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FORESTERS' MANUAL

Forest Engineering—Section 4

DEPARTMENTAL SAWMILLS

FORESTS DEPARTMENT
PERTH
WESTERN AUSTRALIA

CONTENTS

	Paras.
INTRODUCTION	
OPERATION	1–3
FELLING, LOGGING AND CARTING	4–31
MILLING	32–71
HANDLING AND STORAGE	72–113
SALES AND DELIVERIES	114–150
EXPENDITURE, RETURNS AND RECORDS	151–170
MILL MAINTENANCE	171–177
SAFETY PROVISIONS	178–185
FIRE PRECAUTIONS	186
Logging Operations	187–194
Sawmills	195–201
APPENDIX A—Notes on Stain and Mould	
APPENDIX B—Standard Strip-stacked Bundle Tables	

INTRODUCTION

At present the Forests Department operates seven sawmills, and others may be constructed if and when required.

The mills in operation are:

Hardwood Mills

(i) **Dwellingup**—For experimental milling and the training of future timber inspection staff in the milling and properties of jarrah.

(ii) **Ludlow**—For the conversion of silvicultural fellings in the Tuart forest and the production of tuart for Government requirements, mainly for the W.A.G.R.

Softwood Mills

These mills operate primarily for the economic conversion of thinnings to sawn timber at the plantations more remote from markets, where at present there is no trade demand for such thinnings at an economic price. In addition, pine sawmilling and utilization techniques are continually being developed and improved. Experimental work on seasoning and grading is also being actively pursued.

The mills are located at—

Harvey
Grimwade
Ludlow
Margaret River
Pemberton.

OPERATION

1. The mills will operate as directed by the Conservator.

Dwellingup Mill

2. Hardwood operations at Dwellingup are at present on contract to one company and all operations are covered by this contract.

Other mills to cut to order

3. All other mills including the Hardwood Mill at Ludlow will cut to order placed by Head Office on Sales Orders (F.D. 324). These orders will cover both immediate sales and holdings for stock. Cutting without a Sales Order is not permitted **except** for incidental recovery items.

FELLING, LOGGING AND CARTING

Officers to arrange log supply

4. On receipt of Sales Orders, Officers-in-Charge of mills will arrange delivery of suitable logs by the most appropriate method.

Due attention to be paid to silviculture

5. Cutting of logs for milling must be carried out in an approved and workmanlike manner and with due regard to instructions on silviculture promulgated from time to time.

6. Felling for departmental hardwood and pine mills is carried out on either daywork, piecework or contract basis.

Daywork felling rates

7. Where fellers are on daywork, the respective margins as provided by the Forestry Workers' Award currently in force, or such other rates as approved by the Conservator must be paid.

Piecework felling rates

8. Piecework rates and conditions are governed by the A.W.U. (Government) Forestry Award, 1965, as amended and consolidated. In particular, Clause 41—"Piecework" applies and rates are fixed accordingly by Head Office as required.

9. These rates may require adjustment when any variation occurs in the rates upon which piecework rates are based—for example, in the hourly rate, service pay, etc.

Changes in piecework conditions

10. Where significant changes occur in the working conditions such that a variation in the rate appears justified, officers in charge of Divisions are to submit proposals to Head Office for approval. Proposals must be fully documented with complete descriptions of work method and any other relevant details.

Rates for felling and hauling combined

11. Special arrangements are made in some cases where felling and hauling is done by the one pieceworker or team and such rates must not be varied without Head Office approval. Any officer recommending a variation must supply all details relevant to the particular operation for consideration and decision by Head Office.

Pine carters to use Pine Log Delivery Note F.D. 544

12. Each pine carter or team of carters must be issued with a "Pine Log Delivery Note", F.D. 544, and in it must be recorded the required particulars regarding each load of logs carted.

13. This book is to be checked periodically by an officer and at the end of each pay period handed to the local office.

Log measurement—Forests Act and Regulations

14. Officers charged with the administration of departmental sawmills must be thoroughly conversant with the provisions of the Forests Act and Regulations governing the procedure and method of measuring and recording the dimensions and volume of logs.

15. All log volumes are to be calculated in "true volume". All volumes are to be recorded "under bark" (U.B.).

Volume of small pine logs to be by bin measure

16. Pine logs with crown diameters of 250 mm (9 in.) or less and under 3 metres (9 ft.) in length will generally be determined by "bin measure" in which a truck load of logs is stacked to a previously fixed height and length to contain a constant volume of logs.

Use F.D. 544

17. Operations involving the use of bin log measurement will be recorded on Pine Log Delivery Note (F.D. 544).

Checking the bin load

18. Officers in charge of pine sawmills must ensure that each bin load is checked before unloading. This is preferably done by the mill overseer. Logs delivered by bin measure are to be checked to ensure that—

- 18.1 length of logs is correct;
- 18.2 no log is of smaller crown diameter than that fixed from time to time by the Conservator;
- 18.3 logs are up to specification and can be utilised economically for the purpose for which they were produced.

19. A string, run from end to end at the height of the mark will give a fair indication of the average height of the load.

Check of bin volume

20. Check measurements of several complete bin loads are to be carried out from time to time as the Officer-in-Charge considers advisable, but not less than once per quarter and at irregular intervals.

21. Bins are to be check measured "as they come" and are not to be loaded specifically for the purpose. A loaded bin should be discharged in its normal unloading place (mill skids, stockpile) and the logs contained in the bin measured individually.

22. Checks are to be carried out by measuring—
22.1 underbark diameters at both ends of each log in the bin;
22.2 the length of the log;
22.3 the total space occupied by the bin.

Record on F.D. 558

23. This information is recorded on F.D. 558, Chipwood Bin Load Sample, using the current coding details and then forward to Automatic Data Processing (A.D.P.) Centre, Como.

Conversion Factor

24. From this data, A.D.P. will prepare a "Conversion Factor". The Conversion Factor will give the volume of wood, under bark, contained in any bin unit. It is applied as follows:—
Volume of bin = length of logs x distance between stanchions x height of bin mark.
Volume of wood in bin = volume of bin x conversion factor.

Volumes of large pine logs. —By volume tables

25. Volumes of large pine logs will be determined individually from "Softwood Log Volume Tables", as prepared by the A.D.P. Centre, Como, for individual plantations. The tables give the volume of individual logs, given—
25.1 crown diameter under bark;
25.2 log length.

—By mid girth

26. If "Softwood Log Volume Tables" are not available, the mean of the end diameters under bark will be measured. From this the mid-girth is calculated and the volume determined from the current "Cubic Contents of Logs" as issued by the Department.

