11. 会社の概要及び開発プログラム要約

11. 会社概要及び段階的開発プログラム要約

11.1 ナトロン社概要

11.1.1 名称 "NATRON" Maglaj d.d.
11.1.2 住所 BH国 Maglaj市
11.1.3 設立 1968年操業開始
11.1.4 事業内容 パルプ・クラフト紙・紙袋製造
11.1.5 従業員数 1,638 人 (1998年2月。1991年末現在4,491人)
11.1.6 資本金 DM 160,371 千(1997年12月31日現在政府持分37.7%、従業員持分62.3%。
但し、政府持分70%へ変更予定)

11.1.7 生産高

(単位 ton)

品目	1991年	1997年	1997年/1991年
パルプ	120,000	-	-
紙	150,000	4,674	3.1%
(段ボール)	(32,000)	(2,274)	(7.1%)
(紙袋)	(35,000)	(2,400)	(6.9%)
(包装用紙)	(83,000)	(0)	(0%)

11.1.8 売上高

(単位 千DM)

品目	1991年		1997年		
(国内)	数量	金額	数量	金額	97/91
Natron paper(ton)	31,145	82,358	317	336	0.4%
Tape, sheet(ton)	3,541	14,659	150	2,718	18.5%
Natron sacks (千個)	142,780	148,707	9,193	4,419	3.0%
Paper bag (千個)	18,324	5,584	2,326	417	7.5%
Corrugated board & wrapping(ton)	30,079	114,975	2,605	4,504	3.9%
小計	-	366,283	-	12,394	3.4%
(輸出)	数量	金額	数量	金額	
Paper(ton)	14,699	12,281	2,292	1,703	13.9%
Sack, box etc.	-	5,517	-	194	3.5%
小計	-	17,798	-	1,897	10.7%
合計	-	384,081	-	14,291	3.7%

注：旧ユーゴ内共和国向け売上高は1991年度は(国内)に、1997年度は(輸出)に分類

11.1.9 機械　現在稼働中の機械及びその生産能力

(1) パルプ製造機械

パルプ製造機械	パルプ生産能力	原料	付属設備
古紙用パルパー	150 ton/day	古紙	粗選スクリーン、
市販パルプ用パルパー	150 ton/day	市販パルプ	コンベヤー
損紙用パルパー	100 ton/day	損紙	コンベヤー

(2) 抄紙機

名称	抄紙能力	生産紙	仕様	原料
PM-1 (1991年の全効率65%)	50,000~60,000 ton/annual	テストライナー	140～200g/m²	古紙パルプ
		同上トップ層	50g/m²	市販パルプ
		中芯	112～150g/m²	100%古紙パルプ
		シュレンツ	127g/m²	100%古紙パルプ
		ＯＰＮ袋用紙	80～100g/m²	50% 市販パルプ 50% 古紙パルプ

(3) 段ボール製造機械

名称	台数	マシン幅	スピード	生産能力	使用原紙量	エネルギー
コルゲータ	1	1,600mm	100m/min	119,750千㎡／a	71,850 t／a	製紙部門に依存(製紙部門が停止すると蒸気が止まり、コルゲータも停止)
コルゲータ(現在復旧工事中。1998年6月完了予定)	1	2,100mm	300m/min			
製糊装置	1式	温糊法				

(4) 段ボール箱製造機械

名称	台数	マシン幅	スピード	色数	特性	生産能力	使用原紙量
ﾌﾟﾘﾝﾀｰ	1	3,600mm	90r.p.m	2色	油性	11,405千㎡/a	6,843 t/a
ｽﾛｯﾀｰ	1	2,700mm	120r.p.m	2色	水性	12,773千㎡/a	7,664 t/a
ｸﾞﾙｱ	1	2,200mm	150r.p.m	2色	水性	19,958千㎡/a	11,975 t/a
合計						44,136千㎡/a	26,482 t/a

(5) 紙袋製造機械

名称		スピード	生産能力	使用原紙量	原料
大型紙袋	胴貼機5台	100r.p.m	133,056千個/a	36,590 t/a	クラフト紙(ハンガリーから輸入)
	底貼機7台				
	底縫機6台				
小型紙袋	製袋機3台	70r.p.m	55,883千個/a	1,956 t/a	

11.1.10 抄紙機の生産能力

名称	生産品目	抄紙能力	現在の稼動状況
PM-1	段ボール用紙、OPN 袋紙	50 千~60 千 ton/a	稼動(2 か月で 10 日間)
PM-3	片つや紙 (MG 紙)	10 千 ton/a	停止中
PM-4	クラフト袋紙(NATRON 紙)等	60 千 ton/a	停止中

11.1.11 財務諸表 (1997 年度。単位 千DM)

貸借対照表

資産の部		負債・資本の部	
流動資産	**16,097**	**流動負債**	**3,312**
売掛金	5,391	買掛金	2,376
材料	4,509	その他	936
製品	5,304	**固定負債**	**46,115**
その他	893	長期借入金	41,132
固定資産	**195,314**	その他	4,983
有形固定資産	193,145	**資本**	**161,984**
土地	30,584	資本金	160,371
建物	133,203	剰余金	1,613
機械	29,358		
無形固定資産	2,169		
合計	**211,411**	合計	**211,411**

損益計算書

総売上高	17,164
総売上原価	31,781
(内、減価償却費)	(5,871)
経常利益	-14,617
その他純収益	1,400
当期純利益	-13,217

11.2 段階的開発プログラム要約

11.2.1 市場

製品	市場
Sack paper	PM4 による Clupak sack kraft paper は品質的に輸出競争力を有し、イタリア、中東、北アフリカ市場が有望
MG (Machine Glazed) paper for bag	品質、コスト的に輸出競争力を有し、主にスロベニア、イタリア等の市場が有望
Semi-chemical(SC) Fluting	品質、コスト的に輸出競争力を有し、特に段ボール用中芯として最上級品質。市場はイタリア、南欧等が有望
Corrugated board	典型的な国内市場商品。旧ユーゴ地域の政治経済的復興が必須条件。最上級品質の SC fluting を使用した段ボールは国内市場においてもコスト競争力に富む。

輸送機関(鉄道、港湾)の円滑な利用が当開発プログラムの前提条件

11.2.2 生産理念

過大投資を避け、既存設備の最大限活用を図るため、以下の４生産理念を追求する。

(1) 生産ラインの簡素、合理化
(2) 設備のフル稼働
(3) 最小の製品品種変更
(4) 輸出可能な安定的品質の保持

11.2.3 生産方針

(1) 2 パルプ生産ラインの同時開始

両パルプ生産工程は最小の工程修整によって共通の化学回収工程を介して結合できる。針葉樹クラフトパルプ生産工程から発生する緑液は、広葉樹セミケミカル(SC)パルプ生産工程における蒸解液としても利用(共用)できる(クロスリカバリー)。

(2) NSSC フルーティングの優位性

NSSC フルーティングは、古紙を原料とするフルーティングに比べて特に輸出市場に強い競争力を有する。

(3) 製紙機械(PM)の特性と単品生産の有利性

1) PM1 はフルーティング生産に適しており、カミヤパルプ生産ラインによる SC 広葉樹パルプに適合する。
2) PM3 は特殊 MG (Machine Glazed)紙の生産に使用可能
3) PM4 は、高濃度リファイニング及びクルパック設備を備えていることから、未漂白針葉樹クラフトパルプを使用した sack paper の生産に適している。

4) 上記PMはいずれもフル稼働による単一品種生産を行うことによって、結果として生産効率を最大化しコストを最小化する。

(4) 加工プラントは市場需要に適合した生産品目構成(プロダクト・ミックス)を開発する。

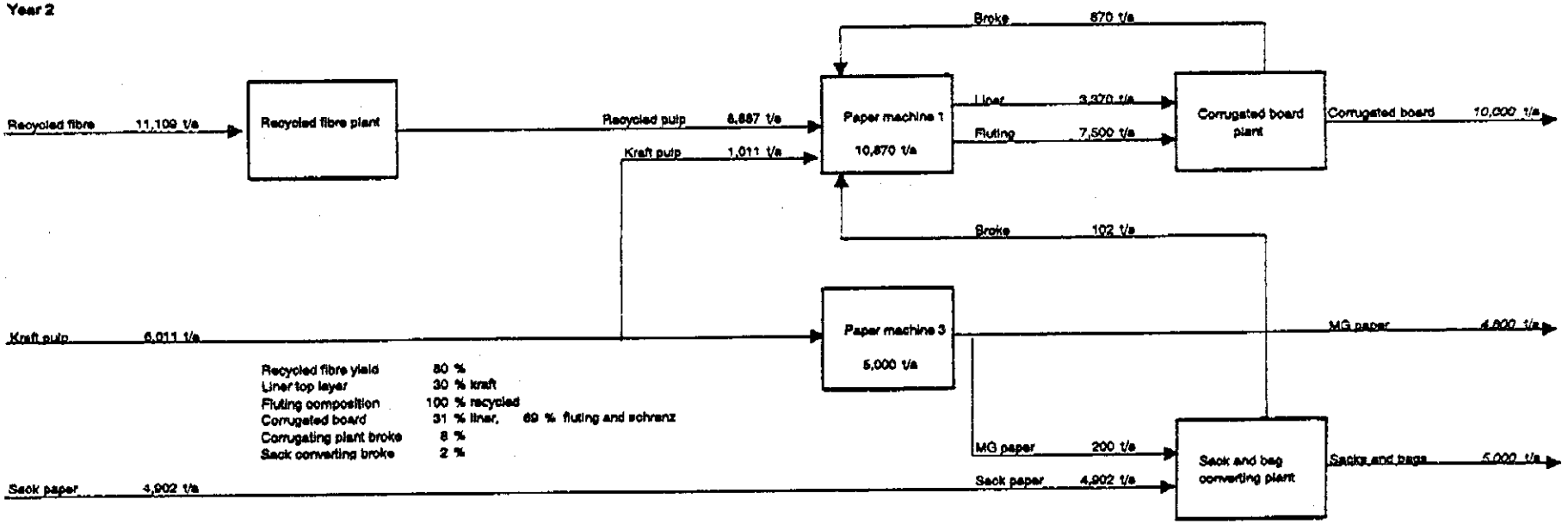
(5) 古紙利用によるschrenz生産用機械である PM2は以下の理由に因り稼働しない。
1) PM2による製品の品質及び収益性は低く（売上総利益段階でマイナス）、工場全体の収益性を著しく低める。
2) PM2の生産紙製品の紙幅は1998年6月導入予定の新ダンボール製造機械に適合しない。一方、PM1は新機械に適合する。
3) PM2再開のためには多額の投資が必要とされ、しかも将来のPM2の稼働停止によってその投資が無駄になる恐れがある。
4) 古紙利用によるPM2はPM1、3、4と異なり、パルプ生産プラントを必要とせず、したがってそれらの稼働率の維持向上に寄与しない。

(6) 古紙は、長期プログラムが開始される2000年下期以降は以下の理由に因り使用されない。
1) 国内古紙回収作業が将来著しく改善される見通しは、現段階ではつけられない。
2) パルプ生産ラインの開始後において、回収ボイラー及びカミヤ蒸解釜は最低50%以上の稼働率を必要とする。PM1の最大生産能力は、その乾燥部の拡張後において、回収ボイラー及びカミヤ蒸解釜の下限稼働率に到達する。
もしPM1が古紙を利用すると、回収ボイラー及びカミヤ蒸解釜の50%以上稼働率が維持不可能となり、パルプ生産プラント全体が稼働不能に陥る。

11.2.4 段階的開発プログラム

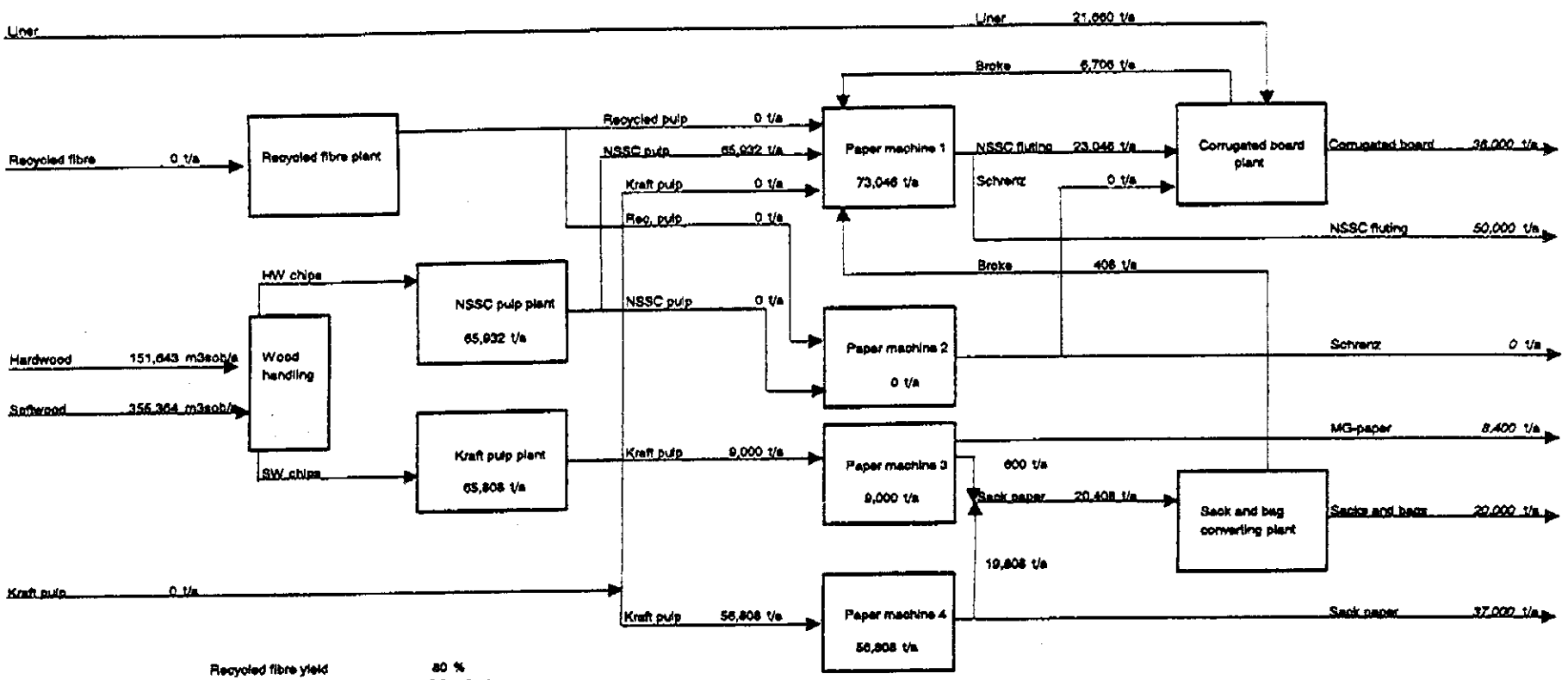
プログラム段階	緊急プログラム (1998年7月～12月)	短期プログラム (1999年1月～2000年6月)	長期プログラム (2000年7月～2009年12月)
目標	1. 品質及びマーケティングの改善 2. コスト削減 3. PM3 開始前に廃水,残灰処理施設の修理、稼働	1. PM1 及び加工プラントの生産増強 2. PM3 による MG paper 生産開始(市販クラフトパルプ使用) 3. 長期プログラムの準備	1. フル稼働による正常・継続生産 2. 2パルプ生産ラインの同時開始
パルプ製造ライン **(Batch)**	-	-	最大生産量 66,000 ADt/a. PM3、PM4 に対して針葉樹クラフトパルプを供給
パルプ製造ライン **(Kamyr Continuous)**	-	-	最低必要生産量 60,000 ADt/a.PM1 に対して広葉樹 SC パルプを供給
古紙パルプ製造プラント	PM1 に対して古紙パルプを供給	PM1 に対して古紙パルプを供給	稼働停止。将来の再開に備えて維持は行う。
PM1	Fluting, Schrenz, Testliner, Natron paper 生産	Fluting, Schrenz, Testliner, Natron paper 生産増強	広葉樹 SC パルプにて Fluting 73,000 t/a 生産。Fluting の品質は輸出市場に適合
PM3	-	paper bag 用 MG paper を主として輸出用に生産	MG paper 9,000 t/a 生産.原料パルプの市販クラフトパルプから自社製クラフトパルプへの転換によりコスト削減
PM4	-	-	自社製クラフトパルプによる Sack paper 57,000 t/a 生産
加工プラント	Corrugated board & box, Sacks, Bags 生産	Corrugated board & box, Sacks, Bags 生産増強	Corrugated board & box, Sacks, Bags 生産増強. Testliner は外部より購入
注	1. 国内市場向け要求品質を満たす 2. 原料及び市場の制限により生産は断続的.	1. 生産はなお断続的 2. 技術水準向上のため従業員総合訓練プログラムの実施必要	1. 機械別単品生産による品質、生産効率の向上 2.フル稼働によるコスト削減、競争力向上 3. PM4 は生産開始前に大修理必要

Fibre balance, Short Term Programme
Purchased kraft pulp, own MG paper production
Year 2



Appendix 7-I

Fibre balance, Long Term Programme, excl. PM2
Own kraft pulp and NSSC pulp production
Year 8 and onwards



Recycled fibre yield	80 %			
NSSC pulp wod consumption	2.3 m3sob			
Kraft pulp wood consumption	5.4 m3sob			
Fluting composition PM1	100 % NSSC	0 % recycled		
Schrenz composition PM2	0 % NSSC	100 % recycled		
Corrugated board	57 % liner,	43 % fluting	0 % schrenz	
Corrugating plant broke	15 %			
Sack converting broke	2 %			

11.2.5 段階的開発プログラムにおける操業開始費用

段階	技術目標	必要資金	市場	原材料
緊急プログラム (1998年7月～ 12月)	1. 品質・販売能力等のレベルアップ、コスト削減 2. 現状の段ボール紙、包装紙（紙袋、手提袋）の生産水準(ＰＭ１。２か月間で10日操業)の向上 3. ＰＭ１（古紙・購入パルプ使用による段ボール紙(表裏・中芯)及び包装紙(ナトロン紙)製造） 4. 緊急環境対策：廃水処理改善及び石炭残灰河川投棄からの改善 5. 熱効率改善・段ボール生産増強のため小型石油ボイラー増設 6. 短期計画の準備	合計ＤＭ３百万	1. 国内市場中心 2. 1998年の予想ＧＤＰ成長率20%	1. 古紙(国産・輸入) 2. 包装紙（ハンガリーより輸入） 3. 市販パルプ(ロシア、スワジランド、スウェーデンより輸入)
短期プログラム (1999年1月～ 2000年6月)	1. ＰＭ１の生産増強・品質改善 2. ＰＭ３操業開始（購入パルプ使用による袋･手提袋用ＭＧ紙年間５千トン製造） 3. 長期計画の準備	合計ＤＭ４１百万	(ＭＧ紙)国内１千トン、スロベニア・イタリア３千トン、その他１千トン	市販パルプ(ロシア、スワジランド、スウェーデンより輸入)
長期プログラム (2000年7月～ 2009年12月)	1. 針葉樹クラフトパルプ・広葉樹SCパルプの本格生産開始（木材加工機（チップ製造・皮剥ぎ）導入） 2. ＰＭ３（自社クラフトパルプ使用によるＭＧ紙製造） 3. ＰＭ４操業開始（自社クラフトパルプ使用による加工プラント用包装紙２万トン、輸出用包装紙用ロール紙３７千トン製造） 4. ＰＭ１(自社SCパルプ使用による段ボールFluting製造） 5. ヨーロッパ標準を満たす廃水処理施設	合計ＤＭ９５百万	国内及び旧ユーゴ諸国、南・中央ヨーロッパ、中東、東南アジア、北アフリカ等合計年間１５３千トン	1. 国産パルプ材：クラフトパルプ生産用針葉樹及びSCパルプ生産用広葉樹 2. 国産段ボール表裏紙２２千トン
	操業開始費用 投資額	ＤＭ５５百万 ＤＭ８４百万 総合計ＤＭ139百万		

11.2.6 代替案(サバイバルプラン)

基本計画の必要資金調達が不調な場合、緊急プログラムがそのままサバイバルプランとして継続していく。

	パルププラント	PM1	PM3	PM4	加工プラント	PM2	PM5
基本計画	○	○	○	○	○	×	×
代替案	×	○	○	×	○	×	×

(1) パルプ製造工程は再開しない。古紙を含む原料紙は全て外部購入に依存する。

(2) 売上高、利益ともに小規模になる。

(3) 必要従業員数は少なくなる。

(4) 最小限の投資による縮小均衡を目指す。

(5) 代替案(サバイバルプラン)の開発プログラム

段階	緊急プログラム (1998年7月～12月)	サバイバルプログラム (1999年1月～)
目標	1. 品質及びマーケティングの改善 2. コスト削減 3. PM3開始前に廃水,残灰処理施設の修理,稼働	1. PM1及び加工プラントの生産増強 2. PM3によるMG paper生産開始（市販クラフトパルプ使用） 3. 長期プログラムへの移行準備
古紙パルプ製造プラント	PM1へ古紙パルプを供給	PM1へ古紙パルプを供給
PM1	Fluting, Schrenz, Testliner, Natron paper生産	Fluting, Schrenz, Testliner, Natron paper生産増強
PM3	-	paper bag用MG paperを主として輸出用に生産
加工プラント	Corrugated board & box, Sacks, Bags生産	Corrugated board & box, Sacks, Bags生産増強
注	1. 国内市場向け要求品質を満たす 2. 原料及び市場の制限により生産は断続的.	1. 生産はなお断続的 2. 技術水準向上のため従業員総合訓練プログラムの実施必要

(6) 代替案(サバイバルプラン)の開発プログラムにおける操業開始費用

段階	技術目標	必要資金	市場	原材料
緊急プログラム (1998年7月～ 12月)	1. 品質・販売能力等のレベルアップ、コスト削減 2. 現状の段ボール紙、包装紙（紙袋、手提袋）の生産水準(ＰＭ１。２か月間で10日操業)の向上 3. ＰＭ１（古紙・購入パルプ使用による段ボール紙(表裏・中芯)及び包装紙(ナトロン紙)製造） 4. 緊急環境対策：廃水処理改善及び石炭残灰河川投棄からの改善 5. 熱効率改善・段ボール生産増強のため小型石油ボイラー増設 6. 短期計画の準備	合計ＤＭ3.2百万	1. 国内市場中心 2. 1998年の予想ＧＤＰ成長率20%	1. 古紙(国産・輸入) 2. 包装紙（ハンガリーより輸入） 3. 市販パルプ(ロシア、スワジランド、スウェーデンより輸入）
サバイバル プログラム (1999年1月～)	1. PM1の生産増強: 2. 電気施設保守、繊維回収、熱回収 3. ＰＭ３操業開始（購入パルプ使用による袋･手提袋用ＭＧ紙年間５千トン製造） 4. 加工プラントの生産増強: (1) 段ボール･箱…保守、型抜き機ライン (2) Sacks…保守、自動化	合計ＤＭ9.8百万	(ＭＧ紙)国内１千トン、スロベニア・イタリア３千トン、その他１千トン	市販パルプ(ロシア、スワジランド、スウェーデンより輸入）
	(型抜き機4.8百万ＤＭは３年後に投資される)	合計ＤＭ13百万		

