[illegible]	46	89.0	47	88.1	48	86.3
49	88.2	50	87.9	51	87.1	52	86.9	53	[illegible]	54	85.2	55	85.7	56	85.7
57	85.8	58	85.6	59	84.4	60	84.0	61	87.6	62	86.3	63	83.9	64	83.6
65	83.3	66	82.3	67	81.4	68	82.8	69	82.5	70	81.8	71	82.3	72	81.0
73	79.3	74	82.4	75	81.2	76	79.8								

CENTRAL STORES "DESIGNATED AREA" SHELTER
GAINESVILLE, FLORIDA

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September 14, 1962 -1400 - September 15, 1962 -1300

1  86.0   2  88.9   3  90.0   4  85.7   5  89.4   6  90.6   7  90.2   8  87.7
9  85.6  10  86.6  11  89.3  12  88.9  13  88.7

September 15, 1962 -1400 - September 16, 1962 -1300

1  86.0   2  90.6   3  91.5   4  87.6   5  91.3   6  92.0   7  92.6   8  91.7
9  84.9  10  84.8  11  90.0  12  89.8  13  89.8

September 16, 1962 -1400 - September 17, 1962 -1300

1  85.9   2  91.0   3  91.5   4  87.7   5  91.6   6  92.1   7  92.6   8  93.4
9  85.3  10  84.8  11  90.5  12  90.3  13  90.4

September 17, 1962 -1400 - September 18, 1962 -1300

1  86.5   2  91.2   3  92.8   4  89.2   5  92.1   6  92.9   7  92.7   8  91.7
9  86.1  10  86.1  11  90.9  12  91.1  13  91.2

September 18, 1962 -1400 - September 19, 1962 -1300

1  87.1   2  91.5   3  93.2   4  89.5   5  92.2   6  93.2   7  92.8   8  91.5
9  85.5  10  85.4  11  91.0  12  91.0  13  91.2

September 19, 1962 -1400 - September 20, 1962 -1300

1  85.9   2  90.3   3  91.8   4  89.1   5  91.4   6  92.2   7  91.8   8  90.7
9  82.5  10  82.4  11  90.0  12  89.4  13  89.6

September 20, 1962 -1400 - September 21, 1962 -1300

1  84.7   2  88.5   3  90.0   4  87.6   5  89.1   6  89.9   7  89.9   8  88.7
9  78.8  10  78.6  11  87.2  12  86.6  13  86.6

September 21, 1962 -1400 - September 22, 1962 -1300

1  84.3   2  85.8   3  85.9   4  84.4   5  86.1   6  87.2   7  87.0   8  84.4
9  77.3  10  77.4  11  85.1  12  82.6  13  79.5

September 22, 1962 -1400 - September 23, 1962 -1300

1  85.4   2  86.8   3  84.7   4  85.0   5  87.5   6  88.7   7  88.3   8  84.8
9  78.8  10  78.7  11  86.0  12  84.7  13  85.0

September 23, 1962 -1400 - September 24, 1962 -1300

1  84.3   2  86.8   3  88.3   4  85.3   5  87.4   6  89.2   7  89.3   8  84.0
9  79.0  10  76.9  11  86.9  12  83.5  13  83.9

September 24, 1962 -1400 - September 25, 1962 -1300

1  84.0   2  85.7   3  87.5   4  85.2   5  86.3   6  87.4   7  87.4   8  85.5
9  79.0  10  79.1  11  85.3  12  84.1  13  83.6
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Model Community Shelter (Winter Test)
Reading, Pennsylvania

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  FEB 25,1963
 1  27.54   2  25.57   3  35.81   4  31.76   5  32.23   6  30.17   7  34.82
 8  34.55   9  46.40  10  43.51  11  44.12  12  42.22  13  43.72  14  43.13
15  44.49  16  42.91  17  44.52  18  42.35  19  44.16  20  44.00  21  42.20
22  41.44  23  40.51  24  42.21  25  36.10  26  33.80  27  32.25  28  29.95
29  37.10  30  36.15  31  34.80  32  33.55  33  40.40  34  36.65  35  35.10
36  32.50  37  23.90  38  27.85  39  79.05  40  31.60  41   0.    42   0.
43   0.    44   0.    45   0.    46   0.    47   0.    48   0.    49   0.

  FEB 26,1963
 1  16.09   2  15.04   3  30.50   4  28.07   5  49.16   6  44.79   7  45.78
 8  47.84   9  43.34  10  43.72  11  44.97  12  42.91  13  47.16  14  44.16
15  46.30  16  44.79  17  42.90  18  42.83  19  43.13  20  45.00  21  42.09
22  40.63  23  19.67  24  39.40  25  38.66  26  34.88  27  32.64  28  29.81
29  38.34  30  36.10  31  34.67  32  33.48  33  40.49  34  36.72  35  34.91
36  32.15  37  29.69  38  31.29  39  82.63  40  42.81  41   0.    42   0.
43   0.    44   0.    45   0.    46   0.    47   0.    48   0.    49   0.

  FEB 27,1963
 1  15.14   2  14.86   3  34.16   4  31.38   5  50.61   6  46.00   7  47.49
 8  44.33   9  44.96  10  45.47  11  46.87  12  44.60  13  48.48  14  45.56
15  47.94  16  46.40  17  44.40  18  43.86  19  43.76  20  45.01  21  43.24
22  42.07  23  17.91  24  32.93  25  40.56  26  36.58  27  33.43  28  27.98
29  39.74  30  34.69  31  34.88  32  33.67  33  40.57  34  36.69  35  34.78
36  30.53  37  25.76  38  23.44  39  52.41  40  32.39  41   0.    42   0.
43   0.    44   0.    45   0.    46   0.    47   0.    48   0.    49   0.

  FEB 28,1963
 1  26.91   2  26.22   3  36.93   4  34.24   5  51.47   6  47.44   7  48.52
 8  45.83   9  46.10  10  46.79  11  48.21  12  45.95  13  49.67  14  47.01
15  49.45  16  47.93  17  45.60  18  44.79  19  44.43  20  45.24  21  44.12
22  43.30  23  27.03  24  32.76  25  41.65  26  37.38  27  33.74  28  29.64
29  40.66  30  37.07  31  34.80  32  33.81  33  40.04  34  35.92  35  34.47
36  31.73  37  27.94  38  27.10  39  33.20  40  32.27  41   0.    42   0.
43   0.    44   0.    45   0.    46   0.    47   0.    48   0.    49   0.

  MAR  1,1963
 1  27.73   2  27.42   3  34.71   4  32.10   5  52.31   6  48.36   7  49.32
 8  46.94   9  [illegible]  10  47.61  11  49.15  12  46.75  13  50.35  14  47.67
15  50.30  16  48.60  17  46.47  18  45.53  19  45.01  20  45.47  21  44.70
22  44.11  23  28.30  24  32.91  25  42.43  26  38.01  27  34.09  28  30.42
29  41.43  30  37.49  31  34.82  32  33.56  33  40.07  34  35.71  35  34.26
36  31.67  37  24.89  38  28.46  39  31.51  40  32.17  41   0.    42   0.
43   0.    44   0.    45   0.    46   0.    47   0.    48   0.    49   0.

  MAR  2,1963
 1  32.33   2  31.36   3  36.84   4  33.47   5  53.28   6  49.40   7  50.25
 8  47.92   9  48.00  10  48.53  11  50.11  12  47.82  13  51.55  14  48.32
15  51.32  16  49.87  17  47.23  18  46.17  19  45.61  20  45.82  21  45.19
22  44.85  23  32.08  24  33.22  25  43.13  26  38.58  27  34.51  28  31.63
29  42.08  30  37.91  31  34.86  32  33.43  33  39.81  34  35.23  35  33.74
36  31.93  37  30.19  38  30.51  39  33.02  40  32.42  41   0.    42   0.
43   0.    44   0.    45   0.    46   0.    47   0.    48   0.    49   0.

  MAR  3,1963
 1  35.40   2  34.48   3  39.50   4  34.04   5  53.95   6  49.84   7  51.16
 8  48.38   9  48.81  10  49.18  11  50.94  12  48.44  13  52.32  14  49.23
15  51.98  16  50.32  17  47.82  18  46.73  19  46.08  20  46.06  21  46.02
22  45.62  23  35.71  24  35.45  25  43.89  26  39.17  27  35.13  28  31.58
29  42.72  30  38.35  31  35.08  32  33.48  33  39.81  34  35.30  35  33.88
36  31.71  37  30.91  38  31.05  39  33.65  40  36.90  41   0.    42   0.
43   0.    44   0.    45   0.    46   0.    47   0.    48   0.    49   0.

  MAR  4,1963
 1  37.18   2  36.85   3  41.72   4  38.05   5  54.78   6  50.97   7  52.16
 8  49.80   9  49.74  10  50.04  11  51.76  12  49.86  13  52.93  14  50.17
15  53.19  16  52.27  17  48.74  18  47.50  19  46.74  20  46.58  21  46.95
22  46.75  23  36.92  24  32.80  25  44.37  26  39.52  27  35.63  28  31.62
29  43.37  30  38.72  31  35.22  32  33.53  33  39.53  34  35.25  35  33.98
36  31.91  37  31.01  38  31.13  39  37.46  40  31.75  41   0.    42   0.
43   0.    44   0.    45   0.    46   0.    47   0.    48   0.    49   0.

  MAR  5,1963
 1  38.13   2  35.75   3  40.81   4  38.34   5  55.65   6  51.86   7  52.87
 8  50.68   9  50.41  10  50.72  11  52.78  12  51.51  13  53.61  14  50.85
15  54.48  16  53.98  17  49.40  18  47.96  19  47.53  20  47.48  21  47.34
22  47.69  23  37.85  24  32.46  25  44.67  26  39.57  27  35.77  28  32.45
29  44.53  30  37.39  31  35.60  32  33.77  33  39.65  34  35.46  35  34.21
36  32.25  37  31.28  38  31.45  39  38.88  40  34.32  41  49.19  42  48.64
43  38.05  44  41.67  45  43.93  46  42.69  47  42.10  48  39.81  49  40.43

  MAR  6,1963
 1  37.18   2  34.89   3  40.51   4  37.85   5  55.66   6  52.12   7  52.96
 8  50.74   9  50.54  10  50.83  11  52.82  12  51.57  13  53.69  14  50.84
15  54.47  16  54.04  17  49.56  18  48.35  19  47.77  20  47.61  21  47.22
22  47.84  23  37.42  24  35.11  25  44.52  26  39.32  27  35.17  28  33.03
29  44.96  30  37.72  31  35.63  32  33.73  33  39.46  34  35.30  35  34.13
36  32.23  37  31.40  38  31.26  39  36.93  40  32.02  41  47.52  42  46.96
43  38.41  44  43.52  45  45.65  46  45.13  47  43.15  48  40.35  49  40.96

  MAR  7,1963
 1  37.34   2  34.80   3  37.72   4  37.15   5  55.94   6  52.39   7  53.37
 8  51.18   9  50.95  10  51.22  11  53.17  12  52.09  13  54.00  14  51.26
15  54.77  16  54.57  17  49.99  18  48.67  19  48.00  20  47.96  21  48.13
22  48.35  23  37.96  24  32.76  25  45.28  26  40.21  27  36.35  28  35.20
29  45.39  30  40.11  31  35.80  32  33.64  33  39.51  34  35.46  35  34.27
36  32.34  37  31.49  38  31.40  39  36.03  40  32.21  41  45.29  42  43.33
43  39.02  44  45.19  45  47.02  46  46.52  47  39.73  48  40.48  49  41.21

  MAR  8,1963
 1  38.39   2  34.38   3  41.44   4  36.83   5  60.21   6  55.05   7  55.74
 8  52.91   9  52.92  10  52.13  11  55.38  12  53.56  13  57.56  14  52.20
15  57.24  16  56.81  17  50.77  18  48.98  19  48.22  20  47.85  21  49.44
22  44.34  23  39.68  24  32.60  25  46.42  26  41.27  27  37.21  28  36.64
29  46.25  30  40.73  31  36.23  32  34.08  33  39.69  34  35.67  35  34.55
36  32.65  37  31.64  38  31.68  39  36.45  40  32.15  41  48.42  42  46.13
43  39.94  44  45.19  45  48.15  46  46.92  47  39.71  48  40.73  49  41.42

  MAR  9,1963
 1  36.83   2  35.10   3  42.01   4  37.32   5  [illegible]   6  53.63   7  60.19
 8  56.45   9  56.41  10  54.42  11  53.97  12  56.71  13  61.96  14  54.44
15  61.11  16  60.71  17  52.36  18  49.87  19  48.71  20  48.03  21  52.28
22  51.88  23  38.52  24  32.24  25  49.15  26  [illegible]  27  39.22  28  37.97
29  47.90  30  41.18  31  36.36  32  34.19  33  39.57  34  35.70  35  34.56
36  32.76  37  31.69  38  31.61  39  37.58  40  32.06  41  51.75  42  53.77
43  39.54  44  40.69  45  49.50  46  47.77  47  39.96  48  40.19  49  41.56

  MAR 10,1963
 1  39.09   2  35.15   3  [illegible]   4  37.77   5  [illegible]   6  60.11   7  61.71
 8  58.31   9  55.56  10  56.28  11  60.80  12  58.61  13  63.79  14  [illegible]
15  62.61  16  [illegible]  17  54.06  18  51.04  19  49.55  20  48.21  21  53.93
22  53.36  23  41.46  24  32.15  25  51.57  26  [illegible]  27  43.13  28  39.19
29  49.05  30  41.53  31  36.45  32  34.11  33  39.19  34  35.41  35  34.42
36  32.85  37  31.79  38  31.93  39  37.76  40  31.96  41  52.83  42  56.60
43  [illegible]  44  41.65  45  51.48  46  [illegible]  47  45.85  48  41.75  49  47.47

  MAR 11,1963
 1  [illegible]   2  27.42   3  46.12   4  [illegible]   5  [illegible]   [illegible]  57.51   7  56.95
 8  55.91   9  [illegible]  10  [illegible]  11  [illegible]  12  [illegible]  13  52.12  14  57.11
15  61.37  16  67.55  17  [illegible]  18  52.02  19  [illegible]  20  63.33  21  55.73
22  53.97  23  [illegible]  24  [illegible]  25  [illegible]  26  [illegible]  27  [illegible]  28  [illegible]
29  [illegible]  30  [illegible]  31  [illegible]  32  [illegible]  33  [illegible]  34  35.12  35  34.18
36  [illegible]  37  [illegible]  38  [illegible]  39  [illegible]  40  [illegible]  41  [illegible]  42  49.00
43  [illegible]  44  [illegible]  45  51.21  46  [illegible]  47  [illegible]  48  42.21  49  42.56

  MAR 12,1963
 [illegible]                                                                   7  [illegible]
 [illegible]                                                                  14  55.19
 [illegible]                                                                  21  [illegible]
 [illegible]                                                                  28  [illegible]
 [illegible]                                                                  35  [illegible]
 [illegible]                                                                  42  [illegible]
 [illegible]                                                                  49  42.90

  MAR 13,1963
 [illegible]
 [illegible]
 [illegible]
 [illegible]
 [illegible]
 [illegible]
 [illegible]

  MAR 14,1963
 [illegible]
 [illegible]
 [illegible]
 [illegible]
 [illegible]
 [illegible]
 [illegible]

  MAR 15,1963
 1  [illegible]   2  32.49   3  60.33   4  54.46   5  61.04   6  54.38   7  73.83
 8  61.65   9  56.61  10  56.64  11  57.77  12  56.63  13  50.15  14  57.26
15  59.40  16  56.98  17  55.00  18  53.11  19  51.67  20  49.90  21  54.02
22  52.60  23  36.28  24  36.10  25  53.76  26  50.30  27  46.58  28  37.02
29  [illegible]  30  43.90  31  [illegible]  32  35.34  33  38.89  34  35.53  35  34.90
36  34.07  37  34.05  38  33.73  39  32.96  40  36.35  41  45.27  42  67.27
43  38.64  44  45.83  45  44.25  46  50.08  47  40.44  48  39.81  49  43.17

  MAR 16,1963
 1  39.21   2  36.33   3  65.53   4  60.85   5  66.12   6  61.29   7  66.68
 8  62.50   9  54.97  10  57.49  11  60.55  12  58.97  13  63.19  14  57.69
15  62.61  16  67.17  17  55.50  18  53.34  19  51.09  20  50.11  21  55.07
22  54.94  23  40.79  24  32.83  25  54.76  26  50.70  27  47.30  28  41.77
29  51.31  30  44.60  31  39.01  32  36.15  33  39.11  34  36.18  35  35.69
36  35.60  37  36.42  38  36.83  39  37.07  40  33.02  41  49.21  42  63.17
43  61.97  44  39.67  45  51.90  46  50.88  47  62.17  48  43.25  49  63.98

  MAR 17,1963
 1  [illegible]   2  44.08   3  70.32   4  [illegible]   5  71.69   6  66.43   7  67.66
 8  [illegible]   9  61.64  10  60.22  11  [illegible]  12  [illegible]  13  67.78  14  60.66
15  67.23  16  [illegible]  17  57.29  18  [illegible]  19  57.76  20  50.80  21  [illegible]
22  59.04  23  67.06  24  33.27  25  58.01  26  [illegible]  27  50.27  28  [illegible]
29  [illegible]  30  65.16  31  39.76  32  37.32  33  39.53  34  36.68  35  36.76
36  [illegible]  37  [illegible]  38  43.28  39  44.76  40  [illegible]  41  50.11  42  66.02
43  [illegible]  44  [illegible]  45  56.21  46  [illegible]  47  62.75  48  65.21  49  44.17

  MAR [illegible],1963
 1  [illegible]   2  [illegible]   3  [illegible]   4  67.45   5  73.21   6  68.70   7  68.00
 8  [illegible]   9  [illegible]  10  [illegible]  11  66.91  12  [illegible]  13  [illegible]  14  [illegible]
15  [illegible]  16  [illegible]  17  [illegible]  18  [illegible]  19  53.50  20  51.36  21  [illegible]
22  [illegible]  23  [illegible]  24  [illegible]  25  [illegible]  26  [illegible]  27  [illegible]  28  [illegible]
29  55.67  30  [illegible]  31  40.16  32  [illegible]  33  [illegible]  34  [illegible]  35  37.48
36  [illegible]  37  [illegible]  38  [illegible]  39  [illegible]  40  [illegible]  41  [illegible]  42  [illegible]
43  [illegible]  44  [illegible]  45  56.50  46  [illegible]  47  62.76  48  65.15  49  [illegible]
```

Hershey Family Shelter

St. Louis, Missouri

JUN 5,1963

1	90.01	2	78.10	3	69.43	4	67.97	5	68.20	6	67.20	7	84.20
8	74.37	9	67.71	10	64.89	11	64.97	12	62.16	13	61.30	14	59.08
15	57.09	16	68.20	17	80.17	18	68.37	19	66.94	20	65.77	21	67.65
22	68.66	23	63.65	24	65.29	25	87.00	26	87.26	27	87.90	28	85.34
29	75.87	30	72.05	31	67.04	32	121.74	33	76.67	34	53.15	35	59.34
36	59.04	37	61.12	38	61.25	39	60.23	40	59.86	41	63.46	42	61.56
43	61.56	44	60.51	45	60.45	46	60.28	47	65.98	48	65.91	49	64.31
50	64.90	51	65.06	52	66.07	53	60.67	54	0.	55	0.	56	82.92

JUN 6,1963

1	88.04	2	74.21	3	74.71	4	70.77	5	71.90	6	69.92	7	82.23
8	73.98	9	71.92	10	69.67	11	69.52	12	65.81	13	64.21	14	60.33
15	57.21	16	76.17	17	82.81	18	72.17	19	70.77	20	69.50	21	71.52
22	73.46	23	67.71	24	69.19	25	83.88	26	83.21	27	84.19	28	79.92
29	77.23	30	74.83	31	70.85	32	118.19	33	73.74	34	58.33	35	60.52
36	59.24	37	63.65	38	63.83	39	62.90	40	61.65	41	73.31	42	66.83
43	66.81	44	62.08	45	61.75	46	60.77	47	66.96	48	67.04	49	67.42
50	67.50	51	67.52	52	67.50	53	61.25	54	0.	55	0.	56	76.60

JUN 7,1963

1	88.19	2	75.25	3	76.48	4	72.65	5	73.52	6	72.08	7	83.10
8	76.13	9	74.33	10	72.13	11	71.94	12	67.98	13	66.79	14	61.21
15	57.90	16	77.63	17	83.63	18	74.52	19	73.02	20	71.94	21	74.15
22	75.83	23	67.56	24	70.71	25	84.50	26	83.73	27	84.73	28	78.44
29	77.48	30	74.19	31	69.31	32	119.25	33	75.83	34	59.35	35	60.96
36	59.23	37	66.06	38	66.42	39	65.19	40	62.46	41	76.13	42	69.48
43	69.25	44	63.58	45	62.94	46	61.19	47	69.67	48	69.69	49	69.54
50	69.56	51	69.56	52	69.56	53	61.42	54	0.	55	0.	56	78.25

JUN 8,1963

1	88.48	2	77.67	3	76.75	4	74.52	5	74.23	6	73.83	7	84.96
8	76.13	9	75.35	10	73.08	11	72.71	12	69.19	13	68.42	14	62.69
15	59.21	16	76.63	17	85.50	18	78.71	19	74.21	20	73.35	21	75.17
22	76.40	23	70.63	24	73.06	25	85.15	26	85.81	27	82.85	28	80.40
29	80.88	30	76.54	31	71.44	32	116.48	33	74.83	34	59.42	35	61.69
36	60.98	37	68.10	38	68.38	39	67.33	40	63.54	41	75.40	42	71.27
43	71.23	44	64.96	45	63.60	46	62.02	47	71.81	48	71.83	49	71.50
50	71.48	51	71.48	52	71.48	53	62.02	54	0.	55	0.	56	77.23

JUN 9,1963

1	87.48	2	76.31	3	77.15	4	75.29	5	75.58	6	74.79	7	84.42
8	74.73	9	76.12	10	73.98	11	73.67	12	69.83	13	69.33	14	63.71
15	59.98	16	77.17	17	85.04	18	77.38	19	75.08	20	74.17	21	77.25
22	77.17	23	71.75	24	73.96	25	86.52	26	86.06	27	86.56	28	80.25
29	81.46	30	77.02	31	72.48	32	118.31	33	75.96	34	59.24	35	62.04
36	59.46	37	69.42	38	69.67	39	68.83	40	64.60	41	74.08	42	72.38
43	72.38	44	66.13	45	64.60	46	62.21	47	73.13	48	73.13	49	73.29
50	73.38	51	73.38	52	73.38	53	62.44	54	0.	55	0.	56	77.67

JUN 10,1963

1	87.29	2	76.04	3	78.48	4	76.17	5	76.98	6	75.94	7	79.94
8	72.96	9	76.92	10	74.94	11	74.79	12	70.85	13	70.31	14	63.63
15	60.83	16	76.27	17	80.42	18	78.17	19	76.60	20	75.13	21	85.02
22	80.85	23	72.42	24	74.48	25	81.88	26	80.42	27	81.48	28	78.00
29	80.40	30	76.96	31	72.73	32	118.27	33	74.96	34	60.23	35	62.44
36	59.56	37	70.17	38	70.88	39	69.81	40	65.54	41	72.63	42	72.33
43	70.44	44	67.17	45	65.50	46	62.69	47	74.15	48	74.67	49	75.17
50	75.08	51	74.73	52	75.08	53	64.10	54	0.	55	0.	56	76.54

JUN 11,1963

1	88.13	2	74.52	3	80.04	4	78.52	5	78.20	6	76.48	7	73.52
8	66.41	9	78.48	10	76.41	11	75.74	12	72.04	13	71.15	14	63.48
15	61.48	16	73.93	17	75.11	18	78.26	19	78.09	20	76.24	21	82.41
22	63.96	23	73.11	24	74.93	25	75.07	26	74.41	27	76.13	28	75.07
29	78.17	30	74.65	31	71.43	32	115.59	33	74.96	34	60.48	35	63.39
36	59.67	37	71.93	38	69.91	39	69.93	40	66.22	41	67.34	42	71.72
43	71.67	44	68.00	45	66.20	46	62.50	47	75.91	48	75.98	49	76.57
50	76.65	51	90.31	52	76.63	53	63.41	54	0.	55	0.	56	75.13

JUN 12,1963

1	88.42	2	74.96	3	80.77	4	77.44	5	79.06	6	77.38	7	71.81
8	64.21	9	79.35	10	77.50	11	76.54	12	72.96	13	71.94	14	65.52
15	62.08	16	72.31	17	72.21	18	76.85	19	78.83	20	77.23	21	80.58
22	65.52	23	73.79	24	73.92	25	74.23	26	72.90	27	73.88	28	71.40
29	75.75	30	72.77	31	70.43	32	115.04	33	76.83	34	60.90	35	65.48
36	59.88	37	73.08	38	73.08	39	72.54	40	67.17	41	66.92	42	72.19
43	72.21	44	69.04	45	67.00	46	62.00	47	77.75	48	77.77	49	77.85
50	77.92	51	80.92	52	77.81	53	64.08	54	0.	55	0.	56	74.13

JUN 13,1963

1	87.65	2	76.19	3	80.92	4	78.25	5	79.44	6	78.29	7	73.27
8	70.31	9	80.03	10	77.77	11	77.00	12	73.52	13	72.25	14	65.67
15	62.10	16	74.77	17	73.79	18	78.48	19	79.40	20	77.85	21	81.31
22	64.38	23	74.31	24	75.50	25	76.54	26	75.23	27	77.73	28	72.81
29	75.24	30	77.69	31	69.60	32	117.08	33	76.85	34	60.44	35	66.98
36	59.88	37	71.15	38	73.23	39	71.67	40	66.83	41	71.42	42	73.56
43	73.27	44	63.58	45	67.46	46	63.17	47	76.04	48	76.15	49	78.43
50	76.57	51	78.07	52	76.52	53	64.25	54	0.	55	0.	56	75.83

JUN 14,1963

1	87.03	2	76.76	3	[illegible]	4	78.24	5	79.76	6	78.87	7	76.09
8	66.70	9	80.54	10	78.35	11	77.41	12	76.02	13	73.09	14	65.98
15	62.96	16	76.41	17	74.56	18	77.72	19	79.76	20	78.46	21	81.29
22	66.50	23	76.83	24	75.93	25	78.26	26	77.83	27	79.50	28	[illegible]
29	75.39	30	73.26	31	67.96	32	116.67	33	75.54	34	59.74	35	66.07
36	59.50	37	76.19	38	76.19	39	72.30	40	67.39	41	70.09	42	74.41
43	76.37	44	[illegible]	45	68.22	46	66.11	47	76.00	48	76.93	49	79.59
50	74.63	51	76.49	52	78.43	53	64.91	54	0.	55	0.	56	75.48

JUN 15,1963

1	88.58	2	71.31	3	81.33	4	78.30	5	79.61	6	78.20	7	62.97
8	61.04	9	83.37	10	78.45	11	78.15	12	74.74	13	73.11	14	67.48
15	61.72	16	72.63	17	66.59	18	70.70	19	80.32	20	78.50	21	80.63
22	81.00	23	76.65	24	74.63	25	[illegible]	26	62.96	27	64.76	28	65.63
29	73.70	30	71.09	31	69.61	32	110.67	33	70.67	34	58.78	35	61.07
36	60.11	37	70.64	38	76.93	39	73.35	40	68.61	41	63.65	42	75.34
43	79.02	44	71.91	45	68.32	46	64.29	47	77.34	48	77.90	49	79.09
50	77.86	51	66.41	52	78.87	53	65.17	54	0.	55	0.	56	72.77

JUN 16,1963

1	88.44	2	76.83	3	82.08	4	78.39	5	80.39	6	77.81	7	63.97
8	61.75	9	63.45	10	79.75	11	78.25	12	75.55	13	73.08	14	68.00
15	66.66	16	72.15	17	0.	18	76.75	19	81.90	20	79.79	21	81.00
22	61.55	23	71.57	24	77.35	25	67.77	26	68.79	27	67.77	28	85.00
29	74.08	30	[illegible]	31	80.21	32	115.81	33	76.71	34	59.39	35	65.77
36	56.77	37	73.36	38	75.11	39	71.68	40	63.52	41	65.48	42	75.65
43	75.06	44	[illegible]	45	67.66	46	66.65	47	77.56	48	77.95	49	79.61
50	74.71	51	67.02	52	78.46	53	66.56	54	0.	55	0.	56	73.00

JUN 17,1963

1	88.19	2	76.06	3	82.04	4	79.31	5	80.46	6	77.75	7	69.96
8	63.52	9	81.00	10	80.13	11	78.31	12	75.98	13	74.60	14	68.94
15	64.79	16	73.27	17	0.	18	80.23	19	81.90	20	80.17	21	81.17
22	81.69	23	76.40	24	78.21	25	73.15	26	72.83	27	73.00	28	67.90
29	72.04	30	71.25	31	68.79	32	117.96	33	74.57	34	60.03	35	66.34
36	59.94	37	75.56	38	75.59	39	73.94	40	70.03	41	63.47	42	75.28
43	75.09	44	72.13	45	69.97	46	65.06	47	77.63	48	77.69	49	79.30
50	79.23	51	67.90	52	78.57	53	66.13	54	0.	55	0.	56	74.60

JUN 18,1963

1	88.23	2	76.85	3	82.21	4	79.52	5	80.60	6	79.15	7	69.83
8	63.67	9	81.70	10	80.33	11	79.42	12	76.04	13	75.23	14	69.48
15	65.40	16	72.58	17	80.50	18	81.29	19	81.08	20	80.48	21	81.73
22	82.38	23	76.60	24	78.65	25	74.58	26	73.98	27	74.06	28	67.75
29	72.71	30	71.46	31	68.10	32	117.29	33	0.	34	61.81	35	66.31
36	59.38	37	75.94	38	76.63	39	74.88	40	69.88	41	70.00	42	75.25
43	75.19	44	72.50	45	70.13	46	64.43	47	80.19	48	80.06	49	79.28
50	77.61	51	77.61	52	80.11	53	65.11	54	0.	55	0.	56	72.22

JUN 19,1963

1	88.32	2	76.21	3	82.15	4	79.82	5	80.82	6	79.35	7	72.18
8	67.12	9	81.79	10	80.56	11	79.47	12	76.62	13	75.50	14	70.24
15	66.01	16	75.68	17	0.	18	81.06	19	81.18	20	80.65	21	81.68
22	62.32	23	77.21	24	79.76	25	76.88	26	76.85	27	75.58	28	69.03
29	71.91	30	71.65	31	67.96	32	[illegible]	33	0.	34	63.33	35	66.33
36	59.33	37	76.02	38	76.67	39	75.17	40	70.25	41	0.	42	74.58
43	75.17	44	72.58	45	70.08	46	64.25	47	80.00	48	80.00	49	79.10
50	77.90	51	77.90	52	79.60	53	66.10	54	0.	55	0.	56	75.00

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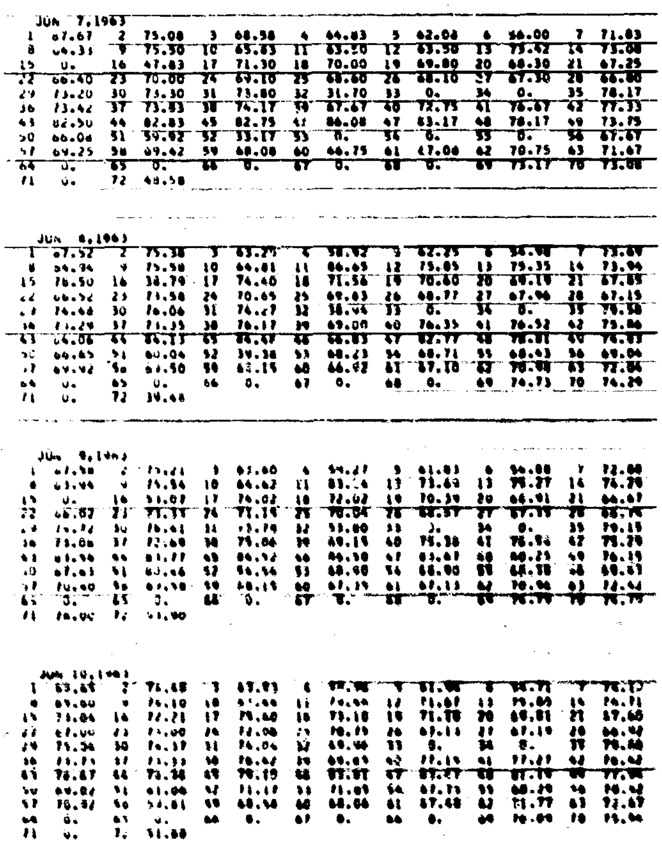

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   JUN  7,1963
 1  67.67   2  75.08   3  68.58   4  64.83   5  62.04   6  58.00   7  71.83
 8  64.33   9  75.50  10  65.83  11  63.50  12  63.50  13  73.42  14  73.08
15   0.    16  47.83  17  71.30  18  70.00  19  69.80  20  68.30  21  67.25
22  66.40  23  70.00  24  69.10  25  68.60  26  68.10  27  67.30  28  66.80
29  73.20  30  73.30  31  73.80  32  31.70  33   0.    34   0.    35  78.17
36  73.42  37  73.83  38  74.17  39  67.67  40  72.75  41  76.67  42  77.33
43  82.50  44  82.83  45  82.75  46  86.08  47  83.17  48  78.17  49  73.75
50  66.08  51  59.92  52  33.17  53   0.    54   0.    55   0.    56  67.67
57  69.25  58  69.42  59  68.08  60  66.75  61  67.08  62  70.75  63  71.67
64   0.    65   0.    66   0.    67   0.    68   0.    69  73.17  70  73.08
71   0.    72  48.58
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   JUN  8,1963
 1  67.52   2  75.38   3  63.29   4  58.92   5  62.25   6  [illegible]   7  73.69
 8  54.94   9  75.50  10  64.81  11  86.65  12  75.05  13  75.35  14  73.94
15  76.50  16  38.79  17  74.40  18  71.56  19  70.60  20  69.19  21  67.85
22  66.52  23  73.50  24  70.65  25  69.03  26  68.77  27  67.96  28  67.15
29  74.44  30  76.06  31  74.27  32  38.94  33   0.    34   0.    35  78.58
36  73.29  37  71.35  38  76.17  39  69.00  40  76.35  41  76.52  42  75.00
43  64.06  44  [illegible]  45  [illegible]  46  [illegible]  47  82.77  48  [illegible]  49  [illegible]
50  66.65  51  60.04  52  39.38  53  68.23  54  68.71  55  68.43  56  69.04
57  69.92  58  69.50  59  63.19  60  66.92  61  67.10  62  70.98  63  72.86
64   0.    65   0.    66   0.    67   0.    68   0.    69  74.75  70  74.29
71   0.    72  39.48
```

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   JUN 11,1963
  1  89.26   2  75.93   3  70.71   4  63.55   5  75.00   6  69.52   7  77.90
  8  72.98   9  79.43  10  73.90  11  72.60  12  65.67  13  78.31  14  76.02
 15  70.50  16  71.98  17  78.50  18  74.36  19  70.62  20  69.29  21  68.02
 22  67.26  23  77.07  24  73.40  25  70.90  26  67.69  27  67.74  28  66.71
 29  76.40  30  79.31  31  75.90  32  69.00  33  80.33  34  80.90  35  84.21
 36  76.38  37  79.83  38  80.52  39  79.07  40  80.48  41  78.26  42  82.93
 43  73.26  44  73.38  45  73.64  46  75.98  47  78.33  48  79.05  49  77.50
 50  70.33  51  64.24  52  71.71  53  72.93  54  70.33  55  69.12  56  79.12
 57  77.90  58  71.14  59  69.00  60  68.48  61  67.86  62  74.88  63  76.00
 64  74.62  65  75.26  66  74.40  67  73.98  68  73.14  69  79.55  70  77.48
 71  76.57  72  70.92
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   JUN 12,1963
  1  88.67   2  75.54   3  74.42   4  70.60   5  76.96   6  70.44   7  80.33
  8  74.56   9  81.65  10  75.42  11  70.44  12  65.52  13  80.98  14  76.19
 15  71.96  16  76.35  17  61.00  18  76.26  19  71.65  20  69.98  21  68.42
 22  67.25  23  79.90  24  75.39  25  72.08  26  69.29  27  68.15  28  67.33
 29  78.15  30  61.15  31  75.10  32  74.17  33  79.81  34  80.25  35  86.88
 36  78.21  37  81.58  38  81.98  39  81.44  40  83.46  41  79.94  42  82.77
 43  71.08  44  71.65  45  71.38  46  75.90  47  76.75  48  76.98  49  75.77
 50  70.27  51  62.08  52  76.44  53  73.67  54  71.19  55  67.40  56  80.98
 57  79.83  58  72.00  59  69.17  60  68.77  61  67.75  62  78.85  63  77.71
 64  77.08  65  76.80  66  75.23  67  74.23  68  72.96  69  82.13  70  79.52
 71  78.94  72  74.92
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   JUN 13,1963
  1  79.96   2  72.92   3  68.94   4  66.30   5  70.00   6  63.12   7  78.00
  8  70.15   9  80.08  10  70.23  11  76.50  12  70.00  13  79.46  14  78.12
 15  72.54  16  73.77  17  77.96  18  75.60  19  72.08  20  70.12  21  68.58
 22  67.58  23  77.15  24  74.82  25  73.00  26  70.00  27  68.19  28  67.94
 29  76.77  30  77.50  31  74.69  32  72.62  33  79.81  34  80.12  35  84.73
 36  77.42  37  79.46  38  79.73  39  77.85  40  79.92  41  79.67  42  79.15
 43  76.81  44  77.08  45  77.08  46  77.81  47  76.69  48  77.15  49  75.38
 50  70.94  51  62.19  52  75.62  53  74.38  54  71.33  55  65.58  56  77.08
 57  76.58  58  73.54  59  70.58  60  69.17  61  68.04  62  77.13  63  78.00
 64  78.75  65  77.83  66  75.98  67  74.46  68  73.83  69  80.54  70  79.92
 71  79.21  72  74.21
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   JUN 14,1963
  1  92.03   2  77.76   3  83.46   4  76.03   5  86.18   6  76.18   7  83.15
  8  78.32   9  83.21  10  78.06  11  81.26  12  71.21  13  84.71  14  79.91
 15  73.85  16  76.44  17  83.85  18  77.27  19  72.76  20  71.00  21  69.26
 22  68.38  23  82.38  24  76.32  25  73.32  26  70.50  27  69.79  28  69.00
 29  79.26  30  83.41  31  75.65  32  74.50  33  79.62  34  79.91  35  88.76
 36  81.38  37  83.03  38  83.97  39  87.00  40  86.03  41  82.74  42  82.21
 43  81.65  44  81.79  45  81.35  46  81.82  47  78.24  48  76.53  49  75.12
 50  70.76  51  62.92  52  76.21  53  74.79  54  72.21  55  70.50  56  87.25
 57  83.53  58  74.26  59  70.38  60  70.06  61  67.94  62  81.68  63  79.32
 64  79.18  65  77.53  66  75.91  67  74.85  68  73.65  69  85.50  70  80.97
 71  79.53  72  74.56
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   JUN 15,1963
  1  89.10   2  76.31   3  87.79   4  78.69   5  88.69   6  77.40   7  86.50
  8  80.23   9  86.44  10  80.77  11  64.50  12  61.33  13  87.65  14  82.60
 15  73.79  16  73.46  17  87.58  18  80.29  19  73.46  20  71.31  21  69.48
 22  67.56  23  85.67  24  79.67  25  74.42  26  70.88  27  68.79  28  68.33
 29  81.40  30  84.94  31  76.75  32  73.25  33  79.71  34  79.60  35  92.10
 36  94.40  37  85.73  38  86.81  39  90.33  40  90.13  41  85.02  42  83.54
 43  63.44  44  63.42  45  63.50  46  68.92  47  74.60  48  76.08  49  75.35
 50  71.04  51  63.54  52  73.69  53  74.94  54  71.83  55  70.24  56  90.48
 57  86.71  58  74.88  59  70.65  60  70.13  61  67.92  62  85.27  63  82.65
 64  81.92  65  77.00  66  76.65  67  75.19  68  73.71  69  89.10  70  83.54
 71  79.69  72  73.66
```

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   JUN 16,1963
  1  88.04   2  75.96   3  89.96   4  79.21   5  89.53   6  77.38   7  88.21
  8  80.65   9  87.98  10  81.56  11  67.92  12  63.98  13  89.58  14  84.65
 15  74.90  16  71.71  17  86.94  18  82.67  19  74.54  20  72.02  21  69.58
 22  67.96  23  88.38  24  82.08  25  70.19  26  71.73  27  69.06  28  68.29
 29  83.17  30  86.60  31  78.13  32  71.27  33  79.52  34  77.17  35  95.06
 36  86.75  37  87.71  38  88.63  39  92.06  40  93.31  41  86.83  42  85.10
 43  67.25  44  67.15  45  67.10  46  69.38  47  71.23  48  72.38  49  73.25
 50  71.10  51  63.73  52  72.15  53  76.35  54  72.44  55  70.52  56  92.06
 57  88.50  58  77.04  59  71.73  60  70.81  61  68.46  62  87.92  63  85.46
 64  84.52  65  81.25  66  78.38  67  76.31  68  74.33  69  91.94  70  86.29
 71  80.33  72  72.08
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   JUN 17,1963
  1  88.21   2  76.02   3  91.10   4  79.25   5  90.40   6  77.27   7  89.44
  8  80.46   9  89.48  10  81.33  11  69.44  12  61.94  13  89.65  14  86.44
 15  76.02  16  72.69  17  85.67  18  82.97  19  75.85  20  72.94  21  70.13
 22  68.35  23  87.29  24  82.54  25  77.31  26  72.79  27  69.46  28  68.92
 29  85.23  30  89.60  31  79.38  32  72.27  33  79.21  34  77.60  35  96.87
 36  88.42  37  89.04  38  91.54  39  93.31  40  92.19  41  88.13  42  87.69
 43  70.54  44  70.73  45  70.35  46  72.40  47  72.85  48  72.90  49  72.77
 50  71.33  51  64.33  52  73.46  53  77.94  54  72.58  55  71.02  56  93.02
 57  89.65  58  78.83  59  72.90  60  71.83  61  69.02  62  89.10  63  87.10
 64  86.46  65  83.02  66  79.92  67  77.38  68  75.15  69  91.96  70  87.48
 71  80.60  72  73.21
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```
   JUN 18,1963
  1  89.27   2  76.83   3  91.90   4  79.98   5  90.50   6  78.13   7  90.27
  8  80.85   9  91.02  10  82.35  11  72.19  12  64.17  13  89.65  14  86.75
 15  77.73  16  55.19  17  86.48  18  79.60  19  77.33  20  74.48  21  71.60
 22  69.46  23  88.23  24  83.06  25  78.75  26  74.40  27  70.67  28  70.11
 29  87.46  30  91.60  31  81.77  32  53.52  33  79.65  34  78.54  35  90.44
 36  88.94  37  89.73  38  92.31  39  93.48  40  92.08  41  88.65  42  87.90
 43  72.25  44  72.63  45  72.42  46  73.60  47  73.63  48  73.31  49  72.65
 50  70.69  51  65.13  52  57.29  53  78.75  54  73.15  55  70.94  56  93.46
 57  90.13  58  80.08  59  73.58  60  72.25  61  69.33  62  89.33  63  87.81
 64  86.92  65  84.08  66  81.00  67  78.38  68  75.83  69  92.38  70  87.81
 71  80.85  72  53.79
```

```
   JUN 19,1963
  1  88.31   2  77.04   3  90.65   4  82.50   5  90.75   6  78.42   7  90.60
  8  81.35   9  91.34  10  82.85  11  74.54  12  65.31  13  89.94  14  86.94
 15  78.50  16  51.52  17  88.27  18  82.00  19  78.08  20  75.23  21  71.88
 22  69.94  23  89.79  24  83.92  25  79.67  26  75.15  27  70.92  28   0.
 29  88.38  30  92.04  31  83.00  32  42.11  33  79.98  34  79.35  35  92.30
 36  89.72  37  93.15  38  92.96  39  94.22  40  93.59  41  89.20  42  88.35
 43  74.28  44  74.61  45  74.74  46  74.65  47  74.70  48  74.26  49  73.26
 50  70.85  51  67.15  52  37.20  53  80.06  54  74.21  55  71.54  56  94.13
 57  91.00  58  81.23  59  74.75  60  73.15  61  69.98  62  90.40  63  88.85
 64  87.75  65  84.94  66  82.02  67  79.50  68  76.65  69  91.60  70  88.65
 71  81.56  72  35.10
```

```
   JUN 20,1963
  1  88.61   2  76.56   3  90.19   4  81.90   5  90.46   6  77.38   7  91.06
  8  80.75   9  91.69  10  82.04  11  72.60  12  64.35  13  90.13  14  87.13
 15  74.00  16  74.71  17  90.13  18  40.29  19  73.77  20  75.65  21  72.10
 22  70.04  23  80.23  24  83.46  25  80.10  26  75.67  27  71.52  28   0.50
 29  88.96  30  92.60  31  83.56  32  42.92  33  81.00  34  79.98  35  92.85
 36  90.37  37  90.69  38  93.16  39  94.77  40  92.57  41  89.06  42  88.31
 43  72.11  44  72.15  45  73.10  46  76.75  47  75.69  48  76.98  49  73.79
 50  70.83  51  63.63  52  56.00  53  80.68  54  74.81  55  71.88  56  94.88
 57  91.83  58  82.00  59  75.60  60  73.77  61  69.31  62  90.50  63  89.21
 64  88.33  65  85.60  66  82.74  67  [illegible]  68  77.14  69  91.58  70  89.06
 71  82.25  72  57.65
```

```
   JUN 21,1963
  1  [illegible]   2  76.15   3  [illegible]   4  [illegible]   5  93.92   6  76.75   7  91.71
  8  77.60   9  [illegible]  10  79.56  11  [illegible]  12  61.21  13  90.66  14  87.38
 15  [illegible]  16  [illegible]  17  [illegible]  18  [illegible]  19  73.52  20  [illegible]  21  72.71
 22  [illegible]  23  [illegible]  24  65.52  25  81.08  26  [illegible]  27  71.98  28   0.
 29  [illegible]  30  [illegible]  31  [illegible]  32  [illegible]  33  91.00  34  [illegible]  35  [illegible]
 36  [illegible]  37  [illegible]  38  [illegible]  39  [illegible]  40  [illegible]  41  89.99  42  [illegible]
 43  [illegible]  44  [illegible]  45  [illegible]  46  [illegible]  47  [illegible]  48  [illegible]  49  [illegible]
 50  [illegible]  51  [illegible]  52  [illegible]  53  [illegible]  54  [illegible]  55  [illegible]  56  [illegible]
 57  [illegible]  58  [illegible]  59  [illegible]  60  [illegible]  61  [illegible]  62  [illegible]  63  [illegible]
 64  [illegible]  65  [illegible]  66  [illegible]  67  [illegible]  68  [illegible]  69  96.02  70  88.98
 71  [illegible]  72  [illegible]
```

```
   JUN 22,1963
  1  [illegible]   2  [illegible]   3  30.66   4  [illegible]   5  30.77   6  76.48   7  97.78
  8  [illegible]   9  [illegible]  10  [illegible]  11  [illegible]  12  [illegible]  13  [illegible]  14  [illegible]
 15  [illegible]  16  [illegible]  17  [illegible]  18  [illegible]  19  [illegible]  20  77.36  21  [illegible]
 22  [illegible]  23  [illegible]  24  [illegible]  25  [illegible]  26  [illegible]  27  [illegible]  28  [illegible]
 29  [illegible]  30  [illegible]  31  [illegible]  32  [illegible]  33  [illegible]  34  [illegible]  35  [illegible]
 36  [illegible]  37  [illegible]  38  [illegible]  39  [illegible]  40  [illegible]  41  [illegible]  42  [illegible]
 43  [illegible]  44  [illegible]  45  [illegible]  46  [illegible]  47  [illegible]  48  72.81  49  77.09
 50  [illegible]  51  [illegible]  52  [illegible]  53  [illegible]  54  [illegible]  55  [illegible]  56  [illegible]
 57  [illegible]  58  [illegible]  59  [illegible]  60  [illegible]  61  [illegible]  62  91.40  63  [illegible]
 64  [illegible]  65  [illegible]  66  [illegible]  67  [illegible]  68  [illegible]  69  [illegible]  70  93.17
 71  [illegible]  72  [illegible]
```

```
   JUN 23,1963
  1  82.54   2  72.71   3  88.42   4  76.04   5  87.50   6  74.17   7  90.38
  8  78.58   9  92.21  10  78.42  11  67.79  12  64.54  13  90.00  14  97.88
 15  80.58  16  77.88  17  91.79  18  90.53  19  80.75  20  77.58  21  [illegible]
 22  71.58  23  90.25  24  86.29  25  82.29  26  77.46  27  73.08  28   0.
 29  89.54  30  93.59  31  85.50  32  86.50  33  81.96  34  79.46  35  92.58
 36  91.25  37  89.06  38  91.83  39  92.50  40  93.42  41  89.67  42  89.17
 43  67.30  44  66.75  45  67.09  46  67.63  47  71.42  48  73.29  49  73.13
 50  70.92  51  65.50  52  76.58  53  82.25  54  76.50  55  73.21  56  93.08
 57  91.77  58  85.17  59  77.50  60  75.42  61  71.75  62  91.50  63  90.46
 64  89.63  65  87.08  66  84.29  67  81.79  68  78.56  69  93.38  70  90.13
 71  83.29  72  75.96
```

```
   JUN 24,1963
  1  51.86   2  74.71   3  89.29   4  80.70   5  89.21   6  78.50   7  71.71
  8  82.41   9  91.07  10  82.27  11  88.14  12  68.64  13  90.98  14  81.16
 15  60.60  16  80.00  17  71.29  18  49.60  19  80.50  20  77.16  21  73.50
 22  79.90  23  90.36  24  83.96  25  92.41  26  77.16  27  73.00  28   0.
 29  89.21  30  92.33  31  86.43  32  85.43  33  82.00  34  79.29  35  96.07
 36  91.06  37  91.21  38  93.29  39  96.14  40  91.06  41  89.71  42  84.60
 43  66.27  44  65.43  45  85.57  46  85.43  47  76.41  48  72.57  49  71.07
 50  70.10  51  67.74  52  78.50  53  82.41  54  77.14  55  73.16  56  93.31
 57   0.    58  89.57  59  77.50  60  75.43  61  73.66  62  92.16  63  90.46
 64  89.16  65  87.00  66  84.50  67  82.00  68  78.66  69  94.57  70  90.16
 71  83.16  72  74.71
```

