

Please substitute this page for that previously sent you which was incorrectly titled.

QHQ., September 4, 1953

A. R. Fisher
C. F. Rassweiler
K. W. Huffine
Alvin Brown
J. A. O'Brien
C. B. Burnett

J. D. Lowry-Toronto Plant
(to be noted by)
A. E. Alpine
W. E. Boyd
R. S. Gardner



Transite Pipe Task force
Summary Progress Report
and Program for Future Work

Attached hereto is the Summary Progress Report and Program of the Transite Pipe Task Force which they have prepared. This report is most excellent in summarizing the activities for the past year and details the future program which should be followed in the future. You will note in reading this report that the Task Force estimates an annual savings of \$480,000 for the past year based on their accomplishments. During the past period costs were estimated at \$64,300. This does not include other intangible benefits that are to be derived from their recommended changes. An E. P. is being prepared to cover the last quarter of this year at an estimated cost of \$27,270. Successful conclusion of the work they plan may result in tangible savings of approximately \$700,000 per year.

I believe that you will be very much interested in reading the details contained in this excellent report.

S. COLLIER, CHAIRMAN
OF THE TRANSITE PIPE STEERING
COMMITTEE

SC:cs
cc

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E. R. Williams-Research
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Research Center
August 24, 1953

File: 425-R7a-1

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Transite Pipe Task Force
Summary Progress Report
and Program for Future Work

Herewith is a copy of the subject report which has been prepared in accordance with the request you made at the meeting of August 12, 1953.

This report summarizes the activities of the Task Force during the 11 months period, September 1, 1952 to August 1, 1953. During this period the Task Force has issued 23 detailed reports covering the results of various fiber and process investigations. Each of these, and other work not yet reported, is summarized briefly in this report.

The total direct cost of Task Force work during this period was \$64,300. Estimated annual savings are \$480,000. These have resulted from the fiber investigations and from the development of electrolytic loosening and moist-heat cure process for the 10 foot machines. Other intangible benefits are also noted in this report.

The future work program has been outlined and a brief discussion of each item in this program is included. Many of the fiber investigations are a continuation of investigations which are already underway. Some of the process investigations are also a continuation but several items are new. The new items have stemmed from information obtained or questions raised by previous work done along these lines. As agreed, this work will, wherever possible, be done on the Research pilot machine.

The estimated cost of the future work program for the next four months, September 1, 1953 - January 1, 1954 is \$27,270. The total tangible savings which may be obtained from this program are estimated to be approximately \$700,000 per year.

The Industrial Products Division will submit an E.P. to cover the \$27,270 estimated cost of the program for the period September 1, 1953 - January 1, 1954.

*
The Task Force

by: K. J. Whalen
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TRANSITE PIPE TASK FORCE
SUMMARY PROGRESS REPORT (Sept. 1, 1952-Aug. 1, 1953)
AND PLAN FOR FUTURE WORK

During the past 11 months the Transite Pipe Task Force has continued experimental investigation and development work under the direction of the Transite pipe Steering Committee. In this period 23 reports have been issued giving in detail, the results of this work. The purpose of this report is to summarize these results and to present a program for continuing the work.

I. SUMMARY OF RESULTS

A. Fiber Investigation:

The objectives of Task Force fiber investigations have been three-fold.

1. The development of fiber blends which will provide optimum use of available fibers.
2. The development of optimum fiber blends for Transite pipe without regard to present availability of fibers.
3. Investigation of fibers which have not heretofore been used in Transite pipe.

Work which was begun towards these objectives early in 1952 has been continued during the past 11 months. Outlined below are the fiber investigations which have been made and a brief summary of the results on each:

1. Substitution of Danville 4Z20 for Danville 4M28:

On the basis of laboratory evaluation, plant experimental, and plant production runs, it was established that Danville 4Z20 fiber is a satisfactory substitute for Danville 4M28 fiber in standard operating blends. (See Task Force Reports No. 23 and No. 30.) As a result of this development 4Z20 has been adopted as the standard 4 grade Danville fiber for use in Transite pipe fiber blends with the following benefits obtained:

- a. Annual savings in raw material cost of approximately \$30,000 at each plant. (Based on normal 5 day operation.)
- b. Fifty per cent increase in supply of Danville 4 grade fiber available for use in Transite pipe.

2. Use of Danville 6D20 Fiber in Transite Pipe:

Task Force investigations covering the use of 6D20 fiber in experimental and standard blends have led to the inclusion of 15 per cent of this fiber in the standard blend now used in making tube mandrel (3 - 8 in.) sizes of Pressure and Sewer pipe. The inclusion of 6D20 fiber in this blend has given the following benefits:

- a. Annual savings in raw material cost of approximately \$31,000 at each plant. (Based on normal 5 day operation.)
- b. Has provided an outlet for the sale of approximately 2000 tons of 6D20 fiber annually.

