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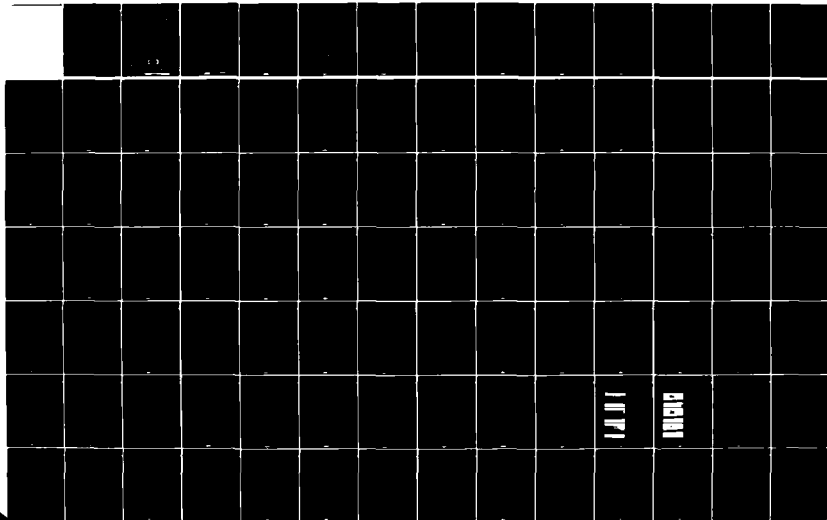
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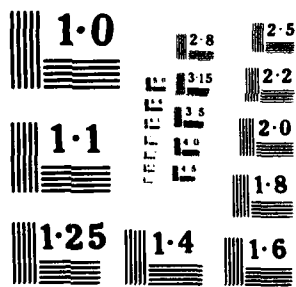
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**DAVID W. TAYLOR NAVAL SHIP  
RESEARCH AND DEVELOPMENT CENTER**

Bethesda, Maryland 20884



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**FINGER MATERIALS FOR AIR CUSHION VEHICLES VOLUME I:  
FLEXIBLE COATINGS FOR FINGER MATERIALS**

by

Paul K. Conn and Ivan Snell  
Bell Aerospace Textron

and

William Klemens, DTNSRDC

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**SHIP MATERIALS ENGINEERING DEPARTMENT  
RESEARCH AND DEVELOPMENT REPORT**

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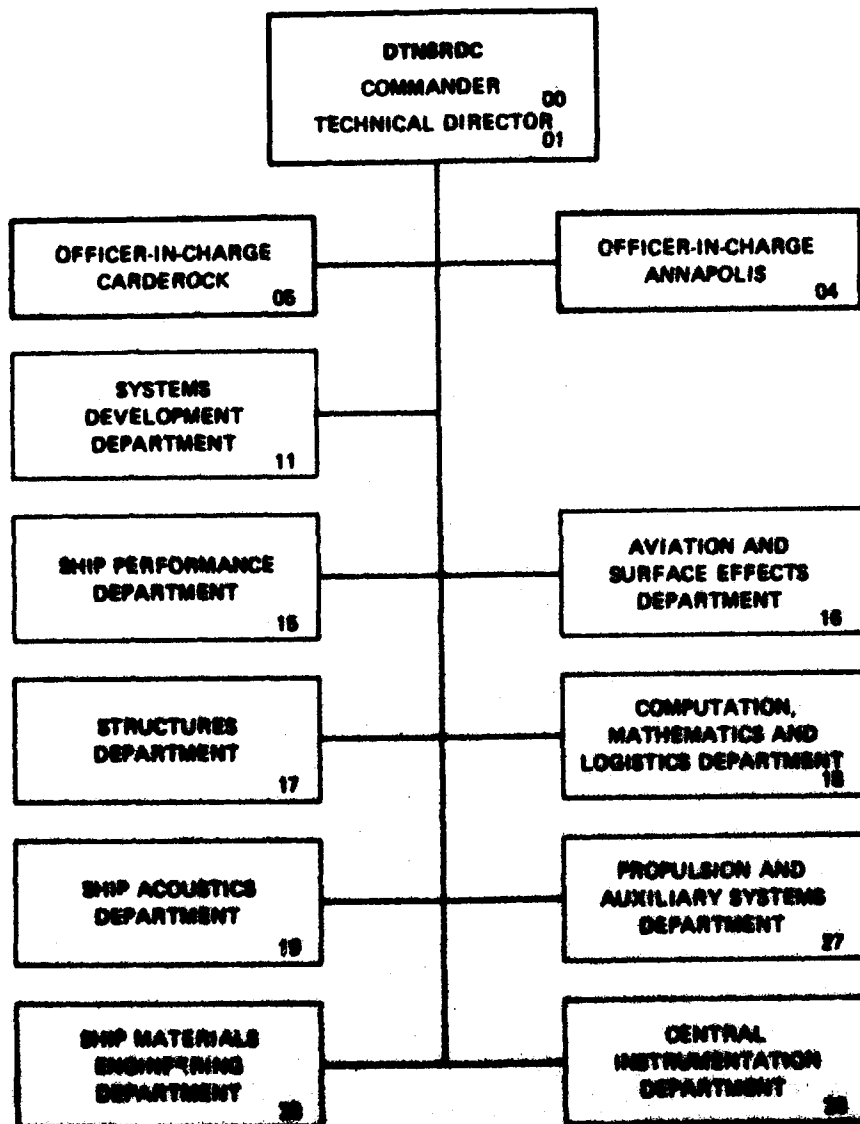
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FINGER MATERIALS FOR AIR CUSHION VEHICLES VOLUME I:  
FLEXIBLE COATINGS FOR FINGER MATERIALS

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| 4. TITLE (and Subtitle)                                                                                                                                                                                                                                                                                                                                                          | 5. TYPE OF REPORT & PERIOD COVERED | 6. PERFORMING ORG. REPORT NUMBER                          |
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| 19. ABSTRACT (Continue on reverse side if necessary and identify by block number)                                                                                                                                                                                                                                                                                                |                                    |                                                           |
| <p>1. Castable Liquid Polyurethanes</p> <p>2. Air Cushion Vehicle Flexible Materials</p> <p>3. Sealant Seal Materials</p>                                                                                                                                                                                                                                                        |                                    |                                                           |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)                                                                                                                                                                                                                                                                                                |                                    |                                                           |
| <p>Twenty polymer formulations from ten selected gum rubber polymers or polymer blends and fourteen formulations of castable liquid polyurethane polymers were characterized as coatings for the coated fabric that is the type material used to make flexible fingers for air cushion vehicles. The formulations were screened for crack</p> <p>(Continued on reverse side)</p> |                                    |                                                           |

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1. The first part of the report is a general introduction to the subject of the study. It discusses the importance of the study and the objectives of the research. It also provides a brief overview of the methodology used in the study.

2. The second part of the report is a detailed description of the study area. It includes information about the location of the study area, the population of the study area, and the characteristics of the study area. It also discusses the data sources used in the study.

3. The third part of the report is a detailed description of the study results. It includes information about the findings of the study, the conclusions drawn from the findings, and the implications of the findings. It also discusses the limitations of the study and the need for further research.

4. The fourth part of the report is a conclusion and recommendations section. It summarizes the main findings of the study and provides recommendations for future research. It also discusses the implications of the findings for policy and practice.

5. The fifth part of the report is a bibliography section. It lists the references used in the study, including books, articles, and other sources of information.

6. The sixth part of the report is an appendix section. It includes additional information that is not included in the main body of the report, such as raw data, detailed calculations, and other supporting materials.

7. The seventh part of the report is a list of figures and tables. It provides a summary of the figures and tables included in the report, along with their locations and descriptions.

8. The eighth part of the report is a list of abbreviations and acronyms. It provides a summary of the abbreviations and acronyms used in the report, along with their full names and descriptions.

9. The ninth part of the report is a list of symbols and units. It provides a summary of the symbols and units used in the report, along with their meanings and descriptions.

10. The tenth part of the report is a list of footnotes. It provides a summary of the footnotes included in the report, along with their locations and descriptions.

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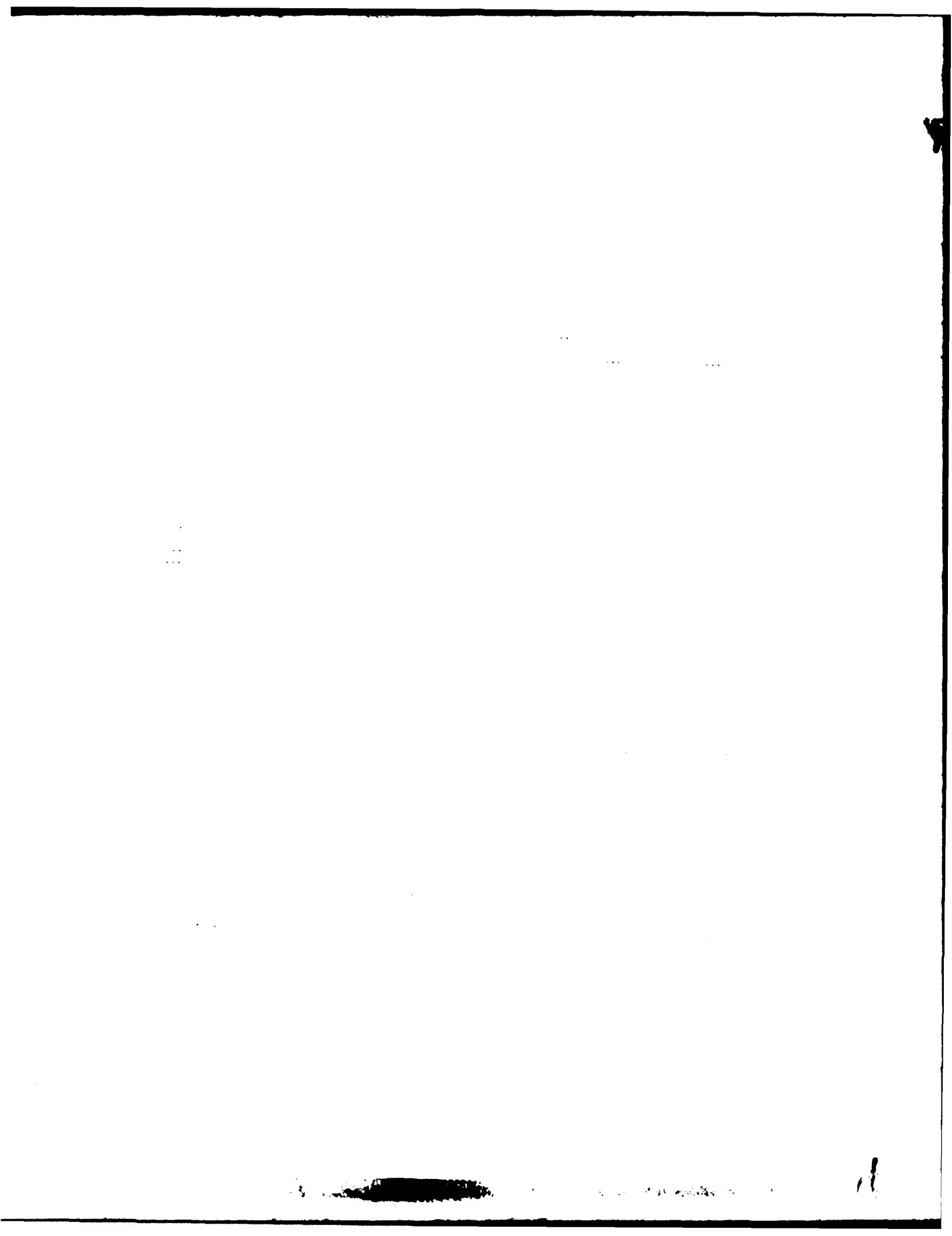
# ABBREVIATIONS AND ACRONYMS

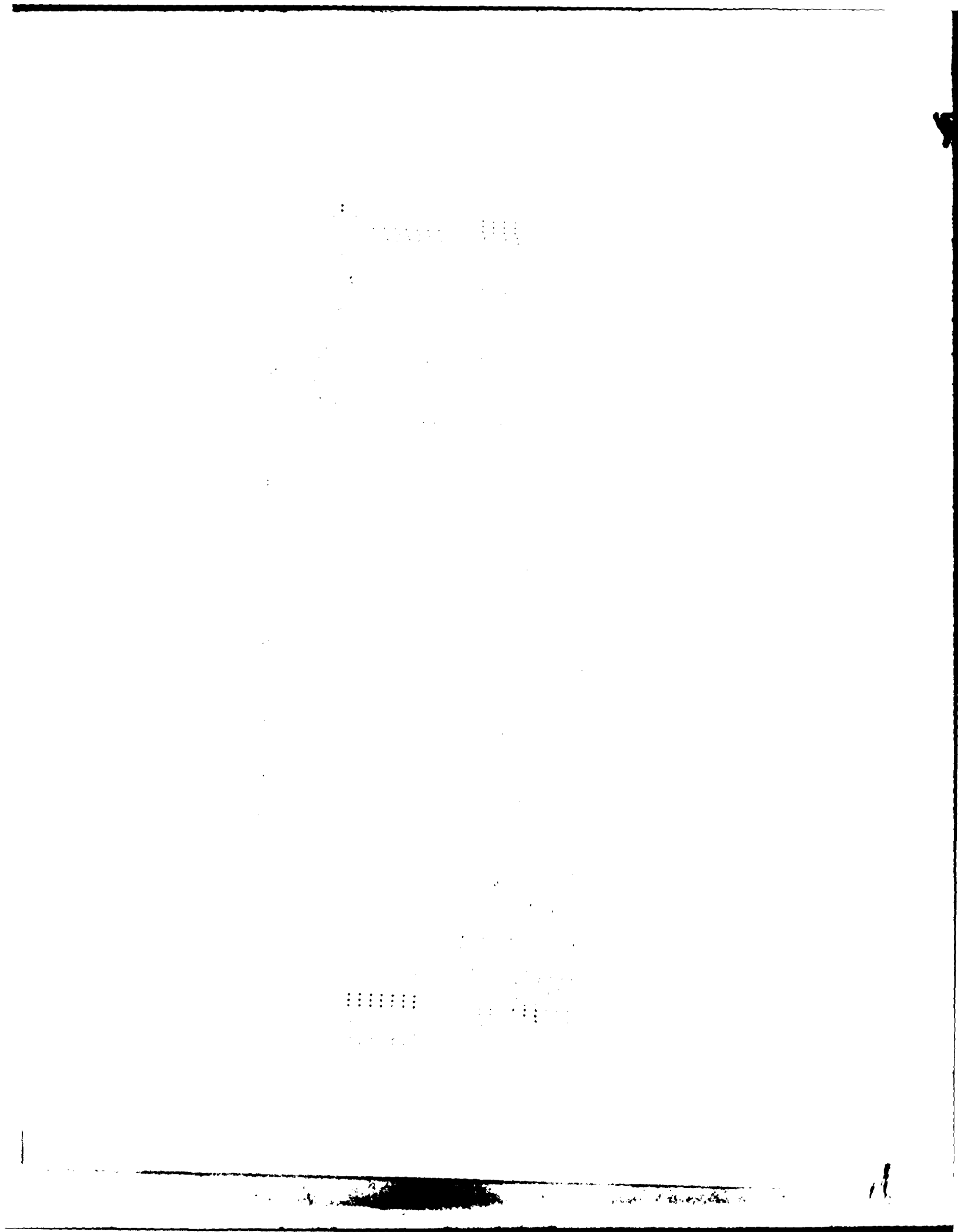
|                  |                                            |
|------------------|--------------------------------------------|
| AV               | Air-Cushion Vehicle                        |
| ASTM             | American Society for Testing and Materials |
| AVL              | Bell Aerospace Testron                     |
| B                | Benzene ring                               |
| C                | Carbon                                     |
| C <sub>10</sub>  | Decalin                                    |
| C <sub>12</sub>  | Dodecane                                   |
| C <sub>16</sub>  | Hexadecane                                 |
| C <sub>18</sub>  | Octadecane                                 |
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| C <sub>426</sub> | hexacosane                                 |
| C <sub>428</sub> | octacosane                                 |
| C <sub>430</sub> | triacontane                                |
| C <sub>432</sub> | triacontane                                |
| C <sub>434</sub> | tetracosane                                |
| C <sub>436</sub> | hexacosane                                 |
| C <sub>438</sub> | octacosane                                 |
| C <sub>440</sub> | triacontane                                |
| C <sub>442</sub> | triacontane                                |
| C <sub>444</sub> | tetracosane                                |
| C <sub>446</sub> | hexacosane                                 |
| C <sub>448</sub> | octacosane                                 |
| C <sub>450</sub> | triacontane                                |
| C <sub>452</sub> | triacontane                                |
| C <sub>454</sub> | tetracosane                                |
| C <sub>456</sub> | hexacosane                                 |
| C <sub>458</sub> | octacosane                                 |
| C <sub>460</sub> | triacontane                                |
| C <sub>462</sub> | triacontane                                |
| C <sub>464</sub> | tetracosane                                |
| C <sub>466</sub> | hexacosane                                 |
| C <sub>468</sub> | octacosane                                 |
| C <sub>470</sub> | triacontane                                |
| C <sub>472</sub> | triacontane                                |
| C <sub>474</sub> | tetracosane                                |
| C <sub>476</sub> | hexacosane                                 |
| C <sub>478</sub> | octacosane                                 |
| C <sub>480</sub> | triacontane                                |
| C <sub>482</sub> | triacontane                                |
| C <sub>484</sub> | tetracosane                                |
| C <sub>486</sub> | hexacosane                                 |
| C <sub>488</sub> | octacosane                                 |
| C <sub>490</sub> | triacontane                                |
| C <sub>492</sub> | triacontane                                |
| C <sub>494</sub> | tetracosane                                |
| C <sub>496</sub> | hexacosane                                 |
| C <sub>498</sub> | octacosane                                 |
| C <sub>500</sub> | triacontane                                |













diisopropylene oxide polymer and was ineffective with the chlorinated polyethylene polymer. This is contrary to published results for a natural rubber-SBR-butadiene blend.\* The concentration used has not yet been best for the particular polymers.

The crack growth and flexural fatigue results for the castable liquid polymer formulations are summarized in Table 4. These formulations were prepared by reacting high molecular weight hydroxy-terminated polyethers, polyacrylates or polybutadienes with a catalyst to effect crosslinking; the prepolymer resulting from these reactions were cured subsequently with either a low molecular weight hydroxy-terminated hydrocarbon or isocyanate as discussed in Appendix B. In several instances, a reactive phenol was added to the polymer. These particular formulations had suitable solubility kinetics for casting, and crack growth and flexural fatigue specimens were cut in the appropriate mold immediately after curing and deaerating the blend. The formulations were cured at room temperature for several days prior to testing; however, the formulations were post-cured at 150°C (312°F) for 24 hr to achieve high temperature cure.

The results in Table 4 show that 11 of the 13 formulations had better crack growth resistance than the standard BAI-100, and two (CB-100, PB-100, PB-108, and CB-109) were substantially better. In contrast, only one of the formulations (PB-108) had better flexural fatigue resistance, and two (CB-100 and CB-109) had approximately the same flexural fatigue resistance as the standard. The results of the preliminary screening tests, for rubber formulations BAI-100, BAI-101, BAI-102, BAI-103, BAI-104, BAI-105, and BAI-109, and castable liquid polyurethane formulations CB-100, CB-101, PB-108, PB-109, and PB-109, were selected for characterization and for primary and secondary characterization tests listed in Appendix C.

Results from the primary characterization tests of the polymer formulations are summarized in the next four tables. In Table 5 are summarized the hardness, tensile properties, tear properties, pier-abrasion index, and coating adhesion. Values for the tear property system tests, as measured on the Goodrich Flexometer, are summarized in Table 6. Resilience is summarized in Table 7 for the Tapko rebound method and in Table 8 for the Yerzley method. In these tables, the results for the polymers are compared to results for the control formulation, ECB-302.

\*Ward, G.G., Lohan, R.D., "Effects of Molybdenum Disulfide on Elastomer Flex Life and Other Properties," paper presented at a meeting of the Rubber Division, American Chemical Society, New Orleans, LA (7-19 Oct. 1970).

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# THE NATIONAL BUREAU OF INVESTIGATION UNITED STATES DEPARTMENT OF JUSTICE

| Matters |             | Status |        | Remarks |        |
|---------|-------------|--------|--------|---------|--------|
| No.     | Description | Open   | Closed | Open    | Closed |
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| 99      | ...         | ...    | ...    | ...     | ...    |
| 100     | ...         | ...    | ...    | ...     | ...    |

1

[illegible][illegible]

Two different types of wax were used in the experiments: 1) a hard paraffin wax (Carnauba) and 2) a soft paraffin wax (petroleum). The wax formulations were prepared by dissolving the wax in a solvent, the wax/solvent ratio was 100/100 parts by weight. The wax/solvent ratio was 100/100 parts by weight. The wax formulations were selected after a preliminary test of the wax/solvent ratio. The wax formulations were selected for the experiments after a preliminary test of the wax/solvent ratio. Finally, two formulations were selected for the experiments: 1) a hard paraffin wax (Carnauba) and 2) a soft paraffin wax (petroleum). The wax formulations were selected after a preliminary test of the wax/solvent ratio. The wax formulations were selected for the experiments after a preliminary test of the wax/solvent ratio.

The main objective of this research is to determine resistance results for the 100 mm rubber mulch at 100 mm and 150 mm (Table 1). A more detailed listing of the experimental results is presented in Appendix A. The formulations were developed and prepared by a commercial concrete manufacturer, in conjunction with the assistance of customer service, utilizing the manufacturer's guidelines and the recommended curing conditions. In appropriate mixtures, the control formulation (B-0) was mixed by a commercial company; the rate was based on the thermometer data obtained in the mix.

#### RESULTS OF EXPERIMENTAL WORK

Fingers on air cushion vehicles are subjected to very high frequencies of vibration for example, 200 cps at relatively large amplitudes. When rubber coated fabrics are subjected to cyclic stresses through repeated or intermittent flexing, the development of cracks in the coating and delamination from the fabric become frequent causes of failure. During rapid flexing, the ability to sustain rapid strain rates and rapid strain recovery rates without crack formation is important. At high rates of flexing, heat build-up may occur so that high temperature (60-100°C) (14-212°F) properties may be important.

Desirable properties of polymer coatings have been inferred from current knowledge of the seal motions and observed damage. The polymer coating should have high flexural, compressive, and tensile fatigue resistance; high flex crack and crack growth resistance; low flexural modulus; high impact resistance; high abrasion resistance; high tear strength; low hysteresis or excellent high temperature properties; high bond strength to itself and to nylon fabric reinforcement; and resistance to environmental resistance (water, sunlight, ozone, fuel).

The principal criteria for evaluation of the polymers were comparisons of measured properties to the measured properties of known materials which had service applications. In the case of gum rubber polymers, the known material was a natural/ synthetic rubber blend formulation which was developed by Bell Aerospace Textcon on a proprietary and designated PCB-101. This formulation was coated on woven nylon fabric and used successfully as bow and side fingers on the British SR.N4 cross-cushion vehicle and on the Army LACV-3 amphibious air cushion vehicle. Among elastomeric polyurethanes, the known material was a polyurethane formulation developed by Bell Aerospace Textcon and designated RM-146. This formulation was coated on woven nylon fabric and used successfully as side fingers on an Army LACV-30. The woven nylon fabric used with the two different rubber coatings for the LACV-30 fingers had the same weight and configuration, and was designated fabric 178b.\* This fabric is a 10 x basket weave of 11 oz yd<sup>2</sup> and was also used as the fabric in this program.

The work is reported under three tasks and five appendices. The experimental results are summarized and discussed in this section. The rationale for polymer

\*Woven by Fabric Development Laboratory, Quakertown, PA.

#### INTRODUCTION

Surface effect ships and air cushion vehicles require a flexible seal or skirt structure to contain the cushion of air in which the craft is supported. The flexibility is necessary to minimize contact (reduce drag) between the vehicle structure and the surface being traversed, which is normally various types of ground terrain or water.

The flexible seals of these craft have typically been fabricated from rubber coated woven fabric laminate materials which were developed originally for applications such as conveyor belts and liquid storage containers. The air cushion craft are exposed to dynamic environments that are more demanding than those for the original applications. These more demanding requirements result from increased mechanical loads, from increased rate of load application, and from environmental extremes which may lead to intolerable or undesirable chemical and physical changes. Hence, substantial improvements of these flexible materials are required to provide adequate structural performance and long operational life with minimum weight and maintenance.

The objective of this program was to develop optimum rubber coatings for flexible seal/skirt applications for surface effect ships and vehicles. The primary emphasis was on gum rubber formulations based on selected synthetic rubber polymers and unstable liquid polyurethane polymers for use as woven fabric coatings. The program included a thermally conductive formulation, formulations for use without reinforcement (homogeneous materials), reinforcements other than woven fabrics, and evaluation of rubber coated fabrics.

Rubber formulations were initially evaluated alone, and then as coatings on nylon fabric. The evaluations were performed by using standard ASTM tests for selected mechanical properties. Since no correlation had been established between standard mechanical properties and service life on a vehicle, the evaluations were accomplished by comparing results from the experimental materials to results obtained from an existing natural/butadiene rubber blend coated nylon fabric which had been used successfully on an Army LACV-30 air cushion vehicle. Test pieces and sample materials were fabricated for evaluation by Bell Aerospace Textron and the DTNSRDC Annapolis Laboratory.

## FOREWORD

The high speed and versatility of Air Cushion Vehicles (ACV) offer significant potential for military applications. However, in amphibious transit over land and water, the lower appendages, called fingers, are subjected to severe flexing and churning, shortening the life of the finger. As a result, craft performance is hampered and life cycle cost increase. The objective of this exploratory development project was to develop sufficient information on fabric and coatings to guide development and selection of coated fabrics as finger materials for Navy air cushion craft.

This volume, the first of three, describes a comprehensive evaluation of candidate finger materials for air cushion vehicles. The approach taken, in which materials were screened in preliminary dynamic tests in order to identify candidates for further research, was a sensible and economic approach. Basically, in this work, the fabric was held constant and the coating was varied. Volume II of this publication describes the effect from fabric structure on the performance of finger materials, where, the coating was held constant and the fabric was varied. A natural rubber/polybutadiene blend coating was common to both endeavors and served as a reference control tying both efforts together. Volume III (to be published) describes the coated fabric as a finger material. Performance was measured in the laboratory's dynamic testing facility called the "Shrimp Tank" and in the traction operation of air cushion vehicles. The information generated from Volume II was used to define coated fabric constructions which were subsequently fabricated and tested as detailed in the third volume.