Francis Family Shelter

Tucson, Arizona

```
   JUL  4,1963
  1  93.05   2  72.73   3  87.68   4  79.32   5  87.82   6  80.14   7  92.50
  8  69.50   9  87.14  10  86.23  11  84.18  12  81.27  13  82.23  14  83.91
 15  92.91  16  78.82  17  79.32  18  91.77  19  90.91  20  91.36  21  94.32
 22  94.55  23  92.91  24  88.77  25  80.68  26  73.50  27  73.41  28  81.32
 29  86.64  30  82.18  31  85.18  32  79.95  33  80.23  34  81.68  35  80.50
 36  79.14  37  77.09  38  75.23  39  73.23  40  72.64  41  84.27  42  81.68
 43  75.82  44  74.59  45  74.05  46  73.14  47  73.09  48  72.82  49  87.45
 50  86.68  51  81.41  52  81.45  53  82.00  54  83.77  55  88.00  56  91.05
 57  85.27  58  82.68  59  75.59  60  75.27  61  74.41  62  73.82  63  73.18
 64  73.64
```

```
   JUL  5,1963
  1  89.69   2  70.92   3  88.48   4  80.00   5  86.73   6  81.98   7  89.31
  8  67.98   9  86.25  10  84.77  11  86.75  12  84.60  13  84.79  14  86.11
 15  90.83  16  78.44  17  74.67  18  89.65  19  89.69  20  89.88  21  92.98
 22  90.10  23  93.54  24  89.81  25  82.60  26  75.48  27  74.00  28  80.67
 29  84.83  30  83.38  31  82.69  32  85.21  33  78.96  34  87.52  35  85.79
 36  83.90  37  80.92  38  76.92  39  73.65  40  71.73  41  86.94  42  85.21
 43  78.81  44  76.69  45  74.65  46  73.48  47  73.13  48  73.00  49  80.19
 50  88.77  51  83.02  52  82.69  53  82.85  54  84.38  55  88.52  56  92.40
 57  88.06  58  86.42  59  78.15  60  77.27  61  75.13  62  74.17  63  73.83
 64  73.90
```

```
   JUL  6,1963
  1  90.77   2  71.02   3  86.15   4  82.04   5  86.31   6  83.65   7  88.31
  8  61.44   9  88.29  10  85.19  11  87.96  12  87.60  13  87.63  14  88.90
 15  92.21  16  77.21  17  75.73  18  89.08  19  89.60  20  90.00  21  94.46
 22  94.77  23  93.90  24  90.54  25  84.63  26  77.77  27  74.23  28  81.67
 29  85.19  30  83.63  31  83.23  32  83.67  33  77.13  34  87.71  35  87.08
 36  85.69  37  81.35  38  79.21  39  74.25  40  71.75  41  86.94  42  85.73
 43  80.65  44  76.50  45  75.92  46  75.65  47  73.04  48  72.83  49  88.29
 50  88.31  51  84.10  52  83.73  53  83.65  54  84.54  55  88.65  56  93.85
 57  88.00  58  86.81  59  80.10  60  79.21  61  76.44  62  74.44  63  73.35
 64  73.88
```

```
   JUL  7,1963
  1  90.65   2  70.69   3  87.10   4  83.65   5  87.19   6  84.90   7  87.05
  8  62.15   9  67.65  10  86.67  11  88.50  12  88.29  13  88.21  14  89.31
 15  92.33  16  76.81  17  78.38  18  87.42  19  87.94  20  88.65  21  94.10
 22  94.38  23  93.81  24  90.85  25  84.67  26  77.69  27  74.67  28  83.54
 29  86.67  30  84.98  31  85.10  32  84.96  33  77.15  34  87.94  35  86.92
 36  85.63  37  83.94  38  80.27  39  75.31  40  72.06  41  87.40  42  86.31
 43  81.85  44  79.83  45  77.15  46  74.29  47  73.44  48  73.19  49  88.73
 50  88.75  51  84.96  52  84.54  53  84.50  54  85.25  55  89.08  56  93.79
 57  88.25  58  87.23  59  81.08  60  80.15  61  77.40  62  75.15  63  73.67
 64  74.02
```

```
   JUL  8,1963
  1  91.04   2  70.27   3  88.98   4  85.15   5  88.75   6  85.77   7  89.88
  8  65.54   9  87.35  10  86.71  11  89.15  12  88.88  13  88.50  14  89.60
 15  94.65  16  79.73  17  79.54  18  91.00  19  91.42  20  91.98  21  95.69
 22  95.54  23  94.50  24  91.08  25  85.13  26  77.98  27  74.40  28  83.73
 29  86.63  30  85.00  31  85.13  32  85.33  33  79.65  34  82.46  35  87.92
 36  86.94  37  85.17  38  81.65  39  76.33  40  72.06  41  87.48  42  86.81
 43  82.54  44  80.58  45  77.94  46  75.27  47  73.73  48  73.33  49  88.94
 50  88.98  51  85.58  52  85.17  53  85.08  54  85.58  55  89.21  56  93.90
 57  86.29  58  88.00  59  81.81  60  81.02  61  78.13  62  75.65  63  73.60
 64  73.75
```

```
   JUL  9,1963
  1  90.65   2  73.23   3  89.90   4  82.73   5  90.06   6  82.98   7  88.38
  8  66.48   9  87.00  10  86.52  11  89.35  12  89.25  13  89.17  14  90.27
 15  94.65  16  76.94  17  80.52  18  88.48  19  88.77  20  89.60  21  96.08
 22  96.31  23  95.35  24  91.67  25  85.56  26  78.15  27  74.67  28  83.98
 29  86.27  30  85.58  31  85.40  32  84.85  33  78.92  34  87.81  35  86.73
 36  86.27  37  85.19  38  82.54  39  77.35  40  72.56  41  87.44  42  86.23
 43  82.85  44  81.17  45  78.81  46  76.06  47  74.13  48  73.52  49  88.38
 50  88.35  51  85.83  52  85.79  53  85.69  54  86.06  55  89.29  56  94.10
 57  88.35  58  87.35  59  82.02  60  81.40  61  79.31  62  76.40  63  74.00
 64  74.19
```

```
   JUL 10,1963
  1  91.02   2  [illegible]   3  90.71   4  82.31   5  95.71   6  87.31   7  83.38
  8  71.69   9  87.50  10  87.08  11  89.40  12  89.79  13  89.92  14  90.71
 15  90.92  16  71.88  17  79.10  18  82.94  19  83.77  20  84.02  21  90.17
 22  96.02  23  94.83  24  92.38  25  88.30  26  78.90  27  74.85  28  84.02
 29  86.96  30  85.77  31  85.38  32  88.02  33  79.83  34  [illegible]  35  [illegible]
 36  87.44  37  85.98  38  82.96  39  77.98  40  73.06  41  88.67  42  87.35
 43  83.60  44  82.02  45  79.52  46  76.79  47  74.96  48  73.61  49  88.08
 50  88.90  51  86.04  52  86.10  53  86.64  54  86.50  55  89.38  56  [illegible]
 57  89.14  58  87.79  59  81.98  60  81.31  61  76.67  62  77.33  63  [illegible]
 64  74.96
```

```
   JUL 11,1963
  1  91.00   2  74.48   3  90.04   4  83.00   5  88.14   6  83.29   7  88.69
  8  70.38   9  86.58  10  87.06  11  [illegible]  12  [illegible]  13  [illegible]  14  [illegible]
 15  [illegible]  16  74.00  17  79.11  18  86.43  19  84.94  20  88.07  21  91.08
 22  91.75  23  92.06  24  91.66  25  88.44  26  78.84  27  76.79  28  83.63
 29  88.04  30  85.19  31  85.19  32  85.71  33  78.89  34  [illegible]  35  88.43
 36  87.66  37  86.13  38  83.50  39  78.58  40  73.31  41  87.78  42  86.82
 43  83.94  44  82.68  45  80.41  46  77.41  47  75.69  48  74.69  49  88.68
 50  88.56  51  86.56  52  85.71  53  [illegible]  54  [illegible]  55  [illegible]  56  [illegible]
 57  88.29  58  87.31  59  82.73  60  82.17  61  80.35  62  77.98  63  75.10
 64  74.92
```

```
   JUL 12,1963
  1  90.48   2  73.23   3  89.23   4  83.88   5  89.40   6  84.56   7  89.96
  8  69.71   9  86.15  10  86.54  11  89.71  12  89.83  13  89.85  14  90.02
 15  92.40  16  81.27  17  79.42  18  89.75  19  90.75  20  91.35  21  95.58
 22  94.50  23  93.35  24  90.79  25  86.46  26  78.79  27  74.71  28  82.60
 29  85.81  30  84.56  31  84.46  32  84.42  33  81.08  34  86.77  35  86.67
 36  86.56  37  85.56  38  83.23  39  79.00  40  73.60  41  86.90  42  85.90
 43  83.75  44  87.21  45  80.10  46  77.29  47  74.83  48  76.04  49  87.92
 50  88.13  51  86.90  52  86.75  53  86.60  54  86.92  55  89.00  56  91.71
 57  87.15  58  86.88  59  83.13  60  82.56  61  80.58  62  78.27  63  75.23
 64  75.02
```

```
   JUL 13,1963
  1  91.08   2  71.96   3  90.27   4  80.67   5  88.42   6  79.52   7  92.02
  8  67.58   9  87.02  10  87.31  11  89.04  12  89.35  13  89.58  14  90.19
 15  93.73  16  81.35  17  81.60  18  91.31  19  92.46  20  93.35  21  97.19
 22  96.56  23  94.92  24  91.27  25  86.52  26  78.88  27  74.81  28  83.81
 29  86.83  30  85.48  31  85.98  32  85.54  33  81.19  34  87.04  35  86.40
 36  88.42  37  85.52  38  83.58  39  [illegible]  40  73.98  41  86.13  42  85.02
 43  83.27  44  81.88  45  80.08  46  77.65  47  75.06  48  74.19  49  88.98
 50  87.06  51  86.67  52  86.98  53  86.58  54  86.75  55  88.58  56  92.00
 57  88.75  58  86.33  59  82.96  60  82.56  61  80.94  62  78.77  63  76.18
 64  75.90
```

```
   JUL 14,1963
  1  89.06   2  71.94   3  87.67   4  80.58   5  87.67   6  88.44   7  93.37
  8  69.89   9  86.94  10  87.63  11  88.72  12  88.89  13  89.72  14  90.96
 15  90.00  16  74.67  17  82.11  18  82.94  19  84.83  20  89.61  21  88.28
 22  96.07  23  [illegible]  24  93.22  25  87.11  26  79.00  27  79.17  28  84.00
 29  88.97  30  87.39  31  85.70  32  [illegible]  33  88.88  34  87.11  35  [illegible]
 36  88.72  37  85.78  38  83.69  39  79.69  40  74.20  41  89.72  42  89.00
 43  82.59  44  81.61  45  88.00  46  77.72  47  75.64  48  76.11  49  86.61
 50  88.09  51  86.89  52  86.09  53  86.61  54  87.17  55  89.36  56  94.96
 57  86.74  58  85.06  59  82.90  60  82.00  61  80.61  62  76.39  63  75.96
 64  75.17
```

Airport Utility Tunnel
Tucson, Arizona

JUL 10,1963

1	72.50	2	59.00	3	84.88	4	70.13	5	82.38	6	65.75	7	80.50
8	80.25	9	80.00	10	73.75	11	80.13	12	79.63	13	75.50	14	68.00
15	64.50	16	80.63	17	78.88	18	72.63	19	73.00	20	72.00	21	71.25
22	74.00	23	80.75	24	76.50	25	80.25	26	75.00	27	76.00	28	77.63
29	74.50	30	74.00	31	72.63	32	71.75	33	70.13	34	70.00	35	69.50
36	86.13	37	89.13	38	85.25	39	87.38	40	87.38	41	89.13	42	84.25
43	85.88	44	77.75	45	88.88	46	84.38	47	88.00	48	88.38	49	83.88
50	89.75	51	87.88	52	91.00	53	81.00	54	91.13	55	87.50		

JUL 11,1963

1	79.40	2	61.82	3	87.48	4	72.77	5	86.58	6	69.42	7	86.38
8	87.48	9	86.00	10	82.63	11	79.40	12	79.33	13	76.23	14	68.69
15	65.08	16	83.90	17	80.98	18	73.31	19	73.67	20	72.81	21	72.19
22	74.77	23	84.42	24	70.35	25	82.35	26	76.52	27	76.31	28	75.52
29	74.94	30	74.21	31	73.21	32	72.50	33	70.69	34	70.25	35	69.90
36	90.96	37	90.35	38	87.13	39	88.65	40	88.38	41	89.13	42	86.19
43	86.67	44	70.71	45	90.27	46	85.58	47	88.98	48	88.90	49	90.52
50	91.59	51	103.44	52	93.58	53	82.60	54	89.63	55	88.81		

JUL 12,1963

1	80.29	2	61.77	3	89.23	4	72.94	5	84.94	6	68.94	7	84.44
8	84.42	9	83.76	10	85.77	11	80.83	12	80.13	13	76.29	14	68.98
15	65.35	16	86.02	17	83.35	18	74.04	19	74.77	20	73.25	21	72.50
22	75.31	23	86.71	24	69.63	25	84.96	26	77.35	27	77.08	28	76.00
29	75.13	30	74.33	31	73.38	32	72.63	33	70.81	34	70.31	35	69.98
36	90.94	37	93.92	38	89.08	39	92.65	40	92.56	41	91.00	42	88.48
43	88.31	44	69.60	45	92.29	46	87.29	47	91.17	48	90.38	49	92.46
50	94.15	51	99.35	52	92.00	53	84.96	54	89.96	55	90.50		

JUL 13,1963

1	78.40	2	60.94	3	88.38	4	71.10	5	84.77	6	66.13	7	86.21
8	85.94	9	85.42	10	84.15	11	81.04	12	80.23	13	76.13	14	68.81
15	65.25	16	85.31	17	83.31	18	74.29	19	74.94	20	73.27	21	72.44
22	75.33	23	85.85	24	70.85	25	84.58	26	78.10	27	77.81	28	76.31
29	75.21	30	74.44	31	73.60	32	72.65	33	70.79	34	70.42	35	70.13
36	88.40	37	93.40	38	88.94	39	91.92	40	91.94	41	92.15	42	88.50
43	89.35	44	71.23	45	92.83	46	87.96	47	91.81	48	91.08	49	93.21
50	95.17	51	102.94	52	93.04	53	85.00	54	89.42	55	90.85		

JUL 14,1963

1	78.83	2	59.63	3	90.06	4	72.31	5	83.13	6	65.98	7	82.90
8	83.44	9	85.17	10	84.90	11	82.33	12	81.08	13	76.31	14	69.06
15	65.40	16	86.81	17	84.75	18	75.02	19	75.75	20	73.81	21	72.69
22	75.69	23	87.44	24	70.54	25	85.98	26	78.85	27	78.40	28	76.75
29	75.02	30	74.21	31	73.71	32	73.46	33	71.23	34	70.81	35	70.40
36	90.38	37	92.35	38	89.81	39	90.67	40	89.27	41	92.04	42	89.40
43	90.56	44	71.81	45	93.50	46	89.04	47	92.67	48	92.15	49	94.10
50	96.27	51	100.06	52	92.04	53	85.31	54	90.79	55	92.40		

JUL 15,1963

1	79.52	2	60.10	3	90.35	4	72.10	5	84.29	6	65.71	7	84.34
8	84.78	9	84.42	10	85.82	11	83.88	12	82.44	13	76.65	14	69.08
15	65.38	16	87.48	17	85.42	18	75.53	19	76.50	20	74.40	21	72.99
22	75.81	23	87.88	24	69.04	25	87.40	26	79.88	27	79.40	28	77.58
29	76.06	30	74.94	31	74.54	32	73.60	33	71.17	34	70.77	35	70.25
36	91.46	37	92.48	38	91.01	39	90.24	40	90.72	41	92.65	42	90.22
43	90.56	44	69.96	45	92.04	46	89.01	47	91.88	48	90.46	49	92.95
50	96.65	51	97.96	52	91.52	53	86.08	54	91.26	55	92.38		

JUL 16,1963

1	79.85	2	60.13	3	91.38	4	73.17	5	85.13	6	65.27	7	83.92
8	83.10	9	81.40	10	78.73	11	83.44	12	82.48	13	76.95	14	69.22
15	65.26	16	87.02	17	86.43	18	76.22	19	77.26	20	74.98	21	73.47
22	76.37	23	89.25	24	67.60	25	88.33	26	80.49	27	80.78	28	78.08
29	76.23	30	74.54	31	75.19	32	74.56	33	72.79	34	72.66	35	72.15
36	93.15	37	94.09	38	91.75	39	92.33	40	91.63	41	93.08	42	90.73
43	91.74	44	68.35	45	93.81	46	90.23	47	93.31	48	92.50	49	94.65
50	96.94	51	100.79	52	89.25	53	86.29	54	92.28	55	93.66		

JUL 17,1963

1	79.50	2	57.96	3	93.42	4	78.38	5	87.25	6	66.77	7	86.63
8	87.19	9	86.39	10	79.44	11	81.94	12	82.16	13	77.27	14	69.52
15	65.85	16	92.60	17	88.17	18	76.79	19	77.92	20	75.66	21	78.16
22	76.77	23	90.75	24	74.22	25	90.36	26	81.29	27	80.88	28	78.64
29	76.74	30	79.11	31	75.02	32	74.03	33	71.39	34	70.99	35	70.60
36	96.80	37	95.04	38	94.25	39	92.65	40	94.40	41	91.63	42	94.59
43	92.09	44	76.48	45	94.17	46	91.19	47	94.62	48	92.90	49	95.05
50	97.12	51	104.80	52	96.08	53	87.30	54	93.65	55	95.21		

JUL 18,1963

1	79.50	2	60.06	3	92.52	4	79.98	5	82.92	6	64.52	7	83.88
8	83.99	9	91.21	10	81.17	11	81.12	12	80.84	13	77.68	14	69.50
15	65.82	16	83.35	17	87.[illegible]	18	77.48	19	78.71	20	76.10	21	74.42
22	77.07	23	83.66	24	71.36	25	89.95	26	82.16	27	81.72	28	79.56
29	76.77	30	79.59	31	75.62	32	74.35	33	71.59	34	71.15	35	70.68
36	95.44	37	95.36	38	92.62	39	93.33	40	92.01	41	91.92	42	92.23
43	92.62	44	72.50	45	95.04	46	91.63	47	95.32	48	93.51	49	95.71
50	97.97	51	101.67	52	93.80	53	87.53	54	92.93	55	94.63		

JUL 19,1963

1	74.58	2	63.29	3	92.92	4	78.96	5	84.44	6	64.79	7	84.11
8	84.32	9	83.65	10	81.35	11	81.33	12	80.8[illegible]	13	77.36	14	69.97
15	65.96	16	91.90	17	89.63	18	78.13	19	79.35	20	76.94	21	76.09
22	77.4[illegible]	23	81.49	24	70.94	25	91.17	26	82.61	27	82.16	28	79.92
29	77.66	30	79.76	31	75.90	32	76.70	33	71.92	34	71.22	35	71.06
36	[illegible]	37	96.07	38	97.64	39	95.68	40	93.77	41	92.06	42	91.93
43	92.57	44	71.69	45	95.15	46	91.32	47	93.90	48	93.83	49	95.76
50	97.63	51	101.90	52	96.55	53	88.66	54	97.38	55	93.66		

JUL 20,1963

1	79.37	2	54.90	3	91.99	4	76.56	5	83.35	6	65.09	7	84.66
8	83.17	9	81.97	10	83.60	11	81.30	12	81.17	13	77.35	14	69.70
15	65.09	16	91.10	17	89.01	18	78.73	19	80.94	20	77.20	21	75.99
22	77.66	23	91.92	24	66.03	25	90.42	26	81.55	27	83.06	28	80.72
29	76.10	30	76.11	31	76.90	32	75.11	33	72.20	34	71.00	35	71.10
36	96.06	37	94.60	38	[illegible]	39	96.61	40	92.86	41	93.36	42	90.89
43	[illegible]	44	[illegible]	45	95.66	46	93.10	47	96.15	48	96.15	49	95.93
50	[illegible]	51	101.82	52	95.17	53	81.67	54	96.80	55	97.86		

JUL 21,1963

1	[illegible]	2	56.09	3	[illegible]	4	90.29	5	[illegible]	6	63.32	7	81.90
8	[illegible]	9	81.79	10	84.16	11	83.56	12	81.63	13	77.81	14	69.70
15	66.07	16	90.07	17	80.71	18	78.29	19	80.13	20	77.20	21	75.70
22	77.27	23	87.27	24	77.87	25	89.97	26	86.01	27	81.67	28	81.17
29	[illegible]	30	76.34	31	77.36	32	75.01	33	72.41	34	71.07	35	[illegible]
36	[illegible]	37	94.75	38	[illegible]	39	94.68	40	92.65	41	92.35	42	91.17
43	[illegible]	44	71.52	45	95.99	46	93.10	47	93.04	48	91.76	49	95.63
50	97.63	51	[illegible]	52	81.19	53	86.06	54	92.01	55	92.91		

JUL 22,1963

1	54.00	2	51.00	3	85.00	4	68.50	5	74.50	6	59.00	7	73.20
8	72.50	9	71.00	10	76.00	11	84.00	12	82.20	13	77.30	14	69.80
15	66.00	16	83.30	17	86.00	18	79.50	19	80.50	20	78.00	21	75.80
22	78.00	23	85.30	24	70.00	25	87.50	26	84.00	27	83.50	28	81.30
29	78.80	30	76.50	31	77.50	32	76.00	33	72.00	34	71.50	35	71.00
36	89.30	37	91.00	38	84.90	39	91.50	40	85.50	41	90.70	42	80.50
43	90.70	44	71.00	45	94.50	46	90.50	47	91.50	48	93.00	49	94.00
50	96.00	51	77.00	52	83.00	53	86.00	54	88.00	55	88.00		

Abo School Shelter
Artesia, New Mexico

JUL 19,1963

1	92.57	2	73.64	3	92.86	4	84.64	5	95.57	6	85.29	7	85.36
8	69.21	9	0.	10	97.50	11	99.93	12	0.	13	108.07	14	104.14
15	84.71	16	83.64	17	83.64	18	84.07	19	88.79	20	92.71	21	90.00
22	87.43	23	79.57	24	76.07	25	0.	26	81.36	27	81.00	28	0.
29	79.64	30	90.50	31	88.36	32	87.93	33	87.93	34	86.93	35	84.29
36	86.21	37	82.86	38	81.57	39	86.00	40	82.36	41	80.93	42	80.21

JUL 20,1963

1	90.31	2	73.41	3	95.67	4	84.78	5	100.02	6	83.57	7	88.33
8	70.50	9	0.	10	97.28	11	99.54	12	0.	13	103.33	14	103.33
15	80.39	16	87.98	17	88.78	18	90.04	19	91.52	20	90.28	21	88.80
22	86.91	23	79.37	24	75.89	25	86.73	26	82.93	27	81.74	28	80.28
29	79.76	30	91.74	31	89.89	32	88.67	33	88.04	34	86.80	35	79.67
36	90.07	37	85.41	38	83.07	39	88.26	40	84.30	41	82.37	42	80.32

JUL 21,1963

1	90.83	2	72.58	3	95.38	4	82.10	5	99.03	6	81.58	7	89.27
8	68.58	9	0.	10	101.54	11	102.54	12	0.	13	106.65	14	105.33
15	80.58	16	89.56	17	90.69	18	91.58	19	93.81	20	93.69	21	91.50
22	86.31	23	80.83	24	77.44	25	88.23	26	84.27	27	82.90	28	81.00
29	80.00	30	92.77	31	91.42	32	90.33	33	89.23	34	87.79	35	79.88
36	92.00	37	87.81	38	85.19	39	92.40	40	87.33	41	84.73	42	81.60

JUL 22,1963

1	90.31	2	72.58	3	94.33	4	83.96	5	97.06	6	80.13	7	88.02
8	68.29	9	0.	10	100.52	11	102.13	12	0.	13	103.55	14	102.50
15	79.90	16	87.77	17	88.63	18	89.23	19	92.81	20	93.30	21	91.69
22	86.48	23	80.94	24	77.42	25	88.75	26	85.23	27	83.75	28	81.54
29	80.23	30	92.83	31	91.98	32	91.00	33	89.75	34	87.63	35	79.23
36	91.40	37	83.31	38	85.94	39	92.98	40	88.38	41	85.73	42	82.31

JUL 23,1963

1	90.60	2	72.19	3	93.50	4	81.10	5	94.67	6	79.00	7	90.17
8	69.00	9	0.	10	96.50	11	98.17	12	0.	13	101.27	14	101.94
15	81.54	16	83.13	17	89.92	18	89.40	19	85.56	20	86.88	21	88.02
22	86.71	23	79.08	24	75.48	25	88.67	26	85.73	27	84.17	28	82.00
29	80.50	30	92.44	31	91.92	32	91.21	33	90.04	34	87.85	35	80.83
36	90.42	37	87.98	38	86.15	39	91.60	40	88.23	41	86.27	42	83.04

JUL 24,1963

1	90.52	2	72.33	3	93.29	4	82.42	5	96.23	6	80.10	7	91.48
8	69.85	9	0.	10	97.79	11	99.71	12	0.	13	104.69	14	104.96
15	81.69	16	90.67	17	91.65	18	87.88	19	90.50	20	89.65	21	87.88
22	86.40	23	79.56	24	75.90	25	88.94	26	85.98	27	84.56	28	82.33
29	80.85	30	92.85	31	92.31	32	91.75	33	90.56	34	88.21	35	80.90
36	91.23	37	88.63	38	86.85	39	92.00	40	88.73	41	86.75	42	83.77

JUL 25,1963

1	90.46	2	73.02	3	93.71	4	81.83	5	94.69	6	80.25	7	92.23
8	70.69	9	0.	10	94.96	11	99.13	12	0.	13	103.73	14	102.90
15	81.75	16	91.25	17	91.63	18	90.15	19	89.10	20	88.88	21	87.33
22	86.03	23	73.08	24	75.46	25	89.06	26	86.27	27	84.85	28	82.96
29	81.06	30	93.52	31	92.96	32	92.35	33	91.02	34	88.67	35	81.19
36	91.13	37	85.79	38	87.13	39	91.81	40	88.86	41	87.08	42	84.41

JUL 26,1963

1	90.48	2	72.94	3	95.08	4	80.73	5	95.65	6	80.88	7	89.27
8	70.52	9	0.	10	100.58	11	102.52	12	0.	13	102.92	14	100.27
15	81.17	16	88.71	17	89.15	18	89.46	19	88.98	20	89.46	21	88.94
22	87.31	23	80.58	24	77.04	25	89.88	26	86.85	27	85.25	28	83.04
29	81.44	30	95.19	31	93.46	32	92.71	33	91.35	34	88.92	35	80.58
36	91.67	37	89.13	38	87.46	39	92.07	40	88.98	41	87.33	42	84.71

JUL 27,1963

1	90.21	2	73.11	3	95.21	4	78.29	5	93.90	6	80.08	7	79.75
8	70.63	9	0.	10	98.08	11	99.98	12	0.	13	95.71	14	98.95
15	80.15	16	89.08	17	90.15	18	77.02	19	80.00	20	84.40	21	86.96
22	86.67	23	83.88	24	76.77	25	90.71	26	88.02	27	86.02	28	83.81
29	81.40	30	96.90	31	93.65	32	93.04	33	91.73	34	88.67	35	79.06
36	91.44	37	83.21	38	87.75	39	92.00	40	89.31	41	87.00	42	84.96

JUL 28,1963

1	80.52	2	72.75	3	94.18	4	77.50	5	94.94	6	79.83	7	94.33
8	70.25	9	0.	10	97.13	11	97.60	12	0.	13	96.23	14	95.17
15	77.88	16	81.90	17	[illegible]	18	78.17	19	79.00	20	80.81	21	84.75
22	85.15	23	83.08	24	76.62	25	91.00	26	88.73	27	85.71	28	86.07
29	82.27	30	[illegible]	31	[illegible]	32	92.40	33	92.10	34	89.33	35	78.71
36	91.02	37	88.17	38	87.91	39	91.48	40	83.13	41	87.63	42	85.71

JUL 29,1963

1	[illegible]	2	[illegible]	3	[illegible]	4	[illegible]	5	[illegible]	6	79.90	7	[illegible]
8	[illegible]	9	[illegible]	10	[illegible]	11	[illegible]	12	0.	13	[illegible]	14	[illegible]
15	[illegible]	16	[illegible]	17	[illegible]	18	[illegible]	19	[illegible]	20	[illegible]	21	[illegible]
22	[illegible]	23	[illegible]	24	[illegible]	25	[illegible]	26	[illegible]	27	[illegible]	28	[illegible]
29	[illegible]	30	[illegible]	31	[illegible]	32	[illegible]	33	[illegible]	34	[illegible]	35	[illegible]
36	[illegible]	37	[illegible]	38	87.44	39	[illegible]	40	[illegible]	41	[illegible]	42	[illegible]

JUL 30,1963

1	[illegible]	2	[illegible]	3	[illegible]	4	[illegible]	5	[illegible]	6	[illegible]	7	[illegible]
8	[illegible]	9	[illegible]	10	[illegible]	11	[illegible]	12	0.	13	[illegible]	14	[illegible]
15	[illegible]	16	[illegible]	17	[illegible]	18	[illegible]	19	[illegible]	20	[illegible]	21	[illegible]
22	[illegible]	23	[illegible]	24	[illegible]	25	[illegible]	26	[illegible]	27	[illegible]	28	[illegible]
29	[illegible]	30	[illegible]	31	[illegible]	32	[illegible]	33	[illegible]	34	[illegible]	35	[illegible]
36	[illegible]	37	[illegible]	38	[illegible]	39	[illegible]	40	[illegible]	41	[illegible]	42	[illegible]

JUL 31,1963

1	74.74	2	71.76	3	88.93	4	78.98	5	90.64	6	80.00	7	81.33
8	70.79	9	96.45	10	96.02	11	97.76	12	0.	13	97.05	14	95.26
15	78.62	16	82.12	17	82.05	18	83.76	19	85.67	20	85.67	21	84.76
22	83.75	23	83.07	24	76.55	25	87.14	26	86.26	27	85.95	28	84.21
29	82.67	30	88.98	31	90.43	32	90.98	33	91.52	34	90.10	35	78.31
36	88.71	37	87.48	38	87.19	39	88.81	40	87.86	41	87.05	42	85.57

Cattle Shelter, (Roberts Dairy)

Omaha, Nebraska

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AUG  6,1963
 1  75.09   2  74.86   3  82.91   4  80.32   5  81.23   6  78.32   7  75.41
 8  74.77   9  73.64  10  70.73  11  82.68  12  83.05  13  82.86  14  81.04
15  80.27  16  79.41  17  80.26  18  86.59  19  80.50  20  82.32  21  79.35
22  79.32  23  79.00  24  73.68  25  80.64  26  79.05  27  77.55  28  77.14
29  73.85  30  67.14  31  58.45  32  70.80  33  0.     34  0.
```

```
AUG  7,1963
 1  78.21   2  72.20   3  83.09   4  79.64   5  81.19   6  79.77   7  76.43
 8  75.02   9  73.92  10  71.03  11  82.24  12  83.12  13  83.09  14  83.07
15  62.09  16  82.11  17  82.98  18  85.[illegible]  19  81.63  20  83.52  21  78.77
22  79.80  23  79.02  24  66.75  25  79.92  26  78.09  27  77.73  28  77.68
29  74.11  30  69.17  31  59.13  32  68.00  33  0.     34  0.
```

```
AUG  8,1963
 1  80.78   2  72.26   3  85.03   4  80.32   5  83.34   6  81.64   7  77.84
 8  75.80   9  74.46  10  71.20  11  82.12  12  80.95  13  85.07  14  85.43
15  84.83  16  85.36  17  86.47  18  88.60  19  84.66  20  85.08  21  79.77
22  81.77  23  81.90  24  66.12  25  80.30  26  79.48  27  78.25  28  78.14
29  74.15  30  67.20  31  58.68  32  67.10  33  81.96  34  74.80
```

```
AUG  9,1963
 1  75.69   2  70.98   3  85.02   4  81.04   5  83.75   6  82.59   7  78.94
 8  76.66   9  75.03  10  71.07  11  78.41  12  77.84  13  85.34  14  88.88
15  86.67  16  87.48  17  87.54  18  87.92  19  84.34  20  85.91  21  75.80
22  76.36  23  76.50  24  68.48  25  78.67  26  78.91  27  78.20  28  78.07
29  74.65  30  61.47  31  60.58  32  67.90  33  79.04  34  73.11
```

```
AUG 10,1963
 1  76.07   2  57.89   3  85.44   4  80.93   5  83.94   6  85.01   7  78.50
 8  77.11   9  75.54  10  71.30  11  78.64  12  78.17  13  85.79  14  87.70
15  87.35  16  83.15  17  88.06  18  90.31  19  86.80  20  85.90  21  77.38
22  77.88  23  76.46  24  66.52  25  79.67  26  79.02  27  78.16  28  77.65
29  74.01  30  64.50  31  59.56  32  68.75  33  79.40  34  72.27
```

```
AUG 11,1963
 1  78.05   2  67.59   3  85.87   4  80.30   5  84.44   6  83.45   7  80.26
 8  77.88   9  75.80  10  71.44  11  78.56  12  78.85  13  86.14  14  87.64
15  87.79  16  83.90  17  49.16  18  89.40  19  87.15  20  86.27  21  78.55
22  77.25  23  77.53  24  60.90  25  79.65  26  79.00  27  78.31  28  78.09
29  74.57  30  67.53  31  59.24  32  62.37  33  80.33  34  72.42
```

```
AUG 12,1963
 1  75.25   2  70.29   3  86.09   4  82.53   5  84.02   6  83.86   7  80.80
 8  78.92   9  76.57  10  71.52  11  79.20  12  79.33  13  86.03  14  88.31
15  88.44  16  83.15  17  88.63  18  86.65  19  90.80  20  85.60  21  75.16
22  75.38  23  75.53  24  65.93  25  77.80  26  78.08  27  77.54  28  75.28
29  74.03  30  69.17  31  59.25  32  58.23  33  78.54  34  72.18
```

```
AUG 13,1963
 1  73.23   2  65.50   3  86.28   4  80.31   5  82.[illegible]   6  [illegible]   7  81.12
 8  76.70   9  76.92  10  72.10  11  77.93  12  78.13  13  [illegible]  14  88.99
15  87.40  16  87.72  17  84.45  18  81.[illegible]  19  91.72  20  84.94  21  66.00
22  66.10  23  66.61  24  67.27  25  [illegible]  26  75.35  27  76.42  28  74.71
29  76.13  30  67.30  31  58.99  32  56.25  33  72.60  34  65.52
```

```
AUG 14,1963
 1  [illegible]   2  [illegible]   3  85.74   4  92.59   5  85.67   6  [illegible]   7  81.63
 8  [illegible]   9  75.85  10  72.73  11  70.70  12  74.05  13  [illegible]  14  86.69
15  56.77  16  65.59  17  83.35  18  [illegible]  19  93.73  20  87.81  21  69.75
22  66.29  23  [illegible]  24  51.44  25  73.10  26  76.33  27  79.81  28  [illegible]
29  [illegible]  30  [illegible]  31  [illegible]  32  [illegible]  33  [illegible]  34  65.66
```

```
AUG 15,1963
[illegible]
```

```
[illegible]
```

```
[illegible]
```

```
AUG 16,1963
 1  [illegible]   2  67.02   3  88.76   4  82.35   5  95.18   6  84.72   7  84.65
 8  80.95   9  73.82  10  73.20  11  92.34  12  75.63  13  85.95  14  86.07
15  [illegible]  16  [illegible]  17  81.71  18  74.65  19  65.41  20  86.00  21  57.63
22  57.67  23  57.73  24  76.90  25  69.55  26  72.94  27  [illegible]  28  75.86
29  71.85  30  67.95  31  59.[illegible]  32  77.66  33  72.92  34  [illegible]
```

```
AUG 17,1963
 1  [illegible]   2  [illegible]   3  87.74   4  94.18   5  [illegible]   6  85.30   7  83.12
 8  [illegible]   9  74.01  10  73.61  11  [illegible]  12  [illegible]  13  87.62  14  87.77
15  [illegible]  16  [illegible]  17  77.75  18  [illegible]  19  45.42  20  87.[illegible]  21  63.67
22  [illegible]  23  [illegible]  24  [illegible]  25  [illegible]  26  [illegible]  27  72.98  28  72.92
29  71.61  30  77.07  31  40.11  32  75.16  33  72.71        67.06
```

```
AUG [illegible]
 1  [illegible]   2  [illegible]   3  [illegible]   4  [illegible]   5  [illegible]   6  85.30   7  63.15
 [illegible]
15  [illegible]  16  [illegible]  17  77.07  18  71.32  19  73.37  20  59.60  21  56.21
 [illegible]
 [illegible]                                                          34  63.65
```

Lincoln Community Shelter
Lincoln, Nebraska

```
     AUG 28,1963
   1  79.77   2  73.25   3  79.85   4  73.77   5  78.30   6  73.80   7  78.30
   8  73.57   9  78.32  10  78.25  11  74.80  12  76.30  13  75.88  14  74.02
  15  73.57  16  78.63  17  77.70  18  74.72  19  76.10  20  75.00  21  73.65
  22  72.35  23  70.30  24  78.45  25  71.40  26  68.85  27  69.17  28  67.38
  29  76.15  30  75.67  31  77.72  32  77.55  33  77.25  34  76.38  35  75.38
  36  74.45  37  79.65  38  81.63  39  82.67  40  84.13  41  87.92  42  89.92
  43  83.10  44  73.88  45  79.33  46  78.75  47  79.10  48 109.40  49  84.75
  50  85.25  51  85.50  52  80.75  53  76.75  54  75.10  55  74.50  56  72.00
  57  67.00  58  63.00  59  79.75
```

```
     AUG 29,1963
   1  66.96   2  69.40   3  86.02   4  70.47   5  89.51   6  75.79   7  88.13
   8  74.97   9  84.10  10  81.67  11  74.74  12  74.44  13  75.77  14  74.80
  15  73.61  16  85.37  17  80.58  18  74.77  19  [illegible]  20  75.00  21  73.66
  22  72.34  23  70.34  24  76.55  25  72.00  26  69.62  27  69.15  28  69.03
  29  81.26  30  80.83  31  79.55  32  78.29  33  77.48  34  76.21  35  75.31
  36  74.38  37  86.02  38  87.59  39  80.27  40  87.05  41  88.72  42  88.90
  43  91.77  44  76.45  45  88.72  46  90.54  47  86.98  48  90.15  49  73.75
  50  75.58  51  73.25  52  76.30  53  75.12  54  75.44  55  74.90  56  72.12
  57  67.62  58  54.05  59  76.04
```

```
     AUG 30,1963
   1  63.13   2  67.82   3  85.01   4  64.36   5  91.05   6  75.30   7  89.54
   8  73.29   9  86.97  10  85.04  11  77.31  12  76.90  13  75.63  14  74.60
  15  73.57  16  87.46  17  82.83  18  74.88  19  76.47  20  75.04  21  73.88
  22  72.56  23  70.30  24  73.99  25  71.64  26  69.13  27  69.21  28  69.16
  29  84.38  30  84.19  31  81.81  32  79.50  33  78.11  34  76.45  35  75.28
  36  74.20  37  88.60  38  90.19  39  87.51  40  84.95  41  87.22  42  87.42
  43  91.75  44  75.16  45  88.38  46  89.72  47  87.68  48  88.29  49  70.18
  50  70.04  51  69.91  52  71.55  53  70.40  54  72.25  55  73.05  56  72.27
  57  67.77  58  63.74  59  74.15
```

```
     AUG 31,1963
   1  63.82   2  68.70   3  85.80   4  67.35   5  91.81   6  75.48   7  90.37
   8  75.99   9  87.40  10  86.21  11  78.51  12  77.11  13  75.03  14  74.62
  15  73.53  16  89.20  17  84.72  18  75.13  19  71.37  20  75.27  21  73.65
  22  72.33  23  70.30  24  75.71  25  71.52  26  69.12  27  69.12  28  68.98
  29  86.90  30  86.32  31  83.83  32  81.01  33  79.35  34  76.98  35  75.59
  36  74.28  37  89.68  38  90.88  39  88.76  40  87.88  41  88.08  42  88.09
  43  92.35  44  76.87  45  89.73  46  90.64  47  88.94  48  85.04  49  69.67
  50  69.79  51  69.72  52  70.72  53  71.22  54  71.90  55  72.55  56  71.33
  57  67.60  58  63.03  59  78.03
```

```
     SEP  1,1963
   1  64.43   2  68.13   3  82.69   4  65.92   5  90.96   6  75.92   7  89.30
   8  74.65   9  88.15  10  86.52  11  79.65  12  77.75  13  76.27  14  74.98
  15  73.32  16  88.77  17  84.45  18  75.57  19  76.32  20  75.50  21  73.44
  22  72.65  23  70.25  24  75.55  25  71.70  26  69.22  27  69.09  28  69.08
  29  86.31  30  86.30  31  84.85  32  82.50  33  80.57  34  77.83  35  75.97
  36  74.66  37  88.67  38  90.07  39  86.60  40  84.85  41  82.95  42  80.82
  43  91.55  44  76.70  45  88.40  46  87.70  47  88.05  48  71.58  49  65.82
  50  65.75  51  65.71  52  66.02  53  61.47  54  69.55  55  70.53  56  71.06
  57  66.44  58  62.99  59  75.75
```

```
     SEP  2,1963
   1  65.60   2  66.57   3  63.60   4  66.97   5  90.90   6  75.85   7  88.20
   8  75.83   9  88.16  10  86.72  11  80.07  12  78.33  13  76.58  14  74.67
  15  73.04  16  85.32  17  84.80  18  76.03  19  78.82  20  75.82  21  73.55
  22  72.00  23  70.10  24  77.11  25  71.74  26  69.10  27  69.07  28  69.03
  29  86.50  30  66.43  31  84.76  32  82.22  33  80.97  34  75.53  35  74.67
  36  75.04  37  67.58  38  88.47  39  85.47  40  84.85  41  94.05  42  83.27
  43  91.37  44  74.67  45  88.20  46  89.38  47  87.15  48  85.40  49  73.75
  50  73.64  51  73.64  52  72.45  53  64.16  54  69.54  55  70.06  56  70.08
  57  67.51  58  63.00  59  77.68
```

```
     SEP  3,1963
   1  65.38   2  66.70   3  65.58   4  67.29   5  91.02   6  75.76   7  88.42
   8  76.22   9  87.00  10  87.11  11  80.65  12  78.82  13  76.93  14  76.01
  15  73.22  16  84.84  17  65.62  18  76.29  19  [illegible]  20  76.75  21  74.82
  22  72.61  23  73.29  24  62.98  25  72.17  26  [illegible]  27  69.24  28  69.20
  29  87.11  30  66.86  31  85.56  32  82.87  33  [illegible]  34  76.87  35  77.23
  36  75.31  37  87.58  38  91.07  39  84.63  40  86.00  41  87.67  42  87.00
  43  92.03  44  62.07  45  89.96  46  91.30  47  86.28  48  85.90  49  60.20
  50  64.30  51  64.75  52  76.12  53  70.46  54  70.59  55  70.64  56  70.06
  57  67.30  58  61.05  59  67.12
```

```
     SEP  4,1963
[illegible]
```

```
     SEP  5,1963
[illegible]
```

```
     SEP  6,1963
[illegible]
```

```
     SEP  7,1963
   1  85.51   2  70.80   3  86.38   4  76.50   5  89.81   6  75.71   7  89.37
   8  79.36   9  67.80  10  86.62  11  81.42  12  80.19  13  78.52  14  75.77
  15  73.64  16  67.58  17  85.37  18  77.59  19  88.62  20  77.60  21  74.99
  22  72.62  23  71.00  24  73.38  25  72.70  26  69.47  27  69.60  28  69.60
  29  87.76  30  87.57  31  86.51  32  84.26  33  82.84  34  80.51  35  78.67
  36  76.65  37  90.27  38  91.01  39  89.66  40  89.11  41  90.14  42  90.15
  43  92.12  44  74.62  45  90.20  46  90.73  47  85.36  48  86.15  49  73.69
  50  73.61  51  74.07  52  75.38  53  73.91  54  72.70  55  71.70  56  70.45
  57  66.97  58  63.81  59  73.85
```

```
     SEP  8,1963
   1  75.55   2  65.35   3  80.23   4  78.47   5  84.78   6  76.83   7  83.98
   8  76.01   9  83.36  10  83.37  11  81.40  12  80.44  13  76.52  14  76.03
  15  73.51  16  63.71  17  83.36  18  77.62  19  80.71  20  77.75  21  74.76
  22  72.81  23  71.05  24  75.28  25  72.08  26  69.41  27  69.50  28  70.01
  29  84.53  30  85.25  31  84.81  32  83.88  33  82.78  34  80.71  35  78.71
  36  77.71  37  86.78  38  87.09  39  86.30  40  86.79  41  87.51  42  87.00
  43  93.01  44  77.31  45  86.98  46  86.08  47  83.77  48  86.87  49  75.06
  50  73.04  51  73.20  52  75.49  53  73.94  54  73.01  55  72.04  56  70.10
  57  64.86  58  61.79  59  76.11
```