3. Reduced Fiber in Machine Furnish Formula:

Task Force Report No. 42 covers the results of experimental and plant production runs in which the quantity of fiber blend in the machine furnish formula was reduced from the normal, 25 per cent to 22-1/2 per cent for the manufacture of 6-in. 150 pipe. This report recommends the adoption of the 22-1/2 per cent furnish formula as standard for the manufacture of 6-in. 150 pipe with the present standard blend.

As a result of this investigation one plant in the Industrial Products Division has adopted this 22-1/2 per cent formula and has operated satisfactorily on this basis for the past six months. The Division is actively engaged in getting other plants on this basis. Based on a savings in material cost of approximately \$4.00 per ton and the normal production volume of 6-in. 150 pipe it is conservatively estimated that this investigation will result in an annual savings of about \$20,000 at each plant.

4. Use of Scrap in Transite Pipe Fiber Blends:

An extensive laboratory investigation has been made on the use of processed Transite pipe scrap in fiber blends. As a result of this investigation basic information on the use of scrap has been obtained. This information is reported in complete detail in Task Force Report No. 37. This report contains the following significant conclusions.

- a. That there is no difference in using scrap from the 10 ft machine or scrap from the 13 ft machine. (Standard practice has been to sort scraps returning each back into its own process.)
- b. That no significant difference results in using scrap processed by any of the following methods:
 - (1) Ground only.
 - (2) Ground and willowed.
 - (3) Ground, willowed and aspirated.
 - (4) Ground, willowed and screened.
 - (5) Ground, willowed, aspirated and screened.

(In the past, some consideration has been given to installation of equipment for improved refining of Transite pipe scrap. These results indicate that there would be no benefits from refining of scrap as it is used in Transite pipe.)

- c. That the inclusion of scrap in the fiber blend results in a reduction in finished product strength. The reduction in strength, however, is not of significant proportion for the amount of scrap included in the blends presently being used. (The test results indicate that the inclusion of additional scrap can be tolerated, within limits, without a critical reduction in strength. Thus some additional cost reduction may be obtained.)

5. Investigation of Blue-Danville Blends:

On the basis of laboratory evaluation work done in the early part of 1952 the Task Force recommended a combination of 30 per cent Blue and 70 per cent Danville as the optimum blend for use in Transite pipe (disregarding present fiber availability). In a series of experimental and extended plant runs made during the past 11 months it has been established that Blue-Danville blends are practical for production use on the tube mandrel machine. Results of these experimental and plant production runs have been reported in Task Force Report Nos. 27, 28, 31, 32, 33, 35 and 41. Inclusion of 6D20 fiber in these Blue-Danville blends was instrumental in development of the use in the present standard blends. (See Item 2 above.)

6. Fiber Blend Comparison Runs on No. 3 (Swing Mandrel) Machine:

At the request of Mr. Huffine the Task Force has conducted a series of fiber blend comparison runs on Manville's No. 3 swing mandrel machine. In these runs a complete comparison was made of the present standard M441 blend and the old standard M62 blend. The purpose of this comparison was to determine the influence of the blend change on machine operation, strength and recovery when manufacturing large diameter pipe. Task Force Report No. 46 presents the results of the first comparison run which covered an 8 week period. This report shows that the overall performance was better with the M62 blend. However, the first time through recovery did not come up to the 95 per cent goal which has been set by Mr. Huffine. (Methods of supporting the pipe with internal forms and methods of electrolytic loosening are also being investigated as a means of achieving this goal.)

A second run, in which British Metals Blue was substituted for MS Blue in both blends, has also been made. This run, covering a 4 week period was completed recently and a report is being prepared.

7. Development of Cheaper Blends for the 10 Ft Machine:

In the past two months the Task Force has been investigating the possibilities of using cheaper fiber blends on the 10 ft machine. As a result of the electrolytic loosening and moist-heat cure process which has been developed for this machine, there is now a good possibility that cheaper grades of fiber, which heretofore could not be tolerated, can now be used. Short, experimental machine runs have been made using a fiber blend composed of short Amosite, Danville 6D20 and scrap. This blend has given satisfactory machine operation and recovery but the crush strength has not been adequate to meet the Conduit and Korduct requirements. This blend has been modified to include some Danville 4Z20 for the purpose of increasing the crush strength. Experimental runs with this modified blend are scheduled.

Results of this work up to the present time indicate that there is a good possibility of from 10 to 15 per cent savings in raw material costs. It is conservatively estimated that this will amount to about \$150,000 per year on a company wide basis. In addition this will provide an outlet for the sale of 2000 to 3000 tons of Danville 6D20 fiber.

