Session 5
Paper (a)

The Effect Of Raw material Quality On The Pulp and Paper Industry

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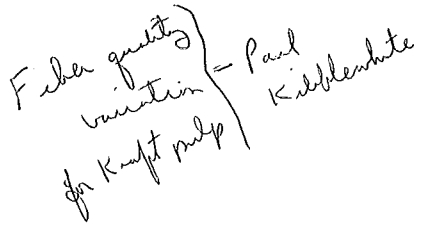
INTRODUCTION

During the past ten years the New Zealand Pulp and Paper industry has gone through a period of major change, as has the rest of the New Zealand forest industry sector. There has been a significant change in the fibre characteristics of the pulp wood supply and at the same time pulp and paper customers have become far more discerning and specific about the type of product they want and the specifications of that product. This is obviously not a phenomenon unique to the pulp and paper industry it is just the reality of the competitive global market in which we operate.

In reality the pulp and paper industry in New Zealand is in survival mode. It is clear that to survive in the world market we must continually strive to improve the efficiency of our operations and the quality of our products just to maintain our current position in the market. The pulp and paper products on the whole are sold into a commodity market that is characterised by falling real prices over time, in line with most world commodity markets. Every new plant that is built is designed to produce better quality product at a faster rate than existing plants.



Given the competitive and demanding market we are operating in it is critically important that we fully understand the requirements of our customers and that we understand the relationship between the raw material characteristics and the pulp and paper end product characteristics that are associated with those raw materials.

In this paper I will outline the fibre characteristics that are most important in terms of the impact on final product quality, with reference to Tasman's operations, and show how variations in fibre type can affect final product quality and therefore customer satisfaction. I will briefly describe the system that Tasman has developed to manage our variable and changing over time, fibre supply, and how our system impacts on harvesting operations. Finally I will outline my perceptions of how ISO 9000 will impact on pulpwood and chip suppliers.

KEY PULPWOOD, CHIP AND FIBRE CHARACTERISTICS THAT AFFECT PRODUCT QUALITY

To put the pulpwood, chip and fibre requirements into perspective it is necessary to understand

Tasmans plant configuration and the products that we make. Appendix (I) is a simple flow chart that traces the fibre flow from the forest through the mill processes to the markets. You can see that we have two separate feed stocks to two separate mechanical pulp production plants. The refiner chip silos supply chips to the refiner mill to produce refiner mechanical pulp (RMP) to provide approximately 30 % of the newsprint pulp furnish. The blockpile supplies 1.2 metre roundwood billets to the stone groundwood mill to produce stone groundwood (SGW) to provide approximately 46% of the newsprint pulp furnish. The remaining 23% required in the newsprint furnish is kraft pulp produced on site by one of the two continuous digesters (CD's) in the Kraft pulp mill. The feed stock for the two CD's is chipped to four chip piles each with different fibre types on them, from which various different chip recipes can be pulled to match target pulp properties. Tasman produces newsprint on three paper machines and kraft pulp in two CD's. About two thirds of the production of one CD is used in the newsprint furnish. The remaining third and 100% of the pulp production from the other CD is sold as market pulp to customers.

Appendix (II) traces the path of specific fibre types from logs and chips to pulp and paper products. Looking first at the requirements for mechanical pulp (MP under the primary process heading). Tasman can only utilise pulplogs as a primary supply for mechanical pulp due to the wood prep. plant configuration. There is a large end diameter restriction for mechanical pulplogs of 40cm and all mechanical pulplogs must be fresh and free of sapstain, as any discolouration or dirt in the raw fibre translates into discolouration or dirt in the finished product. There is some ability to take out discolouration by chemical addition but it is at considerable economic cost. It is possible for Tasman to use significant volumes of low density fibre in mechanical pulp but generally low density mechanical fibre in the furnish needs to be balanced with kraft to give the required paper strength. The process products are defined at the bottom of appendix (II). Generally all the pulp product specifications are dependent on a specific range of basic densities (od kgs/green m^3) that relate to fibre length and fibre coarseness (related to the thickness of the fibre wall). Hence basic density is really the key market kraft fibre variable. The key newsprint fibre variable is also basic density as it relates to paper strength but as mentioned above wood age is also an important variable in the mechanical pulping process.