```
     SEP  9,1963
[illegible]
```

Expedient, Naturally Ventilated Shelter

Protective Structures Development Center

Fort Belvoir, Virginia

SEP 8,1963

1	76.50	2	72.45	3	76.50	4	73.75	5	76.00	6	72.75	7	73.90
8	65.90	9	65.05	10	66.70	11	65.60	12	67.25	13	67.90	14	69.75
15	76.50	16	73.60	17	76.95	18	76.00	19	72.05	20	71.45	21	79.90
22	75.65	23	72.25	24	70.40	25	70.60	26	74.46	27	71.90	28	78.45
29	60.95	30	61.60	31	[illegible]	32	[illegible]	33	72.10	34	72.05	35	[illegible]
36	75.75	37	76.85	38	74.40	39	72.15	40	74.15	41	74.15	42	74.23
43	75.00	44	77.35	45	79.10	46	78.35	47	69.94	48	69.13	49	68.63
50	68.00	51	64.81	52	69.31	53	70.06	54	72.63	55	0.	56	0.
57	0.	58	[illegible]	59	0.	60	0.	61	0.	62	0.		

SEP 9,1963

1	63.10	2	72.38	3	78.94	4	70.79	5	79.44	6	73.15	7	[illegible]
8	[illegible]	9	[illegible]	10	67.25	11	67.63	12	68.27	13	66.90	14	70.52
15	71.80	16	67.38	17	76.92	18	74.58	19	73.73	20	74.29	21	81.69
22	73.10	23	72.19	24	71.85	25	72.42	26	76.48	27	78.69	28	80.15
29	75.57	30	74.82	31	73.66	32	73.36	33	72.94	34	73.10	35	75.60
36	77.29	37	78.10	38	69.56	39	71.59	40	73.58	41	74.08	42	74.73
43	75.23	44	75.88	45	76.96	46	79.36	47	73.00	48	71.71	49	70.33
50	64.58	51	69.29	52	69.81	53	[illegible]	54	73.21	55	78.70	56	82.15
57	75.25	58	75.75	59	73.35	60	73.75	61	77.40	62	78.40		

SEP 10,1963

1	[illegible]	2	71.65	3	80.83	4	69.75	5	[illegible]	6	72.83	7	73.21
8	64.75	9	66.81	10	68.79	11	68.94	12	67.98	13	70.88	14	72.75
15	75.29	16	71.75	17	78.00	18	77.08	19	76.96	20	77.46	21	84.13
22	74.75	23	74.17	24	74.08	25	75.50	26	78.98	27	81.04	28	82.29
29	78.83	30	74.73	31	74.40	32	76.17	33	74.85	34	75.60	35	78.21
36	79.73	37	80.46	38	71.75	39	71.65	40	73.38	41	74.40	42	74.92
43	76.19	44	77.06	45	78.27	46	79.08	47	74.23	48	73.73	49	72.79
50	71.98	51	70.92	52	71.29	53	72.69	54	75.40	55	77.61	56	79.63
57	76.59	58	75.63	59	75.11	60	75.52	61	77.22	62	77.50		

SEP 11,1963

1	61.38	2	71.31	3	78.58	4	69.10	5	80.83	6	77.69	7	70.58
8	64.21	9	67.31	10	68.81	11	69.60	12	70.25	13	70.56	14	71.92
15	73.63	16	70.83	17	76.77	18	77.06	19	78.40	20	78.65	21	83.95
22	74.17	23	74.98	24	75.08	25	76.33	26	78.65	27	80.33	28	81.17
29	74.38	30	74.54	31	76.19	32	76.13	33	76.42	34	77.15	35	77.79
36	78.94	37	78.98	38	71.48	39	71.58	40	73.60	41	75.06	42	74.35
43	76.67	44	76.98	45	77.17	46	77.67	47	72.67	48	71.23	49	70.27
50	69.08	51	71.08	52	71.65	53	73.50	54	75.52	55	77.21	56	79.06
57	75.67	58	75.19	59	76.33	60	76.48	61	77.08	62	77.38		

SEP 12,1963

1	85.35	2	79.63	3	82.54	4	73.69	5	84.38	6	76.06	7	79.38
8	70.63	9	67.23	10	68.94	11	70.00	12	71.23	13	72.71	14	76.27
15	79.75	16	77.23	17	80.46	18	79.44	19	79.31	20	80.13	21	87.33
22	77.81	23	76.58	24	76.27	25	77.88	26	81.54	27	83.77	28	85.00
29	80.44	30	80.02	31	80.38	32	80.17	33	77.85	34	78.25	35	80.69
36	82.71	37	83.46	38	77.63	39	71.96	40	73.57	41	75.21	42	74.73
43	77.40	44	78.48	45	80.54	46	81.63	47	79.10	48	79.33	49	79.06
50	78.42	51	73.25	52	72.96	53	74.81	54	78.04	55	80.85	56	83.25
57	73.90	58	77.83	59	77.29	60	77.48	61	79.57	62	80.12		

SEP 13,1963

1	74.79	2	76.73	3	73.63	4	65.53	5	79.85	6	70.71	7	66.40
8	59.75	9	67.88	10	[illegible]	11	71.13	12	72.10	13	72.63	14	73.06
15	[illegible]	16	72.66	17	[illegible]	18	78.60	19	80.56	20	81.58	21	83.13
22	[illegible]	23	75.81	24	76.15	25	79.15	26	79.93	27	80.48	28	80.31
29	69.50	30	70.42	31	73.54	32	73.10	33	77.35	34	78.98	35	79.42
36	79.79	37	79.35	38	72.74	39	71.60	40	73.73	41	75.71	42	77.27
43	77.40	44	77.02	45	72.55	46	69.65	47	66.46	48	65.58	49	65.21
50	65.16	51	74.08	52	74.31	53	75.63	54	77.06	55	78.02	56	78.75
57	73.94	58	77.06	59	77.96	60	78.02	61	75.58	62	74.96		

SEP 14,1963

1	75.69	2	67.79	3	69.17	4	61.73	5	77.40	6	67.31	7	60.42
8	53.93	9	63.50	10	70.02	11	70.50	12	70.71	13	70.50	14	70.19
15	70.79	16	64.73	17	67.93	18	73.85	19	77.00	20	78.50	21	80.10
22	60.77	23	72.65	24	76.44	25	77.69	26	77.73	27	77.75	28	77.23
29	64.25	30	65.21	31	65.42	32	66.55	33	72.98	34	76.23	35	77.02
36	76.94	37	[illegible]	38	66.42	39	70.38	40	73.29	41	75.02	42	75.15
43	74.11	44	[illegible]	45	57.35	46	64.25	47	60.65	48	54.81	49	59.33
50	59.04	51	71.42	52	72.42	53	74.71	54	75.06	55	75.75	56	78.00
57	66.27	58	71.00	59	72.98	60	73.06	61	70.19	62	69.48		

SEP 15,1963

1	73.69	2	63.78	3	65.81	4	60.69	5	74.54	6	65.08	7	58.65
8	[illegible]	9	63.54	10	[illegible]	11	63.73	12	74.65	13	69.85	14	[illegible]
15	67.85	16	55.50	17	63.97	18	70.69	19	74.35	20	76.00	21	77.27
22	66.27	23	73.77	24	74.77	25	[illegible]	26	75.81	27	75.58	28	74.62
29	61.42	30	62.54	31	64.50	32	63.12	33	71.56	34	74.00	35	74.75
36	74.31	37	73.35	38	66.46	39	[illegible]	40	73.42	41	74.19	42	73.69
43	[illegible]	44	73.35	45	64.19	46	61.08	47	58.27	48	57.58	49	57.08
50	57.33	51	64.73	52	72.08	53	73.92	54	73.69	55	73.35	56	72.88
57	64.77	58	63.12	59	70.00	60	70.00	61	56.35	62	67.73		

SEP 16,1963

1	70.00	2	[illegible]	3	[illegible]	4	63.50	5	70.00	6	65.00	7	61.50
8	60.25	9	63.50	10	68.50	11	69.50	12	67.50	13	66.75	14	66.75
15	66.50	16	67.00	17	64.00	18	65.50	19	68.00	20	70.00	21	71.50
22	64.00	23	67.00	24	70.50	25	71.50	26	71.00	27	70.50	28	70.50
29	62.00	30	61.00	31	59.75	32	59.50	33	69.75	34	70.00	35	70.00
36	63.75	37	64.00	38	70.50	39	70.75	40	73.00	41	72.50	42	69.75
43	67.25	44	62.00	45	62.75	46	61.50	47	59.00	48	58.25	49	58.25
50	[illegible]	51	65.25	52	69.25	53	70.00	54	69.50	55	68.50	56	68.25
57	[illegible]	58	65.25	59	64.75	60	65.25	61	64.75	62	64.50		

200 Person Model Shelter

Protective Structures Development Center

Fort Belvoir, Virginia

SEP 21,1963

1	64.10	2	74.08	3	82.85	4	74.08	5	83.85	6	76.25	7	83.37
8	75.17	9	61.15	10	59.85	11	74.15	12	77.60	13	72.48	14	74.95
15	77.18	16	75.75	17	80.15	18	76.93	19	75.40	20	74.52	21	74.25
22	74.00	23	73.45	24	73.33	25	73.00	26	73.00	27	72.99	28	81.38
29	78.41	30	77.80	31	76.95	32	75.70	33	79.13	34	80.20	35	75.00
36	74.80	37	73.22	38	72.62	39	71.39	40	70.93	41	70.31	42	79.20
43	79.24	44	76.83	45	82.06	46	79.35	47	77.61	48	77.50	49	77.79
50	81.90	51	82.17	52	82.78	53	82.55	54	82.76	55	83.11	56	78.46
57	80.21	58	82.78	59	83.09	60	83.11	61	83.03	62	83.41	63	83.22
64	73.32	65	60.06	66	60.11	67	50.18	68	65.06	69	68.88	70	69.92
71	70.21	72	69.33	73	68.76	74	67.39	75	63.10	76	72.00	77	71.42
78	71.88	79	72.45	80	75.78	81	81.37	82	76.23	83	76.50	84	75.42
85	75.05	86	74.70	87	71.67	88	72.00	89	71.25	90	71.00	91	70.50
92	75.30	93	72.61	94	75.11								

SEP 22,1963

1	84.42	2	75.26	3	83.81	4	79.50	5	84.54	6	81.65	7	83.92
8	60.31	9	56.96	10	50.50	11	77.25	12	79.63	13	74.35	14	76.67
15	79.23	16	79.02	17	82.08	18	79.67	19	78.16	20	76.52	21	75.92
22	74.83	23	73.73	24	73.13	25	72.88	26	72.64	27	72.39	28	83.36
29	81.49	30	80.88	31	83.32	32	70.71	33	82.58	34	83.91	35	78.46
36	78.20	37	[illegible]	38	73.47	39	71.21	40	70.48	41	69.98	42	80.88
43	79.92	44	77.66	45	83.74	46	81.69	47	80.70	48	79.38	49	78.65
50	82.25	51	83.21	52	83.73	53	83.56	54	84.07	55	84.32	56	78.17
57	81.20	58	63.26	59	83.52	60	83.93	61	83.92	62	83.95	63	83.80
64	76.88	65	56.50	66	56.56	67	56.88	68	62.29	69	64.91	70	66.73
71	68.75	72	67.01	73	68.43	74	67.01	75	62.94	76	69.54	77	71.41
78	72.35	79	73.20	80	69.69	81	83.22	82	79.95	83	79.28	84	76.48
85	75.49	86	73.71	87	72.30	88	71.83	89	71.02	90	70.92	91	70.06
92	77.94	93	73.82	94	69.72								

SEP 23,1963

1	84.58	2	75.10	3	85.63	4	80.02	5	87.27	6	82.83	7	85.54
8	61.10	9	52.06	10	46.19	11	78.67	12	81.85	13	76.19	14	78.13
15	80.50	16	80.29	17	84.19	18	81.73	19	80.06	20	78.46	21	77.71
22	76.38	23	74.88	24	73.77	25	73.06	26	72.40	27	72.13	28	86.19
29	84.29	30	83.86	31	83.52	32	69.02	33	83.79	34	88.98	35	80.92
36	80.60	37	77.40	38	75.13	39	72.06	40	70.81	41	70.02	42	81.19
43	80.77	44	73.40	45	84.85	46	83.61	47	82.90	48	82.85	49	83.21
50	65.79	51	85.08	52	86.10	53	85.60	54	85.88	55	86.10	56	79.19
57	83.00	58	85.36	59	85.67	60	86.10	61	86.10	62	86.17	63	85.88
64	70.15	65	50.83	66	50.90	67	51.27	68	58.42	69	61.23	70	63.73
71	67.02	72	68.75	73	68.08	74	66.88	75	62.77	76	68.50	77	71.79
78	73.50	79	74.79	80	7.92	81	85.77	82	82.87	83	81.33	84	78.42
85	77.46	86	73.31	87	73.40	88	72.46	89	71.19	90	70.77	91	70.00
92	79.83	93	75.60	94	68.46								

SEP 24,1963

1	66.06	2	74.75	3	86.41	4	80.26	5	88.05	6	83.96	7	86.57
8	61.06	9	48.19	10	43.73	11	80.35	12	82.71	13	77.15	14	78.78
15	61.15	16	61.75	17	86.32	18	83.22	19	81.60	20	79.98	21	79.42
22	77.89	23	76.01	24	74.78	25	73.72	26	72.65	27	72.13	28	87.60
29	66.15	30	85.30	31	84.63	32	68.78	33	84.93	34	87.70	35	82.61
36	61.65	37	78.53	38	76.24	39	72.74	40	71.13	41	70.02	42	82.35
43	81.81	44	79.29	45	86.78	46	85.24	47	83.92	48	83.39	49	84.68
50	86.98	51	87.12	52	87.11	53	86.69	54	86.85	55	87.20	56	79.95
57	84.77	58	86.83	59	87.20	60	87.35	61	87.33	62	87.48	63	86.64
64	68.96	65	46.67	66	46.94	67	47.48	68	56.38	69	59.37	70	61.66
71	65.41	72	68.17	73	67.95	74	66.73	75	62.75	76	68.75	77	72.10
78	74.24	79	76.19	80	67.78	81	86.29	82	83.57	83	82.70	84	79.35
85	78.39	86	76.23	87	74.19	88	72.90	89	71.28	90	70.52	91	69.95
92	60.40	93	76.90	94	66.19								

SEP 25,1963

1	65.56	2	75.19	3	86.73	4	80.63	5	83.46	6	83.60	7	86.52
8	60.35	9	51.92	10	49.75	11	80.77	12	82.97	13	77.81	14	75.26
15	61.52	16	61.92	17	87.15	18	84.29	19	82.79	20	81.13	21	80.54
22	78.94	23	77.15	24	75.69	25	74.33	26	72.94	27	72.23	28	88.44
29	67.33	30	87.17	31	87.06	32	69.58	33	84.83	34	82.48	35	82.63
36	62.05	37	74.10	38	76.78	39	[illegible]	40	71.35	41	70.19	42	82.52
43	62.04	44	[illegible]	45	87.50	46	86.17	47	85.44	48	85.38	49	85.23
50	67.31	51	87.54	52	87.42	53	87.15	54	87.52	55	87.73	56	80.88
57	64.95	58	87.23	59	87.50	60	87.77	61	87.91	62	88.00	63	86.69
64	70.42	65	[illegible]	66	50.71	67	51.63	68	59.19	69	59.58	70	61.02
71	64.15	72	67.46	73	67.73	74	66.71	75	62.79	76	68.98	77	72.25
78	74.81	79	77.08	80	68.73	81	86.63	82	84.15	83	83.54	84	80.46
85	79.58	86	77.15	87	74.94	88	73.35	89	71.40	90	70.35	91	69.63
92	60.44	93	77.95	94	69.06								

SEP 26,1963

1	55.35	2	75.94	3	88.06	4	81.90	5	89.86	6	84.92	7	88.75
8	62.52	9	57.46	10	54.10	11	81.75	12	84.17	13	78.58	14	80.17
15	[illegible]	16	83.19	17	86.54	18	86.25	19	84.50	20	82.75	21	82.17
22	60.31	23	76.15	24	76.46	25	75.06	26	73.19	27	72.31	28	89.94
29	67.17	30	87.29	31	89.77	32	69.48	33	86.42	34	83.31	35	84.04
36	[illegible]	37	80.23	38	77.88	39	74.13	40	72.00	41	70.69	42	84.10
43	83.85	44	80.15	45	88.40	46	87.56	47	87.13	48	87.17	49	86.42
50	85.31	51	[illegible]	52	[illegible]	53	88.25	54	88.44	55	88.79	56	83.02
57	[illegible]	58	[illegible]	59	86.75	60	89.29	61	89.29	62	89.54	63	88.56
64	61.56	65	56.92	66	57.50	67	58.29	68	63.56	69	62.06	70	61.39
71	63.58	72	66.60	73	67.35	74	66.56	75	62.74	76	69.46	77	72.44
78	75.21	79	77.77	80	68.71	81	88.21	82	85.10	83	84.63	84	81.23
85	83.33	86	77.46	87	75.46	88	73.90	89	71.85	90	70.48	91	69.33
92	61.64	93	76.88	94	68.74								

SEP 27,1963

1	64.96	2	74.98	3	88.02	4	81.60	5	89.56	6	84.81	7	88.56
8	62.92	9	61.81	10	55.25	11	82.35	12	84.54	13	79.19	14	80.67
15	83.10	16	63.67	17	87.63	18	85.98	19	84.56	20	83.15	21	82.75
22	61.00	23	78.81	24	76.92	25	75.44	26	73.23	27	71.96	28	90.02
29	69.85	30	90.02	31	89.36	32	70.52	33	87.25	34	84.40	35	84.10
36	83.81	37	80.71	38	76.40	39	74.50	40	72.19	41	70.83	42	85.13
43	69.83	44	83.96	45	88.46	46	88.19	47	88.08	48	88.19	49	87.06
50	89.13	51	89.17	52	88.77	53	88.27	54	88.35	55	88.94	56	84.31
57	86.31	58	88.10	59	88.48	60	89.17	61	89.17	62	89.40	63	88.25
64	70.25	65	61.69	66	61.98	67	52.38	68	65.83	69	63.98	70	63.56
71	64.35	72	66.23	73	67.08	74	66.40	75	62.86	76	70.69	77	73.56
78	76.00	79	78.25	80	68.71	81	88.15	82	85.56	83	85.31	84	82.10
85	61.25	86	78.65	87	76.07	88	74.29	89	72.08	90	70.40	91	69.23
92	62.04	93	79.69	94	69.58								

SEP 28,1963

1	65.73	2	76.98	3	86.02	4	81.71	5	89.73	6	85.04	7	88.98
8	62.54	9	63.44	10	57.69	11	82.61	12	84.81	13	79.69	14	80.77
15	63.02	16	83.73	17	87.31	18	85.85	19	84.46	20	83.13	21	82.75
22	61.24	23	77.15	24	77.44	25	75.79	26	73.46	27	71.96	28	69.77
29	69.58	30	90.31	31	89.45	32	72.10	33	87.50	34	84.71	35	84.46
36	63.96	37	81.15	38	78.98	39	75.19	40	72.79	41	71.25	42	86.42
43	86.23	44	87.02	45	87.19	46	87.64	47	87.94	48	88.50	49	87.29
50	89.13	51	89.19	52	88.65	53	88.04	54	88.00	55	89.31	56	85.54
57	66.92	58	88.60	59	88.88	60	89.42	61	89.48	62	89.81	63	88.00
64	72.33	65	62.77	66	62.92	67	63.21	68	65.44	69	64.35	70	64.40
71	64.81	72	65.98	73	66.73	74	66.23	75	62.96	76	71.95	77	74.29
78	76.54	79	78.90	80	70.71	81	88.43	82	85.73	83	85.6	84	82.88
85	81.98	86	77.23	87	76.31	88	74.50	89	72.23	90	70.3	91	69.15
92	81.52	93	80.38	94	71.10								

SEP 29,1963

1	84.81	2	76.63	3	88.65	4	82.48	5	90.10	6	85.48	7	90.06
8	83.40	9	64.23	10	64.23	11	83.25	12	65.15	13	80.10	14	80.35
15	82.71	16	83.42	17	87.88	18	86.13	19	84.81	20	83.46	21	82.90
22	81.60	23	79.69	24	77.77	25	76.21	26	73.60	27	71.92	28	90.23
29	69.30	30	90.19	31	89.63	32	73.27	33	88.33	34	85.35	35	85.17
36	64.98	37	81.85	38	79.67	39	75.15	40	73.35	41	71.71	42	86.63
43	66.15	44	87.69	45	88.33	46	88.65	47	88.48	48	88.27	49	88.02
50	89.88	51	89.85	52	89.52	53	89.02	54	89.17	55	90.13	56	86.08
57	87.75	58	89.35	59	89.69	60	90.15	61	90.23	62	90.69	63	88.75
64	74.40	65	63.31	66	63.50	67	63.99	68	65.69	69	65.31	70	65.40
71	65.23	72	66.00	73	66.56	74	66.19	75	63.04	76	67.52	77	70.04
78	72.40	79	74.25	80	72.33	81	88.77	82	86.00	83	85.63	84	82.07
85	80.69	86	75.60	87	74.82	88	73.98	89	72.38	90	70.54	91	69.71
92	81.83	93	76.35	94	73.38								

SEP 30,1963

1	84.98	2	76.17	3	88.27	4	81.58	5	90.08	6	84.88	7	89.13
8	82.13	9	56.75	10	50.13	11	83.19	12	84.98	13	83.35	14	80.31
15	82.69	16	82.69	17	87.03	18	85.92	19	84.79	20	83.46	21	83.06
22	81.92	23	89.04	24	78.15	25	76.52	26	73.92	27	72.15	28	89.88
29	89.54	30	89.81	31	89.23	32	68.58	33	88.27	34	85.81	35	85.25
36	85.15	37	82.31	38	80.19	39	76.25	40	73.67	41	71.96	42	86.44
43	86.08	44	52.88	45	87.69	46	87.88	47	87.56	48	87.21	49	87.71
50	89.40	51	87.40	52	88.90	53	88.13	54	88.17	55	89.42	56	85.63
57	87.52	58	88.90	59	89.06	60	89.35	61	89.50	62	90.17	63	88.31
64	68.94	65	55.63	66	55.73	67	57.25	68	60.31	69	62.48	70	64.15
71	65.25	72	66.15	73	66.54	74	66.08	75	63.06	76	69.46	77	73.63
78	76.54	79	77.08	80	68.48	81	88.63	82	85.96	83	85.73	84	83.06
85	82.33	86	79.67	87	76.96	88	74.96	89	72.90	90	70.94	91	69.44
92	82.10	93	80.69	94	68.13								

OCT 1,1963

1	84.42	2	76.13	3	88.35	4	82.02	5	90.31	6	84.35	7	88.81
8	82.08	9	55.85	10	51.44	11	83.27	12	85.23	13	80.67	14	80.77
15	82.79	16	83.54	17	88.10	18	86.27	19	85.08	20	83.77	21	83.33
22	82.10	23	80.25	24	78.54	25	76.90	26	74.31	27	72.52	28	89.79
29	89.19	30	89.48	31	88.81	32	67.42	33	88.08	34	86.04	35	84.65
36	84.46	37	81.81	38	79.99	39	76.48	40	73.83	41	72.04	42	86.79
43	85.98	44	83.04	45	87.92	46	87.92	47	87.25	48	86.94	49	87.56
50	89.31	51	89.25	52	88.73	53	88.33	54	88.46	55	89.23	56	85.42
57	87.56	58	89.23	59	89.38	60	89.77	61	89.79	62	90.35	63	88.04
64	66.94	65	55.44	66	56.02	67	56.94	68	61.15	69	62.06	70	63.02
71	64.56	72	66.17	73	66.52	74	66.08	75	63.06	76	71.56	77	74.79
78	77.50	79	80.21	80	66.50	81	88.27	82	85.69	83	85.63	84	82.83
85	82.10	86	79.98	87	77.38	88	75.17	89	72.92	90	70.73	91	69.25
92	81.81	93	81.17	94	67.71								

OCT 2,1963

1	85.17	2	76.54	3	88.46	4	79.69	5	89.94	6	83.79	7	88.90
8	81.25	9	60.40	10	55.46	11	83.08	12	85.00	13	80.69	14	80.77
15	82.81	16	83.67	17	87.40	18	85.90	19	84.98	20	83.60	21	83.21
22	82.23	23	80.50	24	78.65	25	77.09	26	74.47	27	72.69	28	89.87
29	89.85	30	90.46	31	89.74	32	67.55	33	87.85	34	85.54	35	85.13
36	85.00	37	82.21	38	80.40	39	77.63	40	74.25	41	72.35	42	86.46
43	85.60	44	82.98	45	88.63	46	88.40	47	87.75	48	87.31	49	88.56
50	90.04	51	90.04	52	89.33	53	88.94	54	89.04	55	89.42	56	85.98
57	87.79	58	88.94	59	89.17	60	88.79	61	89.79	62	90.40	63	88.60
64	67.92	65	58.83	66	59.23	67	59.75	68	62.77	69	62.40	70	63.10
71	64.31	72	65.10	73	63.35	74	66.04	75	63.10	76	72.19	77	75.67
78	78.40	79	80.65	80	67.04	81	88.25	82	85.79	83	85.69	84	82.75
85	81.96	86	80.17	87	77.60	88	75.52	89	73.02	90	70.79	91	69.10
92	82.44	93	81.42	94	67.17								

OCT 3,1963

1	85.98	2	76.31	3	87.48	4	79.54	5	89.58	6	83.15	7	88.77
8	81.15	9	64.54	10	58.42	11	82.77	12	84.73	13	80.73	14	81.08
15	83.00	16	83.77	17	86.92	18	85.58	19	84.71	20	83.56	21	82.98
22	62.27	23	80.85	24	79.00	25	77.46	26	74.92	27	72.94	28	90.10
29	90.44	30	91.15	31	90.31	32	67.73	33	87.88	34	85.50	35	85.04
36	84.92	37	82.33	38	80.40	39	77.08	40	74.60	41	72.67	42	86.44
43	85.77	44	83.06	45	87.48	46	87.54	47	87.38	48	86.96	49	87.60
50	89.04	51	89.00	52	88.35	53	87.69	54	87.69	55	89.13	56	85.81
57	87.55	58	88.63	59	88.79	60	89.25	61	89.35	62	90.00	63	88.50
64	68.94	65	64.65	66	64.79	67	65.17	68	64.73	69	63.98	70	64.04
71	64.38	72	65.90	73	65.33	74	66.10	75	63.25	76	72.71	77	75.71
78	78.65	79	80.77	80	67.04	81	88.10	82	85.52	83	85.69	84	83.73
85	82.42	86	80.10	87	77.67	88	75.69	89	73.17	90	70.88	91	69.10
92	81.38	93	81.58	94	67.06								

OCT 4,1963

1	85.65	2	78.35	3	86.77	4	78.31	5	88.52	6	82.17	7	87.67
8	79.94	9	56.04	10	49.79	11	82.27	12	84.10	13	80.29	14	81.05
15	83.15	16	83.71	17	86.40	18	85.48	19	84.71	20	83.44	21	82.90
22	82.04	23	80.79	24	79.00	25	77.42	26	74.92	27	72.92	28	89.88
29	90.60	30	90.90	31	90.38	32	66.29	33	87.65	34	85.67	35	84.98
36	84.83	37	82.33	38	80.54	39	77.08	40	74.63	41	73.44	42	86.23
43	85.46	44	83.25	45	86.92	46	87.19	47	87.27	48	86.94	49	87.10
50	88.04	51	88.06	52	87.33	53	87.08	54	67.21	55	88.52	56	86.10
57	87.38	58	88.38	59	88.42	60	88.75	61	88.98	62	89.44	63	86.67
64	65.85	65	55.15	66	55.25	67	55.08	68	60.44	69	62.02	70	63.33
71	64.06	72	65.67	73	66.10	74	65.63	75	63.33	76	71.83	77	75.67
78	78.56	79	77.94	80	65.63	81	88.06	82	85.98	83	86.25	84	84.81
85	83.19	86	80.35	87	73.27	88	76.39	89	73.92	90	71.46	91	70.31
92	81.98	93	80.88	94	64.96								

OCT 5,1963

1	85.65	2	76.79	3	86.21	4	76.79	5	88.15	6	80.72	7	87.06
8	78.19	9	51.08	10	45.40	11	81.33	12	83.35	13	80.00	14	80.96
15	82.60	16	83.21	17	85.63	18	84.81	19	83.98	20	82.81	21	82.19
22	81.48	23	80.81	24	79.25	25	77.79	26	75.13	27	73.05	28	89.13
29	89.77	30	89.60	31	89.06	32	69.58	33	88.04	34	85.35	35	84.71
36	84.69	37	82.37	38	81.07	39	77.67	40	75.00	41	73.29	42	85.33
43	85.35	44	83.02	45	86.56	46	86.42	47	86.19	48	85.79	49	87.06
50	88.15	51	88.21	52	87.13	53	86.65	54	86.56	55	87.96	56	85.81
57	87.42	58	88.08	59	88.10	60	88.17	61	88.27	62	88.79	63	87.50
64	69.69	65	51.81	66	50.46	67	51.23	68	57.63	69	58.96	70	60.85
71	62.96	72	65.17	73	65.85	74	65.46	75	63.07	76	72.30	77	76.04
78	78.48	79	80.09	80	69.35	81	86.58	82	85.64	83	86.35	84	85.29
85	83.77	86	80.04	87	78.25	88	76.73	89	74.48	90	71.96	91	70.13
92	80.43	93	80.71	94	69.08								

OCT 6,1963

1	85.79	2	75.96	3	86.46	4	76.77	5	88.65	6	80.52	7	87.69
8	78.27	9	54.31	10	49.02	11	81.35	12	83.60	13	79.81	14	81.19
15	83.83	16	83.44	17	86.13	18	84.48	19	84.25	20	83.13	21	82.38
22	81.54	23	80.83	24	79.46	25	77.98	26	75.54	27	73.44	28	89.29
29	89.54	30	89.08	31	88.38	32	68.46	33	88.69	34	85.92	35	85.21
36	85.13	37	82.35	38	80.83	39	77.65	40	75.10	41	73.27	42	85.60
43	85.10	44	[illegible]	45	86.54	46	86.52	47	85.77	48	85.27	49	87.50
50	88.40	51	88.52	52	87.48	53	86.63	54	86.71	55	88.15	56	85.29
57	87.71	58	88.42	59	88.42	60	88.44	61	88.50	62	89.13	63	87.81
64	69.19	65	53.35	66	53.56	67	54.38	68	59.48	69	59.38	70	60.38
71	62.21	72	64.88	73	65.65	74	65.29	75	62.92	76	72.15	77	75.73
78	78.29	79	80.02	80	67.60	81	88.21	82	85.79	83	86.38	84	85.96
85	84.63	86	80.04	87	78.21	88	76.83	89	74.69	90	72.19	91	70.15
92	0.	93	80.67	94	67.83								

OCT 7,1963

1	85.63	2	76.79	3	86.69	4	76.75	5	89.81	6	80.33	7	88.46
8	78.60	9	60.63	10	55.44	11	81.52	12	84.19	13	79.81	14	81.35
15	83.06	16	83.73	17	86.88	18	85.08	19	84.49	20	83.15	21	82.38
22	81.40	23	80.67	24	79.23	25	77.81	26	75.35	27	73.31	28	89.81
29	90.02	30	90.02	31	89.17	32	68.40	33	89.58	34	86.71	35	84.58
36	84.56	37	82.65	38	81.04	39	77.79	40	75.31	41	73.60	42	86.31
43	85.85	44	82.96	45	86.94	46	86.90	47	86.50	48	85.88	49	88.04
50	89.19	51	89.21	52	87.90	53	87.19	54	87.15	55	89.19	56	85.46
57	88.31	58	89.42	59	89.46	60	89.56	61	89.52	62	90.17	63	88.40
64	69.48	65	61.19	66	61.29	67	61.52	68	63.77	69	61.23	70	61.52
71	62.27	72	64.73	73	65.88	74	65.40	75	63.06	76	72.44	77	75.69
78	76.40	79	80.10	80	67.60	81	89.13	82	85.73	83	86.96	84	86.42
85	85.13	86	79.52	87	77.56	88	76.06	89	73.96	90	71.38	91	69.56
92	0.	93	80.54	94	67.79								

OCT 8,1963

1	85.35	2	76.96	3	86.94	4	76.75	5	90.27	6	80.77	7	89.35
8	79.17	9	62.21	10	55.63	11	81.83	12	84.63	13	80.10	14	81.73
15	83.63	16	84.25	17	87.50	18	86.00	19	85.13	20	83.65	21	83.02
22	81.83	23	80.96	24	79.48	25	77.98	26	75.44	27	73.46	28	90.65
29	91.13	30	90.92	31	90.17	32	68.19	33	90.29	34	87.40	35	85.25
36	85.23	37	83.04	38	81.29	39	78.00	40	76.04	41	73.73	42	86.77
43	86.27	44	83.10	45	87.23	46	87.31	47	87.10	48	86.40	49	88.27
50	89.54	51	89.52	52	88.19	53	87.52	54	87.73	55	89.73	56	86.00
57	88.94	58	89.94	59	90.00	60	90.15	61	90.27	62	90.90	63	88.85
64	58.44	65	60.69	66	60.52	67	60.42	68	63.13	69	62.25	70	62.38
71	62.81	72	64.54	73	65.50	74	65.27	75	63.02	76	72.46	77	75.96
78	76.42	79	80.13	80	67.94	81	89.52	82	86.38	83	87.71	84	87.38
85	86.06	86	83.29	87	77.79	88	76.42	89	74.23	90	71.58	91	69.71
92	82.22	93	80.94	94	67.75								

OCT 9,1963

1	84.18	2	74.42	3	87.42	4	80.15	5	90.31	6	83.08	7	88.83
8	82.19	9	55.23	10	48.54	11	82.27	12	84.79	13	80.31	14	82.19
15	84.21	16	84.58	17	88.91	18	86.73	19	85.48	20	84.21	21	83.67
22	82.33	23	80.94	24	79.33	25	77.83	26	75.25	27	73.44	28	90.70
29	90.96	30	90.61	31	89.83	32	64.96	33	89.79	34	87.10	35	85.83
36	85.69	37	83.13	38	81.48	39	78.10	40	75.73	41	73.77	42	86.10
43	85.69	44	83.06	45	87.81	46	87.08	47	86.94	48	87.19	49	86.48
50	88.23	51	88.54	52	88.21	53	87.96	54	88.21	55	89.46	56	85.90
57	88.04	58	89.56	59	89.79	60	90.23	61	90.35	62	90.96	63	88.81
64	65.67	65	54.44	66	54.48	67	54.60	68	60.25	69	60.83	70	61.77
71	62.73	72	64.42	73	65.33	74	65.04	75	62.67	76	73.19	77	75.10
78	78.33	79	80.31	80	64.17	81	89.31	82	86.85	83	86.75	84	84.88
85	83.79	86	80.29	87	78.21	88	76.71	89	74.44	90	71.70	91	69.79
92	82.85	93	81.13	94	64.77								

OCT 10,1963

1	84.67	2	75.35	3	90.10	4	84.67	5	91.33	6	86.69	7	90.96
8	86.77	9	53.85	10	48.85	11	54.21	12	86.44	13	81.44	14	83.38
15	85.67	16	65.88	17	89.71	18	87.98	19	86.75	20	85.44	21	84.88
22	83.42	23	81.35	24	79.79	25	78.10	26	75.60	27	74.29	28	91.40
29	91.48	30	90.71	31	89.98	32	66.13	33	91.13	34	87.63	35	87.63
36	86.85	37	84.10	38	82.23	39	78.88	40	76.46	41	74.31	42	86.46
43	86.19	44	81.75	45	90.27	46	89.54	47	88.38	48	88.69	49	88.65
50	90.13	51	90.42	52	90.56	53	90.48	54	91.13	55	91.23	56	86.25
57	89.02	58	90.60	59	90.77	60	91.23	61	91.31	62	91.92	63	90.63
64	66.48	65	50.69	66	51.19	67	51.75	68	58.08	69	58.81	70	60.25
71	62.02	72	64.08	73	65.00	74	64.85	75	62.81	76	73.06	77	76.44
78	76.79	79	81.06	80	65.90	81	90.06	82	87.67	83	86.95	84	83.73
85	82.81	86	80.58	87	78.52	88	76.88	89	74.44	90	71.92	91	69.67
92	84.38	93	81.63	94	65.50								

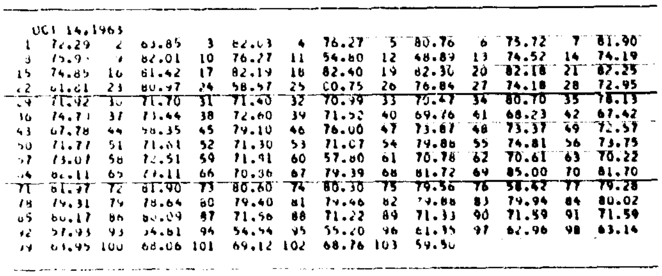
OCT 11,1963

1	84.88	2	74.81	3	90.13	4	86.88	5	91.25	6	88.03	7	91.04
8	88.81	9	53.31	10	49.91	11	84.97	12	86.50	13	82.13	14	84.06
15	86.41	16	86.53	17	89.84	18	88.34	19	87.16	20	85.97	21	85.22
22	83.84	23	81.84	24	80.06	25	78.31	26	75.62	27	73.59	28	91.34
29	91.38	30	90.84	31	89.75	32	64.19	33	90.66	34	87.60	35	88.78
36	87.00	37	84.28	38	82.81	39	79.35	40	77.09	41	74.47	42	67.06
43	86.78	44	84.50	45	88.78	46	89.16	47	88.63	48	88.53	49	89.41
50	90.44	51	90.63	52	90.66	53	90.63	54	90.72	55	91.33	56	86.69
57	88.88	58	90.63	59	90.84	60	91.22	61	91.25	62	91.75	63	90.38
64	64.41	65	52.75	66	52.69	67	54.16	68	59.53	69	57.38	70	59.38
71	61.78	72	64.00	73	64.97	74	64.75	75	62.88	76	73.16	77	76.47
78	79.22	79	81.25	80	64.90	81	90.03	82	88.03	83	87.03	84	83.59
85	82.88	86	80.45	87	78.53	88	76.91	89	74.50	90	71.88	91	69.44
92	84.83	93	81.93	94	63.53								

1000 Person Model Shelter

Protective Structures Development Center

Fort Belvoir, Virginia



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  8  75.9    9  82.01  10  76.27  11  54.60  12  48.89  13  74.52  14  74.19
 15  74.85  16  61.42  17  82.19  18  82.40  19  82.30  20  82.18  21  82.25
 22  61.61  23  80.97  24  58.57  25  60.75  26  76.84  27  74.18  28  72.95
 29  71.92  30  71.70  31  71.40  32  70.99  33  75.47  34  80.70  35  78.13
 36  74.71  37  73.44  38  72.60  39  71.52  40  69.76  41  68.23  42  67.42
 43  67.78  44  58.35  45  79.10  46  76.00  47  73.67  48  73.37  49  72.57
 50  71.77  51  71.61  52  71.30  53  71.07  54  79.86  55  74.81  56  73.75
 57  73.07  58  72.51  59  71.91  60  57.80  61  70.78  62  70.61  63  70.22
 64  82.11  65  77.11  66  70.36  67  79.39  68  81.72  69  85.00  70  81.70
 71  61.97  72  81.90  73  80.60  74  80.30  75  79.56  76  58.42  77  79.28
 78  79.31  79  78.64  80  79.40  81  79.46  82  79.88  83  79.94  84  80.02
 85  80.17  86  80.09  87  71.56  88  71.22  89  71.33  90  71.59  91  71.59
 92  57.93  93  54.61  94  54.54  95  55.20  96  61.35  97  62.96  98  63.14
 99  61.95 100  68.06 101  69.12 102  68.76 103  59.50
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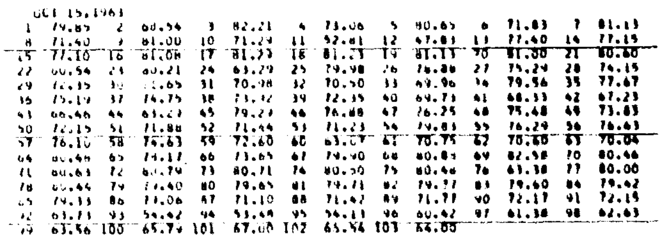

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  OCT 15,1963
  1  79.85   2  68.54   3  82.21   4  73.06   5  80.65   6  71.83   7  81.13
  8  71.40   9  81.00  10  71.29  11  52.81  12  47.83  13  77.40  14  77.15
 15  77.10  16  81.08  17  81.33  18  81.23  19  81.13  20  81.00  21  80.60
 22  60.54  23  60.21  24  63.29  25  79.98  26  76.80  27  75.29  28  74.15
 29  72.35  30  71.65  31  70.98  32  70.50  33  69.96  34  79.56  35  77.67
 36  75.19  37  74.75  38  73.42  39  72.35  40  69.73  41  68.33  42  67.23
 43  68.46  44  63.27  45  79.27  46  76.88  47  76.25  48  75.48  49  73.83
 50  72.15  51  71.88  52  71.44  53  71.23  54  79.83  55  76.29  56  76.63
 57  76.10  58  74.63  59  72.60  60  63.07  61  70.75  62  70.60  63  70.04
 64  80.46  65  74.17  66  73.65  67  79.90  68  80.83  69  82.58  70  80.46
 71  80.63  72  80.79  73  80.71  74  80.50  75  80.46  76  61.38  77  80.00
 78  80.44  79  77.40  80  79.65  81  79.71  82  79.77  83  79.60  84  79.42
 85  79.33  86  71.06  87  71.10  88  71.47  89  71.77  90  72.17  91  72.15
 92  63.71  93  54.42  94  53.49  95  54.11  96  60.42  97  61.38  98  62.63
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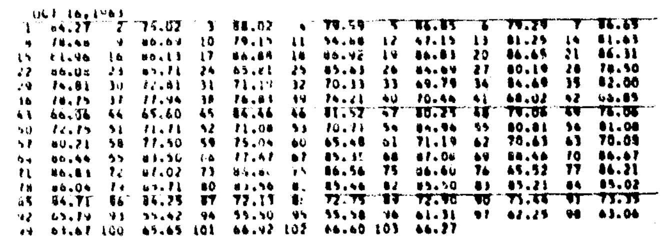

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  OCT 16,1963
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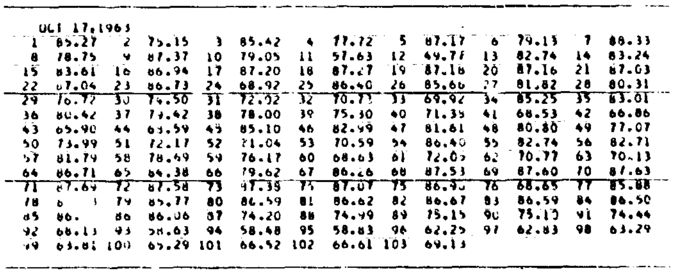
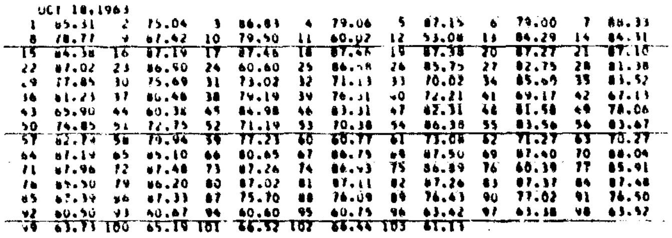
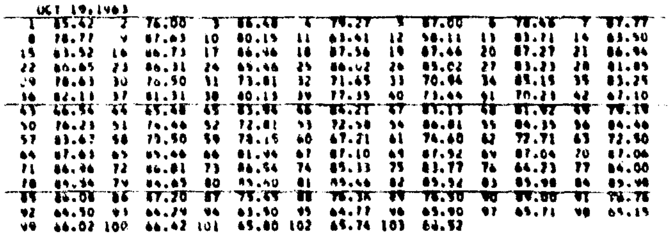
 15  81.96  16  80.13  17  86.84  18  86.92  19  86.83  20  86.65  21  86.31
 22  86.08  23  85.71  24  65.21  25  85.63  26  84.69  27  80.19  28  78.50
 29  76.81  30  72.81  31  71.19  32  70.33  33  69.79  34  84.69  35  82.00
 36  78.75  37  77.94  38  76.81  39  74.21  40  70.44  41  68.02  42  65.85
 43  66.56  44  65.60  45  84.46  46  81.52  47  80.25  48  79.06  49  76.06
 50  72.75  51  71.71  52  71.08  53  70.71  54  84.96  55  80.81  56  81.08
 57  80.21  58  77.50  59  75.04  60  65.48  61  71.19  62  70.63  63  70.09
 64  86.44  65  81.50  66  77.67  67  85.15  68  87.08  69  88.46  70  86.67
 71  86.81  72  87.02  73  85.6   74  86.56  75  86.60  76  65.52  77  86.21
 78  86.04  79  85.71  80  83.96  81  85.46  82  85.50  83  85.21  84  85.02
 85  84.71  86  84.25  87  72.13  88  72.75  89  72.90  90  73.44  91  73.35
 92  65.79  93  55.42  94  55.50  95  55.58  96  61.31  97  62.25  98  63.06
 99  61.67 100  65.65 101  66.92 102  66.60 103  66.27
```



```
  OCT 17,1963
  1  85.27   2  75.15   3  85.42   4  77.72   5  87.17   6  79.13   7  88.33
  8  78.75   9  87.37  10  79.05  11  57.63  12  49.77  13  82.74  14  83.24
 15  83.61  16  86.94  17  87.20  18  87.27  19  87.18  20  87.16  21  87.03
 22  87.04  23  86.73  24  68.92  25  86.40  26  85.66  27  81.82  28  80.31
 29  76.72  30  74.50  31  72.02  32  70.73  33  69.92  34  85.25  35  83.01
 36  80.42  37  79.42  38  78.00  39  75.30  40  71.35  41  68.53  42  66.86
 43  65.90  44  63.59  45  85.10  46  82.99  47  81.61  48  80.80  49  77.07
 50  73.99  51  72.17  52  71.04  53  70.59  54  86.40  55  82.74  56  82.71
 57  81.79  58  78.69  59  76.17  60  68.63  61  72.05  62  70.77  63  70.13
 64  86.71  65  64.38  66  79.62  67  86.26  68  87.53  69  87.60  70  87.63
 71  87.69  72  87.58  73  87.35  74  87.07  75  86.9   76  68.65  77  85.88
 78  [illegible]  79  85.77  80  86.59  81  86.62  82  86.67  83  86.59  84  86.50
 85  86.       86  86.06  87  74.20  88  74.99  89  75.15  90  75.13  91  74.44
 92  68.13  93  58.63  94  58.48  95  58.83  96  62.25  97  62.83  98  63.29
 99  63.81 100  65.29 101  66.52 102  66.61 103  69.13
```



```
  OCT 18,1963
  1  85.31   2  75.04   3  86.83   4  79.06   5  87.15   6  79.00   7  88.33
  8  78.77   9  87.42  10  79.50  11  60.02  12  53.08  13  84.29  14  84.31
 15  84.38  16  87.19  17  87.46  18  87.46  19  87.38  20  87.27  21  87.10
 22  87.02  23  86.90  24  60.60  25  86.58  26  85.75  27  82.75  28  81.38
 29  77.85  30  75.69  31  73.02  32  71.13  33  70.02  34  85.69  35  83.52
 36  81.23  37  80.40  38  79.19  39  76.31  40  72.21  41  69.17  42  67.13
 43  65.90  44  60.38  45  84.98  46  83.31  47  82.31  48  81.58  49  78.06
 50  74.85  51  72.75  52  71.19  53  70.38  54  86.38  55  83.56  56  83.67
 57  82.74  58  79.94  59  77.23  60  60.77  61  73.08  62  71.27  63  70.27
 64  87.19  65  85.10  66  80.65  67  86.75  68  87.50  69  87.40  70  88.04
 71  87.96  72  87.48  73  87.26  74  86.93  75  86.89  76  60.39  77  85.91
 78  85.50  79  86.20  80  87.02  81  87.11  82  87.26  83  87.37  84  87.48
 85  87.39  86  87.33  87  75.70  88  76.09  89  76.43  90  77.02  91  76.50
 92  60.50  93  60.67  94  60.60  95  60.75  96  63.42  97  63.38  98  63.52
 99  63.73 100  65.19 101  66.52 102  66.44 103  61.13
```



```
  OCT 19,1963
  1  85.42   2  76.00   3  86.48   4  79.27   5  87.00   6  78.46   7  87.77
  8  78.77   9  87.63  10  80.15  11  63.41  12  58.11  13  83.71  14  83.50
 15  83.52  16  86.73  17  86.46  18  87.56  19  87.46  20  87.27  21  86.94
 22  86.65  23  86.31  24  65.46  25  86.02  26  85.02  27  83.23  28  81.85
 29  78.63  30  75.50  31  73.81  32  71.65  33  70.94  34  85.15  35  83.25
 36  82.11  37  81.31  38  80.13  39  77.35  40  73.44  41  70.21  42  67.10
 43  66.56  44  65.48  45  85.46  46  84.21  47  83.13  48  81.92  49  78.19
 50  76.23  51  76.46  52  72.81  53  72.50  54  86.81  55  84.35  56  84.46
 57  83.67  58  75.50  59  78.15  60  67.71  61  74.60  62  77.71  63  72.50
 64  87.63  65  85.60  66  81.96  67  87.10  68  87.92  69  87.04  70  87.06
 71  86.96  72  86.81  73  86.54  74  85.13  75  83.77  76  64.23  77  84.00
 78  84.56  79  84.65  80  85.60  81  85.46  82  85.92  83  85.98  84  85.98
 85  86.08  86  87.20  87  75.45  88  76.36  89  76.50  90  89.00  91  78.78
 92  64.50  93  64.29  94  63.90  95  64.77  96  65.90  97  65.71  98  65.15
 99  66.02 100  66.42 101  65.80 102  65.74 103  64.52
```

OCT 20,1963

1	85.29	2	75.04	3	87.58	4	79.17	5	88.29	6	79.46	7	89.46
8	78.83	9	88.56	10	79.85	11	60.00	12	54.94	13	85.02	14	85.08
15	85.25	16	88.19	17	88.52	18	88.52	19	88.52	20	88.42	21	88.23
22	88.17	23	88.04	24	64.88	25	87.67	26	86.71	27	83.96	28	82.71
29	79.38	30	77.15	31	74.44	32	72.17	33	70.60	34	86.67	35	84.65
36	82.44	37	81.54	38	80.38	39	77.33	40	73.46	41	70.08	42	67.63
43	66.00	44	64.54	45	85.77	46	84.29	47	83.44	48	82.58	49	79.17
50	76.13	51	74.06	52	71.98	53	70.81	54	87.73	55	84.96	56	85.06
57	84.27	58	81.35	59	78.52	60	64.31	61	74.46	62	72.17	63	70.94
64	88.56	65	86.38	66	81.60	67	88.04	68	88.29	69	88.79	70	89.04
71	88.88	72	88.69	73	88.40	74	88.06	75	87.94	76	65.27	77	87.04
78	86.79	79	86.94	80	87.92	81	88.06	82	87.96	83	88.00	84	88.21
85	88.13	86	88.13	87	77.52	88	77.58	89	77.08	90	77.52	91	77.08
92	64.27	93	60.83	94	60.69	95	60.88	96	62.01	97	64.00	98	64.46
99	64.52	100	64.96	101	66.24	102	66.20	103	64.96				

OCT 21,1963

1	85.17	2	75.33	3	87.35	4	79.33	5	88.13	6	79.52	7	88.96
8	78.81	9	88.27	10	79.69	11	62.08	12	54.56	13	84.73	14	84.92
15	85.13	16	88.19	17	88.54	18	88.42	19	86.42	20	88.33	21	88.29
22	88.10	23	87.73	24	63.00	25	87.67	26	86.83	27	84.17	28	82.88
29	79.79	30	77.71	31	75.00	32	72.54	33	70.92	34	86.52	35	84.88
36	82.71	37	81.98	38	80.71	39	77.58	40	73.94	41	70.44	42	67.94
43	65.96	44	63.85	45	85.52	46	84.48	47	83.42	48	83.04	49	79.67
50	76.48	51	74.27	52	72.08	53	70.75	54	87.56	55	85.29	56	85.31
57	84.85	58	81.85	59	78.92	60	63.90	61	75.43	62	73.12	63	72.45
64	87.88	65	86.08	66	82.08	67	87.38	68	86.92	69	87.33	70	88.33
71	87.96	72	87.58	73	87.38	74	87.13	75	87.00	76	63.04	77	86.75
78	86.71	79	86.50	80	86.67	81	86.96	82	86.96	83	87.04	84	87.04
85	86.96	86	87.04	87	76.88	88	78.13	89	78.17	90	78.58	91	77.88
92	62.69	93	62.81	94	62.44	95	62.73	96	63.60	97	63.42	98	64.02
99	64.31	100	65.17	101	66.17	102	65.98	103	64.85				

OCT 22,1963

1	84.83	2	75.33	3	87.50	4	79.48	5	88.33	6	79.92	7	88.60
8	79.00	9	88.40	10	80.21	11	58.63	12	54.13	13	85.02	14	85.27
15	85.46	16	88.29	17	88.75	18	88.71	19	88.54	20	88.42	21	88.02
22	87.94	23	87.67	24	65.83	25	87.63	26	86.92	27	84.44	28	83.21
29	80.17	30	78.21	31	75.50	32	73.06	33	71.29	34	86.83	35	85.27
36	83.10	37	82.44	38	81.19	39	78.06	40	74.33	41	71.04	42	68.29
43	66.29	44	64.77	45	86.85	46	85.44	47	84.60	48	83.63	49	80.19
50	77.13	51	74.92	52	72.75	53	71.27	54	87.73	55	85.56	56	85.65
57	85.00	58	82.27	59	79.56	60	64.90	61	76.21	62	74.19	63	74.13
64	0.	65	0.	66	0.	67	0.	68	0.	69	0.	70	0.
71	0.	72	0.	73	0.	74	0.	75	0.	76	0.	77	0.
78	0.	79	0.	80	0.	81	0.	82	0.	83	0.	84	0.
85	0.	86	0.	87	0.	88	0.	89	0.	90	0.	91	0.
92	0.	93	59.23	94	59.73	95	59.21	96	60.98	97	62.75	98	64.00
99	64.25	100	65.02	101	66.10	102	66.35	103	65.63				

OCT 23,1963

1	84.75	2	75.46	3	87.02	4	79.50	5	87.63	6	79.88	7	88.67
8	79.15	9	88.04	10	80.33	11	59.13	12	54.65	13	84.42	14	84.81
15	84.96	16	88.00	17	88.38	18	88.27	19	88.08	20	88.08	21	87.77
22	87.71	23	87.44	24	69.40	25	87.63	26	86.90	27	84.58	28	83.48
29	80.60	30	78.71	31	76.06	32	73.60	33	71.77	34	86.69	35	85.08
36	83.31	37	82.58	38	81.40	39	78.31	40	74.85	41	71.40	42	68.56
43	66.52	44	69.02	45	85.88	46	85.02	47	84.44	48	83.56	49	80.50
50	77.63	51	75.23	52	73.71	53	71.48	54	87.35	55	85.58	56	85.56
57	85.04	58	82.63	59	80.50	60	69.69	61	76.60	62	74.60	63	74.65
64	0.	65	0.	66	0.	67	0.	68	0.	69	0.	70	0.
71	0.	72	0.	73	0.	74	0.	75	0.	76	0.	77	0.
78	0.	79	0.	80	0.	81	0.	82	0.	83	0.	84	0.
85	0.	86	0.	87	0.	88	0.	89	0.	90	0.	91	0.
92	0.	93	60.90	94	60.38	95	61.04	96	63.23	97	63.17	98	63.54
99	63.94	100	65.10	101	66.13	102	66.29	103	69.88				

OCT 24,1963

1	85.02	2	75.52	3	87.21	4	79.63	5	88.40	6	80.21	7	89.40
8	79.42	9	88.81	10	80.46	11	56.42	12	52.35	13	84.44	14	84.93
15	85.06	16	83.44	17	88.85	18	88.77	19	88.71	20	88.54	21	88.25
22	88.17	23	87.83	24	67.10	25	88.23	26	87.31	27	84.90	28	83.73
29	80.96	30	79.08	31	76.60	32	74.10	33	72.27	34	87.15	35	85.65
36	83.67	37	82.92	38	81.79	39	78.79	40	75.31	41	72.02	42	69.06
43	66.98	44	67.17	45	85.58	46	84.90	47	84.27	48	83.63	49	80.65
50	77.67	51	75.42	52	73.04	53	71.60	54	87.67	55	85.67	56	85.67
57	85.06	58	82.63	59	79.94	60	67.00	61	75.88	62	74.73	63	74.39
64	90.31	65	88.25	66	83.94	67	89.81	68	89.31	69	90.63	70	90.63
71	90.69	72	90.44	73	90.06	74	90.06	75	89.69	76	66.06	77	89.69
78	89.38	79	87.75	80	89.75	81	89.88	82	89.88	83	89.88	84	89.94
85	89.94	86	87.94	87	78.81	88	79.38	89	79.75	90	80.44	91	80.50
92	60.44	93	57.52	94	57.67	95	58.13	96	61.94	97	63.25	98	63.92
99	64.10	100	65.06	101	66.00	102	66.13	103	67.73				

OCT 25,1963

1	85.06	2	75.33	3	87.48	4	79.94	5	88.63	6	80.60	7	90.00
8	79.56	9	89.06	10	80.67	11	58.42	12	56.08	13	84.73	14	85.13
15	85.42	16	87.23	17	89.42	18	89.19	19	88.96	20	88.79	21	88.56
22	88.48	23	88.13	24	66.50	25	88.40	26	87.15	27	85.04	28	83.90
29	81.29	30	77.50	31	76.92	32	74.40	33	72.58	34	87.31	35	85.69
36	83.79	37	83.15	38	82.02	39	78.94	40	75.60	41	72.40	42	69.48
43	67.31	44	66.54	45	86.17	46	85.17	47	84.35	48	83.54	49	80.69
50	77.83	51	75.63	52	73.35	53	71.58	54	87.92	55	86.00	56	85.92
57	85.10	58	82.69	59	80.10	60	66.31	61	76.96	62	74.33	63	72.56
64	89.44	65	87.63	66	83.96	67	89.25	68	89.29	69	89.69	70	89.81
71	89.67	72	89.63	73	89.58	74	89.46	75	89.46	76	67.19	77	88.85
78	89.35	79	87.33	80	89.13	81	89.10	82	89.13	83	88.85	84	88.88
85	88.71	86	63.25	87	78.48	88	79.44	89	79.90	90	80.71	91	80.58
92	66.73	93	59.73	94	59.35	95	59.73	96	61.71	97	62.04	98	63.46
99	64.23	100	64.98	101	65.75	102	65.88	103	66.79				

OCT 26,1963

1	84.94	2	75.29	3	87.60	4	80.04	5	88.94	6	80.60	7	89.48
8	79.71	9	87.13	10	80.65	11	63.33	12	60.88	13	85.52	14	85.81
15	85.81	16	88.85	17	89.17	18	88.96	19	88.83	20	88.60	21	88.38
22	88.29	23	87.83	24	69.79	25	88.31	26	87.33	27	85.21	28	84.08
29	81.52	30	79.88	31	77.29	32	74.90	33	72.98	34	87.71	35	86.08
36	84.17	37	83.44	38	82.29	39	79.42	40	76.08	41	72.71	42	69.88
43	67.54	44	70.15	45	87.13	46	85.63	47	84.81	48	83.96	49	80.88
50	77.98	51	75.90	52	73.46	53	71.90	54	88.27	55	86.08	56	86.08
57	85.42	58	82.79	59	80.35	60	69.50	61	77.17	62	74.56	63	72.77
64	88.71	65	87.40	66	84.19	67	88.34	68	89.75	69	88.60	70	89.25
71	89.23	72	89.23	73	89.17	74	89.17	75	88.98	76	69.71	77	89.31
78	89.27	79	87.46	80	89.33	81	89.23	82	89.17	83	85.71	84	88.63
85	88.52	86	87.85	87	79.63	88	80.23	89	80.54	90	81.15	91	81.10
92	69.94	93	64.40	94	64.58	95	64.69	96	66.44	97	65.54	98	64.96
99	64.71	100	65.00	101	65.92	102	66.08	103	70.27				