8. Investigation of Fiber Processing and Blending:

A laboratory investigation has been made to determine if any benefits can be obtained from pre-willowing of Blue fiber before it is mixed and willowed with the blend. In this work Blue-Danville blends were made up with Blue

fiber which had been willowed one, two, and three times before mixing and again willowing as a blend. The blends made with pre-willowed fiber were used to make test cakes which were compared against one another and also against cakes made with the same blend in which the Blue fiber was not pre-willowed. Data from these tests is now being analyzed and a report is being prepared. On the basis of a preliminary examination of the data it is indicated that there is some advantage to be obtained from a more complete opening of Blue fiber. However, more laboratory work and also plant work will be necessary to fully determine the benefits.

In this work consideration is also being given to the suggestion that fibers for Transite pipe be processed and blended at the mines.

9. Other Fiber Investigations:

In addition to the fiber investigation and blend development work outlined above the Task Force has made laboratory investigations and plant runs for the purpose of evaluating special and non-standard fibers. A list of these fibers with comments on each follows:

a. Munro 4AC and 6AC:

The purpose of the investigation of these fibers was to determine if the Munro 4AC fiber is a satisfactory substitute for Munro 4X or Danville 4Z, and also if Munro 6AC is a satisfactory substitute for 6D20. On the basis of information obtained in this investigation, which was reported in Task Force Report No. 38 it was indicated that the AC fibers are generally acceptable substitutes.

b. Munro 4T:

This fiber is being investigated at the request of the Asbestos Fiber Division. The purpose of the investigation is to determine if the Munro 4T is a satisfactory substitute for Munro 4X. Task Force Report No. 49 covers the results of the first part of the investigation - substitution of 4T for 4X in the standard operating blends on the large (13 ft) machine. On the basis of information in this report it is concluded that operation and recovery is somewhat poorer with the 4T fiber.

A second part of this investigation - substitution of 4T in the 10 ft machine blend - has not been completed at the present time.

c. British Metals Blue:

This African Blue fiber is from a new source. An investigation has been made to determine if it is an acceptable substitute for the standard MS Blue. Since this work has been completed just recently, a formal report has not yet been issued. Tabulation of the data indicated that this Blue fiber is a fully acceptable substitute for, and may even be better than, MS Blue.

d. Australian Blue Fiber:

The Task Force was asked to re-evaluate this fiber in consideration of a recent offer to reduce the price by the amount of \$45.00 per ton. The re-evaluation investigation is now under way for the purpose of determining the following:

- (1) Is Australian Blue sufficiently better than MS Blue to justify the higher price?
- (2) If so, can blends be developed using Australian Blue in lesser amounts to equalize its cost with MS Blue?

Preliminary "feeler" runs have been made using each of these Blue fibers in a Blue-Danville blend, additional runs are scheduled.

e. Amosite Fiber:

Laboratory evaluation of short grade Amosite fibers has been made to determine the possibility of inclusion of these fibers in Transite pipe blends. Task Force memorandums dated February 17, 1953, reported the results of these laboratory investigations. These results indicated a good possibility for use of short Amosite in blends for the 10 ft machine and possible inclusion of small amounts in blends for the 13 ft machine. This laboratory work has been used as a basis in the development of cheaper fibers blends for the 10 ft machines.

f. Short Blue Fiber:

A laboratory investigation has been made to determine if short Blue fibers can be used as a partial substitution for the regular MS Blue. The results of this laboratory work were reported in a Task Force memorandum dated February 17, 1953. These results indicate that substitution of short Blue for MS Blue would be practical. The short Blue could be used as an extender for the MS Blue if it is possible to find a reliable source of supply for the short Blue.

B. Process Investigations:

Many of the process problems on which the Task Force has worked during the past 11 months stem from the comprehensive process study which was made in 1951. This study pointed out parts of the process wherein control and improvement could be obtained. The following work has been done on process improvement and control:

1. Investigation of Bird Centrifuge:

An investigation of the Bird Centrifuge has been made for the purpose of evaluating this machine and comparing it to the Savealls as a means of solids recovery and process water clarification. Using a 30 gallon size pilot unit, the Task Force has made a complete determination of the characteristics of this machine when operating on Transite pipe process slurries. The results of this investigation are covered in detail in Task Force Report No. 45. These results indicate that the centrifuge has the following advantages over the Savealls:

- a. Uniform rate of solids return to the process.
- b. Solids separation is very rapid resulting in solids returned to the process which still have great strength value.
- c. Volume of slurry in process is greatly reduced.