27. Where pine mill logs are measured on the mill landing, recording will be in accordance with Forest Act Regulations 58, 59 and 60.

Use Mill Landing Book F.D. 184 (b)

28. Details of logs delivered to pine mill landings, whether as bin measure or individual logs, are to be recorded in the Mill Landing Book (Pine), F.D. 184 (b).

Hardwood Logs F.D. 184 (a)

29. Immediately on delivery at the mill each log must be measured, marked with a consecutive distinguishing number and entered in the Mill Landing Book, F.D. 184 (a), usually kept by the mill overseer.

30. This must be carried out in accordance with Regulations 58, 59 and 60 made under the Forests Act.

Log Folios F.D. 183 (a)

31. The volumes of all logs as entered in the Mill Landing Book are to be transferred at least once every day to the Log Book, F.D. 183 (a) which is kept at the local office.

MILLING

Specifications issued by Head Office

32. Specifications for milling will be issued from time to time by Head Office.

33. All timber shall be truly sawn and free from decay, shakes and splits.

34. All timber shall be square docked each end.

Supervision by Senior Utilization Forester

35. Officers in charge of mill operations are responsible to the Senior Utilization Forester for the supervision of milling standards and the maintenance of mill equipment. (See Mill Maintenance—paras. 171-177.)

36. Milling in departmental sawmills is carried out on daywork, piecework or a "bonus" basis.

Daywork milling rates

37. Where mill workers are on daywork, the respective margins provided by the Sawmills (Forestry) Agreement currently in force, or such other rates as approved by the Conservator, must be paid.

Piecework and bonus rates

38. Where mill workers are paid on bonus or piecework, the rates are based on the Sawmills (Forestry) Agreement and the A.W.U. (Government) Forestry Award.

39. These rates may require adjustment from time to time and in particular when variations occur in award rates.

Changes in piecework or bonus rates or conditions

40. Where the award rates have altered or when significant changes occur in working conditions, Officers-in-Charge should submit proposals for any alteration in the bonus or piecework rates to Head Office. The proposals must be fully documented with complete description of the work method and any other relevant details.

Log "Intake Book"

41. Each mill should keep an "Intake Book" (in the form of a ruled-off notebook), in which the daily intake of logs is recorded. In the case of hardwood, each log, showing the log number, should be entered. In pine mills, where small logs are brought in by the bin load, this is not practicable, and to arrive at the quantity of log timber cut during the period, it is easier to tally all logs (or bin loads) left on the mill skids at the end of the period, and deduct this from the total of the previous balance plus logs delivered at the mill during the period. The intake book should be handed in at the office at the end of each fortnightly pay period.

Daily Cutting Sheets

42. Daily Cutting Sheets are to be used at each mill, on which the mill tallyman will record details of all timber produced during the day.

Daily Cutting Book

43. The Daily Cutting Sheets must be handed in at the office every morning. They will be filed and details entered into the Daily Cutting Book, from which the Fortnightly Return of Sawmilling Operation, F.D. 412, is prepared.

Mill Order Book

44. Details of Sales Orders as received from Head Office will be recorded in the Mill Order Book. From the Daily Cutting Sheets the quantities produced against each order will be entered together with the quantity in pieces and volume remaining. In this way the exact state (quantity cut and quantity to be cut in pieces and volume) of all orders held will be determined daily.

Return for Multisaw on F.D.605

45. A separate Resaw Production Return on F.D. 605 should be maintained for the Multisaw whenever it is working.

Blue Stain Fungi

46. Fungi, which discolour pine timber without decomposing it, usually impart to the wood a bluish-grey colour. This colour is commonly referred to as "blue stain". Although its presence has a negligible effect on the strength and seasoning of the timber, "blue stain" detracts from the appearance of the wood and the sawn product becomes unattractive to buyers.

Dipping as a standard practice

47. To prevent the development of "blue stain" it is standard practice to dip green sawn pine, straight off the saw, in a solution of sodium pentachlorphenate (P.C.P.). The strength of the solution to be used, the precautions to be taken when handling the chemical and when using the solution, are to be found in Appendix A.

48. Care must be taken to ensure that all timber surfaces receive thorough wetting with the dip solution.

Case baulks not dipped

49. At the present time only case baulks are not dipped. However, special instructions for dipping may be issued from time to time and in such cases an additional charge will be levied for dipping.

Stacking arrangements

50. The Officer-in-Charge of the mill must ensure that suitable arrangements are made for the correct stacking and segregation of mill production.

All stock orders to be strip-stacked

51. All stock orders and all other orders unless otherwise specified will be strip-stacked into standard bundles as soon as possible after cutting.

Strip-stacking to be on piecework

52. In order to control the costs of strip-stacking the job should be carried out on piecework or contract except in an emergency.

Top layer to be stacked "heart" down

53. To restrict degrade to a minimum the top layer of boards in any bundle should be stacked "heart" down. This applies particularly to "flitches for resawing".

Block stacking to order only

54. Block stacking of green timber will be permitted only to special order.

Standard size bundles

55. A standard bundle approximately 0.91 metres (3 ft.) x 0.61 metres (2 ft.) will consist of—

55.1 Material of the same section and length.

55.2 The correct number of boards in width and height (see tables in Appendix B).

55.3 Forests Department standard strips, each 0.91 metres (3 ft.) x 16 millimetres ($\frac{5}{8}$ in.) thick, at approximately 406 millimetre (16 in.) centres.

Special "Hicksons" bundles

56. A special bundle of timber 1.22 metres (4 ft.) wide x 0.91 metres (3 ft.) high may be produced from time to time to allow economical use of the treatment cylinder at Hicksons of Picton Junction.

Special strips required

57. Special 1.22 metre (4 ft.) long strips will be produced for the purpose by the Multisaw.

Production of strips limited

58. Due to the difficulty in ensuring economical production and to avoid dislocation of mill production, strips will only be produced in a mill specially designated by the Conservator. This will normally be the mill with the Multisaw.

Strip-stacking jigs

59. All sawn material is to be stripped in jigs ensuring correct spacing of strips (407 mm or 16 in.) for which purpose each mill will have available sufficient jigs of approved design to allow prompt strip-stacking of all production.

60. Modifications may be required to the standard jig to allow the stripping of Hicksons bundles. The Senior Utilization Forester should be consulted if this is required.

Binding of bundles

61. Before removal from the strip-stacking jig, all bundles must be bound—

61.1 As close to each end as possible.

61.2 At the middle if the bundle length exceeds 3 metres (10 ft.).

Hiring of binding equipment

62. The Forests Department at present hires binding equipment from Gerrard Strapping Systems. Servicing of this equipment is Gerrard's responsibility. The O.I.C. Stores at Como should be advised if replacement or repair is required.

