

CONFIDENTIAL

E. I. DU PONT DE NEMOURS & COMPANY, INC.  
FABRICS & FINISHES DEPARTMENT  
RESEARCH DIVISION  
DIVISIONAL PROCESS ENGINEERING GROUP

DUPONT  
MARSHALL LABORATORY  
LIBRARY

REFERENCE COPY  
NOT FOR CIRCULATION

ACRYLIC LATEX CAPACITY - CONSUMER PAINTS  
(November 1967 Forecast)

By: C. B. Patrick

Date Issued: September 30, 1968

Project: 41-8520, Non-Technical Assistance  
to Production

ABSTRACT

Acrylic latex forecast requirements for the years 1968 through 1972 were analyzed to determine the manufacturing and storage facilities required, the timing for additional facilities, and their most economical location. Recommendations were submitted for additional storage facilities at latex consuming plants and for

## ACRYLIC LATEX CAPACITY - CONSUMER PAINTS

### INTRODUCTION

At the start-up of the Fort Madison latex plant it was realized that it was only a matter of time before additional facilities would be needed, either to increase annual output, to store latex for peak period usage or both. When, in the second quarter of 1967, short-term demand exceeded Fort Madison's ability to supply, efforts were aimed at increasing output and this study was initiated on future requirements.

### OBJECTIVES

The objectives of this study were:

1. To determine future requirements for acrylic latexes and means for supplying these requirements in the most economical manner.
  - a. To determine when additional facilities would be required.
  - b. To determine what additional facilities should be supplied.
  - c. To determine where additional facilities should be located.

### SUMMARY AND CONCLUSIONS

The study was based on sales forecasts for the years 1967 through 1972 and seasonality factors based on Trade Sales Paint manufacture in 1966.

From these data it was concluded that:

1. 1968 requirements could be handled by existing manufacturing facilities at Fort Madison and Philadelphia Process Engineering if all available storage were full at the beginning of the peak demand.
2. 1969 requirements could be handled by existing manufacturing facilities if 240,000 gallons of storage were added and full at the beginning of the peak demand.
3. 1970 requirements exceed the annual 5-day capacity of the Fort Madison plant and additional manufacturing facilities will be required.

Location of the proposed facility was based on an economic evaluation of either (1) adding a reactor and necessary auxiliaries at Fort Madison; (2) installing a complete one-reactor plant at Philadelphia, or (3) installing the necessary additional equipment to go with excess facilities available at Niagara Falls. This evaluation showed that the cost of latex including freight and distributed overhead from the three alternates was essentially equal. Out-of-pocket costs, however, pointed to locating the facilities at Philadelphia.

### RECOMMENDATIONS

Based on the conclusions of this study it was recommended that:

1. Storage facilities be added at the consuming plants as shown in Table II following page 5.
2. Single reactor manufacturing facilities be constructed at Philadelphia with auxiliaries sized to handle two reactors to permit further expansion at a later date.

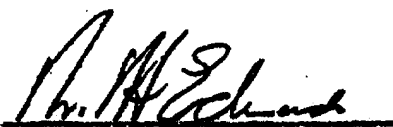
### ACTION TAKEN

The results of this study and the above recommendations were presented verbally to Research, Production, and Sales Management on May 31, 1968. These recommendations were confirmed to R. J. Knake by letters of June 6, 1968 on storage capacity and June 7, 1968 on manufacturing capacity (Appendixes A and B).

PREPARED BY:

  
C. B. PATRICK

APPROVED BY:

  
W. H. EDWARDS

CBP:IL

## DISCUSSION

Soon after the start-up of the Fort Madison latex facilities it was determined that approximately 50,000 gallons of latex could be produced per five-day week. It was expected that, as personnel became more experienced, the production rate would increase. It was also expected that as sales of latex based paints increased, a time would arrive when increased output would be exceeded by increased demand. The first evidence of inadequate supply occurred in the second quarter of 1967. At that time efforts aimed at increasing Fort Madison's output were initiated which have resulted thus far in increasing capacity to approximately 64,000 gallons per week. At the same time this study was initiated to determine the timing and best location for additional facilities.

Requirements for latex for 1968 through 1972 were taken from a compilation by R. B. Holmes in November 1967 with minor later modifications by P. J. Grunwald of Consumer Products Marketing. Monthly requirements were then calculated from the annual requirements based on consumer paint production in 1966. A summary of monthly forecast requirements is shown in Table I (please fold out following page). Also shown are 1967 actual and forecast requirements from an earlier forecast. The wide variation in monthly requirements, running from about 20% to 175% of average should be noted because of its effect on manufacturing and storage requirements.

After the work on increasing capacity at Fort Madison, their monthly capacity was considered to be 280,000 gallons on a five-day week and 308,000 gallons on a six-day week. Seven-day-per-week operation gives limited additional capacity (possibly an additional 20,000 gallons per month) because of kettle cleaning requirements. Kettle cleaning is normally carried out on weekends when no production is scheduled. The pilot scale (1,600-gallon batch) equipment available in the Process Engineering semi-works can be used to provide an additional 40,000 gallons per month on a 5-day basis and 48,000 gallons per month on a 6-day basis. Use of Process Engineering facilities is less efficient since they were not designed for regular production operations. In addition their use interferes with regular Process Engineering development work. Four courses of action appear possible.

1. Further increase capacity with present Fort Madison equipment. Further significant increases in capacity with present Fort Madison equipment are not considered likely. Two sources are considered possible: (1) reduced cycle time and (2) increased solids level. Capacity increases of more than about 10% from each source are not considered likely within extrapolation of present processing knowledge.
2. Purchase latex requirements above capacity. There are no known latexes on the market which match our latexes in terms of composition and properties. Further, it is believed by the Development Laboratory that the paints made from our latexes are superior to those which we can make from purchased latex. There are also problems involved with labeling, inventories, etc. if we were to make two formulas of paint for the same end use.