- d. Elimination of stock losses which occur when Saveall tanks are flushed or drained.

On the basis of these advantages, consideration is being given to the installation of a production size unit on the 10 ft machine. With this installation a complete evaluation could be made under production conditions.

It is also interesting to note that the work done with the pilot unit in Transite pipe has led to similar investigations with the pilot unit in the Paper Mill and Magnesia Departments.

2. Development of Electrolytic Loosening and Moist-Heat Curing for the 10 Ft Pipe Machine:

An investigation was started in August 1952 for the purpose of finding the reasons for poor recovery on 10 ft machine pipe and to establish methods for improving this recovery. Results of the investigation on recovery showed that excessive diametral stretch and out-of-roundness were the major contributing causes for loss. This pointed to the need for some controlled means of loosening the pipe from the mandrel and a means for quick setting the pipe on the mandrel to prevent out-of-roundness and distortion, which resulted from withdrawal of the mandrel from the green pipe. As a result of the experimental development work which has been done to overcome the diametral stretch and out-of-roundness problems, the following major process improvements have been established:

- a. A new method of electrolytic loosening has been developed to replace the old calendar method of loosening the pipe from the mandrel. This method provides uniform, controlled diametral stretch throughout the length of each pipe.
- b. A one-hour moist-heat cure oven has been provided to quick-set the cement, thus giving the pipe sufficient strength to withstand mandrel pulling, handling and tray loading.
- c. A mechanical, multiple-mandrel pulling device has been developed to replace the manual pulling operation. This device permits mandrel extraction with a minimum clearance (diametral stretch) between the pipe and the mandrel.

On the basis of experimental and plant production runs it is indicated that the following benefits will be obtained from these process improvements:

- a. Improved recovery.
- b. Reduced material usage.
- c. Improved dimensions of product.
- d. Reduced material cost through use of cheaper fiber blends.

It is estimated that these benefits will ultimately result in savings of approximately \$100,000 per year at each plant. On the basis of recoveries experienced at Manville factory during 1952, improved recoveries resulting from the production

use of Task Force experimental equipment during the first six months of 1953 has shown savings of approximately \$40,000. Marrero factory has completed the engineering design and estimates for production equipment based on experimental equipment developed by the Task Force. Appropriations for installations at all plants will be prepared.

Task Force Reports No. 37 and No. 47 cover the complete details of this investigation and development.

3. Moist-Heat Cure 13 Ft Tube Mandrel Machine:

Investigations on Production Equipment: As a result of Task Force experimental work done in 1951, production equipment for moist-heat curing of pressure and sewer pipe was installed on Manville's No. 2 (tube mandrel) machine in March 1953. Results of production operation with this oven have been "spotty". As a result it has been suspected that the oven heat might be adversely affecting the strength of the pipe. The Task Force has made a series of tests to check the conditions in this oven and the effect of these conditions on the strength of the pipe. Task Force Report No. 48 covers the results of the initial test runs and heat studies. Further, more extensive tests are now being conducted.

Investigations of Immediate Steam Cure: With the development of the moist-heat cure process, it was suggested that the one hour moist-heat cure might eliminate the need for the normal 16 hour air cure which is now required before steam cure. (Elimination of the 16 hour air cure would shorten the process time and increase the rate of turnover on steam cure trays.) At the time of the suggestion, a laboratory investigation was made. (See Task Force Report No. 25.) Results of this laboratory investigation were favorable. The Report recommended, however, that this should be tried in the plant on production equipment before any definite conclusions were drawn. Since the installation of the production oven on the No. 2 machine at Manville, the plant investigation has been started. On the basis of two short comparison runs, the results are still favorable. Additional trial runs will be necessary to confirm these results before the process change can be recommended.

4. Automatic Gauging Device for Tube Mandrel Machine:

In the course of the comprehensive process study made by the Task Force in 1951, O.D. measurements were taken on a large number of pipe. These measurements showed that there was considerable variation in O.D. between different pipe and also variation in O.D. along the length of each pipe. An improved gauging problem was discussed with engineers from several gauging companies. Two companies, Taft-Pierce and Federal Gauge, showed sufficient interest to submit proposals. The Federal Gauge proposal, which was the cheaper and more practical, was accepted and an order for the equipment has been placed. Detailed designs of this equipment is underway and it is expected that this equipment will be fabricated and installed in the next 2-3 months.

5. Improved Pressure Control System:

The deficiencies in the present system of forming-pressure application and control on the 13 ft pipe machines have been recognized for some time.

This system, which is to a large extent dependent on manipulation by the valve operator, does not guarantee uniform application of forming pressure to every pipe.