Date marking of bundles

63. On completion of strip-stacking, the bundle will be clearly marked on the edge with the date of stripping.

All pine timber to be end marked.

64. All sawn pine board and flitch timber produced from Forests Department mills is to be end-marked with paint to the following code to allow identification of the supplying mill in the event of complaints:—

Harvey	Brown
Grimwade	Grey
Ludlow	Pink (NOT red)
Pemberton	Green
Margaret River	Purple

Water-based paint to be used

65. Paint used for end marking will be of the "water-based" type to facilitate marking on green timber and the cleaning of equipment.

Requistions for marking paint must be endorsed "Water-based paint for timber marking".

Oil-based paints not to be used

66. Oil-based paints should not be used for this purpose except in an emergency.

Sawn Pine Order Progress Return F.D. 594

67. Each pay period a Sawn Pine Order Progress Return on F.D. 594 will be completed and forwarded to Head Office within three (3) days of the close of the period. The form is of vital importance and is used to—

67.1 Check progress on existing orders.

67.2 Allocate new orders to keep mills in production.

67.3 Provide balanced cutting with a range of sizes.

67.4 Check on progress of strip-stacking, dispatch of orders, stock cutting without orders, etc.

68. A separate return on F.D. 594 is required for board production and baulk production.

Separate return for boards and baulks

69. All orders held by the mill must be listed in numerical order including those on which cutting has not yet started.

All orders to be listed

70. On baulk returns the offcuts (recovery items) are to be listed separately on the line below the applicable order. Progressive totals for baulk offcuts are also required.

Baulk recovery to be shown separately

71. With stock orders the "balance on skids" will show the unstripped portion of the order. The "progressive total dispatched" will show the portion of the order already stripped and taken into stock on F.D. 595 (see para. 106).

Stock orders on F.D. 594

HANDLING AND STORAGE

Yard and storage facilities

72. Adequate suitable yard space and storage and handling facilities must be available at each mill. Suggestions for improvement of existing facilities are welcomed, but should be fully documented and, whenever possible, supported by a recommendation from the Senior Utilization Forester.

Regular maintenance

73. The Officer-in-Charge of the mill must ensure that regular and adequate maintenance is carried out on all handling and storage equipment and facilities. Any problems arising should be referred to the Senior Utilization Forester immediately.

Yard layout

74. Yard layout must allow for drainage, air circulation around, through and under stacks and accessibility for loading and unloading.

Stack foundation

75. Adequate foundations must be provided for all stacked timber, particularly that being air-dried.

Supporting gluts

76. Supporting gluts are to be provided at either end of the bundles and at not more than 813 mm (32 in.) centres along the length of the bundles.

Gluts to be placed under strips

77. In order to keep drying distortion to a minimum, gluts are to be placed directly under the line of the strips in the bundles.

78. Green-off-saw material, whether in stripped bundles or block stacked, must not be stored in enclosed or partially enclosed sheds.

Use of height in stacking.

79. Maximum use should be made of forklift capacity to gain height in stacking—

79.1 to make full use of yard space;

79.2 to reduce seasoning degrade.

Care in placement of bundles

80. The use of high-stacked bundles requires greater care in placement of similar length bundles, similar "age" bundles, etc., to get most benefit from the extra work involved.

Date markings to be visible

81. Date markings on bundles must be visible for checking purposes.

Top covers

82. Top cover must be provided for strip-stacked timber to protect it from rain in winter and sun in summer. It may be sisalation, plastic, galvanised iron or face cuts.

Moisture content to be checked

83. A programme of checking the moisture content of drying bundles must be instituted and maintained.

Moisture meter to be used

84. Each mill will have for the purpose a Timber Moisture Meter of an approved type. The currently approved meters work on the "electrical resistance" method.

Meters accurate only below 35 per cent.

85. Timber, "green-off-saw" when tested with the meter, will give a completely inaccurate result due to the high moisture content. It is not until the timber dries below approximately 35 per cent that accurate readings can be expected.

"Green" timber

86. Timber with a moisture content greater than 30 per cent will be classed as "green" for recording and sale purposes.

"Semi-seasoned" timber

87. When sawn pine dries to between 30 and 15 per cent, it will be classed as "semi-seasoned" timber.

88. A separate sale price applies to this classification, the timber being used mainly to make up charges for kiln-drying operations and pressure preservation treatment.

"Seasoned" timber

89. When sawn pine dries to below 15 per cent it will be classed as "seasoned".

Pick up of moisture in winter

90. In winter, seasoned pine will tend to pick up moisture from the air and will in fact attain moisture contents up to about 18-19 per cent dependent on the prevailing conditions. However, all timber which has at one time dried below 15 per cent will be considered seasoned so long as it has been kept dry.

Hire of kilns

91. At certain times of the year, or for specific orders, the Forests Department is prepared to hire kiln-drying space from private timber companies at rates approved by the Conservator.

Making up kiln charges

92. When using kilns, the following points should be noted:—

92.1 Only semi-seasoned timber will be used to make up kiln charges.

92.2 All material in the charge must be of the same thickness.

92.3 Care must be taken to provide adequate support with gluts for the timber whilst drying. For thin material, i.e. below 25 mm (1 in.) this means gluts under every row of strips.

92.4 Maximum use must be made of available kiln capacity.

Kiln charges to be covered in winter

93. The mill arranging kiln-drying will be expected to provide suitable covers for the timber in transit, awaiting drying, and after removal from the kiln.

Seasoned timber to be graded

94. When strip-stacked timber dries below 15 per cent moisture content, the bundles should be broken and the timber graded to the current Standards Association of Australia (S.A.A.) Grading Rules as interpreted by the Radiata Pine Association of Australia (R.P.A.A.) and the Forests Department.

Grading to be on piecework

95. In order to control the costs of grading the job should be carried out on piecework or contract except in an emergency.

Graded dry timber to be block-stacked

96. Graded dry timber will be block-stacked in bundles each containing the same number of pieces as the standard strip-stacked bundle. (See Appendix B.) To ensure maximum use of space on rail wagons, the bundles should be of such a width that either two bundles or three bundles will effectively use the floor space available, *i.e.,* approximately 2.29 metres (7 ft. 6 in.) on a QBB rail wagon.

97. This block-stacking will reduce storage space requirements, return strips to the mill, and improve handling and transport, particularly when using rail.

Block-stacked timber to be bound

98. All bundles of graded timber must be bound—

98.1 as close to each end as possible;

98.2 at the middle if the bundle length exceeds 3 metres (10 ft.).