TABLE I

FORECAST LATEX REQUIREMENTS  
M GALLONS

|                 | <u>67</u><br>(Actual) | <u>67</u>  | <u>68</u>  | <u>69</u>  | <u>70</u>  | <u>71</u>  | <u>72</u>  |
|-----------------|-----------------------|------------|------------|------------|------------|------------|------------|
| January         | 109                   | 188        | 247        | 269        | 293        | 314        | 334        |
| February        | 110                   | 113        | 149        | 162        | 176        | 188        | 200        |
| March           | 132                   | 250        | 324        | 357        | 395        | 426        | 455        |
| April           | 215                   | 240        | 309        | 342        | 382        | 413        | 441        |
| May             | 323                   | 344        | 436        | 488        | 551        | 599        | 641        |
| June            | 257                   | 313        | 372        | 417        | 471        | 512        | 548        |
| July            | 275                   | 217        | 275        | 309        | 349        | 380        | 407        |
| August          | 319                   | 235        | 299        | 335        | 378        | 411        | 440        |
| September       | 211                   | 200        | 260        | 288        | 320        | 346        | 369        |
| October         | 173                   | 125        | 154        | 170        | 189        | 204        | 217        |
| November        | 80                    | 35         | 48         | 51         | 55         | 58         | 62         |
| December        | <u>100</u>            | <u>120</u> | <u>155</u> | <u>168</u> | <u>183</u> | <u>196</u> | <u>208</u> |
|                 | 2304                  | 2380       | 3028       | 3356       | 3742       | 4047       | 4322       |
|                 | <u>67</u><br>(Actual) | <u>67</u>  | <u>68</u>  | <u>69</u>  | <u>70</u>  | <u>71</u>  | <u>72</u>  |
| House Paint     | 1558                  | 1485       | 1752       | 1884       | 1955       | 2105       | 2196       |
| Wall Paint      | 619                   | 869        | 945        | 975        | 996        | 1035       | 1089       |
| Int. Trim       | 127                   | 26         | 268        | 282        | 296        | 311        | 327        |
| Ext. Trim       | -                     | -          | 63         | 66         | 69         | 73         | 77         |
| Floor Paint     | -                     | -          | -          | 55         | 67         | 75         | 87         |
| Gloss House Pt. | <u>-</u>              | <u>-</u>   | <u>-</u>   | <u>94</u>  | <u>359</u> | <u>448</u> | <u>546</u> |
|                 | 2304                  | 2380       | 3028       | 3356       | 3742       | 4047       | 4322       |

3. Provide additional storage capacity to handle peaks. The question of how much, where and when is an objective of this study.
4. Provide additional manufacturing facilities. On the basis that sufficient manufacturing capacity should be provided to handle average requirements on a five-day week, additional capacity is necessary to meet 1970 forecast requirements. As with storage capacity the question becomes where and how much.

#### Latex Storage

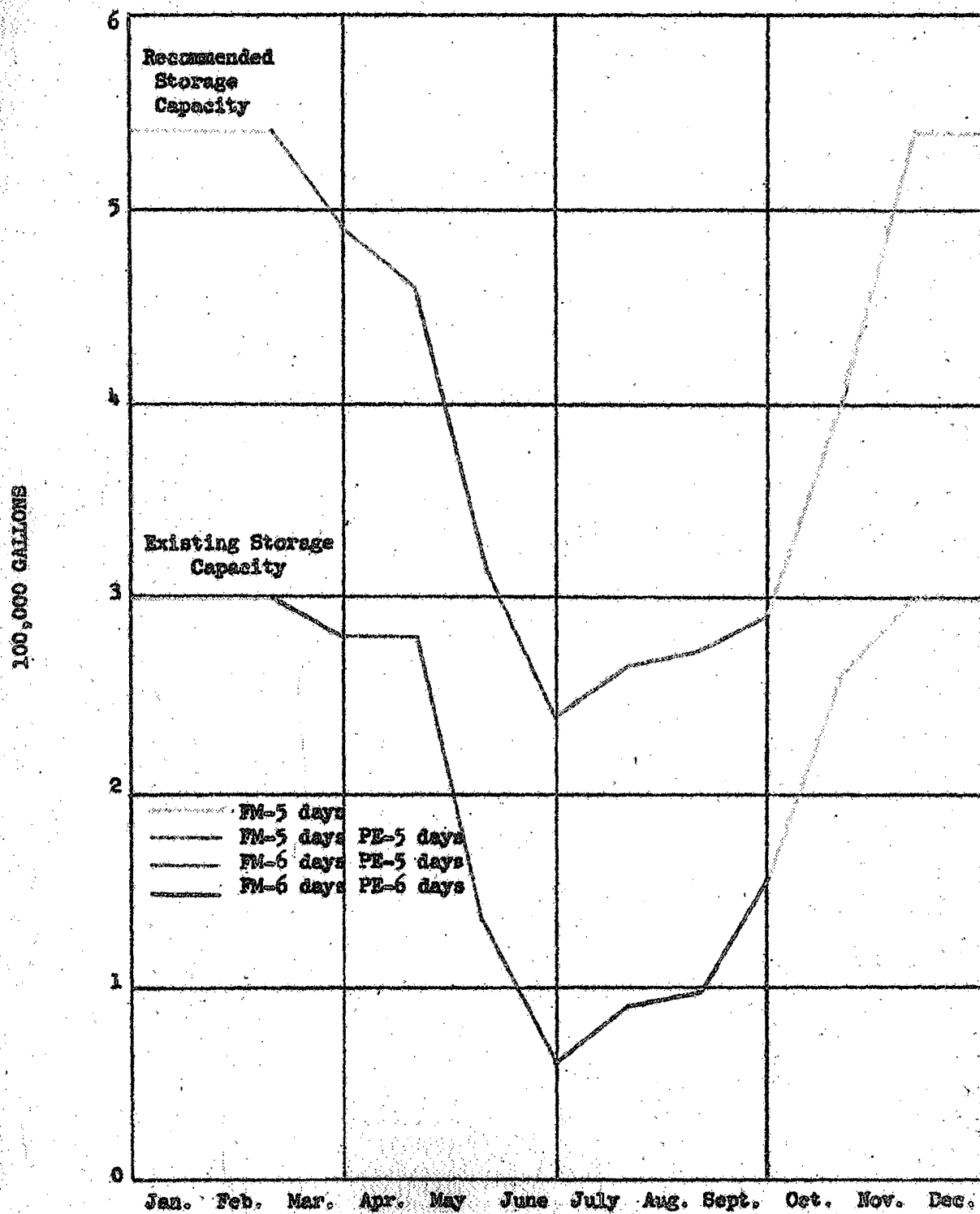
Storage facilities provided as a means for bridging the gap between short-term manufacturing capacity and a variable demand should be of sufficient size to provide a reasonable "safety supply" should demand exceed forecast or supply fail to meet expectations.