11.2.7 プログラムの財務的評価

(1) 内部収益率 (IRR)

プログラムの内部収益率及び対応する資本コスト

内部収益率	基本プラン		サバイバルプラン	
	IRR	資本コスト	IRR	資本コスト
IRROI before tax	**27.1%**	**13.9%**	36.8%	14.5%
IRROI after tax	22.9%	13.8%	33.6%	14.5%
IRROE after tax	39.8%	15%	44.3%	15%

税引前投下資本内部収益率 (IRROI before tax) 27.1% は資本コスト 13.9%を大幅に上回っている。税引後投下資本内部収益率 (IRROI after tax) 22.9%はその資本コスト 13.8%に接近しているが、なお十分な余地がある。これはまた政府による課税面での支援の重要性を示す。税引後株主資本内部収益率 (IRROE after tax) 39.8%は株主投資家にとっての資本コスト 15%をかなり超過している。

結論として、当プログラムのフイージビリテイは十分に高いと評価できる。

サバイバルプランの IRROI 36.8%は基本計画及びその資本コスト 14.5%を上回るが、縮小均衡を目指すものに過ぎず、その社会的意義は大きくない。

(2) プログラム成果の理由

1) 少額な投資金額
2) 輸出指向マーケティング戦略
3) 生産工程の改善
4) 豊富な労働力

(3) プログラムの重要ポイント

1) 当初三年間(1998年～2000年)の資金繰り

当初三年間の資金不足額ＤＭ59.1百万及び投資額ＤＭ139.1百万等を賄うために、プログラム全体でＤＭ83百万(長期借入金ＤＭ68百万及びエクィティＤＭ15百万)の外部からの資金調達を必要とする。但し、その内約87%に相当するＤＭ72百万はプログラム初めの三年間に集中的に調達されなければならない。

2) 戦略投資家(先進的パルプ製紙会社)との提携

12. 勧告

12 勧告

12.1 NATRON 社の自助努力

戦後の困難な経営状況に対してナトロン社は以下のような再建策を実施している。

(1) 従業員数・給与の引き下げ

年度	1991	1997	1997/1991
1.従業員数	4,500 人	1,600 人	1/3
2.平均純月収	DM 1,000	DM 110	1/9
平均年間給与(1*2*12 月)	DM 54 百万	DM 2 百万	1/27

(2) 余剰資産の売却

ナトロン社は小規模民営化制度に則り今夏、その余剰資産（農場、フットボール場、レストラン、ホテル、プール等。簿価 DM８百万相当）の売却を計画している。

(3) 補助事業

ナトロン社は建設・保守等の分野で外部受注活動を積極的に展開しており、1997 年上期だけでボスニア外からの受注も含めて 528 千 DM の売上を上げた(6.5.14 参照)。

(4) 経費節減及び保守的会計処理

ナトロン社は資産保険、社宅保守費等の諸経費削減努力を払っており、また会計的にも RS 域内森林(50 百万 DM)やリゾートホテルの評価減等一定の手当てを実施している(6.5.11 参照)。

(5) 一層の自助努力

ナトロン社は第一に従業員のモラールを高めることによって、製品の品質を改善し、販売力を強化しなければならない。現状の断続的運転(低稼働率)に起因する固定費負担から脱却するために、損益分岐点を上回る稼働率の向上が緊急課題である。

12.2 政府による支援策

ボスニア産業は速やかな市場経済化・民営化を目標にしているが、現状の経済は脆弱であり、ヨーロッパにおける競争力も低い。従って、ナトロン社の自助努力に加えて戦後復興の特別な政策支援が求められる。

例えば、パルプ・製紙会社のような国の重要産業を重点・優先的に支援する政策が採られるべきものと考える。

(1) 国有企業相互間取引の推進

政府が主導して国有企業間の取引を活発化させる。例えば、セメント、砂糖、小麦粉会社、郵便事業等に対してナトロン社の紙袋、段ボール等を優先的に使用するよう勧告し、逆にナトロン社にも政府指定の国有企業との取引をできるだけ増加させることを指導する。これによって、国有企業全体の業務拡大が図られる。

(2) 国内金融システムの再建

政府は、例えば重要産業向け公的基金の設立、郵便貯金制度の振興、政府保証による外国金融機関からの外貨借入を推進する。

公的基金に関しては、時限立法(10 年、融資完済時 20 年)による戦後復興中長期基金の設立が考えられる。この基金はヨーロッパ諸国及び EBRD 等国際機関の拠出を仰ぎ、各国の長期金融専門家が審査委員となって運営され、ボスニア政府からは独立した機関とする。

(3) バーター取引の削減

延滞課金は企業にとって大きな負担であるとともにバーター取引を助長する。企業間取引の健全化、国際金融機関の信用力向上のためにも延滞課金の廃止及び「短期資金決済機構」の設立を提案する(6.5.3 参照)。

「短期資金決済機構」はボスニア中央銀行及び支援諸国の拠出によって設立し、その会員はナトロン社を含むボスニアの重点企業及び信用力ある外国銀行及び企業に制限される。コンピュータによる集中決済と短期資金・救済資金の供給を行う。 会員間の債権債務は機構に登録され、差金残高決済方式によって精算される。このシステムは必要決済資金の減少を通じて信用リスクを軽減し、結果的にバーター取引からの脱却を促進する。また、ボスニアの重要産業及び金融システムの復興・再建を促進する。

(4) 課税免除・繰延べ

重要産業支援の一環として、法人税、輸入関税等の少なくとも 5 年間程度の免除、繰延べが考慮されるべきである。

(5) 長期借入金の政府移管

先進諸国からの長期借入金 DM39 百万 (政府保証付き) は現状のナトロン社にとって過大な負担であり、外国投資家導入の障害にもなっている。この政府による肩代わりが検討されるべきである。プログラムにおいてもこの考え方を計算に採り入れた。

(6) 給与外負担金の軽減

社会保険料等の会社負担金は現在純給与の 86%に達しているが、従業員・政府の負担によってその半額程度の軽減が検討されるべきである。

(7) 余剰資産売却代金の回収

ナトロン社支援の観点から余剰資産売却代金については、その半額以上はナトロン社への給付が検討されるべきである(6.5.11 参照)。

(8) 余剰人員の政府移管

国有企業の余剰人員は有給の職業訓練・職業斡旋所への移管が検討されるべきである。

(9) 輸出振興

輸出補助金、L/C、金融、保険、税制等によって輸出振興政策が採用されるべきである。

(10) 国内パルプ木材価格の低減

国内パルプ木材の価格はヨーロッパの市場価格より高い。これは国内製紙会社の国際競争力を弱める。国内木材・製紙産業振興の観点から何らかの価格政策が必要と考えられる。

(11) 古紙回収システムの改善

ボスニアの古紙回収システムは貧弱であり、古紙利用による製紙産業の成立を困難にしている。産業・資源・環境保護の観点からも古紙回収システムの改善が必要と考えられる。

12.3 生産管理面の勧告

(1) 品質向上

長期プログラムにおける製品品質の向上は以下の諸生産方針によって達成される。

1) 各製紙機械別単一製品品目の生産
2) Fluting 生産原料の古紙から広葉樹 SC パルプへの転換
3) 新鋭設備の導入

(2) コスト削減

コスト削減は、基本的には 1991 年レベルの生産高への回復と従業員数の減少とによって達成される。生産工程は三製紙機械への生産集中及び二化学回収工程の一工程への集約が行われ、これらの工程改善によって製造コストは抜本的に削減される。

プログラムの生産はまた、ボスニア国内産の森林資源の調達を計画している。これによって原料輸入に伴う高い輸送コストを回避でき、さらに国産パルプ材の製造コストの減少を実現することができる。

短期的には、需要増加に基づく生産増加、及び断続的生産の解消に伴って単位当たり製造コスト(固定費、変動費)を減少させる。

原価管理システムを開発し、個々の従業員が日々の生産活動を通じて自らコスト削減を実現できることをしっかり認識する必要がある。

(3) 従業員数の調整

プログラムにおける従業員数は、全世界の同規模工場の経験に基づいて計画した。正常運転到達後は、現在の事実上の従業員数に比較して約 50%の人員増を確保できる。その効率性及びモラールは世界市場と競合し得るレベルまで抜本的に引き上げなければならない。

殆どの機械設備が 1960 年代製であり、近代的な生産・保守計画も保有せず、技術レベルも低い等の現状を考慮してプログラムにおける従業員数を計画した。

(4) 社内従業員教育訓練投資

市場経済化に伴って、最新技術の導入及び全従業員の徹底的な教育訓練が必要とされる。

トップマネジメント教育の目的は、市場経済下の効率的な組織運営のためにいかに権限委譲を行うべきかを理解させることにある。ミドルマネジメント教育の目的は、各自の責任部門の業績を継続的に向上するために必要な部門長としての管理技術の開発にある。工場の近代化には、新らしい生産技術とともに工場管理技術の改善をも必要とする。ミドルマネジメント及び現業従業員の教育訓練計画にはこれらの管理技術の修得も含まれる。

外国専門家によるこれらの従業員教育訓練計画の実施コストとして約 DM800,000 が必要とされよう。

12.4 経営管理面の勧告

(1) 市場経済マインドの向上

戦前のナトロン社は旧ユーゴスラビアの広い市場に対して独占的供給を行っていたが、戦後は競争市場において計画策定、品質向上、市場開拓、資金調達の全てを独自に行わなければならない。まず第一に経営者のみならず、全社員がこの市場経済マインドへの意識転換を行う必要がある。一方、自立的経営を促進し、民営化実現のためにも経営陣は労働組合から離脱すべきである。

(2) 国際的製紙会社との業務・資本提携

例えば、東欧、中東に生産拠点を求めている国際的製紙会社と提携することによってナトロン社はその資本と技術を得、一方提携先は収益見込みの高い生産拠点を割安で取得できる。また、この提携が成立すれば国際金融機関からの資金導入も促進されるであろう。

(3) 経営参加

経営計画は全員参加によって作成されるのが望ましいが、少なくとも作成された経営計画は何らかの方法によって全員に通知し、従業員の経営参加意識を高めることが望ましい。

(4) 事業部制

パルプ生産開始前に事業部制の導入を検討すべきである。各事業部は独自に経営計画を作成し、利益責任を負うプロフィットセンターとなる。これによって意思決定の迅速化、業務

効率の増進、モラール向上が図られる。例えば、バルブ事業部、PM1 事業部、PM3 事業部, PM4 事業部、加工プラント事業部、メンテナンス事業部、本社管理事業部 の７事業部への分割が考えられる。

(5) 各事業部の業績評価方法

各事業部の業績評価方法としては、各事業部の ROI より絶対額としての余剰利益（RI）が適している。

RI = 各事業部の利益 - (K * 各事業部の投下資本)

注： K: 各事業部の資本コスト(最低要求 ROI)

これは各事業部が、新規投資案件に対して、たとえ現在の事業部 ROI を下回る場合でも K を上回る以上積極的に実施するよう誘導することによって結果的に全社利益の最大化を図ることができるからである。

(6) 監督委員会

監督委員会の主な機能は取締役の業務執行行為の監査であり、従ってその事前チェックのために少なくとも委員の１名は取締役会に参加すべきである。また、委員が全員兼務者であることは監督委員会の重要な機能を考慮すると不適当である。少なくとも委員の１名は常勤とすべきである(6.5.15 参照)。

(7) 従業員数適正化プラン

長期経営計画に即した従業員数の適正化を図る長期的プランの作成が必要である。

(8) バーター取引からの脱却

バーター取引の問題点の１つは売上高・仕入高等取引金額の測定方法の信頼性が低い点にある。従って、上記の政府による支援に加えて(12.2(3)参照)、会計手続き上それらの金額決定の証拠書類を適正にファイルし、いつでもその正当性を証明できる態勢を整えておくことが最低限必要とされる(6.5.4 参照)。

(9) 会計財務上の勧告

1) 財務諸表の様式

a. 財務諸表の様式は前期決算書を併記して期間比較可能なものとすべきである。

b. 損益計算書上、売上原価が最初に掲載されているが、売上高が最初に掲載されるべきである。

c. 販売費及び一般管理費の会計処理

販売費及び一般管理費は製造原価に含められており、在庫が増加する場合、棚卸資産及び

利益の過大計上をもたらす。販売費及び一般管理費は製造活動と直接関係しないコストとして、製造原価には含めず、期間費用とすべきである(6.5.8 参照)。

2) 会計的評価

a. 長期滞留棚卸資産をできるだけ正確に把握し、かつ継続的に正味実現可能価額に基づく評価を行う管理体制を整備する必要がある。

プログラムにおいて、1997 年末現在の帳簿価額の約 30%相当額の評価減を行った(10.3.1(5)参照)。

b. 固定資産の範囲として、例えば DM1,500 以上とする等の金額基準を設けるべきである。これによって、会計的評価の健全化及び煩雑な減価償却事務を軽減する効果が期待される。

休止固定資産に対しては、減価償却に替えて使用価値に基づく経済的減価を適正に見積もって評価減を行うべきである(期間費用)(6.5.6, 10.3.1(5)参照)。

3) 標準原価及び損益分岐点分析

経営計画作成及び原価管理のために、近い将来的標準原価計算制度の導入を検討すべきである。また、事業部別・製品別の収益性を把握し、有効な製造・販売戦略(プロダクト・セールスミックス)を建てるために損益分岐点分析を導入すべきである(6.5.8 参照)。

附属資料

Appendix 6-1

Main data of present plant and machinery of pulp plant

1. The purpose of our study and what we have done.

We have investigated the status, specifications, etc. for following facilities in order to check which machinery and equipment can be used for restarting plan or not.

1) Wood preparation
2) Batch Cooking Plant
3) Continuous Cooking Plant
4) Screening and washing for batch cooking plant
5) Screening and washing for continuous cooking plant
6) Recausticizing Plant for batch cooking plant
7) Lime reburning plant for batch cooking plant
8) Recausticizing Plant for continuous cooking plant
9) Lime reburning plant for continuous cooking plant
10) No.1 Black liquor evaporator for continuous cooking plant
11) No.2 Black liquor evaporator
12) No.3 Black liquor evaporator for batch cooking plant
13) Chemical recovery boiler for batch cooking plant
14) Chemical recovery boiler for continuous cooking plant
15) Waste Water Treatment
16) Water Intake
17) Boiler feedwater treatment

2. The result of the site visit and investigation

Parts of facilities are damaged by war and timeworn. Some parts must be replaced. However generally the status of machinery and equipment are better than we expected. Most of the machinery and equipment can be restarted by overhaul and maintenance.

Refer to the attached summery of main machinery and equipment.

3. Impression of the investigation

Basically the mill has a very small market and no plan to obtain raw material at this stage. Now the mill is operating at less than 10% of capacity using waste paper as the raw material. But the product is of low quality.

We think that at first what the mill must do is to import the law material for liner and to improve quality. The market will be grow. After that, the pulp mill shall be restarted.

Anyway the assistance of the government will be required to restart up the mill.

The summery of main machinery and equipment

1.) Wood Preparation (expansion in 1983)

Capacity	Wood Storage capacity	100,000m3 as wood
		250,000m3 as chip
	Chip Storage capacity	80,000 m3
Constructed by, and in		1983

Item	Manufac-turer	Type	Size	Capacity	Drive Power	Damage	Wear of roller	Wear of type
Drum barker	Warkaus	Wet type		30m3/h		Rust, to be overhauled	No.	No.
Ring barker	Valon-Kone	Ring type for long log		80m3/h		Rust, to be overhauled		
Chipper	Black clawson	116"HC12 knives	700mmdia	.156m3/h (100m3/h)	1200kW	Rust, to be overhauled		
Chipper				60m3/h (30m3/h)	420kW	Rust, to be overhauled		
Chip Screen				200m3/h as chip		to be overhauled		
Conveyors						Burned, to be replaced		

2.) Batch Cooking Plant

Capacity	Design (t/d)	150 ADt/d	
	Actual operation (t/d)	150 - 172 Adt/d	
Cooking cycle	Design	Actual operation	
Chip & liquor supply	30 min.		
Steaming(heating)	130 min.		
Cooking	60 min.		
Relieving	25 min.		
Blowing	25 min.		
Total	270 min	Almost same as design base	
Operating Condition	Cooking yield		
	Kappa No.		
	Chemical charge	409.63kg/ADt pulp as A.A.	
	Steam consumption	2.25t/ADt pulp	
	Electric power consumption	44kWh/ADt pulp	

Item	Manufac -turer	Nos.	Type	Size	Capacity	Damage	Rebuiod
Digesters	Hitachi Zosen	5	Vertical	3,350mm dia x 12,760mm H, 25mm t	80 m3	No.1,.2,.3,.4. No.5 ; under repairing and 2 pieces of top hell will be renewed	
Heater	Hitachi Zosen	5	Shell and tube	110 m2 each			No.1-5 All tubes are changed to new stainless steel tubes

3.) Continuous Cooking Plant (1983)

Capacity	Design (t/d)	200 ADt/d
Operating Condition	Cooking yield	48%
	Kappa No.	40 - 50
	Chemical charge	364.48kg/ADt pulp as A.A.
	Steam consumption	0.757t/ADt pulp
	Electric power consumption (including Screening, not including washing)	212kWh/ADt pulp

Item	Manufac -turer	Nos.	Type	Size	Damage
Digester	Kamyr	1	Vertical stationary continuous digester	3,8000/2,400mmdia x 37,000mm H	to be overhauled

4.) Screening and washing for batch cooking plant

Capacity	Design (t/d)	150ADt/h
	Actual operation (t/d)	150 - 172 ADt/d
	Electric power consumption	94kWh/ADt pulp(only for screening)

Item	Manuf ac- turer	Nos.	Type	Size	Capacity	Drive power	Damage
Washers	Hitachi Zosen	3 drums	Vacuum fo;ter	Drum ϕ3000x 4000W	160ADt/d	11kW each	Rust, to be overhauled
Primary Screen	Hitachi Zosen	2	Cowan screen	plate perforate ϕ2.2 - 2.0	80ADt/d each	85kW	Rust, to be overhauled
Secondary Sereen	Hitachi Zosen	1	Cowan screen	plate perforate ϕ2.0	40ADt/d	37kW	Rust, to be overhauled
Cleaners		65	Centri-cleaner				to be overhauled
No.1		12	ditto				ditto
No.2		4	ditto				ditto
No.3		1	ditto				ditto
No.4							

5.) Screening and washing for continuous cooking plant (1983)

Capacity Design (t/d) 200

Item	Manufac-turer	Nos.	Type	Size	Capacity	Drive power	Damage
Vacuum filter	Dorr Oliver		Vacuum filter		2 x 100 AD/d		
Primary Screen	Bird	1		plate perforate ϕ1.6 - 1.8		90kW x 1500rpm	to be overhauled
Secondary Screen	Ahlstom	2		slit 0.45		90kW x 1500rpm	to be overhauled
Reject Screen	Bird	1		plate perforate ϕ2.0		45kW x 1500rpm	to be overhauled
Washers (1988)	Rauma Repora	1	Pressure filter(PFW 3040)			45kW	to be overhauled
Washers (1954)	Dorr Oliver	2 drums	Pressure filter & Balometric				to be overhauled
Reject refiner	Sprout-Waldron		Single Disc	36"			
Cleaners for reject							
Nos. of Primary		10					
Nos. of Secondary		2					
No.s of Tretiary		1					
		Total installed power for Screening plant				1305.1kW	

6.) Recausticizing Plant for batch cooking plant

Capacity

Green liquor feed rate	Design	30m3/h
Required white liquor	Design	22.9m3/h

Equipment specifications

Item	Manufac-turer	Nos.	Type	Size	Capacity	Damage
Green liquor clarifier	Hitachi Zosen		Rake & Clarify	7300mm ϕ.x 3700mmH		Rust, to be overhauled
Dregs washer	Hitachi Zosen		Rake & Clarify	4300mm ϕ.x 2500mmH		Rust, to be overhauled
Lime slaking	Hitachi Zosen		Rake	30m3/h		Heavy rust, to be overhauld
Causticizers	Hitachi Zosen	3			12m3	Rust, to be overhauled
White liquor clarification	Hitachi Zosen		4 component sedimentation	6700mmϕ x 7300mmH		Rust, to be overhauled

Lime mud filter	Vacuum drum filter	110t/d, 60%solid	Rust, to be overhauled

In this area, a lot of corrosion problems are observed in machinery, tanks, pipes, etc.

7.) Lime reburning plant for batch cooking plant

Capacity

Production rate	Design(t/d)	50t/d as CaO
Moisture content in lime mud	Design(%)	40%

Equipment specifications

Item	Manufac-turer	Type	Size	Kind of fuel	Speed (rpm)	Driving power	Damage
Lime kiln	Hitachi Zosen	Long kiln	45mL x ϕ2.12m	Heavy oil	0.4-1.2rpm	22kW	Rust, to be overhauled. Tire and Roller are eroded.

8.) Recausticizing Plant for continuous cooking plant

Capacity

Green liquor feed rate	Design	35m3/h
Required white liquor	Design	

Equipment specifications

Item	Manufac-turer	Nos.	Type	Size	Capacity	Damage
Green liquor clarifier	Dorr-Oliver		Rake & Clarify		249m3	
Dregs washer	Dorr-Oliver		Rake & Clarify		43.2m3	
Lime slaking	Dorr-Oliver		Rake		1-40m3/h, 1-30m3/h	
Causticizers	Dorr-Oliver	3+1			12m3	
White liquor clarification	Dorr-Oliver		2 component sedimentation		226m3 each	
Lime mud filter	ENSO				100t/d, 65%solid	

The piping and auxiliary equipment around causticizers are destroyed by bomb.