Graded timber to be end-marked

99. Bundles of graded timber must be end-marked with the appropriate colour to signify the grade of timber in the bundles. The grade colours are as follows (see R.P.A.A. "Grading Rules", August, 1971):—

Clears	White
Joinery	Yellow
Standard	Red
Commons	Orange

"Glulam" to be black banded

100. In addition, the "Glulam" grade will still be made available to one timber firm. As this is a structural grade all bundles will have a black band painted around the bundle approximately at the middle.

End-marking to be done with grading

101. End-marking must be regarded as an integral part of the grading process. Bundles must be end-marked as soon as bundling is completed. Bundles should not be left to accumulate, as this creates a definite risk of incorrect identification.

Piecework rate to include end-marking

102. Where a piecework or contract rate is used for grading, end-marking should be included as part of the job.

Seasoned timber to be protected

103. Seasoned block-stacked material, whether graded or ungraded, **must** be stored under cover and out of driven rain. Green-off-saw material will **not** be placed in the same shed as block-stacked seasoned material.

Covered storage use to be planned

104. Covered storage facilities must be planned and used to obtain maximum protection for stored material, maximum utilization of space and maximum efficiency of operation.

Private storage may be hired

105. The Forests Department may be prepared to hire private storage facilities if necessary. Details of the type, dimensions, prices, etc., must be submitted to Head Office for approval.

Stripped Stock-Return F.D. 595

106. Each off-pay week the Officer-in-Charge of the mill will prepare a Stripped-Stock Return on F.D. 595. This return should list the complete yard holdings of each mill.

Separate returns required

107. Separate returns are required for:—

107.1 Green-off-saw stock, *i.e.,* greater than 30 per cent. moisture content.

107.2 Semi-seasoned stock, *i.e.,* less than 30 per cent. but 15 per cent. or greater.

107.3 Seasoned stock, *i.e.,* less than 15 per cent. moisture content.

107.4 Blue-stained stock.

List sizes systematically

108. All sizes held are to be listed systematically from the smallest upwards and are to be grouped by thickness of boards.

109. The number and length of boards per bundle should be shown and the number of bundles of each recorded.

110. In the column headed "Grade" a code will be used to indicate the grade as follows:—

CL	....	Clear
J	....	Joinery
S	....	Standard
C	....	Commons
R	....	Run of the Mill

Prompt and accurate submission required

111. Form F.D. 595 will enable Head Office to arrange sales from stock and prepare stock cutting orders to build up necessary holdings. Prompt submission and accurate compilation are essential if full use is to be made of the return.

Nil Return

112. A Nil Return is to be made if applicable.

Stocktaking

113. A physical stocktaking of all timber holdings will be carried out as follows:—

113.1 By the Officer-in-Charge at the end of each quarter.

113.2 By the Officer-in-Charge and an independent Senior Officer at the end of the financial year.

SALES AND DELIVERIES

114. "WAPINE" is the registered trade name for West Australian grown pine as sold by the Forests Department. The registered trade symbol is— Registered trade name—WAPINE

This should be used for branding of bundles, etc.

115. An additional mark may be registered for use on letterheads, etc.

116. The "Conditions of Sale for W.A. Pine" or the current Hardwood Conditions of Sale as promulgated from time to time by the Conservator will be applicable to all sales unless specifically directed otherwise. Conditions of sale to apply

117. Instructions for sale and delivery will be forwarded from Head Office on Sales Order Form F.D. 324. Instructions on S/O F.D. 324

118. Each sale must be covered by a Delivery Note F.D. 456, the original of which will be forwarded to Head Office, the duplicate sent direct to the client and the triplicate retained at the local office. Use Delivery Note F.D. 456

119. Where sawn material is being loaded onto rail by the Forests Department or a contractor, an extra copy of the Delivery Note should be prepared covering all items in the delivery. This extra copy should be attached in the wagon with the W.A.G.R. address papers to allow correct identification at the destination. Extra Delivery Note for rail deliveries

This is particularly necessary where mixed wagon loads are being forwarded to our Metropolitan Road Delivery Agent.

120. Care must be taken to ensure that sufficient detail is entered on the Delivery Note to ensure accurate pricing in Head Office. Sufficient detail to be given

121. The originals and duplicates of all cancelled Delivery Notes must be forwarded to Head Office.

122. Timber transferred from one mill to another for further treatment or to make up orders, etc., will be booked out in the normal manner on Delivery Note F.D. 456 which must be clearly marked "Transfer". Instructions for the transfer of timber will be issued from Head Office to ensure that timber allocated for sale is not inadvertently shifted. Timber transferred on D/Note F.D. 456

123. Delivery Notes normally will be priced and accounts rendered from Head Office. However, local cash sales are permitted. Cash sales permitted

124. When making a cash sale the Delivery Note and the Treasury receipt should be clearly marked "Cash Sale" and the original Delivery Note sent to Head Office with the Cash Abstract. Full particulars must be shown in the body of the Delivery Note and the Receipt Number entered in the space provided.

125. Permission to sell on credit can only be given by Head Office. Any customer requiring credit must apply in writing to the Conservator stating:— Special permission required for credit sales

125.1 Full business name.

125.2 Name of business.

125.3 Approximate monthly credit required.

125.4 Name and address of credit reference.

126. If the application is approved the customer and the appropriate officers will be advised in writing. Divisions to be advised

127. On sales **within** the Forests Department discounts will be allowed as follows:— Discount on internal sales

127.1 Employees and Staff: 12½ per cent. plus 2½ per cent. for cash payment within 30 days of the statement.

127.2 Forests Department Use: 20 per cent. in total.

127.3 Transferred for Resale: 22½ per cent. in total.

Discount on external sales

128. On sales **outside** the Forests Department discounts will be allowed as follows:—

128.1 Other Government Departments and Shire Councils: five per cent.

128.2 Other discounts: As authorised by the Conservator in writing.

Note: For paras. 128.1 and 128.2 a further discount of 2½ per cent. will be allowed as per para. 127.1.

Use current price lists

129. The rates charged for all timber must be in accordance with current Price Lists EXCEPT as provided for in the following paragraph:—

Sale of degraded timber

130. Timber which is not saleable on account of degrade **may** be considered for sale at a reduced price. Authority for the reduction in price can only be given by the Chief of Division (Harvesting and Marketing) or the Marketing Officer, each of whom will be aware of current Head Office intentions.