Chart #1 (please fold out next page) shows the latex stock situation which would exist in 1969 if presently forecast demands, supplies and storage facilities are available and if recommended storage facilities become available. From the chart it can be seen that with the existing effective storage capacity of 300,000 gallons full at the end of February, the forecast peak demands would reduce stocks to about 65,000 gallons by the end of June and keep them below 100,000 gallons until September. It seems obvious that this is an untenable situation when one considers that this would be split among a minimum of three latexes at six plant locations.

At the recommended additional storage level which would bring effective storage capacity to 540,000 gallons, full tanks at the end of February would result in stocks of about 240,000 gallons at the end of June. Such a level seems much more reasonable.

LATEX STORAGE  
1969  
EXISTING AND RECOMMENDED  
STORAGE CAPACITY

CHART 1



The recommended additions (please fold out Table II on the next page) are based on having available storage equal to 75% of the requirements for the maximum month of 1972. The location of the recommended additions were also based on having the storage available at the consuming plant rather than at some other point.



TABLE II  
LATEX STORAGE  
M GALLONS

|                            | <u>Present<br/>Capacity</u> | <u>100%<br/>Max. Mo.<br/>1969</u> | <u>75%<br/>Max. Mo.<br/>1972</u> | <u>Add</u> | <u>Total</u> |
|----------------------------|-----------------------------|-----------------------------------|----------------------------------|------------|--------------|
| <b>CHICAGO</b>             |                             |                                   |                                  |            |              |
| 11005                      | 20                          | 70                                | 61                               | 40         | 60           |
| 11008                      | 12                          | 23                                | 19                               | 10         | 22           |
| 11011/11014                | -                           | 15                                | 25                               | 25         | 25           |
| <b>EVERETT</b>             |                             |                                   |                                  |            |              |
| 11005                      | 18                          | 32                                | 28                               | 10         | 28           |
| 11008                      | 16                          | 11                                | 9                                | -          | 16           |
| 11011/11014                | -                           | 7                                 | 12                               | 12         | 12           |
| <b>PHILADELPHIA</b>        |                             |                                   |                                  |            |              |
| 11005                      | 20                          | 73                                | 64                               | *40        | 65           |
| 11008                      | 25                          | 24                                | 20                               | *          | 20           |
| 11011/11014                | -                           | 15                                | 26                               | 25         | 25           |
| <b>SOUTH SAN FRANCISCO</b> |                             |                                   |                                  |            |              |
| 11005                      | 10.8                        | 35                                | 31                               | 20         | 31           |
| 11008                      | 6.4                         | 12                                | 10                               | 10         | 16           |
| 11011/11014                | -                           | 7                                 | 13                               | 15         | 15           |
| <b>TUCKER</b>              |                             |                                   |                                  |            |              |
| 11005                      | 9                           | 38                                | 33                               | *11        | 33           |
| 11008                      | 22                          | 13                                | 11                               | * 6        | 15           |
| 11011/11014                | -                           | 8                                 | 14                               | 15         | 15           |
| <b>FORT MADISON</b>        |                             |                                   |                                  |            |              |
| 11005                      | 76                          | 70                                | 61                               | -          | 76           |
| 11008                      | 78                          | 23                                | 19                               | -          | 78           |
| 11011/11014                | 40                          | 15                                | 25                               | -          | 40           |

\* Switch tankage now used for 11005 and 11008

Chart #2 (please fold out next page) shows the stock situation which would be expected in 1970 if the recommended storage is made available but no new manufacturing facilities are provided. It can be seen that the additional storage does not provide sufficient "flywheel" to maintain a reasonable stock level during the peak demand months from June through September.