The Task Force has developed automatic pressure control equipment which will repeatedly and accurately produce any forming pressure pattern desired. This equipment was installed on Manville's No. 2 machine where it has been used in production operation for several extended periods ranging from one shift to 3 days. This production operation has demonstrated that the system is sound.

The instrumental part of this equipment is not sturdy enough to stand up under continuous production use. The Task Force has contacted several instrument companies on this problem. At the present time, both the Foxboro Co. and the Minneapolis-Honeywell Co. are preparing quotations for instruments sturdy enough to do the job.

6. Investigation of the Press Section on No. 2 Machine at Manville:

A study of the action of the press rolls during pipe formation has been made. The purpose of this study was to determine if any eccentricities occur in the action of the top press rolls driving-clutch which would indicate the need for a proposed D. C. drive. In this work both high-speed motion picture photography and potentiometers were used at different times to measure the relative rotational speeds of the two top and the bottom press rolls. As a result of these studies it was revealed that there is a small angular lag in the relative rotation of the top press rolls and that the rate of lag is not always the same. However, there was no evidence that this is detrimental to machine operation or to strength of the pipe.

7. Investigation of Electrolytic Loosening Methods for Swing Mandrel Pipe:

Since the inception of the electrolytic loosening method for 13-ft. tube mandrel pipe, some means has been sought for application of the same loosening principle to swing mandrel pipe. Application of the roll method employed on the tube mandrel machine has been considered but it was determined that this would involve massive and expensive equipment. The Task Force has also investigated the possibility of using the screen method of loosening which was developed for the 10-ft. machine. Attempts made to use this method were not successful and apparently have no promise. A method suggested by Marrero Factory has recently been given to the Task Force for investigation. This method proposes passing a ring of charged contact shoes axially along the surface of the pipe. Thus progressive loosening would be accomplished in an axial direction.

The experimental equipment for trial of this method has been designed by the Research Engineering Section. This equipment will be built and tried on the pilot machine and if successful will be moved to the plant.

8. Investigation of Internal Forms for Swing Mandrel Pipe:

During the past eleven months the Task Force has done some work towards improving the dimensional stability of large diameter pipe. A full-length, expanding, wooden form was designed and constructed for experimental use on the 16-in. size. Use of this form was found to give the desired improvement in roundness. Following this lead, Waukegan Factory has also done some work with inside forms which were made for 12-in. pipe. Waukegan Report No. 270-413 covers results of preliminary tests with these forms, Waukegan is continuing this investigation.

On the basis of work done by the Task Force with the 16-in. form, it is felt that these forms are not very practical for production use. They are expensive to build and are cumbersome and awkward for the production crew to handle. As a result, some other means of full length internal support was sought. It was suggested that an internal rubber balloon inflated with air would probably give the required support to maintain roundness throughout the length of the pipe. Manville Factory has recently obtained a rubber-impregnated, nylon balloon for trial purposes. This balloon was specially fabricated for 24-in. diameter pipe by the Air Cruiser Corporation of Delmar, New Jersey. Up to the present time the balloon has been tried in only one pipe. Several more trials with this balloon will be made and if the results look promising it is proposed to obtain 10 or 12 of these units with which a comprehensive study can be made.

9. Density Investigations:

As a result of the development by the Task Force of a method of determining the density of pipe immediately after forming, it has been shown that variations in density do exist throughout the length of a section of pipe as well as variations in density from pipe to pipe. (See Task Force Report No. 17)

An additional investigation has now been made to determine the effect of this density variation on the unit strength of the finished product. Results of this investigation are reported in detail in Task Force Report No. 40. This report shows that there is a significant relation of density to flexural strength with flexural weakness associated with highly localized low-density spots. No significant relation was established between density and hydrostatic or crushing strengths.

In addition to the density investigations above, several other means of measuring variation in the pipe machine sheet or in the formed, green pipe have been attempted:

- a. Task Force Report No. 18 entitled "Investigation of Variation in the Sheet" describes a study of strength comparisons made on slabs cut from the sheet in the "with" and "cross" machine directions.
- b. An attempt has been made to use the roll-type electrolytic loosener as a means of determining density across the pipe. In this work individual ammeters were connected across the line to each of the 21 electrolytic loosener rolls. A correlation of ammeter reading to density was run. It was found that there was only a slight variation in ammeter reading at the various roll positions and these variations could not be associated with density or hydro-breakage.

- c. Representatives from the Industrial Nucleonics Corporation were invited to demonstrate their AccuRay Beta Gauge on the No. 2 Machine. With this gauge, it was possible to pick up variations in the sheet and felt together. Some indication of the variation throughout the length of a section of pipe was also obtained. However, adaptation of the equipment to the pipe machine is not considered practical.