131. Authority for the reduction in price must be quoted on the Delivery Note, F.D. 456.

Sawn Timber Quotes on F.D. 604

132. From time to time requests for quotations for the supply of timber are received. These should be prepared on F.D. 604—Sawn Timber Quotes. These quotes should be checked with Head Office, if prepared at a Division, before the figures are given to the customer.

Transport by road or rail

133. Transport of timber between mills or for sale can be either by road or by rail. In accordance with Government policy, rail transport will be used where it is required by law or where the additional expense involved can be offset against savings in time or extra handling.

Road Transport Board

134. Road transport of sawn timber, whether by F.D. vehicles or contractors, is controlled by decisions of the Road Transport Board. O.I.C.s should ensure that current instructions are adhered to and any problems referred to Head Office.

Check height and weight of loads

135. Particular care must be taken to check timber carried by road to ensure that the maximum legal height and weight is not exceeded. For normal operations no load is to exceed a maximum of 4.3 metres (14 ft.) from the road surface.

Protect timber in transit

136. During inclement weather, timber sold as semi-seasoned or seasoned must be fully protected whilst in transit. Officers in Charge must ensure that each centre has sufficient waterproof covers for its own use.

Private contractor may be used to load onto rail

137. When using rail transport, a private contractor may often be used to cart from the mill to the railhead and carry out the actual wagon loading.

Contractors to be well briefed

138. Because of the financial penalties which can be incurred by the Department as the result of inefficient loading of rail wagons, contractors used for this work must be carefully briefed and their work checked frequently.

139. Contractors should also be made aware of the necessity to cover semi-seasoned or seasoned timber in transit during inclement weather. (See para. 136.)

Loading of rail wagons

140. When rail wagons are being used the following points must be kept in mind to obtain the cheapest and best movement.

Use open-sided trucks

141. Unloading in the metropolitan area is now almost exclusively by forklift, and open-sideded wagons such as QBB or wagons with drop sides such as the HCL are preferred. **Wagons such as GE should not be used at any time nor should they be accepted by the Forests Department as "Departmental Convenience" from the W.A.G.R.**

Watch for minimum loading weights

142. Care in selection of wagons to ensure adequate loading weight is essential. This is particularly true when strip-stacked semi-seasoned or seasoned timber is being loaded. For example, 2.13 metres (7 ft.) long stripped seasoned material must be loaded at least four bundles high on a QBB to get minimum loading weight.

Select correct classification

143. When consigning timber it is important to select the correct rate classification to ensure minimum pricing by the W.A.G.R. At the same time the correct details should be endorsed on the consignment note.

Cheapest rate

144. The cheapest rate ("M" class less 10 per cent) available is for short timber of limited cross-sectional area described as Shorts—2.13 metres (7 ft.) or less in length and not more than 103.25 sq cm (16 sq. in.) in cross-sectional area.

Both the above criteria must be met and endorsed on the consignment note as follows:—

"Timber Shorts 2.13 metres (7 ft.) or less and 103.25 sq cm (16 sq in.) or less."

145. Because of this cheapness (almost half the most expensive rate) "shorts" should be segregated for loading separately whenever possible. Segregate "shorts"

However, the description "Shorts" must apply to the **whole wagon load** if the concession rate is to be obtained.

146. The next cheapest rate ("A" class less 25 per cent) available is for: "Logs for conversion into timber or plywood" or "Pine logs rough squared for case making". This is primarily intended for peeler logs and sawn pine baulks. However, sawn baulks and baulk recovery may be sent at freight savings if they can be described as "shorts". Next cheapest rate

147. The most expensive of the rates ("A" class less 10 per cent) available is for "Sawn Timber". This will include the bulk of our despatches. Highest rate

148. Additional charges levied by the W.A.G.R. include— Additional W.A.G.R. charges

(a) shunt charges, normally 50 cents per 4 wheels, but this should be checked as some sidings cost up to $2;

(b) penalties if the loaded weight is less than the minimum weight loaded on the particular wagon used;

(c) charges for replacing loads on wagons.

149. Covers for railway wagons will be supplied to order by the W.A.G.R. However, O.I.C.s must ensure that these are adequate for the purpose and correctly used. W.A.G.R. will supply covers

150. O.I.C.s should immediately report to the W.A.G.R. for rectification any shortages in standard equipment supplied with railway wagons—e.g., short "tying-down" chains. Equipment shortages to be reported

EXPENDITURE, RETURNS AND RECORDS

All expenditure to be accounted for

151. All expenditure incurred in the course of timber production and sales must be brought to account on the standard forms and headings as authorised by the Conservator from time to time.

Returns to be prompt and accurate

152. Officers should realise that prompt and accurate submission of all returns is essential for the efficient operation of the pine sales section of the Harvesting and Marketing organisation.

Fortnightly Return of Sawmilling Operations F.D. 412 to replace F.D. 182 in pine mills

153. Authority has been given by the Conservator to allow the use of Fortnightly Return of Sawmilling Operations (F.D. 412) in pine mills in place of F.D. 182 as required by the Forests Act and Regulations.

A separate F.D. 412 is required for all baulk production.

F.D. 182 required in hardwood mills

154. Form F.D. 182, "Monthly Return of Sawmilling Operations", will be required from hardwood sawmills.

Details of sawn pine on F.D. 412

155. At the end of each pay period all details of sawn pine production will be entered in F.D. 412, "Fortnightly Return of Sawmilling Operations". Form F.D. 412 is divided into two parts, the top portion covering the mill intake and the bottom portion the mill output.

Transfers to be recorded on F.D. 412

156. As Form F.D. 412 is used to calculate the stock held by the mill for accounting purposes, transfers of timber into and out of the mill must be recorded on this form.

Mills to be advised of "book stock"

157. To allow a check on the "book stock" the mills will be advised each fortnight of the volume produced, the volume sold, and the book balance of stocks on hand.

Insurance of sawn timber stocks

158. Insurance of timber will be arranged by Head Office on a special policy with the S.G.I.O. Insurance will be based on the Stock Return (F.D. 595) and will be checked every month to allow for fluctuations in stock holdings.

Hire of storage—details for insurance

159. If private sheds for storage at some distance from the mill are hired, complete details of shed construction and the contents must be supplied. Nomination of this specific item must be made to the S.G.I.O. to gain insurance cover.

Local records to be maintained

160. A graph showing the output, recovery per cent., cost per unit of volume, etc., should be kept at the local office to illustrate production on a comparative basis from quarter to quarter.

Trading statements produced in H.O.

161. Quarterly Production and Trading Statements for each type of timber produced will be prepared in Head Office and forwarded to the mill as soon as possible after the end of the quarter. There is no need for local officers to prepare statements of their own.