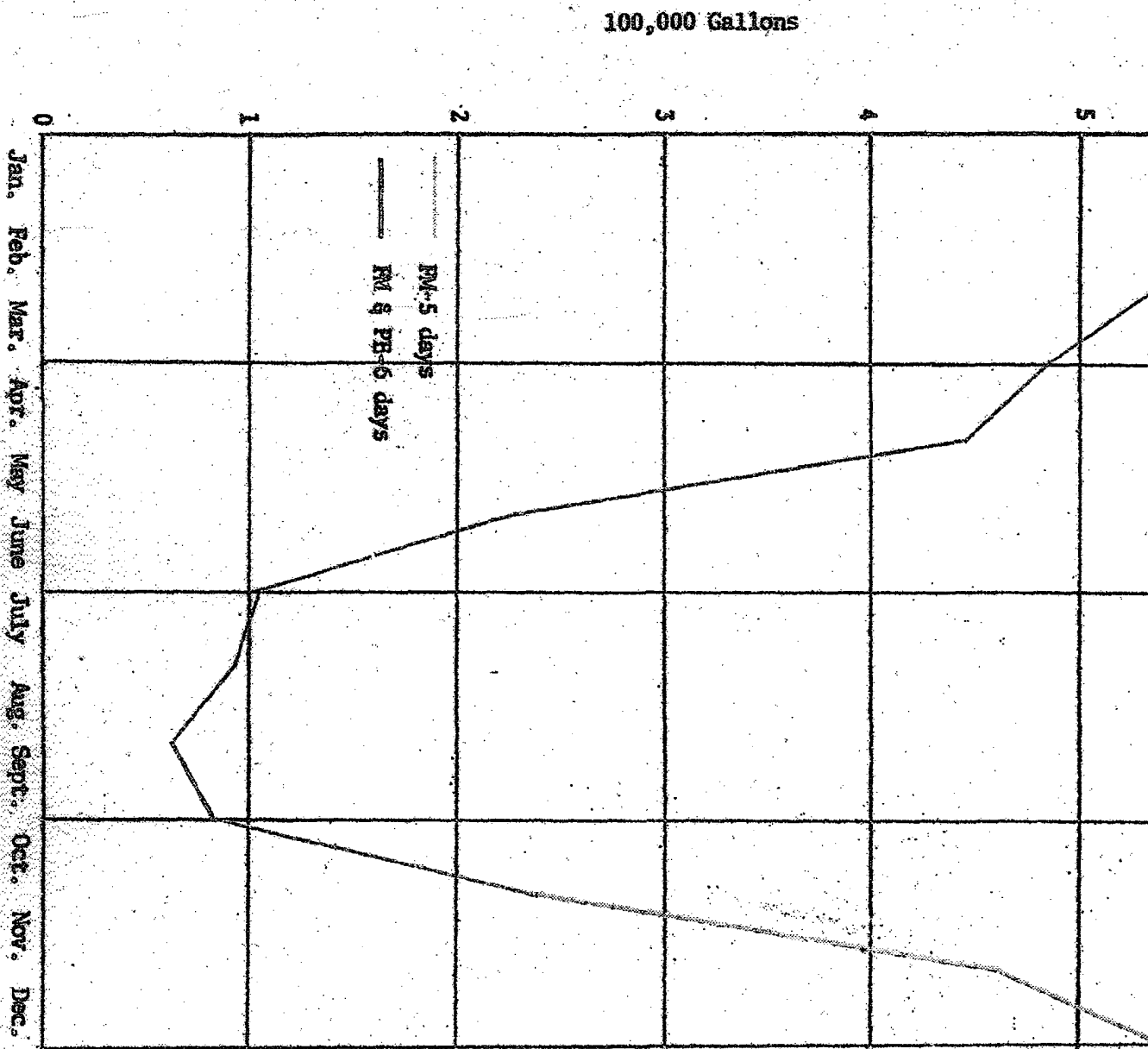
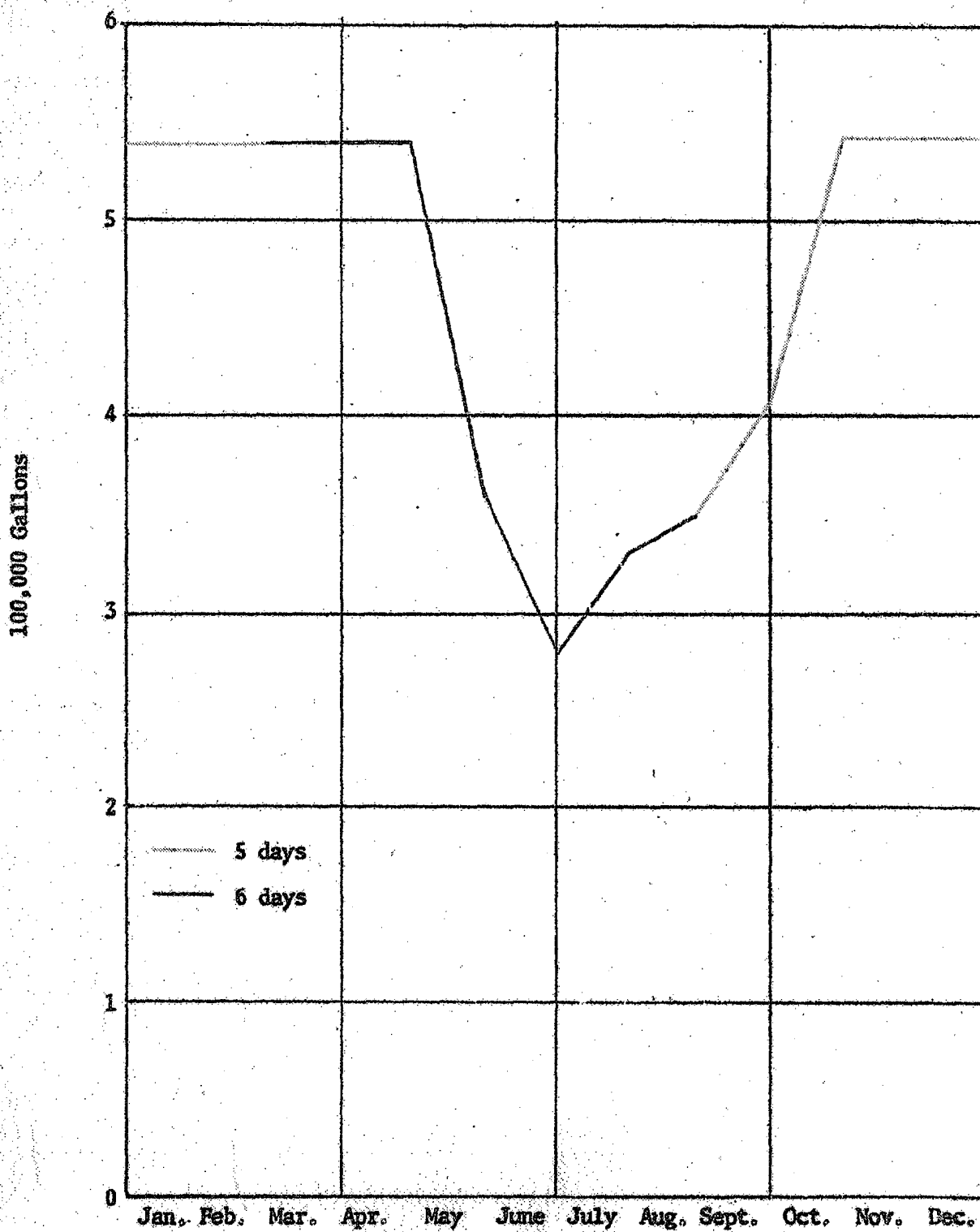


Chart #3 (please fold out next page) shows the expected stock situation in 1972 if both the recommended storage and additional manufacturing facilities are provided. It is apparent that the additional storage is necessary even if additional manufacturing facilities are provided.

LATEX STOCKS  
1972

CHART 3



## Manufacturing Facilities

If it is assumed that sufficient manufacturing facilities should be provided to produce the average requirements in a five-day work week, additional facilities are required in 1970. 1970 average requirements are 311,800 gallons per month and capacity at Fort Madison is 280,000 gallons per month.

The capacity of the reactors in the Fort Madison latex plant is nominally 3,000 gallons. With the original agitator speeds, 2,600 gallons appears to be the maximum reasonable batch size. Variable speed agitators which would permit slower speeds during parts of the cycle offer the possibility of increased batch sizes. There also appear to be possibilities for minor reductions in cycle time. It is estimated that the additional capacity available from sources such as these is on the order of 10% of present capacity.

The Marshall Development Laboratory is also working on studies which should lead to effective additional capacity through increases in the solids content of the latex. If the increase in solids can be achieved, an additional capacity increase on the order of 10% is available.

Even if both of these increases in capacity came to fruition in time (336,000 gallons per month), Fort Madison would still be hard pressed to supply the 1970 forecast. The addition of one 3,000-gallon reactor would increase Divisional capacity by 50% and should provide sufficient capacity to meet forecasts through 1972.

Other considerations not directly concerned with economics also affect the decision as to the site of additional facilities.

Fort Madison - Since our only commercial scale facilities for acrylic latex production are at Fort Madison, expansion of these facilities would increase our dependence on one site. Furthermore, the latex facilities are located adjacent to the "Badium" facilities with the hazards associated with the handling of butadiene.

While the addition of one reactor can be achieved with minimum investment because of the use of supporting facilities presently installed, further expansion would require addition of many other supporting facilities, such as refrigeration, feed tanks, etc. Space for locating these facilities would be a problem.