As a result of these investigations to find means to measure and record variations in the sheet or variations in density across the pipe, the Research Transite Pipe Section has investigated X-Ray type equipment manufactured by the Industrial Gauge Corporation. This equipment has more promise of practical application than any other investigated. Research has placed an order for one of these units, and delivery is promised for September.

Development, by Research, of two vat operation for the pipe machine also has some promise of improved sheet uniformity. With the two vats the pattern of random irregularities across the sheet should tend to cancel, since it is unlikely that both vats would produce the same irregular patterns.

C. General Investigation:

1. Physical Properties of Pipe:

During the past year, the Research Materials Test Laboratory has, at the request of the Task Force, made two complete tests to check the physical properties of Transite pipe. These tests have established such properties as impact strength in both transverse and longitudinal directions, modulus of elasticity in bending, corporation cock pullout strength, and other properties not measured by routine production testing. The Task Force is preparing to issue these reports formally and has recommended that the Quality Control Department set up a procedure for periodic checking of the physical properties of pipe produced at all plants.

2. Evaluation of Waukegan Cement:

Due to poor operation and recovery on the swing mandrel machine at Waukegan the Task Force was requested, in December 1952, to evaluate the Universal Buffington Cement used at Waukegan. To evaluate this cement the Task Force was asked to make comparison runs to determine if the Buffington Cement was as satisfactory in the manufacture of large diameter pressure pipe as the standard cements used at Manville. These short runs could not substantiate any difference between these cements. The results of these cement evaluation runs are reported in Task Force Report No. 44.

3. Evaluation of Special Northampton, Universal Atlas Cement:

At the request of Manville Factory the Task Force made a short comparison run to evaluate a special lot of Universal Atlas Cement. The purpose of this run was to compare the influence of the special cement and regular National cement on machine production, recovery, and ultimate strength. Task Force Report 39 gives the detailed results of this investigation. The special Northampton cement was found to give results equivalent to National cements.

At this point it may be well to note that work is under way by Research in trying to establish a more reliable cement test. Emphasis is placed on eliminating the inherent drawbacks of the presently used "sag cake" method, so as to be able to apply the improved cement test results in cases such as these cement evaluations.

4. Classification and Charting of Rejects:

As a part of the Task Force investigations the inspection and test losses on pipe made on each machine at Manville have been classified and charted. The purpose of this work has been to record in detail the causes for losses so that corrective measures could be devised to eliminate or reduce losses. Task Force Report No. 43 presents graphically the information obtained at Manville during 1952 as a result of the work the Quality Control Department formed a committee to standardize the classification and charting of rejects at all plants. The committee has used the Task Force classification and charting methods to accomplish this standardization.

II. COST OF TASK FORCE INVESTIGATIONS

The total direct cost of Task Force work done in the past eleven months was \$64,311. The following breakdown shows a comparison of the actual expenditures against the expenditures which were estimated when E. P. 270-416C was prepared on September 1, 1952.

	<u>Estimated Expenditures</u> <u>Sept. 1, 1952 - Sept. 1, 1953</u>	<u>Actual Expenditures</u> <u>Sept. 1, 1952-Aug. 1, 1953</u>
Sample test pipe	\$ 33,300	\$ 16,361
Excess breakage	7,000	-
Hourly labor	25,800	28,297
Experimental Equipment	7,500	19,653
Total	\$ 73,600	\$ 64,311

Although the totals are in line, there is a wide difference between the estimated and the actual expenditures in some items shown above. The following are the reasons for the differences:

1. The actual expenditure for sample test pipe was less than forecast because an extensive program for evaluation of proposed 1953 blends for the swing mandrel machine was dropped when it became apparent that fiber for these blends would not be available in 1953.
2. The greater expenditure for experimental equipment is due to the installation of the electrolytic loosener, moist-heat oven and mechanical pulling equipment installed on the 10-ft. machine at Manville. This development was carried to a point considerably beyond the experimental stage. Production equipment which was originally planned for installation on a separate E.P. was progressively installed with Task Force funds, because it was

necessary to study the process under production conditions. It is estimated that about \$15,000 was spent for this equipment.

Savings resulting from Task Force investigations in the past eleven months have been individually listed in other parts of this report. The following list summarizes, on a company-wide yearly basis, the tangible savings which have been or are being realized: (These savings are in addition to savings shown on Summary Report dated August 29, 1952)

1. From substitution of 4Z20 fiber	\$150,000
2. From inclusion of 6D20 fiber in operating blends.	150,000
3. From reduced fiber in the tube machine furnish formula	100,000
4. From development of electric loosener, moist-heat oven and pulling equipment for 10-ft. machine.	80,000*
Total estimated savings	\$480,000

In addition to the tangible savings shown above other intangible benefits or uncalculated savings have resulted from the Task Force work. Notable among these are:

1. Through the substitution of 4Z20 fiber for 4M28, a fifty per cent increase in the supply of 4 grade Danville fiber is available for use in Transite pipe.
2. Through inclusion of 6D20 fiber in tube mandrel blends an outlet has been provided for approximately 2000 tons of 6D20 fiber.
3. As a result of the development of the electrolytic loosening and moist-heat oven process for the 10-ft. machine the products from this machine will be dimensionally improved. This should result in increased sales, due to the ability to meet customer specifications which cannot otherwise be met.