Chip size distribution is important in both the refiner mechanical pulp and Kraft pulp systems. The ideal chip size is different for each system as the RMP process relys on applying a mechanical load to physically tear the chips down into fibres and for this process the ideal chip thickness is less than the ideal Kraft pulping chip. The kraft process relys on penetration of cooking chemicals into the chip and hence the chip thickness required is that which allows complete penetration of chemical to separate the fibres but not to destroy the fibres. In general terms the ideal kraft chip is less than 7-8mm thick and 25mm long and free from bark. We specify no more than 5% over 8mm and no more than 1% fines (chips that pass

through a 3mm round hole screen).

For stone groundwood pulping the key requirements in terms of 1.2 metre billet presentation is flush trimming and straightness of form, so that billets stack neatly in the grinder pockets.

Debarking quality is a key parameter for both systems but critical in the mechanical system as there is no cooking process to dissolve out bark. Bark can cause major paper quality problems in the form of dark specs in the paper sheet. Tasman specifies a maximum bark content of 0.4%.

THE AFFECT OF RAW MATERIAL QUALITY ON FINAL PRODUCT QUALITY AND CUSTOMER SATISFACTION

There is obviously a very good correlation between raw material quality and fibre characteristics and final product quality. I have outlined some of the affects in the section above. To illustrate the dramatic affect that basic density has on market kraft product quality I will outline a specific problem relating to Bleached Kraft Pulp (BKP) strength that occured during the period May-June 1991. I refer to Appendices (III) and (IV). Firstly referring to appendix (III). This graph plots fibre length (related to basic density) against time. The target minimum fibre length is marked on the graph at 2.3mm. It can be seen that a major dip below the minimum spec occured between 30 May and 5 June, this coincided with a change in chip feed recipe as recorded on the graph as 80:1b:20:1a. The 80 and 20 represent percentage feed to the CD and the 1a and 1b are the chip pile reclaims. Minor species chip is stored on pile 1a and the fibre length problem occured when the 1a chip feed was introduced. Again on 10 June when minor species were introduced the fibre length fell below acceptable levels again. Now referring to appendix (IV) which is a graph that plots a measure of pulp tear and tensile strength against time with a minimum target line shown at 10.5, the period plotted on appendix (III) is on the right half of the graph with the June 91 to June 92 period expanded to the left. It can be seen that their is a very strong correlation between fibre length and tear at 90 tensile strength index. To achieve the above target levels shown on the right half of the graph we looked very closely at the composition of the minor species supply and set up a system to meter a known consistent mix of different minor species with known fibre characteristics onto the chip heap. The total fibre supply mix did not change significantly over the time period shown but the way in which we allocated fibre to product was closely controlled and monitored.

If out of spec product is produced as a result of the problem outlined above then Tasman as a supplier has two choices i) ship the product to the customer risking losing that customers business; ii) ship the product to a customer who will accept lower spec. product or iii) repulp the reject product. It is clear that option i) is the fools option and would not be taken. Option (ii) will result in the need for a discount price and less revenue and option (iii) will add cost and no revenue. Any pulp and paper product producer only really has one option and that is to make sure that their raw materials match the

target products and they are produced within the stated specifications.

THE MANAGEMENT OF RAW MATERIAL VARIATION

A quick glance back at appendix (II) will indicate that Tasman receives a wide range of fibre types in terms of species, basic densities and wood age as well as supply in the form of log and chips from various geographical locations. If we were to try to make products from a totally randomly sorted wood supply the consistency of product would follow wild swings related to the extremes of the range of raw material characteristics. Most of the products we make have a minimum strength specification. In the good old days of the high density old crop resource we literally had strength to burn so the consistency of the fibre mix was no where near as important as it is today. With the current fibre supply we are operating very close to the minimum strength specifications and it is necessary to manage the fibre flows from the forest through the process to the pulp and paper product.

At Tasman we have set up a system to identify, document and segregate specific fibre types within our total supply so that we can manage the different fibre types through our storage and wood preparation processes and into target pulp and paper processes and products. We have not set up this system to be difficult as some forestry companies and logging contractors probably imagine, but we see it as an absolute necessity to be in control of the fibre flows through to the finished product.

Appendix (V) shows the eleven different pulplog grades that we differentiate. The first three grades and the last grade are groundwood grades that are metered into the mechanical process wood preparation plant in prescribed ratios that are matched to the incoming wood supply. Grades LK to OM are kraft pulplog grades and in addition we use sawmill chip in the kraft process.