9.) Lime reburning plant for continuous cooking plant

Capacity

Production rate	Design(t/d)	65t/d as CaO
Moisture content in lime mud	Design(%)	35%

Equipment specifications

Item	Manufac-turer	Nos.	Type	Kind of fuel	Size	Speed (rpm)	Capacity	Damage
Lime mud feeder			Screw				100t/d, 65%solid	
Lime kiln	F.L.Smith		Long kiln with satelitecooler	Heavy oil	50.85mL x ϕ2.4m	1.09rpm		Rust, to be overhauld

10.) No.1 Black liquor evaporator for continuous cooking plant(1980)

Manufacturer Hitachi Zosen

Capacity

Feed black liquor

Feed rate(t/h)	Design	63.2,	14.1,	20.0
Solid(%)	Design	15.0,	50.0,	45.0
Temperature(℃)	Design	75.0	100.0,	100.0

Product black liquor

Product rate(t/h)	Design		39.28,
Solid(%)	Design		65.0
	Actual		60
Temperature(℃)	Design		108.0
Evaporation (t/h)	Design		58.02

Specification

Item	Type	Heating surface (m2)	Damage
No.1 effect	Vertical forced Circulation	440	
No.2 effect	Vertical long tube	640	
No.3 effect	Vertical long tube	720	Shot by gun
No.4 effect	Vertical long tube	720	Small hole, shot by gun
High density concentrator	Vertical forced circ	100	
Surface condenser	Shell and tube vertical	635	Rust
Cooling tower	Cross flow	2000	Parts of fillings are lost

11.) No.2 Black liquor evaporator(1955)

Manufacturer Roca+Rosenblad

Capacity

Feed black liquor

Feed rate(t/h) Design

Solid(%)	Design	
Temperature(℃)	Design	
Product black liquor		
Product rate(t/h)	Design	
Solid(%)	Design	
Temperature(℃)	Design	
Evaporation (t/h)	Design	

Specification

Item	Type	Heating surface (m2)	Damage
No.1A/B effect	Vertical long tube	272+272	
No.2A/B effect	Vertical long tube	282+282	
No.3 effect	Vertical long tube	500	
No.4 effect	Vertical long tube	600	

The machinery and equipment in this area are decrepit.

12.) No.3 Black liquor evaporator for batch cooking plant(1964)

Manufacturer	Hitachi Zosen	
Capacity		
Feed black liquor		
Feed rate(t/h)	Design	58.95t/h
Solid(%)	Design	18.0%
Temperature(℃)	Design	
Product black liquor		
Product rate(t/h)	Design	18.95t/h
Solid(%)	Design	58 .0%
Temperature(℃)	Design	
Evaporation (t/h)	Design	40.0

Specification

Item	Type	Heating surface (m2)	Damage
No.1 effect	Vertical forced Circulation	430	
No.2 effect	Vertical long tube	485	
No.3 effect	Vertical long tube	485	
No.4 effect	Vertical long tube	525	
No.5 effect	Vertical long tube	525	
Surface condenser	Shell and tube vertical	2-120	

The auxiliary equipment such as pumps are rusted. To be overhauled.

13.) Chemical recovery boiler for batch cooking plant(1964)

Manufacturer	Kisha Seizo Kaisha	
Capacity		
Black liquor solid	225t/d	
Black liquor concentration	56%(cascade inlet)	
Black liquor temperature		
Feed water temperature	105℃	
Steam temperature	430℃	
Steam pressure	42atg	
Steam generation	32.4t/h	
Boiler outlet gas temp.	395℃	
Economizer outlet gas temp.	245℃	
Cascade outlet gas temp.	130℃	
Specifications		
Heating surface	Boiler proper	1041m2
	Water wall	614m2
	Secondary superheater	211m2
	Primary superheater	529m2
	Primary screensuperheater	150m2
	Economizer	906m2
	Damage	

14.) Chemical recovery boiler for continuous cooking plant(1983)

Manufacturer	Gotaverken	
Capacity		
Black liquor solid	600t/d	
Black liquor concentration	60%	
Black liquor temperature	95℃	
Feed water temperature	130℃	
Steam temperature	460℃	
Steam pressure	61atg	
Steam generation	86.4t/h	
Boiler outlet gas temp.	405℃	
Economizer outlet gas temp.	130℃	
Specifications		
Heating surface	Furnace excluding bottom	592m2
	Superheater enclosure	156m2
	Secondary superheater	660m2
	Primary superheater	740m2
	Primary screensuperheater	150m2
	Screen before boiler bank	90m2
	Boiler bank	1750m2

	Economizer	5150m2
	Damage	Outside surface of tubes are rusted and scaled.

15.) Waste Water Treatment

Manufacturer	Ebara		
Capacity	Design	White water 3000m3/h	
		Black water 1500m3/h	
	Inlet effluent quality		
	Outlet quality		
Required discharge water quality		SS	80mg/l
		TDS	1500mg/l
		Dissolved oxygen	4mg/l
		BOD_5	7mg/l
		pH	6-9
		Color & Smell	None

Item	Manufa c-turer	Type	Size	Driving power	Damage
No.1 Settling basin		Rake clarification	50mϕ x 3mD	2-1.5kW	
No.2 Settling basin		Rake clarification	38mϕ x 3mD	1.5kW	

The rake and driver should be replaced.

16.) Water Intake(1966)

Manufacturer	Ebara
Capacity	3200m3/h

17.) Water Intake(1955)

Manufacturer	Wabag-Njemacka
Capacity	4000m3/h
Note	Working

18.) Boiler feedwater(1986)

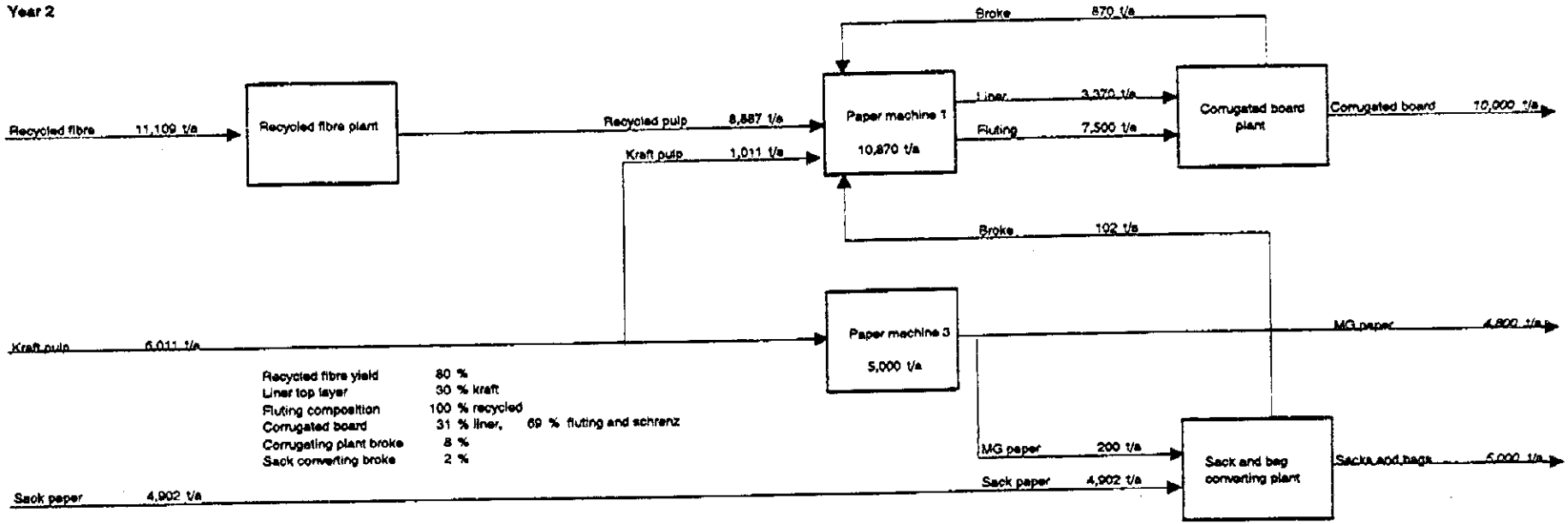
Manufacturer	VKA-Njemacka
Capacity	2-150m3/h
Note	Working

Appendix 7-I
Raw materials and production scenario, excl. PM2

		Year 1	2	3	4	5	6	7	8	9	10	11	12
Raw materials													
Recycled fibre			11,109	5,914	0	0	0	0	0	0	0	0	0
Hardwood	m3sob			68,611	141,211	140,104	145,897	148,770	151,643	151,643	151,643	151,643	151,643
Softwood	m3sob			152,451	246,802	266,033	300,923	333,544	355,364	355,364	355,364	355,364	355,364
Testliner	t			4,275	11,400	14,820	18,240	19,950	21,660	21,660	21,660	21,660	21,660
Sack paper	t		4,902	3,932									
Kraft pulp	t		6,011	6,000									
Department production													
NSSC pulping	ADt			29,831	61,396	60,915	63,433	64,683	65,932	65,932	65,932	65,932	65,932
Kraft pulping	ADt			28,232	45,704	49,265	55,727	61,767	65,808	65,808	65,808	65,808	65,808
PM1	t		10,870	36,392	65,129	65,768	69,407	71,226	73,046	73,046	73,046	73,046	73,046
PM2	t												
PM3	t		5,000	7,300	7,800	8,300	8,800	8,900	9,000	9,000	9,000	9,000	9,000
PM4	t			26,932	37,904	40,965	46,927	52,867	56,808	56,808	56,808	56,808	56,808
Sales production													
Corrugated board	t		10,000	15,000	20,000	26,000	32,000	35,000	38,000	38,000	38,000	38,000	38,000
NSSC fluting	t			24,000	53,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Schrenz	t												
MG paper	t		4,800	7,000	7,500	8,000	8,400	8,400	8,400	8,400	8,400	8,400	8,400
Sacks and bags	t		5,000	8,000	10,000	13,000	16,000	18,000	20,000	20,000	20,000	20,000	20,000
Sack paper	t			23,000	28,000	28,000	31,000	35,000	37,000	37,000	37,000	37,000	37,000
Total sales	t		19,800	77,000	118,500	125,000	137,400	146,400	153,400	153,400	153,400	153,400	153,400

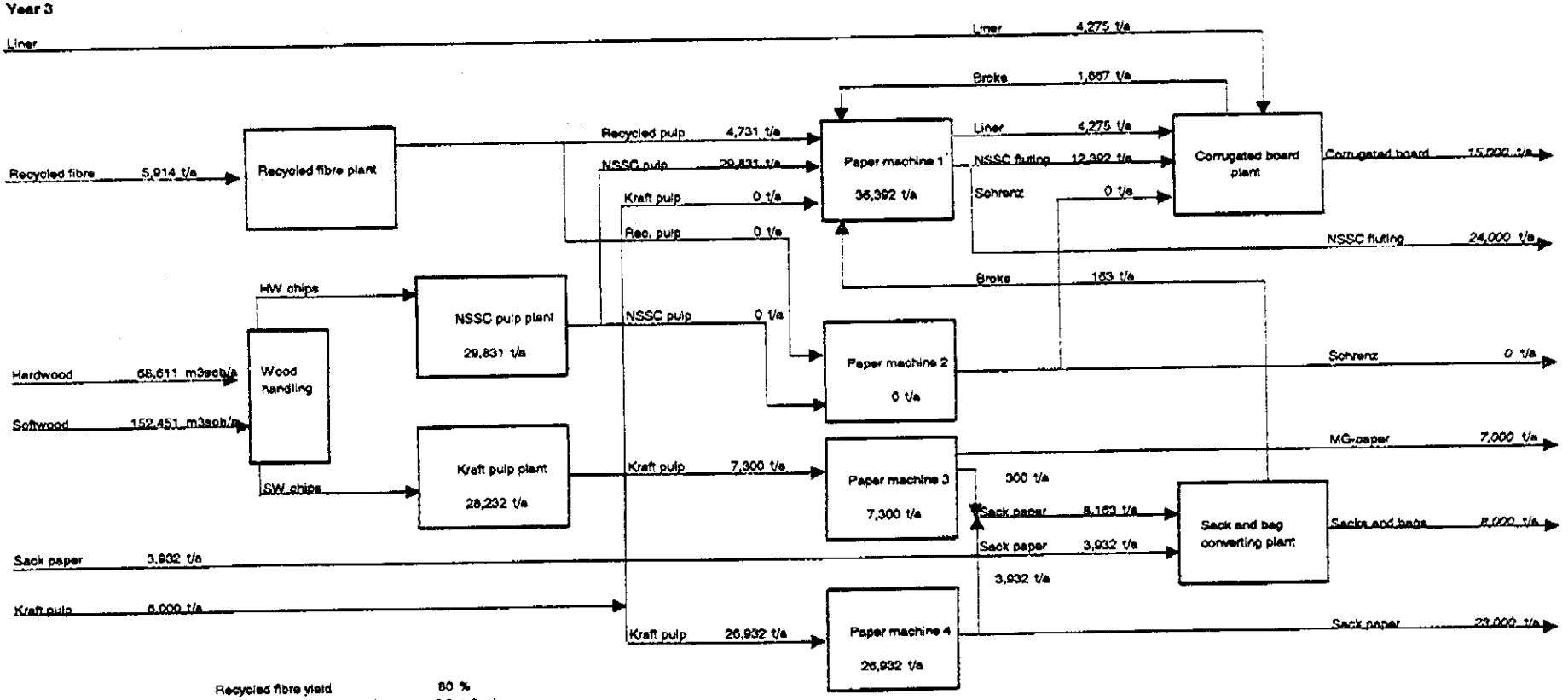
Appendix 7-I

Fibre balance, Short Term Programme
Purchased kraft pulp, own MG paper production
Year 2



Appendix 7-I

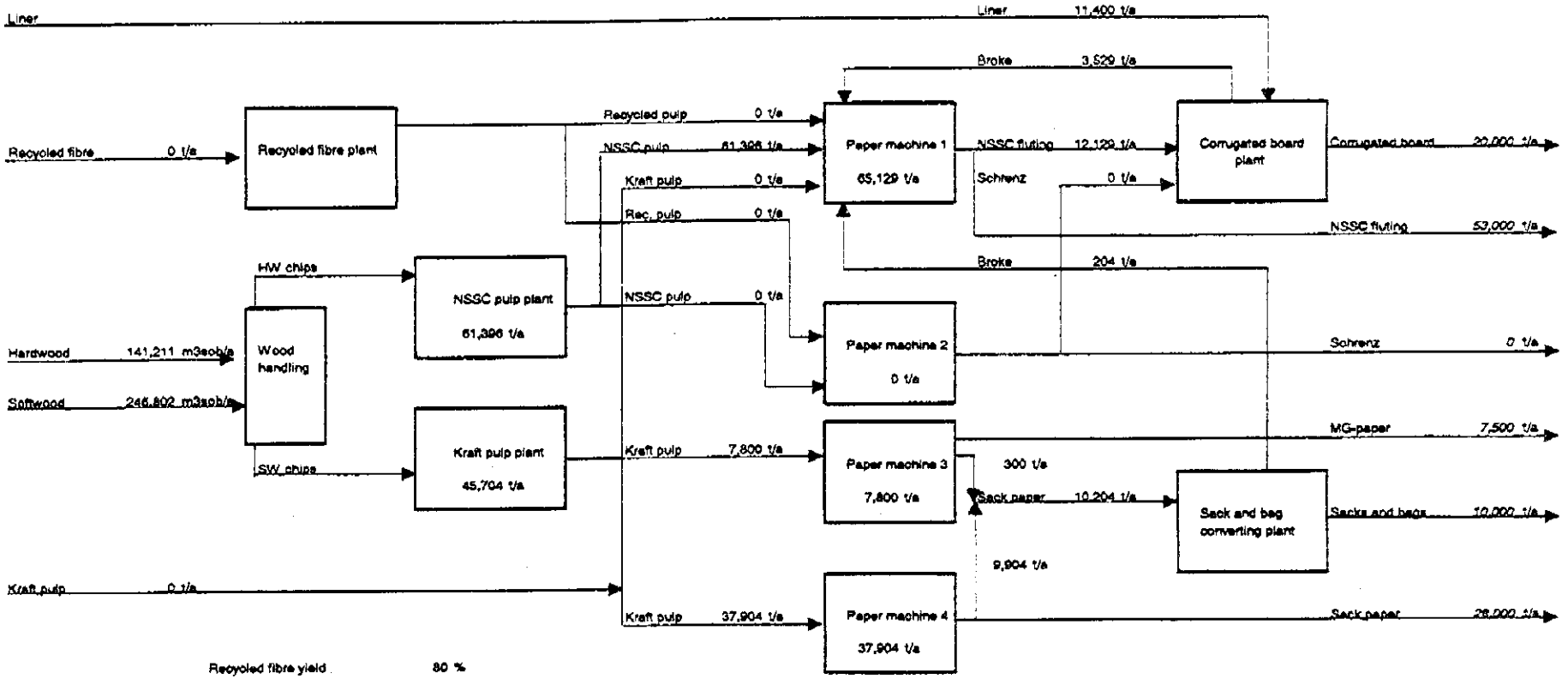
Fibre balance, Long Term Programme, excl. PM2
Purchased kraft pulp, own MG paper production1st half year
Own kraft pulp and NSSC pulp production 2nd half of year
Year 3



Recycled fibre yield	80 %			
NSSC pulp wod consumption	2,3 m3sob			
Kraft pulp wood consumption	5,4 m3sob			
Fluting composition PM1	87 % NSSC	13 % recycled		
Schrenz composition PM2	0 % NSSC	100 % recycled		
Corrugated board	57 % liner,	29 % fluting	14 % schrenz	
Corrugating plant broke	10 %			
Sack converting broke	2 %			

Appendix 7-I

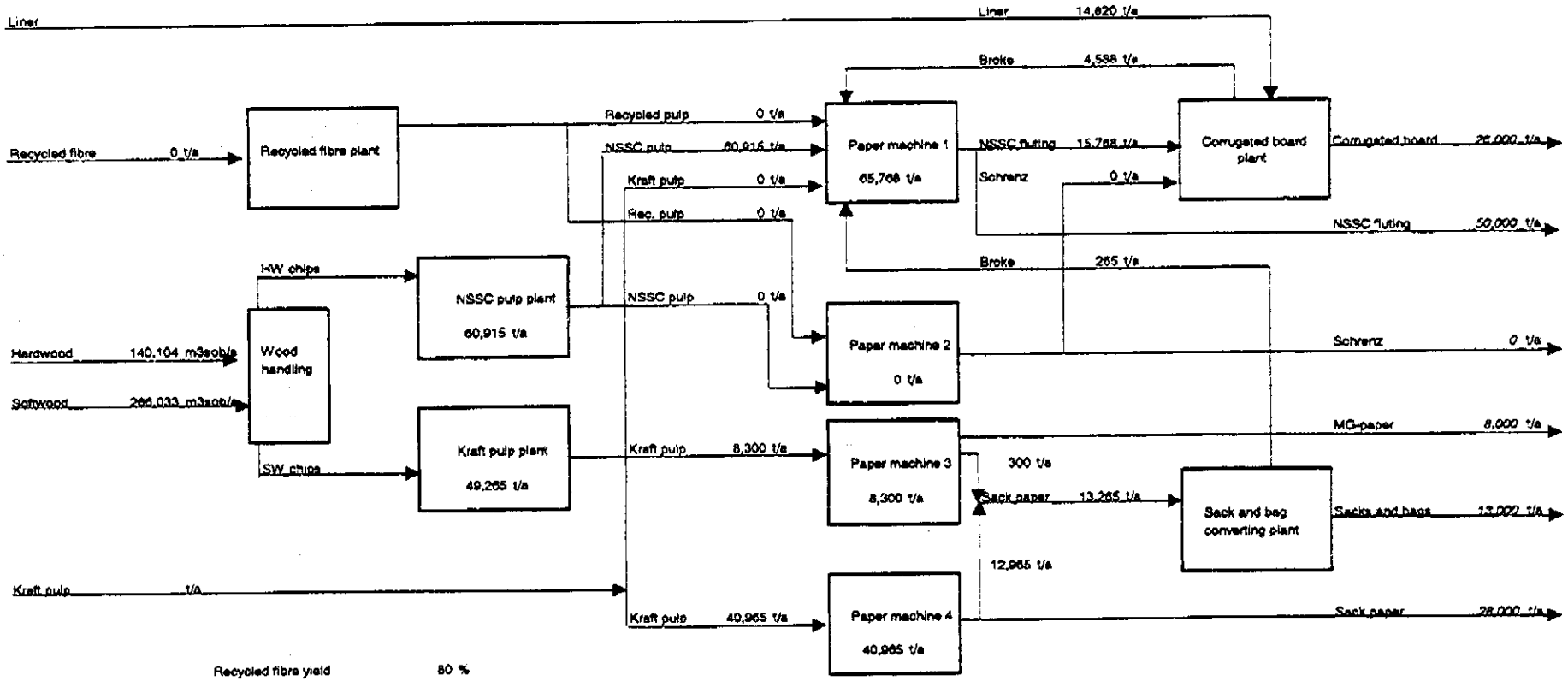
Fibre balance, Long Term Programme, excl. PM2
Own kraft pulp and NSSC pulp production
Year 4



Recycled fibre yield	80 %			
NSSC pulp wod consumption	2,3 m3sob			
Kraft pulp wood consumption	5,4 m3sob			
Fluting composition PM1	100 % NSSC	0 % recycled		
Schrenz composition PM2	0 % NSSC	100 % recycled		
Corrugated board	57 % liner,	43 % fluting	0 % schrenz	
Corrugating plant broke	15 %			
Sack converting broke	2 %			