OCT 27,1963

1	85.08	2	75.40	3	86.75	4	80.33	5	88.54	6	80.85	7	89.06
8	79.90	9	88.69	10	80.75	11	63.13	12	57.85	13	85.23	14	85.67
15	85.63	16	88.17	17	88.58	18	88.50	19	88.44	20	88.31	21	88.00
22	87.88	23	87.48	24	71.02	25	87.81	26	86.57	27	85.04	28	83.98
29	81.52	30	79.90	31	77.27	32	74.98	33	73.13	34	87.27	35	85.81
36	84.13	37	83.42	38	82.11	39	79.13	40	76.08	41	72.88	42	69.94
43	68.44	44	71.67	45	86.33	46	85.27	47	84.46	48	83.65	49	80.77
50	78.15	51	75.94	52	74.29	53	72.56	54	87.75	55	86.06	56	[illegible]
57	85.19	58	[illegible]	59	80.10	60	70.98	61	[illegible]	62	74.88	63	72.94
64	88.54	65	87.29	66	84.48	67	88.96	68	88.54	69	88.46	70	88.79
71	88.73	72	88.79	73	88.71	74	88.66	75	86.69	76	71.02	77	88.52
78	88.35	79	88.69	80	89.00	81	88.85	82	88.61	83	88.35	84	88.21
85	88.19	86	87.50	87	79.67	88	80.44	89	80.75	90	81.25	91	81.19
92	71.29	93	64.29	94	64.10	95	64.60	96	65.90	97	65.52	98	65.10
99	64.90	100	64.94	101	65.73	102	65.77	103	71.71				

OCT 28,1963

1	85.17	2	[illegible]	3	89.71	4	81.96	5	90.35	6	85.19	7	90.58
8	[illegible]	9	[illegible]	10	86.52	11	58.65	12	50.58	13	85.19	14	85.81
15	86.15	16	86.98	17	90.19	18	90.29	19	90.06	20	89.92	21	89.60
22	89.40	23	88.00	24	66.28	25	89.23	26	87.13	27	85.11	28	86.27
29	81.65	30	79.90	31	77.58	32	75.19	33	74.23	34	89.20	35	87.42
36	85.11	37	84.00	38	82.63	39	79.21	40	76.08	41	72.94	42	69.98
43	67.69	44	66.13	45	88.88	46	86.50	47	85.71	48	84.19	49	81.17
50	78.44	51	76.29	52	73.92	53	72.04	54	89.17	55	86.73	56	86.29
57	85.19	58	82.94	59	80.73	60	66.08	61	77.40	62	75.29	63	73.27
64	[illegible]	65	89.90	66	85.50	67	90.50	68	90.77	69	91.58	70	[illegible]
71	[illegible]	72	91.92	73	90.83	74	90.54	75	90.46	76	67.18	77	89.67
78	90.54	79	91.42	80	91.17	81	91.08	82	90.90	83	90.60	84	90.44
85	80.71	86	83.44	87	88.06	88	80.60	89	80.80	90	81.19	91	81.17
92	.04	93	54.58	94	59.17	95	58.96	96	61.61	97	64.43	98	65.24
99	65.10	100	65.28	101	65.92	102	66.02	103	67.07				

OCT 29,1963

1	85.10	2	75.46	3	90.65	4	86.26	5	91.73	6	87.58	7	92.54
8	85.73	9	91.04	10	56.42	11	52.56	12	42.38	13	84.40	14	85.67
15	86.35	16	91.15	17	90.52	18	90.56	19	90.50	20	90.38	21	90.29
22	90.15	23	89.92	24	64.17	25	90.00	26	88.46	27	86.33	28	85.15
29	82.19	30	[illegible]	31	77.63	32	75.17	33	74.02	34	90.31	35	88.33
36	[illegible]	37	[illegible]	38	[illegible]	39	[illegible]	40	76.44	41	72.88	42	69.88
43	[illegible]	44	64.11	45	90.60	46	88.23	47	87.21	48	86.02	49	82.13
50	79.04	51	76.63	52	[illegible]	53	73.17	54	90.33	55	88.17	56	87.52
57	86.60	58	84.17	59	81.15	60	63.70	61	77.79	62	75.10	63	74.04
64	90.98	65	[illegible]	66	88.11	67	91.15	68	91.59	69	93.69	70	92.21
71	92.50	72	[illegible]	73	92.25	74	92.04	75	90.71	76	65.19	77	91.46
78	91.10	79	[illegible]	80	[illegible]	81	92.10	82	91.94	83	91.85	84	91.48
85	91.04	86	87.71	87	[illegible]	88	81.00	89	81.44	90	82.15	91	80.90
92	63.50	93	[illegible]	94	54.67	95	54.73	96	57.52	97	60.42	98	62.67
99	63.94	100	[illegible]	101	65.53	102	65.40	103	64.07				

Model Family Shelter (Winter Test)

Bozeman, Montana

```
   FEB 15,1964
  1  33.43   2  33.10   3  30.90   4  31.12   5  19.40   6  17.65   7  34.00
  8  32.57   9  33.70  10  33.80  11  32.98  12  37.10  13  27.65  14  22.45
 15  33.82  16  33.98  17  33.23  18  34.12  19  34.15  20  33.72  21  34.98
 22  34.95  23  36.20  24  28.55  25   0.    26   0.    27   0.    28   0.
 29   0.    30   0.    31   0.    32   0.    33   0.    34   0.    35   0.
 36   0.
```

```
   FEB 16,1964
  1  32.81   2  32.57   3  31.66   4  31.98   5  26.47   6  23.45   7  34.56
  8  33.68   9  34.59  10  34.45  11  32.95  12  32.01  13  27.12  14  24.34
 15  34.04  16  34.19  17  33.42  18  34.55  19  34.46  20  33.80  21  35.49
 22  35.30  23  36.49  24  28.63  25  37.14  26  36.36  27  37.05  28  38.64
 29  38.09  30  38.05  31  42.95  32  47.55  33  50.05  34  37.64  35  40.32
 36  45.14
```

```
   FEB 17,1964
  1  32.05   2  29.77   3  35.76   4  34.65   5  30.27   6  28.15   7  39.85
  8  37.41   9  38.19  10  36.89  11  33.61  12  32.28  13  27.82  14  27.80
 15  36.72  16  36.21  17  34.16  18  37.72  19  36.83  20  34.68  21  37.50
 22  38.30  23  37.25  24  29.89  25  36.89  26  36.08  27  36.42  28  38.19
 29  37.17  30  37.11  31  42.    32  46.53  33  49.22  34  36.42  35  39.21
 36  43.17
```

```
   FEB 18,1964
  1  35.70   2  30.33   3  49.08   4  45.     5  33.41   6  29.21   7  51.60
  8  47.17   9  46.90  10  46.33  11  38.    12  34.88  13  29.40  14  28.74
 15  45.58  16  44.18  17  38.67  18  47.38  19  45.65  20  40.20  21  45.27
 22  47.06  23  41.59  24  31.07  25  35.56  26  34.70  27  35.03  28  37.27
 29  35.64  30  35.53  31  40.73  32  44.92  33  46.98  34  34.85  35  37.49
 36  42.12
```

```
   FEB 19,1964
  1  31.42   2  27.29   3  53.45   4  49.65   5  26.13   6  23.30   7  54.29
  8  49.12   9  51.86  10  50.28  11  43.02  12  38.42  13  30.58  14  29.75
 15  50.10  16  48.74  17  42.93  18  50.92  19  49.43  20  44.37  21  49.88
 22  50.62  23  44.70  24  31.42  25  36.54  26  34.67  27  34.88  28  38.66
 29  35.63  30  35.52  31  41.14  32  44.58  33  46.79  34  34.71  35  37.25
 36  41.83
```

```
   FEB 20,1964
  1  28.44   2  24.97   3  54.35   4  49.11   5  20.57   6  19.63   7  55.38
  8  38.88   9  53.25  10  51.88  11  45.53  12  41.07  13  31.42  14  24.26
 15  51.83  16  50.92  17  45.57  18  52.84  19  51.48  20  46.76  21  52.87
 22  53.59  23  46.93  24  31.05  25  38.13  26  34.75  27  34.83  28  40.40
 29  44.75  30  35.69  31  42.19  32  44.62  33  46.90  34  34.99  35  37.33
 36  41.93
```

```
   FEB 21,1964
  1  32.75   2  28.91   3  56.46   4  50.86   5  26.02   6  24.71   7  57.66
  8  50.39   9  55.80  10  54.23  11  47.61  12  43.11  13  31.84  14  27.87
 15  53.92  16  51.14  17  47.77  18  54.88  19  53.66  20  48.96  21  55.02
 22  55.57  23  47.02  24  30.74  25  38.35  26  33.63  27  33.85  28  40.94
 29  34.85  30  34.63  31  42.10  32  43.81  33  45.94  34  34.02  35  36.48
 36  41.02
```

```
   FEB 22,1964
  1  33.68   2  27.56   3  57.62   4  51.12   5  27.70   6  25.86   7  58.66
  8  50.88   9  57.10  10  55.74  11  49.37  12  44.63  13  33.05  14  29.66
 15  55.42  16  54.72  17  49.65  18  56.23  19  55.32  20  50.86  21  56.61
 22  57.07  23  50.79  24  31.09  25  39.79  26  33.85  27  33.90  28  42.38
 29  34.98  30  34.60  31  42.88  32  43.67  33  45.63  34  33.75  35  36.10
 36  40.56
```

```
   FEB 23,1964
  1  36.64   2  31.06   3  59.29   4  52.49   5  30.08   6  27.29   7  60.17
  8  52.32   9  53.69  10  57.12  11  50.67  12  46.04  13  34.40  14  30.00
 15  56.94  16  56.28  17  51.15  18  57.65  19  56.68  20  52.21  21  58.67
 22  59.34  23  52.38  24  31.22  25  41.51  26  34.65  27  34.46  28  44.25
 29  35.71  30  35.22  31  44.42  32  44.40  33  46.04  34  34.21  35  36.69
 36  41.13
```

```
   FEB 24,1964
  1  29.29   2  24.65   3  58.26   4  49.44   5  20.72   6  18.49   7  59.09
  8  49.02   9  57.96  10  57.28  11  51.90  12  47.09  13  35.51  14  28.07
 15  56.90  16  56.60  17  52.03  18  57.28  19  56.93  20  53.09  21  56.89
 22  57.32  23  53.30  24  31.17  25  42.81  26  35.38  27  34.70  28  45.74
 29  36.42  30  35.73  31  45.57  32  44.79  33  46.44  34  34.27  35  36.70
 36  41.10
```

```
   FEB 25,1964
  1  35.60   2  20.51   3  51.28   4  40.01   5   8.78   6   4.98   7  54.26
  8  42.36   9  52.74  10  52.95  11  50.88  12  47.69  13  35.21  14  17.81
 15  52.35  16  52.92  17  51.07  18  53.31  19  53.77  20  52.17  21  52.47
 22  52.74  23  51.95  24  29.81  25  44.61  26  38.64  27  34.89  28  45.68
 29  38.18  30  35.79  31  46.71  32  46.82  33  47.61  34  34.18  35  36.50
 36  40.82
```

```
   FEB 26,1964
  1  39.75   2  28.50   3  46.48   4  38.00   5  17.00   6  24.80   7  48.31
  8  38.10   9  49.18  10  49.76  11  49.08  12  46.50  13  33.32  14  18.94
 15  48.13  16  49.44  17  49.24  18  48.90  19  49.64  20  50.02  21  49.14
 22  48.84  23  50.80  24  28.85  25  45.66  26  41.32  27  34.48  28  46.21
 29  39.06  30  35.59  31  50.09  32  48.56  33  49.15  34  34.03  35  37.03
 36  40.91
```

```
   FEB 27,1964
  1  24.28   2   0.     3  40.67   4   0.     5  23.77   6   0.     7  40.95
  8   0.     9  43.93  10  45.04  11  45.55  12  43.95  13  32.28  14  25.14
 15  41.22  16  43.61  17  45.01  18  42.62  19  44.05  20  45.91  21  43.59
 22  43.51  23  47.74  24  29.17  25  48.60  26  46.04  27  34.88  28  45.90
 29  41.29  30  35.15  31  53.96  32  51.65  33  52.54  34  34.31  35  36.98
 36  41.46
```

```
   FEB 28,1964
  1  46.61   2   0.     3  38.26   4   0.     5  25.35   6   0.     7  37.24
  8   0.     9  41.75  10  42.43  11  42.37  12  41.26  13  32.23  14  29.46
 15  38.06  16  43.41  17  42.31  18  40.09  19  41.49  20  43.18  21  41.04
 22  41.03  23  45.92  24  29.32  25  47.14  26  45.86  27  34.91  28  45.14
 29  40.36  30  34.91  31  52.14  32  50.68  33  51.68  34  33.32  35  35.88
 36  40.38
```

```
   FEB 29,1964
  1  31.48   2  29.87   3  41.57   4  47.69   5  31.20   6  27.07   7  43.63
  8  40.9[illegible]   9  43.79  10  43.05  11  40.83  12  35.45  13  32.66  14  30.67
 15  46.06  16  44.93  17  41.72  18  45.08  19  44.76  20  42.05  21  48.18
 22  47.54  23  45.47  24  31.11  25  41.11  26  32.07  27  34.47  28  42.29
 29  30.92  30  34.[illegible]  31  45.92  32  45.88  33  46.41  34  32.78  35  35.55
 36  39.52
```

```
   MAR  1,1964
  1  41.05   2  [illegible]   3  [illegible]   4  41.55   5  32.37   6  28.45   7  53.24
  8  [illegible]   9  [illegible]  10  [illegible]  11  [illegible]  12  [illegible]  13  33.32  14  31.40
 15  47.27  16  47.0[illegible]  17  [illegible]  18  47.66  19  47.66  20  45.40  21  51.02
 22  51.0[illegible]  23  47.56  24  30.75  25  43.44  26  35.7[illegible]  27  35.37  28  41.75
 29  46.75  30  [illegible]  31  45.1[illegible]  32  [illegible]  33  46.[illegible]  34  33.08  35  35.76
 36  [illegible]
```

```
   MAR  2,1964
  1  [illegible]   2  [illegible]   3  [illegible]   4  [illegible]   5  [illegible]   6  [illegible]   7  41.40
  8  [illegible]   9  [illegible]  10  [illegible]  11  [illegible]  12  [illegible]  13  [illegible]  14  [illegible]
 15  47.04  16  47.53  17  [illegible]  18  [illegible]  19  [illegible]  20  45.40  21  [illegible]
 22  [illegible]  23  [illegible]  24  [illegible]  25  [illegible]  26  [illegible]  27  [illegible]  28  [illegible]
 29  [illegible]  30  [illegible]  31  45.5[illegible]  32  [illegible]  33  [illegible]  34  [illegible]  35  [illegible]
 36  [illegible]
```

```
   MAR  3,1964
  1  [illegible]   2  [illegible]   3  [illegible]   4  [illegible]   5  [illegible]   6  [illegible]   7  50.[illegible]
  8  41.[illegible]   9  [illegible]  10  [illegible]  11  [illegible]  12  [illegible]  13  [illegible]  14  24.22
 15  [illegible]  16  [illegible]  17  [illegible]  18  [illegible]  19  [illegible]  20  [illegible]  21  [illegible]
 22  [illegible]  23  [illegible]  24  [illegible]  25  [illegible]  26  [illegible]  27  [illegible]  28  [illegible]
 29  [illegible]  30  [illegible]  31  45.71  32  [illegible]  33  [illegible]  34  [illegible]  35  [illegible]
 36  [illegible]
```

```
   MAR  4,1964
  1  41.97   2  27.59   3  54.15   4  43.00   5  33.44   6  28.42   7  55.21
  8  48.76   9  54.20  10  52.86  11  47.05  12  43.59  13  34.94  14  35.85
 15  52.34  16  51.21  17  46.94  18  52.47  19  51.66  20  49.22  21  55.92
 22  55.82  23  50.86  24  31.15  25  40.75  26  35.45  27  33.92  28  42.77
 29  37.14  30  35.16  31  46.11  32  45.81  33  46.32  34  33.03  35  35.59
 36  40.02
```

```
   MAR  5,1964
  1  63.14   2   0.     3  62.77   4   0.     5  29.73   6   0.     7  64.08
  8  60.44   9  61.51  10  59.76  11  51.07  12  4[illegible].95  13  35.95  14  32.86
 15  60.42  16  57.32  17  50.86  18  59.38  19  57.01  20  53.55  21  62.16
 22  61.66  23  53.44  24  31.36  25  41.26  26  35.43  27  33.99  28  45.68
 29  37.44  30  35.65  31  46.70  32  45.99  33  46.54  34  33.11  35  35.73
 36  40.13
```

```
   MAR  6,1964
  1  60.69   2   0.     3  65.81   4   0.     5  22.24   6  24.93   7  67.49
  8  64.15   9  65.31  10  63.52  11  54.96  12  49.16  13  37.40  14  32.[illegible]
 15  64.09  16  61.12  17  54.70  18  63.09  19  61.42  20  57.49  21  64.44
 22  64.41  23  55.40  24  31.40  25  42.40  26  35.33  27  33.88  28  45.02
 29  37.45  30  35.67  31  47.47  32  45.94  33  46.44  34  32.94  35  35.50
 36  39.92
```

```
   MAR  7,1964
  1  [illegible]9.11   2   0.     3  68.11   4   0.     5  19.06   6  18.18   7  69.82
  8  [illegible].37   9  67.36  10  65.81  11  57.49  12  51.51  13  38.60  14  32.06
 15  [illegible]  16  [illegible]  17  57.13  18  65.41  19  51.35  20  59.94  21  66.74
 22  66.2[illegible]  23  57.63  24  31.70  25  43.75  26  35.43  27  33.97  28  46.34
 29  37.71  30  35.04  31  60.1[illegible]  32  45.06  33  46.24  34  32.08  35  35.32
 36  39.41
```

Buried Quonset Structure
(Replication of Human Occupancy Winter Test)
Bethesda, Maryland

FEB 28,1964

1	38.38	2	31.72	3	31.19	4	29.78	5	65.75	6	59.72	7	65.38
8	59.91	9	65.69	10	58.47	11	53.06	12	58.82	13	62.06	14	59.88
15	64.91	16	61.69	17	64.00	18	60.38	19	49.09	20	38.22	21	67.03
22	60.44	23	64.53	24	62.34	25	61.13	26	62.09	27	64.47	28	61.59
29	67.00	30	56.72	31	63.91	32	58.00	33	59.38	34	63.59	35	60.00
36	56.28	37	54.97	38	54.81	39	54.94	40	55.59	41	58.97	42	57.84
43	53.84	44	53.28	45	53.31	46	53.31	47	54.72	48	61.22	49	58.03
50	57.53	51	57.63	52	58.38	53	59.03	54	60.66	55	64.22	56	62.28
57	55.84	58	54.13	59	53.03	60	52.78	61	52.16	62	54.03	63	54.06
64	62.78	65	58.03	66	50.19	67	46.53	68	43.94	69	41.53	70	63.63
71	61.38	72	55.81	73	53.31	74	51.00	75	49.06	76	47.25	77	64.81
78	61.59	79	57.06	80	56.53	81	56.34	82	56.31	83	56.25	84	56.25
85	56.91	86	33.19	87	33.13	88	33.16	89	33.91	90	35.38	91	36.56
92	40.94	93	48.69	94	59.31	95	59.97	96	57.28	97	58.16	98	58.09
99	72.25	100	60.06	101	60.19	102	58.88	103	70.87	104	58.13	105	58.59
106	55.56	107	53.50	108	53.16	109	52.66	110	52.38	111	60.25	112	60.00
113	55.50	114	52.75	115	47.81	116	42.50	117	42.19	118	62.69	119	58.97
120	58.00	121	72.50	122	71.22	123	62.56	124	50.97	125	54.66	126	51.97
127	57.66	128	57.63										

FEB 29,1964

1	32.63	2	27.60	3	35.88	4	31.40	5	69.34	6	61.02	7	69.40
8	60.94	9	66.38	10	57.38	11	67.67	12	60.46	13	66.21	14	64.04
15	69.44	16	66.44	17	69.73	18	64.50	19	32.58	20	48.63	21	70.56
22	61.19	23	67.90	24	68.71	25	65.35	26	66.90	27	68.77	28	65.17
29	71.46	30	71.17	31	66.96	32	61.00	33	63.58	34	69.08	35	66.15
36	60.94	37	57.94	38	54.73	39	54.88	40	54.21	41	62.92	42	63.21
43	56.06	44	54.59	45	53.08	46	52.92	47	52.77	48	65.98	49	63.19
50	60.58	51	57.94	52	58.27	53	59.04	54	59.40	55	69.13	56	69.13
57	60.25	58	56.59	59	53.58	60	52.98	61	52.38	62	51.21	63	68.85
64	69.46	65	61.11	66	52.52	67	46.81	68	43.98	69	41.46	70	68.98
71	67.08	72	[illegible]	73	56.23	74	51.63	75	49.00	76	47.23	77	69.46
78	66.40	79	61.98	80	58.40	81	56.58	82	56.33	83	56.10	84	56.02
85	56.13	86	35.33	87	35.02	88	33.21	89	33.67	90	34.94	91	36.38
92	40.85	93	48.69	94	59.42	95	59.52	96	59.60	97	61.21	98	61.67
99	75.15	100	64.52	101	64.69	102	64.23	103	74.02	104	60.90	105	62.27
106	58.31	107	53.33	108	53.46	109	52.58	110	52.27	111	62.21	112	62.81
113	60.54	114	56.63	115	49.48	116	45.58	117	42.[illegible]	118	67.17	119	63.92
120	61.24	121	77.50	122	77.06	123	68.77	124	66.33	125	63.67	126	61.98
127	60.81	128	63.83										

MAR 1,1964

1	35.75	2	33.63	3	43.69	4	37.06	5	73.21	6	64.33	7	73.35
8	63.81	9	73.06	10	61.52	11	71.96	12	64.71	13	68.96	14	66.75
15	72.77	16	69.88	17	72.06	18	67.96	19	35.79	20	50.89	21	73.67
22	63.42	23	73.60	24	72.17	25	68.42	26	69.71	27	71.54	28	67.94
29	74.48	30	73.77	31	70.15	32	65.06	33	66.65	34	73.21	35	70.00
36	64.60	37	60.94	38	56.45	39	55.67	40	54.56	41	65.33	42	65.25
43	57.33	44	54.98	45	52.44	46	52.33	47	52.33	48	68.92	49	66.25
50	62.94	51	59.40	52	59.31	53	59.42	54	59.82	55	72.65	56	72.46
57	63.56	58	59.92	59	54.98	60	53.50	61	52.60	62	51.33	63	72.65
64	72.71	65	66.96	66	55.25	67	47.94	68	44.33	69	41.60	70	71.77
71	64.92	72	64.02	73	58.40	74	52.48	75	49.13	76	47.00	77	72.48
78	64.62	79	64.15	80	60.58	81	57.71	82	56.77	83	56.40	84	56.25
85	55.98	86	42.48	87	42.06	88	35.73	89	34.83	90	35.25	91	36.19
92	40.56	93	49.10	94	59.60	95	59.67	96	60.75	97	64.06	98	64.06
99	75.24	100	67.17	101	67.71	102	67.65	103	76.71	104	65.29	105	64.40
106	60.64	107	55.46	108	54.10	109	52.54	110	2.15	111	67.54	112	67.77
113	61.44	114	56.75	115	49.79	116	63.46	117	42.17	118	70.54	119	66.96
120	55.67	121	82.65	122	81.65	123	69.41	124	67.48	125	61.42	126	60.79
127	64.56	128	64.63										

MAR 3,1964

1	34.79	2	33.23	3	46.38	4	45.38	5	76.19	6	69.17	7	76.44
8	68.95	9	77.79	10	65.[illegible]	11	74.60	12	69.38	13	72.02	14	70.00
15	75.4[illegible]	16	72.42	17	74.13	18	70.65	19	35.00	20	52.85	21	76.96
22	67.90	23	75.54	24	76.13	25	74.23	26	72.63	27	74.33	28	70.94
29	77.25	30	76.90	31	71.85	32	64.30	33	58.65	34	74.65	35	72.13
36	67.44	37	64.21	38	58.81	39	56.67	40	54.33	41	68.58	42	68.38
43	59.81	44	[illegible]	45	52.45	46	52.15	47	52.08	48	71.63	49	68.44
50	64.38	51	62.86	52	59.[illegible]	53	[illegible]	54	59.61	55	74.69	56	73.69
57	66.23	58	62.56	59	56.75	60	53.63	61	52.17	62	50.40	63	74.71
64	74.63	65	64.56	66	54.16	67	50.65	68	45.96	69	44.46	70	75.19
71	73.83	72	63.35	73	63.19	74	55.77	75	50.58	76	47.58	77	75.50
78	72.89	79	67.75	80	64.16	81	59.77	82	57.44	83	56.56	84	55.85
85	57.17	86	45.85	87	46.75	88	46.06	89	44.23	90	41.85	91	40.35
92	40.10	93	47.12	94	54.63	95	58.13	96	63.77	97	67.52	98	67.52
99	74.24	100	71.25	101	71.81	102	71.63	103	74.60	104	65.13	105	68.90
106	63.26	107	57.83	108	56.87	109	56.10	110	53.05	111	73.40	112	72.71
113	67.93	114	62.30	115	52.74	116	56.08	117	43.31	118	74.65	119	70.26
120	64.45	121	71.33	122	40.45	123	67.93	124	69.40	125	63.19	126	65.98
127	64.64	128	64.88										

MAR 2,1964

1	[illegible]	2	31.81	3	44.21	4	42.40	5	76.43	6	66.48	7	76.69
8	66.31	9	74.19	10	63.29	11	71.96	12	68.33	13	70.73	14	68.18
15	[illegible]	16	71.31	17	72.35	18	[illegible]	19	36.10	20	[illegible]	21	75.00
22	65.70	23	[illegible]	24	[illegible]	25	71.10	26	71.14	27	72.63	28	64.56
29	76.81	30	[illegible]	31	70.10	32	65.17	33	67.46	34	72.40	35	70.48
36	[illegible]	37	62.15	38	57.44	39	55.71	40	[illegible]	41	66.96	42	67.02
43	58.44	44	[illegible]	45	52.11	46	52.08	47	52.02	48	70.15	49	67.71
50	63.46	51	63.50	52	59.46	53	58.67	54	[illegible]	55	72.79	56	72.41
57	65.08	58	61.21	59	[illegible]	60	51.40	61	[illegible]	62	50.77	63	71.17
64	73.02	65	[illegible]	66	57.42	67	[illegible]	68	44.94	69	42.10	70	[illegible]
71	[illegible]	72	[illegible]	73	[illegible]	74	51.44	75	[illegible]	76	47.21	77	73.54
78	[illegible]	79	[illegible]	80	[illegible]	81	[illegible]	82	[illegible]	83	[illegible]	84	55.75
85	[illegible]	86	[illegible]	87	[illegible]	88	41.75	89	[illegible]	90	[illegible]	91	37.17
92	[illegible]	93	[illegible]	94	54.58	95	55.48	96	62.71	97	65.32	98	65.45
99	77.84	100	[illegible]	101	66.71	102	[illegible]	103	[illegible]	104	65.11	105	64.48
106	[illegible]	107	[illegible]	108	55.17	109	[illegible]	110	[illegible]	111	61.17	112	64.63
113	[illegible]	114	[illegible]	115	[illegible]	116	[illegible]	117	[illegible]	118	71.12	119	66.50
120	[illegible]	121	[illegible]	122	[illegible]	123	[illegible]	124	[illegible]	125	64.11	126	54.61
127	64.76	128	64.81										

MAR 4,1964

1	65.11	2	63.63	3	[illegible]	4	[illegible]	5	[illegible]	6	71.40	7	[illegible]
8	71.40	9	74.73	10	68.25	11	75.60	12	71.35	13	72.88	14	71.08
15	76.11	16	76.06	17	74.00	18	71.73	19	[illegible]	20	58.25	21	77.65
22	73.58	23	76.04	24	75.75	25	72.44	26	71.75	27	73.71	28	72.10
29	76.06	30	77.79	31	72.25	32	65.65	33	66.61	34	75.24	35	72.50
36	66.60	37	64.96	38	59.40	39	57.15	40	54.71	41	69.77	42	68.85
43	61.06	44	[illegible]	45	51.21	46	52.50	47	52.21	48	72.92	49	69.19
50	65.92	51	61.38	52	59.35	53	[illegible]	54	55.88	55	75.79	56	71.10
57	67.76	58	65.13	59	57.98	60	56.08	61	52.58	62	50.58	63	76.00
64	75.42	65	[illegible]	66	60.61	67	52.10	68	47.55	69	47.31	70	76.19
71	75.33	72	[illegible]	73	66.91	74	56.40	75	51.25	76	60.10	77	76.79
78	76.40	79	62.58	80	65.61	81	61.27	82	58.11	83	56.21	84	55.90
85	61.08	86	67.77	87	67.66	88	66.83	89	65.11	90	61.56	91	62.21
92	62.13	93	61.25	94	55.66	95	60.44	96	67.15	97	68.98	98	68.66
99	61.25	100	[illegible]	101	72.74	102	[illegible]	103	80.65	104	66.18	105	70.46
106	65.27	107	61.66	108	57.85	109	55.25	110	56.21	111	76.08	112	71.69
113	70.62	114	66.77	115	56.65	116	71.65	117	66.98	118	76.06	119	72.45
120	67.54	121	[illegible]	122	65.42	123	76.38	124	71.07	125	80.94	126	76.71
127	[illegible]	128	64.19										

```
  MAR  5,1964
  1  51.65    2  44.31    3  61.81    4  53.17    5  78.73    6  72.85    7  78.85
  8  74.06    9  78.27   10  69.42   11  76.65   12  73.06   13  74.30   14  72.42
 15  78.17   16  75.58   17  76.85   18  73.48   19  44.65   20  59.77   21  78.33
 22  71.40   23  77.77   24  77.08   25  73.63   26  75.27   27  76.35   28  73.65
 29  73.67   30  77.33   31  73.50   32  67.88   33  66.90   34  77.33   35  74.44
 36  69.92   37  65.50   38  60.38   39  57.60   40  54.44   41  71.06   42  70.81
 43  63.29   44  59.75   45  54.75   46  53.69   47  52.88   48  74.27   49  70.25
 50  66.44   51  62.56   52  59.83   53  59.98   54  59.81   55  77.02   56  72.60
 57  68.27   58  64.90   59  59.19   60  55.77   61  52.52   62  50.44   63  77.21
 64  77.27   65  67.06   66  61.77   67  53.06   68  49.00   69  47.69   70  77.44
 71  76.19   72  71.25   73  65.94   74  57.46   75  51.67   76  48.10   77  78.08
 78  75.42   79  73.50   80  66.92   81  61.40   82  58.23   83  56.10   84  55.65
 85  64.17   86  62.46   87  62.33   88  54.54   89  50.33   90  46.17   91  44.02
 92  42.88   93  47.94   94  56.77   95  59.44   96  66.35   97  70.44   98  70.33
 99  82.75  100  73.46  101  73.79  102  73.79  103  82.23  104  68.85  105  72.04
106  65.81  107  61.81  108  58.56  109  55.88  110  54.54  111  74.46  112  74.46
113  72.04  114  65.77  115  56.63  116  53.79  117  47     118  77.31  119  73.83
120  70.71  121  91.63  122  87.75  123  76.71  124  76.31  125  80.98  126  83.65
127  68.44  128  70.30
```

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  MAR  6,1964
  1  51.02    2  42.19    3  44.46    4  36.56    5  76.83    6  69.46    7  76.56
  8  69.42    9  75.02   10  66.04   11  75.88   12  69.83   13  73.67   14  72.19
 15  75.88   16  74.79   17  74.10   18  72.35   19  42.44   20  54.92   21  76.27
 22  67.58   23  74.96   24  75.17   25  73.38   26  73.92   27  75.15   28  72.83
 29  78.00   30  77.83   31  72.25   32  67.95   33  66.42   34  74.00   35  73.35
 36  70.48   37  67.23   38  65.17   39  58.42   40  55.21   41  70.63   42  70.63
 43  63.81   44  60.35   45  55.52   46  54.42   47  53.50   48  73.04   49  70.98
 50  67.06   51  63.44   52  60.83   53  60.21   54  59.63   55  75.21   56  72.67
 57  68.92   58  65.83   59  59.48   60  56.27   61  52.88   62  50.50   63  75.69
 64  75.67   65  63.02   66  63.17   67  54.35   68  50.10   69  49.63   70  77.19
 71  76.52   72  72.25   73  67.19   74  58.69   75  52.44   76  48.54   77  76.73
 78  75.23   79  71.15   80  67.56   81  62.31   82  58.92   83  56.38   84  55.56
 85  58.56   86  45.73   87  45.63   88  44.35   89  45.75   90  46.04   91  45.54
 92  43.54   93  48.02   94  59.21   95  61.48   96  66.71   97  70.58   98  70.42
 99  80.94  100  73.63  101  74.31  102  74.40  103  77.35  104  68.48  105  71.94
106  67.69  107  63.40  108  59.35  109  56.35  110  54.77  111  74.44  112  74.40
113  72.15  114  67.19  115  57.31  116  50.71  117  47.38  118  76.17  119  73.69
120  68.50  121  88.48  122  84.71  123  75.42  124  74.98  125  81.56  126  86.32
127  66.02  128  67.00
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  MAR  9,1964
  1  52.74    2  45.79    3  63.23    4  57.52    5  79.63    6  70.10    7  79.56
  8  71.96    9  78.33   10  70.02   11  78.58   12  59.71   13  78.44   14  74.42
 15  79.21   16  78.29   17  76.48   18  75.69   19  46.20   20  56.23   21  78.98
 22  68.96   23  77.94   24  76.10   25  76.67   26  77.5           77.31   28  75.50
 29  81.15   30  81.06   31  79.19   32  69.65   33  71.65           78.04   35  76.92
 36  72.90   37  66.75   38  63.02   39  61.42   40  58.73   41  72.60   42  73.04
 43  73.10   44  60.85   45  55.22   46  54.98   47  54.77   48  75.67   49  71.54
 50  71.48   51  71.21   52  69.08   53  66.23   54  62.65   55  76.50   56  75.10
 57  73.98   58  71.67   59  65.00   60  60.40   61  56.83   62  53.81   63  76.75
 64  72.00   65  70.31   66  66.69   67  58.60   68  53.77   69  51.42   70  78.15
 71  78.96   72  75.29   73  69.71   74  61.50   75  54.98   76  50.40   77  77.63
 78  76.60   79  72.02   80  69.33   81  64.21   82  60.29   83  57.40   84  56.13
 85  63.35   86  63.44   87  63.33   88  56.65   89  51.08   90  47.94   91  46.44
 92  45.56   93  46.96   94  56.40   95  55.90   96  65.27   97  70.90   98  70.81
 99  80.67  100  76.52  101  76.56  102  76.13  103  80.24  104  71.85  105  74.13
106  71.73  107  66.35  108  63.42  109  60.19  110  59.31  111  75.90  112  77.21
113  76.92  114  69.71  115  60.52  116  56.31  117  51.06  118  79.35  119  76.31
120  71.00  121  95.70  122  91.50  123  78.54  124  77.69  125  78.34  126  84.88
127  70.08  128  81.41
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```
  MAR 10,1964
  1  56.58    2  47.56    3  58.33    4  51.08    5  76.90    6  71.19    7  81.13
  8  73.66    9  81.88   10  69.31   11  75.77   12  71.04   13  76.57   14  75.56
 15  80.19   16  74.50   17  79.29   18  77.61   19  68.29   20  57.90   21  80.62
 22  64.63   23  81.82   24  80.60   25  77.63   26  78.17   27  78.56   28  76.81
 29  [illegible]   30  82.19   31  78.35   32  65.76   33  72.24   34  79.10   35  78.50
 36  74.23   37  64.75   38  61.36   39  60.46   40  55.81   41  74.29   42  74.62
 43  64.70   44  82.00   45  57.17   46  55.92   47  55.66   48  76.17   49  77.56
 50  73.77   51  61.11   52  64.[illegible]   53  62.67   54  60.60   55  77.31   56  76.67
 57  73.36   58  61.27   59  [illegible]   60  58.61   61  55.50   62  51.01   63  76.29
 64  76.06   65  71.56   66  67.31   67  54.18   68  54.80   69  54.30   70  69.31
 71  60.02   72  76.21   73  70.65   74  61.90   75  55.56   76  50.06   77  79.77
 78  76.71   79  [illegible]   80  70.11   81  64.45   82  60.01   83  57.61   84  56.08
 85  55.21   86  51.58   87  58.61   88  55.15   89  55.15   90  51.08   91  46.00
 92  45.75   93  47.66   94  57.63   95  57.63   96  67.83   97  77.71   98  77.17
 99  61.21  100  77.02  101  77.06  102  77.06  103  62.66  104  66.90  105  76.81
106  72.25  107  63.79  108  66.79  109  67.10  110  63.31  111  77.17  112  77.21
113  76.67  114  72.35  115  61.10  116  56.10  117  52.96  118  80.10  119  77.90
120  61.64  121  86.20  122  81.57  123  76.58  124  76.06  125  77.87  126  76.61
127  66.17  128  74.25
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```
  MAR  7,1964
  1  50.44    2  39.96    3  47.38    4  41.50    5  75.10    6  61.06    7  75.94
  8  63.71    9  72.15   10  63.90   11  74.52   12  61.71   13  72.54   14  71.27
 15  74.60   16  74.02   17  71.67   18  71.02   19  34.29   20  45.27   21  74.06
 22  60.54   23  71.96   24  72.58   25  72.71   26  73.06   27  73.67   28  71.33
 29  76.71   30  76.50   31  69.38   32  67.33   33  66.92   34  71.33   35  70.88
 36  69.10   37  67.33   38  68.29   39  59.58   40  55.40   41  69.63   42  69.46
 43  65.15   44  60.21   45  55.83   46  54.46   47  53.77   48  71.69   49  70.38
 50  67.15   51  64.29   52  61.46   53  60.92   54  60.35   55  74.04   56  72.31
 57  67.81   58  65.85   59  60.27   60  56.56   61  53.52   62  50.94   63  75.29
 64  73.60   65  67.69   66  63.85   67  55.83   68  51.60   69  50.02   70  76.83
 71  76.13   72  72.15   73  67.88   74  60.98   75  53.29   76  49.17   77  75.48
 78  74.65   79  70.94   80  67.94   81  63.10   82  60.81   83  56.98   84  55.83
 85  57.04   86  48.13   87  48.02   88  45.25   89  45.08   90  45.31   91  45.10
 92  44.44   93  47.88   94  59.35   95  59.83   96  64.71   97  69.68   98  69.42
 99  77.46  100  72.83  101  73.52  102  73.44  103  72.08  104  68.15  105  70.83
106  67.67  107  64.79  108  60.33  109  57.52  110  55.10  111  73.56  112  73.60
113  70.98  114  67.44  115  58.44  116  52.67  117  48.98  118  75.42  119  72.98
120  68.17  121  87.52  122  44.31  123  75.88  124  72.90  125  77.80  126  81.07
127  67.63  128  68.13
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  MAR  8,1964
  1  49.58    2  42.44    3    .27    4  44.       5  78.58    6  67.54    7  79.88
  8  69.71    9  78.06   10  66.94   11  77..     12  65.96   13  74.67   14  73.60
 15  76.77   16  77.63   17  76.33   18  75.33   19  41.88   20  51.81   21  78.00
 22  65.81   23  77.90   24  77.75   25  76.17   26  76.52   27  76.73   28  74.50
 29  80.35   30  80.19   31  74.13   32  67.30   33  69.56   34  76.94   35  75.77
 36  71.50   37  67.67   38  60.15   39  61.06   40  56.29   41  72.58   42  72.58
 43  72.40   44  60.44   45  55.29   46  54.65   47  54.40   48  75.10   49  71.38
 50  68.63   51  66.46   52  63.42   53  63.10   54  62.17   55  77.04   56  75.27
 57  70.13   58  68.17   59  62.27   60  58.83   61  55.71   62  52.90   63  77.77
 64  72.83   65  69.00   66  64.90   67  57.21   68  52.79   69  50.65   70  78.83
 71  78.54   72  74.67   73  68.73   74  60.60   75  54.17   76  49.88   77  77.88
 78  76.77   79  72.13   80  68.58   81  63.75   82  60.06   83  57.32   84  56.02
 85  47.56   86  47.40   87  47.35   88  46.08   89  45.58   90  45.04   91  44.92
 92  44.81   93  47.27   94  58.04   95  57.98   96  65.50   97  70.67   98  70.33
 99  79.88  100  76.04  101  76.10  102  76.06  103  79.19  104  68.09  105  73.15
106  68.98  107  66.00  108  61.46  109  58.71  110  56.67  111  76.08  112  76.60
113  73.35  114  69.08  115  59.71  116  53.38  117  50.02  118  78.56  119  75.50
120  68.15  121  95.32  122  90.75  123  77.27  124  76.36  125  76.67  126  76.72
127  67.67  128  69.44
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  MAR 11,1964
  1  49.17    2  38.75    3  34.50    4  30.00    5  79.92    6  68.67    7  78.75
  8  69.92           77.   10  65.67   11  79.25   12  68.00   13  76.42   14  75.17
 15  79.67   16  76.67   17  78.58   18  77.42   19  38.83   20  52.08   21  79.42
 22  66.08   23  80.17   24  80.17   25  77.25   26  77.67   27  78.33   28  75.75
 29  81.50   30  81.08   31  75.33   32  59.08   33  68.58   34  78.08   35  78.45
 36  75.42   37  71.92   38  65.17   39  60.08   40  60.00   41  76.00   42  74.17
 43  67.58   44  61.08   45  58.08   46  57.25   47  57.17   48  76.50   49  70.92
 50  70.92   51  68.00   52  63.83   53  62.83   54  60.75   55  78.33   56  77.42
 57  72.58   58    .00   59  62.75   60  58.67   61  55.58   62  53.92   63  80.00
 64  77.75   65    .08   66  68.08   67  60.00   68  55.83   69  55.42   70  80.08
 71  80.08   72  76.92   73  71.42   74  62.92   75  56.50   76  51.83   77  79.67
 78  79.08   79    .08   80  71.00   81  65.67   82  61.58   83  58.75   84  56.83
 85  35.83   86  33.75   87  35.67   88  38.08   89  47.08   90  50.33   91  50.17
 92  66.42   93  67.92   94  58.08   95  58.25   96  68.50   97  73.25   98  73.25
 99  79.83  100  76.50  101  78.42  102  78.25  103  81.67  104  60.58  105  75.67
106  73.50  107  70.42  108  65.92  109  62.13  110  60.58  111  77.33  112  77.92
113  75.83  114  72.33  115  62.50  116  56.92  117  53.42  118  80.17  119  77.92
120  40.58  121  96.00  122  92. 8  123  79.17  124  78.42  125   0.    126   0.
127  59.58  128   3.
```
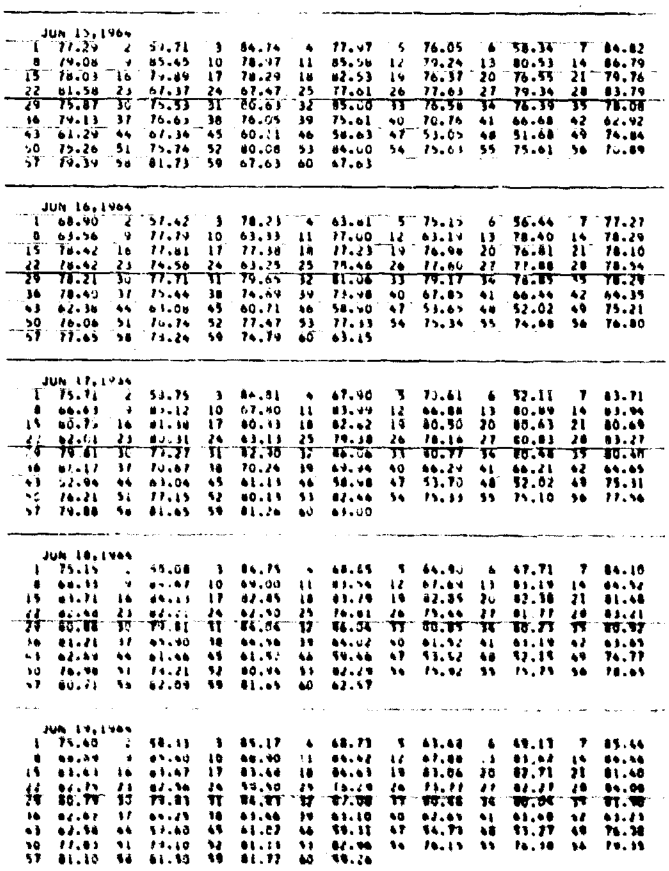

North Arvada High School Shelter
Denver, Colorada



JUN 15,1964

1	77.29	2	57.71	3	84.74	4	77.97	5	76.05	6	58.34	7	84.82
8	79.08	9	85.45	10	78.97	11	85.56	12	79.24	13	80.53	14	86.79
15	78.03	16	79.89	17	78.29	18	82.53	19	76.37	20	76.55	21	79.76
22	81.58	23	67.37	24	67.47	25	77.01	26	77.63	27	79.34	28	83.79
29	75.87	30	75.53	31	80.63	32	85.00	33	76.50	34	76.39	35	78.08
36	79.13	37	76.63	38	76.05	39	75.61	40	70.76	41	66.68	42	62.92
43	61.29	44	67.34	45	60.11	46	58.63	47	53.05	48	51.68	49	74.84
50	75.26	51	75.74	52	80.08	53	84.00	54	75.63	55	75.61	56	76.89
57	79.39	58	81.73	59	67.63	60	67.63						

JUN 16,1964

1	68.90	2	57.42	3	78.23	4	63.81	5	75.15	6	56.44	7	77.27
8	63.56	9	77.79	10	63.33	11	77.00	12	63.19	13	78.40	14	78.29
15	78.42	16	77.81	17	77.38	18	77.23	19	76.90	20	76.81	21	78.10
22	78.42	23	74.56	24	63.25	25	79.46	26	77.60	27	77.88	28	78.54
29	78.21	30	77.71	31	79.65	32	81.06	33	79.17	34	78.85	35	78.29
36	78.40	37	75.44	38	74.69	39	73.98	40	67.85	41	66.44	42	64.35
43	62.38	44	61.08	45	60.71	46	58.90	47	53.65	48	52.02	49	75.21
50	76.06	51	76.74	52	77.47	53	77.13	54	75.34	55	74.68	56	76.80
57	77.65	58	73.24	59	74.79	60	63.15						

JUN 17,1964

1	75.71	2	53.75	3	84.81	4	67.90	5	73.61	6	52.11	7	83.71
8	66.63	9	85.12	10	67.80	11	83.99	12	66.88	13	80.89	14	83.94
15	80.75	16	81.30	17	80.43	18	82.62	19	80.50	20	80.63	21	80.69
22	82.01	23	80.31	24	63.13	25	79.38	26	78.16	27	60.83	28	83.27
29	79.81	30	77.27	31	82.30	32	86.06	33	80.77	34	80.48	35	[illegible]
36	67.17	37	70.67	38	70.24	39	69.44	40	66.29	41	66.21	42	64.65
43	52.94	44	63.04	45	61.13	46	58.98	47	53.70	48	52.02	49	75.31
50	76.21	51	77.15	52	80.13	53	82.46	54	75.33	55	75.10	56	77.56
57	79.88	58	81.65	59	81.26	60	63.00						

JUN 18,1964

1	75.15	2	55.08	3	86.75	4	68.65	5	64.90	6	47.71	7	84.10
8	[illegible]	9	[illegible]	10	69.00	11	[illegible]	12	67.69	13	[illegible]	14	[illegible]
15	[illegible]	16	[illegible]	17	82.85	18	[illegible]	19	82.35	20	82.38	21	81.48
22	[illegible]	23	[illegible]	24	[illegible]	25	76.01	26	75.66	27	[illegible]	28	[illegible]
29	80.88	30	79.81	31	[illegible]	32	[illegible]	33	[illegible]	34	[illegible]	35	[illegible]
36	[illegible]	37	[illegible]	38	[illegible]	39	[illegible]	40	[illegible]	41	[illegible]	42	[illegible]
43	[illegible]	44	[illegible]	45	[illegible]	46	[illegible]	47	53.52	48	52.15	49	74.77
50	76.90	51	[illegible]	52	80.46	53	[illegible]	54	[illegible]	55	[illegible]	56	78.65
57	80.71	58	62.09	59	81.65	60	62.57						

JUN 19,1964

1	75.60	2	58.13	3	85.17	4	68.73	5	[illegible]	6	49.13	7	85.66
8	[illegible]	9	[illegible]	10	[illegible]	11	[illegible]	12	67.88	13	[illegible]	14	[illegible]
15	[illegible]	16	[illegible]	17	83.66	18	[illegible]	19	83.06	20	87.71	21	81.60
22	[illegible]	23	[illegible]	24	[illegible]	25	[illegible]	26	[illegible]	27	[illegible]	28	84.08
29	80.79	30	79.83	31	[illegible]	32	[illegible]	33	[illegible]	34	[illegible]	35	[illegible]
36	[illegible]	37	[illegible]	38	[illegible]	39	[illegible]	40	[illegible]	41	[illegible]	42	[illegible]
43	[illegible]	44	[illegible]	45	[illegible]	46	[illegible]	47	[illegible]	48	[illegible]	49	76.38
50	[illegible]	51	[illegible]	52	[illegible]	53	[illegible]	54	[illegible]	55	[illegible]	56	[illegible]
57	81.10	58	61.35	59	81.72	60	59.26						

```
   JUN 20,1964
 1  75.38   2  58.63   3  85.21   4  69.02   5  61.98   6  51.54   7  85.42
 8  69.00   9  85.25  10  69.25  11  84.10  12  68.13  13  83.29  14  84.40
15  83.19  16  83.29  17  84.08  18  84.77  19  84.79  20  84.44  21  81.50
22  82.79  23  82.88  24  63.17  25  75.88  26  73.69  27  82.65  28  83.96
29  80.69  30  79.73  31  84.98  32  86.73  33  80.04  34  79.58  35  82.13
36  83.06  37  6 .54   38  62.04  39  61.85  40  63.15  41  63.60  42  62.90
43  62.31  44  63.15  45  61.25  46  59.38  47  54.17  48  52.48  49  76.94
50  78.21  51  79.71  52  82.15  53  83.44  54  76.98  55  76.69  56  80.13
57  81.83  58  82.83  59  81.19  60  63.11
```

```
   JUN 21,1964
 1  74.75   2  58.21   3  84.69   4  68.75   5  57.56   6  52.40   7  85.40
 8  69.04   9  84.79  10  60.77  11  84.06  12  67.96  13  82.92  14  83.81
15  83.58  16  83.96  17  83.88  18  84.69  19  84.33  20  83.77  21  80.63
22  81.77  23  82.46  24  66.63  25  74.92  26  72.10  27  82.88  28  84.56
29  80.29  30  79.10  31  85.27  32  87.04  33  78.96  34  78.58  35  82.48
36  63.71  37  58.67  38  58.56  39  58.50  40  61.17  41  62.94  42  63.10
43  62.71  44  67.27  45  61.08  46  59.73  47  54.17  48  52.50  49  77.21
50  78.75  51  83.17  52  82.58  53  84.31  54  76.92  55  77.52  56  80.94
57  82.13  58  83.29  59  81.48  60  67.02
```