Testing and evaluation performed after completion of the work reported here has shown that natural rubber/polybutadiene blend formulations. This is because these coatings have offered the greatest resistance to fatigue. Although, this report contains results which indicate that natural rubber/polybutadiene blend formulations do not necessarily offer the greatest resistance to fatigue. No correlation has been noted between those results reported here and the subsequent testing.

## 1

## ABSTRACT

Twenty polymer formulations from ten selected gum rubber polymers or polymer blends and fourteen formulations of castable liquid polyurethane polymers were characterized as coatings for the coated fabric that is the type material used to make flexible fingers for air cushion vehicles. The formulations were screened for crack growth and flexural fatigue resistance; the results were compared to results from a natural rubber control formulation. The results showed that the polyurethane polymers were superior to the gum rubber polymers in both crack growth and flexural fatigue resistance.

In addition, selected polymers were evaluated with seismic and secondary characterization tests, and the results compared to results from the control formulation. One polymer also was used to evaluate the use of a carbonated carbon black to improve thermal conductivity. Finally, five of the polymer formulations and the control material were applied to cotton fabric and evaluated.

Several polymers had better crack growth resistance and/or better flexural fatigue resistance than the control polymer. A carbonated polyurethane polymer coated on nylon fabric had properties equivalent to the control polymer coated on nylon fabric. Hysteresis tests at different rates of deformation yielded results which indicated that the standard tests were not identical. Polymers with improved performance on air cushion vehicles. Two polymer-coated woven fabric materials exhibited significantly lower tensile strength at 10°C than at 20°C.

Woven fabric, knit, and knit structures were evaluated as reinforcement for polymer coating; the knit reinforcement were not as efficient in increasing the tensile strength as woven fabrics. Castable polymers were evaluated as a homogeneous material without a fiber reinforcement and were found to exhibit poor crack growth and flexural fatigue resistance.

Resilience results on the polymers (Verzley method) are given in Table 6. In this test, an initial 2% compressive deformation is applied to the specimens; upon release, the specimen begins a train of cycles, which decays due to hysteresis. The results suggest that, in partial agreement with the Lupke results, one chlorinated polyethylene (BAL-45), is similar to the control formulation ECB-01; the similarity exists in resilience (energy recovered) but not in the speed of rebound, for which BAL-45 exhibited a greater speed of recovery. The remaining gum rubber polymers exhibited less resilience than the control with recovery times both faster and slower than the control speed. Two of the polyurethanes (PU-183 and -203) exhibited excellent response and rates of recovery all greater than the control; the remaining two polyurethanes (PU-185 and -198) straddled the control both in resilience and rate of recovery, although the polymer with the higher resilience had the lower rate of recovery.

In all three of these dynamic tests, polymer deformation is compressive; indeed, Rheometer is forced high cyclic rate compression-compression, Lupke rebound is a single cycle compression, and the Verzley rebound is a multiple cycle compressive deformation with the cyclic rate and number of cycles controlled by the viscoelastic properties of the polymer. Since polymer coatings on the seals of air-cushion vehicles are subjected to high cyclic rate and concurrent large displacement tensile-tension, tension-compression, and compression-compression cyclic stresses, results from the coefficient of friction flexometer test may be the most important of the three tests. High cyclic rate, large displacement tensile-tension fatigue tests also could have been done but these tests were beyond the scope of the program.

Thermal conductivity of three formulations was measured at each of two different temperatures to evaluate the use of a reticulated carbon black to increase the thermal conductivity of polymer formulations. The three formulations were styrene-butadiene-butadiene-styrene black copolymer (SEBS) with 2 parts per hundred parts rubber (pphr) antioxidant 702, and 2 pphr Thionin 327; the same black copolymer formulation with 2 pphr Ketjenblack EC; and the control formulation ECB-01.

The thermal conductivity results are presented in Table 7.

[illegible]



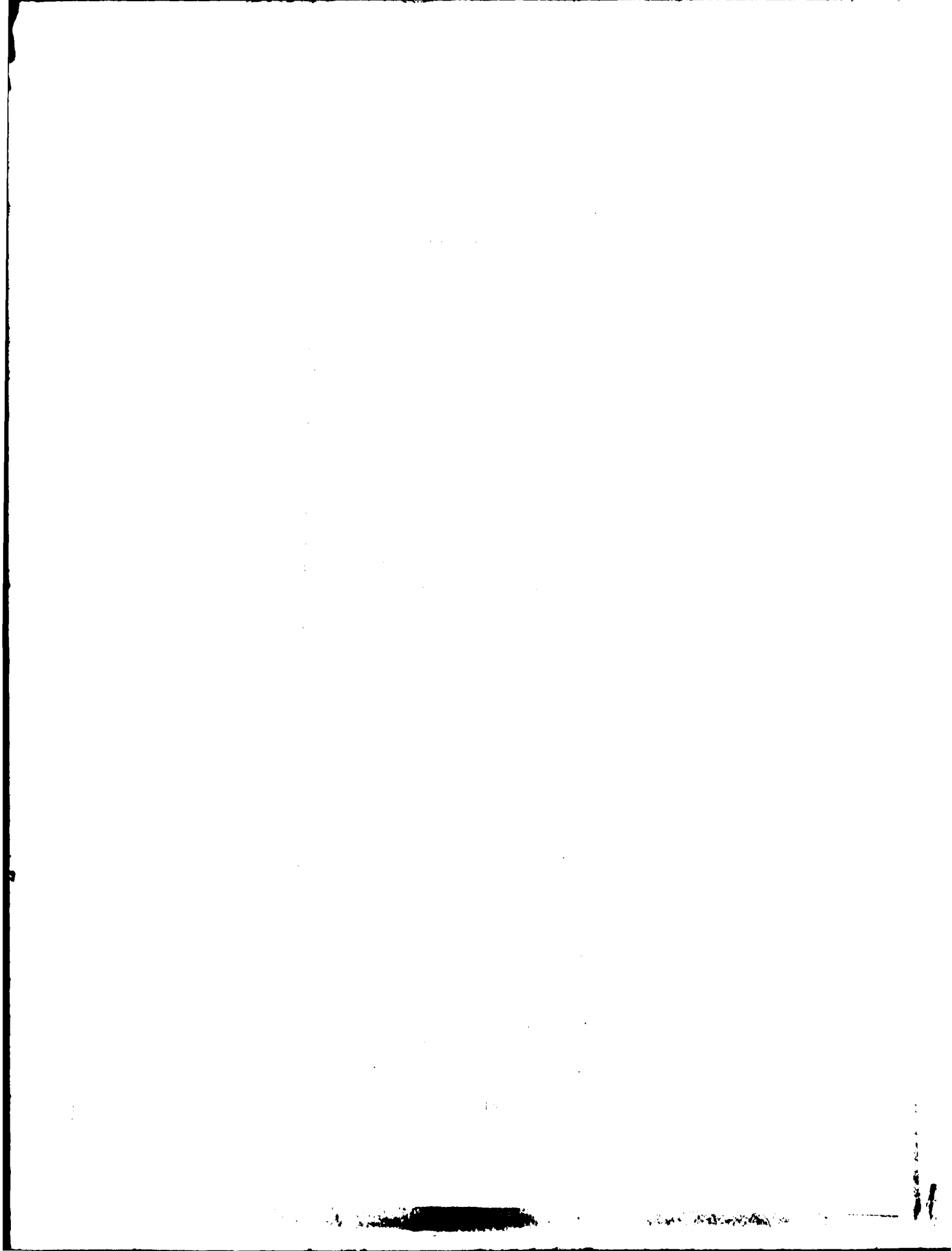


TABLE 10 - OZONE AND OUTDOOR WEATHERING RESISTANCE  
OF POLYMER FORMULATIONS

| Polymer | Polymer                    | Type of damage observed    | Time to damage days |
|---------|----------------------------|----------------------------|---------------------|
| RAT-111 | polyethylene terephthalate | Chalking, surface cracking | 10                  |
| RAT-112 | polyethylene terephthalate | None                       | 10                  |
| RAT-113 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-114 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-115 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-116 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-117 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-118 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-119 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-120 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-121 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-122 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-123 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-124 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-125 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-126 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-127 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-128 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-129 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-130 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-131 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-132 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-133 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-134 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-135 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-136 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-137 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-138 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-139 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-140 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-141 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-142 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-143 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-144 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-145 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-146 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-147 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-148 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-149 | polyethylene terephthalate | Cracking, surface cracking | 10                  |
| RAT-150 | polyethylene terephthalate | Cracking, surface cracking | 10                  |

The natural rubber-butadiene blend control film exhibited the poorest resistance to ozone and outdoor weathering. After one week of exposure to the test atmosphere, the film had become brittle and cracked. The propylene oxide polymer formulation (RAT-111) and the other polymer formulations (RAT-112 through RAT-150) all exhibited better resistance to ozone and outdoor weathering. The propylene oxide polymer (RAT-111) exhibited the best resistance to ozone and outdoor weathering. The other polymer formulations (RAT-112 through RAT-150) all exhibited better resistance to ozone and outdoor weathering than did the control. The propylene oxide polymer (RAT-111) exhibited the best resistance to ozone and outdoor weathering. The other polymer formulations (RAT-112 through RAT-150) all exhibited better resistance to ozone and outdoor weathering than did the control.

The ozone and outdoor weathering resistance of the natural rubber-butadiene blend polymer was poor (Table 10), and all the other polymers and polymer blends exhibited better resistance than did the control. The propylene oxide (RAT-111), the



REPORT OF HANSEN ON THE RESULTS OF THE  
EXPERIMENTAL INVESTIGATION OF THE  
EFFECTS OF THE MALARIAL PARASITE

The purpose of the present investigation was to determine the effect of the malarial parasite on the development of the human body. The investigation was conducted in the laboratory of the U. S. Army Medical Department, and the results are reported in this report. The investigation was conducted in the laboratory of the U. S. Army Medical Department, and the results are reported in this report.

The results of the investigation show that the malarial parasite has a marked effect on the development of the human body. The parasite was found to be present in the blood of the subjects, and it was found that the parasite was able to penetrate the skin of the subjects. The parasite was found to be present in the blood of the subjects, and it was found that the parasite was able to penetrate the skin of the subjects. The parasite was found to be present in the blood of the subjects, and it was found that the parasite was able to penetrate the skin of the subjects.

The results of the investigation show that the malarial parasite has a marked effect on the development of the human body. The parasite was found to be present in the blood of the subjects, and it was found that the parasite was able to penetrate the skin of the subjects. The parasite was found to be present in the blood of the subjects, and it was found that the parasite was able to penetrate the skin of the subjects. The parasite was found to be present in the blood of the subjects, and it was found that the parasite was able to penetrate the skin of the subjects.



| Polymer<br>Designation | Fabric Test<br>Direction | Test<br>Temperature<br>(°C) (°F) | Ultimate<br>Tensile<br>Strength psi     | Ultimate<br>Elongation<br>% | Tear<br>Strength<br>lb. | Coating**<br>Adhesion<br>lb/in. |
|------------------------|--------------------------|----------------------------------|-----------------------------------------|-----------------------------|-------------------------|---------------------------------|
| NR 50-50               | Warp                     | 29 (120)                         | 1060                                    | 18                          | 550                     | —                               |
|                        |                          | 24 (75)                          | 1090                                    | 13                          | 470***                  | —                               |
|                        |                          | 1 (32)                           | 960                                     | 18                          | 19                      | —                               |
|                        | Fill                     | 29 (120)                         | 840                                     | 26                          | 55                      | —                               |
|                        |                          | 24 (75)                          | 800                                     | 27                          | 50                      | —                               |
|                        |                          | 1 (32)                           | 860                                     | 19                          | 190                     | —                               |
| NR 40-60               | Warp                     | 29 (120)                         | 1550                                    | 17                          | 100*                    | —                               |
|                        |                          | 24 (75)                          | 1900                                    | 29                          | 14                      | —                               |
|                        |                          | 1 (32)                           | 90                                      | 32                          | 24                      | —                               |
|                        | Fill                     | 29 (120)                         | 103                                     | 28                          | 7                       | —                               |
|                        |                          | 24 (75)                          | 106                                     | 17                          | 50                      | —                               |
|                        |                          | 1 (32)                           | 107                                     | 25                          | 110                     | —                               |
| NR 30-70               | Warp                     | 29 (120)                         | 150                                     | 4                           | 27                      | —                               |
|                        |                          | 24 (75)                          | 155                                     | 4                           | 30*                     | —                               |
|                        |                          | 1 (32)                           | 114                                     | 6                           | 54*                     | —                               |
|                        | Fill                     | 29 (120)                         | 180                                     | 29                          | 42*                     | —                               |
|                        |                          | 24 (75)                          | 176                                     | 16                          | 50*                     | —                               |
|                        |                          | 1 (32)                           | 114                                     | 5                           | 56*                     | —                               |
| NR 20-80               | Warp                     | 29 (120)                         | Polymer cover was sheared from fabric** |                             |                         | —                               |
|                        |                          | 24 (75)                          | 114                                     | 4                           | 500                     | —                               |
|                        |                          | 1 (32)                           | Test not performed                      |                             |                         | 40***                           |
|                        | Fill                     | 29 (120)                         | 114                                     | 29                          | —                       | —                               |
|                        |                          | 24 (75)                          | 12                                      | 3                           | 63                      | —                               |
|                        |                          | 1 (32)                           | Test not performed                      |                             |                         | 18***                           |
| NR 10-90               | Warp                     | 29 (120)                         | 15                                      | 3                           | —                       | —                               |
|                        |                          | 24 (75)                          | 117                                     | 3                           | 44                      | 34                              |
|                        | Fill                     | 29 (120)                         | 96                                      | 25                          | 60*                     | —                               |
|                        |                          | 24 (75)                          | 110                                     | 25                          | 44*                     | —                               |
| NR 5-95                | Warp                     | 29 (120)                         | 1080                                    | 3                           | —                       | —                               |
|                        |                          | 24 (75)                          | 1190                                    | 3                           | 14*                     | —                               |
|                        | Fill                     | 29 (120)                         | 1070                                    | 29                          | —                       | —                               |
|                        |                          | 24 (75)                          | 115                                     | 27                          | 11*                     | —                               |

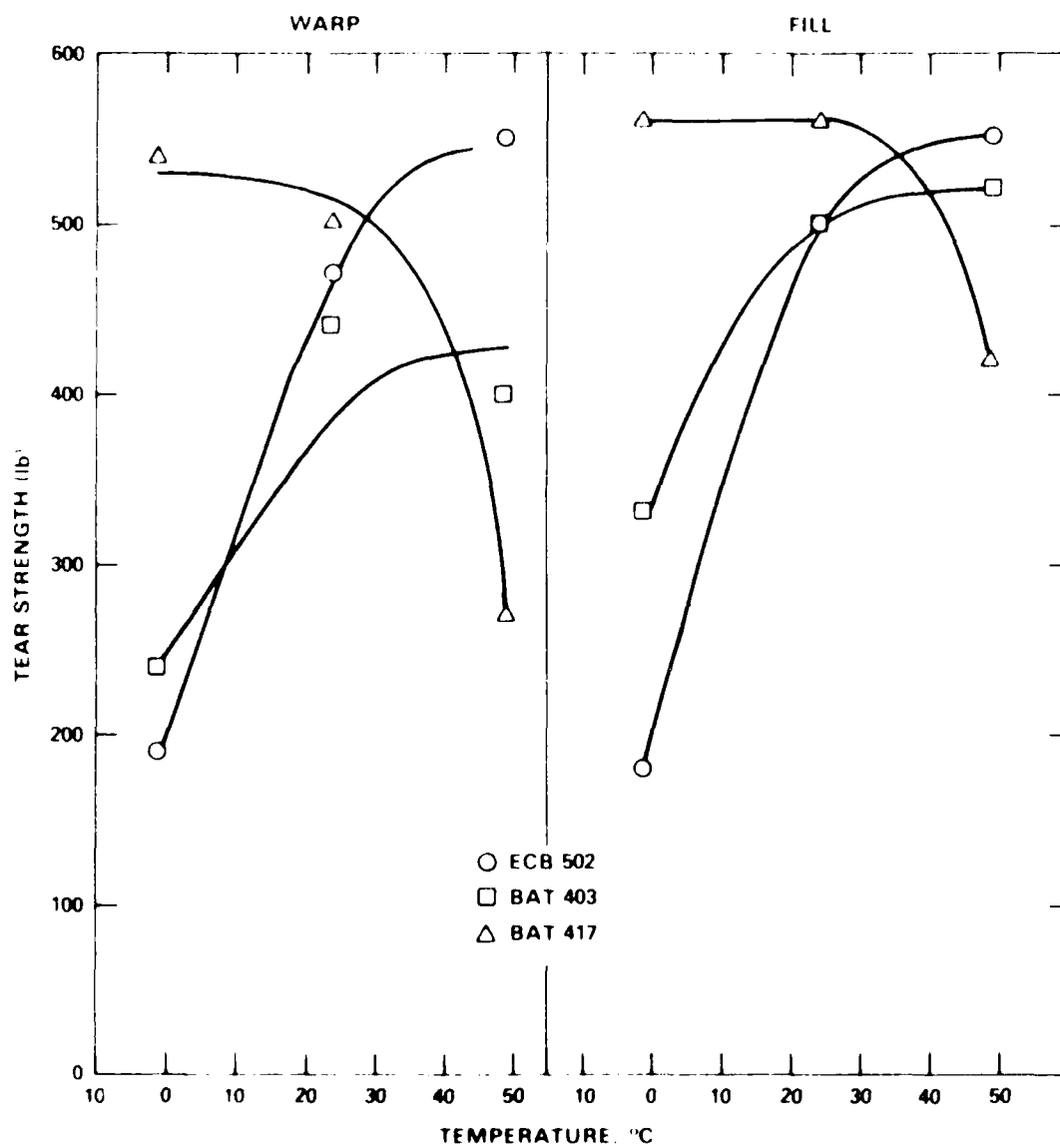
\*The nylon woven fabric was a 10 x 1 basket weave of 21/2 x 20 obtained from Fabric Development Laboratory, Inkertown, PA, with their designation 188.

\*\*The coat 408-51 was used to bond the gum rubber polymers to the fabric, and 414-100 was used as an adhesion promoter with the polyurethane polymers.

\*\*\*Nylon cord partially pulled through the rubber and partially broke.

\*Nylon cord pulled through the rubber and did not break.

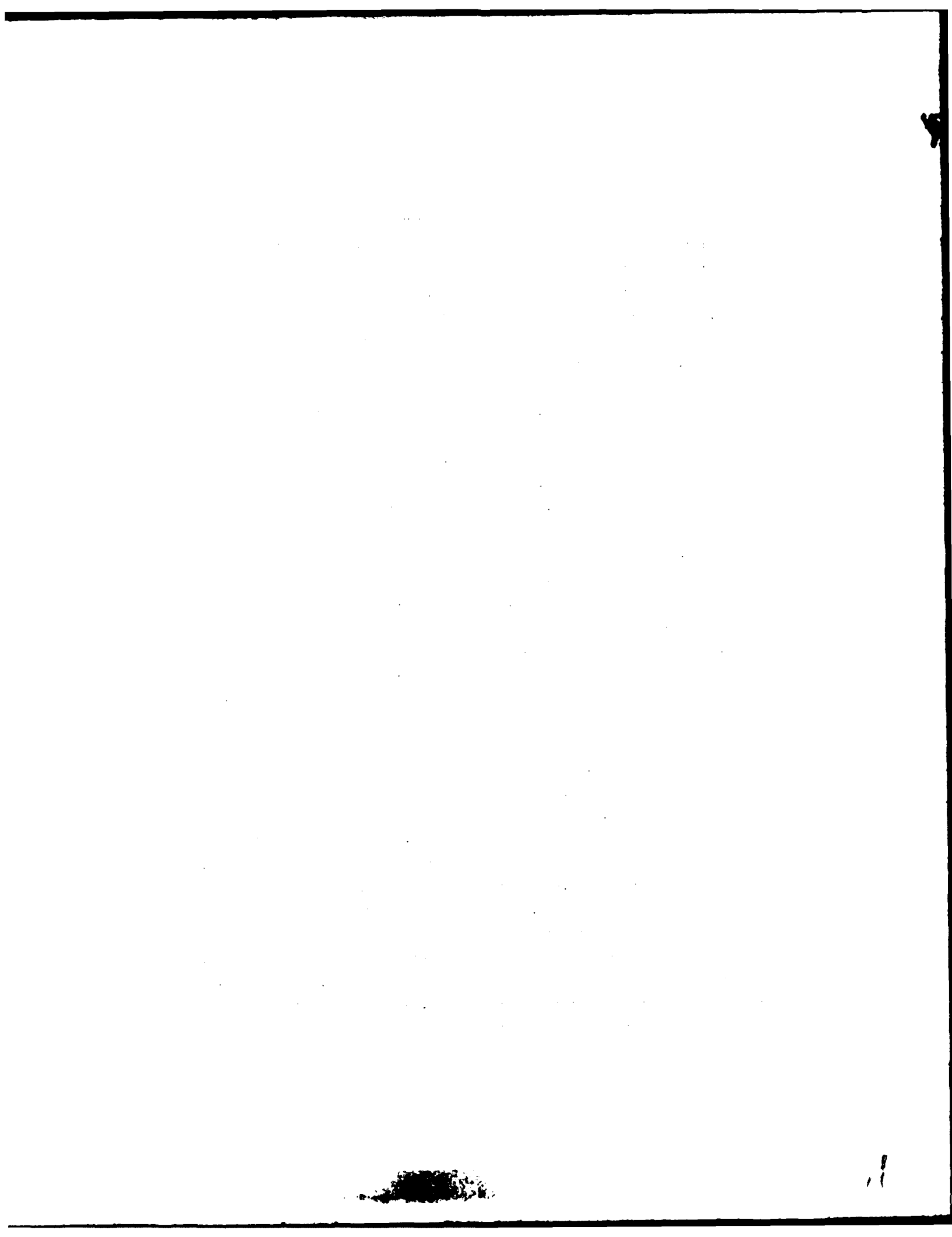
\*\*The Neoprene rubber 10 coat retarded the cure of the chlorinated polyethylene at the interface so that the chlorinated polyethylene remained a thermoplastic at the interface which softens markedly between 40° (109°F) and 49° (120°F).

