

General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.
- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.
- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.
- This document is paginated as submitted by the original source.
- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

DOE / NASA CONTRACTOR REPORT

DOE/NASA CR-150812

THERMAL ENERGY STORAGE SUBSYSTEMS (Quarterly Reports)

Prepared by

Artech Corporation
2816 Fallfax Drive
Falls Church, VA 22042

Under Contract NAS8-32254 with

National Aeronautics and Space Administration
George C. Marshall Space Flight Center, Alabama 35812

For the U. S. Department of Energy

(NASA-CR-150812) THERMAL ENERGY STORAGE N79-10517
SUBSYSTEMS Quarterly Reports, 1 Jan. - 30
Jun. 1978 (Artech Corp.) 17 p HC A02/MF A01
CSCL 10A Unclass
G3/44 33858



U.S. Department of Energy



Solar Energy

NOTICE

This report was prepared to document work sponsored by the United States Government. Neither the United States nor its agents the United States Department of Energy, the United States National Aeronautics and Space Administration, nor any federal employees, nor any of their contractors, subcontractors or their employees, make any warranty, express or implied, or assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product or process disclosed, or represent that its use would not infringe privately owned rights.

1. REPORT NO. DOE/NASA CR-160812		2. GOVERNMENT ACCESSION NO.		3. RECIPIENT'S CATALOG NO.	
4. TITLE AND SUBTITLE Thermal Energy Storage Subsystems (Quarterly Reports)			5. REPORT DATE July 1978		6. PERFORMING ORGANIZATION CODE
			7. AUTHOR(S)		
9. PERFORMING ORGANIZATION NAME AND ADDRESS Artoch Corporation 2816 Fallfax Drive Falls Church, VA 22042			10. WORK UNIT NO.		
			11. CONTRACT OR GRANT NO. NAS8-32254		
12. SPONSORING AGENCY NAME AND ADDRESS National Aeronautics and Space Administration Washington, D. C. 20546			14. SPONSORING AGENCY CODE		
			15. SUPPLEMENTARY NOTES This work was accomplished under the technical management of Mr. Albert Krupnick, George C. Marshall Space Flight Center, Alabama.		
16. ABSTRACT This report contains two quarterly reports covering the progress made in the development, fabrication, and delivery of three Thermal Energy Storage Subsystems. The report discusses the design, development, and progress toward the delivery of three subsystems. The subsystem uses a salt hydrate mixture for thermal energy storage. Included are the program schedules, technical data, and other program activities from January 1, 1978, through June 30, 1978. Cost information has been removed from this report.					
17. KEY WORDS			18. DISTRIBUTION STATEMENT UC-59c Unclassified-Unlimited <i>William A. Brooksbank, Jr.</i> WILLIAM A. BROOKSBANK, JR. Mgr, Solar Heating and Cooling Projects Office		
19. SECURITY CLASSIF. (of this report) Unclassified		20. SECURITY CLASSIF. (of this page) Unclassified		21. NO. OF PAGES 15	22. PRICE NTIS

TABLE OF CONTENTS

A.	Sixth Quarterly Report	
	Summary	1
	Contract Status	2
	Schedules	3
	Technical Performance	5
B.	Seventh Quarterly Report	
	Summary	8
	Contract Status	9
	Schedules	10
	Technical Performance	12



ARTECH CORP. 2816 Fallfax Drive Falls Church, Virginia 22042 (703) 560-3292

THERMAL ENERGY STORAGE SUBSYSTEMS

Sixth Quarterly Report

Covering the Period January 1 - March 31, 1978

by

Fred Ordway and Leslie J. Toth

April 12, 1978

Prepared for

George C. Marshall Space Flight Center
Huntsville, Alabama 35812

Contract No. NAS8-32254

ARTECH No. J7750-QR6

v

SECTION I

SUMMARY

In-house assembly of the test loop is proceeding as components are delivered. Satisfactory plastic containers have still not been received from the vendor. This delay has forced postponement of the First Article Review. All contract requirements applicable during the report period have been fulfilled.

SECTION 11
CONTRACT STATUS

This section has been deleted.