In an attempt to break out of the typical commodity products of the pulp and paper industry, Tasman is now making specialty newsprint products such as telephone directory paper and hibrite newsprint as well as fibre cement pulp and Low coarseness pulp. All these niche products have particular specific fibre requirements. Our fibre segregation system allows us to identify and blend the right fibre to match the required niche product specification.

PULPWOOD QUALITY REQUIREMENTS AND THE IMPACT ON LOG SUPPLIERS AND PROCESSORS

As the competition in world pulp and paper markets intensifies and as New Zealands pulp fibre resources move towards the lower density top logs of 25 to 30 year rotation clearwood regimes it is clear that the pulp and paper processors have to meet the challenges by effectively managing the fibre flows through their processes. This must be done in a way that produces quality products from wood supplies that have lower average basic densities and therefore less

inherent fibre strength. To manage this change while maintaining or enhancing quality the pulp and paper producers need a lot of help from the wood producers. As outlined in the previous section Tasman's approach to managing the variable nature of our fibre supply was to set up a wood segregation system that is heavily reliant on the co-operation and abilities of the log makers, the loader drivers, the dispatchers, the wood flow controllers and the logyard managers as well as all the people on the ground within the mill system. The pulp and paper processors cannot meet the fibre quality needs of the markets without the full co-operation of the harvesters. To maximise productivity and efficiency mills need to receive well presented flush trimmed, in spec. wood that is correctly marked to enable efficient log yard and wood prep. plant control of the different fibre types. If we don't achieve this level of control we are unlikely to meet the quality requirements of our customers and are therefore unlikely to survive. The perception that pulpwood is the rubbish that requires a minimum amount of presentation effort needs to be corrected. It is true that pulpwood is the lowest value wood type and is likely to remain so but to meet the quality requirements of the market, log presentation, marking and documentation is a key requirement that can only be achieved on the forest landing or processing yard.

QUALITY SYSTEMS - ISO 9000 AND ITS AFFECT ON PULPWOOD AND CHIP SUPPLIERS

Why is Tasman pursuing ISO 9001 accreditation ?

The answer is quite simple. Firstly, it is likely to be a mandatory requirement to be registered under at least ISO 9002 for entry to the European community markets after 1994 and secondly, because the process of accreditation is a successful and proven vehicle for maintaining continuous improvement programmes with the emphasis on the process and procedures to achieve quality as opposed to focusing on results i.e. make 100% good product don't sort the good from the bad after you've made it.

To quote Brice Landman, director of operations at Tasman Pulp and Paper, Kawerau in a bulletin to staff. "Quite simply, if we want to continue selling our products in our world markets, we must gain full company accreditation as soon as possible. We have set a target of December 1994 and it is the responsibility of all departments to ensure that we meet that deadline."

It is important to understand what ISO 9000 is in order to fully gauge its impact. The ISO 9000 series of documents provides the standards against which a quality system can be measured. Tasman is aiming to achieve ISO 9001 which requires the company to comply with all twenty elements that make up the standard. ISO 9000 is published by the International Organisation for Standardisation to assist any company to set up quality management systems. ISO 9000 is not a fashionable buzzword that will fade into obscurity as fashion changes. It is not a thing or a concept but a procedure.

To gain ISO 9001 accreditation all mill processes need to be fully

documented and training and operational procedures need to be fully implemented. Accreditation is only achieved when all systems and procedures in the production process have been tested and proved to be working as prescribed to the satisfaction of independent assessors who have to be satisfied that what is said is being done is being done. - WORDS ALONE ARE NOT ENOUGH and SHE'LL BE RIGHT IS NO LONGER GOOD ENOUGH.

There is a developing trend among customers and suppliers as more and more organisations move toward ISO 9000 accreditation, and that is that customers are seeking assurance of product quality from suppliers and are starting to prescribe quality assurance certification of all their suppliers. In other words as one organisation gets accredited its suppliers are required to become accredited to remain a supplier to that organisation.

I have been involved in the woodroom at Tasman's work on ISO and very early in our investigations we found that we were limited in what we wanted to do by our wood suppliers, particularly in the wood presentation, marking and documentation areas. We are working to overcome the quality problems but I would venture to suggest that if our wood suppliers were going down the ISO path with us the going would be considerably smoother.