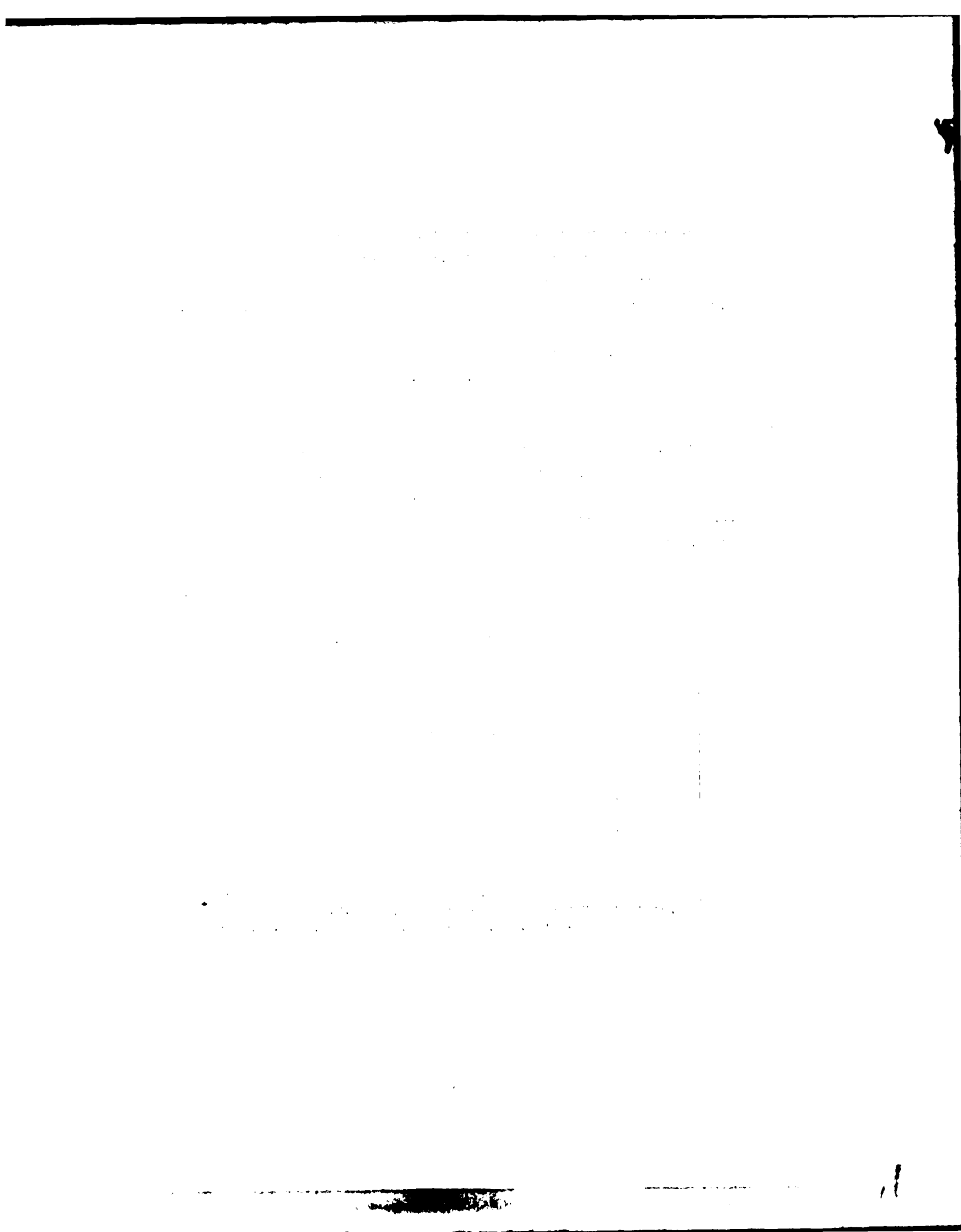


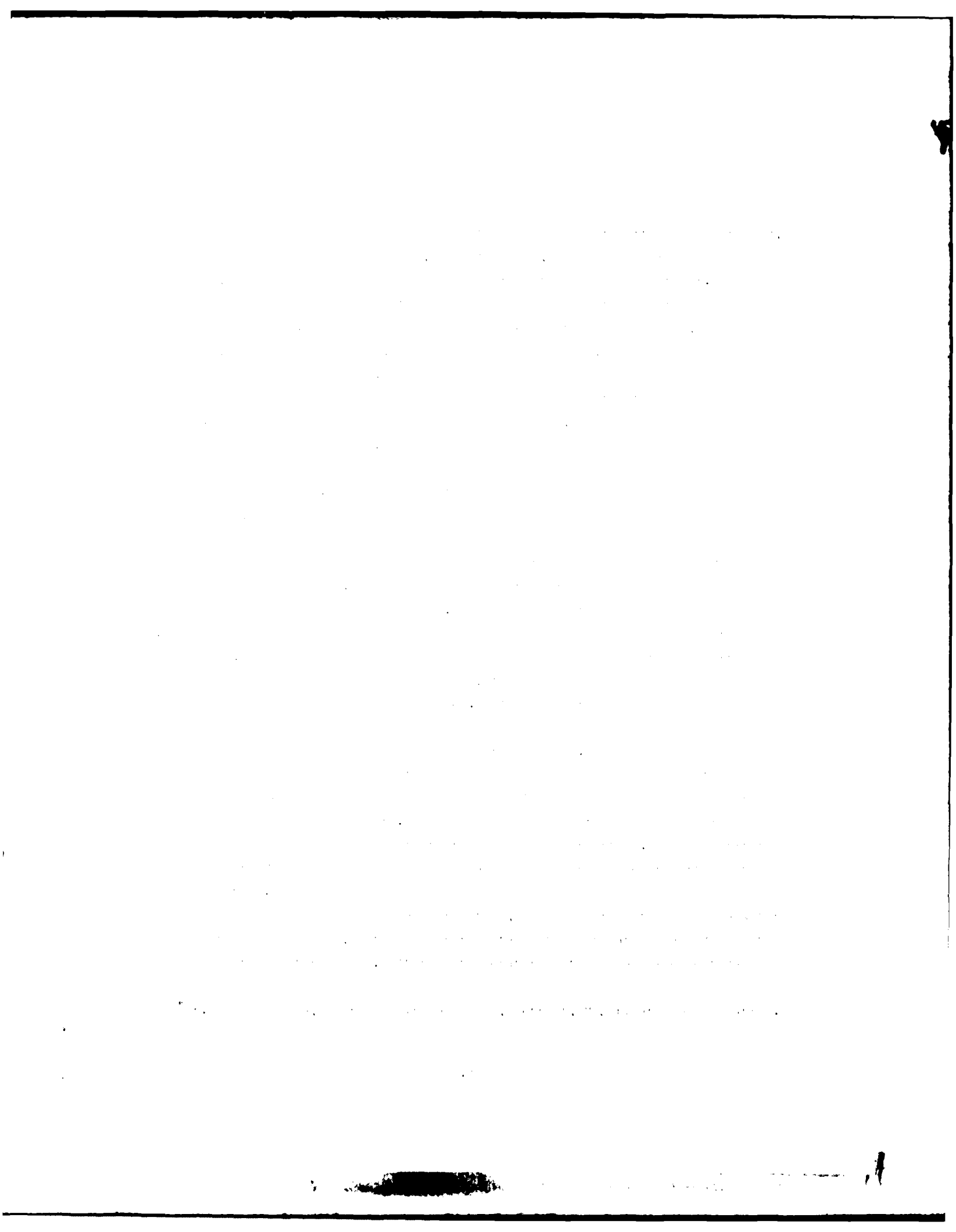












1. Introduction

The purpose of this report is to provide a brief overview of the current state of the art in the field of [illegible] and to discuss some of the challenges that are currently facing the field. The report is organized as follows: Section 2 discusses the background and motivation for the research. Section 3 describes the current state of the art in the field. Section 4 discusses some of the challenges that are currently facing the field. Section 5 discusses some of the potential solutions to these challenges. Section 6 discusses some of the future research directions in the field. Section 7 discusses some of the conclusions of the report. Section 8 discusses some of the references used in the report. Section 9 discusses some of the acknowledgments. Section 10 discusses some of the appendices. Section 11 discusses some of the figures. Section 12 discusses some of the tables. Section 13 discusses some of the equations. Section 14 discusses some of the definitions. Section 15 discusses some of the abbreviations. Section 16 discusses some of the symbols. Section 17 discusses some of the units. Section 18 discusses some of the conventions. Section 19 discusses some of the notations. Section 20 discusses some of the terminology. Section 21 discusses some of the acronyms. Section 22 discusses some of the initialisms. Section 23 discusses some of the contractions. Section 24 discusses some of the colloquialisms. Section 25 discusses some of the slang. Section 26 discusses some of the jargon. Section 27 discusses some of the technical terms. Section 28 discusses some of the scientific terms. Section 29 discusses some of the mathematical terms. Section 30 discusses some of the legal terms. Section 31 discusses some of the medical terms. Section 32 discusses some of the biological terms. Section 33 discusses some of the chemical terms. Section 34 discusses some of the physical terms. Section 35 discusses some of the astronomical terms. Section 36 discusses some of the geographical terms. Section 37 discusses some of the historical terms. Section 38 discusses some of the literary terms. Section 39 discusses some of the artistic terms. Section 40 discusses some of the religious terms. Section 41 discusses some of the philosophical terms. Section 42 discusses some of the political terms. Section 43 discusses some of the economic terms. Section 44 discusses some of the social terms. Section 45 discusses some of the psychological terms. Section 46 discusses some of the behavioral terms. Section 47 discusses some of the environmental terms. Section 48 discusses some of the technological terms. Section 49 discusses some of the engineering terms. Section 50 discusses some of the computer terms. Section 51 discusses some of the internet terms. Section 52 discusses some of the mobile terms. Section 53 discusses some of the cloud terms. Section 54 discusses some of the big data terms. Section 55 discusses some of the artificial intelligence terms. Section 56 discusses some of the machine learning terms. Section 57 discusses some of the deep learning terms. Section 58 discusses some of the neural network terms. Section 59 discusses some of the reinforcement learning terms. Section 60 discusses some of the robotics terms. Section 61 discusses some of the autonomous systems terms. Section 62 discusses some of the cyber security terms. Section 63 discusses some of the information security terms. Section 64 discusses some of the privacy terms. Section 65 discusses some of the ethics terms. Section 66 discusses some of the law terms. Section 67 discusses some of the policy terms. Section 68 discusses some of the governance terms. Section 69 discusses some of the leadership terms. Section 70 discusses some of the management terms. Section 71 discusses some of the business terms. Section 72 discusses some of the marketing terms. Section 73 discusses some of the sales terms. Section 74 discusses some of the customer service terms. Section 75 discusses some of the human resources terms. Section 76 discusses some of the finance terms. Section 77 discusses some of the accounting terms. Section 78 discusses some of the legal terms. Section 79 discusses some of the medical terms. Section 80 discusses some of the biological terms. Section 81 discusses some of the chemical terms. Section 82 discusses some of the physical terms. Section 83 discusses some of the astronomical terms. Section 84 discusses some of the geographical terms. Section 85 discusses some of the historical terms. Section 86 discusses some of the literary terms. Section 87 discusses some of the artistic terms. Section 88 discusses some of the religious terms. Section 89 discusses some of the philosophical terms. Section 90 discusses some of the political terms. Section 91 discusses some of the economic terms. Section 92 discusses some of the social terms. Section 93 discusses some of the psychological terms. Section 94 discusses some of the behavioral terms. Section 95 discusses some of the environmental terms. Section 96 discusses some of the technological terms. Section 97 discusses some of the engineering terms. Section 98 discusses some of the computer terms. Section 99 discusses some of the internet terms. Section 100 discusses some of the mobile terms.

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TABLE 1. ANALYTICAL DATA OF POLYMERIZATION OF MONOMER A

| Sample No. | Yield, % | Purity, % | Weight, g |
|------------|----------|-----------|-----------|
| 1          | 100      | 100       | 1.0       |
| 2          | 100      | 100       | 1.0       |
| 3          | 100      | 100       | 1.0       |
| 4          | 100      | 100       | 1.0       |
| 5          | 100      | 100       | 1.0       |
| 6          | 100      | 100       | 1.0       |
| 7          | 100      | 100       | 1.0       |
| 8          | 100      | 100       | 1.0       |
| 9          | 100      | 100       | 1.0       |
| 10         | 100      | 100       | 1.0       |
| 11         | 100      | 100       | 1.0       |
| 12         | 100      | 100       | 1.0       |
| 13         | 100      | 100       | 1.0       |
| 14         | 100      | 100       | 1.0       |
| 15         | 100      | 100       | 1.0       |
| 16         | 100      | 100       | 1.0       |
| 17         | 100      | 100       | 1.0       |
| 18         | 100      | 100       | 1.0       |
| 19         | 100      | 100       | 1.0       |
| 20         | 100      | 100       | 1.0       |
| 21         | 100      | 100       | 1.0       |
| 22         | 100      | 100       | 1.0       |
| 23         | 100      | 100       | 1.0       |
| 24         | 100      | 100       | 1.0       |
| 25         | 100      | 100       | 1.0       |
| 26         | 100      | 100       | 1.0       |
| 27         | 100      | 100       | 1.0       |
| 28         | 100      | 100       | 1.0       |
| 29         | 100      | 100       | 1.0       |
| 30         | 100      | 100       | 1.0       |
| 31         | 100      | 100       | 1.0       |
| 32         | 100      | 100       | 1.0       |
| 33         | 100      | 100       | 1.0       |
| 34         | 100      | 100       | 1.0       |
| 35         | 100      | 100       | 1.0       |
| 36         | 100      | 100       | 1.0       |
| 37         | 100      | 100       | 1.0       |
| 38         | 100      | 100       | 1.0       |
| 39         | 100      | 100       | 1.0       |
| 40         | 100      | 100       | 1.0       |
| 41         | 100      | 100       | 1.0       |
| 42         | 100      | 100       | 1.0       |
| 43         | 100      | 100       | 1.0       |
| 44         | 100      | 100       | 1.0       |
| 45         | 100      | 100       | 1.0       |
| 46         | 100      | 100       | 1.0       |
| 47         | 100      | 100       | 1.0       |
| 48         | 100      | 100       | 1.0       |
| 49         | 100      | 100       | 1.0       |
| 50         | 100      | 100       | 1.0       |
| 51         | 100      | 100       | 1.0       |
| 52         | 100      | 100       | 1.0       |
| 53         | 100      | 100       | 1.0       |
| 54         | 100      | 100       | 1.0       |
| 55         | 100      | 100       | 1.0       |
| 56         | 100      | 100       | 1.0       |
| 57         | 100      | 100       | 1.0       |
| 58         | 100      | 100       | 1.0       |
| 59         | 100      | 100       | 1.0       |
| 60         | 100      | 100       | 1.0       |
| 61         | 100      | 100       | 1.0       |
| 62         | 100      | 100       | 1.0       |
| 63         | 100      | 100       | 1.0       |
| 64         | 100      | 100       | 1.0       |
| 65         | 100      | 100       | 1.0       |
| 66         | 100      | 100       | 1.0       |
| 67         | 100      | 100       | 1.0       |
| 68         | 100      | 100       | 1.0       |
| 69         | 100      | 100       | 1.0       |
| 70         | 100      | 100       | 1.0       |
| 71         | 100      | 100       | 1.0       |
| 72         | 100      | 100       | 1.0       |
| 73         | 100      | 100       | 1.0       |
| 74         | 100      | 100       | 1.0       |
| 75         | 100      | 100       | 1.0       |
| 76         | 100      | 100       | 1.0       |
| 77         | 100      | 100       | 1.0       |
| 78         | 100      | 100       | 1.0       |
| 79         | 100      | 100       | 1.0       |
| 80         | 100      | 100       | 1.0       |
| 81         | 100      | 100       | 1.0       |
| 82         | 100      | 100       | 1.0       |
| 83         | 100      | 100       | 1.0       |
| 84         | 100      | 100       | 1.0       |
| 85         | 100      | 100       | 1.0       |
| 86         | 100      | 100       | 1.0       |
| 87         | 100      | 100       | 1.0       |
| 88         | 100      | 100       | 1.0       |
| 89         | 100      | 100       | 1.0       |
| 90         | 100      | 100       | 1.0       |
| 91         | 100      | 100       | 1.0       |
| 92         | 100      | 100       | 1.0       |
| 93         | 100      | 100       | 1.0       |
| 94         | 100      | 100       | 1.0       |
| 95         | 100      | 100       | 1.0       |
| 96         | 100      | 100       | 1.0       |
| 97         | 100      | 100       | 1.0       |
| 98         | 100      | 100       | 1.0       |
| 99         | 100      | 100       | 1.0       |
| 100        | 100      | 100       | 1.0       |

# ANNEX A. CONTENTS OF CONTRACT FORMULATION (FCB-002)

| Contract Items                     | Pages, by Weight |
|------------------------------------|------------------|
| 1. General Information             | 1-1              |
| 2. Technical Specifications        | 2-1              |
| 3. Contract Administration         | 3-1              |
| 4. Financial Information           | 4-1              |
| 5. Legal Information               | 5-1              |
| 6. Environmental Information       | 6-1              |
| 7. Social Information              | 7-1              |
| 8. Health and Safety Information   | 8-1              |
| 9. Quality Management Information  | 9-1              |
| 10. Risk Management Information    | 10-1             |
| 11. Communication Information      | 11-1             |
| 12. Dispute Resolution Information | 12-1             |
| 13. Other Information              | 13-1             |
| 14. Summary                        | 14-1             |
| 15. Appendix                       | 15-1             |
| 16. Glossary                       | 16-1             |
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| 18. Bibliography                   | 18-1             |
| 19. References                     | 19-1             |
| 20. Figures                        | 20-1             |
| 21. Tables                         | 21-1             |
| 22. Forms                          | 22-1             |
| 23. Other Documents                | 23-1             |
| 24. Total                          | 24-1             |



## APPENDIX A

NEI ET AL. • *in vitro* and *in vivo* Effects of Polymers

1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 26

For the other polymer formulation developed for its application on woven fabrics, the treatment was based on the formation of a film of a mixture of polymer blends. The components of polymer blends were formulated with the consideration of the cost of the components and the compressions which are required for the various polymers. The blend was formulated with one half of the polymer in polymer blend of the obtained mixture for the mechanical and environmental properties. The polymer in the other half was used as a binder, and the formulation is presented in Table VI. The results of the mechanical and environmental properties were almost identical with the other polymer formulation.

Two samples of the same composition formulation were prepared and compared to a standard polyethylene blend polymer which was a government-furnished reference material of the same composition. The contents of this formulation are shown in Table IV. A comparison of this formulation's different antiscumt and antirub properties is given in the better materials evaluated to date for trimers on the ship's hulls and on the hulls of Army LVT Amphibious landing vehicles. The formulation was developed by the Naval Research Laboratory for the Large Surface Effect Ship Program.

The 100 best formulations were evaluated with initial screening tests and the results compared to results from the natural rubber-butadiene polymer blend formulation. The six best formulations were selected and evaluated further with ultimate mechanical characterization tests (Appendix D) and the results compared to the results obtained from the control polymer formulation. The three best formulations were selected, and together with the control formulation, used as starting points for a new set of trials. The coated fabrics were characterized with property tests (also Appendix D).

(c) Polymers reinforced with knit and mat structures do not exhibit as good resistance to strength as polymers reinforced with woven fabric for the same weight reinforcement.

(d) A crystalline polyethylene was developed which had relatively good resistance to aging, but not to weathering, but the chemical nature and mechanical properties were relatively poor.

(e) A crystalline polyethylene polymer formed from polybutadiene/styrene copolymers had excellent mechanical properties, but high initial compressive creep, and high creep rate at elevated temperature rise caused by hysteresis in the polymer.

(f) A crystalline polyethylene polymer of suitable density, density and mechanical properties was developed for the fabrication of sheets of suitable size and shape for use in the space program.

1. The control fabric, styrlite, the formulated EPDM natural rubber blend, and the formulated copolymer blend (butadiene-styrene copolymer) all exhibited properties equivalent to the natural butadiene blend control. 2. The control fabric, styrlite, exhibited outstanding resistance to fuel. 3. The control fabric, styrlite, exhibited good resistance to fuel. 4. The control fabric, styrlite, exhibited good resistance to fuel.

5. The control fabric, styrlite, exhibited good resistance to fuel. 6. The control fabric, styrlite, exhibited good resistance to fuel. 7. The control fabric, styrlite, exhibited good resistance to fuel. 8. The control fabric, styrlite, exhibited good resistance to fuel. 9. The control fabric, styrlite, exhibited good resistance to fuel. 10. The control fabric, styrlite, exhibited good resistance to fuel.

11. The control fabric, styrlite, exhibited good resistance to fuel. 12. The control fabric, styrlite, exhibited good resistance to fuel. 13. The control fabric, styrlite, exhibited good resistance to fuel. 14. The control fabric, styrlite, exhibited good resistance to fuel. 15. The control fabric, styrlite, exhibited good resistance to fuel.

16. The control fabric, styrlite, exhibited good resistance to fuel. 17. The control fabric, styrlite, exhibited good resistance to fuel. 18. The control fabric, styrlite, exhibited good resistance to fuel. 19. The control fabric, styrlite, exhibited good resistance to fuel. 20. The control fabric, styrlite, exhibited good resistance to fuel.

21. The control fabric, styrlite, exhibited good resistance to fuel. 22. The control fabric, styrlite, exhibited good resistance to fuel. 23. The control fabric, styrlite, exhibited good resistance to fuel. 24. The control fabric, styrlite, exhibited good resistance to fuel. 25. The control fabric, styrlite, exhibited good resistance to fuel.

26. The control fabric, styrlite, exhibited good resistance to fuel. 27. The control fabric, styrlite, exhibited good resistance to fuel. 28. The control fabric, styrlite, exhibited good resistance to fuel. 29. The control fabric, styrlite, exhibited good resistance to fuel. 30. The control fabric, styrlite, exhibited good resistance to fuel.

31. The control fabric, styrlite, exhibited good resistance to fuel. 32. The control fabric, styrlite, exhibited good resistance to fuel. 33. The control fabric, styrlite, exhibited good resistance to fuel. 34. The control fabric, styrlite, exhibited good resistance to fuel. 35. The control fabric, styrlite, exhibited good resistance to fuel.

## CONCLUSIONS

1. Results from laboratory tests at 50 psi on 20-gum rubber formulations prepared from 15 synthetic polymer or polymer blend systems indicated that: (a) two of the formulated polymer systems (carboxylated nitrile and chlorinated polyethylene) had crack growth resistance greater than that of the control polymer blend (natural rubber butadiene) and (b) six of the formulated polymer systems (carboxylated nitrile, trans butyl, natural rubber, EPDM blend, SB black copolymer, SBR blend, SB black copolymer, natural blend, and chlorinated polyethylene, phosphor tritric fluoroclastomer) had tear resistance greater than that of the control polymer blend.

2. Results from laboratory tests at 50 psi on a variety of liquid castable polyurethane polymer formulations prepared from five different polyalcohols, four different triisocyanates, and four diamine or diolcohol curatives indicated that: (a) polyurethane liquid polyurethane formulations had better crack growth resistance than the control polyurethane polymer (BALT-100), and (b) one formulation had better abrasion resistance than the control and one formulation had about the same flexure fatigue resistance as the control.

3. Nylon woven fabric coated with the natural rubber butadiene blend control formulation exhibits a marked reduction in tear strength at -100°C. compared to tear strength at room temperature. Similar effects, but to lesser degrees, are exhibited by the transbutyl-EPDM/natural rubber blend coated woven fabric at -100°C. and by the SB black copolymer/natural rubber blend coated woven fabric at 0°C. and -100°C. The reduction in strength appears to be caused by a modulus change of the polymer such that the polymer causes the fibers in the yarn bundles to pull apart. Thus, consequently, for complete characterization, polymer coated woven fabrics should be evaluated for mechanical properties over the range of temperatures anticipated for air cushion vehicle use.

4. Ketoblack 80 conductive carbon black appears to more effectively increase the thermal conductivity of polymers than regular retort type carbon blacks. Since ketoblack exhibits non-reinforcing in most polymers, a detailed study is necessary in conjunction with retorting carbon blacks to determine if optimum mechanical and thermal properties can be obtained concurrently with improved thermal conductivity.

5. Based on the Pico laboratory abrasion test, the SB black copolymer/natural rubber polymer blend had superior abrasion resistance compared to the natural rubber butadiene blend control polymer, and one castable liquid polyurethane polymer exhibited better abrasion resistance than the control.

the 1990s, the number of people in the world who are undernourished has declined from 1.1 billion to 800 million. The number of people who are malnourished has declined from 1.5 billion to 1 billion. The number of people who are obese has increased from 100 million to 300 million. The number of people who are overweight has increased from 100 million to 300 million. The number of people who are obese and overweight has increased from 100 million to 300 million. The number of people who are obese and overweight has increased from 100 million to 300 million.

the 1990s, the number of people in the world who are under 15 years of age is expected to increase from 1.1 billion to 1.5 billion. The number of people aged 65 and over is expected to increase from 200 million to 400 million. The number of people aged 15 and over is expected to increase from 3.5 billion to 4.5 billion. The number of people aged 15 and over is expected to increase from 3.5 billion to 4.5 billion. The number of people aged 15 and over is expected to increase from 3.5 billion to 4.5 billion.

*Journal of Management Studies*, 20(6), 791-806.

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knit, strike zone, are presented in Table 17. The materials are prepared by the knit factory, which features a lock stitch that prevents raveling. The polyester was selected for use in this program since it possesses strength approaching that of cotton in both warp and fill directions but at a fabric weight of only 14.7 g/m<sup>2</sup> compared to the 20.4 g/m<sup>2</sup> of nylon. The manufacturer advised that the mechanical properties of this polyester are good, or better than, that of the cotton.

Knit and woven fabrics reinforced with material were coated with formulation 10. The knit fabric coated with the unrelaxed formulation 10c also was cast. The results of the tests on these materials show that the unexpected cure properties of formulation 10c work to the advantage as well as the disadvantage. All coated fabrics are characterized by a three-fold increase in tensile strength that is immediate during curing (see Table 18, Appendix B).

TABLE 17. PROPERTIES OF NYLON AND COTTON KNIITS

| Sample No. | Material  | Density | Weight<br>g/m <sup>2</sup> | Tensile Strength, lb |      | Wet Burst<br>lb |
|------------|-----------|---------|----------------------------|----------------------|------|-----------------|
|            |           |         |                            | pH                   |      |                 |
|            |           |         |                            | Warp                 | Fill |                 |
| 1000       | Nylon     | 1.38    | 20.4                       | 136                  | 134  | 600             |
| 1001       | Polyester | 1.38    | 14.7                       | 109                  | 152  | 500             |

The polyester knit reinforced with a polymer was tested at three temperatures. The tensile and tear strength, tear strength and coating adhesion results are presented in Table 18, and the burst test results are presented in Table 19. Since the reinforcement increases the tensile and tear strength of reinforced polymers, the results are compared to the results obtained on woven fabric reinforced PDS-10 (Table 10). As compared to the results shown that the knit reinforced PDS-10 has a tensile strength 1.5 times greater than the tear strength of the woven fabric reinforced material, approximately the same reinforcement weight. However, the elongation at break is approximately three times greater than the woven fabric reinforced material, while the coating adhesion value for the knit material appears to be only two-thirds that of the polyester knit. These large areas of strike may indicate that the test, in this case, is measuring cohesive strength of the polymer reinforcement rather than the force required to peel the elastomer from the knit. A knit reinforcement structure does not yield as efficient a reinforcement as a woven fabric on a strength-to-weight basis.



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The gel permeation method was evaluated for sensitivity to cure pressure using autoclave cure at 1 bar, gel and glass transition at 300°C and 250°C; no sensitivity to cure pressure was found.

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TABLE A.6 - BROMOBUTYL RUBBER FORMULATIONS\*

| Ingredients                  | Formula Designation |         |         |
|------------------------------|---------------------|---------|---------|
|                              | BAL 403             | BAL 404 | BAT 405 |
| Bromobutyl, %                | 60                  | 60      | 100     |
| Resaltene, %                 | 10                  | 5       | —       |
| SPB, %                       | —                   | 25      | —       |
| Elastomer 1, % polybutadiene | —                   | 10      | —       |
| Nonylphenol                  | 2                   | —       | 25      |
| Nonylphenol                  | —                   | 40      | —       |
| Hydrocarbon                  | —                   | —       | 25      |
| Naphthalene, %               | 5                   | —       | —       |
| Hydrocarbon                  | —                   | 5       | —       |
| Nonylphenol                  | —                   | —       | 2       |
| Ammonium chloride            | —                   | —       | 2       |
| Hydrocarbon                  | —                   | 10      | —       |
| Hydrocarbon                  | 1                   | 1       | 25      |
| Hydrocarbon                  | 0                   | 4       | —       |
| Hydrocarbon                  | —                   | 1.75    | 1.75    |
| Hydrocarbon                  | 1.75                | 1.75    | 1.75    |
| Hydrocarbon                  | 1.75                | —       | —       |
| Sum                          | 100                 | 100     | 100     |

\*All ingredients are in parts by weight.

SPB is a polybutadiene copolymer of BAL 403, SBC-48, 101 and 102, containing 20% BAL 403.

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TABLE V. BUTYL RUBBER FORMULATIONS<sup>a</sup>

| Ingredient             | Formula designation |         |         |
|------------------------|---------------------|---------|---------|
|                        | BAT-41              | BAT-41A | BAT-41B |
| Neoprene W             | 100                 | 100     | 100     |
| Cl-4-12-3              | 1                   | 1       | 1       |
| N-33                   | 1                   | 1       | 1       |
| N-35                   | 1                   | 1       | 1       |
| Cl-6-11-2-1-1          | 1                   | 1       | 1       |
| Diethyl sebacate       | 1                   | 1       | 1       |
| Stearic Acid           | 1                   | 1       | 1       |
| Azobisisobutyronitrile | 1                   | 1       | 1       |
| Altax                  | 1                   | 1       | 1       |
| Dieneex                | 1                   | 1       | 1       |
| Sulfur                 | 1                   | 1       | 1       |

<sup>a</sup> Phillips Chemical Co., Stowe, OH.  
 Phillips Chemical designation is  
 DCD-1257.

