4) Paper machine 4

By the end of this program reconditioning and investments will be made in order to prepare the paper machine for restart.

7.2.3 Long Term PROGRAM

The normal, continuous production of the mill in accordance to the outlined production concept is planned to be started in mid-2000. Because the capacity of the recovery boiler is too high for one pulping line only, both of the pulping lines have to be started simultaneously. The production of pulp has to be adjusted in accordance to the following limitations:

- The recovery boiler has been designed to 600 t/d dry solids. The minimum capacity to run the boiler is 300 t/d dry solids without super-concentrator and 270 t/d dry solids with the super-concentrator.
- The dry solids from kraft pulping is 1.5 t/ADt pulp and from semichemical pulping 0.5 t/ADt pulp.
- The maximum capacity of the batch pulping without any measures for capacity increase is 56,000 ADt/a. However, the capacity can be increased to 66,000 ADt/d by applying cold-blow technique. Softwood consumption for this production is 355,000 m^3sob/a.
- The minimum capacity of the continuous pulping line (Kamyr), when producing semichemical hardwood pulp, is 60,000 ADt/a. The digester has been designed for 200 ADt/d softwood cooking, based on 48 % yield. In semichemical pulping the yield is 82 % and the capacity some 400 ADt/d.
- The capacity of PM1 in its present condition is 60,000 t/a, but can be increased to 73,000 t/a by moderate investments. Taking into consideration material circulation from converting, this production rate corresponds 66,000 t/a fresh pulp from the Kamyr line.

These limitations mean, that the Kamyr digester has to be operated at least with minimum possible production rate, 60,000 ADt/a. The production will be increased to 66,000 ADt/a, limited by the capacity of PM1 after rebuilding the machine. The batch pulping line has to be operated with maximum possible production rate, 66,000 ADt/a, in order to secure the sufficient dry solids load of the recovery boiler. The pulp will be used on PM3 producing MG paper 9,000 t/a and on PM4 producing sack paper 57,000 t/a, which corresponds the practical capacity of these machines.

Restarting of PM2, producing schrenz of waste paper, has been investigated as an alternative. However, because of investments required and low product price this alternative seems to be not profitable.

The capacity limitations in pulping, chemical recovery, PM1, PM3 and PM4 in the Long Term PROGRAM are shown on the attached Fig. 7/1, Pulp Mill Block Diagram. The annual sales production is presented in Table 7-3 and the annual raw material consumption and the production of various departments in Appendix 7-1, Production Scenarios and Fibre Balance.

TABLE 7-3
Annual Sales Production in Tons, Long Term PROGRAM

	Year					
	3	4	5	6	7	8
	2nd half					
Corr. Board	9,677	20,000	26,000	32,000	35,000	37,000
Semichemical Fluting	24,000	53,000	50,000	50,000	50,000	50,000
MG paper	3,800	7,500	8,000	8,400	8,400	8,400
Sacks and bags	5,560	10,000	13,000	16,000	18,000	20,000
Sack paper	23,000	28,000	28,000	31,000	35,000	37,000
Total sales	66,037	118,500	125,000	137,400	146,400	153,400

The total capital expenditures during the Long Term PROGRAM is estimated at DM 108.6 million, of which DM 20.5 million is needed to start the mill and DM 88.1 million for further development. The investments are specified in Chapter 8.1

(1) Pulp Mill

In the long term PROGRAM, pulp production is planned to be started in the middle 2000, the production rate is increased year by year, and in 2005 year the normal continuous production, that is 66,000 ADt/a of NSSC pulp and 66,000 ADt/a of kraft pulp, will be attained.

In this phase, the wood handling, the batch kraft pulping line, Kamyr NSSC pulping line, the new recovery boiler, No.1 and No.3 black liquor evaporator, the batch line recausticizing and lime kiln, the waste water treatment, the exhaust gas treatment and condensate stripping plants will be in operation.

1) Wood preparation

The following amount of raw wood is estimated to be required for pulp production.

Hardwood for NSSC pulping	151,600 m^3sob/y, 433 m^3sob/d
Softwood for kraft pulp	355,400 m^3sob/y, 1,015 m^3sob/d

Having considered the production capacity of the existing equipment, barkers, chippers and chip screens, they can treat the required amount of logs and chips based on the designed specification.

However, overhaul and maintenance of equipment and machines and repair of conveyers should be finished before start-up.

Because the major equipment and machines are old fashioned and have been operated for a long period, renewal to effective up-to-date ones is proposed.

2) Pulping line

The designed production rate of batch cooking line was 150 ADt/d (52,500 ADt/a) and that of continuous cooking line was 200 ADt/d (70,000 ADt/a). In this phase , the batch line will produce 188 ADt/d (66,000 ADt/a) Kraft pulp and the continuous cooking line produce 186 ADt/d (66,000 ADt/a) semichemical pulp.

To increase the production capacity of batch cooking, the cooking cycle time will be reduced with the measures for improving the chip feeding equipment, of shortening the heating time and of applying cold-blow system.

The Kamyr continuous cooking line will be converted to green liquor semichemical pulping plant, and conversion of digester, replacement of refiner and installation of new refiner feeding system is proposed.

3) Chemical recovery plant

The chemical recovery plant treats the black liquor from kraft pulping and cross recovery system is applied for green liquor cooking. The total dry solids in the liquor is calculated to be 412 t/d.

The liquor from kraft and NSSC pulping lines is mixed and concentrated with No.1 and No.3 evaporators from 14.64 %DS to 60 %DS as shown in the attached block diagram Fig. 7/2, Configuration of the Evaporators.

The concentrated liquor is possibly burned with the recovery boiler as it was designed for 600 t/d dry solids at normal operation and 300 t/d at minimum.

The batch cooking line recausticizing and lime kiln and the part of continuous cooking line recausticising will be restarted after overhauling and maintenance.