Philadelphia - The facilities available for latex manufacture at Philadelphia are minimal and consist essentially of building space and one raw material storage tank. However, the installation of a one-reactor plant with services (steam, water, electric, and refrigeration) sized to handle two reactors would permit addition of one more reactor at a very low cost. Construction at Philadelphia also provides a second manufacturing site.

Niagara Falls - Manufacture of acrylic latexes at Niagara Falls would, as at Philadelphia, achieve a dispersion of manufacturing facilities. The problems attendant to transfers between departments would be present.

The economic estimates were based on estimates of additional facilities provided by the plants. Operating, ingredient, and freight costs were estimated by Process Engineering for Philadelphia and Fort Madison and by Elchem for Niagara Falls. In the estimates of out-of-pocket operating cost only those items directly affected by production volume (labor and direct employee benefits, supplies, etc.) were considered.

TABLE III

COMPARATIVE LATEX COSTS  
1000 Dollars

|                               | <u>Fort Madison</u> | <u>Fort Madison<br/>Plus<br/>Philadelphia</u> | <u>Niagara Falls</u> |
|-------------------------------|---------------------|-----------------------------------------------|----------------------|
| New Investment                | 160                 | 665                                           | 565                  |
| <u>1970</u>                   |                     |                                               |                      |
| Ingredients                   | 2904                | 2904                                          | 2900                 |
| Oper. Cost (Less New Deprec.) | 551                 | 673                                           | 662                  |
| New Depreciation              | 16                  | 40                                            | 45                   |
| Latex Freight                 | 264                 | 170                                           | 216                  |
| Tank Car Rent                 | <u>31</u>           | <u>18</u>                                     | <u>29</u>            |
|                               | 3766                | 3805                                          | 3852                 |
| <u>1972</u>                   |                     |                                               |                      |
| Ingredients                   | 3388                | 3389                                          | 3383                 |
| Oper. Cost (Less New Deprec.) | 629                 | 784                                           | 750                  |
| New Depreciation              | 16                  | 40                                            | 45                   |
| Latex Freight                 | 307                 | 197                                           | 251                  |
| Tank Car Rent                 | <u>36</u>           | <u>20</u>                                     | <u>32</u>            |
|                               | 4376                | 4430                                          | 4461                 |

TABLE IV

COMPARATIVE LATEX COSTS  
OUT-OF-POCKET  
1000 DOLLARS

|                | <u>Fort Madison</u> | <u>Fort Madison</u><br><u>Plus</u><br><u>Philadelphia</u> | <u>Niagara Falls</u> |
|----------------|---------------------|-----------------------------------------------------------|----------------------|
|                | <u>1970</u>         |                                                           |                      |
| Ingredients    | 2904                | 2904                                                      | 2901                 |
| Operating Cost | 218                 | 240                                                       | 215                  |
| Latex Freight  | 264                 | 170                                                       | 216                  |
| Tank Car Rent  | <u>31</u>           | <u>18</u>                                                 | <u>29</u>            |
|                | 3417                | 3332                                                      | 3361                 |
|                | <u>1972</u>         |                                                           |                      |
| Ingredients    | 3388                | 3389                                                      | 3383                 |
| Operating Cost | 255                 | 275                                                       | 261                  |
| Latex Freight  | 307                 | 197                                                       | 251                  |
| Tank Car Rent  | <u>36</u>           | <u>20</u>                                                 | <u>32</u>            |
|                | 3986                | 3981                                                      | 3927                 |



CC: J. S. ALLEN - WILM. F&amp;P

Philadelphia Plant  
June 6, 1968.R. J. KNAKE  
F. & F. DEPARTMENT  
WILMINGTONACRYLIC LATEXES  
STORAGE CAPACITY  
DIVISIONAL PROCESS ENGINEERING GROUP

As discussed with you we attach a table listing the present storage capacity <sup>\*/</sup> for acrylic latexes and the recommended additional storage capacity believed necessary to provide adequate stocks for reasonable operation in 1969 and beyond. The levels recommended should provide adequate stocks as shown on the attached chart for 1969. These levels will also provide a three-week supply during the peak month forecast for 1972. We understand you will arrange for the plants to submit the necessary projects. A detailed report on this study will follow.

Since metal salts are detrimental to latex, we recommend corrosion-resistant tanks, pipes, and pumps. Stainless steel is a first choice. While we have no production experience with our latexes in plastic pipe and tanks, such equipment has been used successfully by others with other latexes. Our laboratory tests of A. O. Smith glass fiber reinforced plastic pipe and Owens Corning glass fiber reinforced plastic tank material have shown no bad effects after approximately two months exposure. Carbon steel tanks painted on the inside with "Corlar" have been in use for about three months with no apparent difficulty. Carbon steel tanks coated with latex have been used with no known difficulties, but we consider the possible contamination and rusting to be risky.

Tank sizes should be selected considering that delivering tank cars will be mainly 12,000-gallon size with four cars having two 6,000-gallon compartments available. Fast turnaround of tank cars is essential. Manifolding of tanks should also be considered so that tanks can be shifted from one latex to another as seasonal demands change.

If we can be of further help to you or the plants, please call on us.

DIVISIONAL PROCESS ENGINEERING GROUP  
W. H. EDWARDS, DIVISIONAL SUPERVISORBy:   
C. B. PatrickCHP:IL  
Att.

\* Table II - Chart 1

CC: J. S. ALLEN - WILM. P&amp;P

Philadelphia Plant  
June 7, 1968.R. J. KWAKE  
F. & P. DEPARTMENT  
WILMINGTON**ACRYLIC LATEXES  
ADDITIONAL MANUFACTURING FACILITIES  
DIVISIONAL PROCESS ENGINEERING GROUP**

In our discussion we reported to you the results of our economic studies to determine where additional latex manufacturing facilities should be located. The results of these studies are shown in the attached tables. \* Since the results on a full cost basis show essentially a standoff, and a slight advantage for Philadelphia (because of freight) on an out-of-pocket basis, we recommend that you have Philadelphia submit a project for a one reactor plant. While the investment for facilities at Philadelphia is much higher than at Fort Madison, the advantages of having facilities at two locations are believed sufficient to warrant the added investment.

A report covering details of this study will follow. If we can supply additional information in the meantime, please call on us.

DIVISIONAL PROCESS ENGINEERING GROUP  
W. H. EDWARDS, DIVISIONAL SUPERVISOR  
By: C. B. PatrickCBP:IL  
Att.