As a closing comment I would suggest that most, if not all, of the customers for radiata based wood products, both domestic and export, will eventually require some form of quality assurance certification as a condition of being their supplier.

CONCLUSION

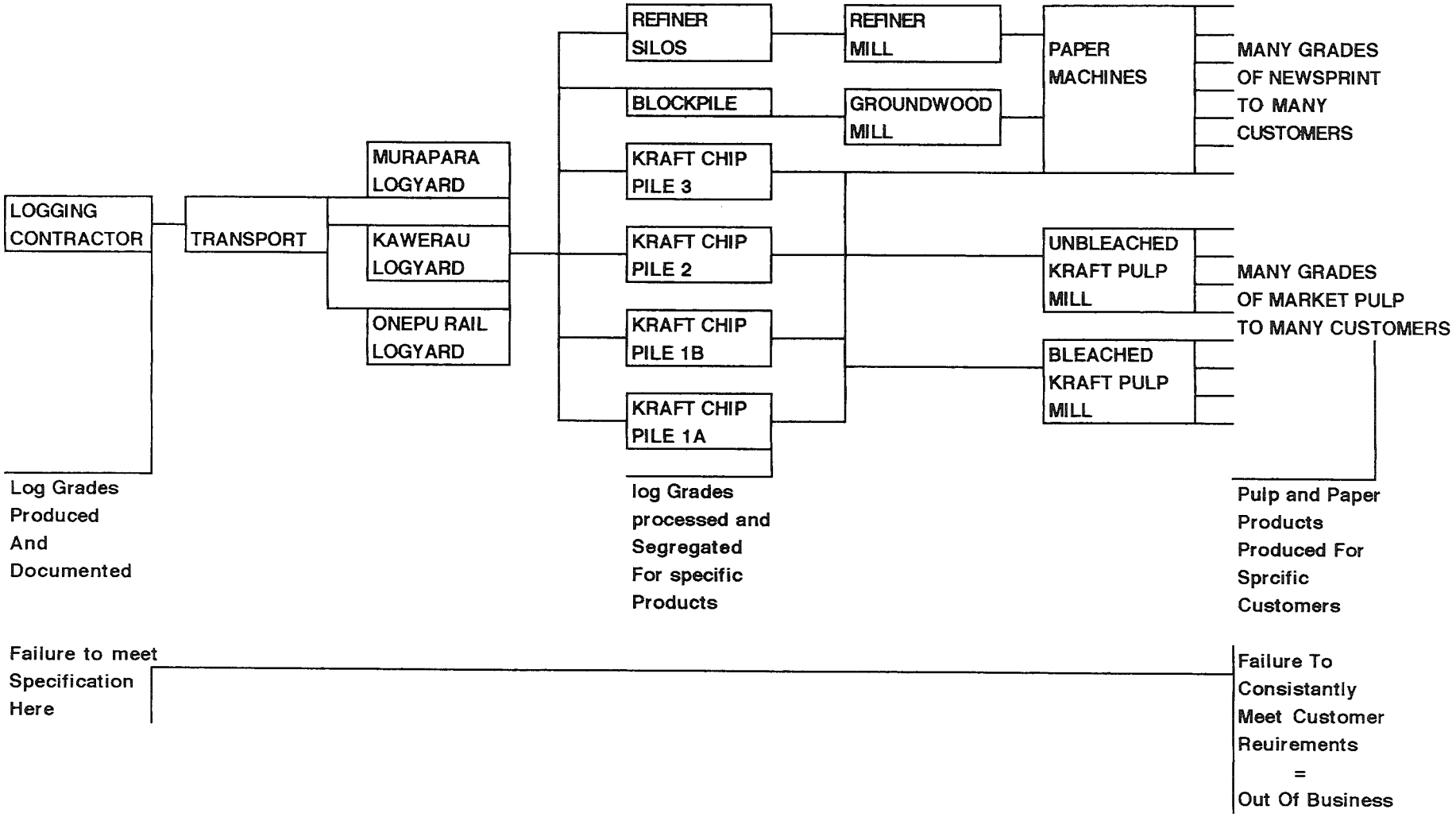
In conclusion raw material quality has a major affect on the pulp and paper industry in New Zealand. Wood presentation directly affects plant productivity and efficiency and the quality management of a consistent mix of correctly identified fibre types matched to target products is a major key to maintaining and growing market share for our pulp and paper products.