Figure 7.1

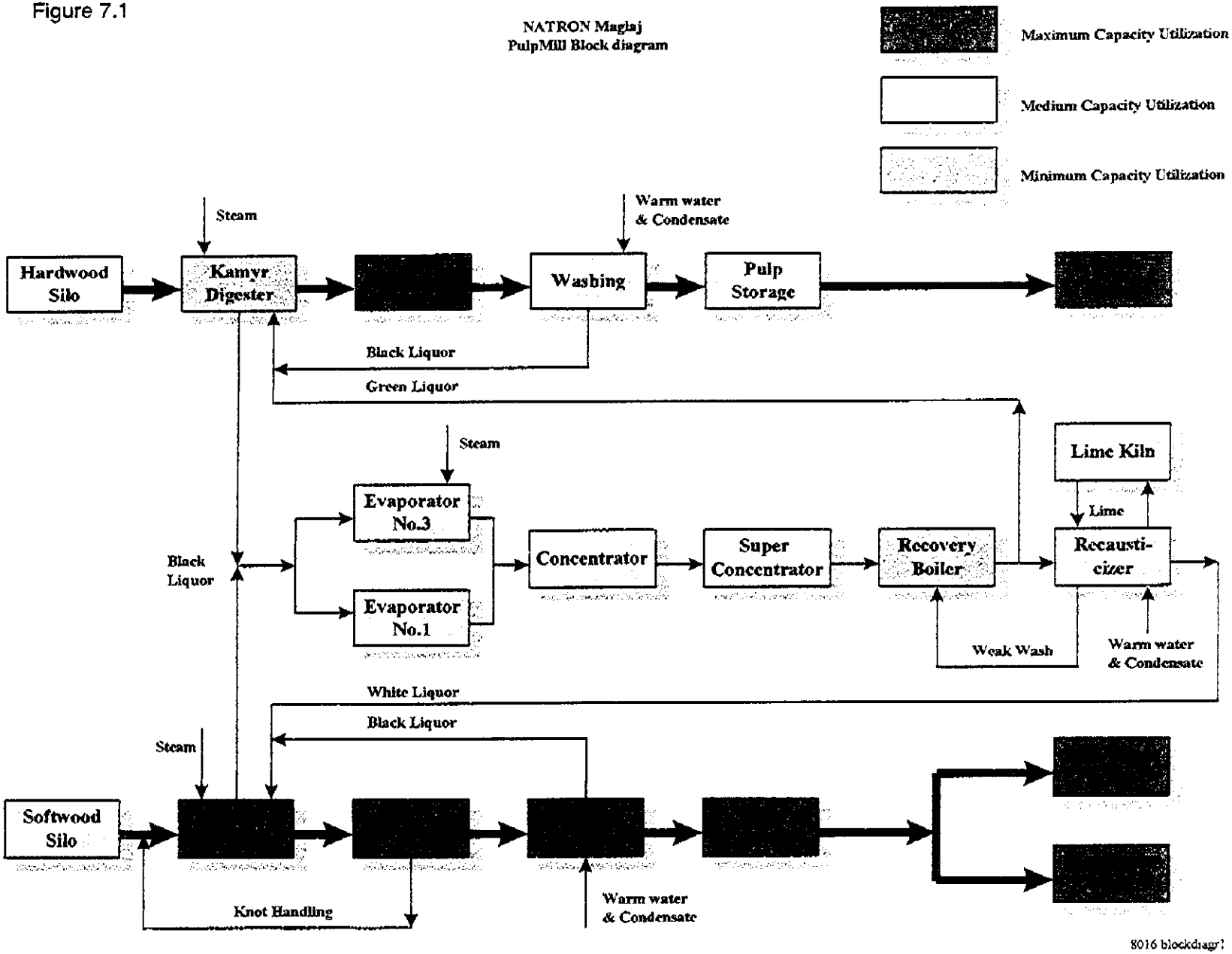

NATRON Maglaj
PulpMill Block diagram
Maximum Capacity Utilization
Medium Capacity Utilization
Minimum Capacity Utilization
Steam
Warm water
& Condensate
Hardwood
Silo
Kamyr
Digester
Washing
Pulp
Storage
Black Liquor
Green Liquor
Steam
Lime Kiln
Lime
Evaporator
No.3
Black
Liquor
Concentrator
Super
Concentrator
Recovery
Boiler
Recausti-
cizer
Evaporator
No.1
Weak Wash
Warm water
& Condensate
White Liquor
Black Liquor
Steam
Softwood
Silo
Knot Handling
Warm water
& Condensate
8016 blockdiagr1

Figure 7.1

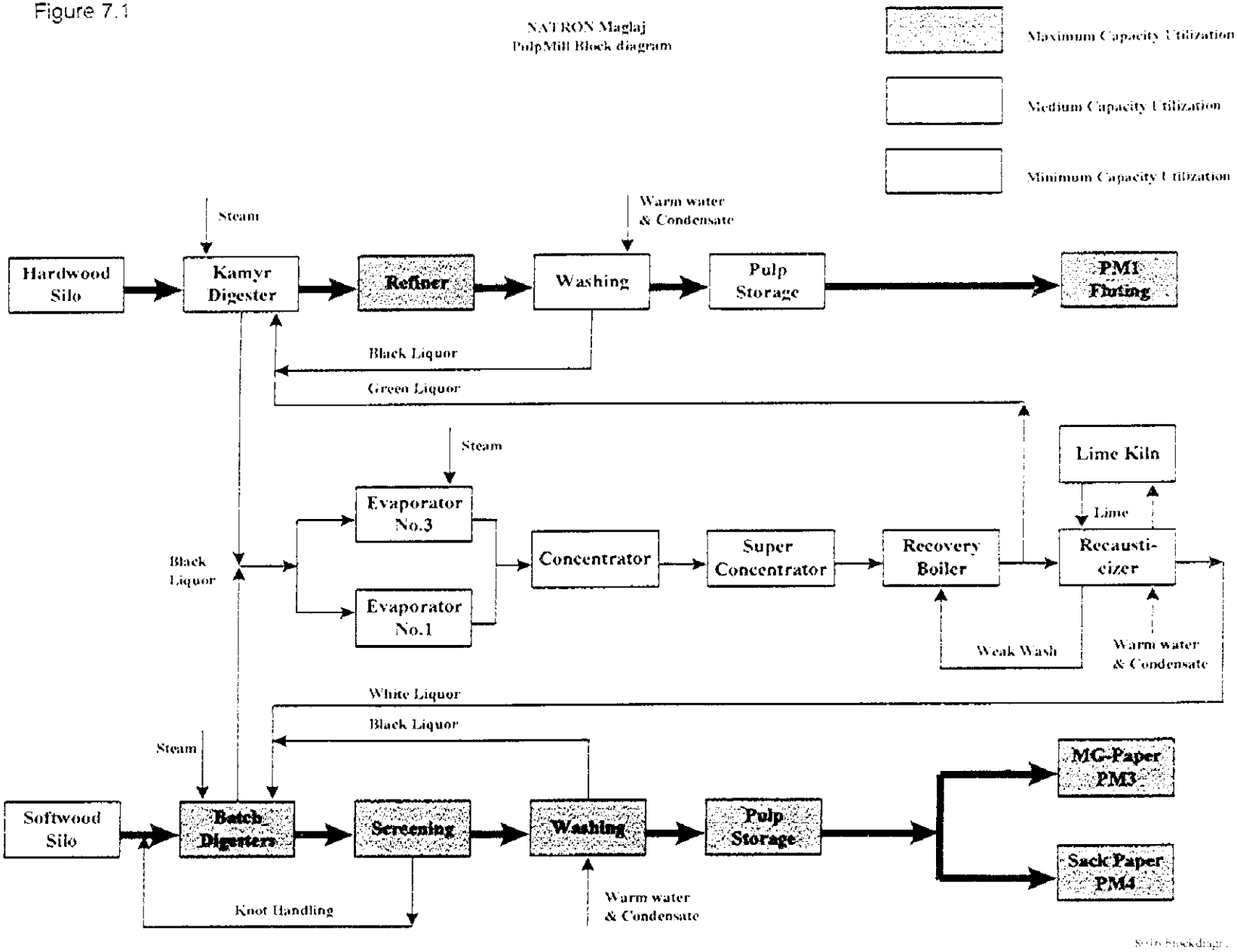
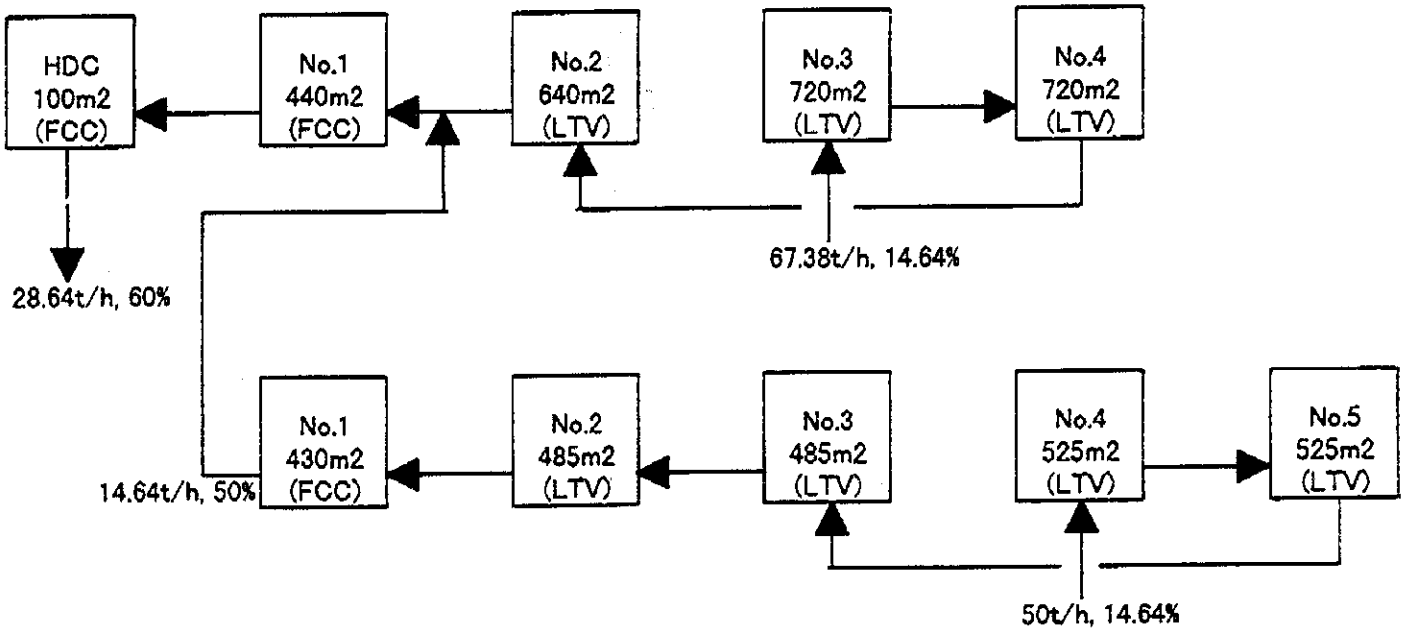