```
   JUN 22,1964
 1  75.00   2  58.00   3  85.17   4  70.25   5  57.75   6  46.06   7  86.33
 8  70.67   9  85.38  10  70.44  11  85.00  12  69.90  13  84.75  14  85.75
15  85.54  16  85.42  17  84.79  18  85.52  19  84.65  20  83.94  21  80.65
22  82.42  23  83.63  24  64.50  25  72.40  26  69.06  27  82.71  28  84.60
29  78.96  30  77.19  31  85.31  32  87.31  33  76.56  34  75.94  35  82.85
36  83.35  37  57.48  38  58.88  39  58.44  40  58.88  41  60.65  42  61.65
43  61.74  44  64.96  45  60.98  46  59.81  47  54.44  48  52.63  49  77.71
50  79.19  51  80.63  52  82.77  53  84.13  54  77.75  55  79.19  56  81.13
57  82.33  58  83.29  59  81.48  60  64.75
```

```
   JUN 23,1964
 1  75.10   2  58.25   3  85.17   4  69.96   5  63.75   6  47.88   7  85.98
 8  70.27   9  85.35  10  70.04  11  84.85  12  69.52  13  84.31  14  85.38
15  85.06  16  85.17  17  84.25  18  85.04  19  84.85  20  84.33  21  80.44
22  82.09  23  83.29  24  67.08  25  75.00  26  73.31  27  81.90  28  83.88
29  78.52  30  77.02  31  84.36  32  86.90  33  77.17  34  76.54  35  82.52
36  83.00  37  64.77  38  64.[illegible]  39  63.77  40  62.92  41  61.75  42  61.13
43  61.04  44  67.44  45  60.48  46  59.65  47  54.54  48  52.67  49  77.96
50  79.50  51  83.72  52  82.63  53  83.85  54  78.17  55  79.38  56  81.19
57  82.46  58  84.46  59  81.33  60  67.22
```

```
   JUN 24,1964
 1  75.04   2  53.67   3  85.94   4  70.28   5  70.02   6  51.25   7  86.56
 8  70.94   9  86.05  10  70.62  11  85.69  12  70.14  13  85.18  14  86.45
15  85.76  16  85.77  17  84.80  18  85.73  19  85.57  20  85.32  21  81.47
22  82.88  23  83.90  24  70.06  25  77.52  26  [illegible].36  27  82.42  28  84.67
29  79.81  30  78.88  31  85.15  32  87.40  33  79.88  34  79.06  35  82.65
36  83.37  37  74.52  38  71.38  39  70.69  40  67.72  41  64.66  42  62.53
43  61.42  44  67.85  45  60.19  46  59.46  47  54.90  48  52.92  49  78.07
50  79.57  51  80.88  52  83.05  53  84.73  54  78.29  55  78.92  56  81.46
57  82.93  58  83.92  59  81.90  60  69.96
```

```
   JUN 25,1964
 1  74.99   2  58.33   3  86.63   4  72.23   5  74.53   6  53.62   7  88.16
 8  72.90   9  86.76  10  72.46  11  87.27  12  72.08  13  86.02  14  87.19
15  86.44  16  86.54  17  86.00  18  87.16  19  85.85  20  85.53  21  82.98
22  84.23  23  84.49  24  43.65  25  80.71  26  90.38  27  83.95  28  86.35
29  81.99  30  81.40  31  86.07  32  88.42  33  [illegible]  34  81.76  35  83.45
36  84.51  37  84.06  38  74.85  39  74.47  40  70.[illegible]  41  67.02  42  64.40
43  62.55  44  63.53  45  60.77  46  59.46  47  54.85  48  52.95  49  78.26
50  79.98  51  81.17  52  84.01  53  85.92  54  77.35  55  78.14  56  81.90
57  83.71  58  84.57  59  82.15  60  63.84
```

```
   JUN 26,1964
 1  75.21   2  59.20   3  86.83   4  72.30   5  76.40   6  54.49   7  88.23
 8  73.24   9  85.89  10  72.58  11  87.12  12  72.10  13  85.99  14  86.86
15  86.40  16  86.47  17  86.27  18  87.37  19  85.72  20  85.56  21  84.00
22  85.04  23  84.97  24  60.82  25  82.29  26  81.73  27  84.78  28  86.48
29  83.98  30  83.01  31  86.83  32  88.71  33  85.02  34  84.22  35  84.53
36  85.06  37  84.92  38  77.35  39  77.17  40  73.15  41  69.00  42  66.27
43  64.04  44  61.80  45  61.86  46  59.50  47  54.85  48  53.01  49  78.60
50  80.17  51  81.49  52  84.10  53  85.35  54  77.61  55  78.69  56  82.17
57  83.81  58  84.75  59  83.99  60  61.08
```

```
   JUN 27,1964
 1  75.34   2  59.00   3  87.74   4  74.52   5  76.17   6  55.24   7  89.16
 8  75.13   9  87.80  10  74.76  11  88.28  12  74.17  13  86.56  14  87.92
15  86.89  16  87.17  17  87.25  18  88.22  19  87.75  20  87.63  21  84.80
22  85.83  23  84.58  24  64.97  25  82.75  26  82.06  27  86.02  28  87.90
29  85.23  30  84.29  31  87.74  32  89.73  33  86.07  34  85.33  35  85.28
36  86.03  37  85.94  38  76.63  39  76.39  40  74.06  41  70.73  42  68.41
43  65.11  44  65.77  45  61.96  46  59.78  47  55.75  48  54.24  49  78.90
50  80.70  51  82.13  52  84.46  53  86.23  54  78.17  55  79.62  56  82.85
57  84.59  58  84.70  59  85.13  60  65.00
```

```
   JUN 28,1964
 1  75.04   2  59.92   3  88.03   4  76.83   5  71.73   6  56.46   7  90.24
 8  77.55   9  85.85  10  76.85  11  89.35  12  76.96  13  87.68  14  88.67
15  88.02  16  87.67  17  86.58  18  89.51  19  89.00  20  86.65  21  85.52
22  86.47  23  66.60  24  64.10  25  82.94  26  81.91  27  87.27  28  88.50
29  86.17  30  85.06  31  88.75  32  90.85  33  86.33  34  85.70  35  85.61
36  86.41  37  86.42  38  72.55  39  72.56  40  72.64  41  71.13  42  68.88
43  66.48  44  65.35  45  63.13  46  60.76  47  55.17  48  53.27  49  79.06
50  80.97  51  82.46  52  55.56  53  87.27  54  78.63  55  80.43  56  83.40
57  85.24  58  86.42  59  86.07  60  63.82
```

```
   JUN 29,1964
 1  75.08   2  57.48   3  89.29   4  77.38   5  70.00   6  55.69   7  90.71
 8  77.98   9  89.08  10  77.23  11  89.81  12  76.96  13  88.17  14  89.52
15  88.00  16  88.10  17  89.35  18  90.10  19  89.92  20  89.65  21  85.75
22  86.92  23  87.23  24  61.41  25  80.90  26  79.31  27  87.44  28  89.42
29  85.90  30  84.58  31  89.13  32  90.94  33  85.10  34  84.52  35  86.21
36  87.03  37  87.08  38  71.44  39  71.52  40  72.23  41  69.73  42  68.29
43  66.50  44  62.68  45  63.81  46  61.23  47  55.38  48  53.44  49  79.81
50  81.77  51  83.35  52  86.17  53  87.81  54  79.50  55  81.23  56  84.38
57  86.13  58  87.31  59  86.71  60  61.74
```

```
   JUN 30,1964
 1  75.09   2  57.22   3  89.15   4  78.22   5  67.63   6  54.58   7  89.83
 8  77.03   9  87.16  10  78.20  11  89.46  12  77.83  13  87.42  14  88.13
15  87.83  16  87.83  17  88.90  18  89.68  19  88.15  20  87.50  21  85.35
22  86.53  23  87.50  24  64.53  25  78.98  26  77.69  27  87.32  28  89.10
29  85.20  30  84.08  31  88.88  32  90.26  33  83.98  34  83.38  35  86.31
36  87.30  37  86.92  38  69.47  39  70.18  40  72.45  41  69.13  42  67.75
43  66.40  44  64.65  45  64.02  46  61.53  47  55.71  48  54.56  49  80.08
50  81.93  51  83.49  52  86.01  53  87.19  54  79.67  55  81.96  56  84.54
57  86.08  58  84.92  59  85.46  60  63.86
```

```
   JUL  1,1964
 1  74.96   2  57.16   3  89.51   4  81.67   5  75.01   6  55.08   7  90.22
 8  82.0[illegible]   9  89.48  10  81.69  11  90.30  12  81.40  13  87.85  14  88.52
15  87.46  16  87.85  17  89.02  18  89.70  19  89.16  20  88.73  21  85.52
22  86.88  23  86.91  24  60.49  25  81.51  26  80.51  27  87.61  28  90.36
29  85.11  30  83.90  31  89.32  32  90.88  33  86.57  34  86.01  35  86.71
36  87.65  37  84.75  38  76.97  39  77.17  40  76.18  41  70.81  42  68.20
43  66.37  44  61.31  45  64.00  46  61.75  47  55.51  48  51.59  49  80.73
50  82.15  51  83.89  52  86.88  53  89.28  54  80.30  55  82.56  56  85.09
57  86.77  58  87.46  59  86.18  60  60.32
```

```
   JUL  2,1964
 1  76.94   2  5[illegible].81   3  89.65   4  81.36   5  76.25   6  55.76   7  90.49
 8  82.03   9  89.44  10  81.07  11  89.[illegible]  12  81.69  13  87.66  14  89.1[illegible]
15  87.98  16  84.08  17  89.10  18  89.88  19  88.99  20  88.63  21  85.81
22  87.20  23  87.86  24  67.44  25  83.40  26  82.94  27  87.72  28  89.93
29  86.44  30  85.18  31  89.65  32  91.29  33  86.66  34  86.80  35  86.79
36  87.21  37  84.27  38  76.13  39  76.20  40  76.30  41  71.80  42  69.[illegible]
43  57.21  44  67.94  45  66.57  46  62.[illegible]  47  55.65  48  53.72  49  83.79
50  [illegible]  51  86.43  52  87.13  53  89.17  54  80.85  55  82.92  56  85.62
57  87.22  58  8[illegible]  59  87.35  60  67.36
```

```
   JUL  3,1964
 1  75.15   2  56.96   3  88.41   4  82.48   5  75.82   6  56.88   7  91.88
 8  82.[illegible]   9  83.38  10  82.38  11  88.98  12  81.80  13  87.73  14  89.13
15  87.18  16  87.67  17  89.66  18  90.78  19  89.78  20  88.66  21  86.81
22  87.78  23  88.10  24  67.38  25  85.15  26  84.69  27  87.98  28  89.98
29  87.20  30  86.98  31  89.89  32  91.88  33  87.76  34  87.87  35  87.76
36  82.65  37  84.71  38  78.88  39  79.42  40  71.68  41  71.66  42  69.34
43  87.85  44  86.37  45  65.11  46  62.76  47  55.98  48  53.67  49  81.82
50  82.56  51  86.94  52  87.84  53  88.65  54  [illegible]  55  81.23  56  85.81
57  87.65  58  88.38  59  87.97  60  67.77
```

```
   JU[illegible]  [illegible],1964
 1  75.73   2  [illegible]   3  88.67   4  84.79   5  77.18   6  77.78   7  91.42
 8  88.97   9  [illegible]  10  96.33  11  [illegible]  12  [illegible]  13  [illegible]  14  88.98
15  87.98  16  86.02  17  [illegible]  18  91.52  19  [illegible]  20  [illegible]  21  87.98
22  88.60  23  89.88  24  88.89  25  81.99  26  82.71  27  [illegible]  28  [illegible]
29  87.37  30  [illegible]  31  [illegible]  32  [illegible]  33  [illegible]  34  [illegible]  35  [illegible]
36  [illegible]  37  [illegible]  38  76.92  39  77.8[illegible]  40  [illegible]  41  [illegible]  42  69.80
43  [illegible]  44  [illegible]  45  65.17  46  62.78  47  [illegible]  48  53.88  49  81.27
50  81.38  51  [illegible]  52  87.06  53  [illegible]  54  [illegible]  55  [illegible]  56  89.88
57  88.73  58  [illegible]  59  88.[illegible]  60  67.63
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   JUL  5,1964
 1  75.01   2  59.27   3  91.71   4  86.60   5  78.79   6  56.90   7  91.05
 8  86.72   9  91.55  10  86.59  11  90.82  12  86.33  13  88.40  14  89.22
15  88.76  16  88.90  17  90.[illegible]  18  90.82  19  90.48  20  90.17  21  88.06
22  89.19  23  88.60  24  71.00  25  86.92  26  84.27  27  88.95  28  90.56
29  88.06  30  87.04  31  90.87  32  92.26  33  88.24  34  87.65  35  87.56
36  88.01  37  79.58  38  79.12  39  78.52  40  70.81  41  71.58  42  70.31
43  66.79  44  71.32  45  65.75  46  63.08  47  56.01  48  53.73  49  81.57
50  83.45  51  85.46  52  88.14  53  89.92  54  82.02  55  84.51  56  86.81
57  88.78  58  89.52  59  89.15  60  71.00
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   JUL  6,1964
 1  74.53   2  58.69   3  91.86   4  87.03   5  76.01   6  55.81   7  91.47
 8  87.07   9  91.76  10  86.96  11  90.33  12  86.72  13  88.72  14  89.[illegible]
15  88.86  16  88.75  17  90.41  18  91.08  19  90.06  20  89.72  21  88.25
22  89.25  23  [illegible]  24  70.28  25  86.03  26  82.81  27  88.13  28  90.79
29  88.22  30  87.08  31  91.16  32  83.16  33  87.85  34  87.34  35  87.61
36  88.11  37  79.33  38  77.24  39  77.20  40  71.04  41  70.67  42  69.66
43  68.67  44  71.09  45  65.86  46  63.21  47  56.69  48  54.19  49  81.97
50  83.96  51  85.88  52  88.50  53  90.36  54  63.41  55  84.84  56  87.31
57  89.25  58  87.91  59  89.56  60  70.31
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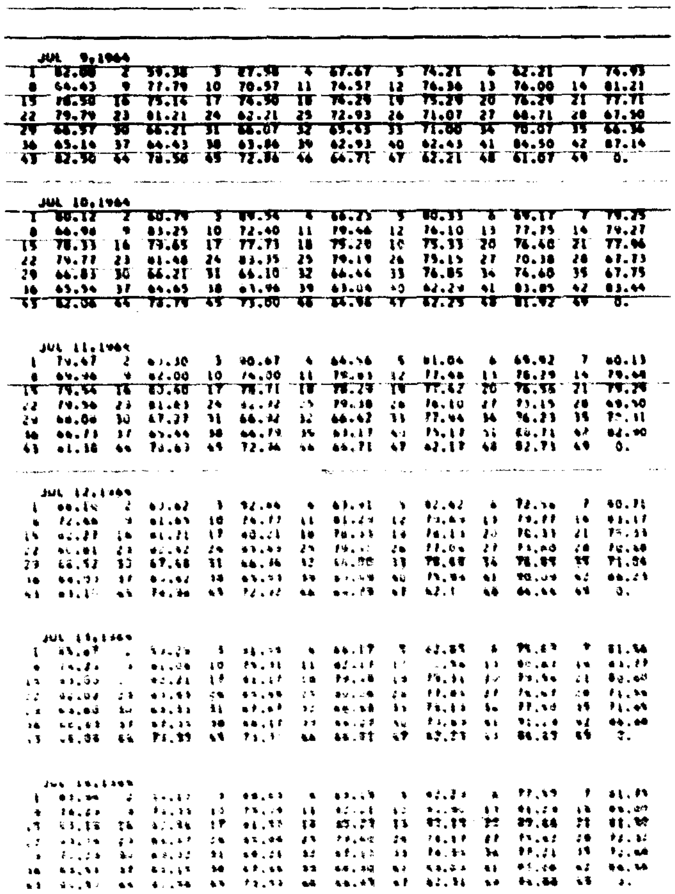
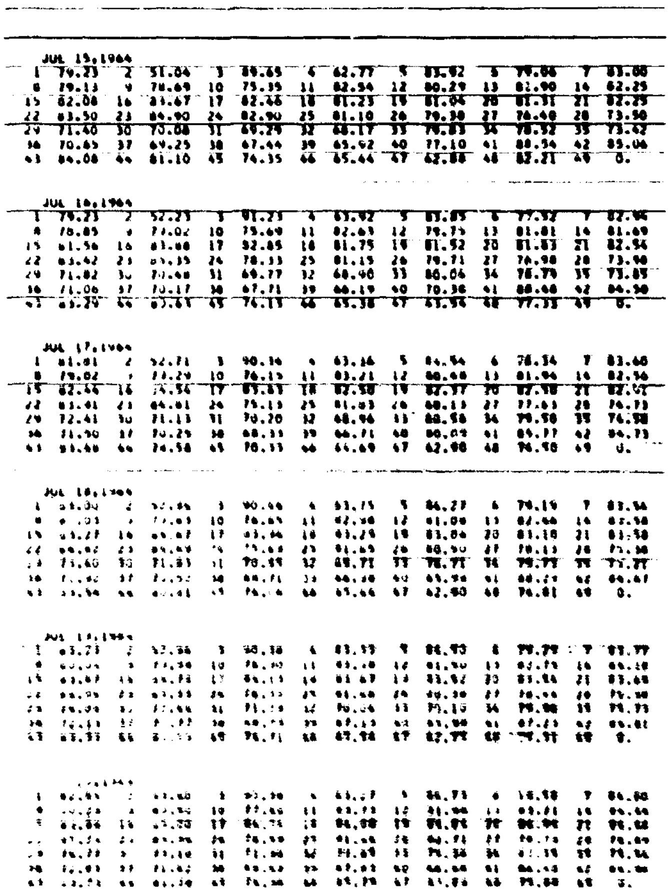
Model Blast and Radiation Shelters of German Design

Shelter "A"

Nevada Test Site, AEC

Mercury, Nevada





JUL 21,1964

1	62.42	2	51.65	3	90.34	4	63.63	5	84.67	6	79.65	7	83.63
8	80.19	9	[illegible]	10	77.35	11	83.52	12	81.75	13	82.90	14	84.29
15	83.48	16	[illegible]	17	84.38	18	86.06	19	84.04	20	84.04	21	84.42
22	85.19	23	[illegible]	24	78.02	25	82.21	26	81.19	27	80.04	28	77.92
29	75.50	30	73.83	31	72.63	32	71.27	33	80.88	34	80.58	35	76.15
36	73.44	37	72.06	38	70.15	39	68.60	40	67.17	41	87.92	42	84.98
43	83.75	44	81.46	45	75.52	46	66.25	47	63.50	48	77.57	49	0.

JUL 22,1964

1	82.96	2	55.52	3	90.44	4	63.72	5	84.75	6	79.81	7	83.91
8	80.50	9	80.23	10	77.60	11	83.63	12	81.85	13	83.15	14	84.17
15	83.75	16	84.88	17	84.50	18	84.08	19	84.02	20	84.05	21	84.43
22	85.07	23	85.81	24	80.43	25	82.21	26	81.21	27	79.77	28	77.89
29	75.51	30	71.82	31	72.56	32	72.35	33	75.98	34	80.71	35	76.04
36	73.71	37	71.96	38	70.00	39	68.86	40	67.07	41	87.95	42	85.45
43	83.51	44	80.98	45	75.15	46	66.03	47	63.10	48	79.70	49	0.

JUL 23,1964

1	86.43	2	58.04	3	91.61	4	[illegible]	5	84.95	6	80.53	7	84.14
8	81.20	9	80.59	10	77.62	11	83.57	12	82.43	13	83.39	14	85.30
15	84.81	16	85.30	17	84.87	18	84.41	19	84.44	20	84.33	21	84.76
22	85.37	23	86.21	24	83.98	25	83.03	26	82.34	27	80.98	28	78.64
29	76.43	30	74.86	31	73.53	32	72.38	33	76.84	34	81.43	35	76.87
36	74.00	37	72.74	38	70.93	39	69.25	40	68.02	41	92.96	42	86.98
43	84.61	44	81.75	45	75.85	46	66.76	47	63.77	48	83.77	49	0.

JUL 24,1964

1	89.06	2	59.68	3	90.80	4	64.40	5	85.30	6	81.17	7	84.72
8	81.89	9	80.60	10	77.56	11	84.21	12	82.94	13	83.70	14	86.00
15	85.19	16	85.31	17	84.95	18	84.52	19	84.45	20	84.65	21	85.05
22	85.97	23	87.01	24	83.17	25	83.67	26	82.73	27	81.32	28	78.96
29	76.69	30	75.04	31	73.94	32	72.79	33	77.34	34	81.98	35	77.18
36	75.47	37	73.10	38	71.20	39	69.65	40	68.20	41	95.00	42	88.73
43	85.88	44	[illegible]	45	75.98	46	66.98	47	65.89	48	83.40	49	0.

JUL 25,1964

1	80.46	2	62.66	3	90.74	4	65.61	5	86.06	6	82.38	7	85.34
8	83.09	9	81.04	10	78.25	11	85.00	12	82.67	13	84.60	14	84.56
15	83.56	16	86.16	17	85.83	18	85.12	19	85.12	20	85.26	21	85.95
22	86.92	23	88.17	24	83.73	25	84.34	26	83.56	27	81.90	28	79.90
29	77.00	30	75.65	31	74.35	32	73.12	33	78.20	34	82.27	35	78.17
36	75.33	37	73.47	38	71.55	39	69.97	40	68.73	41	89.19	42	87.92
43	86.94	44	83.11	45	76.02	46	67.12	47	64.12	48	83.67	49	0.

JUL 26,1964

1	74.35	2	64.60	3	89.96	4	65.48	5	86.66	6	83.29	7	85.80
8	84.21	9	79.90	10	78.69	11	85.04	12	80.68	13	84.77	14	80.69
15	81.58	16	86.83	17	86.44	18	85.90	19	85.79	20	85.94	21	86.90
22	67.00	23	86.75	24	83.85	25	84.96	26	83.85	27	81.65	28	78.81
29	76.88	30	75.38	31	74.65	32	73.21	33	83.19	34	83.06	35	78.88
36	75.58	37	74.15	38	72.31	39	70.60	40	69.17	41	73.75	42	77.19
43	81.35	44	83.06	45	77.98	46	68.92	47	64.40	48	83.98	49	0.

JUL 27,1964

1	75.52	2	65.02	3	90.31	4	66.19	5	87.25	6	84.06	7	86.10
8	84.83	9	77.88	10	79.15	11	85.42	12	81.25	13	84.58	14	81.15
15	81.56	16	87.46	17	87.06	18	86.77	19	86.63	20	86.62	21	86.21
22	85.81	23	84.65	24	83.52	25	84.77	26	84.02	27	81.96	28	79.13
29	77.90	30	75.80	31	74.81	32	73.40	33	83.69	34	82.79	35	78.50
36	75.63	37	74.46	38	72.60	39	70.88	40	69.40	41	77.49	42	78.60
43	79.67	44	80.75	45	77.19	46	67.17	47	64.35	48	82.85	49	0.

JUL 28,1964

1	87.42	2	63.65	3	90.79	4	65.29	5	87.58	6	84.08	7	86.48
8	84.79	9	80.48	10	79.50	11	85.81	12	82.23	13	84.50	14	82.89
15	83.48	16	87.67	17	87.33	18	86.94	19	86.67	20	86.25	21	85.81
22	85.29	23	84.81	24	82.13	25	85.17	26	84.31	27	82.38	28	80.13
29	77.79	30	76.44	31	75.35	32	74.08	33	84.08	34	83.04	35	79.08
36	76.29	37	74.98	38	73.13	39	71.35	40	70.04	41	84.49	42	82.27
43	80.90	44	80.17	45	76.85	46	67.94	47	64.88	48	81.54	49	0.

JUL 29,1964

1	84.94	2	60.47	3	88.63	4	63.18	5	87.13	6	82.69	7	85.88
8	82.83	9	82.33	10	79.92	11	85.58	12	83.05	13	84.43	14	84.25
15	84.42	16	87.20	17	87.04	18	86.75	19	86.44	20	86.17	21	85.96
22	85.65	23	85.81	24	80.79	25	85.24	26	84.28	27	82.64	28	80.01
29	78.05	30	76.87	31	75.74	32	74.46	33	84.17	34	83.29	35	79.58
36	76.55	37	[illegible]	38	73.35	39	71.68	40	70.31	41	87.93	42	85.49
43	83.03	44	80.51	45	76.54	46	68.00	47	64.84	48	80.30	49	0.

JUL 30,1964

1	82.13	2	59.15	3	90.20	4	64.13	5	88.77	6	82.73	7	86.49
8	82.55	9	84.35	10	80.34	11	86.79	12	83.63	13	84.37	14	84.95
15	84.81	16	88.17	17	87.54	18	86.67	19	86.20	20	85.96	21	85.95
22	[illegible]	23	86.51	24	81.23	25	87.20	26	85.39	27	83.02	28	80.53
29	78.62	30	77.26	31	76.26	32	75.00	33	85.90	34	84.31	35	79.80
36	76.97	37	75.62	38	73.91	39	72.13	40	71.59	41	87.07	42	86.49
43	84.70	44	81.69	45	76.80	46	68.48	47	65.27	48	81.00	49	0.

JUL 31,1964

1	80.88	2	55.25	3	90.34	4	63.45	5	89.83	6	82.67	7	87.57
8	82.31	9	84.97	10	81.09	11	87.92	12	84.17	13	85.27	14	84.63
15	84.81	16	89.42	17	88.55	18	87.33	19	86.78	20	86.59	21	86.25
22	86.57	23	86.86	24	80.90	25	88.09	26	86.38	27	83.67	28	80.94
29	78.93	30	77.53	31	76.47	32	75.14	33	86.82	34	[illegible]	35	80.48
36	77.48	37	75.95	38	74.12	39	72.33	40	71.02	41	85.30	42	85.78
43	84.73	44	82.10	45	76.89	46	68.53	47	65.42	48	80.47	49	0.

AUG 1,1964

1	77.26	2	52.40	3	90.56	4	63.52	5	89.15	6	83.39	7	[illegible]
8	83.30	9	85.15	10	81.29	11	87.57	12	83.70	13	85.30	14	83.77
15	83.90	16	88.92	17	88.41	18	87.45	19	86.93	20	86.76	21	86.66
22	86.70	23	86.81	24	80.91	25	87.43	26	86.08	27	83.84	28	[illegible]
29	79.07	30	77.81	31	76.78	32	75.31	33	86.43	34	85.51	35	80.64
36	77.63	37	76.19	38	74.23	39	72.55	40	71.12	41	81.92	42	83.94
43	83.81	44	82.40	45	76.80	46	68.41	47	65.25	48	80.57	49	0.

AUG 2,1964

1	77.05	2	55.16	3	90.51	4	63.60	5	88.32	6	83.35	7	86.65
8	83.40	9	84.82	10	81.39	11	87.28	12	[illegible]	13	84.02	14	82.55
15	82.90	16	88.90	17	87.99	18	87.39	19	87.02	20	86.77	21	86.47
22	86.40	23	86.25	24	80.03	25	86.42	26	85.76	27	83.84	28	81.25
29	79.18	30	77.93	31	76.86	32	75.40	33	86.01	34	85.17	35	80.65
36	77.97	37	76.22	38	74.27	39	72.36	40	71.01	41	83.23	42	83.23
43	82.75	44	81.44	45	76.69	46	68.20	47	65.15	48	79.67	49	0.

AUG ,1964

1	[illegible]	2	58.68	3	89.61	4	61.98	5	88.25	6	80.69	7	86.45
8	[illegible]	9	85.43	10	81.11	11	87.00	12	82.64	13	84.21	14	82.70
15	83.09	16	[illegible]	17	87.52	18	87.07	19	86.76	20	86.37	21	86.20
22	85.02	23	[illegible]	24	80.07	25	86.46	26	85.72	27	83.97	28	81.43
29	78.39	30	78.03	31	77.02	32	76.49	33	86.65	34	85.75	35	81.01
36	77.97	37	76.54	38	74.58	39	72.69	40	71.17	41	87.24	42	84.75
43	63.18	44	81.32	45	75.77	46	68.28	47	65.86	48	81.08	49	0.

AUG 4,1964

1	71.04	2	61.95	3	88.22	4	67.38	5	86.82	6	82.36	7	87.01
8	82.56	9	[illegible]	10	[illegible]	11	87.67	12	82.20	13	84.86	14	80.78
15	81.77	16	88.83	17	88.19	18	87.57	19	87.07	20	86.71	21	[illegible]
22	84.81	23	[illegible]	24	81.23	25	87.66	26	[illegible]	27	84.08	28	81.97
29	[illegible]	30	78.67	31	77.44	32	76.09	33	86.92	34	85.90	35	81.28
36	[illegible]	37	76.40	38	[illegible]	39	73.20	40	71.83	41	79.11	42	84.10
43	81.78	44	82.21	45	77.16	46	68.79	47	[illegible]	48	81.38	49	0.

AUG 5,1964

1	[illegible]	2	[illegible]	3	87.98	4	[illegible]	5	[illegible]	6	82.96	7	87.30
8	[illegible]	9	[illegible]	10	[illegible]	11	87.70	12	[illegible]	13	84.60	14	80.46
15	[illegible]	16	[illegible]	17	86.56	18	87.42	19	87.42	20	86.58	21	86.94
22	[illegible]	23	[illegible]	24	[illegible]	25	87.13	26	[illegible]	27	84.50	28	84.03
29	[illegible]	30	78.37	31	77.91	32	76.69	33	88.07	34	88.77	35	81.63
36	[illegible]	37	[illegible]	38	[illegible]	39	[illegible]	40	[illegible]	41	[illegible]	42	[illegible]
43	[illegible]	44	[illegible]	45	[illegible]	46	68.43	47	65.71	48	80.09	49	0.

AUG 6,1964

1	[illegible]	2	[illegible]	3	[illegible]	4	[illegible]	5	[illegible]	6	[illegible]	7	87.33
8	[illegible]	9	[illegible]	10	[illegible]	11	[illegible]	12	[illegible]	13	[illegible]	14	[illegible]
15	[illegible]	16	[illegible]	17	[illegible]	18	[illegible]	19	[illegible]	20	[illegible]	21	[illegible]
22	[illegible]	23	[illegible]	24	[illegible]	25	[illegible]	26	[illegible]	27	[illegible]	28	[illegible]
29	[illegible]	30	[illegible]	31	[illegible]	32	[illegible]	33	[illegible]	34	[illegible]	35	[illegible]
36	[illegible]	37	[illegible]	38	[illegible]	39	[illegible]	40	[illegible]	41	[illegible]	42	[illegible]
43	[illegible]	44	[illegible]	45	[illegible]	46	[illegible]	47	[illegible]	48	[illegible]	49	0.

AUG 7,1964

1	[illegible]	2	[illegible]	3	[illegible]	4	[illegible]	5	[illegible]	6	[illegible]	7	[illegible]
8	[illegible]	9	[illegible]	10	[illegible]	11	[illegible]	12	[illegible]	13	[illegible]	14	[illegible]
15	[illegible]	16	[illegible]	17	[illegible]	18	[illegible]	19	[illegible]	20	[illegible]	21	[illegible]
22	[illegible]	23	[illegible]	24	[illegible]	25	[illegible]	26	[illegible]	27	[illegible]	28	[illegible]
29	[illegible]	30	[illegible]	31	[illegible]	32	[illegible]	33	[illegible]	34	[illegible]	35	[illegible]
36	[illegible]	37	[illegible]	38	[illegible]	39	[illegible]	40	[illegible]	41	[illegible]	42	[illegible]
43	[illegible]	44	[illegible]	45	[illegible]	46	[illegible]	47	[illegible]	48	[illegible]	49	0.

AUG 8,1964

1	85.03	2	61.33	3	90.50	4	63.74	5	89.75	6	84.39	7	88.58
8	83.83	9	82.46	10	81.81	11	88.02	12	84.19	13	85.11	14	84.20
15	85.32	16	89.58	17	88.91	18	87.65	19	87.54	20	86.47	21	86.07
22	85.90	23	85.80	24	81.20	25	88.45	26	86.95	27	84.73	28	82.37
29	80.63	30	79.16	31	78.36	32	77.08	33	86.75	34	85.75	35	82.02
36	79.12	37	77.85	38	76.09	39	74.44	40	73.10	41	89.05	42	86.10
43	81.48	44	80.45	45	76.45	46	69.09	47	65.85	48	80.99	49	0.

AUG 9,1964

1	86.39	2	61.16	3	90.91	4	64.26	5	87.24	6	83.22	7	87.25
8	83.64	9	70.39	10	82.70	11	87.13	12	85.67	13	85.82	14	85.50
15	86.72	16	89.62	17	88.77	18	88.13	19	87.51	20	86.95	21	86.74
22	86.99	23	87.33	24	81.93	25	86.48	26	86.41	27	85.07	28	82.02
29	80.85	30	79.70	31	78.82	32	77.36	33	85.71	34	84.80	35	81.85
36	79.31	37	78.10	38	76.19	39	74.53	40	73.00	41	90.19	42	87.60
43	65.12	44	81.68	45	76.64	46	69.16	47	66.86	48	81.32	49	0.

AUG 10,1964

1	[illegible]	2	61.11	3	89.76	4	65.63	5	86.84	6	82.26	7	87.27
8	[illegible]	9	71.65	10	82.86	11	86.09	12	[illegible]	13	86.20	14	85.41
15	86.84	16	88.01	17	88.17	18	87.90	19	87.65	20	87.98	21	87.34
22	[illegible]	23	84.00	24	[illegible]	25	86.07	26	86.00	27	84.04	28	82.73
29	80.91	30	79.73	31	78.86	32	77.66	33	85.35	34	84.68	35	81.54
36	[illegible]	37	77.96	38	76.10	39	[illegible]	40	73.00	41	80.24	42	86.94
43	[illegible]	44	82.37	45	76.68	46	69.17	47	66.84	48	81.97	49	0.

AUG 11,1964

1	[illegible]	2	62.36	3	[illegible]	4	64.57	5	86.86	6	81.83	7	85.13
8	[illegible]	9	76.80	10	[illegible]	11	[illegible]	12	[illegible]	13	84.54	14	[illegible]
15	[illegible]	16	[illegible]	17	86.79	18	86.67	19	84.41	20	84.39	21	86.17
22	[illegible]	23	[illegible]	24	[illegible]	25	[illegible]	26	[illegible]	27	84.78	28	[illegible]
29	[illegible]	30	[illegible]	31	79.22	32	[illegible]	33	[illegible]	34	[illegible]	35	[illegible]
36	[illegible]	37	[illegible]	38	[illegible]	39	[illegible]	40	[illegible]	41	[illegible]	42	[illegible]
43	[illegible]	44	[illegible]	45	77.35	46	[illegible]	47	[illegible]	48	[illegible]	49	0.

AUG 12,1964

1	[illegible]	2	[illegible]	3	[illegible]	4	[illegible]	5	[illegible]	6	[illegible]	7	[illegible]
8	[illegible]	9	[illegible]	10	[illegible]	11	[illegible]	12	[illegible]	13	[illegible]	14	[illegible]
15	[illegible]	16	[illegible]	17	[illegible]	18	[illegible]	19	[illegible]	20	[illegible]	21	[illegible]
22	[illegible]	23	[illegible]	24	[illegible]	25	[illegible]	26	[illegible]	27	[illegible]	28	[illegible]
29	[illegible]	30	[illegible]	31	[illegible]	32	[illegible]	33	[illegible]	34	[illegible]	35	[illegible]
36	[illegible]	37	[illegible]	38	[illegible]	39	[illegible]	40	[illegible]	41	[illegible]	42	[illegible]
43	[illegible]	44	[illegible]	45	[illegible]	46	[illegible]	47	[illegible]	48	[illegible]	49	0.

AUG 13,1964

1	[illegible]	2	[illegible]	3	[illegible]	4	[illegible]	5	[illegible]	6	[illegible]	7	[illegible]
8	[illegible]	9	[illegible]	10	[illegible]	11	[illegible]	12	[illegible]	13	[illegible]	14	[illegible]
15	[illegible]	16	[illegible]	17	[illegible]	18	[illegible]	19	[illegible]	20	[illegible]	21	[illegible]
22	[illegible]	23	[illegible]	24	[illegible]	25	[illegible]	26	[illegible]	27	[illegible]	28	[illegible]
29	[illegible]	30	[illegible]	31	[illegible]	32	[illegible]	33	[illegible]	34	[illegible]	35	[illegible]
36	[illegible]	37	[illegible]	38	[illegible]	39	[illegible]	40	[illegible]	41	[illegible]	42	[illegible]
43	[illegible]	44	[illegible]	45	[illegible]	46	[illegible]	47	[illegible]	48	[illegible]	49	0.

Model Blast and Radiation Shelters of German Design

Shelter "B"

Nevada Test Site, AEC

Mercury, Nevada

JUL 9,1964

1	81.33	2	77.17	3	56.86	4	84.05	5	73.21	6	56.00	7	73.50
8	65.17	9	75.86	10	71.07	11	74.50	12	74.43	13	75.21	14	79.37
15	77.14	16	74.64	17	75.00	18	72.86	19	75.50	20	74.84	21	75.43
22	77.14	23	78.50	24	61.50	25	73.43	26	[illegible]	27	66.64	28	67.57
29	0.	30	66.50	31	56.36	32	66.07	33	75.11	34	69.21	35	[illegible]
36	64.00	37	63.36	38	63.07	39	62.71	40	62.57	41	67.71	42	68.43
43	71.43	44	65.07	45	67.57	46	67.36	47	66.50	48	64.14	49	67.25

JUL 10,1964

1	82.72	2	66.06	3	89.58	4	85.32	5	78.92	6	[illegible]	7	77.52
8	65.46	9	82.35	10	69.75	11	75.81	12	74.96	13	76.33	14	78.35
15	77.42	16	77.55	17	75.25	18	73.75	19	74.02	20	75.46	21	76.35
22	77.65	23	79.40	24	83.43	25	78.27	26	76.04	27	69.98	28	68.04
29	67.50	30	65.83	31	65.37	32	66.06	33	75.33	34	73.65	35	66.37
36	64.24	37	63.48	38	63.07	39	62.78	40	62.49	41	68.14	42	68.54
43	72.54	44	68.26	45	67.85	46	67.60	47	66.70	48	66.22	49	83.67

JUL 11,1964

1	87.06	2	64.59	3	89.61	4	83.46	5	81.25	6	69.46	7	80.56
8	64.63	9	84.46	10	70.67	11	78.31	12	76.46	13	78.04	14	78.98
15	78.91	16	79.92	17	77.29	18	75.40	19	74.96	20	76.10	21	76.75
22	78.29	23	79.35	24	83.23	25	80.75	26	78.81	27	72.44	28	69.29
29	66.15	30	67.31	31	66.71	32	66.38	33	78.19	34	76.10	35	68.63
36	65.31	37	64.13	38	63.54	39	62.83	40	62.63	41	67.83	42	68.65
43	71.13	44	68.27	45	67.81	46	67.71	47	[illegible]	48	67.02	49	80.68

JUL 12,1964

1	87.57	2	63.86	3	91.52	4	81.46	5	[illegible]	6	67.65	7	81.19
8	67.06	9	83.46	10	71.77	11	80.00	12	78.60	13	79.40	14	81.83
15	81.31	16	81.44	17	78.92	18	76.63	19	76.10	20	76.71	21	77.38
22	78.56	23	80.33	24	85.00	25	82.81	26	80.63	27	74.44	28	70.83
29	69.29	30	64.27	31	57.42	32	67.05	33	79.40	34	77.56	35	70.25
36	66.79	37	65.10	38	64.29	39	63.65	40	63.58	41	67.83	42	68.96
43	71.60	44	65.19	45	68.56	46	68.08	47	67.42	48	67.13	49	85.60

JUL 13,1964

1	85.63	2	57.15	3	91.25	4	0.	5	83.35	6	83.04	7	82.26
8	68.59	9	63.88	10	73.00	11	[illegible]	12	79.65	13	80.67	14	82.92
15	82.27	16	82.41	17	80.06	18	78.65	19	77.71	20	78.35	21	76.94
22	80.29	23	81.96	24	85.15	25	83.92	26	81.29	27	75.75	28	72.44
29	73.58	30	69.40	31	68.40	32	67.75	33	80.23	34	76.50	35	71.63
36	68.00	37	66.42	38	65.35	39	64.48	40	63.83	41	68.35	42	69.73
43	71.90	44	69.13	45	68.77	46	68.00	47	67.63	48	67.02	49	85.81

JUL 14,1964

1	[illegible]	2	54.42	3	90.77	4	0.	5	82.65	6	75.21	7	82.19
8	75.83	9	79.77	10	72.77	11	81.48	12	80.40	13	81.27	14	82.94
15	83.00	16	82.63	17	81.08	18	79.40	19	78.42	20	79.38	21	80.08
22	81.40	23	82.88	24	85.50	25	83.50	26	82.17	27	76.71	28	73.17
29	71.42	30	70.13	31	69.02	32	68.23	33	79.33	34	78.06	35	72.44
36	69.00	37	67.19	38	66.02	39	64.98	40	64.25	41	68.81	42	69.90
43	72.65	44	67.48	45	68.88	46	68.27	47	67.77	48	67.25	49	56.25

JUL 15,1964

1	79.40	2	51.04	3	91.46	4	84.25	5	81.83	6	74.63	7	81.13
8	75.92	9	81.19	10	73.52	11	80.85	12	80.17	13	81.48	14	81.73
15	81.44	16	82.65	17	81.04	18	80.25	19	80.12	20	80.75	21	81.21
22	82.13	23	83.35	24	82.75	25	82.65	26	81.56	27	77.40	28	74.23
29	72.73	30	71.17	31	70.08	32	69.23	33	79.17	34	78.04	35	73.21
36	69.98	37	68.33	38	66.98	39	65.92	40	65.10	41	69.65	42	70.42
43	73.75	44	69.94	45	69.46	46	58.85	47	68.35	48	67.88	49	85.77

JUL 16,1964

1	83.17	2	52.13	3	90.83	4	0.	5	83.85	6	75.23	7	82.73
8	76.23	9	81.27	10	73.81	11	81.47	12	80.06	13	82.73	14	80.96
15	81.51	16	83.92	17	82.23	18	80.96	19	80.85	20	81.23	21	81.71
22	82.90	23	83.31	24	78.46	25	85.27	26	83.90	27	78.17	28	74.98
29	73.52	30	72.06	31	70.96	32	70.10	33	86.58	34	79.25	35	73.79
36	70.65	37	69.10	38	67.79	39	66.75	40	65.90	41	69.82	42	70.94
43	74.29	44	70.32	45	69.71	46	69.18	47	68.62	48	69.15	49	79.42

JUL 17,1964

1	80.58	2	54.10	3	90.44	4	0.	5	84.33	6	75.31	7	83.31
8	76.73	9	81.25	10	74.21	11	81.92	12	80.46	13	82.13	14	81.48
15	81.81	16	84.48	17	82.85	18	81.73	19	81.52	20	82.04	21	82.31
22	83.10	23	83.98	24	74.74	25	85.46	26	84.27	27	78.92	28	75.48
29	73.73	30	72.35	31	71.21	32	75.38	33	81.06	34	79.73	35	74.27
36	70.85	37	69.73	38	68.08	39	67.02	40	66.06	41	70.73	42	71.41
43	74.36	44	70.57	45	70.02	46	69.35	47	68.86	48	68.35	49	76.34

JUL 18,1964

1	82.33	2	52.44	3	89.75	4	0.	5	84.06	6	75.85	7	82.98
8	76.33	9	80.92	10	74.04	11	82.08	12	80.42	13	81.98	14	82.10
15	82.29	16	84.33	17	82.71	18	81.83	19	81.65	20	81.94	21	82.27
22	82.96	23	83.90	24	75.31	25	84.92	26	83.79	27	78.71	28	75.29
29	73.56	30	72.19	31	70.98	32	70.04	33	80.69	34	79.35	35	74.02
36	70.85	37	69.02	38	67.88	39	66.71	40	65.79	41	69.44	42	70.35
43	73.75	44	[illegible]	45	69.19	46	68.63	47	68.06	48	67.94	49	75.96

JUL 19,1964

1	82.83	2	52.69	3	89.27	4	0.	5	84.60	6	75.25	7	83.43
8	75.88	9	81.83	10	74.56	11	82.77	12	81.00	13	82.67	14	82.60
15	83.06	16	85.00	17	83.42	18	82.48	19	82.27	20	82.63	21	82.92
22	83.60	23	84.40	24	75.90	25	85.21	26	84.04	27	79.15	28	75.75
29	74.00	30	72.65	31	71.46	32	70.38	33	81.04	34	80.00	35	74.73
36	71.17	37	69.50	38	68.08	39	66.92	40	66.04	41	69.50	42	70.52
43	74.00	44	70.42	45	69.35	46	68.77	47	68.25	48	67.81	49	76.90

JUL 20,1964

1	81.67	2	52.90	3	90.00	4	0.	5	84.83	6	75.48	7	83.92
8	76.25	9	81.85	10	74.98	11	83.00	12	81.33	13	82.98	14	82.79
15	83.15	16	85.04	17	83.56	18	82.77	19	82.58	20	83.00	21	83.19
22	83.79	23	84.67	24	76.46	25	85.54	26	84.44	27	79.69	28	76.23
29	74.73	30	73.13	31	71.88	32	70.88	33	81.56	34	80.44	35	75.04
36	71.79	37	69.92	38	68.77	39	67.50	40	66.63	41	69.85	42	71.29
43	76.75	44	75.52	45	69.77	46	68.96	47	68.52	48	67.94	49	77.44

JUL 21,1964

1	82.25	2	53.27	3	90.29	4	0.	5	85.19	6	76.35	7	84.42
8	77.21	9	84.17	10	75.30	11	83.54	12	81.89	13	83.46	14	83.15
15	43.63	16	85.48	17	83.98	18	83.66	19	83.17	20	83.58	21	83.81
22	84.71	23	85.00	24	78.00	25	85.58	26	84.58	27	79.96	28	76.42
29	75.00	30	73.50	31	72.25	32	71.13	33	81.44	34	80.31	35	75.35
36	72.00	37	70.19	38	58.96	39	57.75	40	66.54	41	71.31	42	73.52
43	77.84	44	72.40	45	75.56	46	44.17	47	68.54	48	67.98	49	78.27

JUL 22,1964

1	82.56	2	56.92	3	90.70	4	0.	5	84.88	6	76.39	7	84.08
8	77.31	9	82.49	10	75.71	11	83.30	12	82.07	13	83.48	14	83.49
15	63.83	16	85.21	17	84.05	18	83.81	19	83.67	20	84.03	21	84.12
22	84.71	23	85.38	24	80.43	25	85.12	26	84.17	27	79.96	28	76.93
29	75.25	30	73.79	31	72.54	32	71.57	33	81.10	34	78.94	35	75.48
36	72.28	37	70.53	38	69.29	39	68.08	40	67.10	41	76.46	42	79.60
43	78.63	44	77.95	45	73.89	46	70.51	47	68.96	48	68.13	49	80.63

JUL 23,1964

1	86.23	2	58.02	3	91.71	4	0.	5	85.41	6	76.26	7	84.69
8	[illegible]	9	82.63	10	75.67	11	83.62	12	82.48	13	83.67	14	83.77
15	63.65	16	85.53	17	84.50	18	83.85	19	83.76	20	84.10	21	84.29
22	84.84	23	84.72	24	84.05	25	85.60	26	84.63	27	80.02	28	77.19
29	75.54	30	74.26	31	72.98	32	71.95	33	81.35	34	80.08	35	75.76
36	72.59	37	70.82	38	69.61	39	68.29	40	67.35	41	77.61	42	80.93
43	85.74	44	74.03	45	75.73	46	72.12	47	69.86	48	69.20	49	84.90

JUL 24,1964

1	89.20	2	53.31	3	86.90	4	0.	5	86.01	6	78.13	7	85.12
8	79.11	9	62.70	10	76.08	11	84.29	12	83.30	13	84.27	14	84.99
15	65.20	16	86.65	17	84.77	18	84.45	19	84.21	20	84.61	21	84.77
22	85.33	23	86.70	24	83.37	25	85.94	26	84.94	27	80.62	28	77.50
29	75.60	30	74.56	31	73.35	32	72.38	33	81.99	34	80.81	35	76.05
36	72.99	37	71.20	38	59.98	39	68.80	40	67.94	41	78.96	42	82.38
43	82.11	44	85.68	45	72.21	46	[illegible]	47	71.36	48	69.33	49	83.82

JUL 25,1964

1	81.15	2	62.61	3	91.17	4	0.	5	86.25	6	79.51	7	85.46
8	80.74	9	83.25	10	76.70	11	84.96	12	82.86	13	85.00	14	83.77
15	83.17	16	87.04	17	85.41	18	84.87	19	84.74	20	85.13	21	85.78
22	80.54	23	87.04	24	84.27	25	86.54	26	85.55	27	80.93	28	78.02
29	76.55	30	75.13	31	74.04	32	72.29	33	82.48	34	81.13	35	76.79
36	73.71	37	71.91	38	70.77	39	69.22	40	68.33	41	81.09	42	83.53
43	83.22	44	81.82	45	78.51	46	74.95	47	72.35	48	70.67	49	84.40

JUL 26,1964

1	73.25	2	64.67	3	89.04	4	0.	5	86.13	6	80.69	7	85.50
8	81.50	9	63.56	10	76.52	11	84.48	12	83.83	13	84.50	14	79.88
15	81.77	16	87.60	17	85.57	18	84.94	19	84.98	20	85.48	21	85.79
22	85.79	23	85.35	24	83.58	25	97.19	26	86.00	27	81.33	28	78.44
29	76.85	30	75.63	31	74.52	32	73.27	33	82.77	34	81.46	35	77.13
36	74.00	37	72.21	38	71.00	39	69.90	40	[illegible]	41	81.89	42	84.1
43	83.94	44	82.72	45	79.78	46	76.11	47	73.39	48	71.13	49	84.30

JUL 27,1964

1	74.96	2	64.71	3	88.79	4	0.	5	86.00	6	[illegible]	7	85.29
8	83.25	9	80.33	10	76.71	11	84.33	12	80.73	13	84.04	14	79.67
15	81.15	16	86.07	17	86.08	18	85.42	19	85.04	20	85.04	21	84.58
22	83.85	23	83.98	24	83.00	25	87.17	26	86.23	27	81.88	28	76.96
29	77.23	30	75.94	31	74.83	32	73.71	33	82.92	34	81.81	35	77.46
36	74.31	37	72.75	38	71.23	39	69.98	40	69.10	41	82.21	42	84.38
43	84.23	44	83.04	45	80.17	46	77.02	47	74.13	48	71.98	49	83.50

JUL 28,1964

1	81.29	2	62.94	3	90.25	4	0.	5	85.81	6	82.38	7	85.29
8	83.65	9	80.67	10	73.00	11	84.13	12	81.54	13	83.77	14	81.42
15	82.90	16	87.92	17	86.23	18	85.79	19	85.04	20	84.75	21	84.15
22	83.46	23	83.19	24	81.44	25	86.50	26	85.47	27	81.94	28	78.98
29	77.29	30	76.02	31	74.83	32	73.88	33	82.67	34	81.48	35	77.46
36	74.50	37	72.81	38	71.50	39	70.04	40	69.17	41	82.56	42	85.10
43	84.73	44	83.56	45	80.75	46	77.70	47	74.75	48	72.35	49	81.35

JUL 29,1964

1	83.89	2	59.86	3	89.93	4	0.	5	87.81	6	80.87	7	86.57
8	82.23	9	82.88	10	77.41	11	85.13	12	82.39	13	84.29	14	83.03
15	84.35	16	86.58	17	86.67	18	85.76	19	84.95	20	84.77	21	84.37
22	84.23	23	84.36	24	80.43	25	86.90	26	86.21	27	82.39	28	79.55
29	77.57	30	76.31	31	75.10	32	74.05	33	83.93	34	82.07	35	77.55
36	74.70	37	73.29	38	71.75	39	70.46	40	69.48	41	83.50	42	85.39
43	85.89	44	84.77	45	81.47	46	77.95	47	75.13	48	72.77	49	85.49