TABLE VI. Butyl Rubber Formulations<sup>a</sup>

| Ingredient             | Formula designation |         |
|------------------------|---------------------|---------|
|                        | BAT-41              | BAT-41A |
| Neoprene W             | 100                 | 100     |
| Cl-4-12-3              | 1                   | 1       |
| N-33                   | 1                   | 1       |
| N-35                   | 1                   | 1       |
| Cl-6-11-2-1-1          | 1                   | 1       |
| Diethyl sebacate       | 1                   | 1       |
| Stearic Acid           | 1                   | 1       |
| Azobisisobutyronitrile | 1                   | 1       |
| Altax                  | 1                   | 1       |
| Dieneex                | 1                   | 1       |
| Sulfur                 | 1                   | 1       |

<sup>a</sup> Phillips Chemical Co., Stowe, OH.  
 Phillips Chemical designation is  
 DCD-1257.

TABLE A. Summary of the results of the analysis of variance for the effect of the treatment on the response of the subjects.

| Source of variation |  | Degrees of freedom |  | Mean square |  | F value |  | Probability |  |
|---------------------|--|--------------------|--|-------------|--|---------|--|-------------|--|
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UNITED STATES DEPARTMENT OF AGRICULTURE

Report of the  
Bureau of Plant Industry  
on the  
Work of the Bureau of Plant Industry  
for the Year 1917

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The Bureau of Plant Industry, United States Department of Agriculture, was organized in 1904, and since that time has been engaged in a wide range of research and practical work. The work of the Bureau has been directed towards the improvement of our plant resources, the control of plant diseases and insects, and the dissemination of information on plant matters. The following is a summary of the work of the Bureau for the year 1917.

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# Calculation of Curative weight

The following equations may be used to calculate the curative addition required:

CL = curative level per 100 parts prepolymer

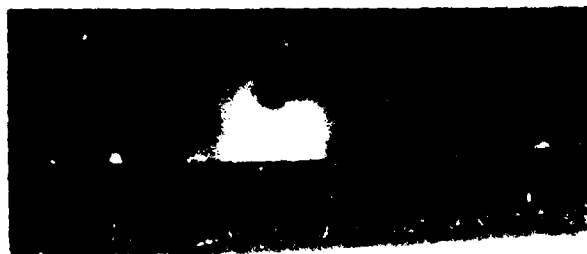
Percent NCO, Equivalent Wt. Curative x Curative Mole Ratio

Curative Mole Ratio =  $\frac{\text{Theoretical Curative Level}}{100}$

## TABLE I. - TENSILE STRENGTH OF Nylon AND POLYESTER MAT

| No. | Material      | Weight<br>oz./sq. ft. | Tensile<br>Strength,<br>P.S.I. |
|-----|---------------|-----------------------|--------------------------------|
|     |               |                       |                                |
| 1   | Nylon MAT     | 1.0                   | 100                            |
| 2   | Polyester MAT | 1.0                   | 100                            |

Figure 1. Polyurethane Formulation 146, 11.8 oz/yd<sup>2</sup> (50% infiltrated) and  
14.5 oz/yd<sup>2</sup> (50% infiltrated) Polyurethane Formulation 146



b) POLYURETHANE  
FORMULATION 146  
COMPLETELY  
INFILTRATED MAT.  
5.5 oz/yd<sup>2</sup>

b) POLYURETHANE  
FORMULATION 146

95-100% INFILTRATED MAT  
11.8 oz/yd<sup>2</sup>

c) POLYURETHANE  
FORMULATION 146

INFILTRATED MAT (50-60%)  
UNINFILTRATED MAT (40-50%)  
14.5 oz/yd<sup>2</sup>

Figure B-1 - Permeation of Formulation 205 Polyurethane Into Polyester Mats  
of Weight 5.5, 11.8 and 14.5 Ounces per Square Yard



a) CAST  
LIQUID 205  
IMPREGNATED  
MAT.

5.5 oz/yd<sup>2</sup>



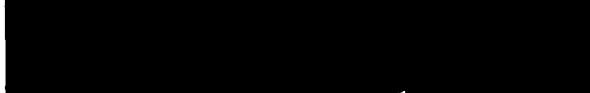
b) CAST LIQUID  
FORMULATION 205  
IMPREGNATED MAT.  
UNIMPREGNATED MAT.

11.8 oz/yd<sup>2</sup>



c) CAST LIQUID  
FORMULATION 205  
IMPREGNATED MAT.  
UNIMPREGNATED MAT.

14.5 oz/yd<sup>2</sup>



the first two steps. As a consequence, the percent increase in  $\Delta H$  is approximately 10% for the first step and 20% for the second step. The total percent increase in  $\Delta H$  is approximately 30%.

the end of the reaction, the content of the prepolymer, transferred to a dry, 100-ml flask, is carefully weighed. This sample is then dissolved in 10 ml of  $\text{CH}_2\text{Cl}_2$  in a 100-ml flask. Because of a weight loss of 0.1N, the chloroform solution is then diluted with a chloroform solution to 100 ml. In the following steps, the chloroform solution is added to a flask of 100 ml and a drop of 0.1N  $\text{NaOH}$  solution is added. Then the flask is titrated with 0.1N  $\text{HCl}$  solution to a color change from pink to colorless. Finally, a "blank" is run using all reagents except the sample.

[illegible]

- a. volume of 0.1N HCl required for blank (ml)
- b. volume of 0.1N HCl required for sample (ml)
- c. normality of HCl solution

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...the filter was placed in a desiccator with a few drops of water to prevent drying. The filter was then placed in a desiccator with a few drops of water to prevent drying. The filter was then placed in a desiccator with a few drops of water to prevent drying.

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- 1.4.5 oz. vol. mat. = approximately 50% permeation
- 1.8.5 oz. vol. mat. = approximately 60% permeation
- 2.5 oz. vol. mat. = approximately 90% permeation.

## TASK 2 - HOMOGENEOUS MATERIALS DEVELOPMENT

In order to prepare specimens for evaluation in this task, the handling procedures for the polyurethane polymers had to be modified. The addition of 5% carbon black or 5% fumed silica increased the viscosity of the prepolymers to such an extent that the additives could not be added either by simple stirring or in a paint mill.

For formulation PU-208 (BAT-140 + 5% carbon black + 5% fumed silica), approximately 1% of xylene was added to reduce the viscosity, and a satisfactory dispersion was obtained by milling on a paint mill. This material was then stirred with a high-speed, low-speed stirrer under vacuum to remove the solvent. Analysis of the prepolymer indicated a 2.95% isocyanate content (compared to 3.4% normally expected for this material). The lower NCO figure may have been due to reaction of the isocyanate group with atmospheric moisture, since a large surface area of the prepolymer is exposed during milling. The correct calculated quantity of curative was subsequently formulated into the prepolymer and the material was successfully cast into a 1- $\text{cm}^2$  sheet.

For PU-211 (PU-208 + 5% carbon black) a slightly different approach was adopted in the modification procedure. The modification was to incorporate the 5% carbon black into the polyurethane prepolymer and, separately, blend the 5% fumed silica into the butane diol chain extender. The two modified components were then to be mixed in a "Newfit" cartridge dispenser, and extruded followed by molding in dies to form 1- $\text{cm}^2$  sheets.

The carbon black was successfully incorporated into the prepolymer. However, blending the 5% into the butane diol was found to be impossible, since only a small quantity is necessary to satisfy the stoichiometric requirements of the prepolymer. (For a prepolymer of 3% NCO content, this would amount to about 0.3 g of butane diol per 10 g of prepolymer). Consequently, a compromise was made, and the material was cast containing the carbon black only.

For PU-212 (PU-198 + 5% carbon black and 5% silica) the addition of approximately 1% xylene was necessary, and curing of the polymer was considerably retarded by the presence of the solvent, even though this system was catalyzed with T-12 catalyst. Even post-cure of this material was delayed until most of the solvent had diffused out; otherwise voids would have been formed by the solvent vapor.

It is concluded from the above that it was necessary to cure this material during the polymerization to retain the properties which existed when the polymer was first prepared. The authors state that the results for the material allowed to cool slowly were better than those for material allowed to cool while submerged in water. This indicates that atmospheric moisture may also have had a detrimental effect on the material and, in polymer films which cure slowly some amount of moisture can diffuse into the cooled polymer and react with free radicals to give water drops.

43-4



[illegible]

439

| PBD          | Reaction of PBD with PBD |     |                     |     |                   |     |                     |     |
|--------------|--------------------------|-----|---------------------|-----|-------------------|-----|---------------------|-----|
|              | R <sub>1</sub> CM        |     |                     |     | CSLS              |     |                     |     |
|              | IPDI                     |     | H <sub>12</sub> MDI |     | IPDI              |     | H <sub>12</sub> MDI |     |
| Control Case | R <sub>1</sub> CM        | MDA | R <sub>1</sub> CM   | MDA | R <sub>1</sub> CM | MDA | R <sub>1</sub> CM   | MDA |
| Estimated    | 190                      | 191 | 187                 | 186 | 19                | 189 | 186                 | 184 |

In general, all four prepolymer, when treated with MDA as a curative, reacted slowly to form a viscous material similar to a cold, opaque, light brown rubbery materials at low dilutions. The short four reaction times automatically eliminated these materials from further consideration.

When the prepolymer, when treated with BDO as a curative, reacted so slowly that it was necessary to catalyze the reaction with 0.12-1.0% catalyst. These materials were collected overnight and were then post-cured at 150°C for 24 hours. They were labeled as low modulus elastomers, 185, 187, 190, and 191 for reference to the results shown in Appendix C.

The work in this case was supplemented as follows: An additional control of MDA elastomer, 188, was formulated at a higher NCO ratio of 3:1 to prepare a elastomer of higher modulus. Generally, these materials did not possess adequate flexural modulus to stand up to continued growth in reaction.

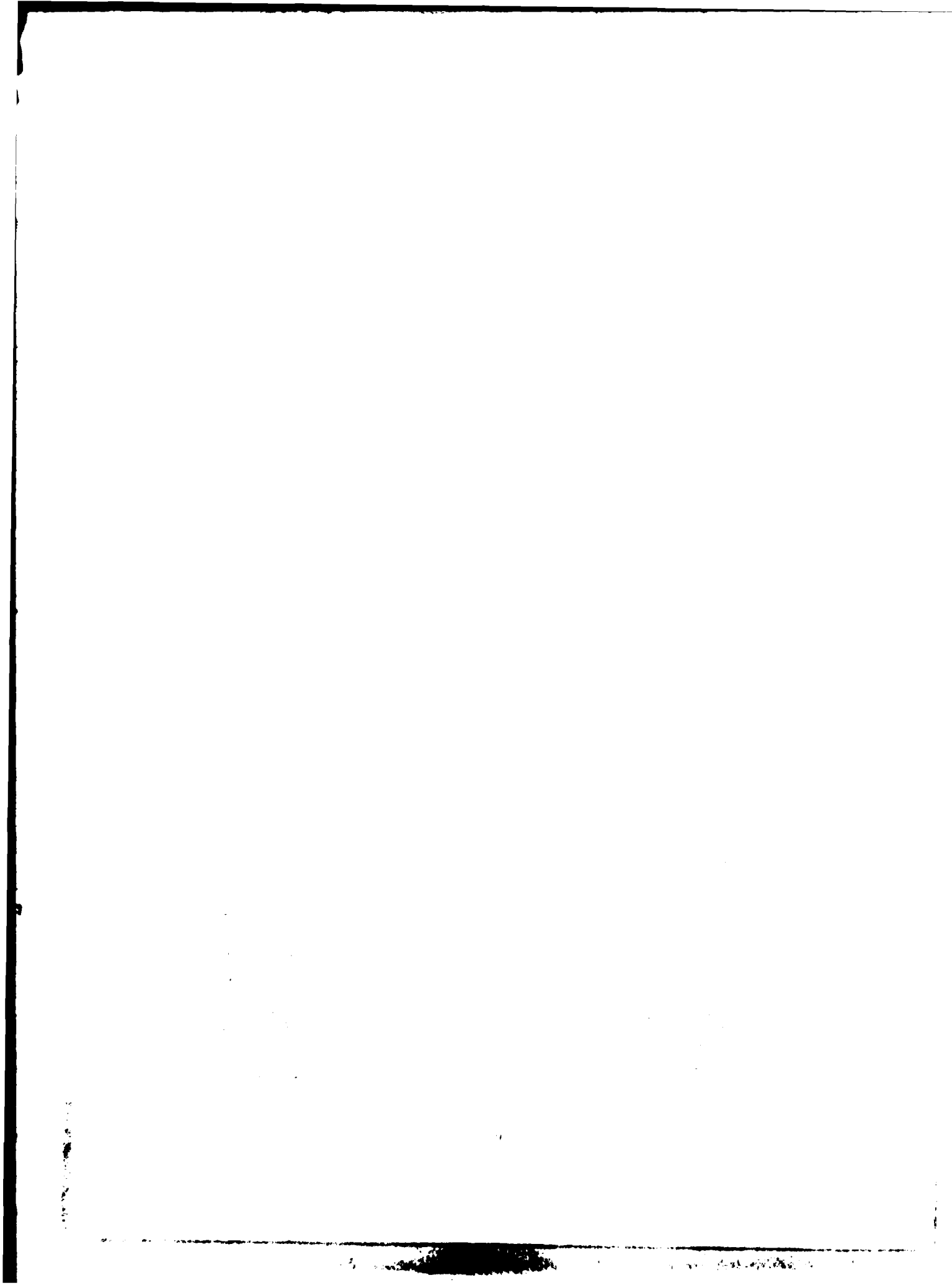
As work progressed with personnel at the center, it was agreed to further evaluate the prepolymer with various other and less curative agents, Isonol 1-3 (N, N-bis-

2-ethyl-1,3-hexane diol) and ethyl 1:3 hexane diol with a potential yield of 197 and 198. In addition, catalysts and attempted heat curing, the prepolymer reacted so slowly that it was nonpolymer. R<sub>1</sub>CM yielded only gummy products; those from the prepolymer were more promising, and led to an additional four elastomers. To assist in formulating the prepolymer at an NCO ratio of 3:1 according to the following experimental plan:

| PBD          | Reaction of PBD with PBD |     |                     |     |
|--------------|--------------------------|-----|---------------------|-----|
|              | CSLS                     |     |                     |     |
|              | IPDI                     |     | H <sub>12</sub> MDI |     |
| Control Case | 2 pt. 1:3* Isonol        |     | 2 pt. 1:3* Isonol   |     |
| Estimated    | 199                      | 200 | 197                 | 198 |
|              | *2-ethyl 1:3 hexane diol |     |                     |     |

The first experiment was designed to determine the effect of temperature on the rate of polymerization of the monomer. The reaction was carried out in a sealed tube at various temperatures. The results are shown in Table I. It is seen that the rate of polymerization increases with increasing temperature. The activation energy for this reaction was calculated to be 12.5 kcal/mole. The second experiment was designed to determine the effect of the concentration of the monomer on the rate of polymerization. The reaction was carried out in a sealed tube at a constant temperature of 100°C. The results are shown in Table II. It is seen that the rate of polymerization increases with increasing monomer concentration. The order of reaction with respect to monomer concentration was calculated to be 1.5. The third experiment was designed to determine the effect of the concentration of the initiator on the rate of polymerization. The reaction was carried out in a sealed tube at a constant temperature of 100°C. The results are shown in Table III. It is seen that the rate of polymerization increases with increasing initiator concentration. The order of reaction with respect to initiator concentration was calculated to be 0.5. The fourth experiment was designed to determine the effect of the concentration of the solvent on the rate of polymerization. The reaction was carried out in a sealed tube at a constant temperature of 100°C. The results are shown in Table IV. It is seen that the rate of polymerization decreases with increasing solvent concentration. The order of reaction with respect to solvent concentration was calculated to be -0.5. The fifth experiment was designed to determine the effect of the concentration of the catalyst on the rate of polymerization. The reaction was carried out in a sealed tube at a constant temperature of 100°C. The results are shown in Table V. It is seen that the rate of polymerization increases with increasing catalyst concentration. The order of reaction with respect to catalyst concentration was calculated to be 1.0.

The results of the experiments described above show that the rate of polymerization of the monomer is affected by temperature, monomer concentration, initiator concentration, solvent concentration, and catalyst concentration. The activation energy for this reaction is 12.5 kcal/mole. The order of reaction with respect to monomer concentration is 1.5, with respect to initiator concentration is 0.5, with respect to solvent concentration is -0.5, and with respect to catalyst concentration is 1.0.



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$$\begin{aligned} \mathcal{A}(\mathcal{B}) &= \{A \in \mathcal{A} : \exists B \in \mathcal{B} \text{ such that } A \subseteq B\} \\ \mathcal{A}(\mathcal{B}) &= \{A \in \mathcal{A} : \exists B \in \mathcal{B} \text{ such that } A \subseteq B\} \end{aligned}$$
[illegible]

<sup>1</sup>  $\mathcal{O}_X = \mathcal{O}_{\mathbb{P}^n}(-1)^{\otimes d}$  and  $\mathcal{O}_X(1) = \mathcal{O}_{\mathbb{P}^n}(1)^{\otimes d}$ . The sheaf  $\mathcal{O}_X(-1)$  is the sheaf of sections of the normal bundle of  $X$  in  $\mathbb{P}^n$ . The sheaf  $\mathcal{O}_X(1)$  is the sheaf of sections of the tangent bundle of  $X$ .

| Test material to be measured         | Standard Test Method |
|--------------------------------------|----------------------|
| Temperature of water in tank         | ASTM D 1595          |
| Relative humidity of air in tank     |                      |
| Temperature of air in tank and water | ASTM D 1595          |

TABLE 1. SUMMARY OF EVALUATION TESTS FOR RUBBER-CASTED FABRICS

|                                                          |                                  |
|----------------------------------------------------------|----------------------------------|
| Properties to be Measured                                | Standard Test Method             |
| Tensile Strength                                         | ASTM D 1004 D 1004               |
| Elongation at Break                                      | Elongation at Break ASTM D 1004* |
| Impact Adhesion                                          | ASTM D 1004 D 1004               |
| Flexural Fatigue                                         | ASTM D 1004 D 1004               |
| Resistance to Low Temperature                            | ASTM D 1004 D 1004               |
| Resistance to Fatigue                                    | ASTM D 1004 D 1004               |
| Water Wicking                                            | Weight Gain                      |
| * A Neoprene-cast fabric strip was bonded to the rubber. |                                  |

## APPENDIX D DETAILED EXPERIMENTAL DATA

This appendix presents more detailed experimental data from which the averaged results were calculated and presented in the text. In most cases, the results for each test specimen are tabulated; in a few cases where the numerical spread in data was small, the maximum and minimum values are tabulated in addition to the average value, rather than each individual data point. Usually 3 to 5 data points were included in each average value.

Tables D.1 and D.2 are presented the crack growth and flexural fatigue data for the 2 gum rubber polymers and the 2 castable liquid polyurethane polymers, respectively. Results are presented for each of the three specimens which were evaluated for each polymer, and the generally large spread in results of this type of test is obvious.

Tables D.3 and D.4 contain the mechanical characterization data for the 2 gum rubber polymers and the 2 castable liquid polyurethane polymers which were selected for this phase of the program. Table D.5 presents the coating adhesion data. Tables D.6 and D.7 contain the Pin Abrasion test results for the 2 gum rubber polymers and the 2 castable liquid polyurethane polymers. Experimental results from the duplicate specimens which were evaluated with the Goodrich flexometer hysteresis test are listed in Tables D.8 and D.9 for the gum rubbers and polyurethanes, respectively. Plots of the temperature rise versus time for the various polymers are presented in Figures D.1, D.2, D.3, D.4, D.5, D.6, and D.7 for the gum rubbers and in Figures D.8, D.9, and D.10 for the polyurethane polymers.

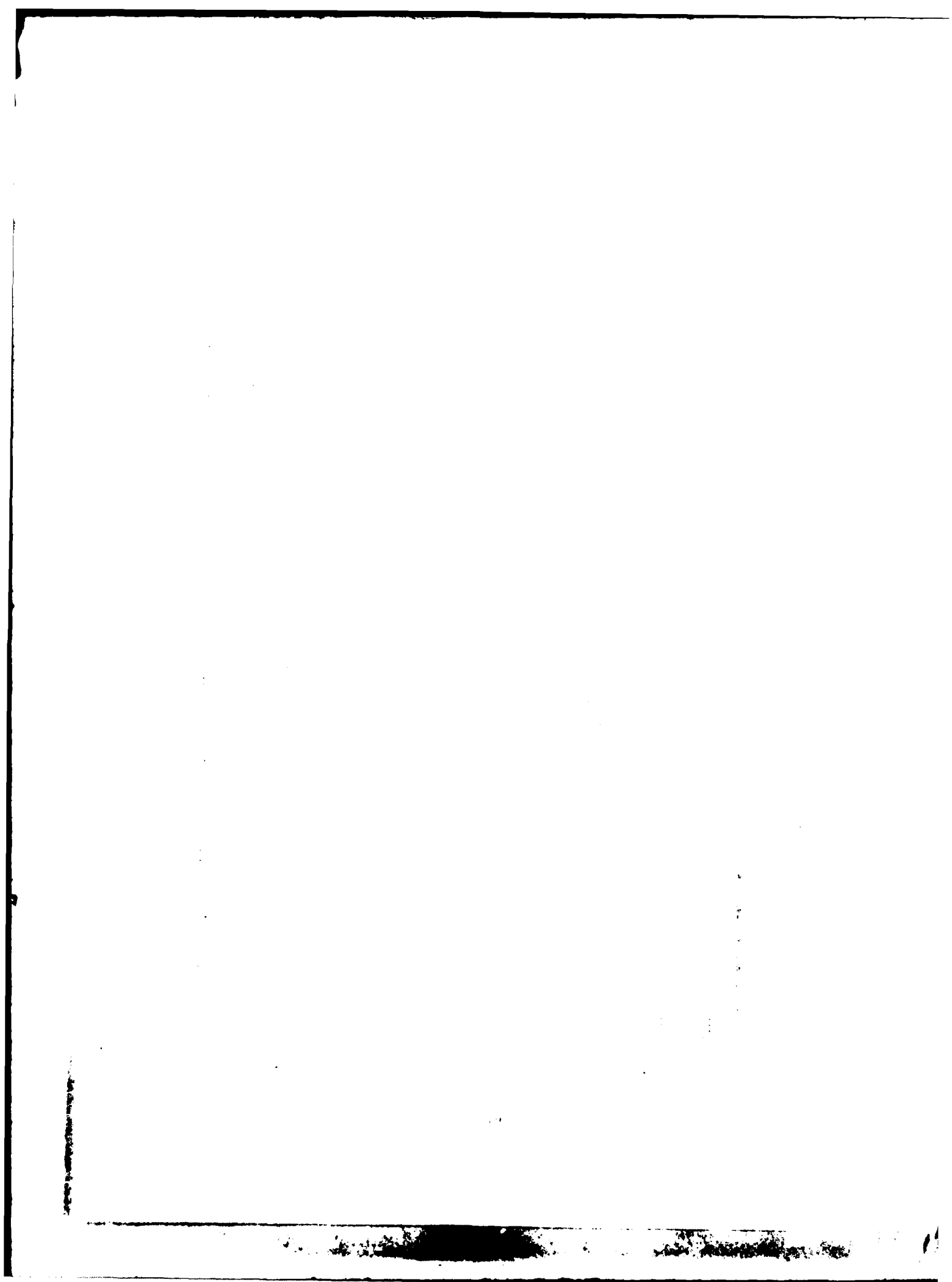
More details of the experimental data characterizing the effects of water on the polymers are presented in Tables D.10 and D.11. Similarly, the effects of 95% immersion are presented in Tables D.12 and D.13.

Tensile and elongation data for each specimen at three different test temperatures are presented in Table D.14 for the gum rubber polymer coated nylon fabric laminate and for the castable polyurethane polymer coated nylon fabric laminate in Table D.15. Similarly, tear strength results are presented in Tables D.16 and D.17. Coating adhesion results are presented in Table D.18 for polyurethane coated nylon fabric; the fabric and adhesion promoter were the same as used in the previous coating adhesion tests.

Results for the triplicate specimens of polymer-coated nylon fabric laminates were evaluated for chemical fatigue resistance in the deMott test, as reported in Tables 9.19 and 9.20.

Results for the triplicate specimens results are presented as a function of exposure time in Figures 9.17 and 9.18.

Results for each laminate and fabric composite specimen are presented in Tables 9.1 (tensile strength), 9.2 (tear strength), and 9.3 (coating adhesion).