Appendix 7-I

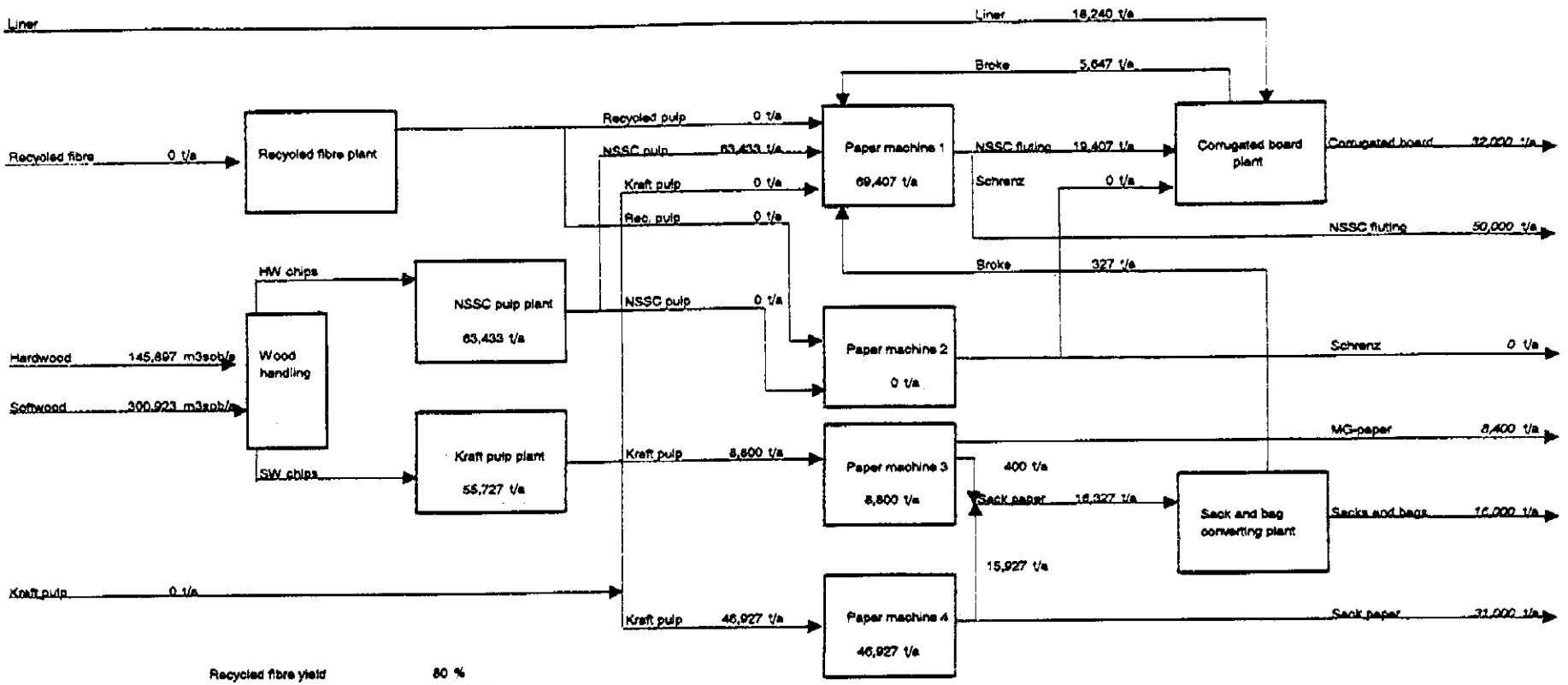
Fibre balance, Long Term Programme, excl. PM2
Own kraft pulp and NSSC pulp production
Year 5



Recycled fibre yield	80 %			
NSSC pulp wod consumption	2,3 m3sob			
Kraft pulp wood consumption	5,4 m3sob			
Fluting composition PM1	100 % NSSC	0 % recycled		
Schrenz composition PM2	0 % NSSC	100 % recycled		
Corrugated board	57 % liner,	43 % fluting	0 % schrenz	
Corrugating plant broke	15 %			
Sack converting broke	2 %			

Appendix 7-I

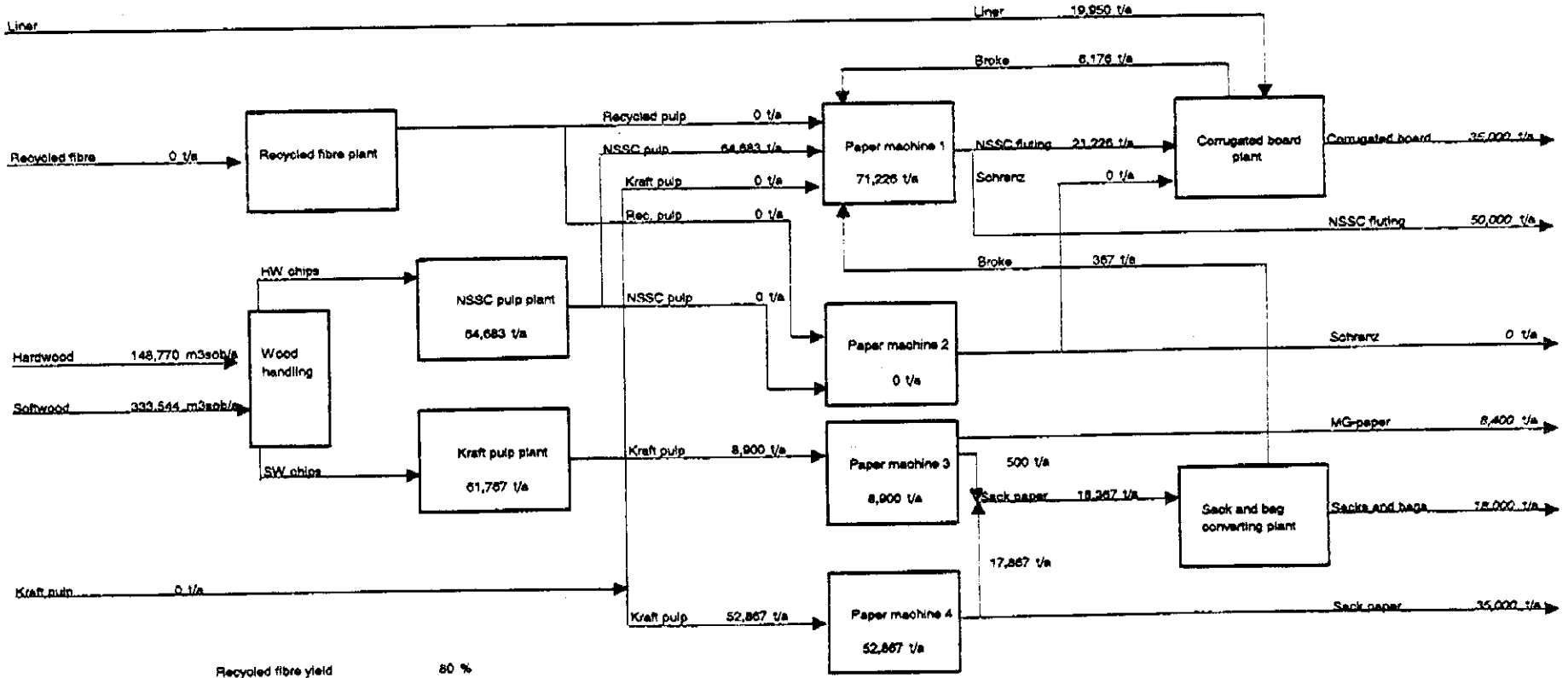
Fibre balance, Long Term Programme, excl. PM2
Own kraft pulp and NSSC pulp production
Year 6



Recycled fibre yield	80 %			
NSSC pulp wod consumption	2,3 m3sob			
Kraft pulp wood consumption	5,4 m3sob			
Fluting composition PM1	100 % NSSC	0 % recycled		
Schrenz composition PM2	0 % NSSC	100 % recycled		
Corrugated board	57 % liner,	43 % fluting	0 % schrenz	
Corrugating plant broke	15 %			
Sack converting broke	2 %			

Appendix 7-I

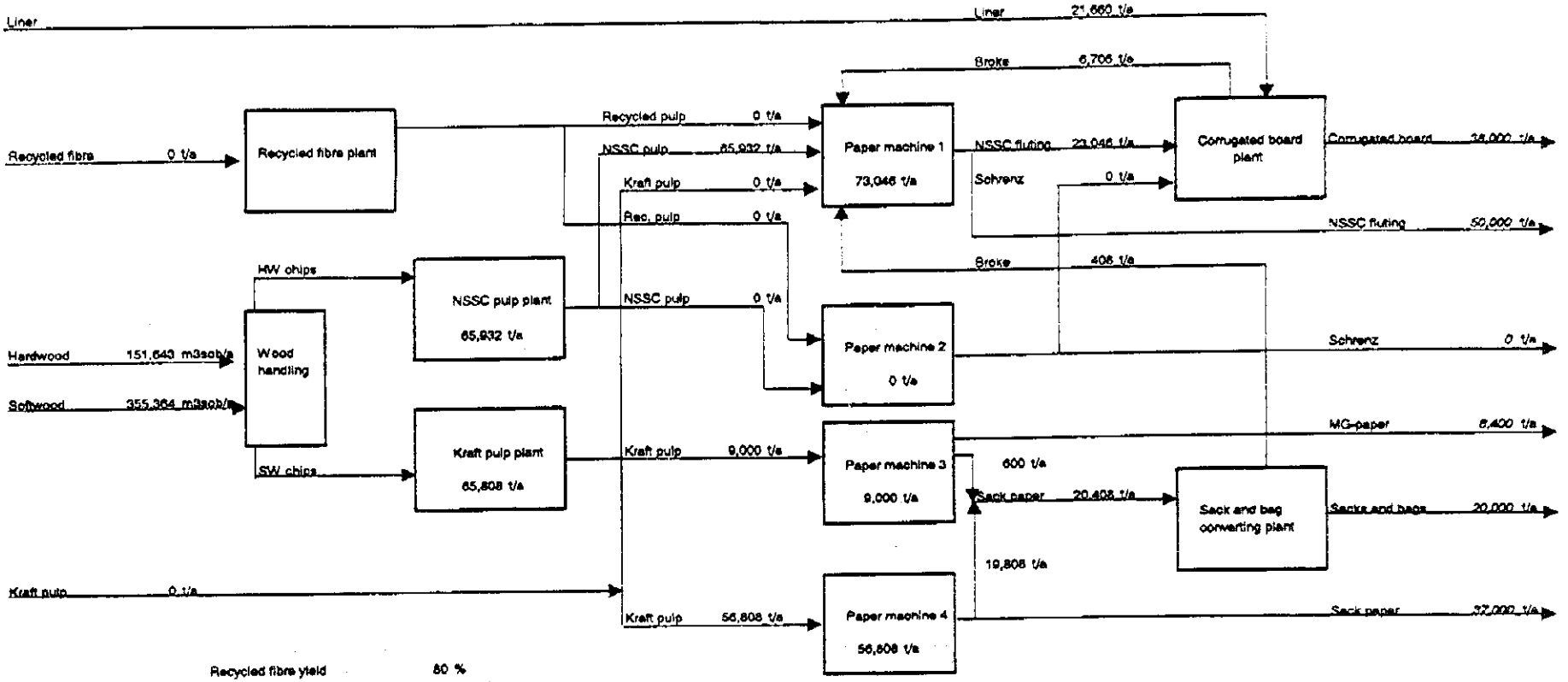
Fibre balance, Long Term Programme, excl. PM2
Own kraft pulp and NSSC pulp production
Year 7



Recycled fibre yield	80 %			
NSSC pulp wod consumption	2,3 m3sob			
Kraft pulp wood consumption	5,4 m3sob			
Fluting composition PM1	100 % NSSC	0 % recycled		
Schrenz composition PM2	0 % NSSC	100 % recycled		
Corrugated board	57 % liner,	43 % fluting	0 % schrenz	
Corrugating plant broke	15 %			
Sack converting broke	2 %			

Appendix 7-I

Fibre balance, Long Term Programme, excl. PM2
Own kraft pulp and NSSC pulp production
Year 8 and onwards



Recycled fibre yield	80 %		
NSSC pulp wod consumption	2,3 m3sob		
Kraft pulp wood consumption	5,4 m3sob		
Fluting composition PM1	100 % NSSC	0 % recycled	
Schrenz composition PM2	0 % NSSC	100 % recycled	
Corrugated board	57 % liner,	43 % fluting	0 % schrenz
Corrugating plant broke	15 %		
Sack converting broke	2 %		

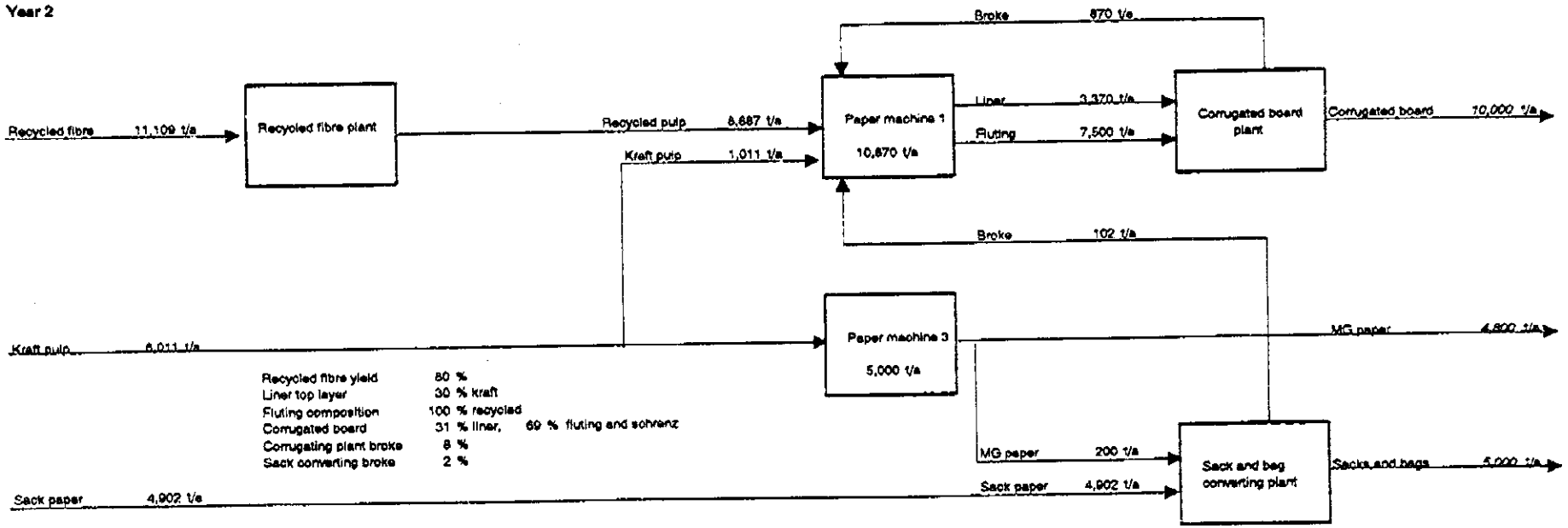
Appendix 7-I
Raw materials and production scenario, ecxl. PM2

		Year 1	2	3	4	5	6	7	8	9	10	11	12
Raw materials													
Recycled fibre			11,109	5,914	0	0	0	0	0	0	0	0	0
Hardwood	m3sob			68,611	141,211	140,104	145,897	148,770	151,643	151,643	151,643	151,643	151,643
Softwood	m3sob			152,451	246,802	266,033	300,923	333,544	355,364	355,364	355,364	355,364	355,364
Testliner	t			4,275	11,400	14,820	18,240	19,950	21,660	21,660	21,660	21,660	21,660
Sack paper	t		4,902	3,932									
Kraft pulp	t		6,011	6,000									
Department production													
NSSC pulping	ADt			29,831	61,396	60,915	63,433	64,683	65,932	65,932	65,932	65,932	65,932
Kraft pulping	ADt			28,232	45,704	49,265	55,727	61,767	65,808	65,808	65,808	65,808	65,808
PM1	t		10,870	36,392	65,129	65,768	69,407	71,226	73,046	73,046	73,046	73,046	73,046
PM2	t												
PM3	t		5,000	7,300	7,800	8,300	8,800	8,900	9,000	9,000	9,000	9,000	9,000
PM4	t			26,932	37,904	40,965	46,927	52,867	56,808	56,808	56,808	56,808	56,808
Sales production													
Corrugated board	t		10,000	15,000	20,000	26,000	32,000	35,000	38,000	38,000	38,000	38,000	38,000
NSSC fluting	t			24,000	53,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Schrenz	t												
MG paper	t		4,800	7,000	7,500	8,000	8,400	8,400	8,400	8,400	8,400	8,400	8,400
Sacks and bags	t		5,000	8,000	10,000	13,000	16,000	18,000	20,000	20,000	20,000	20,000	20,000
Sack paper	t			23,000	28,000	28,000	31,000	35,000	37,000	37,000	37,000	37,000	37,000
Total sales	t		19,800	77,000	118,500	125,000	137,400	146,400	153,400	153,400	153,400	153,400	153,400

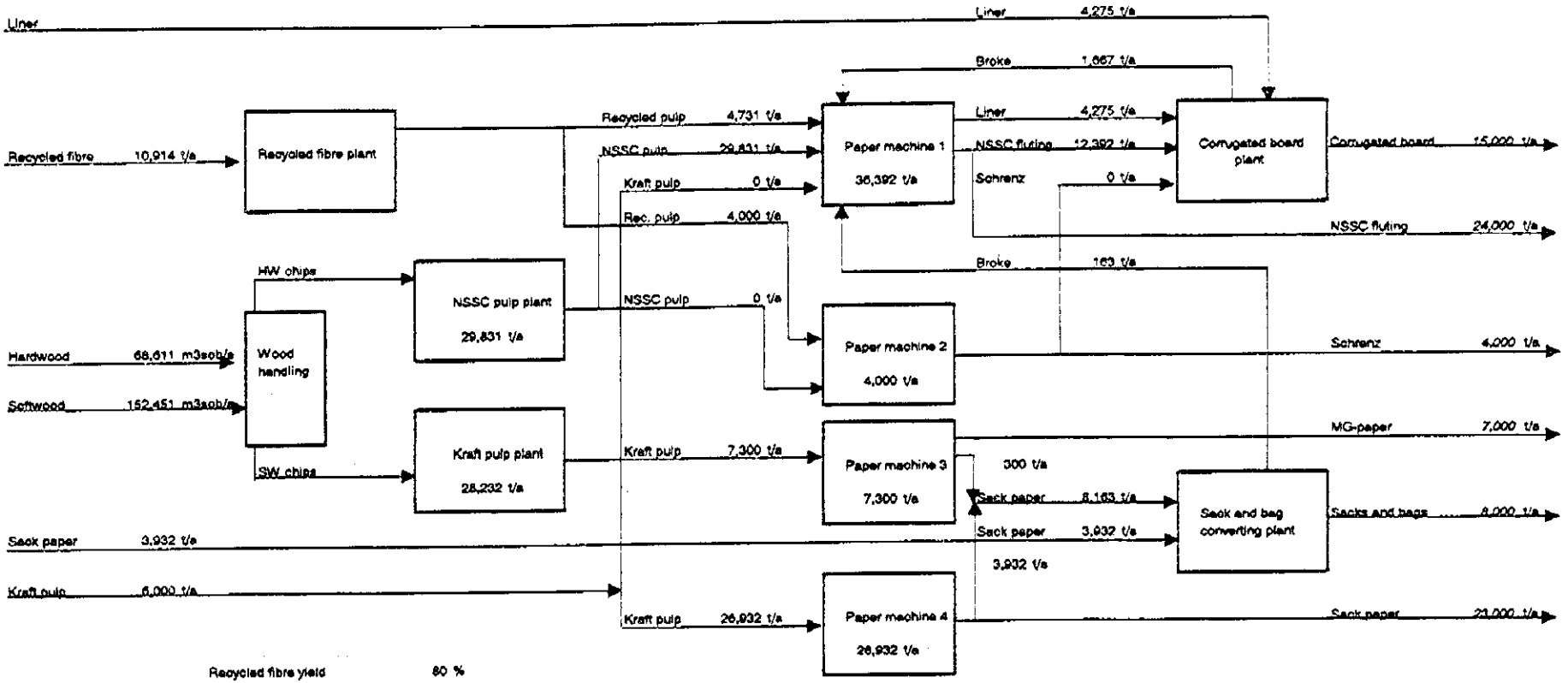
Raw materials and production scenario incl. PM2

		Year 1	2	3	4	5	6	7	8	9	10	11	12
Raw materials													
Recycled fibre	m3sob		11,109	10,914	13,250	16,600	22,450	26,000	27,050	27,050	27,050	27,050	27,050
Hardwood	m3sob			68,611	140,291	138,908	144,425	147,160	149,895	149,895	149,895	149,895	149,895
Softwood	t			152,451	246,802	266,033	300,923	333,544	355,364	355,364	355,364	355,364	355,364
Testliner	t			4,275	6,200	8,060	9,920	10,850	11,780	11,780	11,780	11,780	11,780
Sack paper	t		4,902	3,932									
Kraft pulp	t		6,011	6,000	0	0	0	0	0	0	0	0	0
Department production													
NSSC pulping	ADt			29,831	60,996	60,395	62,793	63,983	65,172	65,172	65,172	65,172	65,172
Kraft pulping	ADt			28,232	45,704	49,265	55,727	61,767	65,808	65,808	65,808	65,808	65,808
PM1	t		10,870	36,392	64,729	65,248	68,767	70,526	72,286	72,286	72,286	72,286	72,286
PM2	t			4,000	10,600	13,280	17,960	20,800	21,640	21,640	21,640	21,640	21,640
PM3	t		5,000	7,300	7,800	8,300	8,800	8,900	9,000	9,000	9,000	9,000	9,000
PM4	t			26,932	37,904	40,965	46,927	52,867	56,808	56,808	56,808	56,808	56,808
Sales production													
Corrugated board	t		10,000	15,000	20,000	26,000	32,000	35,000	38,000	38,000	38,000	38,000	38,000
NSSC fluting	t			24,000	53,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Schrenz	t			4,000	5,000	6,000	9,000	11,000	11,000	11,000	11,000	11,000	11,000
MG paper	t		4,800	7,000	7,500	8,000	8,400	8,400	8,400	8,400	8,400	8,400	8,400
Sacs and bags	t		5,000	8,000	10,000	13,000	16,000	18,000	20,000	20,000	20,000	20,000	20,000
Sack paper	t			23,000	28,000	28,000	31,000	35,000	37,000	37,000	37,000	37,000	37,000
Total sales	t		19,800	81,000	123,500	131,000	146,400	157,400	164,400	164,400	164,400	164,400	164,400

Fibre balance, Short Term Programme
Purchased kraft pulp, own MG paper production
Year 2