III. FUTURE WORK PROGRAM

As requested by the Steering Committee in the meeting of August 12, 1953, the Task Force has prepared the following program for continuing the work. As agreed in the meeting, as much of this work as possible will be done on the Research pilot machine.

A. Fiber Investigations:

Most of the items in this program are a continuation of investigations on which a part of the work has been done, or additional work has been requested.

* Presently in use at Manville factory only. Estimated savings of \$50,000 a year at each plant when installations are made.

1. 4T Munro Fiber:

This fiber is being evaluated at the request of the Asbestos Fiber Division. Evaluation in 13 ft machine blends has been completed. (Task Force Report No. 49.) A preliminary trial run is scheduled on the 10 ft machine. If the trial run is satisfactory, an extended production run will be scheduled. Evaluation of this fiber on the 10 ft machine is considered more significant than on the 13 ft machines since the standard operating blend for the 10 ft machine (C121) is composed wholly of Munro 4 grade fiber and scrap. Any outstanding differences between the 4T fiber and the regular 4X should be readily detectable in the 10 ft machine runs.

2. Fiber Blend Comparison Runs on No. 3 (Swing Mandrel) Machine:

The last part of the M441 (present standard) blend and M62 (old standard) blend comparison runs, which were scheduled in accordance with Mr. S. Collier's letter of April 15, have not been made. These runs have been delayed pending receipt of the last shipment of British Metals Blue Fiber.

3. Fiber Blends for Swing Mandrel Machines:

When the M62 - M441 blend comparison runs (item 2 above) are completed, it is planned to investigate Blue-Danville or similar blends for the large diameter pipe made on the swing mandrel machine. Up to the present time all the work done with Blue-Danville blends has been limited to the tube mandrel sizes.

The purpose of these runs is to compare the blends at the lower fiber-furnish levels. Present standard formulas require 27-1/2 per cent of fiber blend. These runs are to be made at 25 per cent with possible additional runs at a lower level if the results at the 25 per cent level are satisfactory. The ultimate objectives are:

- a. To compare the relative values of the British Metals Blue and the MS Blue at lower fiber furnish levels where differences in the quality of the Blue fiber may be more readily detected.
- b. To determine the possibility of establishing the lower fiber furnish level as standard to obtain material savings.

4. Australian Blue Fiber:

An investigation is being made to re-evaluate this fiber for the purpose of determining the following:

- a. Is Australian Blue sufficiently better than MS Blue to justify its higher price?
- b. If so, can blends be developed using Australian in lesser amounts to equalize its cost with MS?

Preliminary work on this investigation has been done. An 8 hour production run is now to be made on the No. 2 machine at Manville. If the results of the 8 hour run are favorable, a one week production run will be made.

5. Development of Cheaper Blends for the 10 Ft Machine:

Work on this investigation has been started in the past two months. Several short production runs have been made using a blend of Amosite fiber, 6D20 fiber and scrap. The results are promising, but additional investigation is necessary to build up the blend strength to meet crushing requirements for Conduit and Korduct. The work thus far indicates a potential savings of 10-15 per cent of material costs.

6. Investigation of Fiber Processing and Blending:

The purpose of this work is to determine the optimum amount of processing required to develop the full potential of each fiber in the blend. It is believed that such optimum processing would permit the use of less fiber without detriment to the operation or quality of product.

Some preliminary work on Blue fiber has been done in the Task Force laboratory. Results of this work are encouraging. Further laboratory and plant experimental work must be done.

7. Cassiar 4K Fiber:

The Task Force has been requested to evaluate Cassiar 4K fiber as a substitute for other fibers in Transite pipe blends. One hundred and twenty (120) tons of this fiber has been ordered by the Industrial Products Division for shipment to Manville factory. Evaluation runs will be made when the fiber is received.

B. Process Investigations:

The Task Force proposes to pursue the following investigations for improvement and control of the process.

1. Development of Electrolytic Loosening for the Swing Mandrel Machine:

The ring-type unit which was suggested by Marrero has been designed by the Research Engineering Section. It is proposed to build an experimental unit for trial on the Research pilot machine. If this is successful, it will be tried in production on the No. 3 machine at Manville. If it is not successful, the Task Force will seek to develop other means of loosening for the swing mandrel machines.