NATRON Maglaj
PulpMill Block diagram
Maximum Capacity Utilization
Medium Capacity Utilization
Minimum Capacity Utilization
Steam
Warm water & Condensate
Hardwood Silo
Kamyr Digester
Refiner
Washing
Pulp Storage
PM1 Fluting
Black Liquor
Green Liquor
Steam
Lime Kiln
Lime
Evaporator No.3
Black Liquor
Concentrator
Super Concentrator
Recovery Boiler
Recausti-cizer
Evaporator No.1
Weak Wash
Warm water & Condensate
White Liquor
Black Liquor
Steam
Softwood Silo
Batch Digesters
Screening
Washing
Pulp Storage
MC-Paper PM3
Sack Paper PM4
Knot Handling
Warm water & Condensate

Figure 7.2 Natron Magrai Configuration of the evaporators



Design data	Design basis of construction stage				Design basis of future program					
	No.1 eva			No.3 eva	Kraft	NSSC	Total	No.1 eva		No.3 eva
Feed Liq. (t/h)	63.2	14.1	20	58.95	70.71	46.67	117.38	67.38	14.64	50
Feed conc. (%)	15	50	45	18	17.91	9.69	14.64	14.64	50	14.64
Discharge Liq. (t/h)	39.28			18.95			28.64	28.64		14.64
Discharge conc.(%)	65			58	60	60	60	60		50
Evaporation (t/h)	58.02			40	49.6	39.1	88.7	53.38		35.36
Req. steam (t/h)								approx. 18		approx. 9

Note) 1. Black liquor from Kraft line will be concentrated in No.1 and No.3 evaporators after mixed with red liquor from NSSC line.
2. No.2 evaporator may have to work for concentrating the liquor depending on the characteristics of red liquor such as viscosity, boiling point rise etc..

(2) Paper mill

At the beginning of the long term program paper machines 1, 3, and 4, which all have been selected for future operation, will be in operation. Paper machine block diagrams are presented in Fig. 7/3, and more detailed data in Appendix 7-II, Technical Data on Paper Mill.

The waste paper plant will be taken out of operation. The plant will be preserved enabling a convenient start up if conditions change and a restart is desired.

The reporting routines from paper machines and from laboratories has to be improved, being more accurate and comprehensive (Appendix 7-III, Paper Quality and Production Control)

Based on the improved reporting routines from the paper machines and the laboratories new targets for paper machine performance and paper properties are going to be developed.

The gradually updated paper machine performance statistics will assist the paper mill management in their aim to improve paper machine efficiency.

Statistics regarding paper machine properties will give the market and sales department a firm base for commercial discussion with their customers. These statistics will also assist the Market and Sales department in dealing with customer claims.

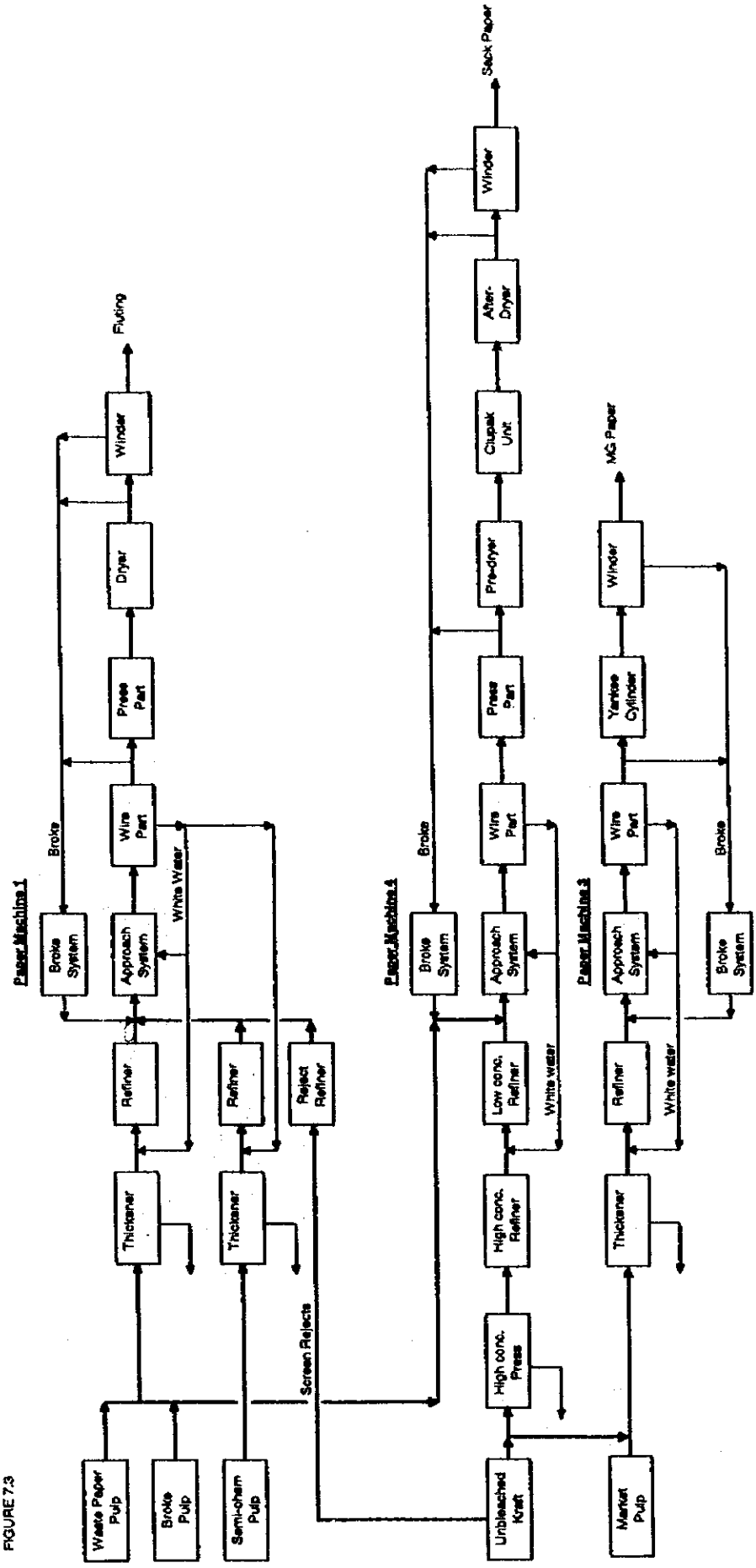

Waste Paper Pulp
Broke Pulp
Semi-chem Pulp
Unbleached Kraft
Market Pulp
Thickener
Refiner
Reject Refiner
High conc. Refiner
Low conc. Refiner
High conc. Press
Screen Rejects
White Water
White water
Broke
Broke System
Approach System
Wire Part
Press Part
Dryer
Pre-dryer
Yankee Cylinder
Chipak Unit
After-Dryer
Winder
Fluting
Stack Paper
MG Paper
Paper Machine 1
Paper Machine 4
Paper Machine 5

FIGURE 7.3

New paper mill organisation will be introduced. Final target for number of employees after investments and training is shown in the Table 7-4.

TABLE 7-4
Paper Mill Organisation and Manning

	Super-intendent	Super-visor	Operator	Maintenance
Group 1	1	4		
PM1			40	4
PM3			22	4
Group 2	1	4		
PM4			44	4
Group 3				
Broke			8	

Total manning in these departments has been estimated at 137.

Paper machine 1

The investments necessary to meet future capacity demands have to be made. The paper machine is now producing only one quality grade of paper, i.e. fluting based on semi chemical pulp. By concentration on one grade only the paper properties will improve. No compromises needed between different requirements for different paper grades.