1. The first part of the report is a general introduction to the subject of the study.

2. The second part of the report is a detailed description of the methods used in the study.

3. The third part of the report is a discussion of the results of the study.

4. The fourth part of the report is a conclusion and a list of references.

5. The fifth part of the report is a list of appendices.

6. The sixth part of the report is a list of figures and tables.

7. The seventh part of the report is a list of footnotes.

8. The eighth part of the report is a list of references.

9. The ninth part of the report is a list of appendices.

10. The tenth part of the report is a list of figures and tables.

11. The eleventh part of the report is a list of footnotes.

12. The twelfth part of the report is a list of references.

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185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 | 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 | 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 | 1001 | 1002 | 1003 | 1004 | 1005 | 1006 | 1007 | 1008 | 1009 | 1010 | 1011 | 1012 | 1013 | 1014 | 1015 | 1016 | 1017 | 1018 | 1019 | 1020 | 1021 | 1022 | 1023 | 1024 | 1025 | 1026 | 1027 | 1028 | 1029 | 1030 | 1031 | 1032 | 1033 | 1034 | 1035 | 1036 | 1037 | 1038 | 1039 | 1040 | 1041 | 1042 | 1043 | 1044 | 1045 | 1046 | 1047 | 1048 | 1049 | 1050 | 1051 | 1052 | 1053 | 1054 | 1055 | 1056 | 1057 | 1058 | 1059 | 1060 | 1061 | 1062 | 1063 | 1064 | 1065 | 1066 | 1067 | 1068 | 1069 | 1070 | 1071 | 1072 | 1073 | 1074 | 1075 | 1076 | 1077 | 1078 | 1079 | 1080 | 1081 | 1082 | 1083 | 1084 | 1085 | 1086 | 1087 | 1088 | 1089 | 1090 | 1091 | 1092 | 1093 | 1094 | 1095 | 1096 | 1097 | 1098 | 1099 | 1100 | 1101 | 1102 | 1103 | 1104 | 1105 | 1106 | 1107 | 1108 | 1109 | 1110 | 1111 | 1112 | 1113 | 1114 | 1115 | 1116 | 1117 | 1118 | 1119 | 1120 | 1121 | 1122 | 1123 | 1124 | 1125 | 1126 | 1127 | 1128 | 1129 | 1130 | 1131 | 1132 | 1133 | 1134 | 1135 | 1136 | 1137 | 1138 | 1139 | 1140 | 1141 | 1142 | 1143 | 1144 | 1145 | 1146 | 1147 | 1148 | 1149 | 1150 | 1151 | 1152 | 1153 | 1154 | 1155 | 1156 | 1157 | 1158 | 1159 | 1160 | 1161 | 1162 | 1163 | 1164 | 1165 | 1166 | 1167 | 1168 | 1169 | 1170 | 1171 | 1172 | 1173 | 1174 | 1175 | 1176 | 1177 | 1178 | 1179 | 1180 | 1181 | 1182 | 1183 | 1184 | 1185 | 1186 | 1187 | 1188 | 1189 | 1190 | 1191 | 1192 | 1193 | 1194 | 1195 | 1196 | 1197 | 1198 | 1199 | 1200 | 1201 | 1202 | 1203 | 1204 | 1205 | 1206 | 1207 | 1208 | 1209 | 1210 | 1211 | 1212 | 1213 | 1214 | 1215 | 1216 | 1217 | 1218 | 1219 | 1220 | 1221 | 1222 | 1223 | 1224 | 1225 | 1226 | 1227 | 1228 | 1229 | 1230 | 1231 | 1232 | 1233 | 1234 | 1235 | 1236 | 1237 | 1238 | 1239 | 1240 | 1241 | 1242 | 1243 | 1244 | 1245 | 1246 | 1247 | 1248 | 1249 | 1250 | 1251 | 1252 | 1253 | 1254 | 1255 | 1256 | 1257 | 1258 | 1259 | 1260 | 1261 | 1262 | 1263 | 1264 | 1265 | 1266 | 1267 | 1268 | 1269 | 1270 | 1271 | 1272 | 1273 | 1274 | 1275 | 1276 | 1277 | 1278 | 1279 | 1280 | 1281 | 1282 | 1283 | 1284 | 1285 | 1286 | 1287 | 1288 | 1289 | 1290 | 1291 | 1292 | 1293 | 1294 | 1295 | 1296 | 1297 | 1298 | 1299 | 1300 | 1301 | 1302 | 1303 | 1304 | 1305 | 1306 | 1307 | 1308 | 1309 | 1310 | 1311 | 1312 | 1313 | 1314 | 1315 | 1316 | 1317 | 1318 | 1319 | 1320 | 1321 | 1322 | 1323 | 1324 | 1325 | 1326 | 1327 | 1328 | 1329 | 1330 | 1331 | 1332 | 1333 | 1334 | 1335 | 1336 | 1337 | 1338 | 1339 | 1340 | 1341 | 1342 | 1343 | 1344 | 1345 | 1346 | 1347 | 1348 | 1349 | 1350 | 1351 | 1352 | 1353 | 1354 | 1355 | 1356 | 1357 | 1358 | 1359 | 1360 | 1361 | 1362 | 1363 | 1364 | 1365 | 1366 | 1367 | 1368 | 1369 | 1370 | 1371 | 1372 | 1373 | 1374 | 1375 | 1376 | 1377 | 1378 | 1379 | 1380 | 1381 | 1382 | 1383 | 1384 | 1385 | 1386 | 1387 | 1388 | 1389 | 1390 | 1391 | 1392 | 1393 | 1394 | 1395 | 1396 | 1397 | 1398 | 1399 | 1400 | 1401 | 1402 | 1403 | 1404 | 1405 | 1406 | 1407 | 1408 | 1409 | 1410 | 1411 | 1412 | 1413 | 1414 | 1415 | 1416 | 1417 | 1418 | 1419 | 1420 | 1421 | 1422 | 1423 | 1424 | 1425 | 1426 | 1427 | 1428 | 1429 | 1430 | 1431 | 1432 | 1433 | 1434 | 1435 | 1436 | 1437 | 1438 | 1439 | 1440 | 1441 | 1442 | 1443 | 1444 | 1445 | 1446 | 1447 | 1448 | 1449 | 1450 | 1451 | 1452 | 1453 | 1454 | 1455 | 1456 | 1457 | 1458 | 1459 | 1460 | 1461 | 1462 | 1463 | 1464 | 1465 | 1466 | 1467 | 1468 | 1469 | 1470 | 1471 | 1472 | 1473 | 1474 | 1475 | 1476 | 1477 | 1478 | 1479 | 1480 | 1481 | 1482 | 1483 | 1484 | 1485 | 1486 | 1487 | 1488 | 1489 | 1490 | 1491 | 1492 | 1493 | 1494 | 1495 | 1 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-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Table 1. Data for the first set of experiments.

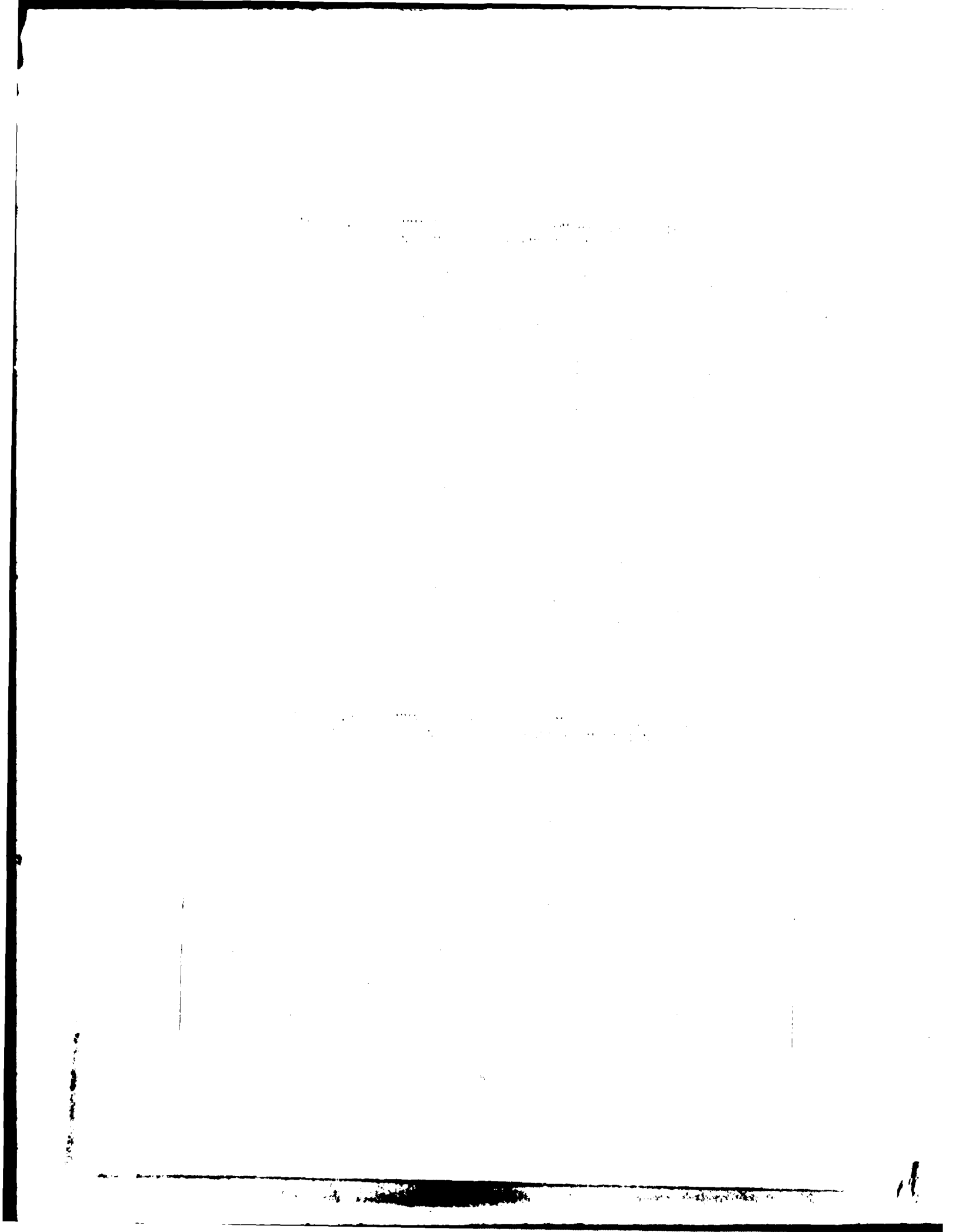
| Run | Time (min) | Conc. (mg/L) | Temp. (°C) | pH  | Notes |
|-----|------------|--------------|------------|-----|-------|
| 1   | 10         | 1.0          | 25         | 7.0 |       |
| 2   | 20         | 1.0          | 25         | 7.0 |       |
| 3   | 30         | 1.0          | 25         | 7.0 |       |
| 4   | 40         | 1.0          | 25         | 7.0 |       |
| 5   | 50         | 1.0          | 25         | 7.0 |       |
| 6   | 60         | 1.0          | 25         | 7.0 |       |
| 7   | 70         | 1.0          | 25         | 7.0 |       |
| 8   | 80         | 1.0          | 25         | 7.0 |       |
| 9   | 90         | 1.0          | 25         | 7.0 |       |
| 10  | 100        | 1.0          | 25         | 7.0 |       |
| 11  | 110        | 1.0          | 25         | 7.0 |       |
| 12  | 120        | 1.0          | 25         | 7.0 |       |
| 13  | 130        | 1.0          | 25         | 7.0 |       |
| 14  | 140        | 1.0          | 25         | 7.0 |       |
| 15  | 150        | 1.0          | 25         | 7.0 |       |
| 16  | 160        | 1.0          | 25         | 7.0 |       |
| 17  | 170        | 1.0          | 25         | 7.0 |       |
| 18  | 180        | 1.0          | 25         | 7.0 |       |
| 19  | 190        | 1.0          | 25         | 7.0 |       |
| 20  | 200        | 1.0          | 25         | 7.0 |       |

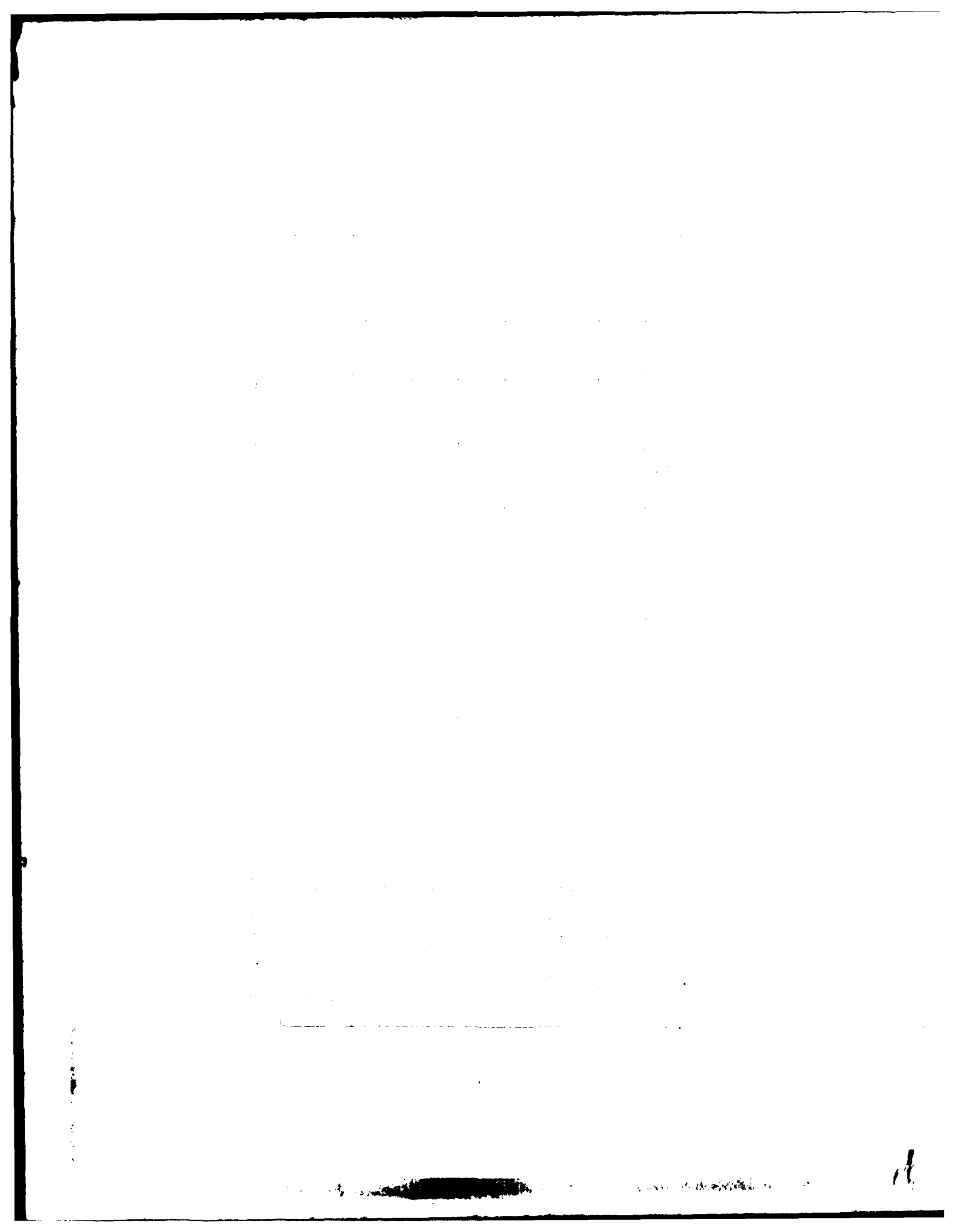
Notes: The data were obtained from the first set of experiments. The concentration of the solution was 1.0 mg/L. The temperature was 25°C. The pH was 7.0. The time was 10 to 200 minutes.

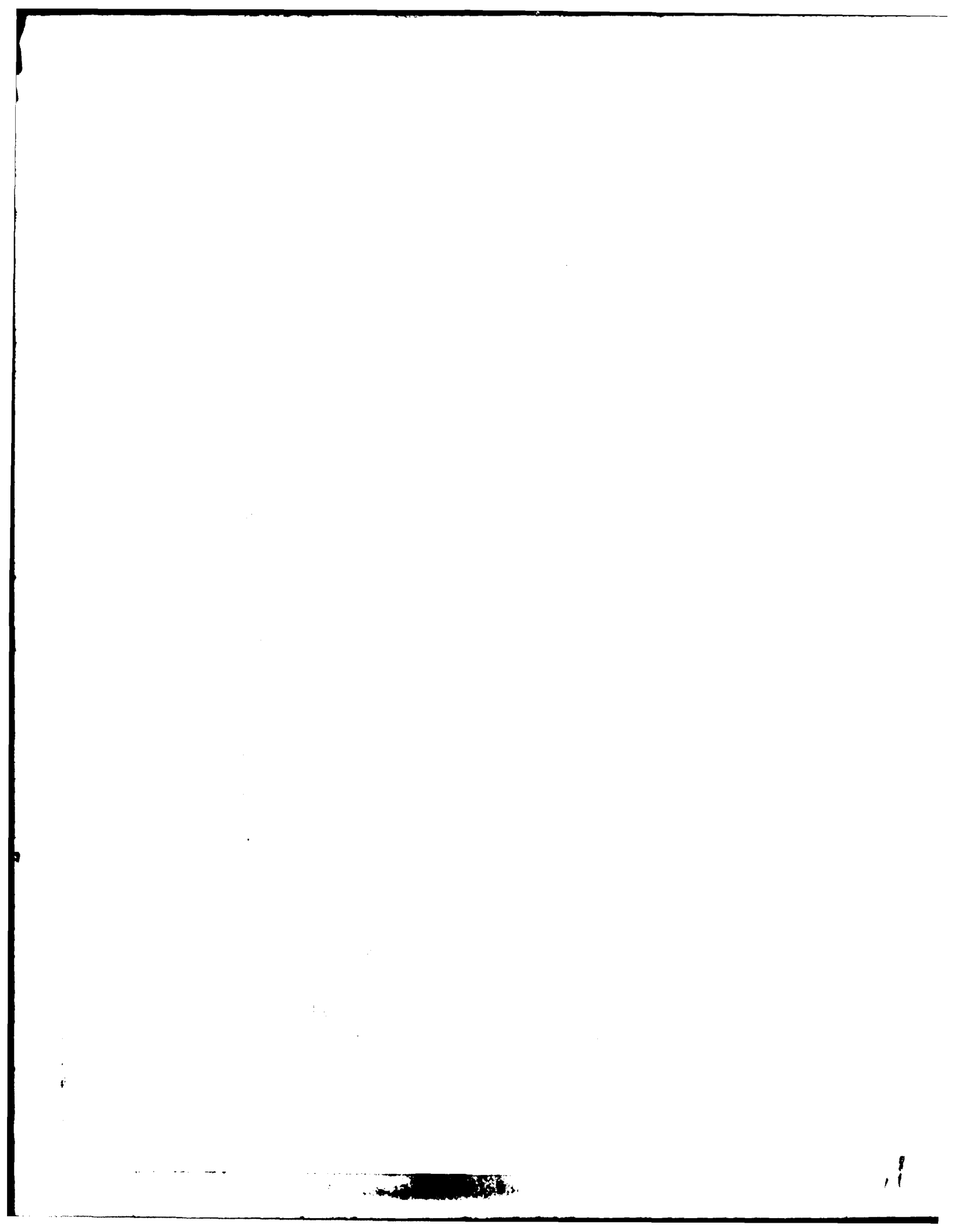
Table 2. Data for the second set of experiments.

| Run | Time (min) | Conc. (mg/L) | Temp. (°C) | pH  | Notes |
|-----|------------|--------------|------------|-----|-------|
| 1   | 10         | 1.0          | 25         | 7.0 |       |
| 2   | 20         | 1.0          | 25         | 7.0 |       |
| 3   | 30         | 1.0          | 25         | 7.0 |       |
| 4   | 40         | 1.0          | 25         | 7.0 |       |
| 5   | 50         | 1.0          | 25         | 7.0 |       |
| 6   | 60         | 1.0          | 25         | 7.0 |       |
| 7   | 70         | 1.0          | 25         | 7.0 |       |
| 8   | 80         | 1.0          | 25         | 7.0 |       |
| 9   | 90         | 1.0          | 25         | 7.0 |       |
| 10  | 100        | 1.0          | 25         | 7.0 |       |
| 11  | 110        | 1.0          | 25         | 7.0 |       |
| 12  | 120        | 1.0          | 25         | 7.0 |       |
| 13  | 130        | 1.0          | 25         | 7.0 |       |
| 14  | 140        | 1.0          | 25         | 7.0 |       |
| 15  | 150        | 1.0          | 25         | 7.0 |       |
| 16  | 160        | 1.0          | 25         | 7.0 |       |
| 17  | 170        | 1.0          | 25         | 7.0 |       |
| 18  | 180        | 1.0          | 25         | 7.0 |       |
| 19  | 190        | 1.0          | 25         | 7.0 |       |
| 20  | 200        | 1.0          | 25         | 7.0 |       |

Notes: The data were obtained from the second set of experiments. The concentration of the solution was 1.0 mg/L. The temperature was 25°C. The pH was 7.0. The time was 10 to 200 minutes.







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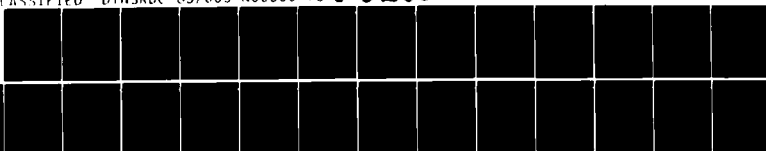
FINGER MATERIALS FOR AIR CUSHION VEHICLES VOLUME 1  
FLEXIBLE COATINGS FOR (U) BELL AEROSPACE TEXTRON  
BUFFALO NY P K CONN ET AL DEC 84 7467-927048-VOL-1  
DTNSRDC-85/003 N00600-78-**C-0250**

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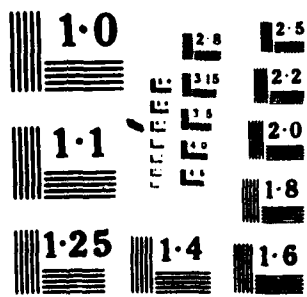




TABLE D-13 - MECHANICAL PROPERTIES OF POLYETHYLENE FORMULATIONS BEFORE AND AFTER EXTENSION IN H-1 STEEL

| Formulation No. | Formulation Data |          |         | Mechanical Properties |             |             | After Extension in H-1 Steel |             |             |
|-----------------|------------------|----------|---------|-----------------------|-------------|-------------|------------------------------|-------------|-------------|
|                 | Dist.            | Ex. (mm) | Station | Modulus (psi)         | Yield (psi) | Tens. (psi) | Modulus (psi)                | Yield (psi) | Tens. (psi) |
| 181             | 2000 MW          | 0.01     | 500     | 1000                  | 1000        | 1000        | 1000                         | 1000        | 1000        |
| PTMOC           |                  |          |         |                       |             |             |                              |             |             |
| 185             | PBC Styrene      | 0.01     | 500     | 1000                  | 1000        | 1000        | 1000                         | 1000        | 1000        |
| Cap. (mm)       |                  |          |         |                       |             |             |                              |             |             |
| 188             | PBC Styrene      | 0.01     | 500     | 1000                  | 1000        | 1000        | 1000                         | 1000        | 1000        |
| Cap. (mm)       |                  |          |         |                       |             |             |                              |             |             |
| 195             | PTMOC            | 0.01     | 500     | 1000                  | 1000        | 1000        | 1000                         | 1000        | 1000        |
| (2000 MW)       |                  |          |         |                       |             |             |                              |             |             |
| 0.01 (500)      |                  |          |         |                       |             |             |                              |             |             |
| 400 mm          |                  |          |         |                       |             |             |                              |             |             |

\* Temperature of test was at 100°C.

TABLE D.1.4 - TEST III RESULTS FROM RUBBER/ KOVIN NYLON COMPOSITE

| TEST NO. | TEST TYPE | TEST TYPE | TEST TYPE | TEST TYPE | TEST TYPE | TEST TYPE |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|
| TEST NO. | TEST TYPE | TEST TYPE | TEST TYPE | TEST TYPE | TEST TYPE | TEST TYPE |
| 1        | 100       | 100       | 100       | 100       | 100       | 100       |
| 2        | 100       | 100       | 100       | 100       | 100       | 100       |
| 3        | 100       | 100       | 100       | 100       | 100       | 100       |
| 4        | 100       | 100       | 100       | 100       | 100       | 100       |
| 5        | 100       | 100       | 100       | 100       | 100       | 100       |
| 6        | 100       | 100       | 100       | 100       | 100       | 100       |
| 7        | 100       | 100       | 100       | 100       | 100       | 100       |
| 8        | 100       | 100       | 100       | 100       | 100       | 100       |
| 9        | 100       | 100       | 100       | 100       | 100       | 100       |
| 10       | 100       | 100       | 100       | 100       | 100       | 100       |
| 11       | 100       | 100       | 100       | 100       | 100       | 100       |
| 12       | 100       | 100       | 100       | 100       | 100       | 100       |
| 13       | 100       | 100       | 100       | 100       | 100       | 100       |
| 14       | 100       | 100       | 100       | 100       | 100       | 100       |
| 15       | 100       | 100       | 100       | 100       | 100       | 100       |
| 16       | 100       | 100       | 100       | 100       | 100       | 100       |
| 17       | 100       | 100       | 100       | 100       | 100       | 100       |
| 18       | 100       | 100       | 100       | 100       | 100       | 100       |
| 19       | 100       | 100       | 100       | 100       | 100       | 100       |
| 20       | 100       | 100       | 100       | 100       | 100       | 100       |
| 21       | 100       | 100       | 100       | 100       | 100       | 100       |
| 22       | 100       | 100       | 100       | 100       | 100       | 100       |
| 23       | 100       | 100       | 100       | 100       | 100       | 100       |
| 24       | 100       | 100       | 100       | 100       | 100       | 100       |
| 25       | 100       | 100       | 100       | 100       | 100       | 100       |
| 26       | 100       | 100       | 100       | 100       | 100       | 100       |
| 27       | 100       | 100       | 100       | 100       | 100       | 100       |
| 28       | 100       | 100       | 100       | 100       | 100       | 100       |
| 29       | 100       | 100       | 100       | 100       | 100       | 100       |
| 30       | 100       | 100       | 100       | 100       | 100       | 100       |
| 31       | 100       | 100       | 100       | 100       | 100       | 100       |
| 32       | 100       | 100       | 100       | 100       | 100       | 100       |
| 33       | 100       | 100       | 100       | 100       | 100       | 100       |
| 34       | 100       | 100       | 100       | 100       | 100       | 100       |
| 35       | 100       | 100       | 100       | 100       | 100       | 100       |
| 36       | 100       | 100       | 100       | 100       | 100       | 100       |
| 37       | 100       | 100       | 100       | 100       | 100       | 100       |
| 38       | 100       | 100       | 100       | 100       | 100       | 100       |
| 39       | 100       | 100       | 100       | 100       | 100       | 100       |
| 40       | 100       | 100       | 100       | 100       | 100       | 100       |
| 41       | 100       | 100       | 100       | 100       | 100       | 100       |
| 42       | 100       | 100       | 100       | 100       | 100       | 100       |
| 43       | 100       | 100       | 100       | 100       | 100       | 100       |
| 44       | 100       | 100       | 100       | 100       | 100       | 100       |
| 45       | 100       | 100       | 100       | 100       | 100       | 100       |
| 46       | 100       | 100       | 100       | 100       | 100       | 100       |
| 47       | 100       | 100       | 100       | 100       | 100       | 100       |
| 48       | 100       | 100       | 100       | 100       | 100       | 100       |
| 49       | 100       | 100       | 100       | 100       | 100       | 100       |
| 50       | 100       | 100       | 100       | 100       | 100       | 100       |
| 51       | 100       | 100       | 100       | 100       | 100       | 100       |
| 52       | 100       | 100       | 100       | 100       | 100       | 100       |
| 53       | 100       | 100       | 100       | 100       | 100       | 100       |
| 54       | 100       | 100       | 100       | 100       | 100       | 100       |
| 55       | 100       | 100       | 100       | 100       | 100       | 100       |
| 56       | 100       | 100       | 100       | 100       | 100       | 100       |
| 57       | 100       | 100       | 100       | 100       | 100       | 100       |
| 58       | 100       | 100       | 100       | 100       | 100       | 100       |
| 59       | 100       | 100       | 100       | 100       | 100       | 100       |
| 60       | 100       | 100       | 100       | 100       | 100       | 100       |
| 61       | 100       | 100       | 100       | 100       | 100       | 100       |
| 62       | 100       | 100       | 100       | 100       | 100       | 100       |
| 63       | 100       | 100       | 100       | 100       | 100       | 100       |
| 64       | 100       | 100       | 100       | 100       | 100       | 100       |
| 65       | 100       | 100       | 100       | 100       | 100       | 100       |
| 66       | 100       | 100       | 100       | 100       | 100       | 100       |
| 67       | 100       | 100       | 100       | 100       | 100       | 100       |
| 68       | 100       | 100       | 100       | 100       | 100       | 100       |
| 69       | 100       | 100       | 100       | 100       | 100       | 100       |
| 70       | 100       | 100       | 100       | 100       | 100       | 100       |
| 71       | 100       | 100       | 100       | 100       | 100       | 100       |
| 72       | 100       | 100       | 100       | 100       | 100       | 100       |
| 73       | 100       | 100       | 100       | 100       | 100       | 100       |
| 74       | 100       | 100       | 100       | 100       | 100       | 100       |
| 75       | 100       | 100       | 100       | 100       | 100       | 100       |
| 76       | 100       | 100       | 100       | 100       | 100       | 100       |
| 77       | 100       | 100       | 100       | 100       | 100       | 100       |
| 78       | 100       | 100       | 100       | 100       | 100       | 100       |
| 79       | 100       | 100       | 100       | 100       | 100       | 100       |
| 80       | 100       | 100       | 100       | 100       | 100       | 100       |
| 81       | 100       | 100       | 100       | 100       | 100       | 100       |
| 82       | 100       | 100       | 100       | 100       | 100       | 100       |
| 83       | 100       | 100       | 100       | 100       | 100       | 100       |
| 84       | 100       | 100       | 100       | 100       | 100       | 100       |
| 85       | 100       | 100       | 100       | 100       | 100       | 100       |
| 86       | 100       | 100       | 100       | 100       | 100       | 100       |
| 87       | 100       | 100       | 100       | 100       | 100       | 100       |
| 88       | 100       | 100       | 100       | 100       | 100       | 100       |
| 89       | 100       | 100       | 100       | 100       | 100       | 100       |
| 90       | 100       | 100       | 100       | 100       | 100       | 100       |
| 91       | 100       | 100       | 100       | 100       | 100       | 100       |
| 92       | 100       | 100       | 100       | 100       | 100       | 100       |
| 93       | 100       | 100       | 100       | 100       | 100       | 100       |
| 94       | 100       | 100       | 100       | 100       | 100       | 100       |
| 95       | 100       | 100       | 100       | 100       | 100       | 100       |
| 96       | 100       | 100       | 100       | 100       | 100       | 100       |
| 97       | 100       | 100       | 100       | 100       | 100       | 100       |
| 98       | 100       | 100       | 100       | 100       | 100       | 100       |
| 99       | 100       | 100       | 100       | 100       | 100       | 100       |
| 100      | 100       | 100       | 100       | 100       | 100       | 100       |