Tables III &amp; IV

CC: P. C. OLIN - WILM. F. & F.

Philadelphia Process Engineering  
October 25, 1968

R. J. KNAKE (3)  
F. & F. DEPARTMENT  
WILMINGTON

ACRYLIC LATEXES  
CAPACITY  
DIVISIONAL PROCESS ENGINEERING GROUP

Confirming our discussion in your office on October 21, 1968 we enclose copies of the charts shown.

Table I shows the latex requirements based on the latest Consumer Paint forecast compared to the forecast on which our previous work was based. Assuming that it is desired to provide manufacturing facilities to be able to produce annual requirements on a 5-day week basis, Fort Madison's present capacity of 280,000 gallons per month or 3,360,000 gallons per year is adequate through 1971. 1972 could be handled on a six-day basis.

Table II shows the monthly requirements based on a monthly distribution calculated from 1966 consumer paint production. Separate distributions were used for interior and exterior products. From these data it can be calculated that about 2/3 of the latex is required in a six-month period and that more latex is required than can be manufactured in about half of the months.

Table III shows the situation with regard to storage facilities which could serve as a "flywheel" to provide material during peak consumption months. We pointed out that South San Francisco and Tucker probably could justify the installation of storage tanks on the savings available from tank car shipments as compared to drum shipments. The other suggested additions would add to the present "flywheel" for use in 1970, 1971, and 1972 as shown in the Latex Stocks charts.

The Latex Stock charts show the forecast total stock position for the Division. The figures in the body of the chart show the percentage of the following months requirements at critical times (for example at the end of June 1969 stocks will equal 72% of July requirements). Obviously either additional storage or additional manufacturing capacity must be available in 1971.

From these data and discussion it was decided that:

1. Fort Madison should be able to handle latex requirements in 1969.
2. You will advise South San Francisco and Tucker to consider the savings available from tank storage of RC-11014 as opposed to receipt in drums.

3. The need for additional storage for "flywheel" purposes and additional manufacturing facilities will be reassessed about March of 1969 when new 5-year forecasts will become available.
4. Process Engineering will study the economics of additional manufacturing facilities versus additional storage as means of providing capacity to meet peak requirements in the period 1970 through 1972.

If we can supply further information please call on us.



C. B. PATRICK

CBP:IL  
Att.

WHE

TABLE I  
COMPARISON OF FORECAST LATEX REQUIREMENTS

Old Forecast - R. B. Holmes, Nov. 7, 1967  
New Forecast - R. L. Manley, Oct. 4, 1968

|                         | <u>1969</u> |            | <u>1970</u> |            | <u>1971</u> |            | <u>1972</u> |            |
|-------------------------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|
|                         | <u>Old</u>  | <u>New</u> | <u>Old</u>  | <u>New</u> | <u>Old</u>  | <u>New</u> | <u>Old</u>  | <u>New</u> |
| <u>RC-11005</u>         |             |            |             |            |             |            |             |            |
| "Lucite" House Paint    | 1,748       | 1,521      | 1,813       | 1,579      | 1,957       | 1,619      | 2,045       | 1,665      |
| "Flow-Kote" House Paint | 27          | 11         | 31          | 19         | 31          | 26         | 32          | 45         |
| Miscellaneous           | 84          | 88         | 84          | 92         | 84          | 100        | 84          | 111        |
| Other Misc.             | 24          | -          | 25          | -          | 31          | -          | 78          | -          |
| Total                   | 1,883       | 1,620      | 1,953       | 1,690      | 2,103       | 1,745      | 2,239       | 1,821      |
| <u>RC-11008</u>         |             |            |             |            |             |            |             |            |
| "Lucite" Wall Paint     | 934         | 773        | 954         | 793        | 996         | 824        | 1,049       | 855        |
| "Flow-Kote" Wall Paint  | 40          | 13         | 39          | 17         | 37          | 21         | 37          | 28         |
| Miscellaneous           | 2           | -          | 2           | -          | 2           | -          | 2           | -          |
| Total                   | 976         | 786        | 995         | 810        | 1,035       | 845        | 1,088       | 883        |
| <u>RC-11014</u>         |             |            |             |            |             |            |             |            |
| Interior Enamel         | 282         | 343        | 296         | 370        | 311         | 396        | 326         | 422        |
| Exterior Enamel         | 66          | 68         | 69          | 78         | 72          | 88         | 76          | 104        |
| Floor Paint             | 55          | 55         | 67          | 63         | 75          | 71         | 86          | 83         |
| Gloss House Paint       | 94          | 83         | 359         | 88         | 447         | 94         | 546         | 104        |
| Total                   | 497         | 549        | 791         | 599        | 905         | 649        | 1,034       | 713        |
| Latex Total             | 3,356       | 2,955      | 3,739       | 3,099      | 4,043       | 3,239      | 4,361       | 3,417      |