Fluting paper properties obtained from the present paper production based on waste paper pulp, compared with European standard, show CMT values as presented in Table 7-5:

TABLE 7-5
Fluting Properties

	NATRON	Typical European mill
Grammage Gr/m2	CMT	CMT
112	170	190
127	190	200
Expected CMT value after change to semichemical pulp;		
112	200	
127	240	

All systems can be controlled to a specific paper grade with few changes. The concentration to one paper grade will improve paper machine efficiency. Principal sectional drawing of paper machines, illustrating the web run, is presented in Appendix 7-II.

Focus for the paper mill management will be:

- Paper quality. Semichemical fluting is a new paper grade to NATRON mill. Paper properties have to meet demands from export markets.
- Efficiency will improve from the previous level due to concentration to one paper grade only. Additional to this efforts must be made to match the efficiency of the competing western mills.
- Costs for production have to be decreased. Higher utilisation of manpower and energy. Reduction of fibre losses.

Paper machine 3

The pulp supply to the paper machine has been changed from market pulp to kraft pulp produced at NATRON pulp plant.

Paper grades produced will be the same as in previous program. Principal sectional drawing of paper machines, illustrating the web run, is presented in Appendix 7-II.

Focus for the paper mill management will be:

- Improved paper properties within the existing grade range
- Improved efficiency and reduction of costs.

Paper machine 4

A comprehensive repair program has been realised before the restart of the paper machine. Damages due to war activities and due to a long period of non operation have been corrected.

Investments have been made in order to meet market demands. Equipment for improved stock preparation, installed before the war but never taken into operation, will be taken into operation from the time of the restart.

The high consistency refining in combination with a new low consistency refining principle will improve the Tensile Energy Absorption (TEA).

TEA is the most important paper property for sack paper and reflects the ability for the paper to stand the stresses and shocks which the paper is exposed to during mechanical and manual handling.

The porosity of the paper, ability to let air trough the paper, will increase. This is an important feature for the sack paper during the filling operation in, for example a cement mill.

Improved dewatering capacity in the wire part will improve formation by lower headbox concentration. Improved formation will improve the tensile strength of the paper.

The Clupak unit improves TEA mainly in the machine direction by compacting the paper thus "building in" more machine direction stretch in the sack paper (Clupak paper)
Based on the equipment available for the paper machine a good quality sack kraft paper will be manufactured. The technology is well established in the industry and the technical risk is low.

Principal sectional drawing of paper machines, illustrating the web run, is presented in Appendix 7-II and a comparison of sack paper properties in Appendix 7-III.

Focus for the paper mill management will be:

- Improved efficiency of the paper machine operation through close process control.
- Paper quality improvements. High consistency and low constancy refining technology to be introduced.
- High utilisation of the Clupak unit.
- Improved paper sheet formation for improved strength properties.
- Cost of production must be decreased. Higher utilisation of manpower and energy. Reduction of fibre losses.

7.2.4 Survival Plan

If the partner or investor, needed to support the mill development towards restarting the pulp mills and PM4, is not found on time, the mill has to continue the operations without major investments. This "Survival Plan" can be considered to be an intermediate stage, which has to be followed with a more comprehensive development program.

Because the pulping lines will not be started, the mill will continue the operations according to the Short term PROGRAM, increasing the production according to marketing possibilities. Exporting corrugating board raw materials seems to be not profitable, and therefore PM1 production is limited by domestic markets of corrugated board. The sales production of converted products and MG paper is expected to develop as in the Long Term PROGRAM.

The Survival Plan includes the following:

- PM1 will produce raw materials for corrugated board (fluting, schrenz, testliner) using domestic and imported waste paper and purchased kraft pulp as raw material. PM1 will be operated intermittently for several years.
- PM3 will produce MG paper of purchased kraft pulp
- The production of sacks will be continued, based on imported sack paper
- Effluent treatment and ash dumping have to be repaired and brought into operation
- Compact boiler will be installed for the conversion plant

All these investments needed for the Survival Plan are included in the further development PROGRAM, so that they will be fully utilised, if the Long Term PROGRAM is implemented in a later phase.

The annual development of sales production in the Survival Plan has been estimated at:

TABLE 7-6
Annual Sales Production in Tons, Survival Plan

	Year						
	2	3	4	5	6	7	8
Corr. Board	10,000	15,000	20,000	26,000	32,000	35,000	38,000
MG paper	5,000	8,000	10,000	13,000	16,000	18,000	20,000
Sacks and bags	4,800	7,000	7,500	8,000	8,400	8,400	8,400
Total sales	19,800	30,000	37,500	47,000	56,400	61,400	66,400

Total capital expenditure for the Survival Plan is estimated at DM 13 million. The investments are specified in Chapter 8.1.

7.3 Basic Operating Concepts for Converting Plant

7-3-1 Urgent Reconstruction Program

First of all, we would like to make clear our concept for the converting plant. History tells us that NATRON has started the business as a container-board manufacturer and then developed step by step to the converting field. So NATRON had a basic idea regarding converting industry including corrugated board or bag manufacturing plants as a downstream process of an integrated paperboard mill. Previously such thought was common also in Japan. However the converting industries always keep in touch directly with consumers' market so that they can sense the needs quickly from market. Therefore, from the view point of the converting industry the paperboard industry should be considered as one of the material suppliers.

Originally NATRON was a kraft paper and container board manufacturing company. When we stand in the position of a consumer, these products are just a simple raw material for packaging industry. On the other hand, corrugated boxes and kraft bags are essential packagings for everyday life all over the world. Production and sale of packaging alone can support companies for the packaging industry. In other words, the packaging industry has been established as an independent industry for a long time.

Considering the present situation of NATRON, a lot of money and time is needed in order to bring its paper manufacturing division to its original state. Additionally far more money and time

should be needed to return this country to the prewar condition and it probably should be a very difficult work. However its converting division has already restarted operation and has been shipping its products to the market. Once the domestic political situation and the civil life is stabilized, domestic consumption will grow. As a result distribution of consumer goods, the basis of consumption, will increase more and more. Corrugated boxes and paper bags are absolutely necessary for distribution. In future, the Republic of Bosnia and Herzegovina which has ample excellent people will be expected to concentrate its energies on the converting industry for production of these consumer goods.

Now it is difficult to see a big leap in the market recovery and development though, it can be expected that the market for packaging industry will steadily recover and the demand for their products will grow. NATRON should promote sale into this market. And at the same time supplying those products in market acceptable "Quality, Price and Time of Delivery" will be quickly needed as "the most urgent reconstruction program". However in the present situation, NATRON cannot invest lots of money into this reconstruction program. So it will have to achieve its object with the current facilities and workers. Above mentioned are the basic philosophies for "the urgent reconstruction program" the study team is going to suggest.

7-3-2 Medium term reconstruction plan

On the assumption that the market activity in BH becomes lively and the production is increased, we made this medium term reconstruction plan. Our fundamental concepts are addition and renewal of facilities for corrugated board and box production, and improvement of material handling system in keeping with production increment. Of course NATRON possibly need to change the layout of the plant. The concept "In a delivery-on-order industry, shipment is of primary importance" should be strictly secured and NATRON has to improve material handling efficiency all over the plant. From the safety and cost reduction point of view, an improvement should be done by eliminating pallets and lifters (pallet transportation system) out of the plant if practical and possible. To break off from a converting section belonging to a paper mill, NATRON should develop products to pack goods as a total packaging producer. To accomplish this objective, it needs an organization to develop its own technology for packaging and training of its employees.

7-3-3 Long term reconstruction plan

Also in the packaging industry of Japan, we are in the borderless age now. So even if the products have an advantage in quality, cost and delivery rather than others, it is still not enough condition to survive in the business race now. We cannot keep customers' satisfaction with only low price. Customers' needs have been such diversified as POP effect expectable package, distribution cost decreasable package and specially functional package. In the next years we will

be requested to cope with these requirements, develop necessary software with technology and provide appropriate services to our customers.

(1) Establishment of the Packaging Technology Research Center

An institute for research and development on packaging technology such as package design(decorative and strength) and packaging system to promote market development is needed.

(2) Introduction of manual labor saving machinery

In Japan the converting industry is considerably dependant on human power still now, and we have had workers' accidents quite often. In order to reduce production cost and improve workers' safety and health, we need mechanisation

(3) Application of computer (CIM)

The computer integrated system is the plant total management system with the computer, which includes all of the order control, production control, schedule control and finance control. To build such a system is very important for NATRON.