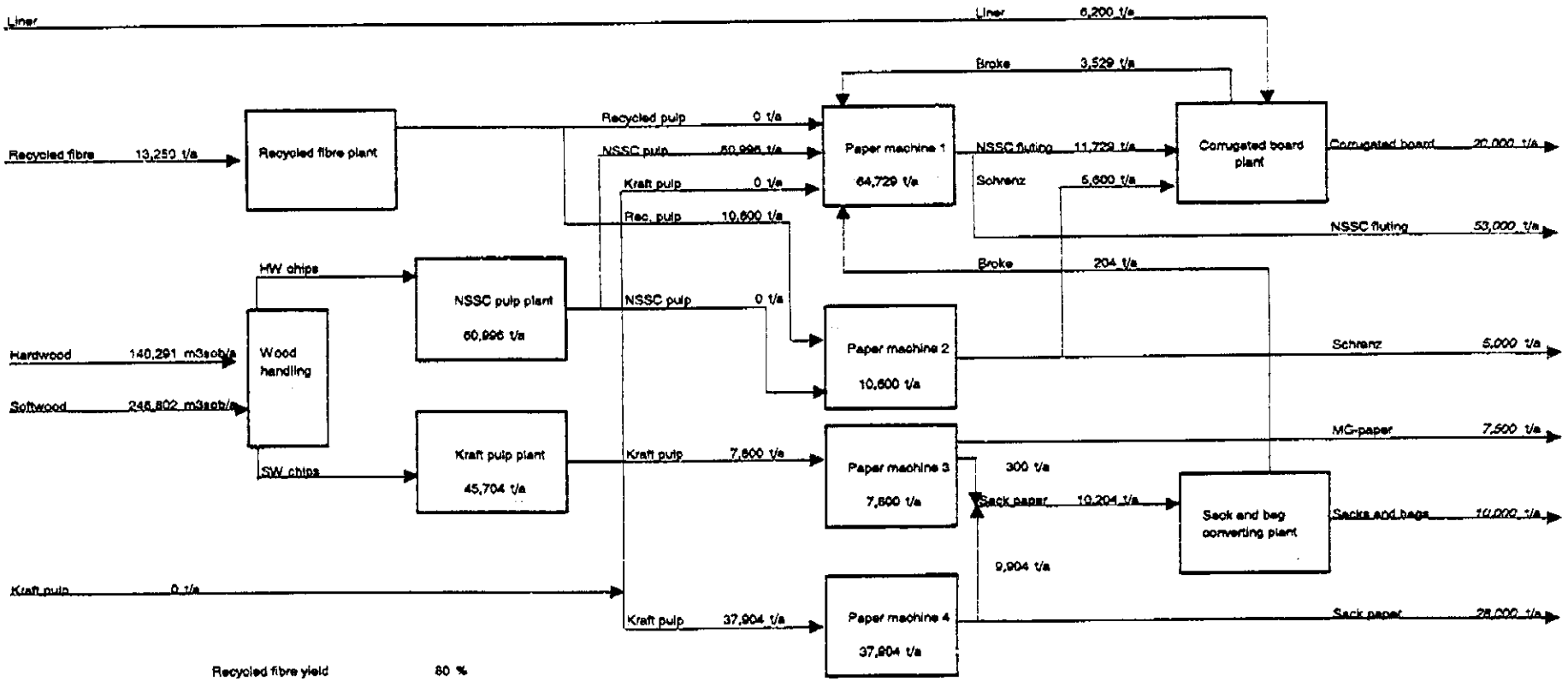


Fibre balance, Long Term Programme, incl. PM2
Purchased kraft pulp, own MG paper production1st half year
Own kraft pulp and NSSC pulp production 2nd half of year
Year 3



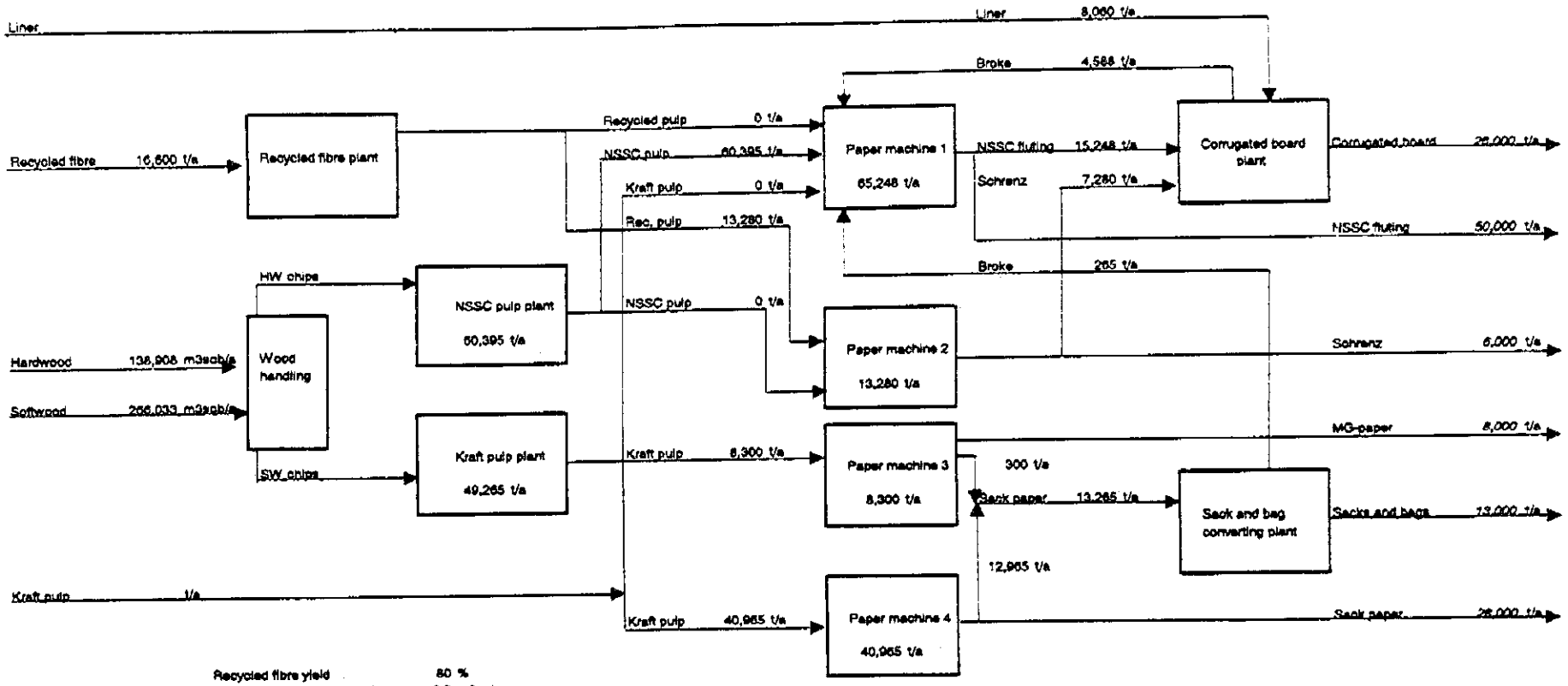
Recycled fibre yield	80 %		
NSSC pulp wod consumption	2.3 m3sob		
Kraft pulp wood consumption	5.4 m3sob		
Fluting composition PM1	87 % NSSC	13 % recycled	
Schrenz composition PM2	0 % NSSC	100 % recycled	
Corrugated board	57 % liner,	29 % fluting	14 % schrenz
Corrugating plant broke	10 %		
Sack converting broke	2 %		

Fibre balance, Long Term Programme, Incl. PM2
Own kraft pulp and NSSC pulp production
Year 4



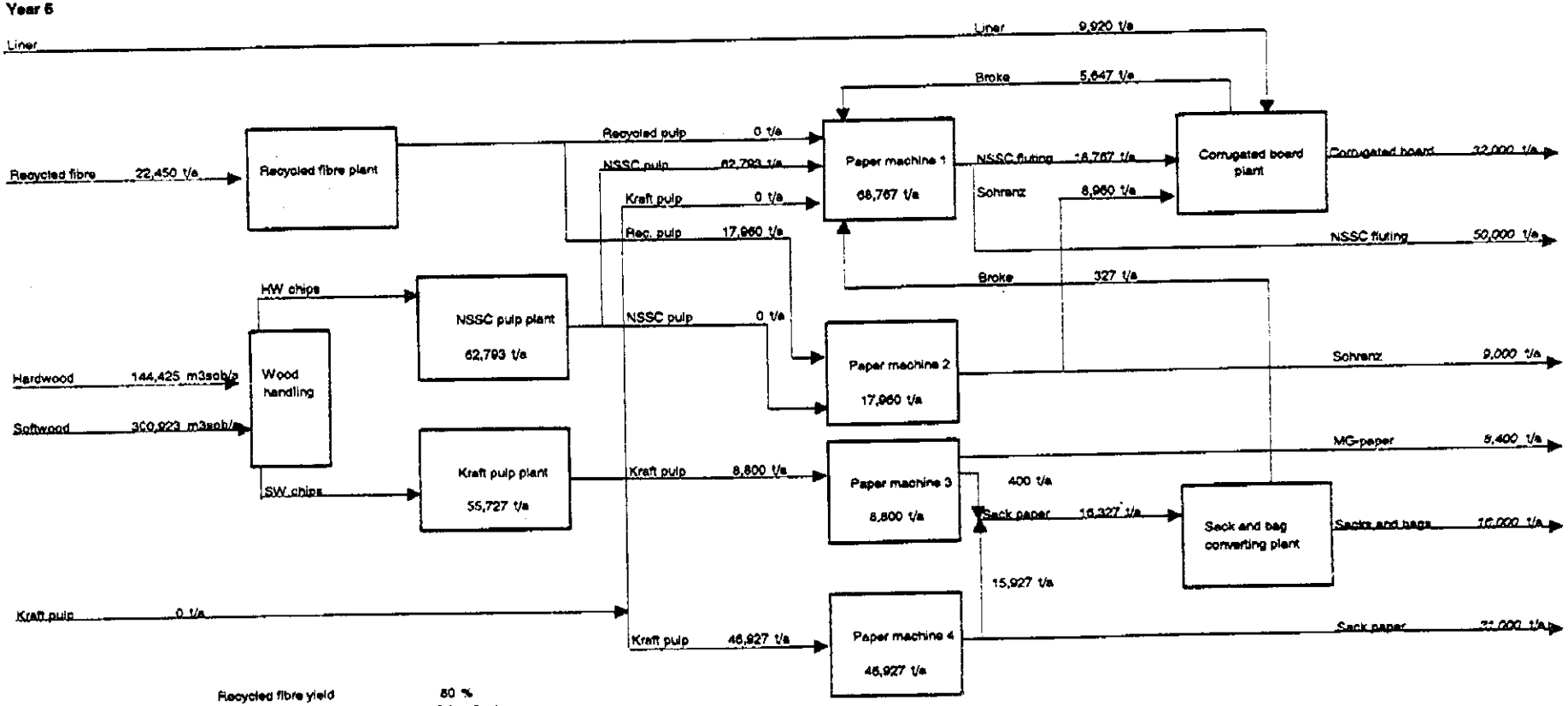
Recycled fibre yield	80 %	
NSSC pulp wod consumption	2.3 m3sob	
Kraft pulp wood consumption	5.4 m3sob	
Fluting composition PM1	100 % NSSC	0 % recycled
Schrenz composition PM2	0 % NSSC	100 % recycled
Corrugated board	31 % liner,	41 % fluting 28 % schrenz
Corrugating plant broke	15 %	
Sack converting broke	2 %	

Fibre balance, Long Term Programme, incl. PM2
Own kraft pulp and NSSC pulp production
Year 5



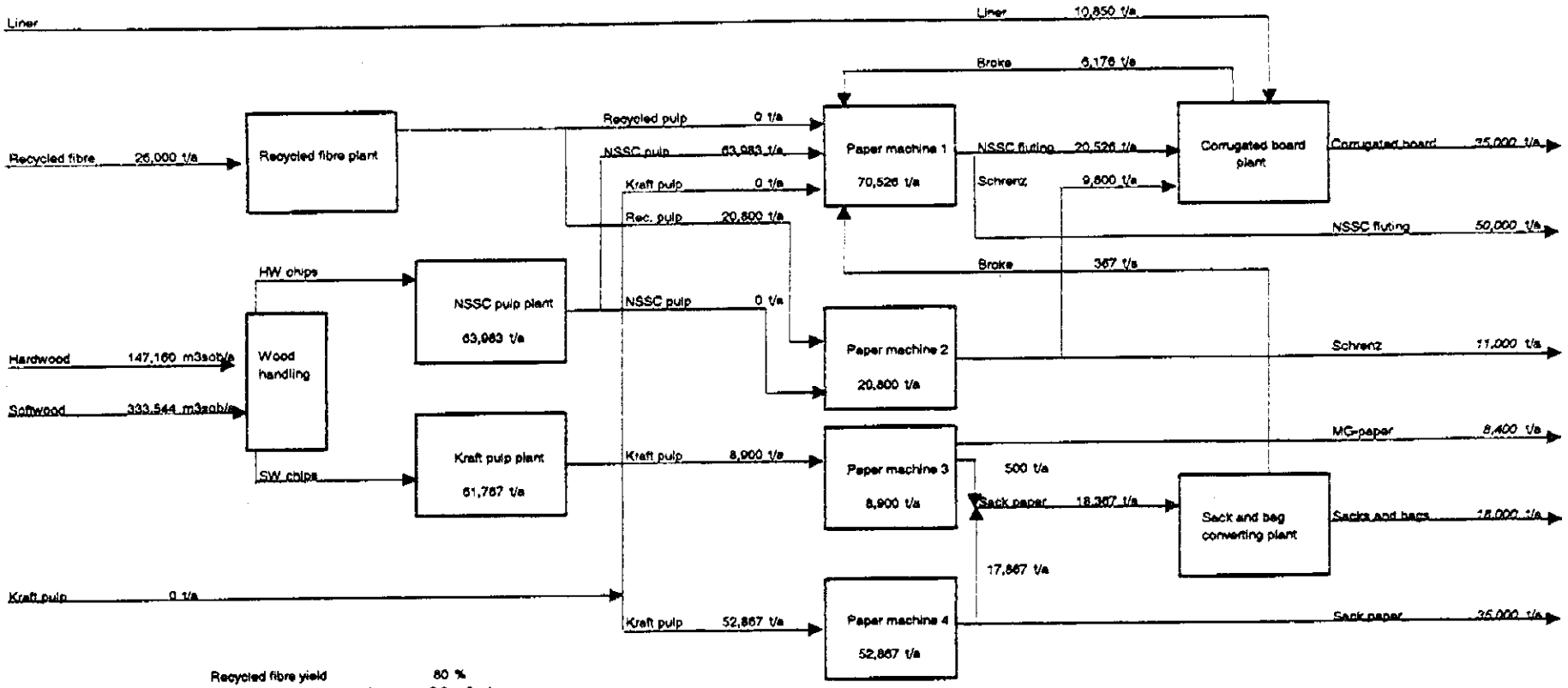
Recycled fibre yield	80 %			
NSSC pulp wod consumption	2.3 m3sob			
Kraft pulp wood consumption	5.4 m3sob			
Fluting composition PM1	100 % NSSC	0 % recycled		
Schrenz composition PM2	0 % NSSC	100 % recycled		
Corrugated board	31 % liner,	41 % fluting	28 % schrenz	
Corrugating plant broke	15 %			
Sack converting broke	2 %			

Fibre balance, Long Term Programme, incl. PM2
Own kraft pulp and NSSC pulp production
Year 5



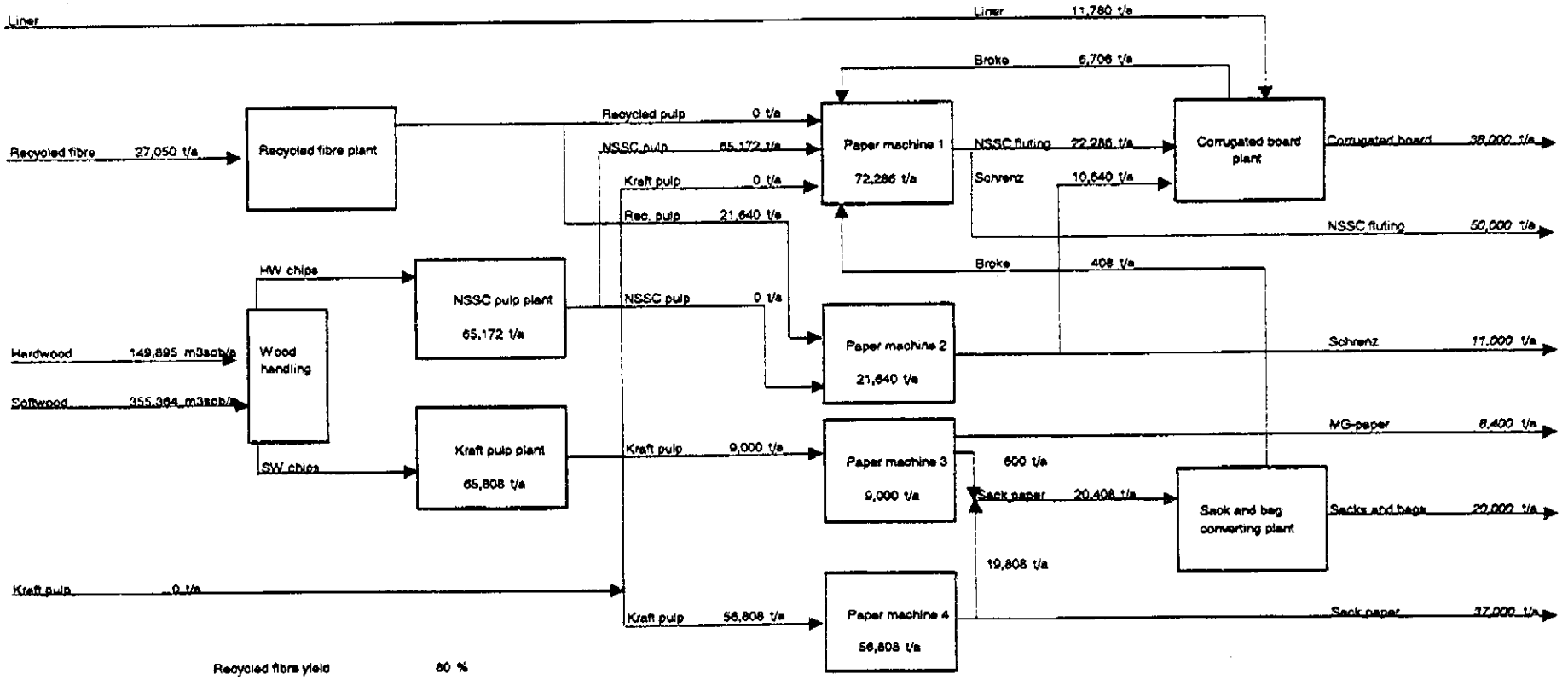
Recycled fibre yield	80 %			
NSSC pulp wod consumption	2.3 m3sob			
Kraft pulp wood consumption	5.4 m3sob			
Fluting composition PM1	100 % NSSC	0 % recycled		
Schrenz composition PM2	0 % NSSC	100 % recycled		
Corrugated board	31 % liner,	41 % fluting	28 % schrenz	
Corrugating plant broke	15 %			
Sack converting broke	2 %			

Fibre balance, Long Term Programme, incl. PM2
Own kraft pulp and NSSC pulp production
Year 7



Recycled fibre yield	80 %			
NSSC pulp wod consumption	2.3 m3sob			
Kraft pulp wood consumption	5,4 m3sob			
Fluting composition PM1	100 % NSSC	0 % recycled		
Schrenz composition PM2	0 % NSSC	100 % recycled		
Corrugated board	31 % liner,	41 % fluting	28 % schrenz	
Corrugating plant broke	15 %			
Sack converting broke	2 %			

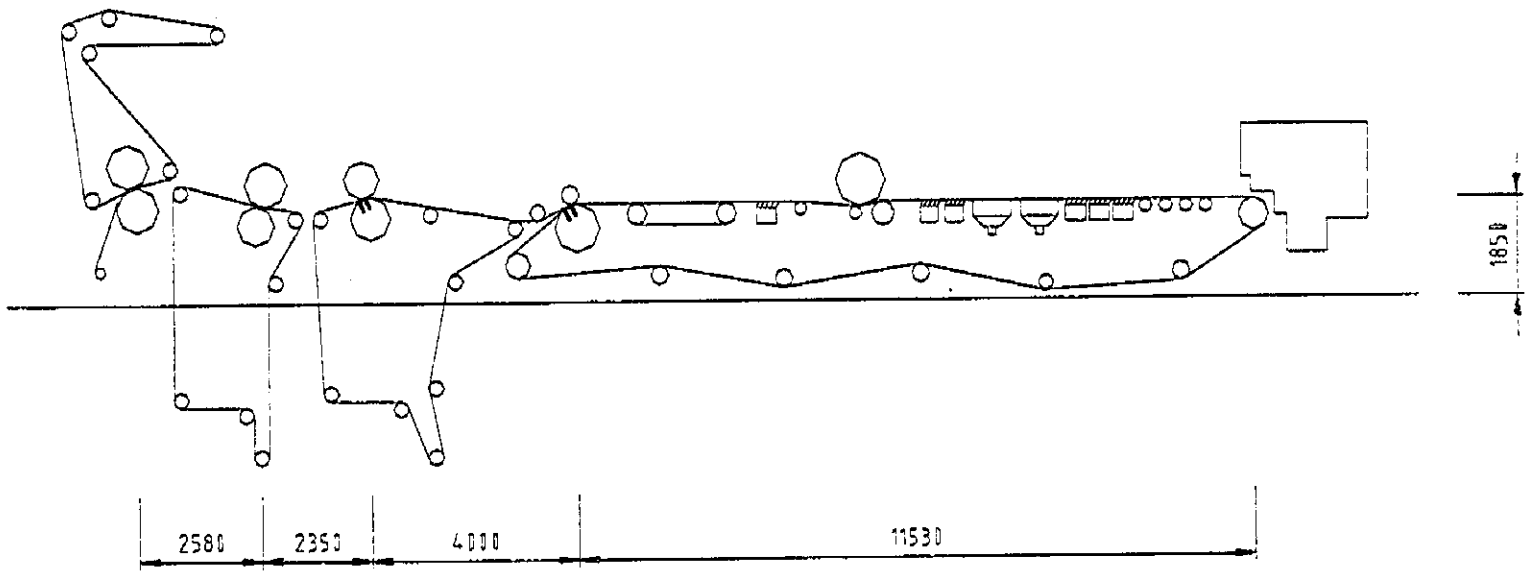
Fibre balance, Long Term Programme, incl. PM2
Own kraft pulp and NSSC pulp production
Year 5 and onwards

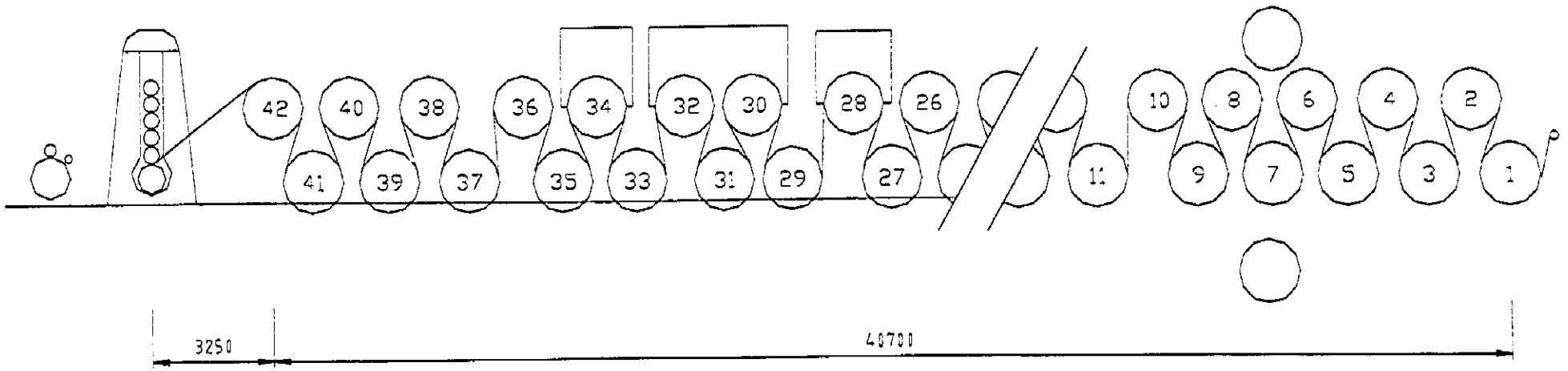


Recycled fibre yield	80 %			
NSSC pulp wod consumption	2.3 m3sob			
Kraft pulp wood consumption	5.4 m3sob			
Fluting composition PM1	100 % NSSC	0 % recycled		
Schrenz composition PM2	0 % NSSC	100 % recycled		
Corrugated board	31 % liner,	41 % fluting	28 % schrenz	
Corrugating plant broke	15 %			
Sack converting broke	2 %			