TABLE II

FORECAST MONTHLY LATEX REQUIREMENTS  
M GALLONS

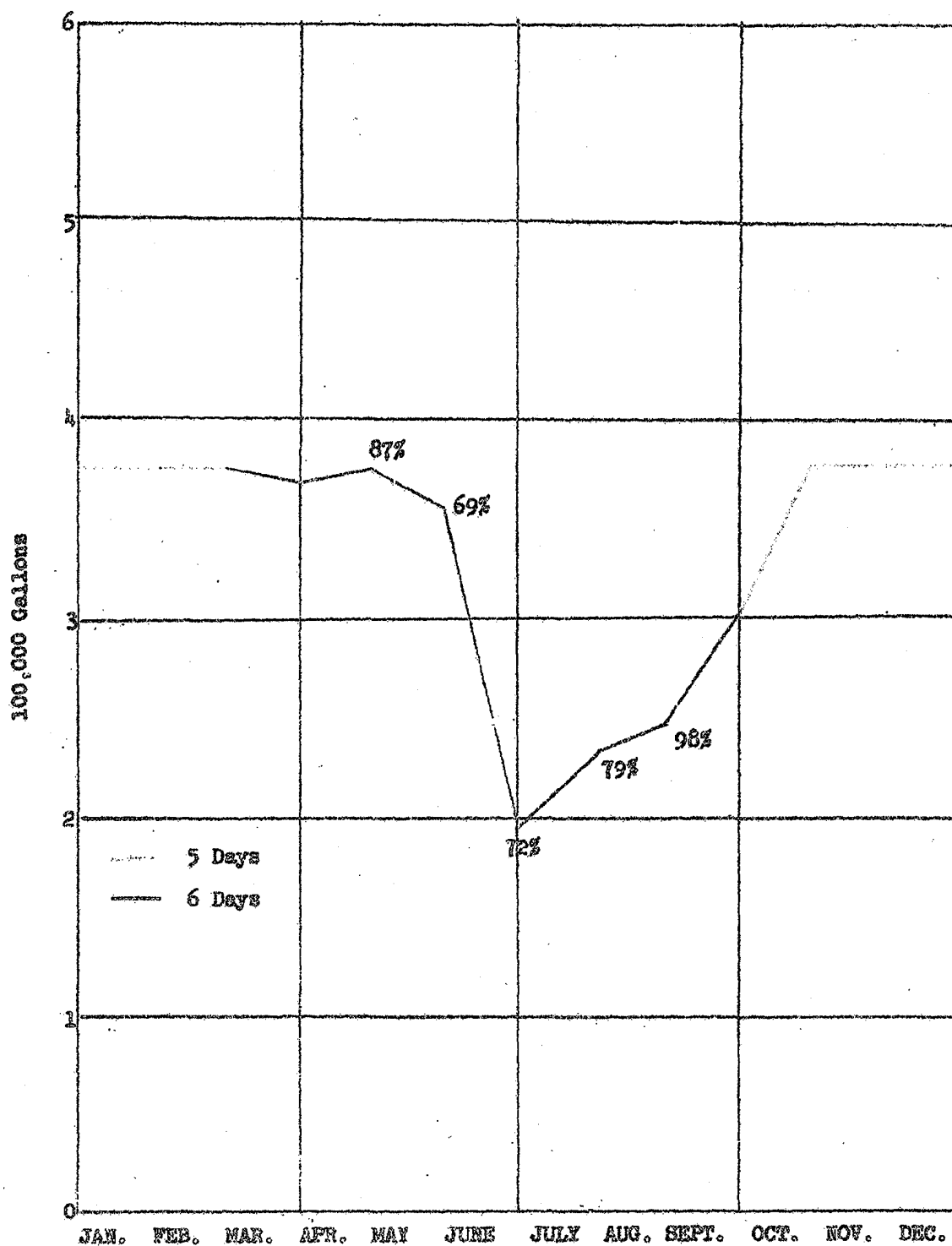
|           | <u>1969</u> | <u>1970</u> | <u>1971</u> | <u>1972</u> |
|-----------|-------------|-------------|-------------|-------------|
| January   | 238         | 249         | 261         | 275         |
| February  | 143         | 150         | 157         | 166         |
| March     | 315         | 330         | 345         | 364         |
| April     | 301         | 316         | 330         | 348         |
| May       | 429         | 450         | 470         | 496         |
| June      | 366         | 384         | 401         | 423         |
| July      | 271         | 284         | 296         | 313         |
| August    | 294         | 309         | 323         | 340         |
| September | 253         | 266         | 278         | 293         |
| October   | 150         | 157         | 165         | 174         |
| November  | 46          | 48          | 50          | 53          |
| December  | <u>149</u>  | <u>156</u>  | <u>163</u>  | <u>172</u>  |
| Total     | 2,955       | 3,099       | 3,239       | 3,417       |

TABLE III  
LATEX STORAGE  
M GALLONS

|                          | <u>Present<br/>Capacity</u> | <u>75%<br/>Max. Month<br/>1972</u> | <u>Suggested<br/>Addition</u> | <u>Total</u> |
|--------------------------|-----------------------------|------------------------------------|-------------------------------|--------------|
| <b>Chicago</b>           |                             |                                    |                               |              |
| 11005                    | 40                          | 51                                 | 10                            | 50           |
| 11008                    | 8                           | 16                                 | 10                            | 18           |
| 11014                    | 22                          | 16                                 | -                             | 22           |
| <b>Everett</b>           |                             |                                    |                               |              |
| 11005                    | 18                          | 21                                 | -                             | 18           |
| 11008                    | 16                          | 6                                  | -                             | 16           |
| 11014                    | 8                           | 6                                  | -                             | 8            |
| <b>Philadelphia</b>      |                             |                                    |                               |              |
| 11005                    | 20*                         | 53                                 | 30                            | 55           |
| 11008                    | 25*                         | 16                                 | -                             | 20           |
| 11014                    | 5                           | 16                                 | 15                            | 20           |
| <b>So. San Francisco</b> |                             |                                    |                               |              |
| 11005                    | 10*                         | 28                                 | 25                            | 31           |
| 11008                    | 6*                          | 9                                  | -                             | 10           |
| 11014                    | -                           | 9                                  | 10                            | 10           |
| <b>Tucker</b>            |                             |                                    |                               |              |
| 11005                    | 22                          | 30                                 | -                             | 22           |
| 11008                    | 22                          | 9                                  | -                             | 22           |
| 11014                    | -                           | 9                                  | 10                            | 10           |
| <b>Fort Madison</b>      |                             |                                    |                               |              |
| 11005                    | 76                          | 51                                 | -                             | 76           |
| 11008                    | 78                          | 16                                 | -                             | 78           |
| 11014                    | 40                          | 16                                 | -                             | 40           |