REFERENCES

Tasman Pulp and Paper Company Limited. Woodflow From Forest To Process - Final Taskforce Report. 1990

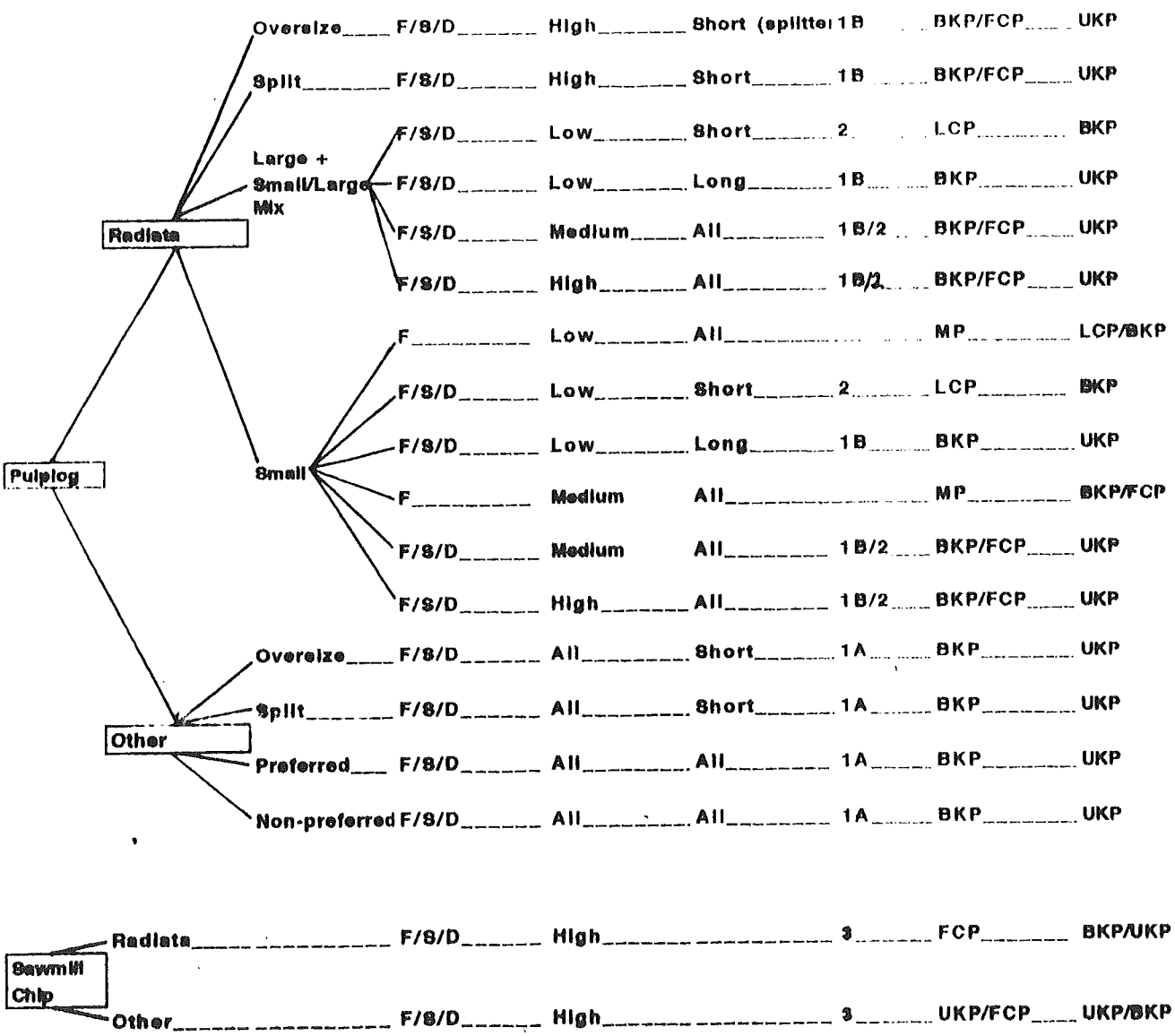
Tasman Pulp and Paper Company Limited. Tasman Bulletin Vol.12 No. 1. March 1993.