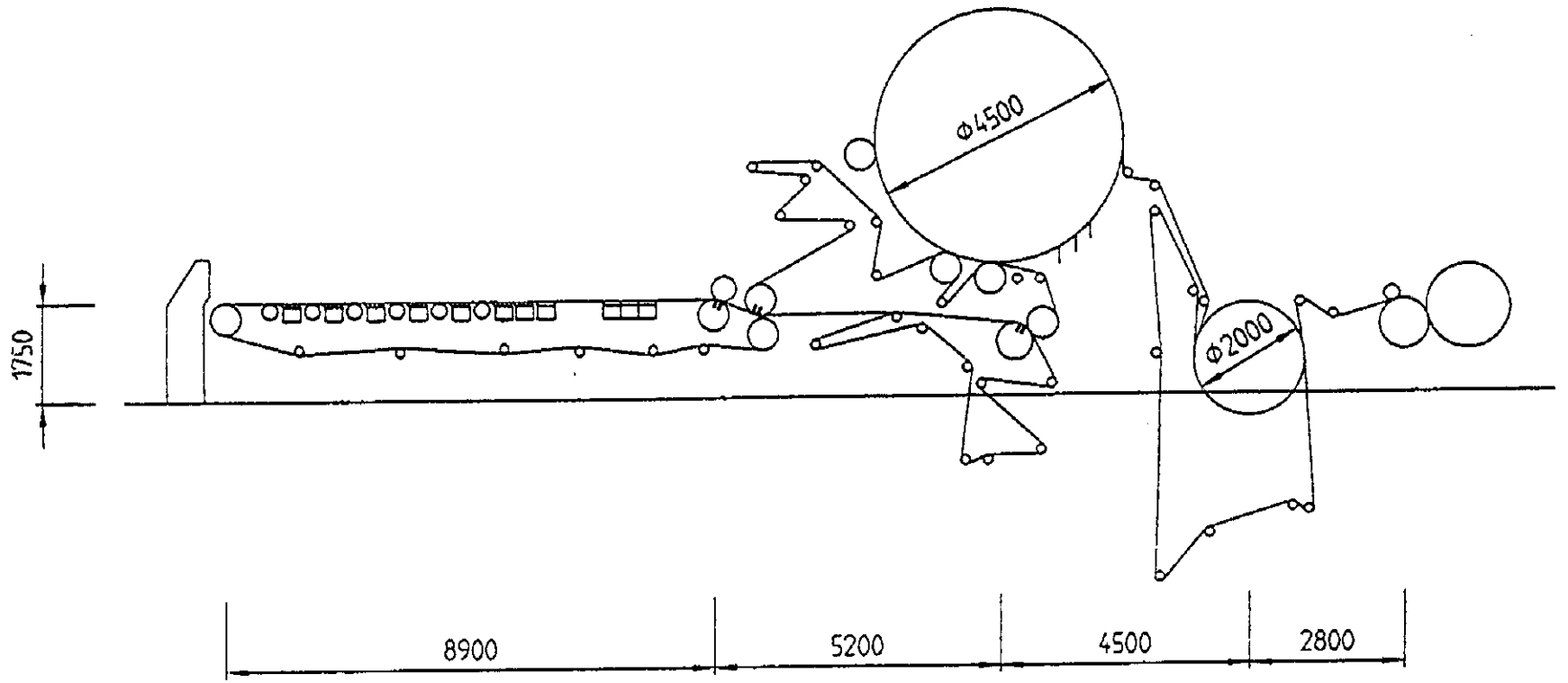
Appendix 7.II

Paper Machine 1
Trim Max 4250 mm
Speed Max 350 m/min



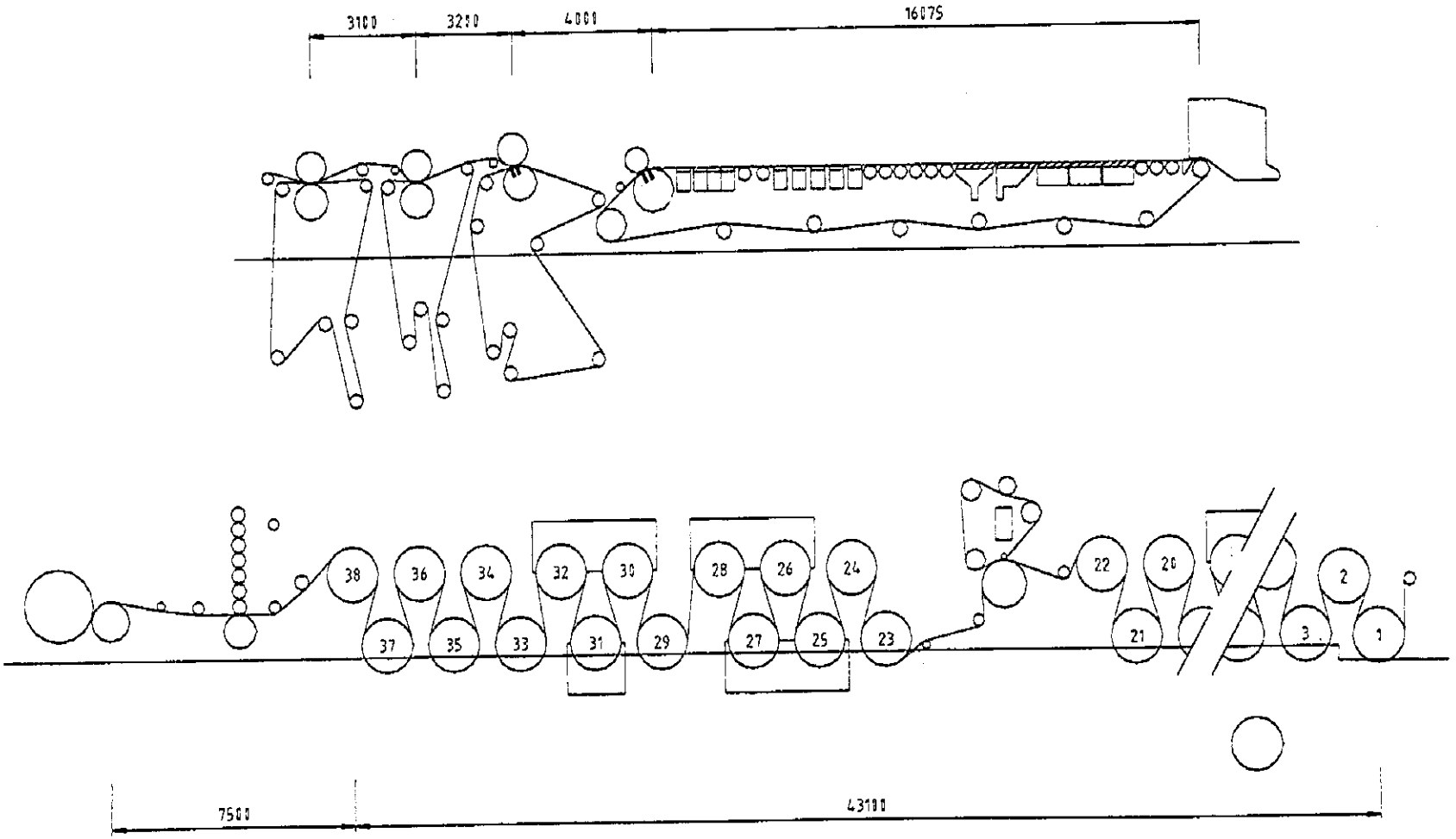


Paper Machine 3
Trim Max 2860 mm
Speed Max 250 m/min



Appendix 7.II

Paper Machine 4
Trim Max 5450 mm
Speed Max 400 m/min



NATRON Maglaj
Paper Mill

Design Criteria

				PM1 Fluting SCP	PM2 Schrenz	PM3 MG	PM4 Sack kraft
1 **PAPER PRODUCTION**							
Basis weights:							
paper at reeler			g/m2	120	140	60	90
Dry contents:							
paper at reeler			%	94	94	94	93
after predrying group			%	94	94	88	93
PM Speeds:							
construction speed			m/min	350	350	250	400
drive speed			m/min	350	350	250	400
production speed	on the reel	max	m/min	335	120	175	290
	on the reel	avg	m/min	330	115	170	285
	on the wire	avg	m/min				
	creping	avg	%				
Widths:							
wire			mm	4,500	3,800	3,150	6,000
web on wire			mm				
web to press			mm	4,380	3,360		5,770
web at PM reeler			mm	4,250	3,260	2,860	5,450
web after winder, max			mm				
web after winder, average			mm	4,100	3,050	2,700	5,200
trim after sheeting, average			mm				
Available time			d/a	350	350	350	350
Time efficiency							
PM shut downs							
operational	of available time		%	3.0	3.0	3.0	3.0
maintenance, planned	of available time		%	1.0	1.0	2.0	2.0
maintenance, unplanned	of available time		%	1.0	1.0	1.0	1.0
PM web breaks	of running time		%	3.0	4.0	3.0	3.0
Other time losses	of running time		%	2.0	2.0	1.0	1.0
Total time efficiency			%	90.3	89.3	90.2	90.2
Material efficiency in roll production							
Trim loss on winder	of max. width after winder		%	3.5	6.4	5.6	4.6
Other loss PM-shipping rolls	of paper on PM reel		%	1.0	3.0	4.0	3.0
Total material efficiency in roll production			%	95.5	90.8	90.6	92.6
Total efficiency in roll production			%	86.2	81.0	81.8	83.5
Total efficiency			%	86.2	81.0	81.8	83.5
Paper machine and winder production							
Design production, on reeler with max. operating speed			t/d	246	79	43	205
Momentary production on reeler with average speed			t/d	242	76	42	201
Avg. production on reeler			t/d	219	67	38	182
Avg. production of rolls after winder			t/d	209	61	34	168
Sales production, average							
rolls			t/d	209	61	34	168
sheets			t/d	0	0	0	0
total			t/d	209	61	34	168
Sales production, excl.packing, annual							
rolls			t/a	73,113	21,438	12,024	58,843
sheets			t/a	0	0	0	0
total			t/a	73,113	21,438	12,024	58,843

NATRON Maglaj
Paper Mill **Design Criteria**

			PM1 Fluting SCP	PM2 Schrenz	PM3 MG	PM4 Sack kraft
2 **DRYING CAPACITY AND ENERGY CONSUMPTION FOR DRYING**						
Dry contents:						
at reeler		%	94	94	94	93
before afterdrying		%	94	94	88	93
* paper after press part		%	37	37	36.5	37
Water evaporation						
predryer section		g/m2	185	216	90.4	136.2
afterdryer section (from surface size or coating colour)		g/m2	0.0	0.0	4.1	
Water evaporation, max. operating speed						
predryer section		kg/h	15,792	5,062	2,716	12,917
afterdryer section or coater		kg/h	0	0	123	
Spec. drying rate :						
* predryer cylinders		kgH2O/m2/h	16	15	70	14
* after dryer or coater cylinders		kgH2O/m2/h			8	
* Steam pressure for drying max.		bar(e)	3.0	3.0	4.0	12.0
* Enthalphy difference (steam-kond.)		GJ/t	2.36	2.36	2.36	2.40
Energy requirement in drying						
* cylinders		GJ/tH2O	3.3	3.3	3.5	4.5
Dryer cylinders						
* diameter, predryers		m	1.5	1.5	4.5	1.5
diameter, afterdryers		m			2.0	
required number	predryers	pcs	49	22	1.0	36
	afterdryers	pcs			0.9	
* actual number	predryers	pcs	41	23	1.0	37
*	afterdryers	pcs			1.0	
Steam demand, max. operating speed						
predrying cylinders		t/h	22	7	4	24
afterdrying cylinders		t/h			0	0
* other steam consumption in paper mill		t/h	6	2	1	3
total continuous, max. operating speed		t/h	28	9	6	27
* Peak demand	(on top of avg 25 %)	t/h	35	11	7	33
Steam demand, average operating speed		t/h	28	9	5	26
Spec. steam consumption per net ton of saleable paper		t/t paper net	3.2	3.4	3.8	3.8
Spec. heat consumption per net ton of saleable paper		GJ/t paper net	7.5	8.0	9.0	9.0

Appendix 7-II-3

Natron Maglaj dd

Compairson Clupak paper properties
Natron perwar quality level.

			Natron			Dunapac		Scan.standard	
Grammage	Gr/m2		70	80	90	80	90	80	90
Tensile Index	Nm/g	MD	59	57	56	48	48	70	70
Tensile Index	Nm/g	CD	35	32	26	33	33	50	50
Stretch at break	%	MD	6	6	6			5.5	5.5
Stretch at break	%	CD	6	6	6	6.5	6.5	8	7.5
Tensile Energy Abs.	J/m2	MD	150	170	180	168	190	200	225
Tensile Energy Abs.	J/m2	CD	120	130	130	147	160	240	250
Air resistance	Sek.		30	30	30	28	28	20	20

Appendix 7-III
Laboratory report
Paper properties

			PM1	PM3	PM4
Grammage		gr/m2	*	*	*
Tensile MD		kN/m	*	*	*
Tensile CD		kn./m	*	*	*
Ratio MD/CD		%	*	*	*
Stretch MD		%		*	*
Stretch MD		%		*	*
TEA MD		J/m2			*
TEA CD		J/m2			*
Tear index	MD	Nm/kg			*
Tear index	CD	Nm/kg			*
Gurley		s	*	*	*
Cobb 60		gr/m2	*	*	*
Wet strength		%			*
RCT index	MD		*		
RCT index	CD		*		
CCT index	CD				
Burst index		MN/kg	*		
CMT		N	*		
Moisture		%	*	*	*

Each Paper machine need to have a separate Paper properties form.

Appendix 7-III

Paper machine targets and reports.

		PM1	PM 3	PM4
Paper grade		*	*	*
Kraft pulp	%		*	*
Semi chemical pulp	%	*		
Broke	%	*	*	*
HC Refining	KWh/t			*
Conc.	%			*
LC Refining	KWh/t	*	*	*
Conc.	%	*	*	*
Beating degree	SR	*	*	*
Size	kg/t		*	*
Starch	kg/t		*	*
Alum	kg/t		*	*
Wet strength	kg/t		*	*
Stuff box conc.	%	*	*	*
Stuff box	SR	*	*	*
Stuff box	pH	*	*	*
Grammage valve	%	*	*	*
Head box conc.	%	*	*	*
Head box slice	mm	*	*	*
Total head	mm	*	*	*
Jet/wire ratio	%	*	*	*
White water	pH	*	*	*
White water conc.	%	*	*	*
Speed wire	m/min	*	*	*
Speed reeler	m/min	*	*	*
Press 1	kN/m	*	*	*
Press 2	kN/m	*	*	*
Press 3	kN/m	*	*	*
Clupak steam pressure	kPa			*
Beam pressurek	N/m			*
Clupak speed difference	%			*
Dry content Clupak	%			*
Yankee steam kPa		*		
Hood steam	kPa		*	
Recirk. Hood			*	

Appendix 7-III

Paper machine production report

Date Shift Year month day Shift No.

Paper grade _____

Grammage _____ gr/m^2

Production rate Actual _____ t/h

Production rate Target _____ t/h

Speed reeler _____ m/min

Lost production time / breaks

Grade change	_____ min	Cause
Wire	_____ min	Cause
Press	_____ min	Cause
Dryer	_____ min	Cause
Clupak	_____ min	Cause
Reeler	_____ min	Cause

Lost production / sub quality

Paper Machine	_____ ton	Cause
Winder	_____ ton	Cause
Lab control	_____ ton	Cause

7-IV Preliminary manning list

The manning list in the next few pages follows the new overall organsation structure proposed by Natron management. Because the purpose this list is only to estimate the total number of personnel needed for operating the mill, some common functions in Production and Technical Division have been combined under same headings, and some other simplifications have been made.

All the existing facilities excluding PM2, and PM5 are expected to be in normal continuo operation including wood handling, two pulping lines, chemicals recovery, four paper machines and the converting plants.

Proposed organisation structure

General Manager ans secretary	7
Production and Technical Division	
Common	81
Pulp and Paper Sector	
Wood handling and Pulp Mill	239
Paper Mill	172
Sack and Bag Production Sector	133
Corrugated Board Sector	117
Maintenance Sector	362
Independent Expertise Division	8
Common Administrative Division	
Common	12
Marketing Sector	15
Development Sector	18
Economy Sector	12
Personnel Administration Sector	28
All total	1,204

Preliminary manning list

	Working shedule shifts/day	days/week	Manning in shift	Manning total
General Manager				1
Secretary and Administration				6
Total				7
Production and Technical Division				
Common				
Assistant for General Manager	1	5		1
Sector Manager	1	5		4
Quality control	1	5		30
Quality control	3	7	4	16
Marketing and sales	1	5		10
Accounting	1	5		8
Personnel	1	5		6
Secretary	1	5		3
Office	1	5		3
Total common				81
1 Pulp and Paper Production Sector				
Wood handling and pulp mill				
Superintendent	1	5		1
Foremen	1	5		3
Foremen	3	7	3	12
Office	1	5		3
Labour				
Wood yard	3	7	15	60
Digesting plant	3	7	6	24
Evaporator	3	7	3	12
Recovery boiler	3	7	5	20
Recaustisising	3	7	4	16
Lime kiln	3	7	4	16
Crude oil production	3	7	2	8
Coal boiler plant	3	7	5	20
Turbine hall	3	7	2	8
Fresh water treatment	3	7	2	8
Effluent treatment	3	7	1	4
Cleaners	1	5		4
Reserve and dayworkers	1	5		20
Total woodhandling and pulp mill				239

Preliminary manning list

	Working shedule shifts/day	days/week	Manning in shift	Manning total
Paper mill				
PM1				
Superintendent (PM1, PM3)	1	5		1
Foremen	3	7	1	4
Office	1	5		2
Labour				
Broke handling	3	7	2	8
Stock preparation	3	7	1	4
Paper machine	3	7	3	12
Winder	3	7	3	12
Packing	3	7	2	8
Paper storing	3	7	1	4
Dispatching	2	5	2	4
Cleaners	1	5		1
Reserve and dayworkers	1	5		4
Total PM1				64
Core manufacturing				14
PM3				
Superintendent	1	5		1
Foremen	1	5		1
Labour				
Stock preparation	3	7	1	4
Paper machine	3	7	1	4
Winder and packing	3	7	3	12
Paper storing	3	7	1	4
Dispatching	2	5		1
Cleaners	1	5		1
Reserve and dayworkers	1	5		3
Total PM3				31

Preliminary manning list

	Working shedule shifts/day	days/week	Manning in shift	Manning total
PM4				
Superintendent	1	5		1
Foremen	3	7	1	4
Office	1	5		2
Labour				
Stock preparation	3	7	1	4
Paper machine	3	7	4	16
Winder	3	7	3	12
Packing	3	7	3	12
Paper storing	3	7	1	4
Dispatching	2	5		2
Cleaners	1	5		1
Reserve and dayworkers	1	5		5
Total PM4				63
Total paper mill				172

2 Sack and Bag Production Sector

Sector Leader				
Superintendent	1	5		1
Foremen	2	5	1	2
Office	1	5		2
Labour				
Operators	2	5	41	82
Material handling	2	5	2	4
Packaging	2	5	3	6
Sorting	2	5	8	16
Cleaners	2	5	2	4
Storing and dispatch	1	5		6
Dayworkers and reserve	1	5		10
Total sack and bag production plant				133

3 Corrugated Board Production Sector

Sector Leader	1	5		1
Superintendent	1	5		1
Sales and customer service	1	5		10
Production planning	1	5		3
Accounting	1	5		2
Foremen	3	5	2	6
Office	1	5		2
Labour				
Corrugators	3	5	10	30
Box making	3	5	12	36
Materials handling	3	5	4	12

Preliminary manning list

	Working shedule shifts/day	days/week	Manning in shift	Manning total
Cleaners	1	5		2
Dayworkers and reserve			10	12
Total corrugated box plant				117

Preliminary manning list

	Working shedule shifts/day	days/week	Manning in shift	Manning total
4 Maintenance Sector				
Sector Leader	1	5		1
Secretary	1	5		1
Procurement	1	5		1
Sales	1	5		2
Engineers	1	5		4
Foremen	1	5		10
Work planning	1	5		4
Accounting	1	5		4
Office	1	5		4
Labour				
Mechanical maintenance	1	5		170
Mechanical maintenance	3	7	8	32
Electrical maintenance	1	5	8	40
Electrical maintenance	3	7	2	8
Instrument maintenance	1	5		30
Instrument maintenance	3	7	2	8
Civil works	1	5		30
Civil works	3	7	2	8
Road, garden maintenance	1	5		5
Total maintenance sector				362
Independent Expertise Division				
Common				
Assistant for General Manager	1	5		1
Secretary	1	5		1
Office	1	5		6
Total common				8

Preliminary manning list

	Working shedule shifts/day	days/week	Manning in shift	Manning total
Common Administrative Division				
Common				
Assistant for General Manager	1	5		1
Secretary	1	5		5
Office	1	5		6
Total common				12
1 Marketing Sector				
Sector Leader	1	5		1
Export marketing	1	5		6
Domestic marketing	1	5		4
Transport	1	5		4
Total marketing sector				15
2 Development Sector				
Sector Leader	1	5		1
Product Development	1	5		4
Investment planning	1	5		4
Engineering	1	5		6
Information System Development	1	5		3
Total development sector				18
3 Economy Sector				
Sector Leader	1	5		4
Finance	1	5		2
Accounting	1	5		4
Budgeting	1	5		2
Toal economy sector				12
4 Personnel Administration Sector				
Sector Leader				1
Lawyer				1
Public relations				1
Human resource development, training				3
Fire fighting	1	5		1
Fire fighting	3	7	2	8
Security	1	5		1
Security	3	7	2	8
Safety	1	5		2
Recruiting				2
Total personnel administration sector				28
Total Common Administrative Division				85
All total				1,204

Appendix 7-V IN-HOUSE TRAINING AND EDUCATIONAL INVESTMENT

The Natron Mill is facing a new environment i.e. the market economy after decades within a planned economic system. This together with the proposed new technology to be introduced will require substantial training of all staff of the mill, top management included. The presentation below describes in general terms the areas to be covered by such a training programme. The training programme will have to be implemented with a top-down approach, meaning to first convince the General Manager and the top management to fully accept and support the new management principles of the company.