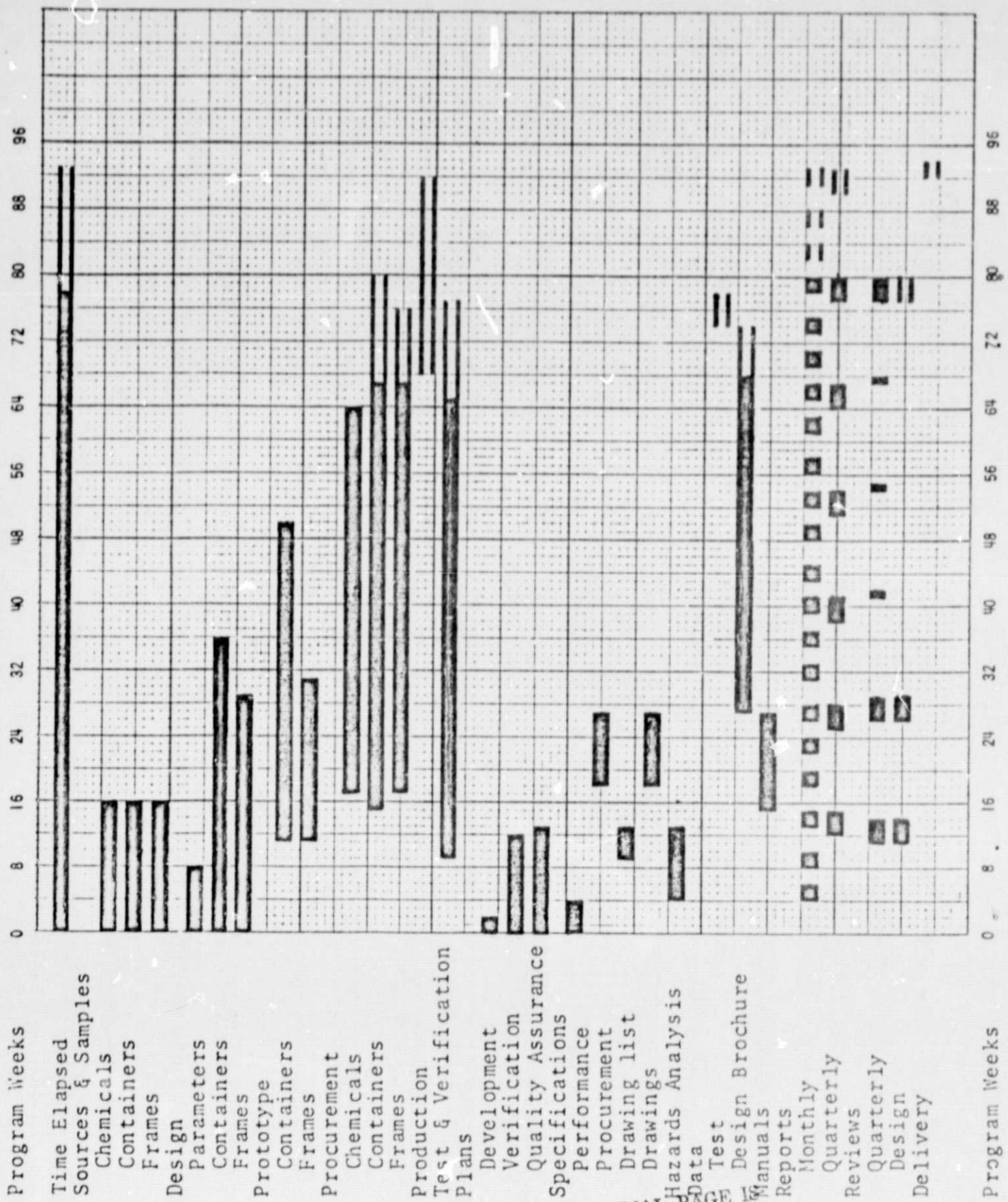
SECTION III

SCHEDULES

Further delays have been encountered in the procurement of suitable plastic containers for initial testing. This caused the postponement of the First Article Review.