7.3.4 Corrugated board and boxes

(1) Urgent Reconstruction Plan

1) Introduction

Of course no need to mention the reason why corrugated boxes have been growing as the main supporter of distribution in these years and their production reached at 13.5 billion square meter in 1997. However we would like to point out here some features briefly.

①We can get six to seven times more boxes in volume from same raw material than wooden ones.

②They are lighter than wooden ones, so possible to decrease distribution cost.

③They have more stiffness and impact strength than that of wooden ones.

④They have flatter surface than wooden ones, so possible to print their surfaces and give them POP effects and such information as bar-codes.

⑤They need less space for storage than wooden ones because of their foldability.

⑥They are recyclable as waste paper.

⑦They are less expensive because they can be mass produced.

Corrugated boxes have excellent characteristics, however they need to be manufactured at high quality, lower cost and higher productivity. When NATRON think about the postwar reconstruction and its competitiveness in the future, the highest priority should be given to the quality of products.

2) Quality control

The quality of corrugated boxes consists of fundamental quality and user quality. The fundamental quality is an essential characteristics steadily had to be bound together with the products through manufacturing process. Therefore manufacturers have to find what is the necessary control for process management at the production site and be sure to perform such operation. All the workers in the production site are requested to understand "quality first" concept and to give the essential characteristics binding with the products. (Introduction of TQC concept into operation)

The user quality is characteristics bound together with the products which are fixed up according to an agreement with customers. In Japan, automatic packaging lines are so popular at customers' sites that customers generally demand supplier controlling his corrugated materials quality very well. So called PPM control, namely only one inferior case allowable per one million cases produced, is usually requested. To fix the user quality, supplier must make clear his user's needs. So the closest cooperation with his production team and marketing team is absolutely needed to get customers' satisfaction.

Quality control system is built on the basis of daily operation data. Getting accurate data from manufacturing process in daily basis and quick information feedback to correct a malfunction of the process is the most important. (Plan - Do - Check - Action circle) To turn round this circle, an appointment of the quality control manager and improvement of workers' sense through training are essential.

3) Quality standard for corrugated board and boxes

In the production activity, to determine the characters to be bound together with the products is more important than anything else. These characters are the quality standard. When going to draw up the quality standard, it has to be confirmed if it is possible to manufacture the products steadily and practically according to this standard. For this, it is important to collect present quality data at first, then have to keep products within and out of standard separately, continue improving the quality of products, finally fix up the standard after this quality becomes stable. Various quality standards have been established according to countries or areas, however these standards are persistently a norm. It doesn't necessarily mean the products precisely produced according to the standard are surely sellable in the market. Manufacturers have to establish the quality standard for their products by themselves. Look around the world, in Japan there are "JIS Z 1516 Corrugated Fiberboard for Shipping Containers" and "JIS Z 1506 Corrugated Shipping Containers". Also in Europe they have "FEFCO" standard, and in the USA they have such standards as "RULE 41 ITEM 222". When own standard is going to established , much information should be obtained from these various standards.

4) Process control to establish fundamental quality

① The fundamental quality of corrugated board

The fundamental qualities of corrugated board are flute formation and adhesive strength. To give these quality bound together with the products in production process, following inspection during the manufacturing process and gathering test data are necessary. If these data are available, it is possible to get products with constant quality and maintain it.

a) Dimensional check for flute height of the corrugating roll (periodically)

b) Starch adhesive preparation record (daily)

Viscosity and temperature of starch at preparation process

Viscosity changing curve with the passage of time

Starch consumption

c) Quality control chart for typical grades (daily)

Thickness (tender side, center and drive side) (sampling inspection)

Flute formation (such as flute leaning and flutes formed low)

Adhesive strength (sampling inspection)

Starch coating uniformity check (periodically)

d) Surface temperature of rolls and heating plates

② The fundamental quality of corrugated boxes

The fundamental quality of corrugated boxes is no flute leaning through the process and conforming to the quality the production order designates, namely the customer's specification.

a) A shear in dimensions, color, design and slotter

b) Thickness (printed parts) (sampling inspection)

c) Compressive strength test (sampling inspection)

5) Energy requirement

Some people think converters of course should depend their energy requirements (electric power, steam and compressed air) on their paper manufacturing department. However converters must investigate these questions deeply.

How much is the cost for their energy per unit production ?

How is their competitiveness ? and

Is there any problems in the production program and delivery schedule management ?

Though such investigation has already been done in NATRON, we think investment effect should be studied more in detail. In Japan, even a converter located in the site of a paper mill generally has its own energy plant. Percentage of energy in the total production cost of NATRON is too high compared with Japanese converters.

6) Maintenance system

Maintenance for paper mills are usually done with closing all of the operation (shut-down maintenance system according to predetermined schedule), because the paper mills run in the system of product-out. On the other hand, converting plants for corrugated board or paper bags run in the system of market-in. So we have to deliver sufficient products to our customers any time they need, and delivery is of the most importance for converters. Including the energy reason, generally we cannot stop all of our equipment extending several days. Therefore the maintenance organization for converting plants must be flexible to cope with any situation. All of the operators should have been trained to repair equipment in his or her charge. So the converting plants must have their own maintenance system.

Above stated are "the urgent reconstruction program" we suggest. As a premise, we would like to say that all NATRON members from officers to workers should primarily change to a more professional attitude.

(2) Mid-Long Term Reconstruction Plan

1) An addition and a renewal of equipment for corrugated board and box production

① An addition of a flexo-graphic printer folder gluer

② An addition of an autoplaten

③ A renewal of a flex-graphic printer slotter

2) An improvement of the material handling system in the site

An introduction of the material handling system without pallets and lifters

3) A new product development

① Corrugated board having function such as water resistance, moisture proofness, antirust quality and freshness keeping

② Cushioning materials such as moulded pulp products, angle type corner pads and single faced corrugated board.

③ Color graphic printed corrugated board

(4) Qualification for ISO 9000 series

When NATRON is going to market its products in Europe, qualification for ISO 9000 series will be an essential condition. NATRON has to hold this qualification just as an identification card for its quality.

7.3.5 Sacks and Bags

(1) Introduction

Though the plant for paper bag production is somewhat obsolete, almost all of the equipment has been luckily kept away from the war fire and can be operated. However the market for paper

bags may be very small. Compared the production in 1997 with 1991 figures, larger sized and smaller sized paper bags sharply decreased by 6.7% and 7.3% respectively. Therefore without quick recovery of sales volume, the most urgent reconstruction program cannot be practical. What do we think about the paper bag market in future, after the reconstruction was advanced ? Because we don't have any market data here in this country, NATRON should help itself to associate its future with the past records of Japanese paper bag production.

In Japan, larger sized paper bags are called kraft bags. The National Kraft Bag Manufacturers' Association has collected the statistics of the production. According to these statistics, the production has decreased year by year since the peak of 1973. From the peak of 2,895 million bags (paper consumption : 542,762t) in 1973, the production has decreased by 33% to 1,934 million bags (paper consumption : 312,212t) in 1997. In 1973 three major fields consuming paper bags were cement, grain flour and feed industry and these industries represented 45% of total consumption. In 1997, those three industries' share dropped to only 27%, and the top consumer was synthetic resin industry at 18%. As these figures suggest, the demand pattern of paper bags has changed so dramatically. You should compare the paper bag industry with reconstructing and rehabilitating activity of other industries in BH.

In Japan, smaller sized paper bags are called self-opening square bags, and the Japan Self-opening Square Bag Manufacturers' Guild has gathered the statistics of the production. According to these statistics, the production has decreased year after year as kraft bags since the peak of 1977. From the peak of 15,832 million bags (paper consumption : 259,422t) in 1977, the production has decreased by about 65% to 5,505 million bags (paper consumption : 117,629t) in 1997. Above all, because the production of self-opening square bags dropped so drastically, we may easily imagine that it has been caused by shifting from paper bags to plastic ones.
For your reference, the breakdown of kraft paper (wrapping paper) production in 1997 is shown in the following table.