TABLE D.14 - (Continued)

| Material | Condition | Average<br>Thickness<br>(in.) | Test<br>Temperature<br>(°C. or °F.) | Tensile<br>Strength<br>(lbs./in.) | Average | Elongation<br>(%) | Average |
|----------|-----------|-------------------------------|-------------------------------------|-----------------------------------|---------|-------------------|---------|
| A533-B   | 1111      | 0.750                         | 24 (75.0)                           | 1020                              | 1042    | 33                | 26      |
|          |           |                               | 24 (75.0)                           | 1086                              |         | 24                |         |
|          |           |                               | 24 (75.0)                           | 993                               |         | 25                |         |
|          |           |                               | 24 (75.0)                           | 1072                              |         | 31                |         |
|          |           |                               | 24 (75.0)                           | 1072                              |         | 33                |         |
|          | 1112      | 0.750                         | 24 (75.0)                           | 1033                              | 1007    | 25                | 29      |
|          |           |                               | 24 (75.0)                           | 1117                              |         | 30                |         |
|          |           |                               | 24 (75.0)                           | 1061                              |         | 30                |         |
|          |           |                               | 24 (75.0)                           | 1023                              |         | 28                |         |
|          |           |                               | 24 (75.0)                           | 1086                              |         | 31                |         |
|          | 1113      | 0.750                         | 24 (75.0)                           | 1180                              | 1143    | 28                | 25      |
|          |           |                               | 24 (75.0)                           | 1086                              |         | 24                |         |
|          |           |                               | 24 (75.0)                           | 1143                              |         | 29                |         |
|          |           |                               | 24 (75.0)                           | 1260                              |         | 27                |         |
|          |           |                               | 24 (75.0)                           | 1147                              |         | 20                |         |
| A533-B   | 1111      | 0.750                         | 24 (75.0)                           | 1033                              | 1003    | 30                | 24      |
|          |           |                               | 24 (75.0)                           | 964                               |         | 31                |         |
|          |           |                               | 24 (75.0)                           | 987                               |         | 28                |         |
|          |           |                               | 24 (75.0)                           | 1006                              |         | 25                |         |
|          |           |                               | 24 (75.0)                           | 1033                              |         | 28                |         |
|          | 1112      | 0.750                         | 24 (75.0)                           | 1020                              | 1031    | 30                | 24      |
|          |           |                               | 24 (75.0)                           | 1039                              |         | 38                |         |
|          |           |                               | 24 (75.0)                           | 1086                              |         | 34                |         |
|          |           |                               | 24 (75.0)                           | 1092                              |         | 38                |         |
|          |           |                               | 24 (75.0)                           | 1070                              |         | 37                |         |
|          | 1113      | 0.750                         | 24 (75.0)                           | 1008                              | 990     | 27                | 32      |
|          |           |                               | 24 (75.0)                           | 970                               |         | 28                |         |
|          |           |                               | 24 (75.0)                           | 894                               |         | 32                |         |
|          |           |                               | 24 (75.0)                           | 987                               |         | 34                |         |
|          |           |                               | 24 (75.0)                           | 981                               |         | 24                |         |
| A533-B   | 1111      | 0.750                         | 24 (75.0)                           | 987                               | 1029    | 14                | 27      |
|          |           |                               | 24 (75.0)                           | 1086                              |         | 19                |         |
|          |           |                               | 24 (75.0)                           | 987                               |         | 17                |         |
|          |           |                               | 24 (75.0)                           | 1033                              |         | 16                |         |
|          |           |                               | 24 (75.0)                           | 1033                              |         | 20                |         |
|          | 1112      | 0.750                         | 24 (75.0)                           | 1003                              | 1033    | 28                | 25      |
|          |           |                               | 24 (75.0)                           | 1006                              |         | 26                |         |
|          |           |                               | 24 (75.0)                           | 1020                              |         | 26                |         |
|          |           |                               | 24 (75.0)                           | 1099                              |         | 30                |         |
|          |           |                               | 24 (75.0)                           | 1046                              |         | 30                |         |

TABLE D.14 - (Continued)

| Material | Specimen No. | Weave Direction | Test Temperature (°C) (°F) | Tensile Strength (lbs.) (N)                                                         | Average | Elongation (%) | Average |
|----------|--------------|-----------------|----------------------------|-------------------------------------------------------------------------------------|---------|----------------|---------|
|          | 11           |                 | -1 (30)                    | 1092                                                                                | 1068    | 35             | 27      |
|          | 12           |                 | -1 (30)                    | 1042                                                                                |         |                |         |
|          | 13           |                 | -1 (30)                    | 1084                                                                                |         | 20             |         |
|          | 14           |                 | -1 (30)                    | 974                                                                                 |         | 32             |         |
|          | 15           |                 | -1 (30)                    | 1041                                                                                |         | 14             |         |
| BAT 418  | 1            | Warp            | 24 (75)                    | 1127                                                                                | 1130    | 39             | 34      |
|          | 2            |                 | 24 (75)                    | 1049                                                                                |         | 39             |         |
|          | 3            |                 | 24 (75)                    | 1131                                                                                |         | 39             |         |
|          | 4            |                 | 24 (75)                    | 1131                                                                                |         | 36             |         |
|          | 5            |                 | 24 (75)                    | 1131                                                                                |         | 36             |         |
|          | 6            |                 | 29 (120)                   |                                                                                     |         |                |         |
|          | 7            |                 | 29 (120)                   |                                                                                     |         |                |         |
|          | 8            |                 | 29 (120)                   | Testing cancelled, material softened.                                               |         |                |         |
|          | 9            |                 | 29 (120)                   |                                                                                     |         |                |         |
|          | 10           |                 | 29 (120)                   |                                                                                     |         |                |         |
|          | 11           |                 | -1 (30)                    |                                                                                     |         |                |         |
|          | 12           |                 | -1 (30)                    |                                                                                     |         |                |         |
|          | 13           |                 | -1 (30)                    | Testing cancelled.                                                                  |         |                |         |
|          | 14           |                 | -1 (30)                    |                                                                                     |         |                |         |
|          | 15           |                 | -1 (30)                    |                                                                                     |         |                |         |
|          | 1            | 1111            | 24 (75)                    | 1118                                                                                | 1131    | 39             | 36      |
|          | 2            |                 | 24 (75)                    | 1224                                                                                |         | 36             |         |
|          | 3            |                 | 24 (75)                    | 1125                                                                                |         | 30             |         |
|          | 4            |                 | 24 (75)                    | 1220                                                                                |         | 29             |         |
|          | 5            |                 | 24 (75)                    | 1316                                                                                |         | 29             |         |
|          | 6            |                 | 29 (120)                   | 1152                                                                                | 1176    | 25             | 28      |
|          | 7            |                 | 29 (120)                   | Rubber covering gave-way first pull; spec. repositioned and test completed.<br>1289 |         |                |         |
|          | 8            |                 | 29 (120)                   | (Test temperature > 110°F) First test at 120°F; rubber gave-way.                    |         |                |         |
|          | 9            |                 | 29 (120)                   | Rubber covering softened and was separated from fabric by grip.<br>1089             |         |                |         |
|          | 10           |                 | 29 (120)                   | (Test Temperature < 110°F)                                                          |         |                |         |
|          | 11           |                 | -1 (30)                    | Testing cancelled.                                                                  |         |                |         |
|          | 12           |                 | -1 (30)                    |                                                                                     |         |                |         |
|          | 13           |                 |                            |                                                                                     |         |                |         |
|          | 14           |                 |                            |                                                                                     |         |                |         |
|          | 15           |                 |                            |                                                                                     |         |                |         |

TABLE 10.13 - TENSILE RESULTS FROM POLYMERIZABLE NYLON  
NYLON COMPOUND

| Material           | Specimen No. | Warp Direction | Test Temperature, °F. | Material Avg. Stress, lbs./sq. in. | Tensile Strength, lbs./sq. in. | Elongation, % |
|--------------------|--------------|----------------|-----------------------|------------------------------------|--------------------------------|---------------|
| 180 - Nylon Fabric | 1            | Warp           | 24 (75)               | 0,185                              | 1040                           | 35            |
|                    | 2            | Warp           | 24 (75)               | 0,184                              | 1100                           | 35            |
|                    | 3            | Warp           | 24 (75)               | 0,190                              | 1160                           | 30            |
|                    |              |                |                       | Avg. 1100                          | Avg. 37                        |               |
|                    | 4            | Warp           | 49 (120)              | 0,177                              | 1150                           | 40            |
|                    | 5            | Warp           | 49 (120)              | 0,198                              | 1030                           | 40            |
|                    | 6            | Warp           | 49 (120)              | 0,195                              | 1100                           | 35            |
|                    | 7            | Warp           | 49 (120)              | 0,207                              | 1040                           | 32            |
|                    |              |                |                       | Avg. 1080                          | Avg. 37                        |               |
| 180 - Nylon Fabric | 1            | F111           | 24 (75)               | 0,184                              | 830                            | 20            |
|                    | 2            | F111           | 24 (75)               | 0,186                              | 1180                           | 25            |
|                    | 3            | F111           | 24 (75)               | 0,185                              | 1170                           | 30            |
|                    | 4            | F111           | 24 (75)               | 0,191                              | 1290                           | 25            |
|                    |              |                |                       | Avg. 1120                          | Avg. 25                        |               |
|                    | 5            | F111           | 49 (120)              | 0,168                              | 1120                           | 30            |
|                    | 6            | F111           | 49 (120)              | 0,172                              | 970                            | 35            |
|                    | 7            | F111           | 49 (120)              | 0,186                              | 1170                           | 28            |
|                    | 8            | F111           | 49 (120)              | 0,187                              | 1000                           | 22            |
|                    |              |                |                       | Avg. 1070                          | Avg. 26                        |               |
| 180 - Nylon Fabric | 1            | Warp           | 24 (75)               | 0,140                              | 1140                           | 35            |
|                    | 2            | Warp           | 24 (75)               | 0,140                              | 1180                           | 30            |
|                    | 3            | Warp           | 24 (75)               | 0,139                              | 1060                           | 30            |
|                    | 4            | Warp           | 24 (75)               | 0,140                              | 1240                           | 38            |
|                    |              |                |                       | Avg. 1170                          | Avg. 32                        |               |
|                    | 5            | Warp           | 49 (120)              | 0,140                              | 1060                           | 31            |
|                    | 6            | Warp           | 49 (120)              | 0,144                              | 1000                           | 40            |
|                    | 7            | Warp           | 49 (120)              | 0,146                              | 1100                           | 32            |
|                    | 8            | Warp           | 49 (120)              | 0,146                              | 1080                           | 31            |
|                    |              |                |                       | Avg. 1080                          | Avg. 34                        |               |
| 180 - Nylon Fabric | 1            | F111           | 24 (75)               | 0,141                              | 1120                           | 25            |
|                    | 2            | F111           | 24 (75)               | 0,150                              | 1100                           | 22            |
|                    | 3            | F111           | 24 (75)               | 0,169                              | 1170                           | 26            |
|                    | 4            | F111           | 24 (75)               | 0,150                              | 1220                           | 25            |
|                    |              |                |                       | Avg. 1160                          | Avg. 25                        |               |
|                    | 5            | F111           | 49 (120)              | 0,151                              | 950                            | 25            |
|                    | 6            | F111           | 49 (120)              | 0,150                              | 875                            | 23            |
|                    | 7            | F111           | 49 (120)              | 0,152                              | 970                            | 28            |
|                    | 8            | F111           | 49 (120)              | 0,150                              | 1030                           | 22            |
|                    |              |                |                       | Avg. 960                           | Avg. 25                        |               |



| TABLE 1. SUMMARY OF DATA FOR THE 1960-1961 SEASON |          |               |              |                |
|---------------------------------------------------|----------|---------------|--------------|----------------|
| Station                                           | Location | Altitude (ft) | Area (sq ft) | Volume (cu ft) |
| 1                                                 | ...      | ...           | ...          | ...            |
| 2                                                 | ...      | ...           | ...          | ...            |
| 3                                                 | ...      | ...           | ...          | ...            |
| 4                                                 | ...      | ...           | ...          | ...            |
| 5                                                 | ...      | ...           | ...          | ...            |
| 6                                                 | ...      | ...           | ...          | ...            |
| 7                                                 | ...      | ...           | ...          | ...            |
| 8                                                 | ...      | ...           | ...          | ...            |
| 9                                                 | ...      | ...           | ...          | ...            |
| 10                                                | ...      | ...           | ...          | ...            |
| 11                                                | ...      | ...           | ...          | ...            |
| 12                                                | ...      | ...           | ...          | ...            |
| 13                                                | ...      | ...           | ...          | ...            |
| 14                                                | ...      | ...           | ...          | ...            |
| 15                                                | ...      | ...           | ...          | ...            |
| 16                                                | ...      | ...           | ...          | ...            |
| 17                                                | ...      | ...           | ...          | ...            |
| 18                                                | ...      | ...           | ...          | ...            |
| 19                                                | ...      | ...           | ...          | ...            |
| 20                                                | ...      | ...           | ...          | ...            |
| 21                                                | ...      | ...           | ...          | ...            |
| 22                                                | ...      | ...           | ...          | ...            |
| 23                                                | ...      | ...           | ...          | ...            |
| 24                                                | ...      | ...           | ...          | ...            |
| 25                                                | ...      | ...           | ...          | ...            |
| 26                                                | ...      | ...           | ...          | ...            |
| 27                                                | ...      | ...           | ...          | ...            |
| 28                                                | ...      | ...           | ...          | ...            |
| 29                                                | ...      | ...           | ...          | ...            |
| 30                                                | ...      | ...           | ...          | ...            |
| 31                                                | ...      | ...           | ...          | ...            |
| 32                                                | ...      | ...           | ...          | ...            |
| 33                                                | ...      | ...           | ...          | ...            |
| 34                                                | ...      | ...           | ...          | ...            |
| 35                                                | ...      | ...           | ...          | ...            |
| 36                                                | ...      | ...           | ...          | ...            |
| 37                                                | ...      | ...           | ...          | ...            |
| 38                                                | ...      | ...           | ...          | ...            |
| 39                                                | ...      | ...           | ...          | ...            |
| 40                                                | ...      | ...           | ...          | ...            |
| 41                                                | ...      | ...           | ...          | ...            |
| 42                                                | ...      | ...           | ...          | ...            |
| 43                                                | ...      | ...           | ...          | ...            |
| 44                                                | ...      | ...           | ...          | ...            |
| 45                                                | ...      | ...           | ...          | ...            |
| 46                                                | ...      | ...           | ...          | ...            |
| 47                                                | ...      | ...           | ...          | ...            |
| 48                                                | ...      | ...           | ...          | ...            |
| 49                                                | ...      | ...           | ...          | ...            |
| 50                                                | ...      | ...           | ...          | ...            |
| 51                                                | ...      | ...           | ...          | ...            |
| 52                                                | ...      | ...           | ...          | ...            |
| 53                                                | ...      | ...           | ...          | ...            |
| 54                                                | ...      | ...           | ...          | ...            |
| 55                                                | ...      | ...           | ...          | ...            |
| 56                                                | ...      | ...           | ...          | ...            |
| 57                                                | ...      | ...           | ...          | ...            |
| 58                                                | ...      | ...           | ...          | ...            |
| 59                                                | ...      | ...           | ...          | ...            |
| 60                                                | ...      | ...           | ...          | ...            |
| 61                                                | ...      | ...           | ...          | ...            |
| 62                                                | ...      | ...           | ...          | ...            |
| 63                                                | ...      | ...           | ...          | ...            |
| 64                                                | ...      | ...           | ...          | ...            |
| 65                                                | ...      | ...           | ...          | ...            |
| 66                                                | ...      | ...           | ...          | ...            |
| 67                                                | ...      | ...           | ...          | ...            |
| 68                                                | ...      | ...           | ...          | ...            |
| 69                                                | ...      | ...           | ...          | ...            |
| 70                                                | ...      | ...           | ...          | ...            |
| 71                                                | ...      | ...           | ...          | ...            |
| 72                                                | ...      | ...           | ...          | ...            |
| 73                                                | ...      | ...           | ...          | ...            |
| 74                                                | ...      | ...           | ...          | ...            |
| 75                                                | ...      | ...           | ...          | ...            |
| 76                                                | ...      | ...           | ...          | ...            |
| 77                                                | ...      | ...           | ...          | ...            |
| 78                                                | ...      | ...           | ...          | ...            |
| 79                                                | ...      | ...           | ...          | ...            |
| 80                                                | ...      | ...           | ...          | ...            |
| 81                                                | ...      | ...           | ...          | ...            |
| 82                                                | ...      | ...           | ...          | ...            |
| 83                                                | ...      | ...           | ...          | ...            |
| 84                                                | ...      | ...           | ...          | ...            |
| 85                                                | ...      | ...           | ...          | ...            |
| 86                                                | ...      | ...           | ...          | ...            |
| 87                                                | ...      | ...           | ...          | ...            |
| 88                                                | ...      | ...           | ...          | ...            |
| 89                                                | ...      | ...           | ...          | ...            |
| 90                                                | ...      | ...           | ...          | ...            |
| 91                                                | ...      | ...           | ...          | ...            |
| 92                                                | ...      | ...           | ...          | ...            |
| 93                                                | ...      | ...           | ...          | ...            |
| 94                                                | ...      | ...           | ...          | ...            |
| 95                                                | ...      | ...           | ...          | ...            |
| 96                                                | ...      | ...           | ...          | ...            |
| 97                                                | ...      | ...           | ...          | ...            |
| 98                                                | ...      | ...           | ...          | ...            |
| 99                                                | ...      | ...           | ...          | ...            |
| 100                                               | ...      | ...           | ...          | ...            |

TABLE 2. SUMMARY OF DATA FOR THE 1962-1963 SEASON

| TABLE 2. SUMMARY OF DATA FOR THE 1962-1963 SEASON |          |               |              |                |
|---------------------------------------------------|----------|---------------|--------------|----------------|
| Station                                           | Location | Altitude (ft) | Area (sq ft) | Volume (cu ft) |
| 1                                                 | ...      | ...           | ...          | ...            |
| 2                                                 | ...      | ...           | ...          | ...            |
| 3                                                 | ...      | ...           | ...          | ...            |
| 4                                                 | ...      | ...           | ...          | ...            |
| 5                                                 | ...      | ...           | ...          | ...            |
| 6                                                 | ...      | ...           | ...          | ...            |
| 7                                                 | ...      | ...           | ...          | ...            |
| 8                                                 | ...      | ...           | ...          | ...            |
| 9                                                 | ...      | ...           | ...          | ...            |
| 10                                                | ...      | ...           | ...          | ...            |
| 11                                                | ...      | ...           | ...          | ...            |
| 12                                                | ...      | ...           | ...          | ...            |
| 13                                                | ...      | ...           | ...          | ...            |
| 14                                                | ...      | ...           | ...          | ...            |
| 15                                                | ...      | ...           | ...          | ...            |
| 16                                                | ...      | ...           | ...          | ...            |
| 17                                                | ...      | ...           | ...          | ...            |
| 18                                                | ...      | ...           | ...          | ...            |
| 19                                                | ...      | ...           | ...          | ...            |
| 20                                                | ...      | ...           | ...          | ...            |
| 21                                                | ...      | ...           | ...          | ...            |
| 22                                                | ...      | ...           | ...          | ...            |
| 23                                                | ...      | ...           | ...          | ...            |
| 24                                                | ...      | ...           | ...          | ...            |
| 25                                                | ...      | ...           | ...          | ...            |
| 26                                                | ...      | ...           | ...          | ...            |
| 27                                                | ...      | ...           | ...          | ...            |
| 28                                                | ...      | ...           | ...          | ...            |
| 29                                                | ...      | ...           | ...          | ...            |
| 30                                                | ...      | ...           | ...          | ...            |
| 31                                                | ...      | ...           | ...          | ...            |
| 32                                                | ...      | ...           | ...          | ...            |
| 33                                                | ...      | ...           | ...          | ...            |
| 34                                                | ...      | ...           | ...          | ...            |
| 35                                                | ...      | ...           | ...          | ...            |
| 36                                                | ...      | ...           | ...          | ...            |
| 37                                                | ...      | ...           | ...          | ...            |
| 38                                                | ...      | ...           | ...          | ...            |
| 39                                                | ...      | ...           | ...          | ...            |
| 40                                                | ...      | ...           | ...          | ...            |
| 41                                                | ...      | ...           | ...          | ...            |
| 42                                                | ...      | ...           | ...          | ...            |
| 43                                                | ...      | ...           | ...          | ...            |
| 44                                                | ...      | ...           | ...          | ...            |
| 45                                                | ...      | ...           | ...          | ...            |
| 46                                                | ...      | ...           | ...          | ...            |
| 47                                                | ...      | ...           | ...          | ...            |
| 48                                                | ...      | ...           | ...          | ...            |
| 49                                                | ...      | ...           | ...          | ...            |
| 50                                                | ...      | ...           | ...          | ...            |
| 51                                                | ...      | ...           | ...          | ...            |
| 52                                                | ...      | ...           | ...          | ...            |
| 53                                                | ...      | ...           | ...          | ...            |
| 54                                                | ...      | ...           | ...          | ...            |
| 55                                                | ...      | ...           | ...          | ...            |
| 56                                                | ...      | ...           | ...          | ...            |
| 57                                                | ...      | ...           | ...          | ...            |
| 58                                                | ...      | ...           | ...          | ...            |
| 59                                                | ...      | ...           | ...          | ...            |
| 60                                                | ...      | ...           | ...          | ...            |
| 61                                                | ...      | ...           | ...          | ...            |
| 62                                                | ...      | ...           | ...          | ...            |
| 63                                                | ...      | ...           | ...          | ...            |
| 64                                                | ...      | ...           | ...          | ...            |
| 65                                                | ...      | ...           | ...          | ...            |
| 66                                                | ...      | ...           | ...          | ...            |
| 67                                                | ...      | ...           | ...          | ...            |
| 68                                                | ...      | ...           | ...          | ...            |
| 69                                                | ...      | ...           | ...          | ...            |
| 70                                                | ...      | ...           | ...          | ...            |
| 71                                                | ...      | ...           | ...          | ...            |
| 72                                                | ...      | ...           | ...          | ...            |
| 73                                                | ...      | ...           | ...          | ...            |
| 74                                                | ...      | ...           | ...          | ...            |
| 75                                                | ...      | ...           | ...          | ...            |
| 76                                                | ...      | ...           | ...          | ...            |
| 77                                                | ...      | ...           | ...          | ...            |
| 78                                                | ...      | ...           | ...          | ...            |
| 79                                                | ...      | ...           | ...          | ...            |
| 80                                                | ...      | ...           | ...          | ...            |
| 81                                                | ...      | ...           | ...          | ...            |
| 82                                                | ...      | ...           | ...          | ...            |
| 83                                                | ...      | ...           | ...          | ...            |
| 84                                                | ...      | ...           | ...          | ...            |
| 85                                                | ...      | ...           | ...          | ...            |
| 86                                                | ...      | ...           | ...          | ...            |
| 87                                                | ...      | ...           | ...          | ...            |
| 88                                                | ...      | ...           | ...          | ...            |
| 89                                                | ...      | ...           | ...          | ...            |
| 90                                                | ...      | ...           | ...          | ...            |
| 91                                                | ...      | ...           | ...          | ...            |
| 92                                                | ...      | ...           | ...          | ...            |
| 93                                                | ...      | ...           | ...          | ...            |
| 94                                                | ...      | ...           | ...          | ...            |
| 95                                                | ...      | ...           | ...          | ...            |
| 96                                                | ...      | ...           | ...          | ...            |
| 97                                                | ...      | ...           | ...          | ...            |
| 98                                                | ...      | ...           | ...          | ...            |
| 99                                                | ...      | ...           | ...          | ...            |
| 100                                               | ...      | ...           | ...          | ...            |

TABLE 1. Summary of Test Results for the Various Specimens  
 (a) Specimens Exhibited No Cracks

| Material Description | Test Temperature<br>(°C) (°F) | Test Results     |                                        |
|----------------------|-------------------------------|------------------|----------------------------------------|
|                      |                               | Crack Initiation | Crack Propagation                      |
| FOR 502 Nylon Warp   | 1                             | 0.000            | 2.810 <sup>6</sup> all three specimens |
|                      | 49                            | 0.120            | 2.810 <sup>6</sup> all three specimens |
|                      | 144                           | 0.000            | 2.810 <sup>6</sup> all three specimens |
|                      | 49                            | 0.120            | 2.810 <sup>6</sup> all three specimens |
| BAL 400 Nylon Warp   | 1                             | 0.000            | 2.810 <sup>6</sup> all three specimens |
|                      | 49                            | 0.120            | 2.810 <sup>6</sup> all three specimens |
|                      | 144                           | 0.000            | 2.810 <sup>6</sup> all three specimens |
|                      | 49                            | 0.120            | 2.810 <sup>6</sup> all three specimens |
| BAL 411 Nylon Warp   | 1                             | 0.000            | 2.810 <sup>6</sup> all three specimens |
|                      | 49                            | 0.120            | 2.810 <sup>6</sup> all three specimens |
|                      | 144                           | 0.000            | 2.810 <sup>6</sup> all three specimens |
|                      | 49                            | 0.120            | 2.810 <sup>6</sup> all three specimens |
| BAL 419 Nylon Warp   | 1                             | 0.000            | 2.810 <sup>6</sup> all three specimens |
|                      | 49                            | 0.120            | 2.810 <sup>6</sup> all three specimens |
|                      | 144                           | 0.000            | 2.810 <sup>6</sup> all three specimens |
|                      | 49                            | 0.120            | 2.810 <sup>6</sup> all three specimens |

• The static test results for cracks in the tension region of the specimens.  
 ••• Specimens exhibited no cracks in the tension region.  
 •••• Specimens exhibited some cracks in the tension region.