JUL 30,1964

1	82.00	2	58.93	3	90.54	4	0.	5	90.39	6	80.20	7	88.88
8	81.18	9	46.20	10	78.06	11	87.01	12	83.85	13	85.73	14	84.02
15	85.35	16	89.90	17	88.01	18	85.96	19	85.10	20	85.07	21	84.99
22	85.09	23	85.82	24	80.65	25	89.05	26	87.55	27	82.62	28	79.48
29	77.82	30	76.47	31	75.36	32	74.50	33	86.16	34	83.68	35	78.04
36	74.82	37	73.30	38	72.13	39	70.63	40	69.73	41	83.20	42	86.33
43	85.90	44	84.76	45	81.90	46	78.57	47	75.76	48	73.68	49	80.79

JUL 31,1964

1	79.86	2	55.35	3	90.28	4	0.	5	90.18	6	79.91	7	89.36
8	81.49	9	56.50	10	78.57	11	87.63	12	84.53	13	86.45	14	83.97
15	85.62	16	69.54	17	88.13	18	86.49	19	85.63	20	85.59	21	85.50
22	85.57	23	85.88	24	80.25	25	89.26	26	87.58	27	83.06	28	79.89
29	78.21	30	76.83	31	75.68	32	74.62	33	87.13	34	84.30	35	78.78
36	75.28	37	73.57	38	72.27	39	70.91	40	69.91	41	83.41	42	86.70
43	86.20	44	85.64	45	82.34	46	79.00	47	76.31	48	73.79	49	80.25

AUG 1,1964

1	77.13	2	53.55	3	90.97	4	0.	5	89.70	6	80.89	7	88.95
8	81.93	9	86.38	10	78.85	11	87.48	12	84.47	13	86.79	14	82.98
15	85.03	16	89.48	17	88.00	18	86.75	19	86.00	20	85.96	21	85.95
22	85.80	23	86.10	24	80.79	25	89.19	26	87.55	27	83.58	28	80.26
29	78.67	30	77.23	31	76.87	32	74.96	33	87.66	34	84.86	35	79.37
36	75.81	37	74.15	38	72.70	39	71.37	40	69.88	41	83.89	42	86.93
43	86.39	44	85.24	45	82.65	46	79.54	47	76.82	48	74.27	49	80.72

AUG 2,1964

1	76.43	2	59.57	3	89.70	4	0.	5	69.61	6	80.42	7	86.76
8	81.60	9	85.15	10	79.12	11	87.31	12	84.09	13	86.63	14	[illegible]
15	84.44	16	87.26	17	88.36	18	86.47	19	86.32	20	86.20	21	85.96
22	85.57	23	85.69	24	80.19	25	88.90	26	87.32	27	83.37	28	80.50
29	78.86	30	77.95	31	76.26	32	75.19	33	87.37	34	84.97	35	79.67
36	75.43	37	74.44	38	72.97	39	71.64	40	70.40	41	84.99	42	87.07
43	86.62	44	87.42	45	82.94	46	79.38	47	77.20	48	74.67	49	80.39

AUG 3,1964

1	80.31	2	53.60	3	87.94	4	0.	5	89.22	6	77.35	7	88.52
8	78.28	9	85.41	10	78.97	11	86.92	12	84.00	13	86.04	14	82.28
15	84.84	16	85.75	17	87.51	18	86.70	19	86.05	20	85.90	21	85.61
22	59.77	23	65.27	24	80.89	25	89.14	26	87.13	27	83.55	28	80.94
29	79.40	30	77.86	31	76.78	32	75.70	33	88.35	34	86.20	35	80.65
36	78.74	37	74.90	38	73.40	39	71.98	40	70.90	41	85.37	42	87.85
43	87.23	44	86.15	45	83.43	46	80.21	47	77.72	48	75.08	49	81.66

AUG 4,1964

1	76.83	2	64.06	3	86.70	4	0.	5	89.70	6	80.76	7	89.71
8	81.75	9	84.45	10	79.09	11	87.61	12	84.00	13	86.98	14	80.47
15	83.86	16	87.33	17	87.97	18	87.00	19	86.15	20	86.19	21	86.02
22	86.03	23	86.26	24	81.29	25	89.36	26	87.82	27	83.77	28	81.15
29	79.84	30	78.37	31	76.93	32	75.62	33	88.23	34	85.88	35	80.60
36	77.04	37	75.34	38	73.93	39	72.49	40	71.39	41	88.07	42	89.13
43	88.52	44	87.32	45	84.34	46	81.02	47	78.16	48	75.65	49	81.70

AUG 5,1964

1	75.49	2	64.04	3	86.57	4	0.	5	89.26	6	80.32	7	88.85
8	81.11	9	84.43	10	79.06	11	87.17	12	83.07	13	86.04	14	79.83
15	83.22	16	[illegible]	17	87.74	18	86.96	19	86.03	20	85.84	21	85.49
22	84.69	23	83.78	24	79.61	25	89.38	26	87.95	27	84.14	28	81.63
29	80.09	30	78.72	31	77.52	32	76.33	33	87.47	34	85.41	35	80.90
36	77.52	37	75.87	38	74.24	39	72.91	40	71.80	41	86.83	42	89.98
43	89.22	44	87.77	45	85.13	46	81.69	47	78.87	48	76.11	49	80.49

AUG 6,1964

1	76.18	2	62.67	3	88.81	4	0.	5	91.00	6	79.18	7	90.15
8	79.42	9	85.62	10	79.41	11	88.00	12	84.10	13	86.33	14	80.39
15	84.46	16	90.37	17	88.78	18	87.05	19	85.93	20	85.56	21	85.01
22	84.13	23	83.67	24	79.57	25	90.82	26	88.99	27	84.46	28	81.97
29	80.36	30	78.94	31	77.60	32	76.58	33	88.36	34	86.14	35	80.88
36	77.70	37	76.40	38	74.89	39	73.50	40	72.40	41	89.00	42	90.65
43	90.01	44	88.79	45	85.88	46	82.07	47	79.14	48	76.62	49	80.55

AUG 7,1964

1	81.76	2	61.72	3	87.80	4	0.	5	89.67	6	79.48	7	89.05
8	78.78	9	85.40	10	79.74	11	87.59	12	85.03	13	86.54	14	81.75
15	84.51	16	89.99	17	88.57	18	87.32	19	85.69	20	85.16	21	84.88
22	84.17	23	83.96	24	80.21	25	89.77	26	88.53	27	84.74	28	81.95
29	80.30	30	78.96	31	77.77	32	76.70	33	87.92	34	85.91	35	81.07
36	77.97	37	75.12	38	74.57	39	73.15	40	72.11	41	89.17	42	91.76
43	90.92	44	89.88	45	86.68	46	82.63	47	79.60	48	76.88	49	81.35

AUG 8,1964

1	64.25	2	63.93	3	82.77	4	69.33	5	[illegible]	6	78.72	7	90.65
8	78.27	9	87.10	10	80.09	11	88.68	12	85.87	13	87.49	14	83.52
15	86.42	16	90.91	17	89.23	18	87.23	19	85.64	20	84.15	21	85.15
22	84.91	23	85.29	24	80.81	25	92.03	26	90.08	27	85.11	28	82.32
29	80.81	30	79.87	31	78.36	32	77.22	33	89.14	34	87.75	35	81.63
36	78.55	37	76.57	38	75.38	39	73.65	40	72.85	41	89.97	42	93.23
43	92.63	44	91.27	45	87.88	46	83.69	47	80.44	48	77.82	49	81.34

AUG 9,1964

1	65.01	2	63.20	3	63.71	4	63.10	5	90.55	6	78.49	7	89.87
8	78.27	9	86.66	10	80.03	11	88.68	12	86.53	13	87.74	14	84.90
15	86.57	16	90.45	17	89.15	18	87.51	19	85.97	20	85.98	21	85.70
22	85.76	23	89.40	24	80.83	25	92.48	26	90.95	27	86.75	28	83.74
29	82.40	30	81.05	31	79.99	32	78.93	33	90.23	34	89.76	35	83.99
36	80.47	37	78.51	38	77.16	39	75.74	40	74.53	41	89.56	42	91.31
43	90.19	44	90.05	45	88.77	46	85.71	47	82.42	48	79.95	49	81.75

AUG 10,1964

1	62.72	2	62.43	3	64.58	4	64.05	5	90.49	6	78.62	7	90.03
8	78.94	9	85.47	10	80.09	11	88.46	12	86.90	13	88.05	14	84.70
15	86.85	16	90.73	17	89.04	18	87.67	19	86.30	20	86.38	21	86.36
22	86.49	23	87.25	24	81.10	25	92.36	26	91.00	27	86.99	28	84.11
29	82.89	30	81.51	31	80.62	32	79.25	33	90.24	34	89.67	35	84.45
36	80.99	37	79.11	38	77.63	39	76.07	40	75.02	41	84.10	42	84.57
43	84.86	44	84.93	45	85.02	46	84.98	47	83.04	48	80.38	49	82.26

AUG 11,1964

1	80.91	2	62.03	3	65.85	4	63.90	5	90.63	6	78.51	7	89.62
8	78.36	9	87.31	10	80.90	11	88.20	12	86.59	13	87.65	14	84.20
15	86.55	16	91.02	17	89.38	18	87.98	19	86.97	20	87.05	21	87.00
22	86.95	23	87.12	24	81.32	25	92.10	26	90.57	27	86.45	28	83.70
29	82.49	30	81.14	31	80.07	32	78.82	33	90.14	34	88.94	35	85.71
36	80.88	37	78.74	38	77.28	39	75.74	40	74.42	41	86.58	42	88.93
43	88.05	44	87.68	45	85.10	46	82.96	47	81.35	48	79.72	49	82.18

AUG 12,1964

1	82.40	2	60.93	3	67.77	4	64.14	5	91.06	6	79.15	7	90.10
8	78.99	9	87.72	10	80.88	11	88.80	12	86.79	13	87.95	14	84.51
15	85.71	16	[illegible]	17	89.97	18	88.40	19	87.38	20	87.30	21	87.08
22	86.96	23	87.25	24	82.42	25	91.66	26	90.21	27	86.50	28	83.17
29	81.86	30	80.56	31	79.35	32	78.17	33	88.52	34	88.00	35	83.35
36	79.90	37	77.98	38	76.37	39	75.00	40	73.87	41	91.79	42	94.62
43	92.86	44	91.97	45	88.71	46	83.66	47	80.74	48	78.46	49	83.01

AUG 13,1964

1	72.01	2	59.32	3	70.88	4	66.80	5	90.07	6	79.39	7	89.15
8	79.24	9	83.26	10	81.25	11	88.67	12	86.24	13	88.00	14	82.72
15	84.41	16	90.47	17	89.36	18	88.54	19	87.70	20	87.76	21	87.90
22	87.54	23	88.30	24	83.31	25	91.11	26	90.00	27	86.09	28	83.52
29	82.21	30	81.00	31	79.96	32	78.63	33	88.21	34	88.02	35	83.52
36	80.15	37	78.49	38	77.00	39	75.49	40	74.32	41	95.24	42	95.96
43	94.41	44	93.56	45	89.96	46	85.02	47	81.61	48	79.00	49	83.95

Underground Parking Garage
Nevada Test Site, AEC
Mercury, Nevada

JUL 22,1964

1	94.60	2	65.50	3	87.97	4	69.90	5	92.67	6	60.00	7	87.63
8	70.77	9	87.63	10	70.67	11	87.23	12	70.80	13	84.63	14	81.10
15	75.70	16	74.57	17	72.83	18	71.97	19	70.90	20	69.13	21	67.20
22	86.77	23	83.37	24	83.17	25	80.37	26	75.47	27	73.87	28	72.83
29	71.27	30	70.73	31	68.83	32	67.70	33	82.50	34	80.90	35	75.43
36	74.13	37	72.73	38	71.63	39	70.60	40	68.93	41	66.37	42	63.63
43	82.90	44	87.27	45	86.50	46	88.53	47	85.37	48	70.27	49	87.27
50	84.60	51	81.03	52	81.10	53	80.93	54	85.57	55	83.07	56	78.23
57	77.43	58	80.33	59	87.33	60	83.57	61	78.93	62	79.17	63	81.20
64	87.10	65	85.43	66	80.23	67	80.70	68	80.60	69	89.07	70	84.50
71	79.97	72	76.93	73	77.07	74	78.50	75	79.73	76	93.10	77	94.63
78	94.47	79	97.33	80	85.50	81	83.07	82	81.03	83	79.67	84	76.17
85	59.90	86	58.67	87	71.00	88	70.97	89	85.00	90	85.37	91	86.77
92	85.97	93	70.50										

JUL 23,1964

1	89.91	2	65.16	3	88.61	4	71.66	5	84.73	6	56.95	7	88.86
8	72.20	9	89.35	10	72.39	11	88.77	12	72.23	13	86.70	14	83.77
15	77.82	16	75.80	17	73.59	18	72.55	19	71.41	20	69.64	21	67.77
22	86.09	23	87.80	24	85.27	25	82.80	26	77.36	27	75.05	28	73.61
29	71.93	30	71.34	31	69.41	32	68.18	33	84.93	34	83.48	35	77.48
36	75.61	37	73.50	38	72.18	39	71.09	40	69.52	41	67.48	42	84.95
43	85.20	44	89.27	45	88.43	46	89.70	47	87.27	48	65.61	49	86.32
50	85.36	51	83.57	52	82.23	53	81.66	54	84.93	55	83.75	56	81.11
57	80.07	58	79.89	59	85.16	60	83.25	61	81.41	62	81.11	63	81.39
64	85.50	65	84.93	66	81.93	67	81.18	68	81.14	69	85.64	70	84.14
71	81.52	72	80.48	73	80.39	74	80.05	75	80.39	76	85.09	77	86.89
78	86.57	79	91.25	80	86.41	81	84.02	82	82.59	83	80.16	84	76.66
85	60.25	86	59.07	87	65.95	88	66.07	89	85.73	90	85.66	91	88.39
92	87.70	93	66.86										

JUL 24,1964

1	90.45	2	66.84	3	89.95	4	71.20	5	88.86	6	59.52	7	89.93
8	71.57	9	90.52	10	71.70	11	89.50	12	71.86	13	88.20	14	85.07
15	79.59	16	77.34	17	74.61	18	73.18	19	71.89	20	70.00	21	68.05
22	87.57	23	90.07	24	87.14	25	84.75	26	78.91	27	76.36	28	74.66
29	72.43	30	71.82	31	69.84	32	68.45	33	86.45	34	85.20	35	79.14
36	76.73	37	74.32	38	72.77	39	71.39	40	69.84	41	67.11	42	88.50
43	88.25	44	89.81	45	89.39	46	90.55	47	88.64	48	64.36	49	88.32
50	87.39	51	85.36	52	82.93	53	82.73	54	87.00	55	85.39	56	83.45
57	81.48	58	80.73	59	87.16	60	85.80	61	83.34	62	82.11	63	82.27
64	87.57	65	86.77	66	84.34	67	82.80	68	82.70	69	87.59	70	85.75
71	83.07	72	82.07	73	81.64	74	81.11	75	81.55	76	89.32	77	89.80
78	89.84	79	93.25	80	87.57	81	85.07	82	82.05	83	80.70	84	76.75
85	60.36	86	59.23	87	64.61	88	64.73	89	86.45	90	86.43	91	89.34
92	88.82	93	64.27										

JUL 25,1964

1	91.69	2	66.96	3	91.17	4	73.42	5	89.94	6	66.06	7	91.27
8	73.71	9	91.85	10	74.08	11	90.73	12	74.00	13	89.40	14	86.73
15	81.19	16	78.75	17	75.81	18	74.17	19	73.46	20	71.35	21	68.52
22	89.05	23	91.65	24	89.63	25	86.79	26	80.56	27	77.60	28	75.71
29	74.23	30	73.23	31	70.13	32	68.92	33	88.15	34	87.00	35	80.60
36	78.13	37	75.38	38	73.60	39	71.98	40	70.13	41	67.52	42	89.23
43	89.96	44	91.52	45	91.00	46	91.23	47	90.06	48	64.24	49	92.25
50	90.50	51	87.17	52	83.63	53	83.63	54	91.02	55	89.33	56	86.13
57	82.35	58	81.69	59	91.31	60	88.75	61	85.15	62	83.02	63	83.23
64	90.69	65	89.42	66	85.96	67	83.50	68	83.46	69	91.58	70	88.40
71	84.96	72	83.38	73	82.63	74	82.06	75	82.69	76	89.92	77	90.40
78	90.50	79	95.58	80	89.27	81	86.21	82	82.60	83	80.69	84	76.79
85	60.71	86	58.98	87	64.21	88	64.27	89	88.02	90	88.02	91	91.06
92	90.52	93	64.47										

JUL 26,1964

1	90.28	2	70.22	3	90.41	4	74.70	5	80.41	6	67.63	7	[illegible]
8	74.98	9	91.24	10	75.09	11	90.17	12	75.22	13	89.59	14	87.61
15	82.30	16	73.85	17	76.83	18	74.96	19	73.28	20	70.98	21	68.89
22	89.43	23	90.76	24	89.43	25	87.26	26	91.67	27	79.15	28	77.54
29	74.02	30	72.91	31	70.48	32	69.17	33	88.35	34	87.46	35	81.91
36	79.17	37	76.28	38	74.39	39	72.57	40	70.37	41	67.74	42	89.50
43	90.00	44	91.26	45	90.74	46	91.26	47	89.46	48	64.09	49	89.78
50	89.63	51	88.28	52	84.78	53	84.35	54	87.52	55	87.93	56	86.59
57	63.17	58	81.85	59	88.30	60	88.15	61	86.41	62	83.96	63	84.15
64	88.20	65	89.70	66	87.13	67	84.74	68	84.76	69	87.61	70	87.96
71	86.52	72	85.24	73	84.33	74	83.76	75	84.28	76	80.61	77	81.28
78	81.35	79	87.07	80	87.57	81	84.59	82	83.72	83	81.50	84	77.33
85	60.61	86	60.07	87	63.96	88	64.02	89	87.80	90	87.83	91	90.72
92	90.39	93	64.13										

JUL 27,1964

1	92.50	2	69.90	3	91.94	4	75.27	5	81.50	6	67.83	7	92.10
8	75.60	9	92.79	10	75.54	11	91.77	12	75.77	13	90.90	14	88.92
15	83.48	16	80.79	17	78.04	18	75.98	19	74.17	20	71.46	21	69.48
22	90.31	23	92.08	24	90.06	25	88.38	26	82.75	27	79.96	28	77.75
29	74.88	30	73.48	31	71.13	32	69.77	33	89.50	34	88.63	35	82.94
36	80.23	37	77.35	38	75.42	39	73.44	40	70.92	41	68.42	42	90.60
43	91.17	44	92.63	45	92.27	46	92.42	47	91.17	48	63.33	49	89.50
50	88.81	51	87.79	52	85.85	53	85.85	54	87.63	55	87.17	56	86.17
57	84.33	58	83.25	59	88.00	60	87.63	61	86.10	62	85.13	63	85.25
64	88.58	65	87.75	66	86.79	67	85.81	68	85.75	69	88.33	70	87.27
71	86.23	72	85.88	73	85.52	74	85.10	75	85.42	76	81.48	77	82.10
78	82.14	79	88.65	80	86.06	81	85.06	82	83.23	83	81.90	84	77.48
85	60.79	86	59.42	87	63.08	88	63.13	89	88.38	90	88.42	91	91.77
92	91.33	93	61.00										

JUL 28,1964

1	92.69	2	68.54	3	92.33	4	75.25	5	85.60	6	65.13	7	92.65
8	75.88	9	93.19	10	75.94	11	92.04	12	75.90	13	91.23	14	89.23
15	83.98	16	81.65	17	78.67	18	76.52	19	74.73	20	71.85	21	69.65
22	91.00	23	92.58	24	91.27	25	88.88	26	83.23	27	80.60	28	78.27
29	75.67	30	74.31	31	71.48	32	69.83	33	89.85	34	89.08	35	83.31
36	80.63	37	77.81	38	75.77	39	73.77	40	71.00	41	68.33	42	91.31
43	91.38	44	93.17	45	92.79	46	92.92	47	91.27	48	65.58	49	91.08
50	89.90	51	87.98	52	86.02	53	86.13	54	89.17	55	88.29	56	86.25
57	84.35	58	83.27	59	89.31	60	88.00	61	86.21	62	84.98	63	85.40
64	89.96	65	89.10	66	87.25	67	86.19	68	86.25	69	89.77	70	87.63
71	85.77	72	85.71	73	85.56	74	85.17	75	85.69	76	86.19	77	86.56
78	86.73	79	92.83	80	86.88	81	84.94	82	82.52	83	81.31	84	77.44
85	60.40	86	58.98	87	64.81	88	65.02	89	88.83	90	88.90	91	91.94
92	91.52	93	65.29										

JUL 29,1964

1	92.04	2	68.15	3	92.35	4	73.54	5	86.88	6	60.85	7	92.83
8	73.94	9	92.42	10	73.96	11	92.15	12	73.88	13	91.10	14	89.33
15	84.48	16	82.13	17	79.27	18	76.77	19	75.19	20	72.21	21	69.81
22	91.46	23	92.73	24	91.40	25	89.35	26	83.67	27	81.04	28	78.85
29	76.21	30	74.88	31	71.94	32	70.06	33	90.40	34	89.67	35	83.83
36	81.23	37	78.42	38	76.02	39	74.33	40	71.44	41	68.52	42	91.69
43	92.08	44	92.67	45	92.44	46	92.38	47	91.40	48	65.98	49	90.90
50	90.38	51	88.85	52	86.85	53	86.98	54	89.44	55	88.90	56	87.31
57	85.10	58	84.23	59	89.08	60	88.52	61	87.10	62	85.77	63	85.85
64	89.04	65	88.98	66	87.98	67	87.00	68	87.00	69	90.13	70	88.54
71	86.98	72	86.13	73	86.06	74	85.75	75	86.40	76	86.60	77	87.10
78	87.48	79	92.15	80	87.48	81	85.63	82	83.15	83	81.48	84	77.60
85	60.46	86	58.92	87	65.13	88	65.25	89	89.23	90	89.33	91	91.38
92	91.13	93	65.21										

JUL 30,1964

1	92.04	2	70.21	3	92.52	4	73.79	5	87.69	6	62.15	7	92.98
8	74.29	9	92.81	10	74.15	11	92.40	12	74.08	13	91.19	14	89.58
15	84.71	16	82.46	17	79.69	18	78.25	19	75.58	20	72.40	21	69.88
22	91.54	23	92.94	24	91.71	25	89.52	26	84.00	27	81.44	28	79.29
29	76.69	30	75.15	31	72.00	32	70.10	33	90.71	34	89.90	35	84.06
36	81.65	37	78.83	38	76.60	39	74.63	40	71.94	41	68.23	42	91.60
43	91.69	44	91.54	45	92.60	46	92.29	47	91.50	48	63.19	49	90.15
50	89.75	51	89.31	52	87.54	53	87.85	54	89.25	55	88.65	56	87.88
57	85.81	58	85.10	59	88.69	60	88.54	61	87.29	62	86.63	63	87.08
64	89.83	65	89.69	66	88.83	67	88.08	68	88.08	69	88.75	70	88.13
71	87.29	72	87.04	73	86.88	74	86.75	75	87.35	76	88.77	77	89.06
78	89.15	79	91.59	80	87.54	81	85.94	82	83.44	83	81.77	84	77.60
85	60.35	86	59.02	87	63.58	88	62.58	89	89.96	90	90.08	91	91.85
92	91.42	93	62.83										

JUL 31,1964

1	91.83	2	69.77	3	92.79	4	73.75	5	86.27	6	58.58	7	92.88
8	74.17	9	92.30	10	73.98	11	92.60	12	73.85	13	90.83	14	89.15
15	84.96	16	82.85	17	80.08	18	78.63	19	75.94	20	72.92	21	70.19
22	92.06	23	93.40	24	92.00	25	89.88	26	84.35	27	81.94	28	79.83
29	77.06	30	75.83	31	72.48	32	70.38	33	90.90	34	90.04	35	84.67
36	82.06	37	79.29	38	77.15	39	75.06	40	72.13	41	68.54	42	93.98
43	93.19	44	92.85	45	92.63	46	92.42	47	91.63	48	61.08	49	89.44
50	69.46	51	89.47	52	38.38	53	88.58	54	88.54	55	88.94	56	88.17
57	86.65	58	85.96	59	88.98	60	88.85	61	87.96	62	87.23	63	87.94
64	89.71	65	69.69	66	89.19	67	88.65	68	88.85	69	87.92	70	88.29
71	87.71	72	87.79	73	87.96	74	87.92	75	88.56	76	85.98	77	87.31
78	87.19	79	90.10	80	87.77	81	86.38	82	84.04	83	82.35	84	78.35
85	61.04	86	59.52	87	60.90	88	60.98	89	90.19	90	90.23	91	91.77
92	91.44	93	60.55										

AUG 1,1964

1	91.90	2	69.92	3	92.79	4	74.19	5	83.50	6	56.48	7	93.08
8	74.48	9	92.90	10	74.21	11	92.67	12	74.27	13	91.60	14	90.15
15	85.54	16	83.40	17	81.67	18	78.58	19	76.60	20	73.42	21	70.69
22	92.13	23	93.25	24	92.15	25	90.13	26	84.90	27	82.42	28	80.33
29	77.67	30	76.23	31	72.98	32	70.90	33	91.02	34	90.46	35	85.00
36	82.67	37	79.88	38	77.83	39	75.40	40	72.48	41	69.15	42	93.75
43	93.48	44	93.00	45	92.35	46	92.52	47	91.83	48	61.31	49	87.63
50	87.92	51	88.85	52	88.73	53	89.15	54	87.31	55	87.75	56	87.96
57	87.19	58	86.69	59	87.25	60	87.83	61	87.79	62	87.96	63	88.69
64	88.48	65	88.75	66	89.13	67	89.25	68	89.29	69	86.21	70	87.15
71	87.50	72	87.83	73	88.38	74	88.40	75	89.15	76	84.13	77	84.33
78	84.81	79	86.94	80	86.56	81	85.81	82	84.02	83	82.67	84	78.75
85	61.33	86	59.83	87	61.31	88	61.29	89	90.25	90	90.33	91	91.88
92	91.58	93	60.75										

AUG 2,1964

1	92.02	2	70.27	3	93.08	4	74.35	5	81.75	6	58.92	7	93.44
8	74.77	9	93.52	10	74.54	11	92.69	12	74.60	13	91.48	14	90.06
15	85.75	16	83.79	17	81.02	18	78.88	19	77.02	20	73.79	21	71.00
22	92.35	23	93.44	24	92.38	25	90.27	26	85.08	27	82.83	28	80.75
29	78.00	30	76.67	31	73.33	32	71.19	33	91.40	34	90.92	35	85.38
36	82.98	37	80.29	38	78.19	39	75.96	40	72.85	41	69.44	42	94.02
43	94.00	44	93.67	45	93.44	46	93.19	47	92.23	48	61.08	49	86.33
50	86.23	51	86.90	52	87.48	53	88.27	54	85.69	55	85.75	56	86.00
57	86.04	58	85.83	59	85.06	60	85.67	61	86.00	62	86.71	63	87.79
64	86.77	65	87.00	66	87.50	67	88.42	68	88.40	69	85.42	70	85.21
71	85.75	72	86.33	73	87.35	74	87.44	75	88.21	76	80.67	77	81.83
78	82.08	79	87.79	80	84.69	81	83.94	82	82.54	83	81.44	84	77.79
85	60.25	86	58.56	87	59.79	88	59.91	89	90.65	90	90.77	91	92.15
92	91.96	93	60.46										

AUG 3,1964

1	92.35	2	70.85	3	93.33	4	74.73	5	84.48	6	62.52	7	93.73
8	75.23	9	93.50	10	75.10	11	93.06	12	75.02	13	91.85	14	90.40
15	85.65	16	83.92	17	81.13	18	79.15	19	77.23	20	73.92	21	71.06
22	89.69	23	90.75	24	89.67	25	90.63	26	85.40	27	83.04	28	80.92
29	78.33	30	77.10	31	73.50	32	71.29	33	91.69	34	91.00	35	85.58
36	83.17	37	80.44	38	78.42	39	76.23	40	72.94	41	69.58	42	94.35
43	94.35	44	93.81	45	93.63	46	93.33	47	92.31	48	63.13	49	88.10
50	87.35	51	87.00	52	87.33	53	88.77	54	87.71	55	86.94	56	86.06
57	85.92	58	85.88	59	86.67	60	86.25	61	85.77	62	86.60	63	87.88
64	88.04	65	87.60	66	87.31	67	88.25	68	88.25	69	88.10	70	86.00
71	85.40	72	85.81	73	86.94	74	87.13	75	87.96	76	82.75	77	84.13
78	84.63	79	90.92	80	84.96	81	83.48	82	81.71	83	80.71	84	77.31
85	59.69	86	58.06	87	61.71	88	61.56	89	91.00	90	91.08	91	92.31
92	92.02	93	62.75										

AUG 4,1964

1	91.75	2	70.67	3	92.92	4	74.63	5	73.31	6	65.88	7	93.25
8	74.88	9	93.50	10	74.65	11	92.48	12	74.58	13	91.15	14	89.81
15	65.83	16	83.71	17	81.21	18	79.00	19	77.17	20	73.81	21	71.02
22	92.23	23	92.98	24	92.21	25	89.90	26	85.29	27	82.83	28	80.75
29	78.21	30	76.94	31	73.35	32	70.96	33	91.40	34	90.77	35	85.52
36	83.06	37	80.25	38	78.44	39	76.21	40	72.85	41	69.38	42	93.83
43	93.88	44	93.50	45	93.35	46	92.90	47	92.19	48	64.23	49	82.48
50	65.15	51	87.58	52	67.85	53	88.75	54	82.46	55	85.13	56	86.85
57	86.54	58	86.54	59	83.94	60	86.19	61	86.75	62	87.27	63	88.73
64	86.85	65	87.90	66	88.33	67	88.81	68	88.94	69	78.29	70	84.94
71	86.58	72	87.15	73	87.77	74	88.40	75	89.08	76	72.65	77	73.38
78	73.33	79	75.44	80	83.85	81	84.27	82	82.88	83	81.46	84	77.90
85	60.35	86	58.73	87	63.58	88	63.63	89	90.81	90	90.94	91	92.83
92	92.46	93	64.40										

AUG 5,1964

1	92.00	2	69.90	3	92.25	4	72.44	5	78.52	6	67.15	7	92.92
8	72.75	9	92.48	10	72.65	11	92.19	12	72.35	13	91.23	14	89.90
15	65.60	16	83.71	17	81.13	18	79.02	19	77.15	20	73.96	21	71.00
22	91.90	23	92.50	24	91.81	25	90.15	26	85.02	27	82.77	28	80.85
29	78.44	30	76.98	31	73.50	32	70.90	33	91.02	34	90.67	35	85.60
36	82.88	37	80.33	38	78.60	39	76.13	40	72.94	41	69.40	42	93.42
43	93.38	44	92.65	45	92.35	46	91.85	47	91.40	48	61.81	49	82.44
50	62.48	51	84.83	52	87.81	53	88.81	54	81.56	55	81.94	56	64.06
57	86.52	58	86.98	59	81.92	60	83.08	61	84.90	62	87.54	63	89.29
64	83.33	65	84.15	66	86.67	67	89.17	68	89.23	69	79.58	70	81.69
71	84.04	72	86.17	73	87.67	74	88.60	75	89.19	76	78.38	77	80.29
78	80.21	79	75.00	80	78.35	81	80.77	82	81.08	83	80.75	84	77.88
85	60.52	86	57.06	87	61.25	88	61.35	89	91.15	90	91.23	91	92.67
92	92.40	93	62.22										

AUG 6,1964

1	92.92	2	70.44	3	92.27	4	72.40	5	82.44	6	66.21	7	92.88
8	72.79	9	92.44	10	72.77	11	92.15	12	72.31	13	91.25	14	89.29
15	85.75	16	83.96	17	81.44	18	79.44	19	77.48	20	74.13	21	71.29
22	91.88	23	92.44	24	91.73	25	90.06	26	85.08	27	82.88	28	80.94
29	78.88	30	77.13	31	73.85	32	71.31	33	91.15	34	90.69	35	85.71
36	83.04	37	80.71	38	78.81	39	76.46	40	73.15	41	69.83	42	93.58
43	93.54	44	92.83	45	92.71	46	92.25	47	92.04	48	62.94	49	86.58
50	85.83	51	85.40	52	87.13	53	88.83	54	85.06	55	84.40	56	84.29
57	85.90	58	86.61	59	85.23	60	84.60	61	84.60	62	87.17	63	88.94
64	85.25	65	85.46	66	86.06	67	88.96	68	89.00	69	83.81	70	83.52
71	83.58	72	85.15	73	87.00	74	88.19	75	88.98	76	82.27	77	83.21
78	83.10	79	76.04	80	76.83	81	79.17	82	79.50	83	79.69	84	77.63
85	60.21	86	58.44	87	62.54	88	62.58	89	90.56	90	90.75	91	91.60
92	91.44	93	62.65										

AUG 7,1964

1	93.31	2	70.56	3	92.38	4	72.90	5	85.92	6	65.35	7	92.96
8	73.08	9	92.52	10	72.98	11	91.98	12	72.60	13	90.88	14	89.77
15	85.98	16	84.00	17	81.75	18	80.13	19	77.83	20	74.40	21	71.50
22	91.96	23	92.56	24	91.80	25	90.15	26	85.17	27	83.00	28	81.13
29	79.00	30	77.44	31	74.00	32	71.42	33	91.27	34	90.73	35	85.77
36	83.08	37	80.92	38	79.00	39	76.79	40	73.31	41	70.00	42	93.56
43	93.56	44	92.88	45	92.77	46	92.40	47	91.92	48	60.98	49	89.90
50	89.06	51	87.52	52	87.92	53	89.44	54	88.35	55	87.54	56	86.15
57	86.52	58	87.50	59	88.63	60	87.42	61	86.42	62	87.60	63	89.38
64	88.48	65	87.92	66	87.33	67	89.56	68	89.52	69	87.88	70	87.02
71	85.04	72	85.81	73	87.10	74	88.19	75	69.08	76	85.50	77	86.58
78	86.79	79	81.15	80	78.58	81	79.25	82	78.98	83	79.13	84	77.48
85	60.50	86	58.58	87	60.83	88	60.88	89	90.65	90	90.75	91	91.52
92	91.33	93	60.60										

AUG 8,1964

1	94.30	2	71.02	3	92.98	4	74.36	5	87.05	6	63.55	7	93.18
8	74.55	9	93.50	10	74.34	11	92.43	12	74.32	13	91.30	14	90.09
15	86.41	16	84.70	17	82.10	18	80.07	19	78.25	20	74.95	21	72.02
22	90.58	23	92.34	24	91.48	25	90.66	26	85.93	27	83.75	28	81.91
29	79.45	30	77.95	31	74.59	32	72.02	33	91.59	34	91.09	35	86.09
36	83.75	37	81.41	38	79.48	39	77.39	40	73.84	41	70.41	42	94.32
43	94.32	44	93.64	45	93.48	46	93.23	47	114.93	48	60.66	49	90.59
50	90.05	51	88.98	52	88.64	53	89.70	54	87.75	55	87.55	56	87.07
57	87.04	58	87.68	59	88.86	60	88.48	61	87.64	62	87.80	63	89.50
64	89.09	65	88.80	66	88.27	67	89.70	68	89.68	69	88.32	70	87.66
71	86.57	72	86.82	73	87.59	74	88.41	75	89.36	76	87.75	77	89.05
78	88.80	79	87.36	80	81.11	81	80.36	82	79.25	83	78.95	84	77.32
85	60.80	86	58.89	87	60.70	88	60.70	89	91.57	90	91.59	91	92.61
92	92.48	93	60.91										

AUG 9,1964

1	93.40	2	70.69	3	92.96	4	74.27	5	86.60	6	62.90	7	93.29
8	74.35	9	93.56	10	75.27	11	92.50	12	74.31	13	91.40	14	90.33
15	86.54	16	84.69	17	82.48	18	80.48	19	78.58	20	75.19	21	72.44
22	92.52	23	93.17	24	92.33	25	90.90	26	86.15	27	84.04	28	82.13
29	79.92	30	78.31	31	75.02	32	72.35	33	91.88	34	91.21	35	86.23
36	84.04	37	81.58	38	79.73	39	77.58	40	74.04	41	70.60	42	94.38
43	94.38	44	93.33	45	93.44	46	92.90	47	92.06	48	63.40	49	90.31
50	90.15	51	89.52	52	89.17	53	90.04	54	86.94	55	87.29	56	87.29
57	87.54	58	88.15	59	88.96	60	88.81	61	88.19	62	88.52	63	89.90
64	89.27	65	89.04	66	88.77	67	89.94	68	89.96	69	88.08	70	87.83
71	87.10	72	87.38	73	88.00	74	88.67	75	89.48	76	86.29	77	87.77
78	88.10	79	85.40	80	81.90	81	81.04	82	79.52	83	78.98	84	77.00
85	60.83	86	58.92	87	63.06	88	63.13	89	91.58	90	91.58	91	92.67
92	92.54	93	63.17										

AUG 10,1964

1	93.02	2	70.89	3	93.09	4	74.78	5	87.30	6	66.52	7	93.57
8	74.89	9	93.83	10	74.96	11	92.98	12	74.76	13	91.93	14	90.96
15	87.24	16	85.52	17	83.04	18	81.09	19	79.33	20	76.04	21	73.13
22	92.91	23	93.30	24	92.74	25	91.30	26	86.89	27	84.85	28	83.00
29	80.70	30	77.30	31	75.80	32	73.33	33	92.20	34	91.80	35	86.96
36	84.65	37	82.39	38	80.07	39	78.80	40	75.80	41	71.35	42	94.76
43	94.76	44	93.87	45	93.87	46	93.39	47	92.57	48	63.61	49	90.48
50	91.04	51	90.50	52	89.70	53	90.22	54	88.70	55	88.83	56	87.89
57	87.96	58	88.30	59	89.72	60	89.93	61	88.93	62	89.02	63	90.20
64	90.00	65	89.98	66	89.48	67	90.17	68	90.13	69	87.80	70	88.80
71	86.04	72	88.15	73	88.50	74	89.15	75	89.89	76	87.91	77	88.07
78	87.80	79	85.46	80	84.15	81	83.00	82	80.59	83	79.61	84	77.50
85	61.02	86	59.09	87	62.87	88	62.89	89	91.54	90	91.70	91	92.57
92	92.39	93	62.91										

AUG 11,1964

1	92.13	2	70.35	3	92.83	4	74.27	5	86.92	6	67.44	7	93.17
8	75.00	9	93.50	10	75.15	11	92.54	12	74.77	13	91.88	14	91.06
15	87.79	16	86.10	17	83.83	18	81.92	19	80.44	20	76.96	21	73.83
22	92.90	23	93.17	24	92.54	25	91.23	26	87.17	27	85.27	28	83.63
29	81.17	30	79.88	31	76.44	32	73.85	33	92.23	34	92.00	35	87.19
36	85.10	37	82.88	38	81.15	39	78.92	40	75.54	41	71.83	42	94.71
43	94.67	44	93.46	45	93.44	46	92.90	47	92.35	48	62.56	49	91.79
50	91.33	51	91.06	52	90.46	53	90.98	54	90.02	55	89.50	56	88.10
57	88.42	58	88.50	59	89.98	60	90.00	61	88.79	62	89.52	63	90.47
64	90.23	65	90.00	66	89.94	67	90.79	68	90.79	69	89.79	70	89.13
71	88.17	72	88.67	73	89.10	74	89.58	75	90.38	76	86.58	77	87.69
78	87.92	79	87.18	80	83.79	81	82.63	82	80.63	83	79.71	84	77.25
85	61.25	86	59.10	87	61.52	88	61.75	89	91.46	90	91.48	91	91.99
92	91.81	93	61.39										

AUG 12,1964

1	91.98	2	69.90	3	92.81	4	74.54	5	87.15	6	65.69	7	93.17
8	75.17	9	93.90	10	79.46	11	92.35	12	75.15	13	91.60	14	90.90
15	87.60	16	86.21	17	83.96	18	82.15	19	80.44	20	77.13	21	74.29
22	92.73	23	92.98	24	92.48	25	91.27	26	87.38	27	85.56	28	84.00
29	81.77	30	80.13	31	76.96	32	74.40	33	92.02	34	91.48	35	87.31
36	85.35	37	83.13	38	81.46	39	79.23	40	75.83	41	72.42	42	94.56
43	94.58	44	93.58	45	93.65	46	92.77	47	92.25	48	62.85	49	91.83
50	91.75	51	91.42	52	90.81	53	91.33	54	91.04	55	90.79	56	89.21
57	89.08	58	89.15	59	90.98	60	91.06	61	89.96	62	90.19	63	91.08
64	91.21	65	91.00	66	90.58	67	91.25	68	91.13	69	90.35	70	89.90
71	88.92	72	89.17	73	89.56	74	89.85	75	90.48	76	86.85	77	87.56
78	87.58	79	86.90	80	84.38	81	83.31	82	81.19	83	80.08	84	77.38
85	61.35	86	59.27	87	62.02	88	62.02	89	91.38	90	91.50	91	92.23
92	91.96	93	61.44										

AUG 13,1964

1	91.46	2	69.67	3	93.06	4	74.23	5	85.17	6	63.77	7	93.21
8	74.63	9	93.50	10	75.08	11	92.71	12	74.67	13	92.23	14	91.13
15	87.83	16	86.10	17	84.00	18	82.35	19	80.44	20	77.21	21	74.15
22	92.74	23	93.15	24	92.50	25	91.17	26	87.29	27	85.42	28	83.79
29	81.60	30	80.17	31	76.77	32	74.29	33	92.04	34	91.71	35	87.27
36	85.25	37	83.17	38	81.48	39	79.52	40	76.02	41	72.17	42	94.79
43	94.73	44	93.52	45	93.42	46	92.98	47	92.40	48	62.52	49	91.13
50	91.44	51	91.46	52	91.02	53	91.35	54	90.42	55	90.52	56	89.63
57	89.52	58	89.46	59	90.83	60	91.38	61	90.46	62	90.58	63	91.33
64	91.15	65	89.98	66	91.00	67	91.38	68	91.25	69	89.19	70	89.79
71	89.38	72	89.56	73	89.92	74	90.10	75	90.65	76	83.96	77	85.73
78	85.75	79	86.77	80	84.85	81	83.81	82	81.63	83	80.40	84	77.63
85	61.67	86	59.33	87	61.96	88	61.96	89	91.67	90	91.75	91	92.10
92	92.02	93	61.39										

AUG 14,1964

1	91.42	2	70.02	3	92.46	4	74.88	5	81.04	6	58.48	7	93.02
8	75.13	9	93.10	10	75.42	11	92.52	12	75.42	13	91.63	14	90.67
15	87.44	16	85.71	17	83.73	18	81.85	19	80.06	20	76.69	21	73.96
22	92.25	23	92.83	24	92.73	25	91.17	26	86.98	27	85.08	28	83.50
29	81.31	30	80.02	31	76.65	32	74.02	33	91.90	34	90.54	35	86.92
36	84.94	37	82.89	38	81.08	39	79.08	40	75.60	41	72.17	42	94.38
43	94.35	44	93.27	45	93.27	46	93.23	47	92.38	48	62.06	49	87.77
50	88.88	51	90.60	52	91.04	53	91.35	54	87.27	55	88.21	56	89.02
57	89.54	58	89.42	59	87.96	60	89.54	61	89.94	62	90.50	63	91.13
64	89.00	65	89.67	66	90.54	67	91.17	68	91.25	69	86.79	70	88.06
71	88.96	72	89.73	73	90.23	74	90.54	75	90.96	76	81.43	77	82.40
78	82.77	79	84.75	80	83.52	81	83.35	82	81.96	83	80.88	84	77.94
85	61.90	86	59.58	87	61.94	88	61.94	89	91.63	90	91.75	91	92.69
92	92.40	93	61.27										

AUG 15,1964

1	91.35	2	70.29	3	92.98	4	75.92	5	80.69	6	56.04	7	92.94
8	76.21	9	93.29	10	76.42	11	92.23	12	76.35	13	91.31	14	90.46
15	87.10	16	85.54	17	83.33	18	81.60	19	79.98	20	76.71	21	73.79
22	92.29	23	92.96	24	92.71	25	91.15	26	86.94	27	85.00	28	83.19
29	80.94	30	79.85	31	76.33	32	73.85	33	91.33	34	91.02	35	86.69
36	84.77	37	82.56	38	80.69	39	76.75	40	75.19	41	71.71	42	94.44
43	94.38	44	93.29	45	93.15	46	92.77	47	92.04	48	64.35	49	86.21
50	87.35	51	89.48	52	90.71	53	91.27	54	85.35	55	86.63	56	87.90
57	89.38	58	89.52	59	86.73	60	88.52	61	89.23	62	90.56	63	91.19
64	87.77	65	88.50	66	89.75	67	91.02	68	91.15	69	84.29	70	86.54
71	88.04	72	89.17	73	90.00	74	90.40	75	90.90	76	81.10	77	81.46
78	81.52	79	83.54	80	82.58	81	82.54	82	81.52	83	80.63	84	77.92
85	62.21	86	59.48	87	64.21	88	64.33	89	91.83	90	91.90	91	93.06
92	92.73	93	65.92										

AUG 16,1964

1	92.21	2	70.15	3	93.21	4	75.42	5	76.10	6	51.90	7	93.27
8	76.08	9	93.40	10	76.25	11	92.21	12	76.29	13	91.27	14	90.46
15	87.27	16	85.79	17	83.52	18	81.88	19	80.48	20	76.98	21	74.04
22	92.60	23	93.42	24	92.87	25	91.38	26	87.17	27	85.21	28	83.44
29	81.08	30	80.00	31	76.63	32	74.08	33	91.63	34	91.27	35	86.83
36	84.90	37	82.67	38	80.90	39	79.15	40	75.71	41	72.00	42	94.65
43	94.58	44	93.56	45	93.42	46	93.19	47	92.17	48	64.73	49	82.44
50	83.83	51	67.06	52	89.63	53	90.56	54	82.94	55	84.40	56	86.19
57	88.52	58	88.46	59	84.77	60	86.42	61	87.75	62	89.81	63	90.73
64	85.75	65	86.44	66	88.33	67	90.44	68	90.44	69	82.25	70	84.19
71	86.15	72	87.67	73	88.98	74	89.63	75	90.19	76	76.15	77	76.71
78	76.83	79	80.54	80	80.23	81	80.17	82	80.19	83	79.69	84	77.19
85	61.50	86	58.59	87	63.74	88	63.93	89	91.75	90	91.85	91	92.96
92	91.33	93	64.33										

AUG 17,1964

1	92.00	2	67.28	3	93.38	4	75.68	5	76.35	6	52.23	7	93.81
8	76.11	9	93.81	10	76.42	11	93.48	12	76.24	13	92.40	14	91.08
15	87.33	16	85.83	17	83.73	18	81.90	19	80.13	20	77.06	21	74.13
22	92.75	23	93.58	24	93.21	25	91.71	26	87.38	27	85.46	28	83.63
29	81.42	30	80.08	31	76.94	32	74.23	33	92.29	34	90.88	35	87.04
36	85.21	37	82.92	38	80.88	39	79.04	40	75.56	41	72.13	42	94.63
43	94.83	44	93.77	45	93.67	46	93.46	47	92.54	48	62.81	49	81.23
50	82.33	51	85.54	52	88.94	53	89.92	54	81.75	55	82.75	56	84.79
57	87.73	58	83.71	59	83.25	60	85.04	61	66.65	62	89.42	63	90.63
64	84.71	65	85.54	66	87.40	67	90.17	68	90.15	69	81.33	70	83.00
71	85.06	72	86.96	73	88.46	74	89.35	75	90.08	76	76.15	77	77.06
78	77.46	79	80.85	80	79.40	81	79.98	82	79.88	83	79.65	84	77.46
85	61.00	86	58.69	87	62.08	88	62.08	89	91.71	90	91.85	91	93.29
92	91.60	93	62.28										

AUG 18,1964

1	91.82	2	64.50	3	93.84	4	76.69	5	71.23	6	56.80	7	94.00
8	76.71	9	93.86	10	77.89	11	94.18	12	77.13	13	93.18	14	91.70
15	87.61	16	85.91	17	83.89	18	82.14	19	80.36	20	77.39	21	74.43
22	93.09	23	93.77	24	93.30	25	92.02	26	87.70	27	85.77	28	83.77
29	81.75	30	80.30	31	76.95	32	74.52	33	92.41	34	91.91	35	87.45
36	85.55	37	83.30	38	81.55	39	79.34	40	75.84	41	72.48	42	94.84
43	94.84	44	93.16	45	93.86	46	93.66	47	92.66	48	60.74	49	77.64
50	80.02	51	84.36	52	87.45	53	90.07	54	77.73	55	80.45	56	84.00
57	87.23	58	88.64	59	80.25	60	83.61	61	85.93	62	89.05	63	90.52
64	82.02	65	83.61	66	86.18	67	89.93	68	89.89	69	75.34	70	80.84
71	84.39	72	86.34	73	88.09	74	89.20	75	89.93	76	70.61	77	70.59
78	70.68	79	74.07	80	77.32	81	78.80	82	79.25	83	79.05	84	77.20
85	61.39	86	58.50	87	61.21	88	61.21	89	91.68	90	91.80	91	93.25
92	91.57	93	60.47										

AUG 19,1964

1	91.82	2	64.50	3	94.38	4	78.81	5	80.63	6	60.30	7	94.53
8	78.56	9	94.48	10	79.26	11	95.32	12	79.84	13	93.02	14	92.15
15	88.50	16	86.65	17	84.45	18	82.52	19	80.57	20	77.65	21	74.95
22	93.13	23	94.02	24	93.60	25	92.27	26	88.15	27	86.30	28	84.25
29	82.50	30	80.82	31	77.40	32	74.93	33	92.77	34	92.10	35	87.92
36	86.00	37	83.50	38	81.77	39	79.62	40	76.17	41	72.92	42	95.17
43	95.08	44	93.16	45	94.35	46	94.07	47	[illegible]	48	61.22	49	82.50
50	81.95	51	83.32	52	87.22	53	90.00	54	83.40	55	82.27	56	84.95
57	86.90	58	87.82	59	87.85	60	[illegible]	61	84.67	62	88.77	63	90.75
64	83.07	65	[illegible]	66	85.38	67	[illegible]	68	84.32	69	82.19	70	81.94
71	82.83	72	85.19	73	77.42	74	88.69	75	[illegible]	76	73.83	77	[illegible]
78	79.14	79	80.33	80	78.39	81	[illegible]	82	77.72	83	[illegible]	84	75.75
85	61.11	86	58.58	87	60.03	88	60.39	89	[illegible]	90	91.72	91	[illegible]
92	91.55	93	61.16										

AUG 20,1964

1	91.89	2	64.18	3	[illegible]	4	78.25	5	[illegible]	6	[illegible]	7	95.16
8	78.16	9	[illegible]	10	[illegible]	11	95.48	12	[illegible]	13	[illegible]	14	92.18
15	88.64	16	86.89	17	84.68	18	[illegible]	19	[illegible]	20	[illegible]	21	75.09
22	93.48	23	94.91	24	94.14	25	[illegible]	26	[illegible]	27	[illegible]	28	84.48
29	82.39	30	[illegible]	31	77.41	32	[illegible]	33	[illegible]	34	[illegible]	35	88.20
36	86.20	37	83.84	38	[illegible]	39	[illegible]	40	76.20	41	[illegible]	42	95.84
43	95.83	44	94.18	45	95.10	46	[illegible]	47	[illegible]	48	[illegible]	49	[illegible]
50	83.52	51	84.34	52	87.36	53	[illegible]	54	[illegible]	55	[illegible]	56	[illegible]
57	[illegible]	58	86.57	59	[illegible]	60	[illegible]	61	85.11	62	87.86	63	90.52
64	84.57	65	84.68	66	[illegible]	67	[illegible]	68	[illegible]	69	[illegible]	70	[illegible]
71	83.77	72	[illegible]	73	87.34	74	[illegible]	75	89.96	76	[illegible]	77	[illegible]
78	80.37	79	[illegible]	80	79.41	81	[illegible]	82	[illegible]	83	[illegible]	84	75.48
85	61.16	86	58.75	87	64.27	88	[illegible]	89	[illegible]	90	[illegible]	91	94.45
92	93.95	93	[illegible]										

AUG 21,1964

1	94.11	2	64.98	3	95.04	4	80.67	5	77.92	6	52.75	7	95.25
8	80.58	9	95.06	10	81.29	11	95.15	12	81.65	13	93.40	14	92.19
15	86.71	16	86.94	17	84.69	18	82.77	19	80.98	20	77.90	21	75.10
22	93.60	23	94.81	24	93.98	25	92.56	26	88.52	27	86.58	28	84.58
29	82.27	30	80.92	31	77.60	32	75.17	33	93.02	34	92.44	35	88.29
36	86.23	37	83.75	38	82.02	39	80.00	40	76.42	41	73.06	42	95.69
43	95.63	44	95.33	45	95.13	46	94.68	47	92.25	48	61.41	49	81.83
50	82.33	51	83.81	52	87.27	53	89.75	54	83.02	55	83.15	56	83.77
57	86.25	58	86.33	59	83.02	60	83.90	61	85.00	62	87.92	63	90.29
64	83.56	65	83.88	66	95.27	67	89.20	68	89.24	69	81.73	70	82.88
71	84.08	72	85.56	73	87.06	74	88.50	75	89.71	76	77.94	77	78.85
78	78.50	79	80.63	80	78.25	81	78.50	82	77.90	83	77.63	84	76.23
85	61.17	86	58.56	87	60.44	88	60.46	89	91.94	90	92.06	91	94.13
92	93.88	93	61.31										

AUG 22,1964

1	84.56	2	62.02	3	91.52	4	62.94	5	77.85	6	52.46	7	92.56
8	63.19	9	92.31	10	84.44	11	91.60	12	63.44	13	91.63	14	91.77
15	69.29	16	87.46	17	85.06	18	83.10	19	81.40	20	78.21	21	75.50
22	92.73	23	91.92	24	91.43	25	91.85	26	89.10	27	87.13	28	85.08
29	82.65	30	81.29	31	78.04	32	75.50	33	91.29	34	92.15	35	88.88
36	86.92	37	84.19	38	82.52	39	80.27	40	76.81	41	73.31	42	93.02
43	92.96	44	92.40	45	92.90	46	91.60	47	92.44	48	65.04	49	82.60
50	82.88	51	84.50	52	87.60	53	90.13	54	83.19	55	81.69	56	84.60
57	86.90	58	88.30	59	83.71	60	94.47	61	85.65	62	88.50	63	90.83
64	84.33	65	84.56	66	85.83	67	89.58	68	89.60	69	82.63	70	83.04
71	84.13	72	85.63	73	87.52	74	88.47	75	90.00	76	77.27	77	78.48
78	78.60	79	81.65	80	78.77	81	78.67	82	78.23	83	78.04	84	76.58
85	61.56	86	[illegible]	87	64.23	88	64.29	89	89.85	90	89.81	91	92.65
92	92.65	93	64.06										

Aboveground Brick Test Structure (Blockhouse)

Nevada Test Site, AEC

Mercury, Nevada

AUG 17,1964

1	0.	2	0.	3	0.	4	0.	5	0.	6	0.	7	0.
8	0.	9	0.	10	0.	11	0.	12	0.	13	0.	14	0.
15	0.	16	0.	17	0.	18	0.	19	0.	20	0.	21	0.
22	0.	23	0.	24	0.	25	73.23	26	76.67	27	87.67	28	87.70
29	88.00	30	85.93	31	81.67	32	83.53	33	94.73	34	92.03	35	92.07
36	88.20	37	80.83	38	82.73	39	93.93	40	92.30	41	91.00	42	88.37
43	81.03	44	84.33	45	96.17	46	92.23	47	91.77	48	85.17	49	87.50
50	90.00	51	82.15	52	86.30	53	85.75	54	84.25	55	81.25	56	74.75
57	89.50	58	89.25	59	75.75	60	75.25	61	76.20	62	80.70	63	83.15
64	81.35	65	80.40	66	78.30	67	0.						