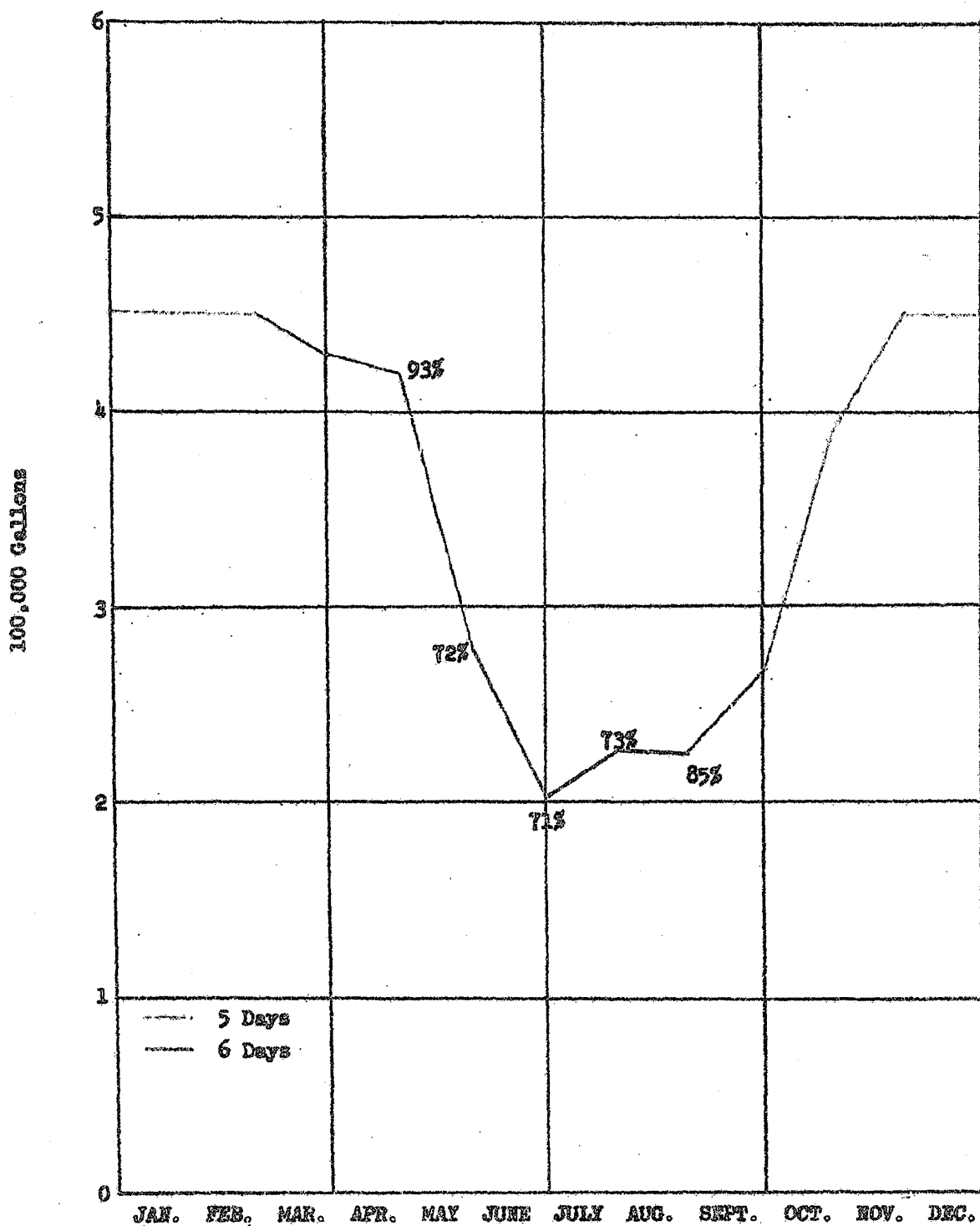
\* Switch 11005 and 11008

# LATEX STOCKS 1969

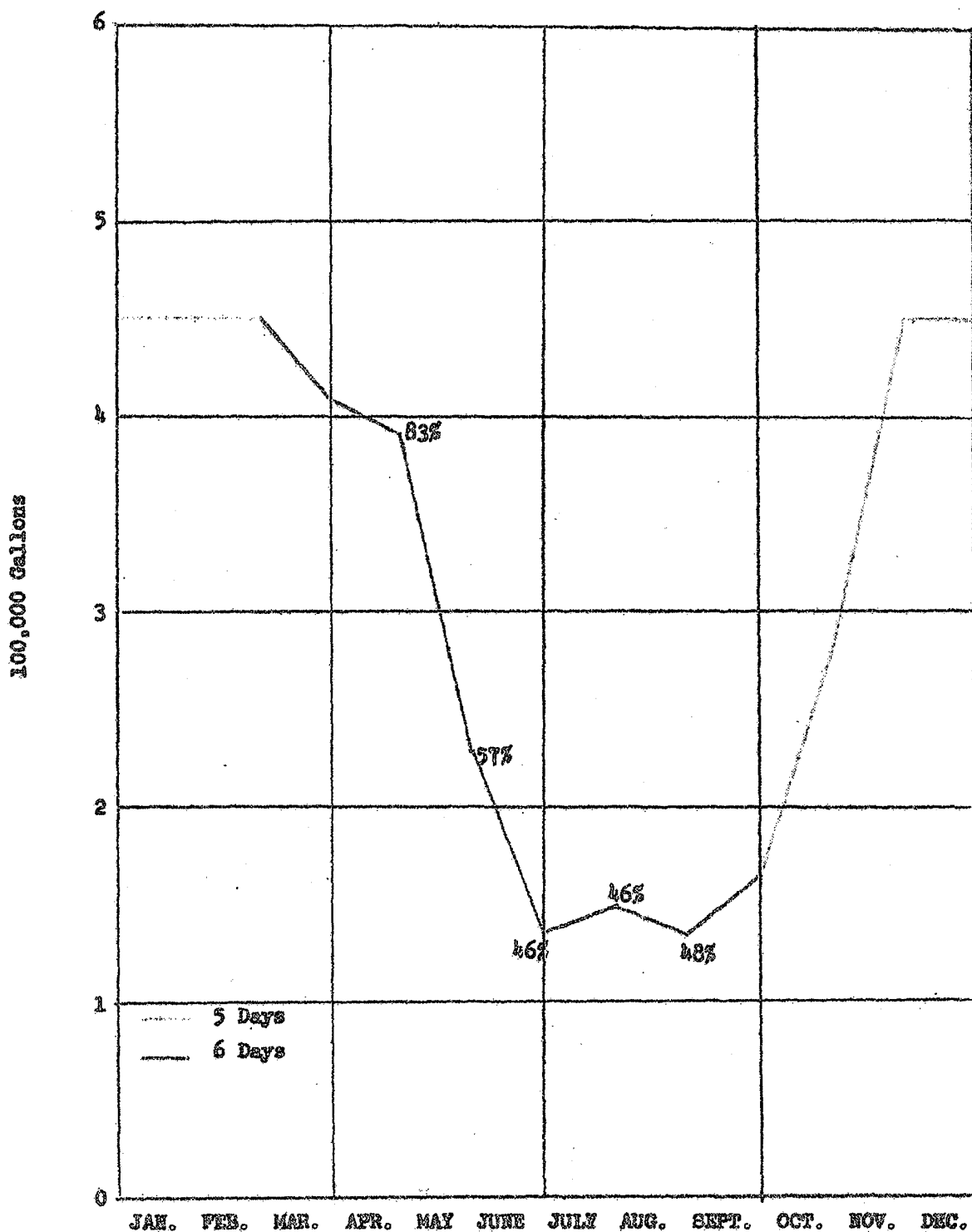




LATEX STOCKS  
1970



# LATEX STOCKS 1971



# LATEX STOCKS 1972