162. An Annual Production and Trading Statement for each mill will also be produced.

Officer time to be shown on F.D. 1

163. All salaried officers connected with the supervision and administration of departmental sawmills should show the percentage of their time spent on these duties in their Monthly Journals F.D. 1.

List of forms, books and publications

164. The following is a list of forms, books and publications for use in Departmental sawmilling operations:

Forests Act and Regulations.
T.I.R. Act and Regulations.
Bush Fires Act and Regulations.
W.A. Sawmill Safety Code.
A.W.U. (Government) Forestry Award.
Sawmills (Forestry) Agreement.
Table of Cubic Contents of Logs.
Pine Carters Delivery Note F.D. 544.
Mill Landing Book, F.D. 184a or 184b.
Chipwood Bin Load Sample F.D. 558.
Softwood Log Volume Table.
Log Book (Folios) F.D. 183 (a).
Mill Intake Book.
Daily Cutting Sheets.

Daily Cutting Book.
Two weekly Sawn Order Progress Return, F.D. 594.
Fortnightly Return of Sawmilling Operations, F.D. 412.
Monthly Return of Sawmilling Operations, F.D. 182.
Two-weekly Stock Progress Return, F.D. 595.
Sawn Timber Delivery Note, F.D. 456.
Sawn Timber Quote, F.D. 604.
Planer/Resaw Production Return, F.D. 605.
Treasury Receipt Book.
Production Graph.
Mill Maintenance and Lubrication Record Chart.
Record Book (T.I.R. Act Form 1).
Bulletin 56—Grading Rules for Jarrah, Karri and Wandoo.
Conditions of Sale of W.A. Pine.
W.A. Pine Price Lists.
Radiata Pine—R.P.A.A. Grading Rules—1 August, 1971.
Radiata Pine—Visually Graded Radiata Pine for Structural Purposes AS 078-1969.
Radiata Pine—Sawn Boards from Radiata Pine AS 072-1969.

Low-grade material to be sent to Ludlow

165. With the introduction of grading of seasoned timber the method of disposal of timber rejected for sale because of degrade will be to transfer this material to Ludlow.

Timber to be held for annual write-off

166. Timber unfit for sale at Ludlow or unfit for transfer from other centres will be written off on instructions from either Chief of Division (Harvesting and Marketing) or the Marketing Officer.

167. "Writing-off" should normally be timed to coincide with annual stock-taking. On "write-off", a completed Delivery Note F.D. 456 with all details will be sent to Head Office.

Dispose of "written-off" timber immediately

168. It is important that "written-off" timber be disposed of immediately, either for local use or otherwise, so that it is not taken into account again.

Use Planer/Resaw Production Return F.D. 605

169. Timber being machined or resawn suffers waste in treatment and by docking. The loss in dimension and waste in docking is the difference between the input and the output on the Planer/Resaw Production Return F.D. 605. The O.I.C. must personally sign this return as confirmation that this machining loss has actually taken place. This will be treated as a stock adjustment by Head Office.

170. A separate return should be lodged for each species.

MILL MAINTENANCE

171. For efficient and economical operations of the mill, proper maintenance procedure is essential.

Maintenance chart

172. For this purpose, a maintenance chart should be kept at each sawmill and all maintenance and lubrication should be regularly carried out in accordance with this chart at the prescribed periods for each item of machinery.

Maintenance during "shut-downs"

173. Whenever possible, maintenance work should be done during mill "shut-downs" for holidays, etc., or when the loss in mill production will have least effect on the supply situation.

Inform Senior Utilization Forester

174. Where breakdowns and repairs are beyond local resources, the help of the Senior Utilization Forester should be sought immediately.

175. It should be remembered that the Department has spent large amounts of money on mill machinery and the Officer-in-Charge is to see that this equipment is properly maintained.

Senior Utilization Forester to report on F.D. 609

176. To assist the mill maintenance programme, the Senior Utilization Forester will make regular inspections of all mill plant and machinery. His Mill Inspection Report on F.D. 609 will detail findings and recommendations.

Officer-in-Charge to follow-up

177. Recommendations on F.D. 609 by the Senior Utilization Forester must be followed up by the local Officer-in-Charge of the mill to ensure that action has been taken either to rectify the fault or to secure the necessary assistance or finance for rectification.

SAFETY PROVISIONS

Timber Industry Regulation Act

178. All Departmental sawmills must be conducted in accordance with the provisions of the T.I.R. Act, 1926-67, and all officers connected with the administration of Departmental sawmills should be conversant with this Act.

Registration of sawmills

179. All sawmills must be registered in accordance with the T.I.R. Act and it is the responsibility of the Officer-in-Charge of each Departmental sawmill to see that the registration is renewed at the end of each calendar year. For this purpose, Form T.I.R. 19 has to be completed and forwarded to the Controlling Officer T.I.R. Act (Conservator of Forests) before the expiration of the current registration. No registration fees are payable for the registration of Departmental sawmills.

Note.—Registration of staff and bush-workers under Regulation 53 (2) of the Forests Act is not required for employees of Departmental sawmills.

Weekly examination of sawmills

180. Section 19 of the T.I.R. Act provides that the mill manager, or a duly qualified person appointed by him, shall once each week carefully examine the buildings, plant, and machinery. He shall record, in writing, and sign in the Record Book (T.I.R. Form No. 1) his opinion as to their condition and safety and any repairs and alterations required to ensure greater safety to the persons employed.

Advising accidents

181. The procedure to be followed in Workers' Compensation cases is fully set out in the Foresters' Manual, Pamphlet No. 3. If, however, an accident occurs in a Departmental sawmill, a report form (T.I.R. Form No. 2) has to be completed in duplicate and the original forwarded to the District Inspector, T.I.R. Act.

Fatal accidents

182. If a fatal accident or an accident causing serious bodily injury has occurred, the District Inspector or the Workman's Inspector must be notified immediately and the place the accident occurred must not be interfered with until the Inspector has examined the scene. If the accident has occurred under the mill roof, the mill must be closed down, pending the Inspector's visit.

183. Particular attention must be given to the provisions covering guards on saws, belts, ropes and all other safety devices. These must be kept up to the required standard and in good condition.

W.A. Sawmill Safety Code

184. A copy of the W.A. Sawmill Safety Code is to be issued to every mill worker, and his signed receipt for it will be retained at the local office.

Local safety committees

185. Officers-in-Charge of mills should ensure that the mill is adequately represented on all local safety committees.

FIRE PRECAUTIONS

186. All precautions against fire must be taken in accordance with the Forests Act and Regulations, the T.I.R. Act and Regulations and the Bush Fires Act and Regulations as applicable. In addition, reference should be made to Fire Control Section of the Foresters Manual—Pamphlet No. 7.