AUG 18,1964

1	73.27	2	62.80	3	86.62	4	66.34	5	88.41	6	68.06	7	88.49
8	67.40	9	87.31	10	66.64	11	80.15	12	79.67	13	80.92	14	82.39
15	83.27	16	86.56	17	80.09	18	79.19	19	80.36	20	82.16	21	83.34
22	86.80	23	95.26	24	79.56	25	81.06	26	81.08	27	82.57	28	85.36
29	85.41	30	88.32	31	89.56	32	88.36	33	89.51	34	89.44	35	89.27
36	90.01	37	82.97	38	82.91	39	84.67	40	86.92	41	87.67	42	89.07
43	84 35	44	83.98	45	84.14	46	81.51	47	86.14	48	81.14	49	86.79
50	85.24	51	86.33	52	85.98	53	85.01	54	83.76	55	80.96	56	74.46
57	89.51	58	87.24	59	77.29	60	77.04	61	77.71	62	77.71	63	77.12
64	78.82	65	77.60	66	71.94	67	79.56						

AUG 19,1964

1	80.25	2	60.62	3	85.12	4	66.75	5	88.30	6	71.73	7	89.05
8	70.70	9	87.03	10	70.40	11	86.16	12	84.52	13	84.12	14	84.18
15	84.65	16	86.60	17	86.07	18	83.65	19	83.53	20	84.34	21	85.28
22	87.57	23	93.98	24	78.77	25	81.90	26	81.69	27	83.72	28	85.57
29	85.73	30	88.04	31	94.72	32	91.84	33	90.78	34	89.91	35	89.61
36	90.03	37	87.91	38	88.20	39	87.18	40	87.96	41	88.40	42	89.09
43	88.58	44	87.68	45	85.70	46	85.44	47	86.42	48	79.29	49	86.30
50	85.14	51	86.70	52	85.98	53	84.37	54	83.02	55	80.05	56	73.60
57	86.59	58	87.13	59	80.13	60	80.11	61	79.80	62	80.61	63	76.81
64	76.90	65	76.07	66	70.73	67	78.28						

AUG 20,1964

1	79.95	2	52.65	3	85.05	4	66.21	5	91.33	6	72.49	7	91.47
8	71.17	9	89.58	10	71.23	11	89.29	12	89.13	13	89.78	14	89.75
15	89.94	16	90.57	17	89.23	18	88.05	19	89.08	20	90.05	21	90.11
22	91.47	23	91.17	24	80.58	25	81.29	26	81.68	27	85.35	28	87.50
29	87.53	30	88.74	31	94.36	32	92.11	33	92.57	34	91.41	35	91.12
36	91.05	37	92.43	38	92.84	39	91.80	40	91.13	41	90.77	42	90.79
43	93.00	44	92.73	45	90.66	46	89.50	47	89.55	48	80.15	49	88.63
50	88.31	51	88.72	52	87.95	53	85.75	54	83.70	55	80.49	56	74.33
57	90.29	58	89.48	59	81.25	60	80.25	61	79.20	62	82.05	63	79.72
64	78.08	65	75.99	66	70.82	67	79.47						

AUG 21,1964

1	76.97	2	50.64	3	85.10	4	67.47	5	90.09	6	73.98	7	90.92
8	73.26	9	87.95	10	73.18	11	89.54	12	89.06	13	89.14	14	88.67
15	88.79	16	87.33	17	88.76	18	86.70	19	87.75	20	88.88	21	89.09
22	90.45	23	89.99	24	79.32	25	80.32	26	80.67	27	83.96	28	86.26
29	86.58	30	87.77	31	95.04	32	92.59	33	92.47	34	90.90	35	90.59
36	90.25	37	91.43	38	91.70	39	91.61	40	90.79	41	89.75	42	90.44
43	92.28	44	91.84	45	91.25	46	89.53	47	89.41	48	79.44	49	88.72
50	90.26	51	89.18	52	88.77	53	87.04	54	84.75	55	81.13	56	74.97
57	90.41	58	90.35	59	80.25	60	79.62	61	80.22	62	82.13	63	80.17
64	78.95	65	76.63	66	71.17	67	79.47						

AUG 22,1964

1	79.47	2	55.40	3	86.90	4	67.15	5	92.70	6	74.54	7	94.65
8	75.00	9	91.88	10	74.62	11	93.13	12	92.26	13	92.06	14	91.92
15	92.16	16	93.22	17	91.57	18	89.71	19	90.83	20	92.10	21	92.52
22	93.63	23	92.91	24	78.63	25	80.45	26	80.72	27	84.30	28	87.38
29	87.85	30	89.43	31	96.35	32	93.88	33	93.75	34	92.22	35	91.93
36	91.77	37	91.82	38	92.42	39	92.33	40	91.75	41	91.77	42	91.61
43	92.27	44	91.63	45	91.64	46	90.86	47	90.98	48	77.57	49	91.05
50	92.39	51	90.04	52	89.36	53	87.57	54	84.96	55	81.28	56	75.15
57	91.30	58	92.1[illegible]	59	80.23	60	78.65	61	79.60	62	82.29	63	80.19
64	79.24	65	76.79	66	71.31	67	77.77						

AUG 23,1964

1	76.20	2	58.77	3	84.91	4	67.29	5	91.10	6	73.64	7	92.78
8	73.33	9	90.20	10	72.72	11	89.30	12	89.05	13	89.68	14	89.86
15	90.10	16	90.67	17	89.20	18	87.75	19	89.02	20	89.77	21	90.00
22	91.74	23	90.81	24	76.37	25	80.87	26	81.33	27	84.98	28	87.93
29	88.07	30	90.02	31	96.95	32	94.69	33	94.78	34	92.73	35	92.40
36	90.78	37	91.16	38	91.52	39	92.18	40	91.57	41	91.07	42	91.51
43	89.43	44	89.57	45	91.55	46	90.83	47	90.96	48	75.92	49	91.22
50	91.49	51	89.97	52	89.48	53	88.17	54	85.44	55	80.95	56	75.19
57	92.18	58	92.01	59	80.17	60	78.90	61	80.22	62	82.23	63	80.27
64	79.13	65	76.85	66	71.67	67	76.20						

AUG 24,1964

1	80.20	2	57.97	3	85.80	4	66.73	5	93.54	6	76.09	7	94.38
8	75.02	9	93.30	10	74.87	11	91.72	12	90.80	13	91.23	14	91.36
15	91.61	16	92.59	17	91.24	18	90.06	19	90.97	20	92.23	21	92.65
22	95.21	23	92.03	24	77.72	25	82.93	26	83.14	27	85.92	28	89.24
29	89.28	30	91.57	31	96.75	32	94.98	33	95.09	34	93.76	35	93.53
36	93.33	37	91.67	38	92.08	39	92.67	40	92.74	41	92.65	42	93.45
43	90.82	44	87.92	45	91.16	46	91.18	47	91.25	48	76.40	49	92.23
50	92.21	51	90.78	52	89.44	53	87.77	54	85.63	55	80.94	56	75.42
57	93.15	58	93.04	59	82.67	60	82.30	61	83.04	62	83.45	63	80.52
64	79.02	65	76.89	66	71.59	67	76.79						

AUG 25,1964

1	84.99	2	62.82	3	85.67	4	66.92	5	92.65	6	76.80	7	93.77
8	76.17	9	92.50	10	75.85	11	93.14	12	92.36	13	92.30	14	92.42
15	92.37	16	92.64	17	93.18	18	91.59	19	92.32	20	92.96	21	92.98
22	94.15	23	93.48	24	80.16	25	86.44	26	86.37	27	88.11	28	89.83
29	89.80	30	91.29	31	98.96	32	96.86	33	96.27	34	94.17	35	93.80
36	92.90	37	93.24	38	93.47	39	93.[illegible]2	40	92.92	41	93.16	42	92.73
43	91.85	44	91.90	45	92.15	46	91.75	47	91.83	48	78.75	49	91.34
50	91.60	51	90.72	52	89.97	53	87.95	54	85.31	55	80.69	56	74.67
57	93.10	58	92.45	59	85.88	60	85.56	61	86.59	62	86.17	63	81.36
64	79.05	65	76.04	66	70.76	67	78.50						

AUG 26,1964

1	83.57	2	61.68	3	85.60	4	66.64	5	93.76	6	77.67	7	93.64
8	76.82	9	93.61	10	76.90	11	92.20	12	92.00	13	93.01	14	93.05
15	93.22	16	93.66	17	92.09	18	90.71	19	92.20	20	93.02	21	93.11
22	94.45	23	94.00	24	80.47	25	85.74	26	86.21	27	89.19	28	90.75
29	90.81	30	92.14	31	97.55	32	95.46	33	96.37	34	94.80	35	94.45
36	93.84	37	92.70	38	93.28	39	94.08	40	93.55	41	93.36	42	93.30
43	93.02	44	92.53	45	93.02	46	92.44	47	92.51	48	79.50	49	92.08
50	92.40	51	91.40	52	90.70	53	88.36	54	86.01	55	80.90	56	75.32
57	93.83	58	93.10	59	84.35	60	83.64	61	84.32	62	86.14	63	82.74
64	79.97	65	76.49	66	71.23	67	79.58						

AUG 27,1964

1	77.77	2	53.22	3	85.21	4	67.06	5	93.57	6	78.65	7	92.79
8	77.32	9	93.01	10	77.41	11	88.78	12	89.45	13	90.95	14	91.40
15	92.17	16	93.62	17	88.10	18	87.75	19	89.97	20	91.75	21	91.88
22	93.78	23	92.43	24	79.43	25	81.29	26	82.13	27	86.75	28	89.83
29	90.16	30	92.02	31	94.46	32	92.38	33	94.63	34	93.81	35	93.64
36	93.42	37	91.19	38	91.52	39	93.35	40	92.98	41	92.74	42	92.98
43	90.72	44	89.96	45	91.81	46	91.60	47	91.69	48	78.62	49	92.15
50	93.05	51	91.84	52	91.30	53	89.27	54	86.78	55	81.18	56	75.81
57	93.77	58	93.21	59	80.13	60	79.51	61	80.17	62	82.80	63	82.02
64	80.75	65	77.35	66	72.06	67	79.02						

AUG 28,1964

1	77.04	2	55.40	3	85.91	4	66.92	5	90.20	6	76.75	7	90.2[illegible]
8	76.07	9	87.87	10	76.45	11	83.99	12	84.56	13	86.26	14	87.60
15	87.93	16	89.29	17	83.54	18	83.15	19	85.50	20	87.57	21	87.21
22	86.98	23	88.60	24	76.11	25	79.91	26	80.54	27	84.46	28	87.28
29	87.42	30	87.23	31	90.84	32	88.69	33	91.47	34	91.25	35	91.10
36	91.03	37	78.78	38	86.16	39	89.67	40	90.18	41	90.10	42	90.17
43	84.94	44	85.86	45	88.79	46	89.17	47	89.33	48	76.21	49	89.80
50	90.30	51	90.27	52	90.26	53	89.30	54	87.35	55	82.75	56	76.21
57	91.11	58	91.57	59	78.59	60	78.80	61	78.98	62	79.90	63	80.28
64	80.37	65	77.80	66	72.77	67	76.87						

AUG 29,1964

1	75.65	2	53.92	3	85.39	4	67.94	5	91.01	6	75.95	7	90.73
8	75.54	9	90.63	10	75.38	11	85.82	12	85.67	13	86.67	14	87.62
15	88.35	16	90.24	17	85.89	18	84.38	19	86.15	20	87.62	21	88.08
22	91.15	23	83.55	24	74.09	25	78.68	26	79.21	27	84.03	28	87.10
29	87.43	30	89.86	31	91.07	32	88.42	33	90.99	34	91.20	35	90.85
36	91.67	37	86.14	38	93.45	39	90.92	40	90.83	41	90.85	42	91.58
43	81.86	44	84.82	45	89.20	46	89.23	47	89.51	48	74.58	49	89.20
50	90.43	51	89.34	52	88.79	53	88.00	54	86.55	55	82.52	56	78.38
57	91.85	58	90.17	59	77.29	60	76.83	61	77.02	62	79.25	63	79.52
64	79.00	65	77.45	66	72.59	67	74.[illegible]2						

AUG 30,1964

1	74.65	2	54.15	3	84.75	4	66.54	5	90.18	6	76.91	7	88.98
8	75.93	9	89.11	10	75.89	11	83.77	12	84.00	13	85.65	14	86.52
15	87.14	16	88.30	17	83.30	18	82.65	19	85.14	20	87.22	21	87.50
22	90.02	23	87.79	24	74.69	25	78.03	26	78.61	27	82.80	28	86.20
29	86.27	30	88.49	31	92.04	32	89.10	33	90.92	34	90.51	35	90.27
36	90.16	37	82.06	38	86.45	39	89.70	40	[illegible]0.00	41	89.88	42	90.12
43	77.77	44	84.48	45	87.91	46	88.52	47	88.77	48	74.79	49	88.01
50	88.67	51	88.46	52	88.25	53	87.11	54	86.31	55	83.51	56	76.49
57	90.35	58	89.38	59	75.04	60	75.18	61	75.55	62	77.76	63	77.85
64	78.61	65	76.82	66	72.45	67	74.54						

AUG 31,1964

1	76.16	2	56.22	3	85.13	4	66.57	5	87.63	6	77.45	7	86.82
8	76.77	9	86.76	10	76.47	11	80.77	12	81.62	13	83.61	14	85.05
15	85.47	16	86.36	17	79.89	18	80.13	19	82.35	20	84.78	21	85.11
22	87.35	23	85.31	24	76.17	25	78.01	26	78.68	27	82.86	28	85.30
29	85.33	30	86.77	31	87.75	32	83.70	33	89.06	34	88.07	35	88.52
36	88.57	37	78.20	38	83.12	39	86.84	40	87.33	41	87.31	42	87.41
43	78.21	44	81.69	45	85.40	46	86.36	47	86.72	48	76.27	49	86.17
50	86.62	51	86.65	52	86.90	53	86.80	54	85.93	55	82.57	56	77.23
57	88.25	58	87.34	59	76.42	60	76.66	61	77.28	62	78.45	63	78.31
64	78.33	65	76.58	66	72.64	67	76.02						

. . 1,1964

1	67.64	2	50.13	3	85.40	4	66.71	5	84.63	6	77.07	7	85.81
8	77.27	9	85.07	10	76.82	11	74.13	12	75.60	13	78.66	14	80.95
15	81.77	16	84.07	17	70.83	18	73.62	19	77.10	20	80.25	21	80.96
22	84.50	23	81.31	24	75.25	25	70.52	26	71.90	27	78.00	28	81.27
29	81.39	30	83.76	31	81.62	32	69.97	33	84.30	34	84.54	35	84.26
36	84.85	37	70.15	38	76.84	39	81.61	40	82.69	41	82.78	42	83.88
43	73.16	44	76.88	45	80.92	46	82.40	47	83.53	48	75.19	49	83.78
50	82.42	51	83.00	52	83.65	53	84.62	54	84.86	55	82.72	56	77.95
57	85.36	58	84.98	59	68.11	60	69.17	61	68.47	62	72.58	63	76.36
64	77.64	65	76.31	66	72.97	67	75.[illegible]						

SEP 2,1964

1	67.81	2	47.58	3	85.47	4	66.95	5	84.56	6	73.98	7	85.06
8	73.57	9	84.28	10	73.18	11	80.71	12	77.78	13	76.77	14	77.39
15	78.71	16	82.29	17	80.13	18	76.07	19	75.86	20	77.63	21	78.61
22	84.03	23	81.46	24	72.59	25	70.78	26	70.78	27	74.38	28	79.10
29	79.26	30	83.00	31	81.45	32	70.53	33	82.35	34	82.83	35	82.57
36	84.07	37	73.14	38	84.12	39	79.85	40	81.68	41	81.92	42	83.34
43	77.85	44	80.14	45	77.66	46	81.00	47	81.70	48	72.69	49	83.06
50	83.13	51	82.20	52	82.58	53	83.16	54	83.54	55	82.05	56	76.99
57	83.35	58	82.53	59	70.33	60	69.06	61	70.06	62	70.71	63	72.47
64	75.72	65	75.53	66	73.19	67	72.61						

Buried Quonset Type Structure
Nevada Test Site, AEC
Mercury, Nevada

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   SEP  8,1964
  1  93.55   2  69.85   3  84.79   4  76.54   5  85.56   6  76.73   7  84.31
  8  76.21   9  76.45  10  49.62  11  83.07  12  79.69  13  76.38  14  75.56
 15  76.27  16  77.66  17  78.39  18  81.72  19  78.63  20  74.13  21  72.03
 22  71.57  23  71.37  24  60.89  25  80.07  26  78.50  27  75.85  28  73.44
 29  72.89  30  77.74  31  73.07  32  75.74  33  78.23  34  74.47  35  72.59
 36  71.72  37  71.42  38  72.28  39  79.52  40  78.65  41  77.24  42  76.66
 43  76.06  44  90.08  45  78.33  46  78.21  47  77.65  48  76.39  49  71.69
 50  78.07  51  79.30  52  75.38  53  76.39  54  77.47  55  78.83  56  76.64
 57  77.60  58  78.67  59  79.45  60  79.36  61  79.07  62  70.30  63  61.34
 64  61.36  65  82.63  66  79.97  67  74.92  68  72.88  69  72.09  70  71.36
 71  72.05  72  77.94  73  77.13  74  73.29  75  71.07  76  69.44  77  67.92
 78  67.53  79  80.57  80  61.87

   SEP  9,1964
  1  69.17   2  70.17   3  86.16   4  77.41   5  87.03   6  77.73   7  86.04
  8  77.29   9  65.43  10  43.85  11  85.17  12  81.82  13  80.70  14  78.15
 15  77.01  16  77.42  17  78.05  18  85.15  19  82.94  20  79.44  21  74.82
 22  72.32  23  71.50  24  63.41  25  82.99  26  80.93  27  79.16  28  75.51
 29  73.10  30  77.89  31  72.55  32  79.60  33  82.20  34  77.41  35  74.55
 36  72.30  37  71.25  38  71.01  39  82.64  40  82.20  41  80.19  42  78.66
 43  77.54  44  82.65  45  77.76  46  77.42  47  76.65  48  75.65  49  72.21
 50  78.64  51  79.07  52  66.51  53  66.03  54  66.21  55  70.56  56  76.24
 57  77.34  58  78.38  59  79.22  60  79.21  61  79.06  62  70.93  63  72.26
 64  64.15  65  84.87  66  83.27  67  78.86  68  75.49  69  72.95  70  71.76
 71  71.55  72  82.66  73  82.42  74  78.20  75  73.50  76  70.42  77  69.27
 78  66.75  79  83.10  80  64.20

   SEP 10,1964
  1  89.42   2  70.26   3  87.49   4  78.32   5  87.91   6  78.43   7  87.27
  8  88.28   9  68.97  10  47.13  11  86.70  12  84.95  13  82.14  14  80.20
 15  76.14  16  77.91  17  77.89  18  86.44  19  84.70  20  80.98  21  77.31
 22  73.85  23  72.06  24  64.02  25  84.60  26  82.21  27  80.52  28  76.95
 29  73.84  30  72.77  31  72.48  32  82.60  33  85.70  34  79.39  35  75.75
 36  72.25  37  70.62  38  70.22  39  85.95  40  84.86  41  82.45  42  80.19
 43  77.96  44  85.64  45  77.14  46  76.72  47  76.17  48  76.33  49  71.97
 50  77.55  51  78.04  52  69.43  53  70.54  54  70.95  55  75.15  56  75.84
 57  76.77  58  77.46  59  78.35  60  78.49  61  78.45  62  70.34  63  83.47
 64  65.21  65  84.57  66  84.24  67  80.60  68  77.27  69  73.86  70  72.32
 71  71.89  72  85.02  73  84.42  74  80.31  75  75.20  76  70.25  77  67.60
 78  66.30  79  86.76  80  65.47

   SEP 11,1964
  1  88.91   2  70.64   3  88.25   4  78.79   5  89.24   6  78.90   7  88.24
  8  78.77   9  73.18  10  48.96  11  87.07  12  86.16  13  83.57  14  81.73
 15  79.32  16  78.51  17  78.16  18  86.75  19  85.41  20  82.10  21  78.74
 22  75.23  23  72.95  24  64.98  25  85.31  26  83.88  27  81.89  28  78.41
 29  74.90  30  73.40  31  72.86  32  84.60  33  86.38  34  80.02  35  77.39
 36  73.51  37  71.37  38  70.63  39  86.75  40  86.05  41  83.63  42  81.59
 43  78.89  44  86.57  45  77.90  46  77.07  47  76.69  48  77.12  49  72.29
 50  78.13  51  78.15  52  71.51  53  71.86  54  71.98  55  75.50  56  77.15
 57  77.35  58  77.56  59  78.02  60  77.94  61  77.46  62  70.12  63  78.9
 64  64.80  65  65.93  66  84.88  67  81.44  68  78.74  69  75.09  70  73.25
 71  72.24  72  85.42  73  85.12  74  81.79  75  76.91  76  71.19  77  67.9
 78  66.47  79  87.11  80  64.85
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SEP 12,1964
 1  89.11   2  70.16   3  89.16   4  78.83   5  89.70   6  78.83   7  89.50
 8  78.65   9  72.98  10  51.45  11  88.43  12  86.95  13  84.32  14  82.42
15  79.78  16  78.59  17  77.90  18  87.67  19  86.20  20  82.72  21  79.71
22  75.79  23  73.40  24  66.53  25  86.54  26  84.70  27  82.63  28  79.21
29  75.60  30  73.70  31  72.79  32  85.76  33  87.91  34  81.79  35  78.26
36  74.05  37  71.59  38  70.53  39  88.49  40  87.58  41  84.91  42  82.46
43  79.50  44  87.68  45  77.87  46  77.57  47  77.20  48  77.88  49  72.69
50  78.38  51  78.38  52  74.42  53  75.23  54  75.40  55  79.47  56  77.70
57  77.60  58  77.69  59  77.87  60  77.97  61  77.98  62  70.56  63  81.55
64  66.35  65  87.70  66  86.36  67  82.97  68  79.95  69  76.10  70  73.75
71  72.52  72  86.46  73  86.24  74  87.72  75  78.19  76  72.27  77  68.35
78  66.63  79  89.08  80  66.48
```

```
SEP 13,1964
 1  88.97   2  70.25   3  89.29   4  79.21   5  89.55   6  79.14   7  89.21
 8  79.10   9  73.50  10  51.40  11  88.86  12  87.50  13  85.11  14  83.23
15  80.38  16  78.95  17  77.92  18  88.10  19  86.82  20  83.57  21  80.55
22  77.09  23  73.92  24  68.85  25  86.70  26  85.17  27  83.40  28  80.13
29  76.34  30  74.28  31  73.15  32  85.83  33  87.66  34  82.69  35  79.30
36  75.10  37  72.22  38  70.88  39  88.59  40  87.89  41  85.83  42  83.55
43  81.27  44  87.60  45  78.69  46  78.37  47  78.37  48  78.92  49  73.17
50  78.63  51  78.60  52  74.52  53  74.75  54  75.05  55  78.94  56  78.33
57  79.21  58  78.04  59  78.05  60  78.02  61  78.01  62  70.47  63  82.00
64  68.33  65  87.93  66  87.05  67  83.88  68  81.00  69  76.97  70  74.49
71  73.45  72  87.07  73  86.97  74  83.82  75  79.17  76  73.14  77  68.80
78  66.77  79  88.62  80  69.21
```

```
SEP 14,1964
 1  88.67   2  70.17   3  89.87   4  79.63   5  89.67   6  79.48   7  89.41
 8  79.47   9  67.79  10  45.43  11  89.22  12  88.04  13  86.02  14  84.25
15  81.48  16  79.79  17  78.67  18  88.39  19  87.40  20  84.56  21  81.74
22  77.89  23  75.00  24  69.04  25  87.43  26  85.92  27  84.27  28  81.17
29  77.65  30  75.38  31  74.05  32  86.50  33  87.90  34  83.48  35  80.41
36  76.32  37  73.34  38  71.77  39  88.79  40  88.21  41  86.41  42  84.48
43  81.38  44  88.68  45  79.69  46  79.42  47  78.78  48  78.08  49  73.55
50  78.96  51  78.85  52  68.07  53  68.57  54  68.68  55  74.84  56  77.44
57  78.02  58  79.00  59  78.11  60  78.06  61  78.22  62  70.94  63  80.50
64  68.66  65  87.60  66  87.12  67  84.47  68  81.72  69  77.79  70  74.99
71  73.30  72  86.75  73  86.77  74  84.38  75  80.07  76  73.31  77  69.29
78  67.05  79  89.59  80  68.62
```

```
SEP 15,1964
 1  88.59   2  70.57   3  89.61   4  79.22   5  89.69   6  79.10   7  88.99
 8  79.33   9  68.52  10  45.88  11  88.90  12  87.96  13  86.07  14  84.45
15  81.82  16  80.08  17  78.94  18  88.62  19  87.61  20  84.80  21  82.11
22  78.46  23  75.67  24  71.09  25  87.40  26  86.05  27  84.50  28  81.56
29  78.13  30  75.78  31  74.37  32  86.61  33  88.20  34  83.56  35  80.72
36  76.77  37  73.81  38  72.14  39  88.89  40  88.04  41  86.59  42  84.65
43  81.93  44  88.79  45  80.22  46  79.50  47  78.56  48  77.44  49  73.85
50  79.60  51  79.21  52  68.85  53  69.86  54  70.27  55  74.93  56  76.80
57  77.43  58  77.61  59  77.75  60  77.67  61  77.59  62  70.42  63  77.77
64  70.86  65  87.96  66  87.36  67  84.78  68  82.22  69  78.39  70  75.62
71  74.13  72  86.75  73  87.17  74  84.57  75  80.56  76  74.60  77  69.74
78  67.19  79  89.55  80  70.87
```

```
SEP 16,1964
 1  88.65   2  70.11   3  89.77   4  79.40   5  90.02   6  79.05   7  89.92
 8  79.26   9  68.21  10  45.94  11  89.00  12  88.11  13  86.22  14  84.80
15  82.19  16  80.39  17  78.97  18  88.76  19  87.80  20  85.06  21  82.45
22  78.83  23  75.82  24  [illegible].46  25  87.57  26  86.25  27  84.65  28  81.97
29  76.55  30  75.99  31  73.17  32  86.70  33  88.79  34  84.02  35  81.19
36  77.25  37  74.20  38  72.38  39  89.66  40  88.97  41  86.94  42  85.06
43  82.35  44  88.60  45  80.41  46  79.45  47  78.32  48  77.35  49  74.24
50  80.10  51  79.34  52  69.03  53  69.32  54  69.47  55  73.15  56  77.11
57  77.55  58  77.75  59  77.68  60  77.45  61  77.46  62  70.43  63  77.50
64  71.57  65  88.39  66  87.81  67  85.30  68  82.67  69  78.72  70  76.10
71  74.16  72  87.61  73  87.78  74  85.09  75  81.16  76  75.12  77  70.23
78  67.54  79  67.09  80  71.02
```

```
SEP 17,1964
 1  88.50   2  70.16   3  90.15   4  80.15   5  90.14   6  79.68   7  90.44
 8  80.16   9  70.50  10  48.48  11  89.14  12  88.44  13  86.78  14  85.33
15  82.86  16  81.00  17  79.40  18  89.06  19  88.17  20  85.60  21  83.13
22  77.63  23  76.65  24  63.87  25  88.01  26  86.82  27  85.52  28  82.70
29  79.27  30  77.05  31  75.44  32  87.99  33  89.42  34  84.93  35  82.00
36  78.05  37  74.96  38  73.06  39  90.50  40  89.79  41  87.80  42  86.01
43  82.97  44  83.99  45  80.45  46  80.09  47  79.05  48  78.04  49  74.89
50  80.49  51  80.00  52  70.69  53  71.46  54  71.56  55  74.77  56  76.05
57  76.95  58  77.21  59  77.34  60  77.33  61  77.18  62  70.56  63   0.
64  63.95  65  88.59  66  88.03  67  85.71  68  83.06  69  79.49  70  76.65
71  74.65  72  87.94  73  87.95  74  85.72  75  81.86  76  75.77  77  70.89
78  67.98  79  67.63  80  64.04
```

```
SEP 18,1964
 1  87.13   2  70.03   3  90.68   4  79.83   5  90.64   6  79.49   7  91.04
 8  77.91   9  73.77  10  52.52  11  89.43  12  88.90  13  87.27  14  85.70
15  83.20  16  81.41  17  79.77  18  89.55  19  88.60  20  86.08  21  83.56
22  80.28  23  77.15  24  65.80  25  88.39  26  87.25  27  85.74  28  83.18
29  77.65  30  77.63  31  75.92  32  88.31  33  89.67  34  85.31  35  82.51
36  76.62  37  75.47  38  73.58  39  90.82  40  90.26  41  88.38  42  86.45
43  83.41  44  89.14  45  81.04  46  80.25  47  79.42  48  79.55  49  75.17
50  80.91  51  80.14  52  74.20  53  75.10  54  75.15  55  78.74  56  77.16
57  77.02  58  77.06  59  77.31  60  77.29  61  77.29  62  70.51  63   0.
64  64.82  65  88.96  66  88.25  67  85.86  68  83.39  69  79.96  70  77.03
71  74.96  72  88.37  73  88.23  74  85.85  75  82.12  76  76.18  77  71.17
78  68.07  79  90.33  80  64.84
```

```
SEP 19,1964
 1  89.07   2  70.09   3  90.60   4  78.88   5  90.58   6  78.63   7  91.05
 8  79.45   9  67.64  10  45.83  11  89.56  12  89.00  13  87.36  14  86.10
15  83.50  16  81.84  17  80.02  18  89.70  19  88.90  20  86.47  21  83.96
22  80.62  23  78.04  24  63.79  25  88.41  26  87.47  27  86.14  28  83.59
29  80.35  30  75.19  31  76.47  32  88.60  33  89.50  34  85.91  35  83.10
36  79.37  37  76.72  38  74.10  39  91.01  40  90.51  41  88.65  42  86.97
43  83.94  44  89.85  45  82.17  46  81.50  47  80.81  48  79.32  49  75.34
50  81.22  51  80.27  52  69.20  53  69.90  54  70.02  55  72.15  56  77.26
57  77.35  58  77.23  59  77.27  60  77.20  61  77.11  62  70.41  63  72.10
64  63.47  65  88.65  66  88.17  67  86.10  68  83.67  69  80.20  70  77.31
71  75.14  72  88.34  73  88.24  74  86.16  75  82.50  76  76.69  77  71.84
78  68.44  79  90.26  80  63.55
```

```
SEP 20,1964
 1  88.45   2  70.24   3  90.59   4  78.52   5  90.65   6  78.27   7  91.31
 8  75.53   9  64.30  10  42.79  11  85.52  12  88.82  13  87.18  14  85.94
15  83.47  16  81.60  17  80.18  18  89.43  19  88.67  20  86.36  21  83.97
22  80.57  23  77.67  24  64.75  25  88.42  26  87.27  27  85.92  28  83.39
29  80.23  30  77.74  31  76.02  32  88.32  33  89.39  34  85.66  35  83.09
36  79.29  37  76.14  38  74.04  39  91.42  40  90.61  41  88.77  42  87.01
43  83.95  44  90.00  45  81.65  46  80.52  47  78.98  48  76.40  49  75.63
50  81.34  51  80.18  52  64.88  53  66.19  54  66.21  55  69.59  56  74.66
57  76.04  58  76.80  59  76.94  60  76.94  61  76.85  62  70.30  63  74.50
64  64.94  65  89.05  66  88.43  67  86.20  68  83.86  69  80.40  70  77.60
71  75.40  72  88.38  73  88.31  74  86.21  75  82.59  76  76.93  77  71.90
78  68.50  79  90.59      64.87
```

```
SEP 21,1964
 1  88.74   2  70.39   3  91.23   4  78.60   5  91.24   6  79.49   7  91.87
 8  78.73   9  62.11  10  44.12  11  90.37  12  89.45  13  87.48  14  86.33
15  83.62  16  81.84  17  80.10  18  89.72  19  88.86  20  86.68  21  84.30
22  80.94  23  77.91  24  68.04  25  88.58  26  87.73  27  86.32  28  83.79
29  80.56  30  78.45  31  76.72  32  88.34  33  89.28  34  86.08  35  83.41
36  79.62  37  76.48  38  74.41  39  91.36  40  90.64  41  89.37  42  87.38
43  84.41  44  90.79  45  81.41  46  80.00  47  78.33  48  75.95  49  76.80
50  81.13  51  81.14  52  63.37  53  63.79  54  63.92  55  66.35  56  74.57
57  76.01  58  75.63  59  76.93  60  76.75  61  76.52  62  70.65  63  75.67
64  67.99  65  87.75  66  89.01  67  86.75  68  84.34  69  81.00  70  78.22
71  75.89  72  88.76  73  88.78  74  86.55  75  83.15  76  77.52  77  72.49
78  69.01  79  91.74  80  68.00
```

```
SEP 22,1964
 1  88.85   2  70.10   3  91.25   4  79.32   5  91.23   6  79.26   7  91.79
 8  79.35   9  67.80  10  47.63  11  90.45  12  89.68  13  87.08  14  86.71
15  83.92  16  82.11  17  80.06  18  89.62  19  89.39  20  87.04  21  84.65
22  81.28  23  78.29  24  66.66  25  85.32  26  88.07  27  86.72  28  84.30
29  80.96  30  78.78  31  77.16  32  88.54  33  89.85  34  86.34  35  83.65
36  80.02  37  76.75  38  74.64  39  91.05  40  90.66  41  89.11  42  87.57
43  84.65  44  91.64  45  83.12  46  79.50  47  77.18  48  74.94  49  76.38
50  82.03  51  81.07  52  68.37  53  68.83  54  68.85  55  70.26  56  72.44
57  73.97  58  75.29  59  76.07  60  76.33  61  76.31  62  70.45  63  78.50
64  66.51  65  87.90  66  89.10  67  87.02  68  84.64  69  81.17  70  78.38
71  76.11  72  89.21  73  89.20  74  [illegible].92  75  83.46  76  77.37  77  72.81
78  69.25  79  91.45  80  66.54
```

```
SEP 23,1964
 1  89.23   2  70.17   3  91.47   4  79.46   5  91.97   6  79.02   7  91.95
 8  79.24   9  73.54  10  50.92  11  90.60  12  89.80  13  88.04  14  86.87
15  84.21  16  82.35  17  80.05  18  90.36  19  89.50  20  87.19  21  84.90
22  81.67  23  78.62  24  64.71  25  89.43  26  88.35  27  86.92  28  84.63
29  81.31  30  77.15  31  77.49  32  89.09  33  90.01  34  86.48  35  83.90
36  80.35  37  77.09  38  74.94  39  91.06  40  90.74  41  89.10  42  87.70
43  84.80  44  91.66  45  80.98  46  79.51  47  77.68  48  76.66  49  76.43
50  82.14  51  81.13  52  73.56  53  73.47  54  73.40  55  73.98  56  73.57
57  73.70  58  74.72  59  75.45  60  75.94  61  75.91  62  70.35  63   0.
64  64.75  65  87.76  66  89.25  67  87.02  68  84.66  69  81.46  70  78.65
71  76.32  72  87.35  73  88.92  74  87.11  75  83.77  76  78.13  77  73.20
78  69.57  79  91.40  80  64.85
```

```
SEP 24,1964
 1  89.23   2  70.32   3  91.79   4  79.51   5  91.66   6  79.40   7  91.91
 8  79.41   9  75.87  10  53.01  11  90.69  12  90.28  13  88.58  14  87.43
15  84.89  16  82.88  17  80.38  18  90.75  19  90.00  20  87.82  21  85.65
22  82.47  23  79.32  24  66.01  25  89.92  26  88.75  27  87.46  28  85.31
29  82.15  30  77.99  31  78.17  32  89.54  33  90.16  34  87.10  35  84.62
36  81.21  37  77.85  38  75.78  39  91.34  40  91.15  41  89.62  42  88.25
43  85.48  44  91.00  45  81.60  46  80.43  47  78.96  48  78.88  49  76.77
50  82.28  51  81.18  52  75.22  53  75.72  54  75.92  55  77.60  56  74.80
57  74.69  58  74.86  59  75.16  60  75.74  61  75.66  62  70.23  63   0.
64  65.02  65  89.38  66  89.10  67  87.11  68  84.96  69  81.63  70  78.79
71  76.55  72  87.40  73  89.37  74  87.31  75  84.05  76  78.44  77  73.38
78  69.85  79  90.52  80  65.09
```

