DISCLAIMER

This book was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DOE/ES/34135-6

TECHNICAL PROGRESS REPORT NO. 6

Project title:

MASTER

Solar Atrium: A Hybrid Solar Heating and Cooling System

Grant No. EG-77-G-04-4135

Period covered: 12-19-78 to 3-19-79

Report date: 3-19-79

Reporting organization:

Ueland and Junker, Architects and Planners
1616 Walnut Street
Philadelphia, Pennsylvania 19103

Author: Mark Ueland, A.I.A.

Monitoring Consultant:

D. C. Larson, Associate Professor
Dept. of Physics and Atmospheric Science
Drexel University
Philadelphia, Pennsylvania 19104

Engineering Consultant:

Robert G. Werden, Associates, Inc.
Consulting Engineers
P.O. Box 414
Jenkintown, Pennsylvania 19046

This report was prepared with the support of the Solar Heating and Cooling Research and Development Branch, Office of Conservation and Solar Applications, U.S. Department of Energy, Grant No. EG-77-G-04-4135. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the authors and do not necessarily reflect the views of U. S. Department of Energy.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

- NOTICE -

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States nor any agency thereof, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for any third party's use or the results of such use of any information, apparatus, product or process disclosed in this report or represents that its use by such third party would not infringe privately owned rights.

TABLE OF CONTENTS

Report Distribution

Abstract

Technical Progress Report

- 1. Progress since Last Report**
- 2. Schedule for Next Reporting Period**

Appendix

- 1. Photos of construction site**
- 2. Drawings and diagrams of revised heating and cooling system**

REPORT DISTRIBUTION

Destination

Number of Copies

U.S. Department of Energy
R & D Branch
Division of Solar Energy
ATTN.: Michael Maybaum
20 Massachusetts Avenue
Washington, D.C. 20545

2 copies

Los Alamos Scientific Laboratory
ATTN.: Dr. Douglas Balcomb
P.O. Box 1663
Los Alamos, New Mexico

1 copy

U. S. Department of Energy
Chicago Operations and Regional Office
ATTN.: H. N. Miller, Asst. Manager
for Acquisition and Assistance
9800 South Cass Avenue
Argonne, Illinois 60439

2 copies

ABSTRACT

A program of applied research has been developed for the design, construction and monitoring of an innovative concept of solar heating and cooling called "solar atrium."

The solar atrium concept is adaptable to residences and smaller commercial and institutional buildings. It is designed to be constructed of materials and equipment that are economical and readily available. Cost-effectiveness of installation and operation is a primary design objective.

The solar atrium is a further development of efforts begun in the 1930's and 1940's to design houses that would obtain a major portion of their heating from the sun.

The early "solar house" experiments proved the benefits of large glazed areas for trapping solar energy. However, they were not equipped to collect and store surplus solar energy, nor were they equipped to control heat losses through glass areas at night or during cloudy days. The solar atrium incorporates the large glass areas of the earlier houses and adds facilities for heat storage and control of heat losses through glass.

The solar atrium has been designed and will be constructed for testing within a demonstration model single family residence. The atrium and residence will be instrumented and monitored to obtain data on the system operation and electricity costs over a full year heating and cooling season. Life-cycle costs will be generated, including costs of installation, operation and financing. Cost-effectiveness will be measured by comparing the life-cycle costs generated for the experimental residence with those of a similar residence of conventional design without the solar atrium. Comparisons will also be made with other existing passive and hybrid solar homes.

1. PROGRESS SINCE LAST REPORT

1.1 Since the last quarterly report, construction of the test model house continued. As of the date of this report the construction work items have been completed as follows:

Excavation	100%
Concrete footings	100%
Foundation walls	100%
Basement slab	100%
Driveway excavation and stone base	100%
Septic system	100%
Rough framing	80%
Rock box	50%
Plumbing rough-in	20%

In addition to the above, windows, exterior doors, millwork items have been delivered and stored on site. Attached photos of construction site illustrate construction progress as of the date of this report.

1.2 A contract for the heating and cooling system has been let for \$7,100. This figure is well below the budget figure of \$8,000, upon which our early assessments of cost-effectiveness were based. A plan of the revised heating system design is attached.

2. SCHEDULE FOR NEXT REPORTING PERIOD

2.1 In the next reporting period construction of the test model house will continue. Completion of the test model is projected now for July or August of 1979, depending on weather conditions and availability of materials.

We foresee no special problems affecting this schedule at this time.

APPENDIX 1

Photos of Construction Site

View to North West

View to Southeast

View to East

View to North

View of rock box

View of atrium - looking up

View of atrium - looking south

APPENDIX 2

Drawings and Diagrams of Revised
Heating and Cooling System