Unbleached wrapping paper		Bleached wrapping paper	
Unglazed kraft paper for heavy duty sack	422,440	Bleached machine glazed tape	118,771
Other unglazed kraft paper	218,723	Bleached kraft paper	220,901
Other unbleached wrapping paper	56,357	Other bleached wrapping paper	70,709
Subtotal	697,520	Subtotal	410,381
Total 1,107,901			

(2) Product Standard

Paper bags have such variety that the establishment of a standard is not easy. However when push on quality control, the standard of product is essential. Especially the most important function of the larger sized paper bags depends on their strength, because all these function including protection for their contents and leak proofing just depend on the strength of the bag. In Japan, kraft bags are standardized with "JIS Z 1565 Kraft Paper Bag for Cement" and "JIS Z 1509 Potato Starch Coated Kraft Bag". To establish the standard of it product, NATRON

should also refer to the standards of European countries and the USA and make a draft of its standard on the basis of them.

(3) Paper bags

Change their function from distribution to packaging

7.4 Steam and Power Supply

7.4.1 Power demand

The power demands in the new mill configuration are different from the pre-war operation. The major changes are;

a) PM4 high density refiner (2.5 MW) will be started
b) Kamyr digester will have new, larger hot stock refiner.
c) PM1 and PM4 will have higher production rate.

The power demand figures are as below. The numbers are when all the equipment is running at the highest planned capacity and considered as peak, not average, demand

Plant	Demand (MW)	
PM1	7.67	
PM3	1.13	
PM4	8.75	
SCP (Kamyr)	5.08	Includes chem. recovery
Kraft (Batch)	6.91	Includes chem. recovery
Conversion	0.80	
Power plant	3.77	
Total:	34.12 MW	

The power demands for the new mill configuration are estimated as 34 MW.

Due to the balance of power and steam demands (see next section), the steam turbines have to be run with considerable amount of steam passing through the low pressure stage to the condensers.

7.4.2 Steam demand

The steam demands for the coal boilers in the new mill configuration are different from pre-war operation. The major changes are;

1) PM1 and PM4 will have higher production rate.
2) Black liquor from SCP (Kamyr) line will have much smaller heat value and generate less steam in the recovery boiler.

The estimated steam demands are as below. The numbers are when all the equipment is running at the highest planned capacity and considered as peak, not average, demand.

Plant	Demand (t/h)	
PM1	37.8	
PM3	4.9	
PM4	31.1	
SCP (Kamyr)	18.1	Includes chem. recovery
Kraft (Batch)	40.1	Includes chem. recovery
Conversion	3.5	
Power plant	15.0	Estimate
Total:	150.5	

Steam turbine requires minimum 10 - 15% of steam put through the condensing stage. Therefore, in order to supply 150 t/h steam to process, turbine inlet steam has to be at least 170 t/h, of which approximately 20 t/h goes through the condenser.

7.4.3 Power and Steam Balance

(1) Cost of purchased power

Purchased power prices as of April 1998 are as below;

Demand charge (monthly)*1)

Winter month (Dec-Feb.)	27,000 DM/MW
Summer month	18,000 DM/MW

Energy Charge

Winter high rate hours *2)	81 DM/MWh
Winter low rate hours	40.5 DM/MWh
Summer high rate hours	54 DM./MWh
Summer low rate hours	27 DM/MWh

*1) Monthly peak power measured in 15 minutes interval, measured in high rate hours only

*2) High rate hours 7:00 - 13:00 and 16:00 - 22:00, rest of day is low rate

From these power charge structure, the actual power cost are calculated as below,

	L.F.=0.8	L.F=0.9*3)
Winter high rate hours	127.9	127.7 DM/MWh
Winter low rate hours	40.5	40.5
Summer high rate hours	85.3	81.8
Summer low rate hours	27.0	27.0

*3) L.F. = Load Factor = monthly average power (MW)/peak power (MW)

(2) Cost of generating power

Incremental power generation fuel cost calculated based on the following data is 84 DM/MWh

Coal price	43 DM/t
Coal heat value	10,480 MJ/t
Coal boiler efficiency (1991)	82 %
Incremental steam rate of condensing power	5.5 t/MW (estimate)

Above figures imply that, expect in winter high rate hours, it is more beneficial to purchase power from grid than to generate in the mill power plant.

(3) Power-Steam balance

The capacity of mill coal boilers excluding the old boiler UKO-1 and 2 is 180 t/h. Steam generation by the recovery boiler is estimated to be 46 t/h. The future bark boiler will generate approximately 25 t/h of steam. The net steam generating capacity of the mill is 226 t/h before the bark boiler installation and 251 t/h after the installation. Except in winter high rate hours, it is more beneficial to purchase power from the grid. In this case, the steam-power balance will be as below.

Before the bark boiler is installed	Winter high rate	Rest of time
Power demands	34.1 MW	34.1 MW
Steam available to generate the power	226 t/h (maximum)	170 t/h
Estimated turbine steam rate	7.5 t/MWh	7.5 t/MWh (estimate)
Net power generation	30.1 MW	22.7 MW
Purchased from network	4.0 MW	11.4 MW
Process steam demands	150 t/h	150 t/h
Steam passing through the condenser	76 t/h	20 t/h (minimum)
Steam generated by recovery boiler	46 t/h	46 t/h
Net steam to be generated by coal boiler	180 t/h	124t/h
After the bark boiler is installed		
Power demands	34.1 MW	34.1 MW
Steam available to generate the power	251 t/h (maximum)	170 t/h
Estimated turbine steam rate	7.5 t/MWh	7.5 t/MWh (estimate)
Net power generation	33.5 MW	22.7 MW
Purchased from network	nearly 0 MW	11.4 MW
Process steam demands	150 t/h	150 t/h

Steam passing through to condenser	101 t/h	20 t/h (minimum)
Steam generated by recovery boiler	46 t/h	46 t/h
Steam generated by bark boiler	25 t/h	25 t/h
Net steam to be generated by coal boiler	180 t/h	99 t/h

The old coal boilers UKO-1 and 2 should be kept as stand-by boilers due to their age and low efficiency.

7.5 Environmental

Rehabilitation and start-up of the effluent treatment, the solid waste disposal, and the air pollution protection system is completed in this period before Long Term Program is commenced.

7.5.1 Effluent Treatment

Estimated effluent load assuming full production and allowed load after treatment will be as follows in consideration of the European standard (Table 7-7):

TABLE 7-7
Effluent Load

	Flow m^3/t	BOD_5 kg/t	TSS kg/t
NSSC	70	30	20
Kraft pulp	70	20	20
PM1	50	6	10
PM2 and recycled fiber	150	10	20
PM3	50	7	15
PM4	50	7	10

Total load to external treatment

	Design production t/a	Flow m^3/d	BOD_5 t/d	COD t/d	TSS t/d
Semich. pulp	66,000	13,200	5.7		3.8
Kraft pulp	66,000	13,200	3.8		3.8
PM1	73,000	10,400	1.3		2.1
PM2	22,000	9,400	0.6		1.3
PM3	9,000	1,300	0.2		0.4
PM4	57,000	8,100	1.1		1.6
Total		56,000	12.7	38.1	13.0

Allowed load after treatment		BOD_5	COD	TSS
Allowed specific load after treatment	kg/t paper	5	35	8
Allowed total load after treatment	t/d	2.3	16.4	3.7
	mg/l	41	293	66
Required reduction in external treatment	%	82	57	71

The total amount of effluent to be treated is calculated to be 56,000 m^3/d, that is 2,333m^3/h. The BOD and TSS are possible to reach the target values, but COD is very difficult to attain, without any additional equipment. Detailed study by the original manufacturer is required to reach a conclusion.

7.5.2 Solid Waste Disposal

The ash from the coal boilers will be damped in the damping place which is about 2 km far from the mill.

It is sent through piping by slurry pumping.

The thickened sludge from effluent treatment should be damped to the damping place, however it should be considered for burning in the sludge boiler.

The barks discharged from debarking in wood handling plant should be also burned in the bark boiler.

7.5.3 Emission to air

The exhaust gas treatment for both batch cooking line and continuous cooking line and the condensate stripping are restarted to prevent air pollution and odor emission.

The old recovery boiler shall not be operated from the view point of preventing air pollution as the cascade evaporator is applied and it is not a large economy type.

7.6 Organisation and Human Resource Development

7.6.1 Organisation

According to the plan prepared by NATRON mill management, the organisation would be divided into three main units: 1) Production and Technical, 2) Independent Expertise Department, 3) Collective Activities.