Top Management Training

The objective of the top management training is to develop the understanding on how an efficient organisation works within a market economy with distributed authority. Areas to be covered within this programme are:

Modern organisation systems such as profit centre organisation where full authority is delegated profit centre managers.

- The role and function of the marketing and sales organisation of the different profit centres. Presentation on how the company representatives out in the field should work.

- Present modern financial accounting systems to be able to monitor the financial performance of each individual profit centre.

- Develop the principles of product costing systems to evaluate the profitability of each individual paper grade at each basis weight as well as the profitability of each individual corrugated box, paper sack, customer and sales representative.

Middle Management Organisation Training

The objective of middle management training is to both develop their managerial skills as leaders of team to continuously improve the performance of the department within their responsibility. These managers will also have to be developed to achieve the understanding on how to operate an organisation with distributed authority and how to work towards financial goals. Areas to be covered are:

- Principles and objectives of a decentralised profit centre organisation.

- Cost accounting principles with product costing as above.

- Training on how to motivate subordinates to support the process of change within the organisation.

- Computer training to work with modern word processors and spread-sheet programmes.

- Training for modern computerised order administration and production planning programmes.

- Training for modern computerised maintenance planning programme.

Middle Management and Operators Technical Training

The modernisation of the Natron mill will result in new technologies as well as new methodology and principles on how the mill should be operated. This will primarily cover areas where "new" technology will be introduced:

- Kamyr Digester pulp line for the production of Semi-Chemical pulp.

- Training in the principles of operating a super concentrator.

- Training programme of modern papermaking applicable to the new production concept.

- Paper testing and quality control with reference to new paper qualities to be produced

- Training of corrugated board production in a modern market economy, particularly with respect to customer service and flexibility in operation.

- General operators training to be introduced to the new production concept.

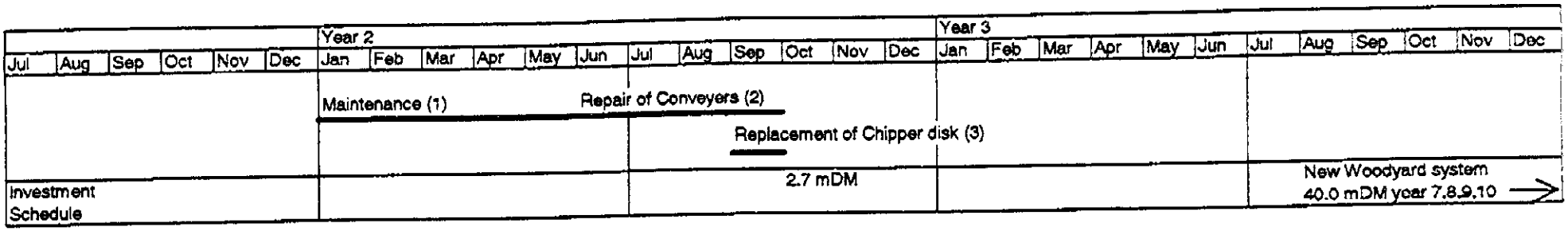
Management programme should be planned and executed by professionals with a background from market economies and with experience from similar programmes in eastern Europe. Technical training programme will be related to the new technology to be introduced. The total cost of this programme is estimated to be DEM 800,000.

Appendix 8-1 Investment and maintenance costs divided per area.

The wood yard restoration program will require DM 2,7 million before start up. This is primarily to execute maintenance work. Late on in year 7-9 additional investments in primarily a new wood handling system with a new bark drum will be required with a total cost of DM 40 million.
To prepare the Kamyr line for semi-chemical pulp production an total investment of DM 3.2 million will be required. And DM 3.7 million for the Kamyr recovery section plus DM 6.2 million for Gotaverken recovery boiler. The batch digester line will be refurbished and expanded at a total cost of DM 2.1 million. And in year 6 - 7, a cold blow system is to be built.
The power plant needs maintenance work and overhaul of one generator at a cost of DM 3.9 million. The water treatment needs overhauling at a cost of DM 0.4 million.
Paper machine No.1 will have to be extended with an addition eight cylinders to increase capacity. The heat recovery and wire section will be refurbished. A new scanner will be installed. Including overall maintenance the total cost is estimated to DM 7.4 million
Paper machine No. 3 will only require minor maintenance and grinding of the Yankee cylinder at a total cost of DM 0.5 million.
Paper machine No. 4 will require a new winder to produce rolls of acceptable quality. The HC refining will have to be taken into operation. Together with overall maintenance to total cost for PM 4 will be DM 12.8 million.
The ware house of the corrugated box plant was destroyed during the war and have to be rebuild. The converting operation will be increased with new case-maker and die-cutter. Total cost DM 6.3 million.
The sack mill needs some maintenance and needs to improve the automation to a total cost of 1.6 mDM.
There is also a big need to restore the fleet of trucks and vehicles. This will be going on for year 2 - 5 to a total estimated cost of 5.0 mDM.
The common system in the mill are in a bad shape and they will need a big part of overhaul for a number of years to a total cost of 10.7 mDM.
The new wood yard line will introduce a need for a bark boiler in year 7 - 9 to a total cost of 20 mDM.

Restart of NATRON

Woodyard Restoration



(1) (2) Average working staff for 9 months is 48;

Mech	16
Elect	6
Civil	26
Total	48

(1)	Maintenance cost	1.50 mDM
(2)	Replacement of current conveyers	1.00 mDM
(3)	New Chipper disk	0.20 mDM
	Total	2.70 mDM

Additional investment of 40 mDM comes in year 7,8,9
when a new wood handling becomes necessary to raise the quality.

Restart of NATRON

Kamyr Pulp Line

Year 2																		Year 3											
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
												Maintenance (1)																	
															(2), (3), (4), (5), (6)														
Investment schedulke												2.2 mDM						1.0 mDM						Investment schedule					

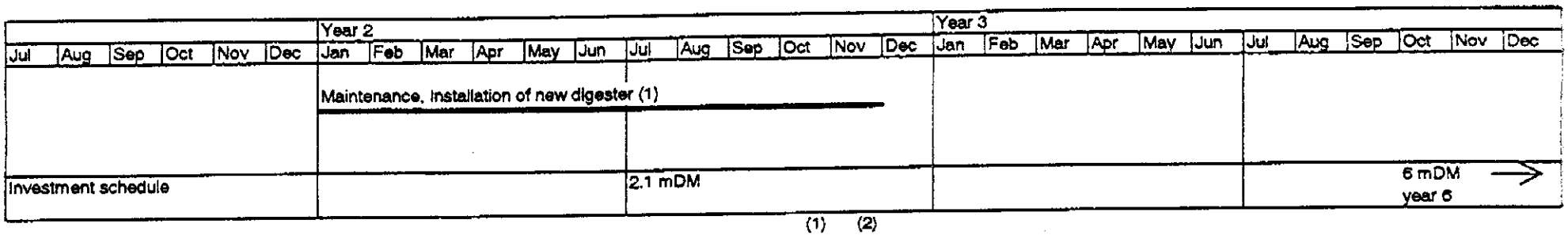
Average working staff for (1)	Mech	38
	Elec	12
	Instr	9
	Civil	18
	Total	77

Average working staff for (2)	Mech	20
	Electr	2
	Civil	8
	Total	30

(1)	Maintenance cost 1.4 mDM	1.40	mDM
(2)	2-new refiner motors each 1.2 MW	0.60	mDM
(3)	6-new level indicators	0.30	mDM
(4)	Heat exchanger, Black liquor to bottom	0.20	mDM
(5)	Pump and piping for black liquor to flash tank	0.20	mDM
(6)	Order spare top screens	0.50	mDM
	Total	3.20	mDM

Kamyr line screens will not be used in future.
They can be used for old batch line instead.

Restart of NATRON
Batch line Restoration



		(1)	(2)
Average working staff	Mech	28	10
	Electr	10	
	Instr	7	
	Civil	12	5
	Total	57	15

(1) Maintenance cost	1.1	mDM
(2) Cost for installation of new digesters	1	mDM
Total	2.1	mDM

Additional investment in cold blow system year 6 of 6 mDM

Restart of NATRON

Restoration Recovery Island
Kamyr Line

	Year 2												Year 3											
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
						Maintenance (1)																							
						Badly damaged building and instrumentation from War (2), (3)																							
Investment schedule												3.7 mDM																

		(1)	(2)
Average working staff	Mech	34	3
	Electr	11	
	Instr	5	8
	Civil	12	7
	Total	62	18

(1) Maintenance cost	2.9	mDM
(2) Cost for war damage repair	0.5	mDM
(3) Liquor storage tanks	0.3	mDM
Total	3.7	mDM

Restart of NATRON
Recovery Boiler Gotaverken

	Year 2												Year 3											
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
															Maintenance (1) (3) (4)														
															Erection Super-concentrator (2)														
Investment schedule												2.3 mDM						3.9 mDM											

		(1),(3),(4)	(2)
(1) (3) (4) Average working staff	Mech	38	18
	Electr	16	2
	Instr	19	2
	Civil	25	8
	Total	98	30

(1) Maintenance cost	3.7	mDM
(2) Superconcentrator	2	mDM
(3) Extra cost building construction	0.2	mDM
(4) Extra cost material Electro-static precipitat	0.3	mDM
Total	6.2	mDM

(2) The superconcentrator must be ordered in Jan. year-2 so thast it is complete before mill start up.

Restart of NATRON

Environment, Air and Water

	Year 2												Year 3											
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		Maintenance (1) (2)																Maintenance (3) (4)											
		Maintenance (6)																											
Investment Schedule		1.3 mDM										0.5 mDM						2.5 mDM											

		(1)(2)	(6)	(3)(4)
(1) (2) Average working staff	Mech			19
(3) (4) Average working staff	Electr			3
	Instr			4
	Civil			6
	Total	23	18	32

(1) Restoration of effluent treatment	0.5 mDM
(2) Restoration of ash system for ash dumping	0.2 mDM
(3) Restotation of treatment of gases	0.5 mDM
(4) Restoration of stripping column	0.5 mDM
(5) Expansion of effluent treatment to fit EU standard	2.0 mDM
(6) Dumping of industrial waste	0.5 mDM
	4.2 mDM

Restart of NATRON

Power Plant

	Year 2												Year 3											
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
												Maintenance (1)																	
															Generator overhaul (2)														
Investment Schedule												2.5 mDM						1.4 mDM											

		(1)	(2)
Average working staff	Mech	39	11
	Electr	7	6
	Instr	5	
	Civil	9	5
	Total	60	22

(1) Miantenance	2.9	mDM
(2) Generator	1.0	mDM
Total	3.9	mDM

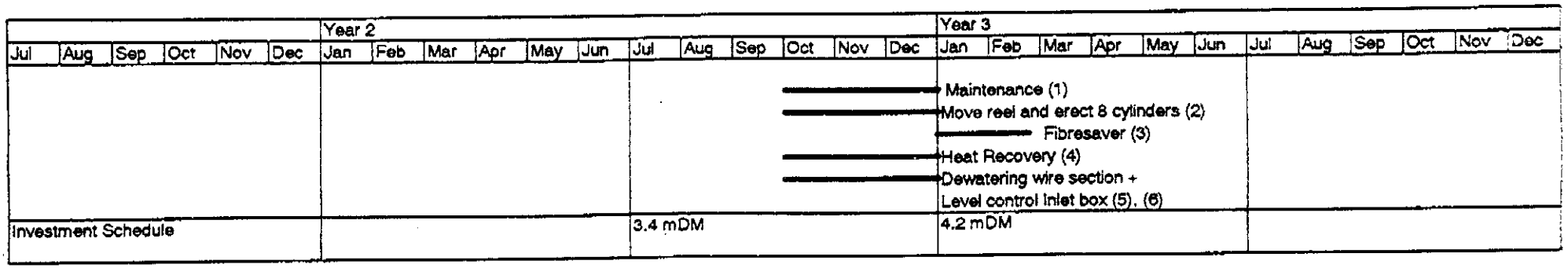
Restart of NATRON
Water Treatment

	Year 2												Year 3											
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maintenance (1)																													
Investment Schedule						0.4 mDM																							

Average working staff	Mech	11
	Electr	3
	Instr	4
	Civil	6
	Total	24
Maintenance cost	0.4 mDM	

Restart of NATRON

Paper Machine No.1



		(1)(2)(4)(5)	(3)
Average working staff	Mech	38	3
	Elect	9	
	Instr	10	
	Civil	20	2
	Total	77	5

(1) Maintenance	0.5	mDM
(2) Pope reel + Cylinders	4.5	mDM
(3) Fibresaver for PM2 (no restart of PM2)	0.2	mDM
(4) Heat Recovery	0.7	mDM
(5) Wire section & Inlet box	0.3	mDM
(6) Scanning frame Basis weight/Moisture control	1.4	mDM
	7.6	mDM

(Dewatering elements must be ordered Jan. year 2)

Break down of item (2)

Dryer part extention, incl. mechanical drive, guide rolls, and hood	3.6	mDM
Relocation of reel and winder	0.4	mDM
Electrical drive	0.5	mDM
Total	4.5	mDM

Restart of NATRON

Paper Machine No.3

	Year 2												Year 3											
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
						Maintenance + Grinding of Yankee-cylinder (1)																								
Investment Schedule												0.5 mDM																	

Average working staff

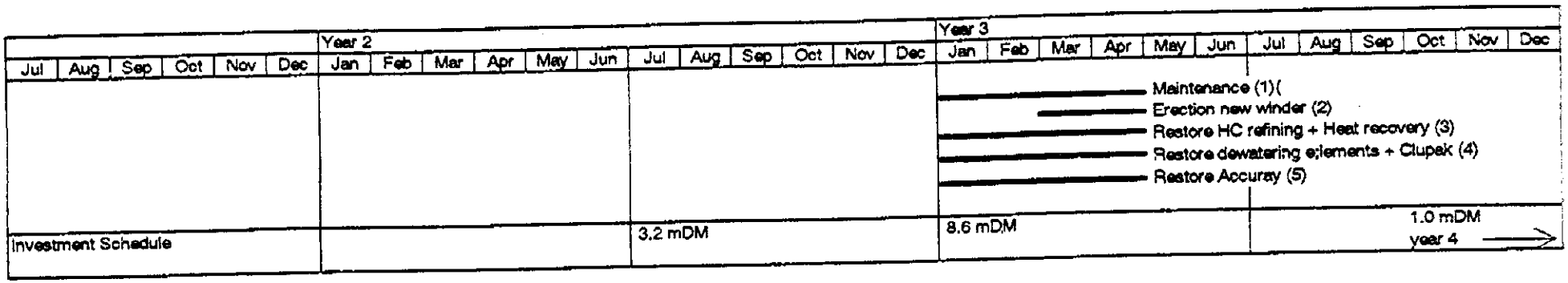
Mech	6
Electr	1
Instr	1
Civil	4
Total	12

Costs of Miantenance + Grinding 0.5 mDM

Grinding of Yankee cylinder order Jan. year 2

Restart of NATRON

Paper Machine No.4

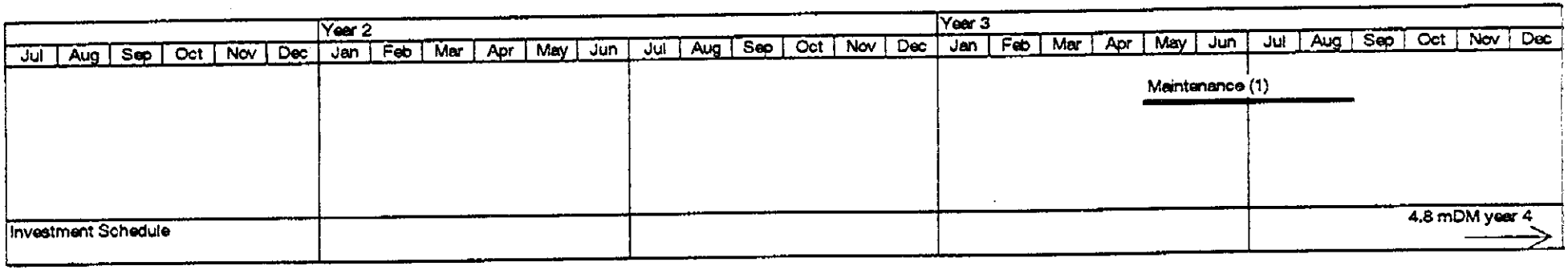


Average working staff		(1)(4)	(2)(5)	(3)
	Mech	24	9	15
	Electr	14	3	4
	Instr	7	7	3
	Civil	12	6	6
	Total	57	25	28

(1) Maintenance	1.6	mDM
(2) New winder (has to be ordered Jan. year 2)	6.9	mDM
(3) HC refining - Heat recovery	2.5	mDM
(4) Dewatering elements ordered year 2	0.4	mDM
(5) Scanning frame Basis weight/Moisture control	1.4	mDM
Total	12.8	mDM

Restart of NATRON

Corrugated Board Box Plant



Average working staff

Mech	5
Civil	25
Total	30

(1) Building and warehouse 1.5 mDM
New Die cutter and additional investment 4.8 mDM

Unit prices

	unit	used DEM/unit	coefficient	basic DEM/unit
Purchased raw materals			1	
OCC, domestic	t	135		135
OCC, imported	t	120		120
mixed wasre	t			
unbleached kraft pulp	ADt	750		750
roundwood, SW	m3smob	75		75
sawmill chips, SW	m3s			
roundwood, HW	m3smob	50		50
sawmill chips, HW	m3s			
testliner	t	720		720
sack paper	t	1400		1400
Chemicals			1	
CaCO3	kg	0.10		0.1
NaOH	kg 100%	0.60		0.60
NA2SO4	kg 100%	0.73		0.73
H2SO4	kg 100%	0.44		0.44
HCL	kg	0.30		0.30
rosin size	kg 100%	9.00		9.00
neutral size	kg	10.00		10.00
alum	kg	0.34		0.34
starch for paper machine	kg	1.80		1.8
wet strength agent	kg	6.00		6.00
colour for testliner	kg	9.00		9.00
silicon	kg	5.00		5.00
starch for corrugated board	kg	1.03		1.03
glue for corrugated board, bo>	kg	3.79		3.79
printing colour for boxes	kg	10.00		10.00
Energy			1	
coal, 10.5 GJ/t	t	43		43
oil, light	t	650		650
oil, heavy	t	370		370
heat in process steam (coal)	GJ	5.0		5.0
electricity	kWh	0.10		0.10
Water and effluent			1	
fresh water	m3	0.038		0.038
effluent and sludge dumping	m3	0.19		0.19
Personnel			1	
production	manyear	21600		21600
maintenance	manyear	21600		21600
administration	manyear	43200		43200

Sales product prices, mill net

	unit	used DM/unit	coefficient	basic DM/unit
			1	
schrenz	t	352		352
corrugated products, rec. fibre	t	1320		1320
corrugated prod., NSSC+schr	t	1505		1505
corrugated products, NSSC	t	1620		1620
sacks	t	1720		1720
bags	t	3390		3390
MG paper	t	1150		1150
sack paper	t	1090		1090
NSSC fluting	t	672		672

Sales prices, delivered and mill net

	Mill net price DM/t	Transport, commission DM/t	Delivered price DM/t
schrenz	352	88	440
corrugated products, rec. fibre	1320	60	1380
corrugated prod., NSSC+schrenz	1505	60	1565
corrugated products, NSSC	1620	60	1680
sacks	1720	60	1780
MG paper	1150	100	1250
sack paper	1090	146	1236
NSSC fluting	672	117	789

Variable Production Costs

Recycled fibre processing plant

	Unit	Unit price DM/unit	Unit consumpt. units/ADt	Unit cost DM/ADt
Raw materials total	t		1.25	169
OCC, domestic	t	135	1.25	169
OCC, imported	t	120	0.00	0
Mixed waste	t	0		0
Chemicals total				
Heat total	GJ			
steam to process	GJ			
steam to bp power	GJ			
Electric power total	kWh			26
purchased or condensing pow	kWh	0.10	260	26
bp power generation	kWh			
Other costs total				27
fresh water	m3	0.038	100	4
effluent treatment	m3	0.19	100	19
operation materials				4
Variable costs total, recycled pulp				222

Variable Production Costs

Unbleached kraft pulp

	Unit	Unit price DM/unit	Unit consumpt. units/ADt	Unit cost DM/ADt
Raw materials total				403
roundwood, SW	m3smob	75	5.4	403
sawmill chips, SW	m3s	0		0
Chemicals total				44
CaCO3	kg 100%	0.10	27.0	3
NaOH	kg 100%	0.60	8.0	5
NA2SO4	kg 100%	0.73	45.0	33
H2SO4	kg 100%	0.44	4.2	2
other chemicals				2
Heat total	GJ		-2.7	3
steam to process	GJ	5.0	10.0	50
steam to bp power	GJ	5.0	1.7	8
fuel oil for lime kiln	GJ	15.5	1.6	25
steam from bark	GJ	5.0	-3.0	-15
steam from liquour	GJ	5.0	-13.0	-65
Electric power total	kWh		750	33
purchased or condensing pow	kWh	0.10	333	33
bp power generation	kWh		417	0
Other costs total				21
fresh water	m3	0.038	70	3
effluent treatment	m3	0.19	70	13
operation materials				5
Variable costs total, unbleached kraft pulp				504

Variable Production Costs

Semichemical pulp, before installing debarking

	Unit	Unit price DM/unit	Unit consumpt. units/ADt	Unit cost DM/ADt
Raw materials total				115
roundwood, HW	m3smob	50	2.3	115
sawmill chips, HW	m3s	0		0
Chemicals total				31
CaCO3	kg 100%	0.10		0
NaOH	kg 100%	0.60	5.5	3
NA2SO4	kg 100%	0.73	33.0	24
H2SO4	kg 100%	0.44	2.8	1
other chemicals				2
Heat total	GJ		2.3	11
steam to process	GJ	5.0	4.5	22
steam to bp power	GJ	5.0	0.8	4
fuel for lime kiln	GJ			0
steam from bark	GJ	5.0		0
steam from liquour	GJ	5.0	-3.0	-15
Electric power total	kWh		550	36
purchased or condensing pow	kWh	0.10	363	36
bp power generation	kWh		188	0
Other costs total				16
fresh water	m3	0.038	50	2
effluent treatment	m3	0.19	50	10
operation materials				5
Variable costs total, semichem. pulp without debarking				209