2. Investigation of Internal Forms for Swing Mandrel Pipe:

The 24 in. internal rubber balloon which Manville factory purchased from Air Cruiser Corp Delmar, New Jersey, will be tried in several pipe. If the results look promising, it is proposed to obtain 10 or 12 of these balloons with which a comprehensive study can be made. If these are not successful, the Task Force will seek to develop other methods to improve the dimensional stability of large diameter pipe.

3. Investigation of Moist-Heat Oven on Manville No. 2 Machine:

The Task Force will continue the investigation of this oven to establish heat and humidity conditions which will give the same results as obtained with the experimental oven.

4. Investigation of Immediate Steam Cure After Moist-Heat Oven Cure:

Additional test runs will be made to compare the effects of immediate steam cure vs. steam cure after normal, 16 hour air cure. Results of these and previous runs will be reported and recommendations will be made as to the elimination or reduction of the presently required air cure period.

5. Automatic Gauging Device for Tube Mandrel Machine:

The Task Force will follow the design, purchase and installation and operation of this equipment.

6. Bird Centrifuge:

If it is decided to purchase one of these units for production trial, the Task Force will set up and follow production trial runs to fully evaluate this machine.

7. Automatic Pressure Control:

The Task Force will continue to follow this project until satisfactory production equipment has been obtained and is in operation.

8. Investigation of Forming Pressures:

Following satisfactory operation of the automatic pressure control equipment, it is proposed to make a thorough study of forming pressures to determine their effect in strength and density and to establish the required forming pressures for the various sizes and classes of pipe. Preliminary work on this will be done on the Research pilot machine.

9. Investigation of Calcium Chloride Additive as an Alternative to Moist-Heat Cure:

It has been suggested that calcium chloride properly introduced into the process might have the same quick-setting effect as the moist-heat oven. If this proved to be so, it would eliminate the need for ovens, thus accomplishing the same result at a lower investment cost. The Task Force proposes to investigate this suggestion on the Research pilot machine.

10. Investigation of Low Pressure Quick Steam Cure as an Alternative to Moist-Heat Cure:

As an alternative to the moist-heat cure a quick steam cure in a low pressure autoclave has been suggested to the Task Force. This suggestion may have considerable merit since with the proper steam pressures a quick-set could probably be accomplished in a shorter time than in the moist-heat oven. The Task Force proposes to investigate this suggestion.

11. Rubber Covered Top Press Rolls:

A top press section with the rubber rolls has been made up and trial runs have been made on the Research pilot machine. These runs have been promising but further investigation is necessary to develop these rolls for plant production use. The Task Force will make additional investigations on the Research pilot machine.

12. Investigation of Steam Cure:

The Task Force proposes to make a laboratory investigation to determine if the rate of charging and exhausting steam in the curing autoclave has any effect on the strength of Transite pipe.

13. Measurement of Bottom Felt Condition:

The Task Force will investigate the possibility of using porosity meters to continuously record the conditions across the width of the bottom felt. The purpose of this investigation is to improve uniformity of density across the pipe and to determine if increased felt life can be obtained. Preliminary work will be done on the pilot machine.

14. Automatic Mandrel Change:

This is primarily an Engineering job. The Task Force is interested, however, for the improved uniformity of machine operation which this equipment will give. Experimental equipment can be installed on the Research pilot machine and its development for production use followed by the Task Force.

15. Investigation of Proposed Changes in Dimensional Tolerances for Conduit and Korduct:

The Task Force has been asked to determine if Conduit and Korduct made with the new electrolytic loosening and moist-heat cure process, will meet new specifications proposed by the Sales Department. A run of 4 in. Korduct will be made on the 10 ft machine at Manville and the finished pipe will be checked against the proposed specifications.

IV. COST OF FUTURE PROGRAM

The estimated cost to operate the program for the next four months (Sept. 1, 1953-Jan. 1, 1954) is summarized as follows:

Sample Test Pipe	\$ 8870
Hourly Labor	8600
Provision for Excess Breakage	3500
Equipment	6300
Total Estimated Expenditure	\$27,270

The items scheduled for investigation during the next four months which are covered by this estimate are shown on the attached detailed estimate sheet.

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An estimate of the possible savings which may be obtained from some of these investigations is as follows:

1. Development of cheaper fiber blends for the
10 ft machines \$200,000/yr
2. Electrolytic loosening and internal forms
for swing mandrel pipe 300,000/yr
3. Reduced fiber in swing mandrel machine
furnish formula 200,000/yr
\$700,000/yr