1) The Production and Technical Unit would be headed by Assistant for General Manager and divided further into following four sectors, either to profit centres or business units:

- Pulp and Paper Production Department, covering wood handling, pulping, plants, paper machines, power plants and environmental protection
- Paper Packaging Department, covering sack and bag production and plastic coating
- Cardboard Production Department, covering corrugated board and box production

- Maintenance Department, covering internal maintenance (mechanical, electrical, instrument, building) and supplying of external services

Each of these profit centres or business units include departments for supplies and preparation, quality control, sales, economics and personnel administration.

2) The Independent Expertise department would report directly to General Manager and be responsible of common quality and other control functions.

3) The Collective Activities Unit would include Commercial and Marketing Sector, Development Sector (investments, engineering, information), Economy Sector and Personnel Sector (law, personnel and public relations, fire protection and human resource development).

The organisation chart is illustrated in Fig. 7/4, Company Organisation, Proposed.
This plan can be considered to be the first step towards such an organisation, which would best serve the future operations The final decision depends on the privatisation and the future company structure. However, we recommend to consider the following alternative:

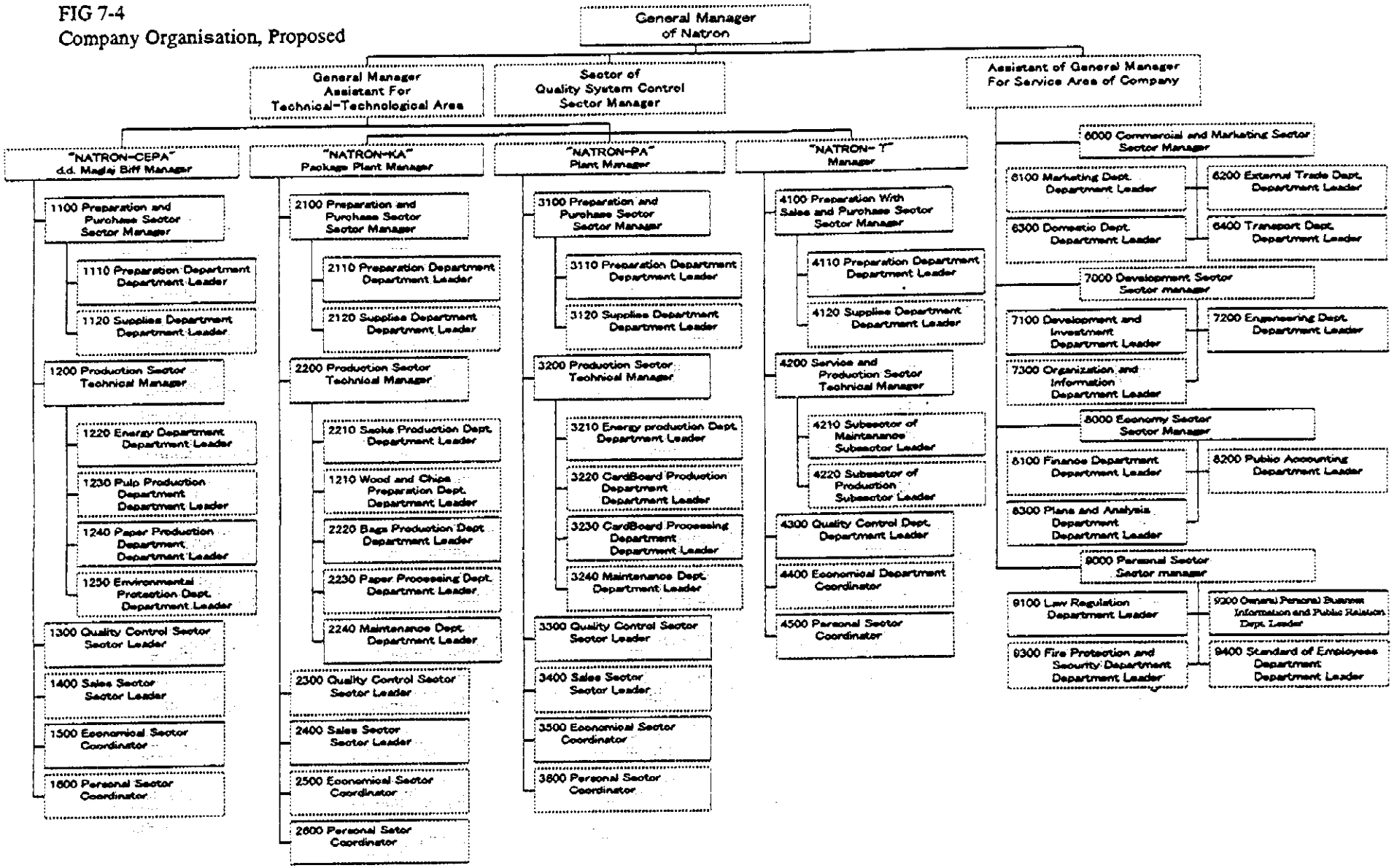
1) Pulp and Paper Production Sector

This sector would have the following sub sectors: 1)Production, 2)Procurement, 3)Quality control, 4)Sales, 5)Economical, 6)Personnel
The Production sub-sector would include the following departments: 1)Pulp, 2)Paper, 3)Energy, 4)Environmental, 5)Maintenance. We have subordinated the wood handling operations to pulp production department, because it is only supplying the raw material to the pulping lines.
Because the maintenance functions will be centralised, the maintenance department would be rather small and include shut-down and work planning and required capability to define the maintenance need, to discuss with maintenance specialists and to place orders to the maintenance department.
The sales sector would be responsible of production planning and paper storage operations.

2) Paper Packaging and Cardboard Packing Sectors

The same sub sectors would be established as in the pulp and paper production sector, so that the Supplies and Preparation Sector would be changed to Procurement Sector. We are not convinced, that the energy sector, as planned by NATRON, is needed in the cardboard packing sector, because in the future steam and power would be continuously available from the centralised power plant.

FIG 7-4
Company Organisation, Proposed



Customer service and product planning are important in converted products business, especially concerning cardboard, and these functions should be given the required attention when defining the personnel resources in quality control, marketing and sales. The marketing of cardboard products would be mainly in the responsibility of that particular sector.

3) Maintenance Sector

We recommend to centralise the management of maintenance material storage. By this way the capital bounded in the storage can be minimised, without hampering mill operations. Standards for equipment, supplies and materials have to be created. Physically the storage of special equipment needed in that particular department only and frequently needed standard parts and materials can be located in production departments, but book keeping would be in the hands of the maintenance department.

A close co-operation is needed between the maintenance and production departments, so that maintenance shut-downs are planned in accordance with production schedule. Therefore we recommend to nominate a counterpart in maintenance departments for each production department, who are familiar with the special requirements of that particular production department. For example, the requirements of pulp mill are quite different than the requirements of paper machines or converting plants regarding maintenance or operational shut downs. A good understanding is needed between the parties when specifying maintenance operations.

4) Common Administrative Functions

These sectors would assist the various production and maintenance sectors by co-ordinating the common functions. It is important to avoid unnecessary overlapping of these functions with the production and other departments.

According to the organisation plan prepared by NATRON there is no common purchasing department. We feel that the procurement activities of various departments should be co-ordinated at least in the intermediate phase, when they still are under the same management.

We recommend to move the Organisation and Information Department to the Personal Sector, and to include Environmental Matters in Public Relations.

Minimum number of organisation levels should be used, thus simplifying decision-making, responsibility, control and follow-up functions.

The final organisation depend on the future company structure, affected by possible selling, leasing or privatising the company of part of it.

7.6.2 Manning

Before war, during the socialist system, when the mill was operating close to designed capacity corresponding sales production of 140,000 tons, the total manning of the mill was around 4,500. Cost competitiveness in the Western markets was probably not considered to be of major importance.

In open markets the labour force has in principle the freedom to move and select the country and their working place, and so the level of salaries and wages in B-H tend to increase, approaching in long term the same level as in other European countries. Entering to market economy requires cost-competitive operations, and this will create pressure to increase the productivity and reduce the number of personnel.