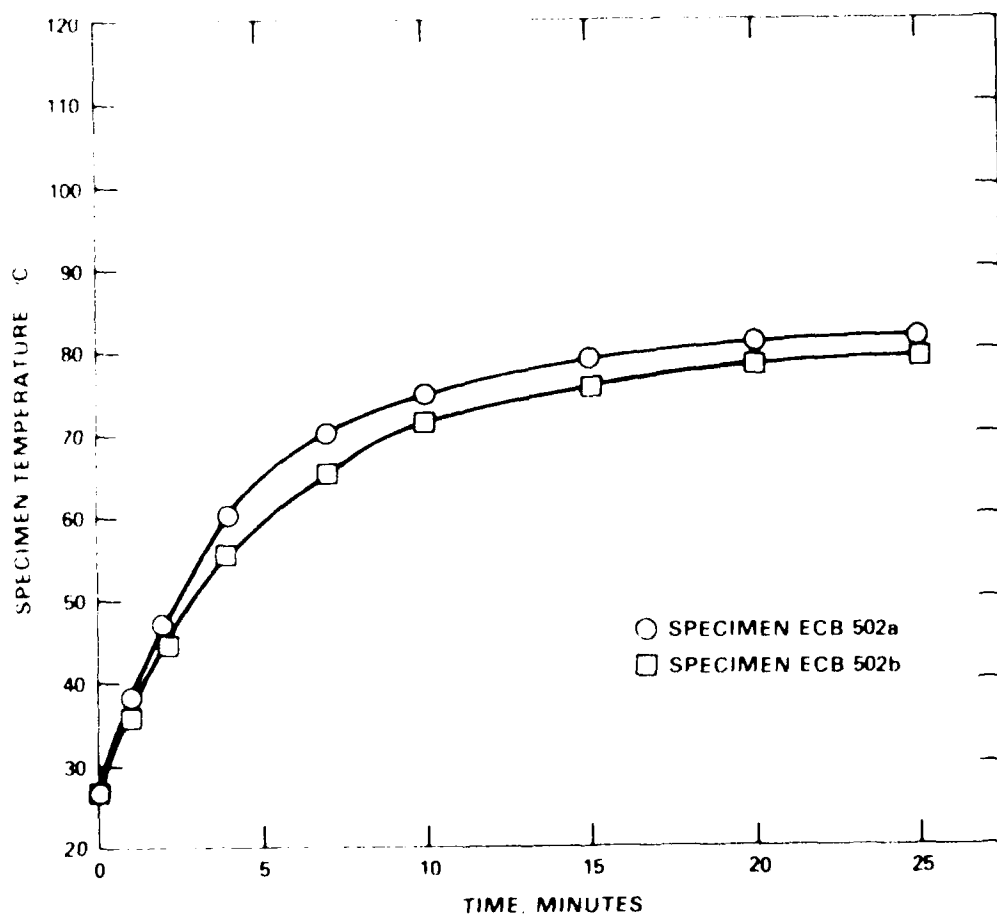
**Y**

TABLE 1. DATA FROM SOLUBLE MANIPULATOR AND COMPOSITE

| Material            | Sample No. | Test | Temp. | Pressure |
|---------------------|------------|------|-------|----------|
| Soluble Manipulator | 1          | 1000 | 100   | 100      |
|                     | 2          | 1000 | 100   | 100      |
|                     | 3          | 1000 | 100   | 100      |
|                     | 4          | 1000 | 100   | 100      |
|                     | 5          | 1000 | 100   | 100      |
|                     | 6          | 1000 | 100   | 100      |
|                     | 7          | 1000 | 100   | 100      |
|                     | 8          | 1000 | 100   | 100      |
|                     | 9          | 1000 | 100   | 100      |
|                     | 10         | 1000 | 100   | 100      |
| Composite           | 11         | 1000 | 100   | 100      |
|                     | 12         | 1000 | 100   | 100      |
|                     | 13         | 1000 | 100   | 100      |
|                     | 14         | 1000 | 100   | 100      |
|                     | 15         | 1000 | 100   | 100      |
|                     | 16         | 1000 | 100   | 100      |
|                     | 17         | 1000 | 100   | 100      |
|                     | 18         | 1000 | 100   | 100      |
|                     | 19         | 1000 | 100   | 100      |
|                     | 20         | 1000 | 100   | 100      |

TABLE 2. DATA FROM MANIPULATOR AND COMPOSITE

| Material            | Sample No. | Temp. | Pressure | Average |
|---------------------|------------|-------|----------|---------|
| Soluble Manipulator | 1          | 100   | 100      | 110     |
|                     | 2          | 100   | 100      | 110     |
|                     | 3          | 100   | 100      | 110     |



# APPENDIX A Chemical Suppliers

## Acetic Acid

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

## Acetic Acid

Acetic Acid, Glacial, Anhydrous, Company

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

Acetic Acid, Glacial, Anhydrous

TABLE 1.1. THE 1994-1995 FISCAL YEAR: A SUMMARY OF THE FISCAL YEAR

| FISCAL YEAR 1994-1995 |       |
|-----------------------|-------|
| 1. Total Revenue      | 100.0 |
| 2. Total Expenditure  | 100.0 |
| 3. Total Surplus      | 0.0   |
| 4. Total Deficit      | 0.0   |
| 5. Total Debt         | 0.0   |
| 6. Total Assets       | 0.0   |
| 7. Total Liabilities  | 0.0   |
| 8. Total Equity       | 0.0   |
| 9. Total Capital      | 0.0   |
| 10. Total Income      | 0.0   |
| 11. Total Expenses    | 0.0   |
| 12. Total Profit      | 0.0   |
| 13. Total Loss        | 0.0   |
| 14. Total Net Income  | 0.0   |
| 15. Total Net Loss    | 0.0   |
| 16. Total Net Profit  | 0.0   |
| 17. Total Net Loss    | 0.0   |
| 18. Total Net Income  | 0.0   |
| 19. Total Net Loss    | 0.0   |
| 20. Total Net Profit  | 0.0   |
| 21. Total Net Loss    | 0.0   |
| 22. Total Net Income  | 0.0   |
| 23. Total Net Loss    | 0.0   |
| 24. Total Net Profit  | 0.0   |
| 25. Total Net Loss    | 0.0   |
| 26. Total Net Income  | 0.0   |
| 27. Total Net Loss    | 0.0   |
| 28. Total Net Profit  | 0.0   |
| 29. Total Net Loss    | 0.0   |
| 30. Total Net Income  | 0.0   |
| 31. Total Net Loss    | 0.0   |
| 32. Total Net Profit  | 0.0   |
| 33. Total Net Loss    | 0.0   |
| 34. Total Net Income  | 0.0   |
| 35. Total Net Loss    | 0.0   |
| 36. Total Net Profit  | 0.0   |
| 37. Total Net Loss    | 0.0   |
| 38. Total Net Income  | 0.0   |
| 39. Total Net Loss    | 0.0   |
| 40. Total Net Profit  | 0.0   |
| 41. Total Net Loss    | 0.0   |
| 42. Total Net Income  | 0.0   |
| 43. Total Net Loss    | 0.0   |
| 44. Total Net Profit  | 0.0   |
| 45. Total Net Loss    | 0.0   |
| 46. Total Net Income  | 0.0   |
| 47. Total Net Loss    | 0.0   |
| 48. Total Net Profit  | 0.0   |
| 49. Total Net Loss    | 0.0   |
| 50. Total Net Income  | 0.0   |
| 51. Total Net Loss    | 0.0   |
| 52. Total Net Profit  | 0.0   |
| 53. Total Net Loss    | 0.0   |
| 54. Total Net Income  | 0.0   |
| 55. Total Net Loss    | 0.0   |
| 56. Total Net Profit  | 0.0   |
| 57. Total Net Loss    | 0.0   |
| 58. Total Net Income  | 0.0   |
| 59. Total Net Loss    | 0.0   |
| 60. Total Net Profit  | 0.0   |
| 61. Total Net Loss    | 0.0   |
| 62. Total Net Income  | 0.0   |
| 63. Total Net Loss    | 0.0   |
| 64. Total Net Profit  | 0.0   |
| 65. Total Net Loss    | 0.0   |
| 66. Total Net Income  | 0.0   |
| 67. Total Net Loss    | 0.0   |
| 68. Total Net Profit  | 0.0   |
| 69. Total Net Loss    | 0.0   |
| 70. Total Net Income  | 0.0   |
| 71. Total Net Loss    | 0.0   |
| 72. Total Net Profit  | 0.0   |
| 73. Total Net Loss    | 0.0   |
| 74. Total Net Income  | 0.0   |
| 75. Total Net Loss    | 0.0   |
| 76. Total Net Profit  | 0.0   |
| 77. Total Net Loss    | 0.0   |
| 78. Total Net Income  | 0.0   |
| 79. Total Net Loss    | 0.0   |
| 80. Total Net Profit  | 0.0   |
| 81. Total Net Loss    | 0.0   |
| 82. Total Net Income  | 0.0   |
| 83. Total Net Loss    | 0.0   |
| 84. Total Net Profit  | 0.0   |
| 85. Total Net Loss    | 0.0   |
| 86. Total Net Income  | 0.0   |
| 87. Total Net Loss    | 0.0   |
| 88. Total Net Profit  | 0.0   |
| 89. Total Net Loss    | 0.0   |
| 90. Total Net Income  | 0.0   |
| 91. Total Net Loss    | 0.0   |
| 92. Total Net Profit  | 0.0   |
| 93. Total Net Loss    | 0.0   |
| 94. Total Net Income  | 0.0   |
| 95. Total Net Loss    | 0.0   |
| 96. Total Net Profit  | 0.0   |
| 97. Total Net Loss    | 0.0   |
| 98. Total Net Income  | 0.0   |
| 99. Total Net Loss    | 0.0   |
| 100. Total Net Profit | 0.0   |
| 101. Total Net Loss   | 0.0   |
| 102. Total Net Income | 0.0   |
| 103. Total Net Loss   | 0.0   |
| 104. Total Net Profit | 0.0   |
| 105. Total Net Loss   | 0.0   |
| 106. Total Net Income | 0.0   |
| 107. Total Net Loss   | 0.0   |
| 108. Total Net Profit | 0.0   |
| 109. Total Net Loss   | 0.0   |
| 110. Total Net Income | 0.0   |
| 111. Total Net Loss   | 0.0   |
| 112. Total Net Profit | 0.0   |
| 113. Total Net Loss   | 0.0   |
| 114. Total Net Income | 0.0   |
| 115. Total Net Loss   | 0.0   |
| 116. Total Net Profit | 0.0   |
| 117. Total Net Loss   | 0.0   |
| 118. Total Net Income | 0.0   |
| 119. Total Net Loss   | 0.0   |
| 120. Total Net Profit | 0.0   |
| 121. Total Net Loss   | 0.0   |
| 122. Total Net Income | 0.0   |
| 123. Total Net Loss   | 0.0   |
| 124. Total Net Profit | 0.0   |
| 125. Total Net Loss   | 0.0   |
| 126. Total Net Income | 0.0   |
| 127. Total Net Loss   | 0.0   |
| 128. Total Net Profit | 0.0   |
| 129. Total Net Loss   | 0.0   |
| 130. Total Net Income | 0.0   |
| 131. Total Net Loss   | 0.0   |
| 132. Total Net Profit | 0.0   |
| 133. Total Net Loss   | 0.0   |
| 134. Total Net Income | 0.0   |
| 135. Total Net Loss   | 0.0   |
| 136. Total Net Profit | 0.0   |
| 137. Total Net Loss   | 0.0   |
| 138. Total Net Income | 0.0   |
| 139. Total Net Loss   | 0.0   |
| 140. Total Net Profit | 0.0   |
| 141. Total Net Loss   | 0.0   |
| 142. Total Net Income | 0.0   |
| 143. Total Net Loss   | 0.0   |
| 144. Total Net Profit | 0.0   |
| 145. Total Net Loss   | 0.0   |
| 146. Total Net Income | 0.0   |
| 147. Total Net Loss   | 0.0   |
| 148. Total Net Profit | 0.0   |
| 149. Total Net Loss   | 0.0   |
| 150. Total Net Income | 0.0   |
| 151. Total Net Loss   | 0.0   |
| 152. Total Net Profit | 0.0   |
| 153. Total Net Loss   | 0.0   |
| 154. Total Net Income | 0.0   |
| 155. Total Net Loss   | 0.0   |
| 156. Total Net Profit | 0.0   |
| 157. Total Net Loss   | 0.0   |
| 158. Total Net Income | 0.0   |
| 159. Total Net Loss   | 0.0   |
| 160. Total Net Profit | 0.0   |
| 161. Total Net Loss   | 0.0   |
| 162. Total Net Income | 0.0   |
| 163. Total Net Loss   | 0.0   |
| 164. Total Net Profit | 0.0   |
| 165. Total Net Loss   | 0.0   |
| 166. Total Net Income | 0.0   |
| 167. Total Net Loss   | 0.0   |
| 168. Total Net Profit | 0.0   |
| 169. Total Net Loss   | 0.0   |
| 170. Total Net Income | 0.0   |
| 171. Total Net Loss   | 0.0   |
| 172. Total Net Profit | 0.0   |
| 173. Total Net Loss   | 0.0   |
| 174. Total Net Income | 0.0   |
| 175. Total Net Loss   | 0.0   |
| 176. Total Net Profit | 0.0   |
| 177. Total Net Loss   | 0.0   |
| 178. Total Net Income | 0.0   |
| 179. Total Net Loss   | 0.0   |
| 180. Total Net Profit | 0.0   |
| 181. Total Net Loss   | 0.0   |
| 182. Total Net Income | 0.0   |
| 183. Total Net Loss   | 0.0   |
| 184. Total Net Profit | 0.0   |
| 185. Total Net Loss   | 0.0   |
| 186. Total Net Income | 0.0   |
| 187. Total Net Loss   | 0.0   |
| 188. Total Net Profit | 0.0   |
| 189. Total Net Loss   | 0.0   |
| 190. Total Net Income | 0.0   |
| 191. Total Net Loss   | 0.0   |
| 192. Total Net Profit | 0.0   |
| 193. Total Net Loss   | 0.0   |
| 194. Total Net Income | 0.0   |
| 195. Total Net Loss   | 0.0   |
| 196. Total Net Profit | 0.0   |
| 197. Total Net Loss   | 0.0   |
| 198. Total Net Income | 0.0   |
| 199. Total Net Loss   | 0.0   |
| 200. Total Net Profit | 0.0   |

# APPENDIX

## 1. SUMMARY OF RESULTS OF TESTS

The following table summarizes the results of the tests. The data are given in the form of a table, the columns being the test number, the test material, the test results, and the test conditions.

| Test No. | Test Material | Test Results |
|----------|---------------|--------------|
| 1        | 100           | 100          |
| 2        | 100           | 100          |
| 3        | 100           | 100          |
| 4        | 100           | 100          |
| 5        | 100           | 100          |

The following table summarizes the results of the tests. The data are given in the form of a table, the columns being the test number, the test material, the test results, and the test conditions.

### 2. TESTS OF THE

The following table summarizes the results of the tests. The data are given in the form of a table, the columns being the test number, the test material, the test results, and the test conditions.

### 3. TESTS OF THE

1. The test material was found to be
2. The test material was found to be
3. The test material was found to be
4. The test material was found to be

The results of the tests are shown in the following table.

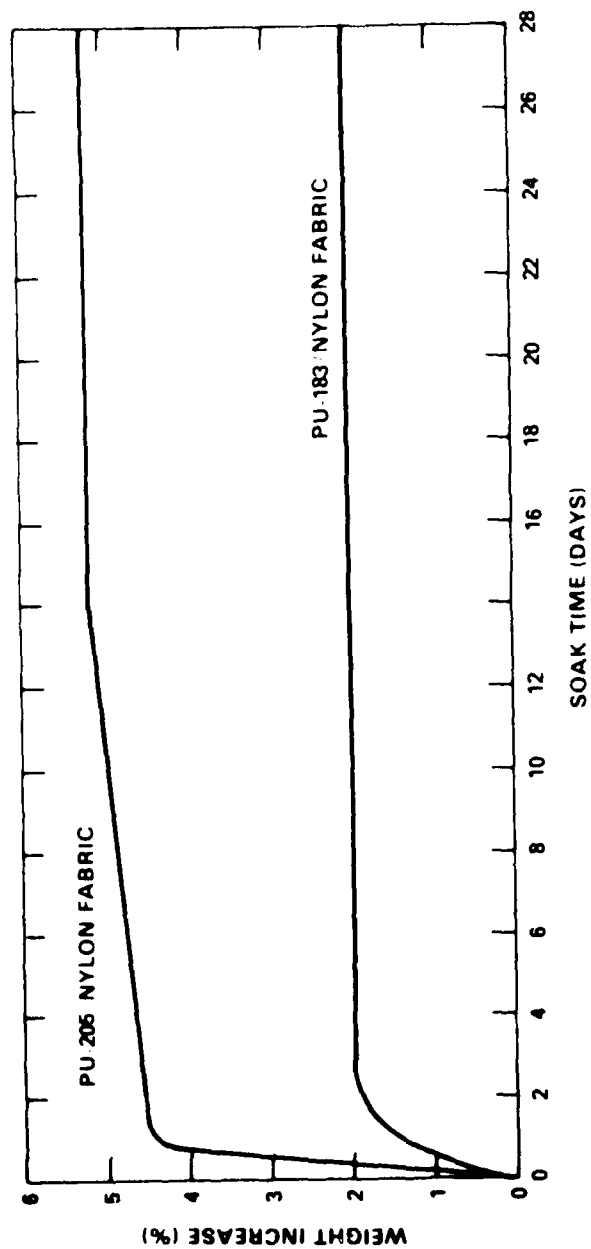
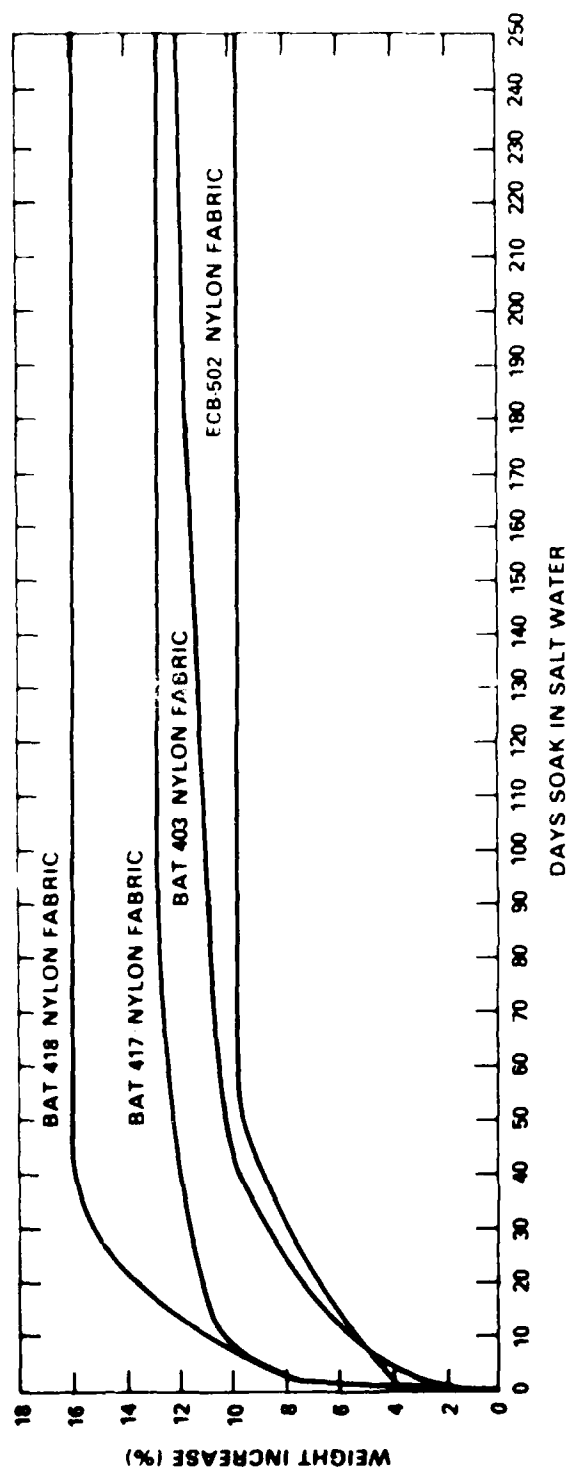


Figure 10. Weight increase of nylon fabric in water at 25°C.



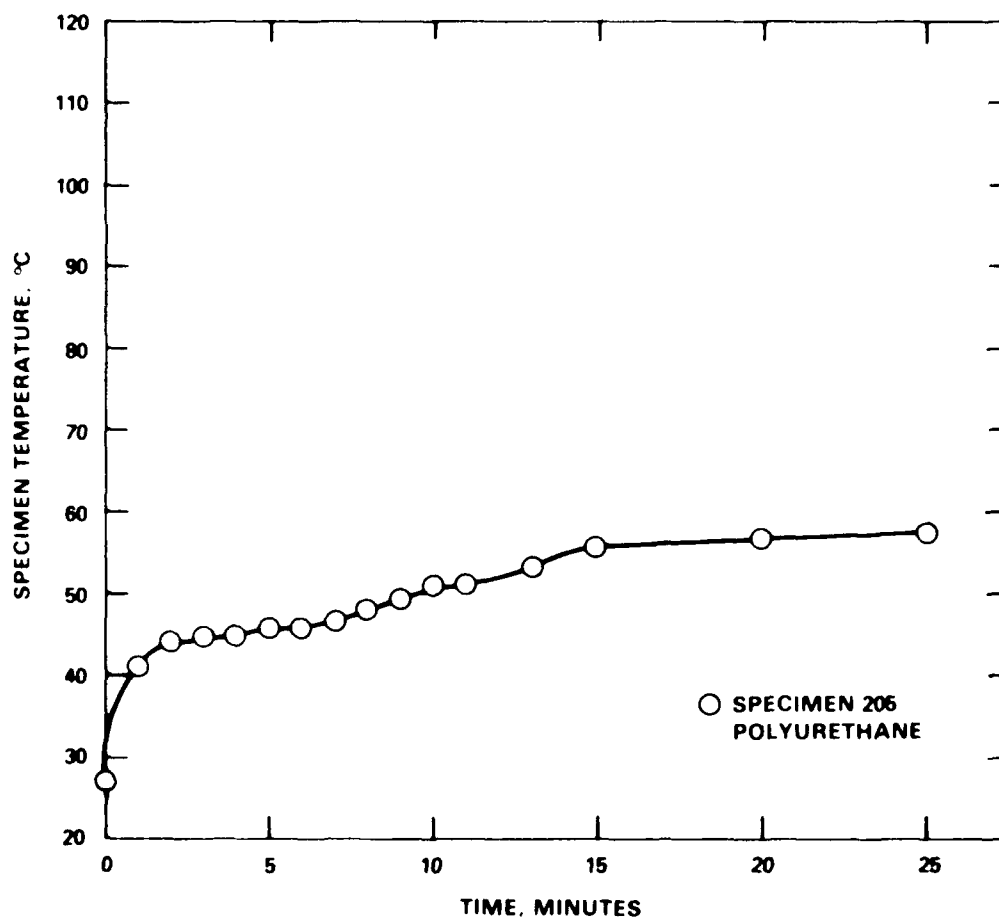


Figure 1. Specimen temperature rise during curing cycle. The curing cycle consists of 10 minutes per minute Super Imposition at 100°C, followed by 15 minutes per minute Super Imposition at 100°C.