Variable Production Costs

Semichemical pulp, after installing debarking

	Unit	Unit price DM/unit	Unit consumpt. units/ADt	Unit cost DM/ADt
Raw materials total				115
roundwood, HW	m3smob	50	2.3	115
sawmill chips, HW	m3s	0		0
Chemicals total				28
CaCO3	kg 100%	0.1		0
NaOH	kg 100%	0.60	5.0	3
NA2SO4	kg 100%	0.73	30.0	22
H2SO4	kg 100%	0.44	2.5	1
other chemicals				2
Heat total	GJ		0.8	4
steam to process	GJ	5.0	4.5	22
steam to bp power	GJ	5.0	0.8	4
fuel for lime kiln	GJ			0
steam from bark	GJ	5.0	-1.7	-8
steam from liquour	GJ	5.0	-2.8	-14
Electric power total	kWh		550	36
purchased or condensing pow	kWh	0.10	363	36
bp power generation	kWh		188	0
Other costs total				16
fresh water	m3	0.038	50	2
effluent treatment	m3	0.19	50	10
operation materials				5
Variable costs total, semichem. pulp with debarking				199

Variable Production Costs

Testliner

	Unit	Unit price DM/unit	Unit consumpt. units/t	Unit cost DM/t
Raw materials total	ADt		1.065	405
purchased unbleached pulp	ADt	750	0.320	240
own unbleached pulp	ADt	504		
processed recycled fibre	ADt	222	0.746	165
Chemicals total				87
rosin size	kg	9.00	5.0	45
neutral size	kg	10.00		0
alum	kg	0.34	15.0	5
starch	kg	1.80	5.0	9
colour	kg	9.00	3.0	27
other chemicals				1
Heat total	GJ			50
steam to process	GJ	5.0	8.5	42
steam to bp power	GJ	5.0	1.4	7
Electric power total	kWh		850	50
purchased or condensing pow	kWh	0.10	496	50
bp power generation	kWh		354	
Other costs total				28
fresh water	m3	0.038	50	2
effluent treatment	m3	0.19	50	10
operation materials				10
packaging materials				7
Variable costs total, testliner from purchased kraft pulp				619

Variable Production Costs

Fluting of recycled fibre

	Unit	Unit price DM/unit	Unit consumpt. units/t	Unit cost DM/t
Raw materials total	ADt		1.060	235
processed recycled fibre	ADt	222	1.060	235
Chemicals total				19
starch	kg	1.8	10	18
other				1
Heat total	GJ		9.3	47
steam to process	GJ	5.0	8.0	40
steam to bp power	GJ	5.0	1.3	7
Electric power total	kWh		800	47
purchased or condensing pow	kWh	0.10	467	47
bp power generation	kWh		333	
Other costs total				28
fresh water	m3	0.038	50	2
effluent treatment	m3	0.19	50	10
operation materials				10
packaging materials				7
Variable costs total, fluting from recycled fibre				375

Variable Production Costs and Sales Margin

Schrenz

	Unit	Unit price DM/unit	Unit consumpt. units/t	Unit cost DM/t
Raw materials total	ADt		1.065	236
processed recycled fibre	ADt	222	1.065	236
Chemicals total				40
rosin size	kg	9.00	4.0	36
neutral size	kg	10.00		0
alum	kg	0.34	10.0	3
starch	kg	1.80		0
other	kg			1
Heat total	GJ		9.3	47
steam to process	GJ	5.0	8.0	40
steam to bp power	GJ	5.0	1.3	7
Electric power total	kWh		800	47
purchased or condensing pow	kWh	0.10	467	47
bp power generation	kWh		333	
Other costs total				28
fresh water	m3	0.038	50	1.9
effluent treatment	m3	0.19	50	9.5
operation materials				10
packaging materials				7
Variable costs total, schrenz				398
Sales price, mill net				352
Sales margin				-46

Variable Production Costs and Sales Margin

Semichemical fluting

	Unit	Unit price DM/unit	Unit consumpt. units/t	Unit cost DM/t
Raw materials total	ADt		1.065	212
Semichemical pulp excl.debar	ADt	209		
Semichemical pulp incl.debarl	ADt	199	1.065	212
processed recycled fibre	ADt	222	0.000	0
Chemicals total				5
starch	kg			
other				5
Heat total	GJ		8.8	44
steam to process	GJ	5.0	7.5	37
steam to bp power	GJ	5.0	1.3	6
Electric power total	kWh		750	44
purchased or condensing pow	kWh	0.10	438	44
bp power generation	kWh		313	
Other costs total				28
fresh water	m3	0.038	50	2
effluent treatment	m3	0.19	50	10
operation materials				10
packaging materials				7
Variable costs total, semichem. fluting excl. debarking				121
Variable costs total, semichem. fluting incl. debarking				333
Sales price, mill net				672
Sales margin, excl. debarking				551
Sales margin, incl. debarking				339

Variable Production Costs and Sales Margin

Sack paper

	Unit	Unit price DM/unit	Unit consumpt. units/t	Unit cost DM/t
Raw materials total	ADt		1.060	535
Own unbleached pulp	ADt	504	1.060	535
Chemicals total				66
rosin size	kg	9.00	4.0	36
neutral size	kg	10.00		0
alum	kg	0.34	15.0	5
starch	kg	1.80	4.0	7
silicon	kg	5.00	0.4	2
wet strength agent	kg	6.00	2.5	15
other				1
Heat total	GJ		10.5	52
steam to process	GJ	5.0	9.0	45
steam to bp power	GJ	5.0	1.5	7
Electric power total	kWh		1200	83
purchased or condensing pow	kWh	0.10	825	83
bp power generation	kWh		375	
Other costs total				36
fresh water	m3	0.038	50	2
effluent treatment	m3	0.19	50	10
operation materials				10
packaging materials				15
Variable costs total, sack paper, own kraft pulp				772
Sales price, mill net				1090
Sales margin, sack paper				318

Variable Production Costs and Sales Margin

MG paper

	Unit	Unit price DM/unit	Unit consumpt. units/t	Unit cost DM/t
Raw materials total	ADt		1.060	795
purchased kraft pulp	ADt	750	1.060	795
own kraft pulp	ADt	504		
Chemicals total				49
rosin size	kg	9.00	4.0	36
neutral size	kg	10.00		0
alum	kg	0.34	15	5
starch	kg	1.80	4.0	7
other				1
Heat total	GJ		10.5	52
steam to process	GJ	5.0	9.0	45
steam to bp power	GJ	5.0	1.5	7
Electric power total	kWh		900	53
purchased or condensing pow	kWh	0.10	525	53
bp power generation	kWh		375	
Other costs total				41
fresh water	m3	0.038	50	2
effluent treatment	m3	0.19	50	10
operation materials				10
packaging materials				20
Variable costs total, MG paper, purchased kraft pulp				991
Variable costs total, MG paper, own kraft pulp				730
Sales price, mill net				1150
Sales margin, MG paper, purchased kraft pulp				159
Sales margin, MG paper, own kraft pulp				420

Variable Production Costs and Sales Margin

Corrugated board and boxes, recycled fibre, schrenz, purch.testliner
Year 2

	Unit	Unit price DM/unit	Unit consumpt. units/t	Unit cost DM/t
Raw materials total	t		1.060	478
testliner from purch. kraft pulp	t	619	0.329	203
fluting from recycled fibre	t	375	0.366	137
schrenz	t	398	0.366	145
testliner, purchased	t	720		0
semichem. fluting	t	333		0
credit for broke	t	135	-0.060	-8
Chemicals total				59
starch	kg	1.03	30	31
glue	kg	3.79	0.64	2
printing colour	kg	10	1.9	19
other chemicals				7
Heat, as steam, 11 bar	GJ	5.0	1.5	7
Electric power	kWh	0.10	182	18
Other costs total				40
operating materials				20
other				20
Variable costs of board and boxes, rec. fibre and purchased kraft pulp total				603
Sales price				1320
Sales margin of corr. board and boxes, rec. fibre and purchased kraft pulp				717

Variable Production Costs and Sales Margin

Corrugated board and boxes, semich fluting, purchased testliner, schrenz from PM2

	Unit	Unit price DM/unit	Unit consumpt. units/t	Unit cost DM/t
Raw materials total	t		1.176	428
testliner, purchased	t	720	0.365	262
schrenz	t	398	0.329	131
semichem. fluting, excl debarl	t	121	0.482	58
semichem. fluting, incl debark	t	333		0
credit for broke	t	135	-0.176	-24
Chemicals total				59
starch	kg	1.03	30.0	31
glue	kg	3.79	0.64	2
printing colour	kg	10.00	1.9	19
other chemicals				7
Heat, as steam, 11 bar	GJ	5.0	1.3	6
Electric power	kWh	0.10	96	10
Other costs total				40
operating materials				20
other				20
Variable costs of board and boxes, semich.fluting excl. debarking, testliner and schrenz				543
Variable costs of board and boxes, semich.fluting incl. debarking, testliner and schrenz				646
Sales price incl. schrenz from PM2				1505
Sales margin of board and boxes, semich.fluting excl. debarking, testliner and schrenz				962
Sales margin of board and boxes, semich.fluting incl. debarking, testliner and schrenz				859

Variable Production Costs and Sales Margin

Corrugated board and boxes, semichem. fluting and purchased testliner

	Unit	Unit price DM/unit	Unit consumpt. units/t	Unit cost DM/t
Raw materials total	t		1.176	520
testliner, purchased	t	720	0.670	483
schrenz	t	398		0
semichem. fluting, excl debarl	t	121	0.506	61
semichem. fluting, incl debark	t	333		0
credit for broke	t	135	-0.176	-24
Chemicals total				59
starch	kg	1.03	30	31
glue	kg	3.79	0.64	2
printing colour	kg	10.00	1.9	19
other chemicals				7
Heat, as steam, 11 bar	GJ	5.0	1.3	6
Electric power	kWh	0.10	96	10
Other costs total				40
operating materials				20
other				20
Variable costs of board and boxes, semich. fluting excl. debarking, testliner excl. schrenz				635
Variable costs of board and boxes, semich. fluting incl. debarking, testliner excl. schrenz				743
Sales price exl. schrenz				1620
Sales margin of board and boxes, semich.fluting excl. debarking, testliner excl. schrenz				985
Sales margin of board and boxes, semich.fluting incl. debarking, testliner excl. schrenz				877

Variable Production Costs and Sales Margin

Sacks

	Unit	Unit price DM/unit	Unit consumpt. units/t	Unit cost DM/t
Paper	t		1.020	1398
purchased paper	t	1400	1.000	1400
own pulp, own paper	t	772		
credit for broke	t	120	-0.020	-2
Chemicals				34
glue	kg	1.03	27.5	28
printing colour	kg	10.00	0.52	5
other chemicals				
Heat	GJ	5.0	0.5	2
Electric power	kWh	0.10	104	10
Other costs				10
operating materials				10
other				
Variable costs, purchased paper total				1454
Variable costs, own pulp, own paper total				826
Sales price, mill net				1720
Sales margin, sacks of purchased paper				266
Sales margin, sacks of own pulp, own paper				894

TABLE 8-1
Variable costs of pulp

	Recycled fibre	Unbleached kraft pulp	Semi-chemical pulp, excl. debarking	Semi-chemical pulp, incl. debarking
	DM/ADt	DM/ADt	DM/ADt	DM/ADt
Raw materials	169	403	115	115
Chemicals	0	44	31	28
Purchased fuels	0	3	11	4
Purchased power	26	33	36	36
Other variable costs	27	21	16	16
	222	504	209	199

TABLE 8-2
Variable costs of corrugated board materials

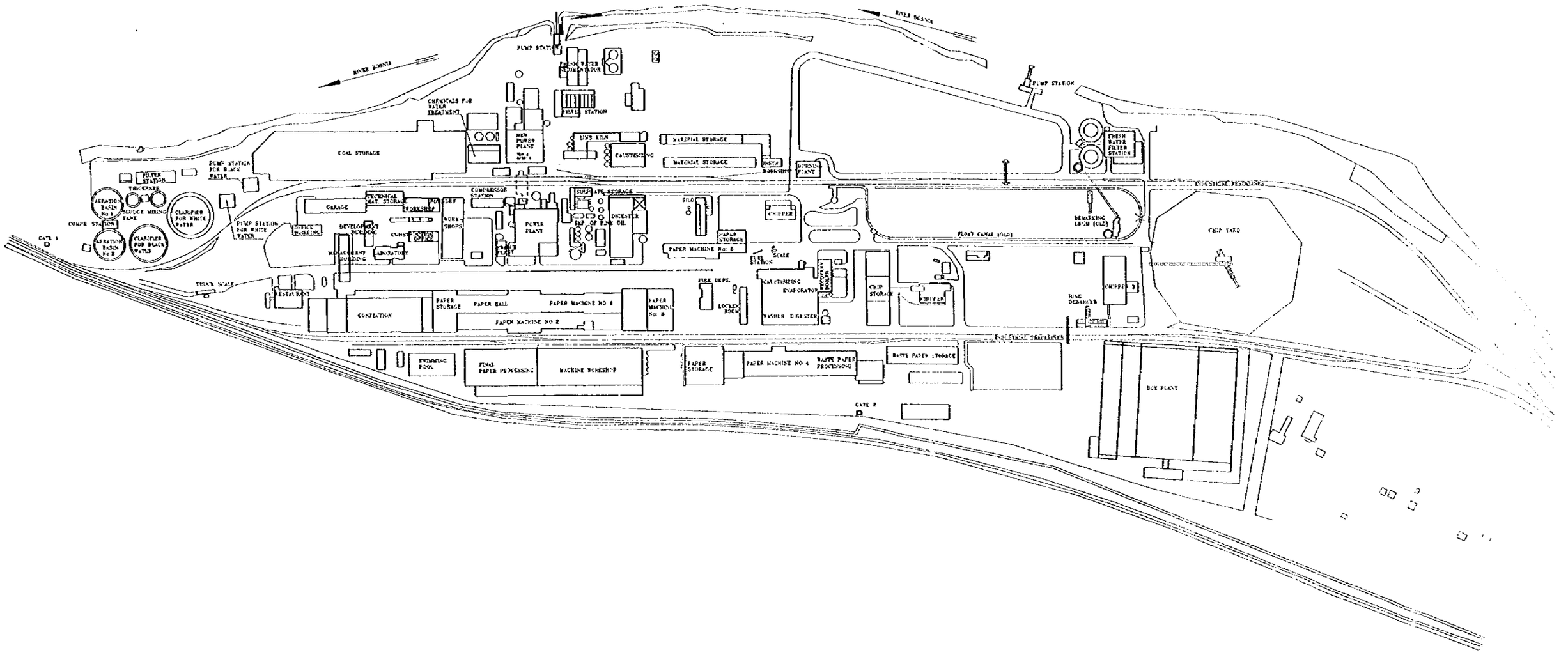
	Testliner	Fluting of recycled fibre	Schrenz	Semichem. fluting, excl. debarking	Semichem. fluting, incl. debarking
	DM/t	DM/t	DM/t	DM/t	DM/t
Pulp (variable costs)	405	235	236	0	212
Chemicals	87	19	40	5	5
Purchased fuels	50	47	47	44	44
Purchased power	50	47	47	44	44
Other variable costs	28	28	28	28	28
Total	619	375	398	121	333

TABLE 8-3
Variable costs of sack paper and MG paper

	Sack paper	MG paper, purch. pulp	MG paper, own. pulp
	DM/t	DM/t	DM/t
Pulp (variable costs)	535	795	535
Chemicals	66	49	49
Purchased fuels	52	52	52
Purchased power	83	53	53
Other variable costs	36	41	41
Total	772	991	730

TABLE 8-4
Variable costs of converted products

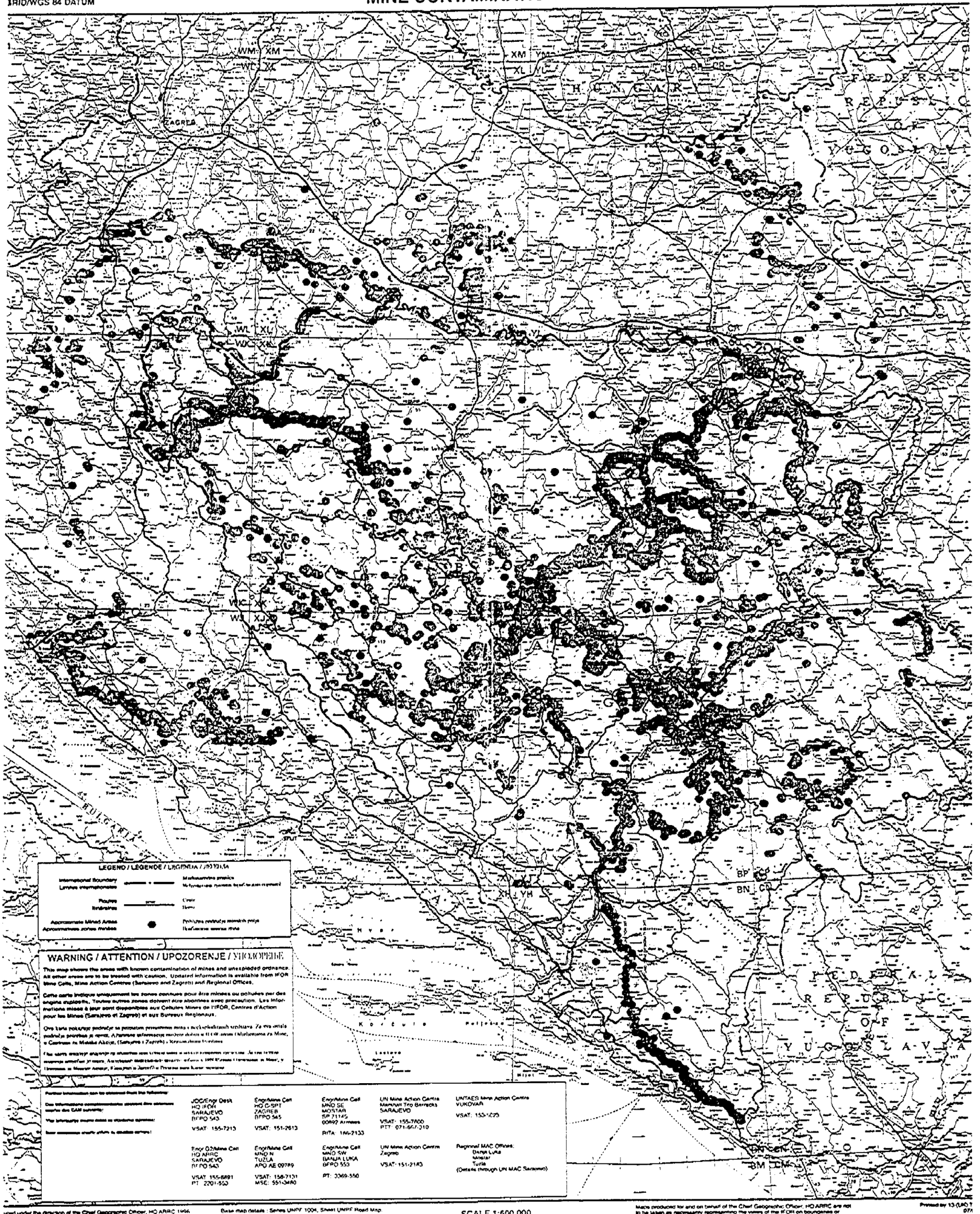
	Corr. board recovered fibre	Corr. board virgin fibre	Corr. board schrenz + virgin fibre	Sacks, purch. paper	Sacks, own paper
	DM/t	DM/t	DM/t	DM/t	DM/t
Paper (variable costs)	478	520	428	1398	770
Chemicals	59	59	59	34	34
Purchased fuels	7	6	6	2	2
Purchased power	18	10	10	10	10
Other variable costs	40	40	40	10	10
Total	603	635	543	1454	826


RIVER BOUND
PUMP STATION
RIVER BOUND
CHEMICALS FOR WATER TREATMENT
COAL STORAGE
PUMP STATION
FILTER STATION
PUMP STATION FOR BLACK WATER
THICKENER
SLUDGE MIXING TANK
CLARIFIER FOR WHITE WATER
AERATION BASIN No 1
AERATION BASIN No 2
CLARIFIER FOR BLACK WATER
COMP STATION
PUMP STATION FOR WHITE WATER
OFFICE BUILDING
GARAGE
MECHANICAL MAT. STORAGE
WORKSHOP
DEVELOPMENT BUILDING
CONSTRUCTION OFFICE
LABORATORY
WORK SHOPS
COMPRESSOR STATION
POWER PLANT
DIGESTER
SILO
PAPER STORAGE
PAPER MACHINE No. 6
CHIPPER
FLOAT CANAL (OLD)
DEBARKING DRUM (OLD)
CHIP YARD
GATE 1
TRUCK SCALE
RESTAURANT
CONTENTION
PAPER STORAGE
PAPER BALL
PAPER MACHINE NO 1
PAPER MACHINE NO 2
PAPER MACHINE No. 3
FIRE DEPT.
LOCKER ROOM
CAUSTISIZING
EVAPORATOR
WASHER DIGESTER
CHIP STORAGE
CHIPPER
RING DEBARKER
CHIPPER 3
SWIMMING POOL
FINAL PAPER PROCESSING
MACHINE WORKSHOP
PAPER STORAGE
PAPER MACHINE NO 4
WASTE PAPER PROCESSING
WASTE PAPER STORAGE
GATE 2
BOX PLANT

GRID/WGS 84 DATUM

MINE CONTAMINATION MAP

AS AT: 25 JUNE



MAGENTA SHADING REPRESENTS APPROXIMATE MINED AREAS
TO DATE ONLY 50% OF MINED AREAS HAVE BEEN IDENTIFIED

LES ZONES DE COULEUR MAGENTA REPRÉSENTENT APPROXIMATIVEMENT LES ZONES MINÉES
A CE JOUR, SEULEMENT 50% DES ZONES MINÉES ONT ÉTÉ IDENTIFIÉES

RUZICASTO OSJENJENE POVRSINE PRIBLIZNO PREDSTAVLJAJU MINSKA PODRUCJA
SAMO 50% MINSKIH PODRUCJA JE IDENTIFIKOVANO DO DANAS

РУЖИЧАСТО ОСЕЊЕНЕ ПОВРШИНЕ ПРИБЛИЖНО ПРЕДСТАВЉАЈУ МИНСКА ПОДРУЧЈА
САМО 50% МИНСКИХ ПОДРУЧЈА ЈЕ ИДЕНТИФИКОВАНО ДО ДАНАС

ARRC Misc 56
Mine Contamination Map