The chart on the following page shows by blackened lines the estimated progress of the major work elements and contract management functions against the previously established schedule estimates. A schedule revision will be proposed when the effectiveness of measures to obviate container production problems, which are now being taken by the vendor, becomes clear. This is expected to occur by May 20. If the problem has then been solved, the initial production, cycling, and testing required for the First Article Review may be completed by July 15.

ARIECH CORP., LES PROGRAM PROGRESS CHART



ORIGINAL PAGE IS OF POOR QUALITY

SECTION IV
TECHNICAL PERFORMANCE

A. Work Accomplished

1. Design and Development

A six-foot high TESmodTM frame, loaded to simulate its weight with 24 filled containers, was tested for structural integrity and found to have ample rigidity for handling. Calculations of compressive forces on the frame in transit indicate that it could sustain a vertical acceleration of several G. Resistance to racking and bending of the vertical members will be evaluated by manipulating the assembly with a heavy crane, using a "spreader bar" designed for applications requiring that the TESmodTM be lifted into place from above.

2. Materials Procurement

All production chemicals have been received.

3. Production

Samples of the plastic containers made with a new mold were received from the vendor. Each of the samples had at least a few pinholes. The vendor attributes such pinholes to porosity of the mold, wherein air becomes trapped and by its subsequent expansion causes voids or openings in the wall of the resulting container.

4. Quality Assurance

The approved quality control plan is ready to be implemented.

5. Test and Verification

The test loop design was modified to improve temperature control. The construction of the test loop is proceeding as components are delivered.

Supersession of the test procedure description of NBS Technical Note 899 by ASHRAE Standard 94-77 was approved and baselined.

B. Forecast of Activities

During the next quarter, the following tasks will be performed:

1. Production and approval of container first lot.
2. Final assembly and debugging of test loop.
3. Filling and cycling of test lot.

C. Problem Areas

Delay in the production of suitable containers is the main problem area. Test loop construction is behind the previously established schedule but is in conformance with the progress of production. Every effort is being made to expedite these activities.

D. Data Submittals

Data and status reports were submitted according to contract requirements during the report period.



ARTECH CORP 2816 Fallfax Drive Falls Church, Virginia 22042 (703) 560-3292

THERMAL ENERGY STORAGE SUBSYSTEMS

Seventh Quarterly Report

Covering the Period April 1 - June 30, 1978

by

Fred Ordway and Leslie J. Toth

July 14, 1978

Prepared for

George C. Marshall Space Flight Center
Huntsville, Alabama 35812

Contract No. NAS8-32254

ARTECH No. J7750-QR7

SECTION I

SUMMARY

Satisfactory plastic containers have still not been received from the vendor. Assistance in solving the vendor's production problem is being obtained from several sources. This delay necessitated a request for contract extension to January 15, 1979. All requirements applicable during the report period under the contract with the requested amendment have been fulfilled.

SECTION II
CONTRACT STATUS

This section has been deleted.