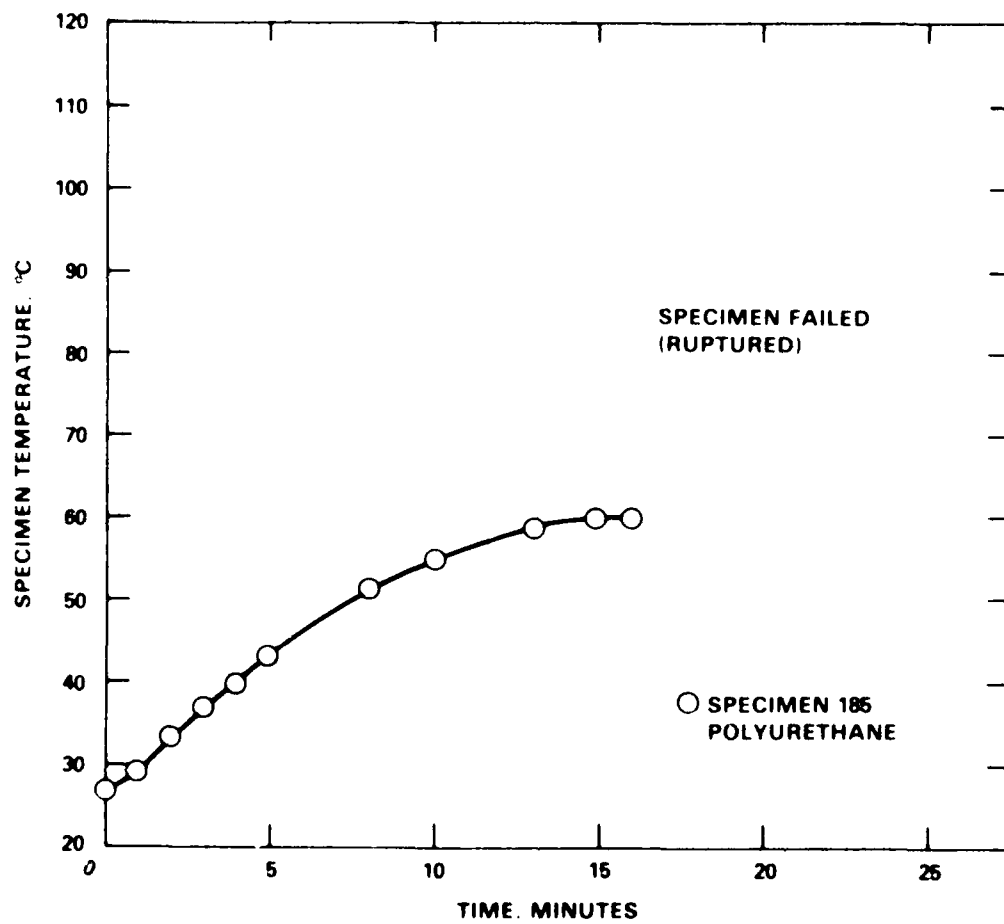


Figure 10. Specimen Temperature Time History for Specimen 185  
Loading at 1000 psi per Minute Superimposed on a Compressive  
Loading of 1000 psi per Square Inch

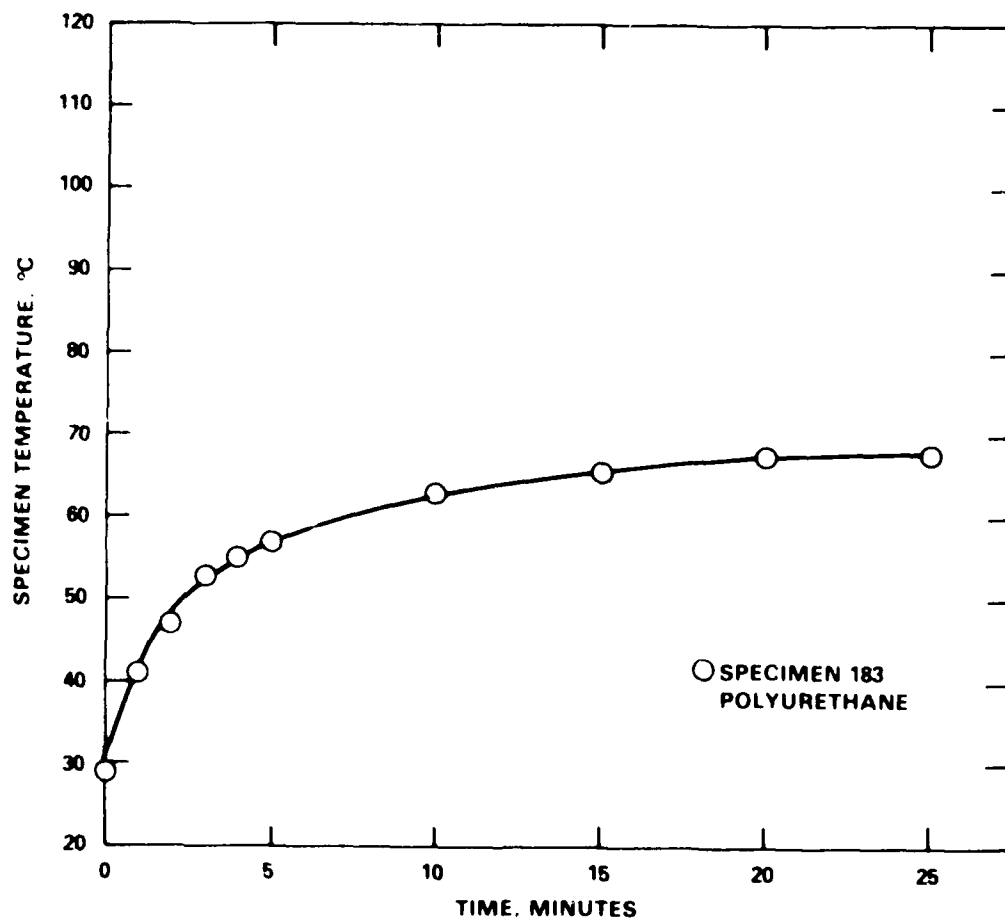


Figure 10. Specimen temperature versus time during one-half compressive loading at 1000 psi. One per Minute Superimposed on a Compressive Loading of 14.8 lb/in<sup>2</sup> per square inch.

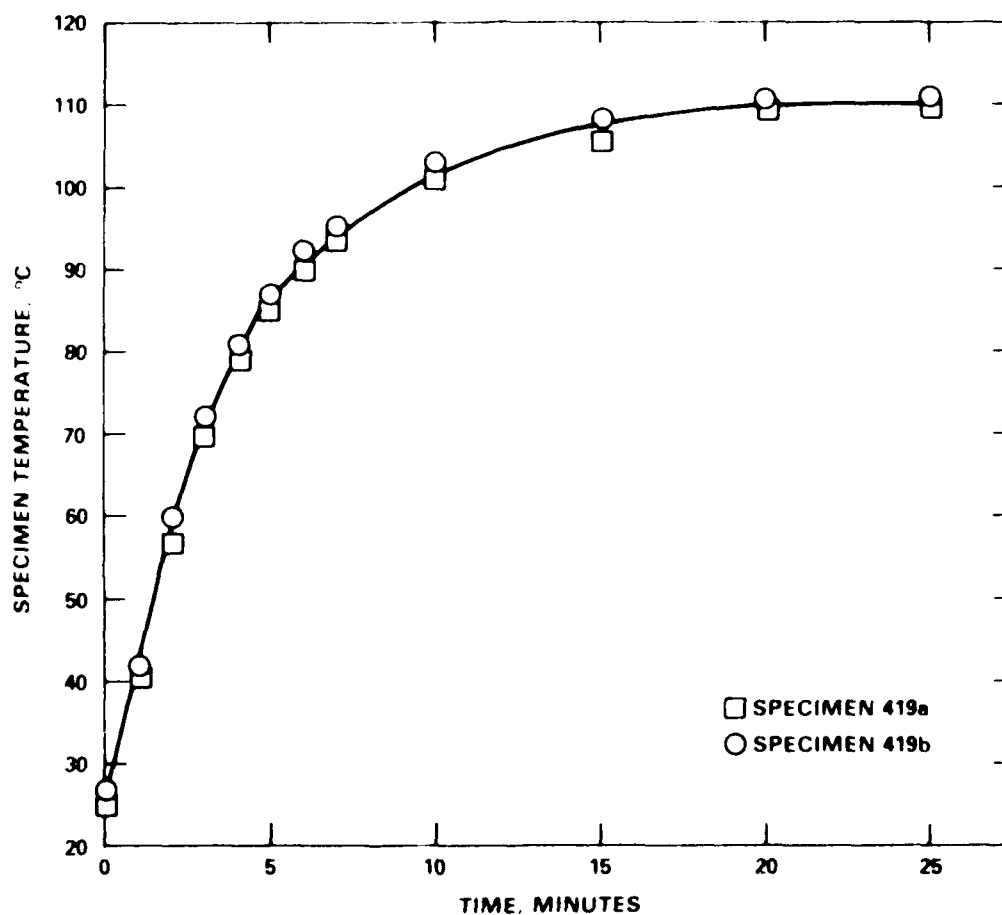


Figure 1. Specimen temperature (°C) vs. time (minutes) for Specimen 419a and Specimen 419b. The temperature of the specimens was measured at 1-minute intervals. The temperature of the specimens was measured at 1-minute intervals. The temperature of the specimens was measured at 1-minute intervals.

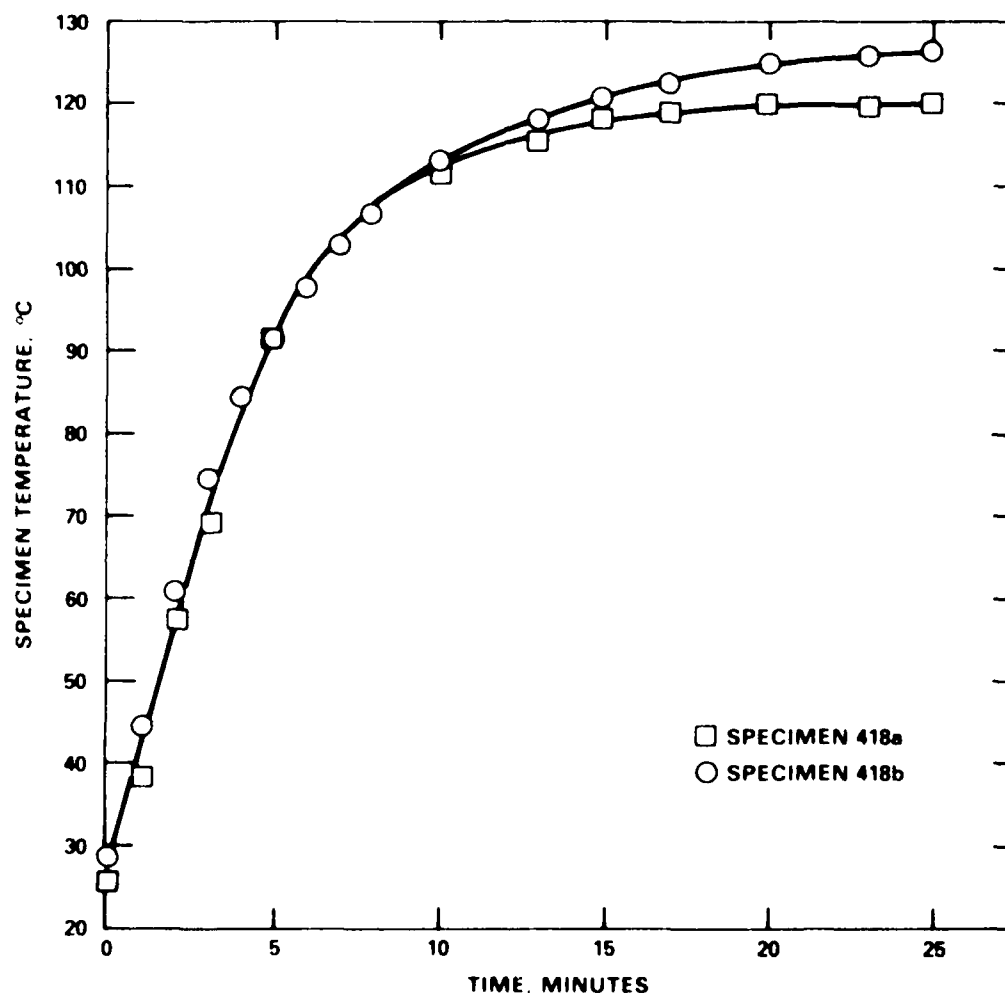


Figure 10. Specimen Temperature (°C) vs Time (Minutes) during Compressive Loading of Specimen 418a and Specimen 418b. Specimens were loaded in a compressive loading machine with a 100 kN capacity.

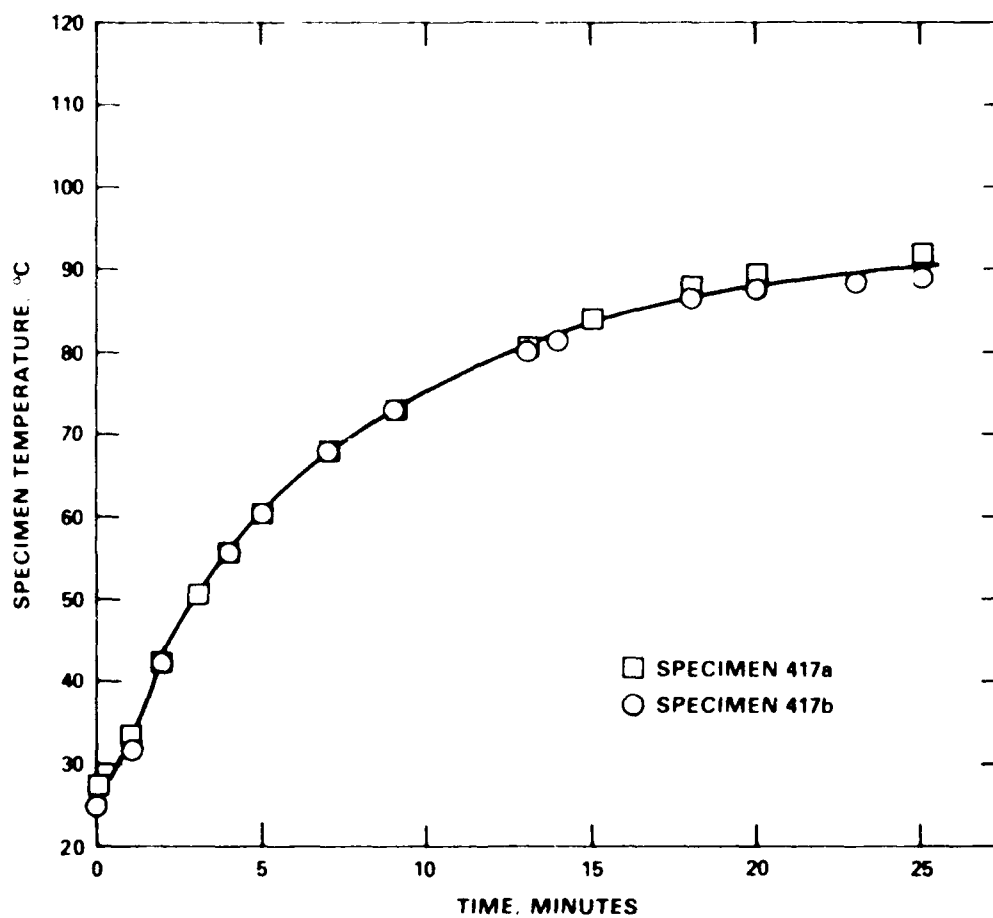


Figure 1. Specimen temperature vs. time for specimens 417a and 417b. The temperature of the specimens was measured every minute during the test. The temperature of the specimens was measured at 1 minute intervals.

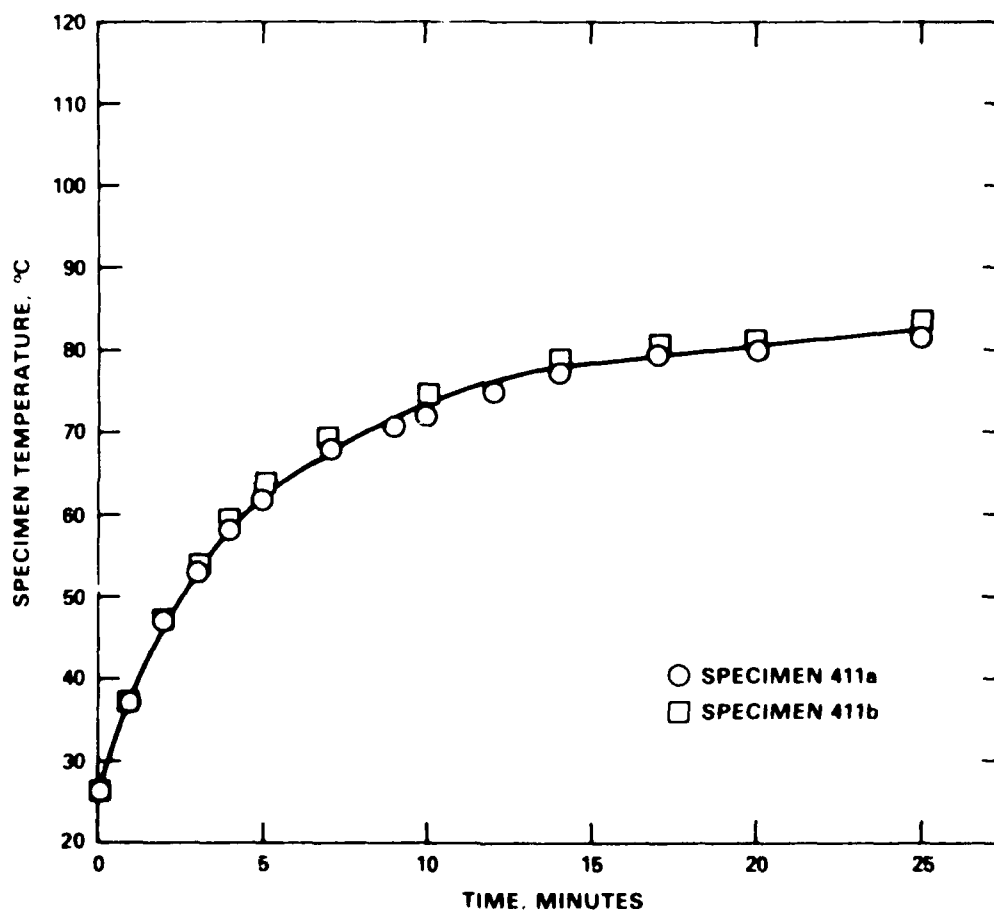


Figure 10-1. Hysteresis Temperature Rise during Cyclic Compressive Loading at 1000 Cycles per Minute Superimposed on a Compressive Load of 143 Pounds per Square Inch

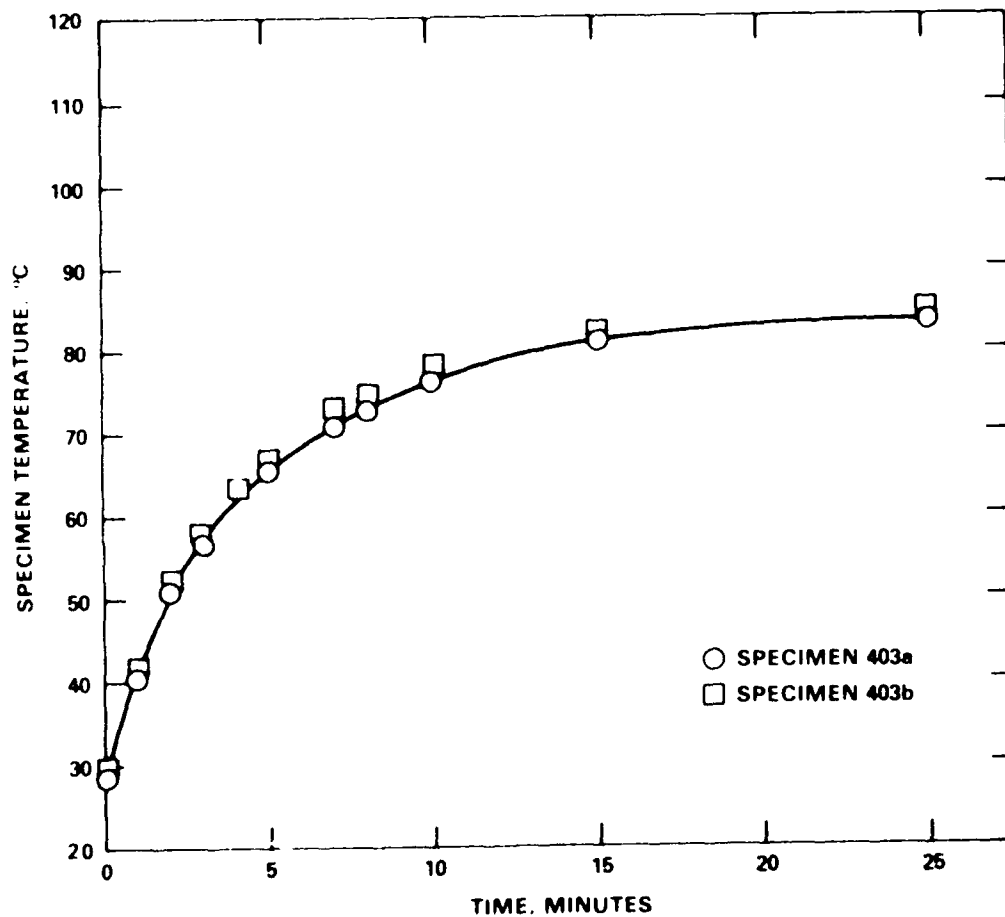


Figure 1. Specimen Temperature vs. Time During 15.44 Compressive  
 Load. Specimen 403a (Left) Specimen 403b (Right) Superimposed on a Compressive  
 Load of 14.0 Pounds per Square Inch

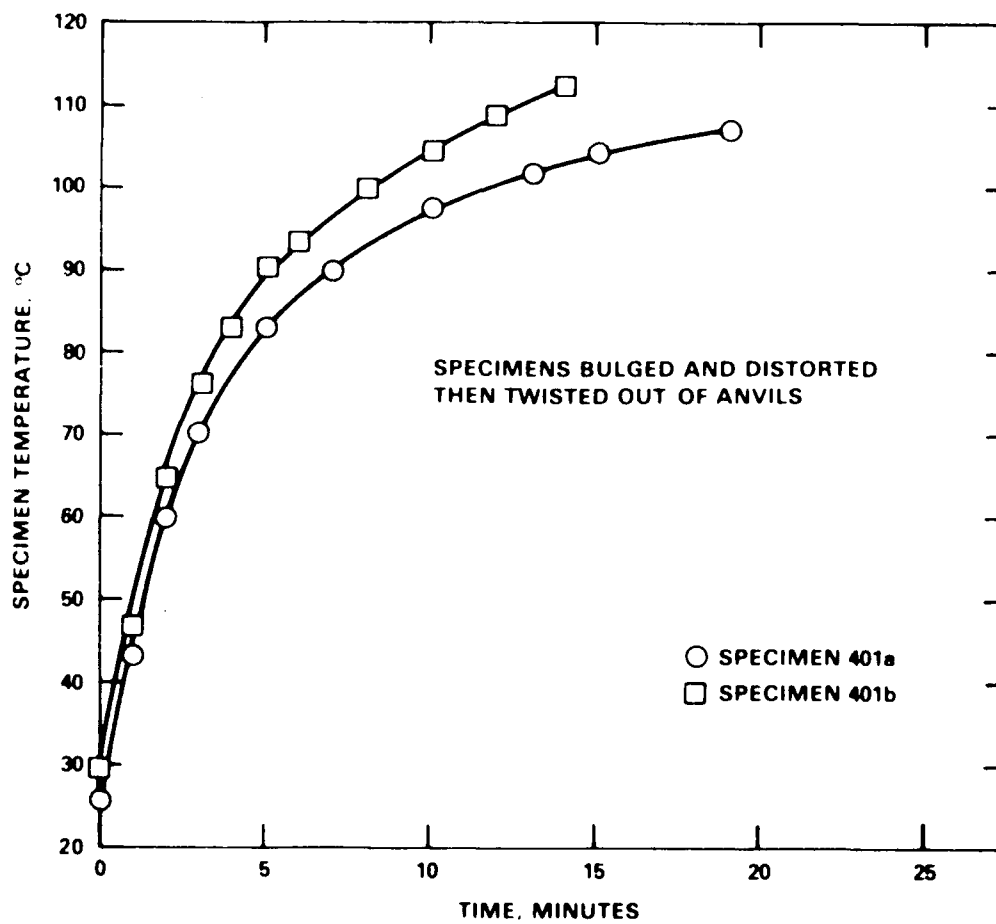


Figure 1. Specimen temperature versus time during cold-chamber compression at 1000 psi per minute. Temperature based on thermocouple readings at 1/4 inch and 1/2 inch per square inch.

|                                |                                    |
|--------------------------------|------------------------------------|
| Hypalon                        | E.I. duPont de Nemours & Co., Inc. |
| Kevlar                         | Wilmington, DE 19898               |
| NA-22                          |                                    |
| Neoprene GNA                   |                                    |
| Neoprene W                     |                                    |
| Tetrone A                      |                                    |
| Thionex                        |                                    |
| Antioxidant 702                | Ethyl Corporation                  |
|                                | 451 Florida Street                 |
|                                | Baton Rouge, LA 70801              |
| Wingstay 100                   | Goodyear Tire & Rubber Company     |
|                                | Chemical Division                  |
|                                | 1485 E. Market Street              |
|                                | Akron, OH 44316                    |
| STAN MAG Beads                 | Harwick Chemical Corporation       |
|                                | 60 S. Seiberling Street            |
|                                | P.O. Box 9360                      |
|                                | Akron, OH 44305                    |
| Parel 58                       | Hercules Incorporated              |
| Piccopale 100                  | 910 Market Street                  |
|                                | Wilmington, DE 19899               |
| T.12                           | M&T Chemical Incorporated          |
|                                | Woodbridge Road                    |
|                                | P.O. Box 1104                      |
|                                | Rahway, NJ 07065                   |
| Antioxidant MB                 | Mobay Chemical Company             |
| Polycarbonate (Desmophen 2020) | Penn Lincoln Parkway West          |
|                                | Pittsburgh, PA 15205               |
| Santicizer 79TM                | Monsanto                           |
| Santicizer 711                 | Rubber Chemicals Division          |
| Santocure                      | 260 Springside Drive               |
| Santocure NS                   | Akron, OH 44313                    |
| Santoflex AW                   |                                    |
| Santoguard PVI                 |                                    |
| Sulfasan R                     |                                    |
| Cumar MH                       | Neville Chemical Company           |
|                                | Neville Island                     |
|                                | Pittsburgh, PA 15225               |
| Kadox-15                       | New Jersey Zinc Company, Inc.      |
|                                | Palmerton, PA 18071                |

Chemical Division  
P.O. Box 1200

Phillips Chemical Company  
A Division of Phillips Petroleum Company  
1200 Phillips Building  
Bartlesville, OK 74604

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