Logging Operations

Smoking restricted

187. Smoking will be prohibited in all plantations except on fire lines when butts and spent matches must be deposited on bare mineral soil and buried.

Billy fires restricted

188. Billy fires are to be discouraged, but if it is necessary to light a billy fire it must be lit on an area cleared down to mineral soil and the remains of the fire doused with water and covered with soil.

Use of mechanical equipment in summer

189. Whenever mechanical equipment is used in plantations the following procedure must be followed during summer months:—

189.1 Chainsaws must be fitted with an efficient spark arrestor which will be inspected periodically.

189.2 Chainsaws must not be used for at least 60 minutes prior to the operator leaving the area.

189.3 Pack sprays painted yellow must be within 50 metres of felling and, loading operations, full of water, tested frequently and ready for instant use.

189.4 The area worked over each day must be closely inspected by the faller before leaving.

189.5 Vehicles must be in reasonable condition and particular attention given to exhaust systems and brakes.

Log-hauling tractors

190. Log-hauling tractors must carry a knapsack spray—which must be kept filled with water—and have a vertical exhaust fitted with an efficient arrestor whilst operating between the first day of October and the next following thirtieth day of April in any yearly period (Bush Fires Act, Section 27).

Pine-logging trucks

191. Pine log-hauling trucks must carry a knapsack or tank spray—filled with water—while operating in pine forests during the above period.

Spark arrestors to be inspected

192. Spark arrestors on all logging trucks, tractors and power saws must be inspected periodically and maintained in a clean, sound and efficient condition.

193. All new employees must be instructed in precautions outlined above.

Days of high fire danger

194. On days of high fire danger rating, operation of power saws and other mechanical equipment in the bush or plantation is at the discretion of the Officer-in-Charge.

Sawmills

Fire-fighting Equipment

195. All Departmental sawmills must be equipped with efficient fire-fighting appliances which at all times must be kept in good working order and condition.

196. This fire-fighting equipment is to be kept in a place readily available in an emergency and the mill crew trained to work all such equipment.

Water supply

197. Each mill is supplied with water for fire fighting. Periodic checks on this are necessary, particularly in summer.

Cleanliness

198. The mill must be kept clear of all loose debris, bark, sawdust and other inflammable material likely to increase the risk of fire.

Burning of waste

199. Except in specially provided incinerators, no debris, bark or sawdust may be burned within 30 metres of the nearest part of the sawmill.

After hours check

200. Periodic inspections of the sawmill during non-working hours should be arranged for the purpose of preventing any possible outbreak of fire in the sawmill. This will normally only be necessary where mill waste is burnt in an open pit.

Damping-down

201. During the summer season, immediately after operations in the sawmill cease on each working day, the interior of the mill and an area of 3 metres around the mill must be damped down by spraying with water.

APPENDIX A

Notes on Stain and Mould Fungi which may Attack Softwood

Types of Fungi

Deep Staining (Blue Stain)

The principal types are species of Ceratostomella (which may be more correctly called Ophiostoma) of the class Ascomycatae and Graphium of the class Imperfecti.

These fungi consume materials stored in the wood cells, principally the sap and ray tissue and the discoloration imparted to the wood is from the fine ramifying hyphae.

Sporing bodies may appear externally as dark-coloured specks.

There is no appreciable weakening of the wood involved except perhaps a slight reduction in resistance to shock.

Superficial Staining (Moulds)

The surface of the wood may be infected by a number of saprophytic fungi of the mould type, principally Aspergillus and Penicillium species but others such as Stemphyllium, Alternaria, Cladosporium, etc., may operate.

Some of these stains are yellow to brown, but the spores and other parts are frequently objectionable, sometimes forming into a greenish-black mass covering the whole surface.

Prevention of Stain

Physiology

Fungi of the types concerned require moisture and food materials for sustenance and an adequate supply of oxygen. The temperatures at which they operate are usually above freezing point, but some fungi can operate at or just below freezing point, while most fungi will be completely inactive at minus 6°C. On the upper range of temperatures there is a wide tolerance, but most fungi will not operate efficiently in temperatures much above those found in their normal habitat. Temperatures of 40°C to 50°C could normally be regarded as limiting for spore production, but killing temperatures are in excess of boiling point (100°C) for some organisms.

Most fungi operating on wood cease operating when the moisture content drops below 20 per cent.

It is apparent that the limiting factor most easily controllable is moisture content and that surface moulds could be quickly limited by efficient surface drying. However, the deeper-seated stain fungi would need complete seasoning. It is further apparent that close contact of damp faces or even dry faces of unseasoned timber could produce wood dampness and humidity sufficient for fungal growth.

Seasoned timber re-wet or stored in damp conditions is vulnerable to attack by fungi.

Infection Potential

Wherever infected material exists, a reservoir of infection at a high concentration is maintained, although it must be understood that spores (the "seed" of the fungus) are present in the air in low concentration (spores are microscopic and cannot be seen by the human eye).

It is, therefore, possible for clean discarded material or poorly stacked material to rapidly become heavily infested. In this connection, separating strips from stacks must be watched as they may carry infection.

Remember, in suitable conditions, three days is sufficient for severe attack.

Precautions

(1) All sawn pine boards and flitches will be dipped.
(2) Green sawn timber should not be held in block stack for more than seven days after dipping.
(3) All green strips and gluts must be dipped.
(4) Keep the mill and storage sheds clean and well ventilated.
(5) Avoid roof leaks and accumulation of ground water.
(6) Observe stacking ventilation rules.
(7) With log material, bark is an efficient protection when green, but fungi can enter via abrasions. Also, logs left lying in damp unventilated situations or unstacked in contact with moist earth or old waste may be rapidly attacked. Avoid stacking for protracted periods.

Fungicides

Formulation

Numerous fungicides are on the market, but probably the most economical and simple preventative is sodium pentachlorphenate.

The following formula should prove effective:—

Sodium pentachlorphenate—0.75% or 1% (either is effective).

Anhydrous sodium carbonate (soda ash)—0.05%.

Detergent—0.2%.

Water solvent—99.0% or 98.75%.

The detergent (soapless soap) or wetting agent is purely to break down the surface tension of the solution and ensure a protective film.

Soda ash is added to keep the solution alkaline as the acid wood may cause the sodium pentachlorphenate to revert to pentachlorphenol (non-water soluble) and precipitate out.

Actually, after the boards have dried, the carbon dioxide in the atmosphere does cause this change to pentachlorphenol on the board, but this compound is equally effective as a fungicide and since it is not then water soluble, there is less chance of it washing out.