THE BUSINESS



Appendix (I)

APPENDIX (II)



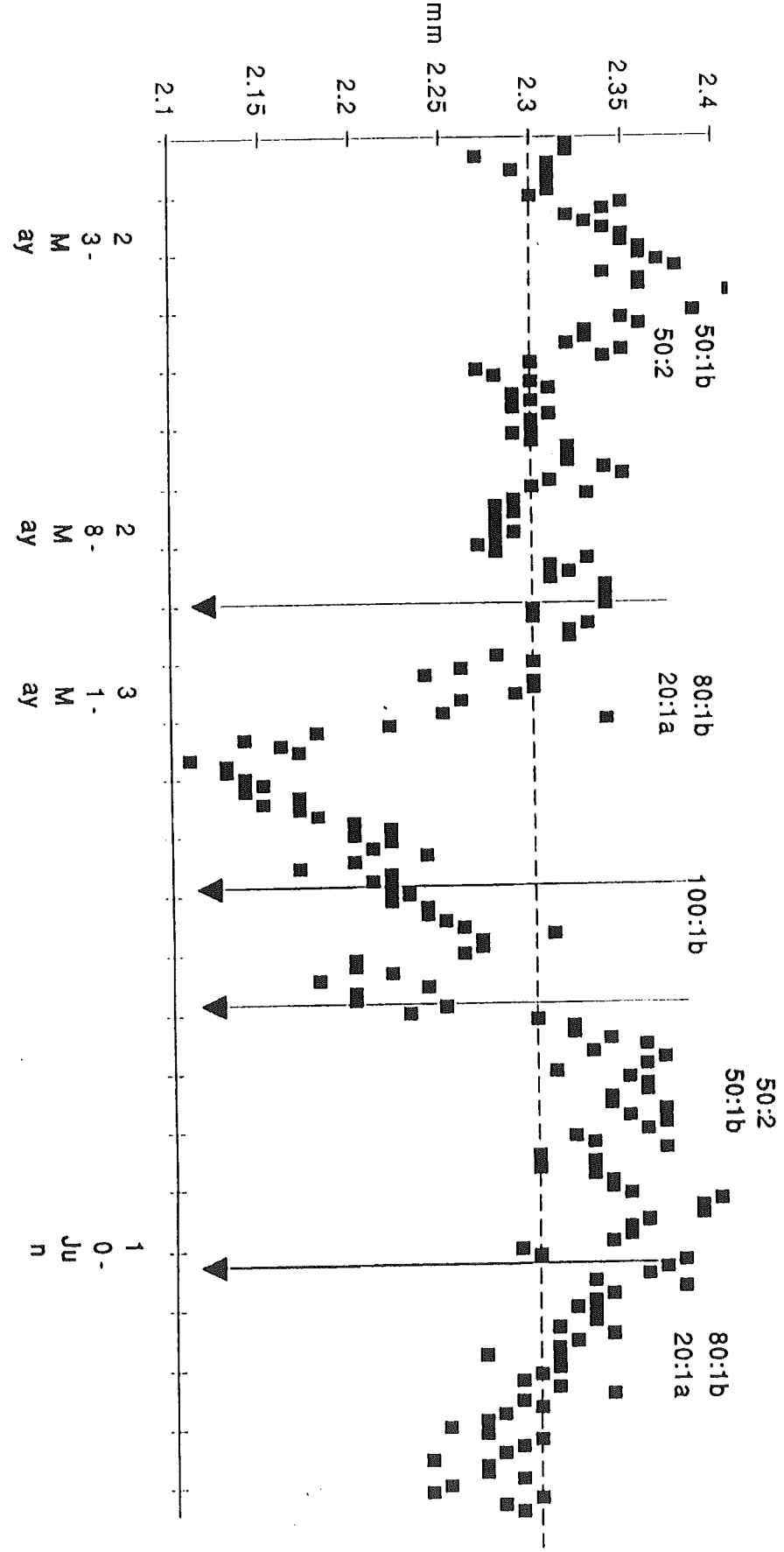
Condition

F = Fresh (free from Sapstain)
S = Sapstained
D = Sound-dead

Primary/Fall Down Process

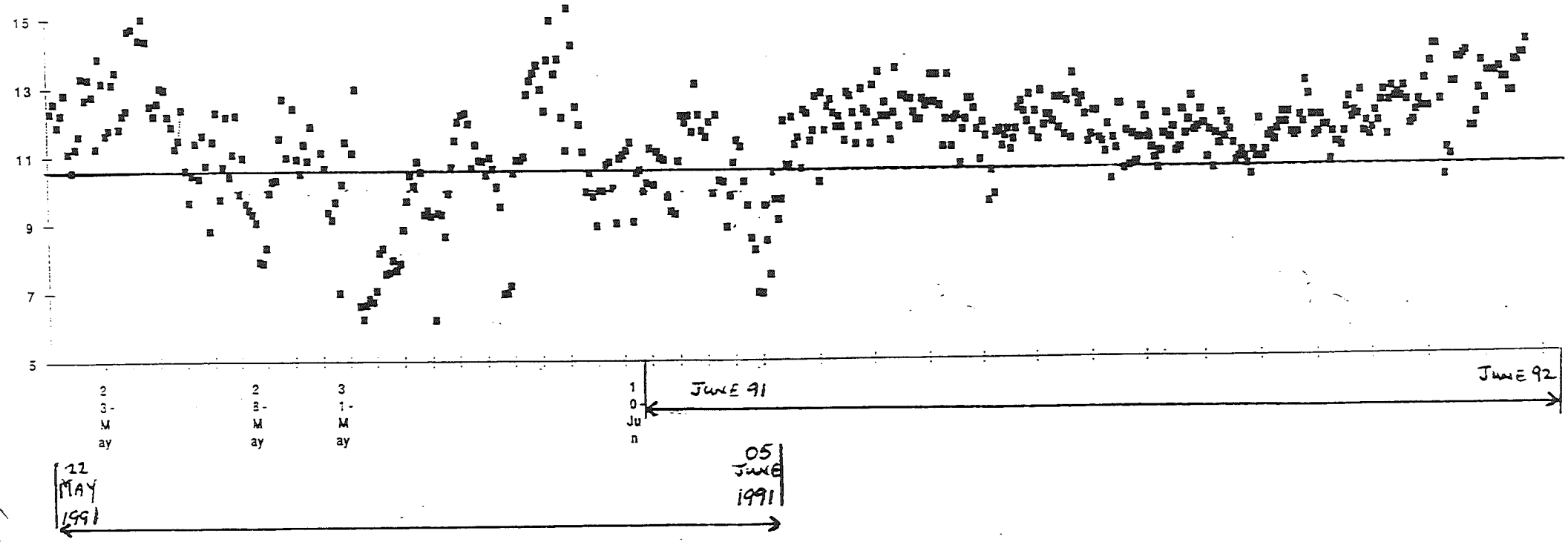
MP = Mechanical Pulp
LCP = Low Coareeness Pulp
FCP = Fibre Cement Pulp
BKP = Bleached Kraft Pulp
UKP = Unbleached Kraft Pulp

APPENDIX (III)



BKP STACK STRENGTH 1991-92

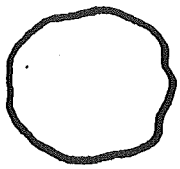
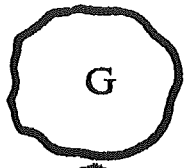
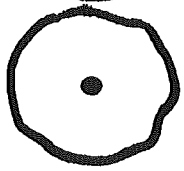
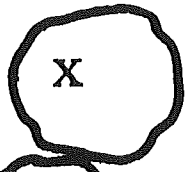
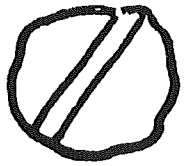
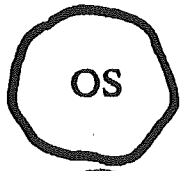
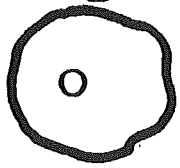
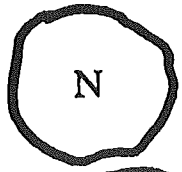
Tear at 90 Tensile Index (mNm2/g)



APPENDIX (II)

APPENDIX (II)

LOG MARKING

GRADE	LOG MARK	DESCRIPTION
LG		Nil
MG		Letter G
AG		Dot of Paint
LK		Letter X
MK		Stripe of Paint
HK		Double Stripe of Paint
OS		Letters O and S
MP		Letter O
MS		Letter N
OM		Letters O and M
MSG		TWO DOTS OF PAINT