SECTION III

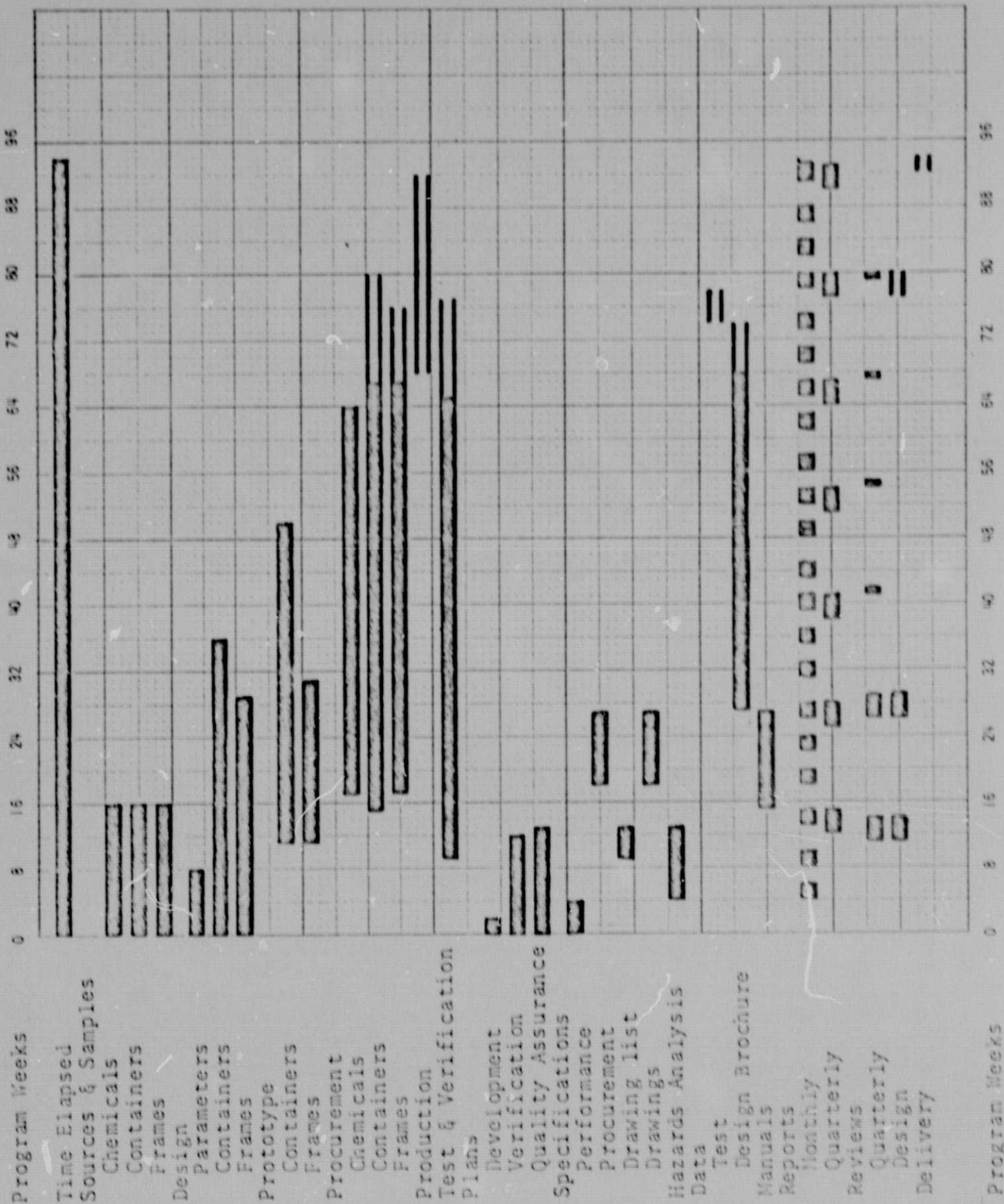
SCHEDULES

The delay in procurement of plastic containers for initial testing has necessitated a request for contract extension to January 15, 1979. It is understood that a contract amendment to that effect is in preparation, although it has not yet been received.

The First Article Review has been rescheduled for November 15, 1978.

The chart on the following page shows by blackened lines the estimated progress of the major work elements and contract management functions against the previously established schedule estimates. The schedule chart will be revised upon receipt of the requested contract amendment.

AMERICAN CORP. TES PROGRAM PROGRESS CHART



SECTION IV
TECHNICAL PERFORMANCE

A. Work Accomplished

1. Design and Development

The vendor supplying plastic containers for the thermal energy storage materials has been unable to supply a satisfactory product in spite of prolonged experimentation with mold coatings, vacuum impregnation, and recasting of molds. Assistance in identifying the exact cause of the defects and solving the production problem is being obtained from the resin supplier, the applications laboratory of the maker of the molding machine, and plastics specialists at Marshall Space Flight Center.

2. Materials Procurement

All production chemicals have been received.

3. Production

Production of modules for testing is being delayed by the inability to obtain satisfactory containers.

4. Quality Assurance

The approved quality control plan is ready to be implemented.

5. Test and Verification

The construction of the test loop was completed and the instrumentation installed.

B. Forecast of Activities

During the next quarter, the following tasks will be performed:

1. Production and approval of container first lot.
2. Debugging of test loop.
3. Filling and cycling of test lot.

C. Problem Areas

Delay in the production of suitable containers is the main problem area. Every effort is being made to expedite this activity.

D. Data Submittals

Data and status reports were submitted according to contract requirements during the report period.