Mixing

Sodium pentachlorphenate is now supplied as "Santobrite" which is a thick paste containing 50% Nacp. The actual concentration should always be checked on the container label to see that the manufacturer has not changed his product.

Each mill should mix the correct solution in a one hundred gallon holding tank which is connected by pipeline to the dipping trough.

Cleaning and Renewal

From time to time the dipping trough should be cleaned out, as dirt, sawdust, etc., will accumulate in it. Residual liquid should not be wasted as it is useful for ground sterilisation, both against fungi and termites (white ants). Cleaning should normally be required no more than twice per year.

Precautions when Handling Santobrite Solution

Since Santobrite Solution is by nature a toxic compound, due care should be observed in handling. The solution, being very concentrated, is more dangerous if it comes into contact with the body than the dilute solutions used in dipping tanks. When handling Santobrite Solution the following precautions should be observed:—

(1) Avoid all contact with skin and clothing.

(2) Remove contaminated clothing immediately and launder before re-use.

(3) Wear rubber gloves when handling solutions or freshly treated materials.

(4) Wear long-sleeved shirt and long trousers, but not shorts.

(5) See that equipment is in sound condition. Avoid leakage on clothing, especially from faulty connections.

(6) Avoid spillage around the filling areas.

(7) Where possible, avoid repeated contact. If several men are available, switch plant operatives frequently.

(8) Do not siphon the liquid by mouth. Do not drink or eat from contaminated utensils.

(9) Drink plenty of fluids during and after contact with this material.

N.B.—Operators should be particularly warned against rubbing their eyes with contaminated hands.

APPENDIX B

Standard Strip-stacked Bundle Tables

It is assumed that strips are exactly 0.91 m (3 feet) long and exactly 16 mm ($\frac{5}{8}$ in.) thick.

The number of layers of boards in the bundle will remain constant but, due to variation in the actual thickness of individual boards, the height of bundles will vary about the "norm" of 0.61 m (2 feet).

STANDARD BUNDLES

Table 1

Number of Pieces High

Board Thickness		Number of Boards
Inches	*mm*	
$\frac{5}{8}$	16	19
1	25	15
$1\frac{3}{8}$	35	13
$1\frac{1}{2}$	38	11
2	50	10
3	76	7

Table 2

Number of Pieces Wide

Board Width		Number of Boards
Inches	*mm*	
2	50	16
3	76	11
4	102	8
5	127	7
6	152	6
7	178	5
8	203	4
9	229	4
10	254	3
11	279	3
12	305	3

TABLE 3.

NUMBER OF PIECES PER STANDARD BUNDLE.

Board Thickness		Board Width											
	ins.	2	3	4	5	6	7	8	9	10	11	12
	mm	50	76	102	127	152	178	203	209	254	279	305
$\frac{5}{8}$	16	304	209	152	133	114	95	76	76	57	57	57
1	25	240	165	120	105	90	75	60	60	45	45	45
$1\frac{3}{8}$	35	208	143	104	91	78	65	52	52	39	39	39
$1\frac{1}{2}$	38	176	121	88	77	66	55	44	44	33	33	33
2	50	160	110	80	70	60	50	40	40	30	30	30

TABLE 4A—VOLUME IN SUPER FEET PER STANDARD BUNDLE

Cross Section of Piece (inches)

Length of Bundle (feet)	4 x 5/8	5 x 5/8	6 x 5/8	7 x 5/8	8 x 5/8	2 x 1	3 x 1	4 x 1	5 x 1	6 x 1	7 x 1	8 x 1	9 x 1	10 x 1	12 x 1	4 x 1 3/8	5 x 1 3/8	Length of Bundle (feet)
5	158	173	178	173	158	200	206	200	219	225	219	200	225	188	225	238	261	5
6	190	208	214	208	190	240	248	240	263	270	263	240	270	225	270	286	313	6
7	222	242	249	242	222	280	289	280	306	315	306	280	315	263	315	334	365	7
8	253	277	285	277	253	320	330	320	350	360	350	320	360	300	360	381	417	8
9	285	312	321	312	285	360	371	360	394	405	394	360	405	338	405	429	469	9
10	317	346	356	246	317	400	413	400	438	450	438	400	450	375	450	477	521	10
11	348	381	392	381	348	440	454	440	481	495	481	440	495	413	595	524	573	11
12	380	416	428	416	380	480	495	480	525	540	525	480	540	450	540	572	626	12
13	412	450	436	450	412	520	536	520	569	585	569	520	585	488	585	620	678	13
14	443	485	499	485	443	560	578	560	613	630	613	560	630	525	630	667	730	14
15	475	520	534	520	475	600	619	600	656	675	656	600	675	565	675	715	782	15
16	507	554	570	554	507	640	660	640	700	720	700	640	720	600	720	763	834	16

N.B.—Volumes for the above in metric sizes will be prepared later.

21157/3/73—500

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TABLE 4B—VOLUME IN SUPER FEET PER STANDARD BUNDLE

Cross Section of Piece (inches)

Length of Bundle (feet)	2 x 1½	3 x 1½	4 x 1½	5 x 1½	6 x 1½	7 x 1½	8 x 1½	9 x 1½	3 x 2	4 x 2	5 x 2	6 x 2	7 x 2	8 x 2	9 x 2	10 x 2	12 x 2	Length of Bundle (feet)
5	220	227	220	241	248	241	220	248	275	267	292	300	292	267	300	250	300	5
6	264	272	264	289	297	289	264	297	330	320	350	360	350	320	360	300	360	6
7	308	318	308	336	347	337	308	347	385	373	408	420	408	373	420	350	420	7
8	352	363	352	385	396	385	352	396	440	427	467	480	467	427	480	400	480	8
9	396	408	396	433	440	433	396	446	495	480	525	540	525	480	540	450	540	9
10	440	454	440	481	495	481	440	495	550	533	583	600	583	533	600	500	600	10
11	484	499	484	529	545	529	484	545	605	578	642	660	642	587	660	550	660	11
12	528	545	528	578	594	578	528	594	660	640	700	720	700	640	720	600	720	12
13	572	590	572	626	644	626	572	644	715	693	758	780	758	693	780	650	780	13
14	616	635	616	674	693	674	616	693	770	747	817	840	817	747	840	700	840	14
15	660	681	660	722	743	722	660	743	825	800	875	900	875	800	900	750	900	15
16	704	726	704	770	792	770	704	792	880	853	933	960	933	853	960	800	960	16

N.B.—Volumes for the above in metric sizes will be prepared later.