```
SEP 25,1964
 1  89.01   2  70.00   3  92.19   4  83.09   5  92.02   6  82.89   7  92.24
 8  82.95   9  73.07  10  53.90  11  91.35  12  90.43  13  88.72  14  87.56
15  85.01  16  84.00  17  80.55  18  90.77  19  90.34  20  87.96  21  85.76
22  82.85  23  79.84  24  65.20  25  90.31  26  89.35  27  87.80  28  85.40
29  82.51  30  80.37  31  78.66  32  90.02  33  90.77  34  87.32  35  84.80
36  81.49  37  78.28  38  76.16  39  90.95  40  90.90  41  89.71  42  88.25
43  85.67  44  91.07  45  82.10  46  81.21  47  80.28  48  80.27  49  77.25
50  82.58  51  81.36  52  73.38  53  74.15  54  74.29  55  75.92  56  76.30
57  75.84  58  75.62  59  75.66  60  75.72  61  75.28  62  70.36  63   0.
64  64.10  65  90.05  66  89.62  67  87.25  68  85.07  69  81.96  70  79.07
71  76.93  72  89.75  73  89.69  74  87.46  75  84.27  76  78.75  77  73.77
78  7[illegible]  79  91.29  80  64.09
```

Hillside Shelter (Former Refrigerated Cave)

Lakeside, California

OCT 13,1964

1	74.86	2	66.69	3	79.41	4	70.75	5	82.04	6	72.30	7	74.69
8	71.63	9	62.27	10	58.70	11	78.01	12	77.02	13	74.63	14	74.17
15	73.89	16	73.64	17	75.08	18	72.70	19	77.23	20	76.25	21	75.05
22	75.01	23	75.13	24	0.	25	73.43	26	75.43	27	77.79	28	76.48
29	74.20	30	73.44	31	72.66	32	72.12	33	71.21	34	71.05	35	76.74
36	75.94	37	77.45	38	76.66	39	78.31	40	77.38	41	78.94	42	79.50
43	77.77	44	77.67	45	78.81	46	78.28	47	77.98	48	67.78	49	76.10
50	76.64	51	76.80	52	77.75	53	74.53	54	76.62	55	76.84	56	76.97
57	77.29	58	72.17	59	76.72	60	77.27	61	77.68	62	77.88	63	78.04
64	77.80	65	64.21	66	76.66	67	77.38	68	67.33	69	77.07	70	77.56
71	77.61	72	77.67	73	77.94	74	77.74	75	76.88	76	77.04	77	77.72
78	78.20	79	77.86	80	72.21	81	78.14	82	78.62	83	78.55	84	67.84
85	63.99	86	64.23	87	64.49	88	74.69	89	78.08	90	78.77	91	79.10
92	79.15	93	76.97	94	77.90	95	78.20	96	77.70				

OCT 14,1964

1	78.15	2	67.32	3	82.78	4	72.42	5	85.80	6	74.12	7	83.65
8	73.15	9	64.88	10	58.99	11	82.27	12	80.66	13	76.74	14	74.91
15	74.10	16	73.09	17	72.54	18	72.10	19	82.31	20	80.29	21	77.58
22	75.61	23	75.08	24	75.18	25	75.30	26	75.35	27	82.43	28	80.76
29	77.09	30	74.88	31	73.06	32	72.61	33	71.13	34	71.02	35	80.91
36	76.58	37	81.51	38	80.34	39	82.63	40	81.65	41	86.68	42	85.47
43	83.57	44	83.27	45	83.94	46	83.40	47	83.13	48	66.40	49	77.40
50	76.92	51	76.60	52	76.16	53	73.95	54	78.68	55	77.46	56	76.96
57	76.41	58	72.99	59	77.72	60	77.60	61	77.55	62	77.41	63	76.99
64	76.06	65	71.34	66	77.03	67	77.50	68	66.46	69	76.65	70	77.37
71	76.95	72	76.73	73	76.53	74	75.47	75	76.94	76	77.18	77	77.32
78	77.00	79	75.92	80	72.52	81	82.98	82	83.57	83	83.41	84	66.51
85	65.66	86	66.09	87	66.60	88	74.39	89	76.89	90	78.40	91	76.91
92	79.15	93	79.12	94	78.11	95	81.49	96	80.47				

OCT 15,1964

1	79.05	2	67.70	3	84.04	4	73.22	5	86.52	6	75.09	7	84.61
8	74.03	9	66.40	10	61.25	11	83.36	12	82.37	13	79.08	14	76.71
15	75.20	16	73.91	17	73.12	18	72.72	19	84.11	20	82.69	21	80.27
22	77.84	23	76.29	24	75.96	25	75.60	26	75.67	27	83.50	28	82.38
29	79.60	30	77.39	31	74.55	32	72.74	33	71.37	34	71.28	35	83.12
36	80.82	37	83.15	38	82.34	39	84.15	40	83.36	41	87.94	42	87.23
43	85.58	44	85.39	45	84.84	46	84.54	47	84.52	48	68.60	49	79.36
50	77.90	51	76.66	52	74.99	53	70.58	54	81.01	55	78.52	56	77.22
57	75.66	58	69.06	59	79.83	60	78.66	61	77.80	62	77.29	63	76.23
64	73.58	65	67.71	66	78.50	67	77.97	68	68.74	69	76.84	70	76.73
71	76.79	72	75.63	73	74.70	74	71.88	75	77.64	76	77.72	77	77.13
78	76.02	79	72.75	80	68.35	81	84.14	82	84.32	83	83.96	84	66.61
85	66.84	86	65.97	87	67.22	88	70.73	89	74.67	90	77.49	91	73.84
92	78.63	93	73.69	94	78.02	95	82.72	96	81.77				

OCT 16,1964

1	76.55	2	67.78	3	84.10	4	73.92	5	85.54	6	74.26	7	84.49
8	73.61	9	64.38	10	60.02	11	83.45	12	82.67	13	80.03	14	77.76
15	76.11	16	74.16	17	73.30	18	72.58	19	75.03	20	83.09	21	81.30
22	78.94	23	77.25	24	75.89	25	75.72	26	75.62	27	83.84	28	82.90
29	80.42	30	71.39	31	75.45	32	73.34	33	71.67	34	71.32	35	83.77
36	81.52	37	83.23	38	82.64	39	84.61	40	84.09	41	86.54	42	85.98
43	86.45	44	84.95	45	85.63	46	85.25	47	85.44	48	70.01	49	80.11
50	78.06	51	76.23	52	74.00	53	70.92	54	81.61	55	75.33	56	77.38
57	75.06	58	67.79	59	80.94	60	78.91	61	77.33	62	76.09	63	74.44
64	72.64	65	63.06	66	78.52	67	77.86	68	70.13	69	76.44	70	76.41
71	75.73	72	74.27	73	73.30	74	71.71	75	78.38	76	77.95	77	76.43
78	74.42	79	71.69	80	68.85	81	85.22	82	85.15	83	84.96	84	70.14
85	65.07	86	63.27	87	65.81	88	72.89	89	73.71	90	76.26	91	77.89
92	78.41	93	79.56	94	78.13	95	83.50	96	82.55				

OCT 17,1964

1	78.59	2	67.35	3	84.19	4	73.34	5	85.15	6	73.38	7	84.59
8	73.65	9	64.79	10	59.10	11	83.51	12	82.82	13	80.40	14	78.38
15	76.92	16	74.75	17	73.37	18	72.62	19	84.94	20	83.68	21	81.84
22	79.60	23	77.99	24	76.47	25	75.61	26	75.40	27	84.42	28	83.55
29	81.10	30	79.16	31	76.17	32	73.77	33	71.95	34	71.39	35	84.44
36	82.16	37	83.63	38	83.06	39	84.74	40	84.34	41	84.95	42	84.01
43	86.69	44	86.67	45	86.26	46	85.02	47	85.80	48	72.08	49	80.02
50	78.58	51	76.72	52	75.03	53	73.05	54	81.16	55	79.44	56	77.65
57	75.76	58	72.36	59	80.40	60	79.18	61	77.48	62	76.33	63	75.16
64	74.26	65	73.74	66	78.86	67	78.07	68	72.24	69	75.96	70	76.04
71	75.28	72	74.65	73	74.46	74	73.77	75	78.70	76	77.91	77	76.58
78	74.88	79	73.37	80	71.62	81	85.72	82	85.18	83	85.02	84	72.30
85	65.88	86	66.31	87	67.00	88	75.56	89	74.85	90	76.20	91	77.31
92	78.07	93	78.23	94	77.92	95	83.50	96	82.83				

OCT 18,1964

1	78.57	2	67.39	3	84.52	4	73.49	5	85.09	6	73.41	7	84.96
	73.87	9	65.03	10	58.77	11	83.75	12	83.20	13	80.97	14	78.98
15	77.43	16	75.20	17	73.62	18	72.82	19	85.29	20	84.18	21	82.44
22	80.27	23	76.69	24	77.03	25	76.00	26	75.78	27	84.77	28	83.99
29	81.66	30	77.78	31	76.79	32	74.40	33	72.33	34	71.91	35	84.60
36	82.50	37	83.97	38	83.37	39	84.66	40	84.52	41	84.95	42	83.95
43	87.07	44	87.00	45	86.37	46	86.05	47	86.14	48	70.59	49	81.34
50	79.44	51	77.48	52	75.27	53	72.25	54	81.18	55	79.48	56	77.82
57	75.97	58	71.05	59	80.62	60	79.68	61	77.84	62	76.67	63	75.52
64	74.50	65	70.52	66	79.22	67	78.54	68	70.53	69	75.85	70	75.71
71	75.10	72	74.47	73	73.89	74	73.47	75	78.35	76	77.38	77	76.41
78	74.72	79	72.93	80	72.92	81	85.16	82	84.57	83	84.38	84	70.54
85	65.97	86	65.57	87	66.97	88	75.88	89	74.85	90	76.16	91	76.86
92	77.63	93	77.73	94	77.71	95	83.65	96	82.05				

OCT 19,1964

1	78.79	2	67.12	3	84.92	4	73.17	5	65.41	6	73.19	7	85.44
8	73.65	9	72.87	10	54.38	11	83.77	12	83.52	13	81.48	14	79.40
15	77.84	16	75.83	17	73.95	18	73.03	19	85.58	20	84.59	21	82.92
22	80.97	23	77.32	24	77.35	25	76.65	26	75.76	27	85.13	28	84.41
29	82.10	30	80.22	31	77.41	32	74.92	33	72.75	34	72.30	35	84.46
36	82.76	37	84.17	38	83.70	39	[illegible]	40	84.92	41	85.30	42	84.49
43	87.33	44	87.08	45	86.72	46	86.41	47	85.27	48	67.17	49	81.80
50	79.80	51	77.63	52	75.15	53	72.42	54	81.27	55	79.50	56	77.84
57	75.91	58	72.08	59	81.46	60	80.02	61	78.33	62	76.99	63	75.76
64	74.50	65	72.80	66	79.35	67	78.70	68	67.27	69	76.43	70	76.01
71	75.34	72	74.75	73	74.20	74	72.76	75	78.75	76	77.93	77	76.50
78	74.73	79	72.70	80	72.17	81	86.00	82	85.57	83	85.34	84	67.20
85	73.48	86	73.33	87	73.46	88	77.31	89	74.84	90	76.07	91	76.72
92	77.23	93	77.48	94	77.56	95	83.91	96	83.13				

OCT 20,1964

1	77.94	2	64.19	3	84.05	4	73.70	5	85.60	6	73.72	7	85.15
8	74.06	9	73.27	10	56.78	11	83.92	12	83.60	13	81.62	14	79.90
15	76.31	16	76.09	17	74.10	18	73.14	19	85.07	20	84.82	21	83.27
22	81.33	23	79.79	24	78.08	25	76.12	26	75.67	27	84.45	28	84.38
29	82.46	30	80.72	31	77.91	32	75.10	33	73.11	34	72.60	35	84.62
36	82.95	37	84.31	38	83.87	39	85.18	40	85.01	41	85.47	42	84.45
43	85.77	44	86.20	45	86.63	46	86.18	47	84.94	48	64.23	49	81.96
50	80.06	51	76.18	52	76.50	53	76.22	54	81.52	55	79.85	56	78.30
57	77.14	58	76.52	59	81.90	60	80.65	61	78.90	62	77.67	63	76.73
64	76.82	65	74.05	66	80.50	67	79.70	68	64.51	69	76.64	70	76.17
71	75.66	72	75.11	73	74.76	74	74.74	75	78.98	76	78.04	77	76.83
78	75.60	79	73.33	80	76.21	81	85.76	82	85.38	83	85.29	84	64.14
85	77.51	86	77.60	87	77.57	88	81.08	89	76.49	90	76.40	91	76.94
92	77.20	93	77.38	94	77.56	95	84.06	96	83.27				

OCT 21,1964

1	78.11	2	77.10	3	84.83	4	73.60	5	85.51	6	73.66	7	85.14
8	76.17	9	64.95	10	54.76	11	83.95	12	83.64	13	81.66	14	80.00
15	78.57	16	76.26	17	74.14	18	73.20	19	85.57	20	84.77	21	83.35
22	81.40	23	77.95	24	78.28	25	76.53	26	75.88	27	84.55	28	84.14
29	82.44	30	80.72	31	78.23	32	75.47	33	73.65	34	72.99	35	84.76
36	83.01	37	84.30	38	83.82	39	85.27	40	[illegible]	41	85.29	42	84.30
43	85.79	44	85.82	45	86.07	46	85.80	47	[illegible]	48	65.43	49	82.08
50	80.55	51	79.13	52	78.01	53	75.56	54	[illegible]	55	80.17	56	79.13
57	78.01	58	76.87	59	81.57	60	80.83	61	78.94	62	78.02	63	77.57
64	77.52	65	76.79	66	80.07	67	79.70	68	65.41	69	76.57	70	76.52
71	75.66	72	75.64	73	75.95	74	75.52	75	79.23	76	77.42	77	77.61
78	76.84	79	76.11	80	75.18	81	85.41	82	[illegible]	83	85.12	84	65.48
85	64.26	86	65.99	87	70.19	88	78.42	89	77.08	90	77.16	91	78.99
92	77.16	93	77.26	94	77.33	95	83.97	96	83.32				

OCT 22,1964

1	75.12	2	67.21	3	84.98	4	73.55	5	85.22	6	73.53	7	85.19
8	74.02	9	66.45	10	60.89	11	83.89	12	83.56	13	81.84	14	79.98
15	78.60	16	76.37	17	74.42	18	73.28	19	85.75	20	84.93	21	83.46
22	81.64	23	79.99	24	78.52	25	76.66	26	75.90	27	84.78	28	84.23
29	82.36	30	80.82	31	78.24	32	75.79	33	73.55	34	72.98	35	85.28
36	83.30	37	84.49	38	84.06	39	84.82	40	84.65	41	85.03	42	84.22
43	86.03	44	86.02	45	85.91	46	85.80	47	85.22	48	65.29	49	82.38
50	81.04	51	77.71	52	78.00	53	75.38	54	81.98	55	80.80	56	79.69
57	78.40	58	74.55	59	81.61	60	80.87	61	79.46	62	78.43	63	77.65
64	77.07	65	73.23	66	80.06	67	79.16	68	65.60	69	76.83	70	76.63
71	76.13	72	75.87	73	75.95	74	75.30	75	79.51	76	78.87	77	78.12
78	77.20	79	76.16	80	74.27	81	85.22	82	85.05	83	84.97	84	65.47
85	67.14	86	67.86	87	68.05	88	77.17	89	76.40	90	77.00	91	77.04
92	77.19	93	77.27	94	77.82	95	83.95	96	83.05				

OCT 23,1964

1	77.84	2	67.42	3	85.83	4	74.80	5	86.60	6	74.87	7	84.21
8	75.44	9	66.25	10	59.71	11	84.41	12	84.75	13	82.18	14	80.23
15	78.69	16	76.76	17	74.81	18	73.43	19	86.39	20	85.56	21	83.90
22	82.02	23	80.50	24	78.83	25	76.87	26	75.92	27	85.36	28	84.81
29	82.72	30	81.11	31	78.68	32	75.96	33	73.90	34	71.31	35	86.02
36	84.11	37	85.05	38	84.60	39	85.73	40	85.43	41	86.27	42	85.05
43	87.07	44	87.07	45	86.88	46	86.65	47	85.75	48	67.29	49	82.81
50	81.79	51	[illegible]	52	78.27	53	73.44	54	82.48	55	81.46	56	80.13
57	78.49	58	72.08	59	82.42	60	81.37	61	80.00	62	79.14	63	78.11
64	77.96	65	69.58	66	81.17	67	79.72	68	68.00	69	77.40	70	77.16
71	76.87	72	76.40	73	75.73	74	73.74	75	79.84	76	79.55	77	78.77
78	77.92	79	75.03	80	70.69	81	85.76	82	[illegible]	83	85.66	84	67.87
85	65.02	86	65.21	87	65.29	88	70.19	89	75.00	90	76.51	91	76.90
92	76.99	93	77.10	94	77.18	95	84.64	96	83.86				

OCT 24,1964

1	77.82	2	67.15	3	87.26	4	77.75	5	86.11	6	77.75	7	87.04
8	78.32	9	61.52	10	57.56	11	85.15	12	84.67	13	82.67	14	80.72
15	79.07	16	76.86	17	74.88	18	73.51	19	86.92	20	86.03	21	84.43
22	82.55	23	80.78	24	78.85	25	76.95	26	76.00	27	86.25	28	85.54
29	83.44	30	81.60	31	78.96	32	76.13	33	74.55	34	73.97	35	87.10
36	85.06	37	85.89	38	85.30	39	87.44	40	87.20	41	88.01	42	86.12
43	86.98	44	87.27	45	87.55	46	87.37	47	87.97	48	68.47	49	83.66
50	81.76	51	77.88	52	77.30	53	73.50	54	83.09	55	81.12	56	79.80
57	77.92	58	71.81	59	82.32	60	81.66	61	80.00	62	78.80	63	76.97
64	74.51	65	64.63	66	81.10	67	79.83	68	68.83	69	77.51	70	77.16
71	76.28	72	74.35	73	76.47	74	72.70	75	80.09	76	79.82	77	73.36
78	76.61	79	73.84	80	70.34	81	87.76	82	87.55	83	87.55	84	68.69
85	64.61	86	64.78	87	65.07	88	70.27	89	73.61	90	75.46	91	76.55
92	77.05	93	77.15	94	77.17	95	85.56	96	84.74				

OCT 25,1964

1	77.89	2	67.65	3	87.35	4	78.09	5	87.80	6	78.14	7	87.89
8	78.76	9	61.42	10	56.32	11	85.65	12	85.27	13	83.25	14	81.32
15	79.74	16	77.24	17	75.19	18	73.76	19	87.16	20	86.52	21	85.01
22	83.04	23	81.33	24	79.76	25	77.29	26	76.22	27	86.41	28	85.84
29	83.94	30	82.22	31	79.62	32	76.72	33	74.70	34	73.90	35	87.57
36	85.33	37	86.22	38	85.85	39	88.09	40	87.65	41	89.21	42	87.60
43	88.19	44	88.11	45	87.71	46	87.57	47	88.42	48	68.15	49	64.64
50	81.97	51	79.7	52	77.27	53	72.92	54	83.75	55	81.81	56	79.95
57	77.67	58	71.35	59	83.03	60	81.90	61	80.01	62	78.51	63	76.46
64	74.32	65	69.22	66	81.55	67	80.94	68	68.38	69	77.59	70	77.15
71	75.75	72	74.65	73	73.77	74	72.37	75	80.71	76	79.78	77	78.09
78	76.12	79	73.45	80	69.79	81	88.05	82	87.75	83	86.84	84	68.26
85	62.22	86	62.41	87	63.33	88	71.42	89	73.06	90	74.90	91	76.01
92	76.85	93	76.93	94	77.05	95	85.83	96	85.30				

OCT 26,1964

1	66.57	2	71.72	3	88.44	4	77.64	5	89.30	6	77.25	7	89.53
8	78.36	9	61.51	10	55.05	11	87.08	12	86.07	13	83.48	14	81.53
15	79.97	16	77.57	17	75.29	18	74.35	19	88.16	20	87.06	21	85.20
22	83.35	23	81.63	24	79.66	25	77.40	26	76.38	27	86.69	28	86.19
29	84.21	30	82.50	31	79.91	32	76.49	33	74.94	34	74.15	35	87.91
36	85.51	37	87.09	38	86.44	39	89.01	40	88.40	41	89.38	42	88.06
43	88.61	44	88.54	45	88.78	46	88.54	47	88.59	48	69.31	49	84.26
50	82.44	51	80.23	52	77.44	53	73.10	54	84.07	55	82.00	56	80.27
57	78.14	58	71.28	59	83.26	60	82.13	61	80.06	62	78.51	63	76.79
64	74.79	65	68.73	66	81.61	67	80.12	68	70.27	69	77.64	70	77.14
71	75.76	72	74.85	73	74.21	74	73.03	75	80.70	76	79.92	77	78.32
78	76.75	79	73.76	80	69.35	81	88.67	82	88.67	83	88.52	84	69.38
85	62.00	86	62.59	87	63.21	88	71.31	89	73.62	90	74.94	91	75.83
92	76.64	93	76.79	94	77.03	95	86.70	96	85.76				

OCT 27,1964

1	91.29	2	[illegible]	3	89.49	4	77.18	5	69.17	6	76.74	7	90.21
8	77.34	9	60.34	10	53.33	11	88.13	12	87.18	13	84.30	14	81.92
15	80.07	16	77.69	17	75.25	18	73.85	19	88.40	20	87.71	21	85.80
22	83.70	23	81.80	24	79.79	25	77.46	26	76.22	27	86.22	28	86.22
29	84.15	30	82.62	31	80.03	32	77.22	33	75.04	34	74.33	35	87.45
36	85.16	37	87.93	38	87.38	39	88.19	40	87.91	41	88.53	42	87.20
43	88.05	44	89.02	45	88.80	46	88.49	47	88.63	48	68.10	49	84.60
50	82.37	51	77.82	52	75.96	53	70.02	54	83.36	55	81.93	56	79.95
57	76.76	58	63.24	59	83.58	60	82.07	61	79.84	62	77.91	63	75.47
64	71.84	65	65.54	66	81.16	67	79.81	68	68.95	69	77.78	70	77.14
71	75.63	72	73.78	73	72.19	74	69.55	75	81.22	76	80.14	77	78.05
78	75.32	79	71.81	80	66.40	81	88.76	82	89.02	83	88.78	84	68.33
85	[illegible]	86	61.65	87	62.56	88	[illegible]	89	71.67	90	74.20	91	75.70
92	76.51	93	76.87	94	76.96	95	[illegible]	96	86.25				

OCT 28,1964

1	62.92	2	64.47	3	89.21	4	75.62	5	89.67	6	75.10	7	89.28
8	75.12	9	66.00	10	54.37	11	87.04	12	86.62	13	84.45	14	82.58
15	80.72	16	78.14	17	75.67	18	74.20	19	87.92	20	87.42	21	85.84
22	84.09	23	82.27	24	80.14	25	77.76	26	76.61	27	87.03	28	86.60
29	84.44	30	82.89	31	80.32	32	77.76	33	75.32	34	74.89	35	87.62
36	85.68	37	87.44	38	86.94	39	88.75	40	[illegible]	41	89.38	42	87.70
43	89.35	44	89.13	45	89.59	46	89.25	47	89.24	48	69.35	49	84.22
50	81.97	51	79.71	52	76.88	53	73.07	54	83.70	55	81.65	56	79.74
57	77.32	58	71.57	59	82.82	60	82.07	61	79.70	62	77.73	63	75.60
64	73.77	65	69.96	66	81.03	67	79.68	68	68.12	69	77.70	70	76.72
71	75.19	72	73.79	73	72.93	74	71.67	75	80.96	76	79.85	77	77.70
78	75.72	79	[illegible]	80	69.45	81	88.75	82	89.19	83	89.16	84	68.35
85	66.41	86	67.08	87	67.65	88	71.40	89	72.55	90	73.77	91	75.09
92	76.03	93	76.49	94	79.30	95	[illegible]	96	86.07				

OCT 29,1964

1	83.06	2	64.85	3	89.94	4	75.86	5	89.80	6	75.67	7	90.30
8	75.94	9	62.05	10	58.21	11	87.75	12	87.20	13	84.72	14	82.75
15	81.00	16	78.42	17	75.97	18	74.41	19	88.59	20	87.86	21	85.21
22	84.38	23	82.58	24	80.49	25	78.07	26	76.79	27	87.37	28	87.05
29	84.99	30	83.34	31	80.62	32	78.09	33	76.14	34	75.52	35	88.39
36	86.19	37	87.96	38	87.40	39	89.31	40	88.89	41	89.02	42	88.15
43	89.83	44	89.58	45	89.93	46	89.69	47	90.15	48	68.92	49	84.59
50	82.23	51	80.02	52	77.04	53	71.32	54	83.83	55	81.85	56	80.07
57	77.63	58	69.50	59	83.80	60	82.19	61	79.99	62	78.34	63	75.17
64	73.05	65	66.03	66	81.69	67	79.85	68	68.71	69	77.86	70	77.02
71	75.56	72	74.16	73	73.10	74	[illegible]	75	81.12	76	80.02	77	78.07
78	76.07	79	72.19	80	66.88	81	89.14	82	89.15	83	88.94	84	68.79
85	62.70	86	62.96	87	63.14	88	69.37	89	72.41	90	73.98	91	75.00
92	75.95	93	76.44	94	80.35	95	87.65	96	86.43				

OCT 30,1964

1	82.97	2	64.55	3	89.22	4	76.02	5	88.95	6	75.54	7	90.63
8	75.92	9	58.36	10	53.84	11	87.44	12	86.99	13	85.00	14	82.98
15	81.32	16	78.71	17	76.06	18	74.64	19	88.36	20	87.76	21	[illegible]
22	84.63	23	82.83	24	80.69	25	78.22	26	76.82	27	87.44	28	87.10
29	85.06	30	83.69	31	80.89	32	78.51	33	76.00	34	75.47	35	89.82
36	86.89	37	88.10	38	87.45	39	88.64	40	88.62	41	89.21	42	87.72
43	89.10	44	88.88	45	89.35	46	89.21	47	89.64	48	68.72	49	84.93
50	82.54	51	79.74	52	75.95	53	69.70	54	84.11	55	82.07	56	79.91
57	77.18	58	67.59	59	83.95	60	82.55	61	79.98	62	78.03	63	75.12
64	71.41	65	64.00	66	82.70	67	80.94	68	68.17	69	77.14	70	76.40
71	74.50	72	72.74	73	71.18	74	68.69	75	81.17	76	79.97	77	77.58
78	74.61	79	70.28	80	65.10	81	88.65	82	88.79	83	88.39	84	68.08
85	58.66	86	59.60	87	59.92	88	69.06	89	70.99	90	73.18	91	74.82
92	75.63	93	76.01	94	76.23	95	86.90	96	85.97				

NOV 3,1964

1	77.95	2	67.33	3	88.20	4	79.44	5	87.99	6	79.04	7	88.51
8	78.98	9	60.44	10	48.53	11	86.84	12	86.27	13	84.86	14	83.00
15	81.52	16	79.00	17	76.46	18	74.70	19	86.86	20	86.39	21	85.23
22	85.03	23	82.58	24	80.72	25	78.20	26	76.69	27	85.44	28	85.57
29	84.20	30	83.18	31	81.09	32	78.84	33	76.67	34	76.03	35	89.60
36	86.81	37	86.77	38	86.01	39	87.55	40	87.50	41	86.86	42	85.94
43	88.46	44	88.04	45	88.07	46	87.97	47	87.44	48	64.52	49	84.52
50	82.13	51	77.30	52	75.04	53	67.87	54	83.02	55	80.96	56	78.87
57	75.73	58	65.58	59	83.37	60	82.09	61	79.54	62	77.04	63	74.24
64	70.41	65	62.53	66	81.92	67	79.93	68	64.77	69	76.97	70	75.64
71	73.77	72	71.54	73	69.69	74	66.13	75	80.66	76	79.11	77	76.72
78	73.77	79	68.20	80	62.72	81	87.71	82	87.79	83	87.63	84	64.54
85	60.02	86	60.91	87	61.34	88	66.87	89	69.65	90	72.69	91	73.09
92	74.41	93	75.15	94	76.04	95	86.32	96	84.45				

NOV 4,1964

1	60.72	2	64.25	3	89.50	4	81.10	5	89.33	6	90.67	7	89.60
8	80.56	9	63.50	10	46.03	11	88.15	12	87.38	13	84.96	14	83.09
15	81.52	16	79.24	17	76.49	18	74.73	19	87.33	20	86.85	21	85.42
22	84.00	23	82.50	24	80.67	25	78.20	26	76.67	27	86.16	28	86.11
29	84.42	30	83.18	31	81.13	32	78.05	33	76.69	34	76.09	35	89.00
36	87.00	37	87.46	38	86.81	39	88.74	40	88.44	41	90.02	42	86.59
43	[illegible]	44	[illegible]	45	89.11	46	88.62	47	80.56	48	63.32	49	84.52
50	81.85	51	73.86	52	74.65	53	68.67	54	82.75	55	80.48	56	78.36
57	75.26	58	67.15	59	83.36	60	81.65	61	79.11	62	76.59	63	73.75
64	73.62	65	63.56	66	82.26	67	80.57	68	65.40	69	76.63	70	75.23
71	71.06	72	70.88	73	69.18	74	66.25	75	80.45	76	78.77	77	76.22
78	72.98	79	61.31	80	64.79	81	88.69	82	89.29	83	89.07	84	63.07
85	62.57	86	61.31	87	63.11	88	64.18	89	69.15	90	71.09	91	72.59
92	74.02	93	74.83	94	75.19	95	87.03	96	86.39				

NOV 5,1964

1	73.15	2	61.31	3	90.82	4	69.20	5	95.91	6	89.21	7	91.66
8	[illegible]	9	[illegible]	10	51.41	11	[illegible]	12	[illegible]	13	85.60	14	83.22
15	[illegible]	16	[illegible]	17	76.05	18	76.49	19	89.92	20	88.62	21	86.87
22	[illegible]	23	[illegible]	24	80.79	25	77.82	26	77.36	27	87.07	28	87.22
29	[illegible]	30	[illegible]	31	[illegible]	32	78.44	33	76.06	34	77.04	35	91.60
36	[illegible]	37	[illegible]	38	88.52	39	89.99	40	89.35	41	89.82	42	88.38
43	87.47	44	87.47	45	89.82	46	69.67	47	90.06	48	61.87	49	85.87
50	81.47	51	78.60	52	73.77	53	71.06	54	83.11	55	80.92	56	78.16
57	76.47	58	73.65	59	[illegible]	60	82.03	61	[illegible]	62	70.58	63	73.76
64	[illegible]	65	71.42	66	81.99	67	79.62	68	62.63	69	76.12	70	76.86
71	72.92	72	70.50	73	68.07	74	65.78	75	80.75	76	78.86	77	76.32
78	72.22	79	66.22	80	69.69	81	90.22	82	[illegible]	83	89.91	84	61.95
85	[illegible]	86	69.78	87	69.11	88	73.66	89	68.05	90	70.90	91	72.37
92	73.96	93	[illegible]	94	75.47	95	86.95	96	85.86				

OCT 31,1964

1	62.20	2	64.56	3	89.33	4	76.59	5	89.21	6	76.62	7	90.23
8	76.13	9	60.80	10	53.30	11	88.00	12	87.45	13	85.31	14	83.17
15	81.56	16	79.05	17	76.72	18	75.22	19	88.78	20	88.13	21	86.54
22	84.84	23	82.95	24	80.92	25	78.35	26	76.90	27	87.30	28	87.14
29	85.20	30	83.93	31	81.23	32	78.85	33	76.24	34	75.78	35	90.70
36	88.22	37	81.80	38	[illegible]	39	88.88	40	88.74	41	88.86	42	87.56
43	89.27	44	83.97	45	89.56	46	89.44	47	88.56	48	65.37	49	84.78
50	82.25	51	74.35	52	75.20	53	69.41	54	83.86	55	81.63	56	79.44
57	75.14	58	67.58	59	84.06	60	82.46	61	79.75	62	77.46	63	74.56
64	70.96	65	64.92	66	82.24	67	80.25	68	65.22	69	77.28	70	76.22
71	74.14	72	72.67	73	70.54	74	67.92	75	81.04	76	79.80	77	77.35
78	74.10	79	67.48	80	66.19	81	88.99	82	89.32	83	89.90	84	65.25
85	61.08	86	61.90	87	62.15	88	69.62	89	70.35	90	72.82	91	74.30
92	75.65	93	76.03	94	76.77	95	87.29	96	86.31				

NOV 1,1964

1	78.65	2	67.59	3	88.67	4	73.97	5	88.35	6	79.74	7	88.52
8	79.97	9	61.16	10	55.71	11	87.53	12	87.28	13	85.57	14	83.60
15	81.87	16	79.25	17	76.69	18	76.96	19	87.60	20	87.57	21	86.69
22	85.03	23	81.09	24	81.09	25	78.49	26	77.02	27	86.38	28	86.63
29	85.11	30	83.98	31	81.64	32	78.97	33	76.64	34	76.00	35	89.61
36	87.72	37	87.98	38	87.26	39	88.44	40	88.50	41	87.83	42	87.09
43	88.92	44	[illegible]	45	89.03	46	89.01	47	89.41	48	67.06	49	84.93
50	82.27	51	[illegible]	52	75.95	53	70.66	54	83.92	55	81.61	56	79.66
57	76.55	58	69.15	59	[illegible]	60	82.34	61	79.72	62	77.56	63	75.30
64	71.67	65	64.10	66	82.46	67	80.38	68	65.82	69	77.28	70	76.10
71	74.94	72	72.65	73	71.24	74	69.31	75	81.10	76	79.81	77	77.58
78	74.78	79	71.07	80	67.19	81	88.65	82	88.71	83	88.49	84	65.36
85	61.36	86	61.83	87	62.17	88	68.13	89	70.65	90	72.63	91	73.82
92	75.17	93	75.80	94	76.06	95	87.91	96	86.60				

NOV 2,1964

1	78.14	2	67.65	3	88.16	4	79.77	5	87.97	6	78.93	7	88.83
8	78.63	9	59.07	10	53.68	11	87.23	12	86.81	13	85.07	14	83.32
15	81.85	16	79.16	17	76.72	18	75.68	19	86.80	20	86.63	21	86.81
22	84.86	23	81.26	24	81.30	25	[illegible]	26	77.92	27	85.70	28	86.01
29	84.56	30	83.76	31	81.60	32	78.17	33	77.37	34	76.47	35	88.79
36	88.71	37	87.09	38	88.02	39	87.76	40	87.65	41	87.19	42	88.22
43	87.85	44	87.53	45	88.77	46	88.25	47	88.56	48	67.90	49	85.99
50	82.16	51	79.60	52	76.20	53	70.60	54	83.37	55	81.60	56	79.59
57	76.88	58	67.91	59	81.75	60	82.30	61	79.88	62	77.56	63	74.94
64	72.07	65	65.11	66	82.17	67	80.39	68	66.77	69	76.01	70	75.70
71	73.85	72	72.27	73	70.86	74	68.55	75	80.87	76	79.38	77	77.10
78	74.61	79	70.35	80	65.57	81	87.90	82	88.06	83	87.83	84	64.68
85	59.18	86	59.57	87	60.00	88	67.75	89	70.67	90	72.19	91	73.90
92	74.79	93	75.65	94	75.00	95	86.70	96	85.70				

UNDERGROUND PARKING GARAGE
"Fire Test"
Nevada Test Site, AEC
Mercury, Nevada

AUG 27,1964

1	79.82	2	71.05	3	84.14	4	77.86	5	70.73	6	50.91	7	83.64
8	78.41	9	84.41	10	78.32	11	83.23	12	78.73	13	82.00	14	77.82
15	74.35	16	76.18	17	77.59	18	78.41	19	78.27	20	77.32	21	75.18
22	77.73	23	81.55	24	81.50	25	77.73	26	73.86	27	79.05	28	76.86
29	77.73	30	78.09	31	77.14	32	75.05	33	78.40	34	77.55	35	74.50
36	79.45	37	76.90	38	77.75	39	77.80	40	76.00	41	73.45	42	80.10
43	81.70	44	84.40	45	82.65	46	83.00	47	78.60	48	70.70	49	243.80
50	249.40	51	242.20	52	240.60	53	0.	54	209.20	55	143.25	56	86.60
57	86.20	58	0.	59	169.50	60	117.25	61	86.10	62	86.10	63	0.
64	139.00	65	112.20	66	85.90	67	85.13	68	0.	69	411.00	70	151.80
71	87.70	72	85.50	73	77.63	74	0.	75	0.	76	0.	77	0.
78	332.00	79	0.	80	0.	81	84.00	82	84.00	83	85.00	84	[illegible]
85	0.	86	0.	87	0.	88	0.	89	79.91	90	80.59	91	85.23
92	83.95	93	71.32										

AUG 28,1964

1	91.02	2	65.06	3	88.15	4	74.83	5	77.53	6	53.58	7	89.08
8	74.56	9	89.81	10	75.77	11	87.94	12	74.74	13	86.19	14	82.00
15	77.27	16	77.23	17	77.35	18	78.25	19	78.23	20	77.35	21	75.40
22	81.56	23	86.44	24	85.79	25	81.71	26	76.27	27	75.94	28	76.81
29	77.10	30	77.58	31	77.00	32	75.21	33	81.81	34	81.06	35	76.71
36	76.52	37	75.65	38	77.04	39	77.13	40	75.90	41	73.19	42	90.69
43	91.73	44	88.23	45	86.46	46	87.54	47	83.21	48	68.52	49	131.90
50	165.02	51	127.04	52	89.20	53	84.00	54	176.06	55	156.85	56	123.30
57	90.17	58	89.50	59	176.73	60	147.30	61	115.37	62	90.98	63	80.37
64	167.85	65	150.13	66	118.26	67	87.43	68	84.58	69	103.27	70	154.80
71	121.52	72	98.20	73	85.65	74	83.81	75	82.26	76	83.31	77	84.42
78	84.44	79	85.39	80	80.36	81	80.69	82	80.33	83	79.86	84	77.22
85	62.67	86	57.78	87	66.39	88	66.53	89	87.63	90	89.65	91	89.75
92	88.02	93	66.65										

AUG 29,1964

1	92.13	2	64.96	3	89.85	4	78.90	5	76.81	6	50.40	7	90.19
8	78.21	9	90.83	10	79.40	11	88.92	12	78.48	13	87.92	14	85.00
15	80.40	16	74.15	17	78.40	18	78.32	19	78.06	20	77.40	21	75.77
22	85.44	23	88.58	24	88.20	25	84.92	26	79.54	27	78.13	28	77.63
29	77.27	30	77.42	31	77.00	32	75.69	33	86.63	34	85.92	35	80.02
36	78.85	37	77.65	38	77.50	39	77.38	40	76.27	41	73.73	42	92.33
43	[illegible]	44	87.85	45	88.92	46	89.23	47	86.10	48	81.44	49	119.97
50	123.96	51	123.25	52	98.04	53	86.19	54	120.23	55	125.67	56	122.23
57	100.33	58	86.29	59	123.06	60	124.08	61	119.96	62	94.98	63	84.67
64	124.71	65	125.67	66	121.27	67	94.67	68	94.60	69	109.96	70	119.56
71	118.00	72	108.44	73	95.73	74	87.33	75	93.88	76	77.31	77	77.96
78	77.92	79	81.17	80	79.54	81	79.73	82	79.58	83	79.27	84	77.48
85	62.90	86	71.85	87	61.79	88	61.79	89	89.73	90	91.71	91	90.44
92	89.29	93	61.54										

AUG 30,1964

1	92.13	2	64.67	3	91.19	4	79.13	5	75.33	6	53.54	7	91.67
8	[illegible]	9	92.04	10	79.67	11	90.56	12	78.67	13	89.63	14	87.00
15	[illegible]	16	83.71	17	79.27	18	78.73	19	78.04	20	77.13	21	75.88
22	[illegible]	23	90.10	24	89.81	25	87.00	26	81.69	27	79.85	28	78.54
29	77.75	30	77.58	31	76.90	32	75.71	33	88.02	34	87.56	35	82.04
36	80.40	37	78.48	38	77.92	39	77.27	40	76.13	41	73.63	42	91.10
43	91.85	44	91.27	45	90.19	46	90.77	47	87.92	48	62.58	49	105.63
50	104.57	51	111.65	52	100.19	53	89.00	54	107.19	55	110.29	56	112.52
57	102.21	58	93.33	59	107.94	60	110.67	61	111.04	62	93.13	63	87.69
64	108.81	65	110.88	66	112.31	67	98.58	68	87.50	69	98.19	70	105.79
71	107.77	72	104.56	73	96.98	74	90.69	75	86.90	76	75.73	77	76.33
78	76.44	79	77.29	80	78.38	81	79.04	82	79.31	83	79.21	84	77.54
85	63.17	86	63.10	87	63.21	88	63.21	89	89.27	90	90.48	91	91.42
92	90.33	93	62.40										

AUG 31,1964

1	92.02	2	64.75	3	91.80	4	78.18	5	76.40	6	52.13	7	92.90
8	77.96	9	93.02	10	78.93	11	90.35	12	77.86	13	90.29	14	88.39
15	83.73	16	81.95	17	80.21	18	79.19	19	78.31	20	77.13	21	75.89
22	88.67	23	91.15	24	90.69	25	88.21	26	83.13	27	81.23	28	79.61
29	78.17	30	77.96	31	76.73	32	75.52	33	88.77	34	88.52	35	83.68
36	81.58	37	[illegible]	38	78.42	39	77.38	40	76.02	41	73.58	42	93.21
43	[illegible]	44	92.27	45	91.35	46	91.58	47	89.40	48	60.70	49	97.98
50	[illegible]	51	[illegible]	52	[illegible]	53	[illegible]	54	[illegible]	55	[illegible]	56	109.60
57	100.67	58	87.81	59	100.17	60	[illegible]	61	[illegible]	62	[illegible]	63	98.82
64	100.98	65	103.00	66	105.77	67	90.69	68	89.81	69	91.77	70	90.04
71	[illegible]	72	[illegible]	73	[illegible]	74	91.75	75	84.75	76	76.68	77	77.31
78	[illegible]	79	78.35	80	[illegible]	81	[illegible]	82	78.44	83	[illegible]	84	77.23
85	[illegible]	86	[illegible]	87	61.02	88	61.02	89	32.65	90	[illegible]	91	[illegible]
92	[illegible]	93	60.62										

SEP 1,1964

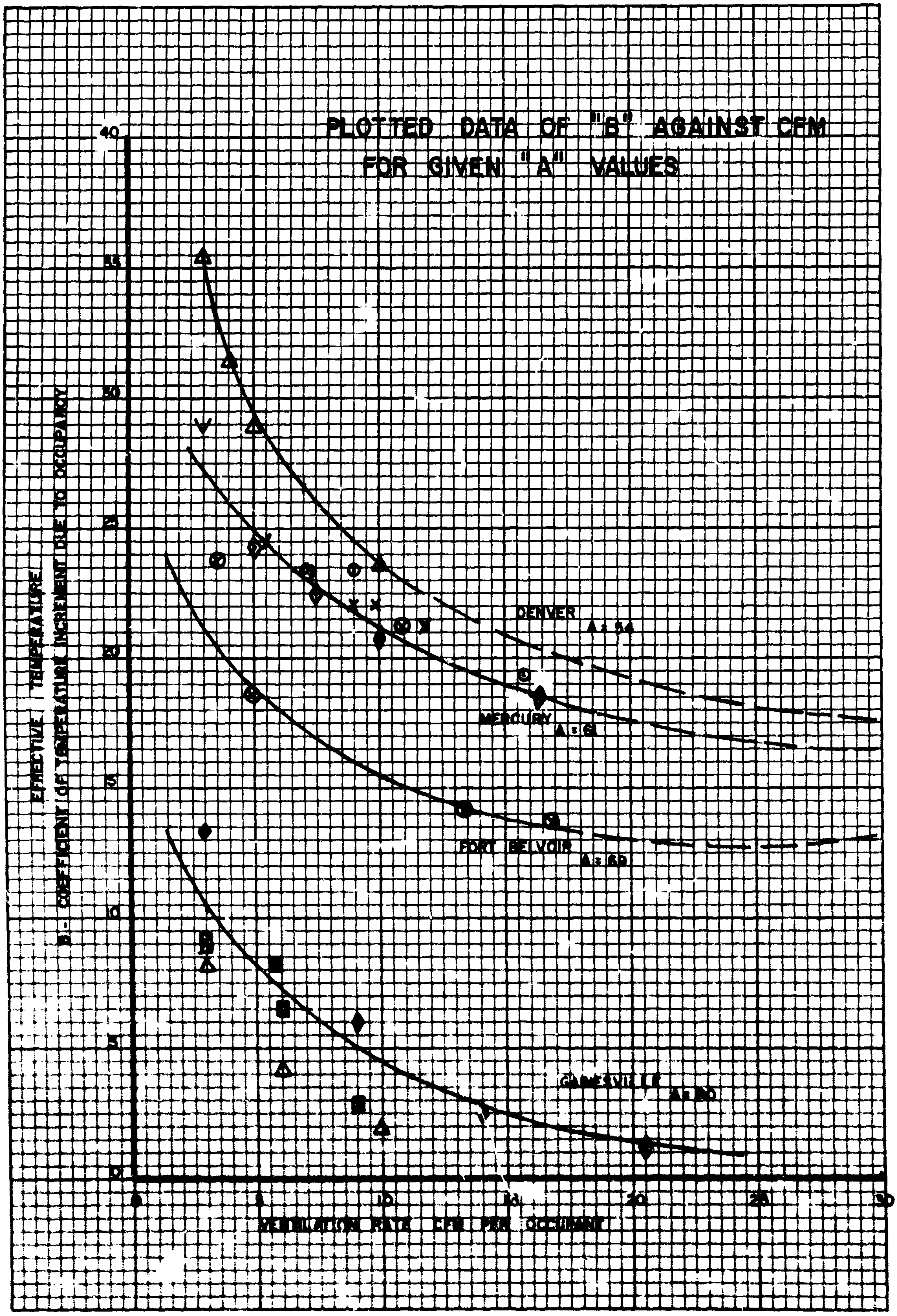
1	[illegible]	2	66.21	3	[illegible]	4	[illegible]	5	[illegible]	6	[illegible]	7	[illegible]
8	[illegible]	9	[illegible]	10	[illegible]	11	[illegible]	12	[illegible]	13	[illegible]	14	[illegible]
15	[illegible]	16	[illegible]	17	[illegible]	18	[illegible]	19	[illegible]	20	[illegible]	21	[illegible]
22	[illegible]	23	[illegible]	24	[illegible]	25	[illegible]	26	[illegible]	27	[illegible]	28	[illegible]
29	[illegible]	30	[illegible]	31	[illegible]	32	[illegible]	33	[illegible]	34	[illegible]	35	[illegible]
36	[illegible]	37	[illegible]	38	[illegible]	39	[illegible]	40	[illegible]	41	[illegible]	42	[illegible]
43	[illegible]	44	[illegible]	45	[illegible]	46	[illegible]	47	[illegible]	48	[illegible]	49	[illegible]
50	[illegible]	51	[illegible]	52	[illegible]	53	[illegible]	54	[illegible]	55	[illegible]	56	[illegible]
57	[illegible]	58	[illegible]	59	[illegible]	60	[illegible]	61	[illegible]	62	[illegible]	63	[illegible]
64	[illegible]	65	[illegible]	66	[illegible]	67	[illegible]	68	[illegible]	69	[illegible]	70	[illegible]
71	[illegible]	72	[illegible]	73	[illegible]	74	[illegible]	75	[illegible]	76	[illegible]	77	[illegible]
78	[illegible]	79	[illegible]	80	[illegible]	81	[illegible]	82	[illegible]	83	[illegible]	84	[illegible]
85	63.13	86	83.13	87	[illegible]	88	[illegible]	89	[illegible]	90	[illegible]	91	[illegible]
92	[illegible]	93	[illegible]										

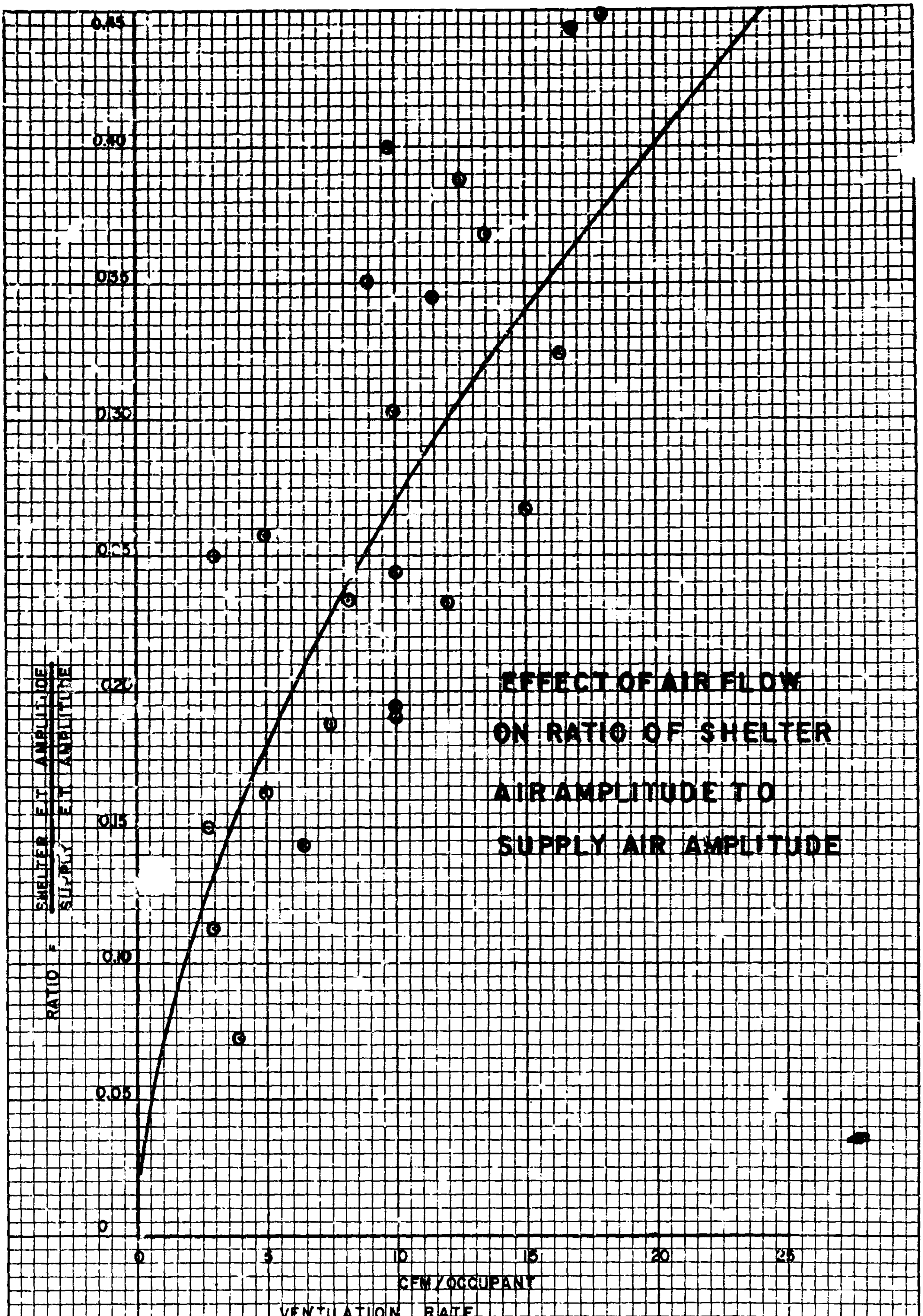
SEP 2,1964

1	91.99	2	64.26	3	93.41	4	78.63	5	68.	6	44.40	7	93.96
8	78.57	9	94.14	10	79.44	11	[illegible]	12	78.56	13	92.05	14	89.75
15	65.40	16	83.70	17	81.72	18	80.29	19	79.04	20	77.17	21	75.68
22	90.55	23	92.88	24	91.02	25	90.26	26	[illegible]	27	82.95	28	81.10
29	79.41	30	74.56	31	76.56	32	76.46	33	[illegible]	34	90.11	35	85.22
36	83.25	37	80.66	38	79.26	39	[illegible]	40	75.06	41	71.42	42	94.02
43	93.57	44	93.77	45	92.91	46	[illegible]	47	91.39	48	[illegible]	49	88.20
50	90.09	51	94.03	52	95.60	53	[illegible]	54	89.12	55	91.25	56	95.11
57	96.04	58	90.99	59	90.78	60	[illegible]	61	95.20	62	95.55	63	92.65
64	69.90	65	91.58	66	95.92	67	96.22	68	92.51	69	83.05	70	87.86
71	91.25	72	92.89	73	92.81	74	91.92	75	70.81	76	69.71	77	69.68
78	64.14	79	72.79	80	73.72	81	75.57	82	[illegible]	83	77.30	84	76.98
85	63.71	86	[illegible]	87	55.30	88	64.42	89	72.16	90	93.13	91	93.44
92	92.61	93	64.56										

SEP 3,1964

1	92.91	2	[illegible]	3	93.21	4	[illegible]	5	[illegible]	6	63.53	7	[illegible]
8	78.59	9	94.03	10	79.56	11	[illegible]	12	75.98	13	91.57	14	90.20
15	[illegible]	16	84.30	17	82.36	18	[illegible]	19	[illegible]	20	77.32	21	[illegible]
22	[illegible]	23	[illegible]	24	[illegible]	25	[illegible]	26	[illegible]	27	[illegible]	28	[illegible]
29	[illegible]	30	[illegible]	31	[illegible]	32	[illegible]	33	[illegible]	34	[illegible]	35	[illegible]
36	[illegible]	37	[illegible]	38	[illegible]	39	[illegible]	40	[illegible]	41	[illegible]	42	[illegible]
43	[illegible]	44	[illegible]	45	[illegible]	46	[illegible]	47	91.35	48	61.02	49	89.11
50	[illegible]	51	[illegible]	52	[illegible]	53	[illegible]	54	[illegible]	55	[illegible]	56	[illegible]
57	[illegible]	58	83.63	59	[illegible]	60	[illegible]	61	[illegible]	62	[illegible]	63	[illegible]
64	[illegible]	65	[illegible]	66	[illegible]	67	[illegible]	68	[illegible]	69	[illegible]	70	[illegible]
71	[illegible]	72	[illegible]	73	[illegible]	74	[illegible]	75	[illegible]	76	[illegible]	77	[illegible]
78	[illegible]	79	[illegible]	80	[illegible]	81	[illegible]	82	[illegible]	83	[illegible]	84	[illegible]
85	[illegible]	86	[illegible]	87	[illegible]	88	[illegible]	89	[illegible]	90	[illegible]	91	82.78
92	[illegible]	93	[illegible]										


PLOTTED DATA OF "B" AGAINST CFM FOR GIVEN "A" VALUES



EFFECT OF AIR FLOW ON RATIO OF SHELTER AIR AMPLITUDE TO SUPPLY AIR AMPLITUDE

Sample Calculation for Adiabatic Response Curve.

Problem: To find exhaust effective temperature, knowing characteristics of supply air and ventilation rate.

Gainesville, Florida
Supply Air 24 hr. Avg. Dry Bulb 86.6 °F
24 hr. Avg. Dew Point 72.0 °F
w_1 humidity ratio 0.017 lb. water/lb. dry air
v_1 specific volume 14.12 cu. ft./lb. dry air
h_1 enthalpy 39.4 BTU/lb. dry air

for a ventilation rate of 10 cubic feet/minute occupant

$$\frac{10 \text{ cu/min occ} \times 60 \text{ min/hr} \times 1 \text{ occ}}{14.12 \text{ cu ft/lb}} = 42.5 \text{ lb air/hr.}$$

each occupant releases 400 BTU/hr metabolic heat
therefore: $\Delta h = \frac{400}{42.5} = 9.4$ BTU's are added to each pound of ventilation air

$h_2 = h_1 + \Delta h$
$= 39.4 + 9.4 = \underline{48.8}$ $\underline{\text{BTU}}$ enthalpy of exhaust air

assume an exhaust dry bulb:

94.0 °F for 94 a human body yields .3145[*] lb water/hr or for

10 cfm .3145/42.5 = .0074 lb water/lb dry air

then: .0074 + .017 = .0244 lb water/lb air

from psychrometric chart h_2 = 49.6 (too high)

now assume 93° F for lower value of h_2

93° F a human yields .304 lb water/hr or $.304/42.5 = .00715 \frac{\text{lb water}}{\text{lb air}}$

then .0071 + .017 = .0241 from psychrometric chart h_2 = 48.9
92.5° F gives .2988 lb/hr or .00703 .017 + .0070 = .024

h_2 = 48.7 therefore interpolating 92.8 db 84.6 wb = 87 effective temperature

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[*] See table following

DESIGN VALUES OF HOURLY LATENT HEAT LOSS FOR 400 BTU/HR PERSON*

Dry Bulb Temperature °F	Latent Heat Loss per Hour		Dry Bulb Temperature °F	Latent Heat Loss per Hour	
	Btu	lb water		Btu	lb water
55.0	65.0	0.0621	75.0	135.0	0.1291
55.5	65.5	0.0626	75.5	139.5	0.1334
56.0	66.0	0.0631	76.0	144.0	0.1377
56.5	66.5	0.0636	76.5	148.5	0.1420
57.0	67.0	0.0641	77.0	153.0	0.1463
57.5	67.5	0.0646	77.5	157.5	0.1506
58.0	68.0	0.0650	78.0	162.0	0.1549
58.5	68.5	0.0655	78.5	166.5	0.1592
59.0	69.0	0.0660	79.0	171.0	0.1635
59.5	69.5	0.0664	79.5	175.5	0.1678
60.0	70.0	0.0669	80.0	180.0	0.1721
60.5	71.0	0.0679	80.5	185.0	0.1769
61.0	72.0	0.0688	81.0	190.0	0.1816
61.5	73.0	0.0699	81.5	195.0	0.1864
62.0	74.0	0.0707	82.0	200.0	0.1912
62.5	75.0	0.0717	82.5	205.0	0.1960
63.0	76.0	0.0727	83.0	210.0	0.2008
63.5	77.0	0.0736	83.5	215.0	0.2055
64.0	78.0	0.0746	84.0	220.0	0.2103
64.5	79.0	0.0755	84.5	225.0	0.2151
65.0	80.0	0.0765	85.0	230.0	0.2199
65.5	82.0	0.0784	85.5	235.5	0.2251
66.0	84.0	0.0803	86.0	241.0	0.2304
66.5	86.0	0.0822	86.5	246.5	0.2357
67.0	88.0	0.0841	87.0	252.0	0.2409
67.5	90.0	0.0860	87.5	257.5	0.2462
68.0	92.0	0.0880	88.0	263.0	0.2514
68.5	94.0	0.0899	88.5	268.5	0.2567
69.0	96.0	0.0918	89.0	274.0	0.2620
69.5	98.0	0.0937	89.5	279.5	0.2672
70.0	100.0	0.0956	90.0	285.0	0.2725
70.5	103.5	0.0989	90.5	290.5	0.2777
71.0	107.0	0.1023	91.0	296.0	0.2830
71.5	110.5	0.1056	91.5	301.5	0.2882
72.0	114.0	0.1090	92.0	307.0	0.2935
72.5	117.5	0.1123	92.5	312.5	0.2988
73.0	121.0	0.1157	93.0	318.0	0.3040
73.5	124.5	0.1190	93.5	323.5	0.3093
74.0	128.0	0.1224	94.0	329.0	0.3145
74.5	131.5	0.1257	94.5	334.5	0.3198

* from: Manual of Procedures and Instrumentation for Simulated Occupancy Tests of Survival Shelters, MRD Technical Report 1191-1, December 1962, Table A2.

DESIGN VALUES OF HOURLY LATENT HEAT LOSS FOR 400 BTU/HR PERSON (Continued)

Dry Bulb Temperature °F	Latent Heat Loss per Hour Btu	Latent Heat Loss per Hour lb water
95.0	340.0	0.3250
95.5	346.0	0.3308
96.0	352.0	0.3365
96.5	358.0	0.3423
97.0	364.0	0.3480
97.5	370.0	0.3537
98.0	376.0	0.3595
98.5	382.0	0.3652
99.0	388.0	0.3709
99.5	394.0	0.3767
100.0	400.0	0.3824
100.5	406.0	0.3881
101.0	412.0	0.3939
101.5	418.0	0.3996
102.0	424.0	0.4054
102.5	430.0	0.4111
103.0	436.0	0.4168
103.5	442.0	0.4226
104.0	448.0	0.4283
104.5	454.0	0.4340
105.0	460.0	0.4398

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13. ABSTRACT

A series of tests using simulated occupants were conducted on 24 underground survival shelters located in various geographical areas of the United States. The purpose of this test program was to evaluate changes in shelter environment brought about by shelter occupants. These shelters were loaded with simulated occupants in a manner similar to the loading anticipated during a national emergency brought about due to radioactive fallout as the result of a nuclear attack. A second objective of this program was to determine the minimum amount of mechanical equipment necessary to control the shelter environment to a level suitable for human survival. In accord with guidelines established by the Office of Civil Defense most of the test shelters were loaded on the basis of one occupant per ten square feet of floor area. However, special shelters such as the St. Louis Command Center were tested at lower loadings and during the course of the program other shelter loadings were used to investigate the effect of shelter loading on the environment within the shelter. Ventilation air was conditioned to conform to typical values of effective temperature for the test locale. Shelters were tested under simulated summer and winter climatic conditions. Simulated occupants were used and adjusted so as to release sensible and latent heat to the shelter atmosphere in quantities equivalent to those that would be released by human occupants.

Suitable ventilation air flow rates were determined for the shelters tested. An equation was developed based on the relationship between shelter environment, surrounding earth temperature, and ambient air effective temperature. This equation can be used to predict quantities of shelter ventilation air needed for maintenance of effective temperatures tolerable for human occupants of survival shelters. An arbitrarily selected value of 85 F effective temperature was considered the upper limit of human tolerance and was used to evaluate shelter environmental conditions.

It was further concluded that: (1) In most sections of the United States, the 3 cfm per occupant of ventilation air needed to control the chemical environment in underground shelters was not adequate to control the thermal environment in these shelters during summer occupancy, but was adequate for both chemical and thermal environmental control during the winter; (2) Prior use requiring heating or cooling of the shelter space or occupancy by human beings or other animals would be detrimental to the shelter environment when the space was converted to shelter use under emergency conditions; (3) A fire storm burning above an underground shelter would not adversely affect the thermal environment of the shelter, but could disturb the chemical environment; (4) Thermal conductivity of the earth surrounding a shelter was dependent to a large degree on the moisture content of the earth surrounding the shelter. The range of variation in soil conductivity throughout the test program geographic locations was within a range of 0.45 to 0.96 Btu $HR^{-1} FT^{-1} F^{-1}$. (5) Well water used in conjunction with water coils was effective in controlling shelter environment; (6) Evaporative type air coolers could be effective in controlling shelter environment but required more energy for operation that the muscular power of the occupants in a shelter could provide; (7) Desiccants as a means of humidity control or the operation of mechanical dehumidifiers in shelters would increase the shelter environment; (8) Fans and blowers should be adapted so that during interruption of the power service to shelters, these devices could be operated by the muscular activity of the shelter occupants, and such fans and blowers should be selected on the basis of overall operating efficiency rather than their rated air delivery.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
HUMIDITY						
EFFECTIVE TEMPERATURE						
VENTILATION						
DEW POINT						
SIMULATED OCCUPANTS						
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CHEMICAL ENVIRONMENT						
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WET BULB TEMPERATURE						
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