After implementing the production development plan as described above, the production will be higher than the pre-war level. The total manning needed to operate the mill according to the production plan after start-up (including wood handling, two pulping lines, three paper machines, power plant, converting, maintenance, offices, administrative and service functions) in the future is estimated at 1,170. Even this number is higher than which would be used in similar mill in Western Europe or Scandinavia. Therefore the number of personnel is planned to be reduced gradually to 930, targeting to approach normal level. If in addition the waste paper plant and PM2 would be operated, the corresponding numbers would be 1,280 and 1,045.
The extra personnel (including disabled, war invalids, family members suffered during war), now supported by NATRON, are expected after the start-up of the mill to be paid by public funds and not included in the costs of NATRON in the future.

The list of future manpower requirement, after start-up of the mill, excluding the waste paper plant and PM2, in shown in Appendix 7-IV, Preliminary Manning List, and summarised below, Table 7-8):

TABLE 7-8
Manning list, After Start-up

General Manager and Secretary	7
Production and Technical Division	
Common Functions	81
Pulp and Paper Sector	
Wood Handling and Pulp Mill	239
Paper Mill	172
Sack and Bag Converting Sector	99
Corrugated Board Sector	117
Maintenance Sector	362
Independent Expertise Division	8

Common Administrative Division	
Common Functions	12
Marketing Sector	15
Development Sector	18
Economy Sector	12
Personnel Administration Sector	28
All total	1,170

Later on the number of personnel can be reduced further, when approaching normal situation, i.e. comparable with European practices. The target has been set at 930.

In the Survival Plan, when the pulping lines and PM4 will not be started, the manpower requirement, after having reached normal situation, has been estimated at 500.

7.6.3 Training and Operations Improvement

(1) Technical know-how

According to the development plan, the existing pulp lines, chemical recovery, three paper machines and the converting plant will be used in the future. The mill has experienced personnel, who are familiar with and can operate these departments and equipment. Well equipped workshop and own spare part manufacturing indicate required level of technical skill in these sectors.

New processes and equipment will be installed to

- wood handling plant
- pulping and chemical recovery plant for semichemical pulp production
- power plant for bark burning
- effluent treatment plant
- process control and production control

The existing wood handling plant originates mainly from 1970's, is worn out and does not have sufficient capacity when entering export markets. Production of semichemical pulp requires some modifications in pulping and chemical recovery process. Burning of bark is recommended, because it most probably is more profitable than dumping or transporting the bark to other mills. Treatment of effluent is required, if the mill is continuing and expanding production. The control of process and production is out-of-date. Technical training for mill personnel in these areas is recommended.

Training to operate and maintain the new plants and equipment includes training periods abroad, participating in installation of the plant and on-job training.

The training period abroad is preferably arranged in the supplier's plants during manufacture of equipment. Expediting of the deliveries will be connected to this period. Main operators from the departments in question, maintenance specialists (mechanical, electrical, instrument) and the corresponding designers from the Development Sector would participate in the journeys, guided by head of the department. The trainees and supplier's supervisors would arrange the on-job training during installation and commissioning.

(2) Production Management

The existing production management system originates from pre-war period, when economic decision-making was centralised in the country. Operations in the mills was production-oriented, while marketing in the mill level had no major priority and the lower level of the organisation was not aware of costs, prices and profitability of the operations.

The development of production management includes acquiring tools, methods and follow-up systems for mill management to control the operations and main cost factors affecting the result of day-to-day financial result as follows:

- measurement and reporting system for the consumption of raw materials, main chemicals, heat and power
- reporting for production quantity, including analysis of time efficiency, material efficiency and production rate
- clear definition of job functions, authorisations and responsibilities in all organisation levels
- reporting system for production costs and contribution margin for each product grade and each order separately, which helps to optimise order acceptance and production planning separately for each of the paper machines

Now the measurement devices are missing or are out of operation. The most importance device and system includes weighing the recycled fibre entering the process, consistency and flow meters for the pulp components and steam to the paper machine, devices for electric energy measurement, paper moisture and basis weight measuring devices combined with data collecting system of production and efficiency, and system for calculation of saleable production tonnage.

The collected data would be screened and reported in such a way, that only the information needed for decision making in each of the organisation levels would be reported regularly.

Clear definitions for production efficiency, following the common practices (time efficiency, material efficiency, divided to various categories), would be prepared, so that the comparison with other producers is possible.

Decision-making, concerning day-to-day production and maintenance operations, is recommended to be delegated to lower levels in the organisation. This requires, that the organisation is clearly defined including formal position, authorisation and responsibility for each member. Job descriptions have to be prepared for each position in the organisation.

All levels of the organisation has to be made aware of the cost structure of the production, and each member in the organisation should be trained to know his role in efficient and cost-effective operation. Applying a promotion system in a later phase for production and maintenance personnel should be considered, including incentives and penalties, depending on production and quality.

This requires, that production and quality targets have to be defined clearly, based on annual budget, sales plan and quality requirements. Each organisation level has to be aware of it's role, authorisation, responsibility and reporting system.

(3) Energy Management

Energy management includes following three important aspects, which all have to be considered when aiming to energy- and cost-effective operation in the framework set by local conditions such as mill energy demand, existing power plants, fuels available and fuel and power prices:

- energy supply
- energy generation
- energy consumption

The NATRON mill has possibilities to buy, generate only own need or sell the electric power because of condensing turbines and condensers for the back pressure turbines. Combining and processing the information on steam and power demand of the mill, power plant characteristics, prices of purchased and sold power, tariff regulations, fuel prices and power prices - the mill can optimise the power supply. The prices of purchased and sold power depend on time of day, day of week, mill power demand and other tariff regulations. The selection of optimum power supply in various conditions can be calculated and used as instructions for power plant day-to-day operation. The programming of the system can be made in co-operation with hardware and software supplier. Special training of energy management and power plant operators is needed.

Efficient energy generation can be achieved by adjusting the operating parameters in the power plant at the most optimum way. Measurement devices, data collecting and reporting systems are

required. Power plant operators have to be trained and made aware of the cost structure of energy generation and of the optimum way to operate the plant.

Energy consumption per ton of product in the NATRON mill is considerably higher than in competing mills. The consumption will be reduced when having the mill in normal operation, but with moderate investments and suitable operating practices the energy consumption can be reduced even further.

Water consumption per ton of paper is reported to be 260 m^3, when modern mills use 10-20 m^3. None of the paper machines have efficient heat recovery systems, and process temperature is low, below 30 °C. Buffer capacity of white water and broke is insufficient, and maintaining the water balance during production disturbances is not possible without excessive fresh water intake and white water overflow. Considerable savings in heat, power and raw material consumption can be achieved through reducing water consumption.

Adjusting the process equipment - pumps, fans, suction pumps, refiners, screens - to fit the actual process requirement allows energy consumption reduction. Many of these measures can be made without any or with only minor investments, by only improving the operation practices.

Training and personnel development is discussed further in Appendix 7-V, Transfer of Technology and Need for Training.

8. RESTARTING COSTS AND INVESTMENT ESTIMATES

8 RESTARTING COSTS AND INVESMENT ESTIMATE

8.1 Fixed Investments

8.1.1 Basis for the Estimates

Major part of the capital expenditure for restarting the mill is needed to replace the equipment damaged during the war, to repair the buildings and structures, to repair the corroded parts or to make complete surface treatment for some structures, piping, vessels and equipment. These costs have been estimated from the experiences of the study team.

Some new equipment is needed because of changing the product (hardwood semichemical pulp and fluting instead of softwood kraft pulp and kraft paper), improving the quality and improving the operation performance. These costs have been estimated partly on the basis of discussions with the suppliers, partly on updated file data of the study Consultants.

Later on a new woodhandling plant and a new bark boiler will be installed. The costs have been estimated on the basis of Consultant's updated file data.

The following cost items have not been included in the estimate:

- interest during construction
- cost escalation
- working capital
- local taxes and import duties
- financing costs
- value of the existing assets

The estimates have been based on the cost level of 1st quarter 1998, corresponding the following exchange rates:

1 DEM	=	70.5	JPY
1 DEM	=	0.550	USD
1 DEM	=	0.334	GPB
1 DEM	=	4.41	SEK
1 DEM	=	3.03	FIM

It will be necessary later on to prepare the maintenance, restarting and investment cost budget with the required accuracy after having carried out more detailed planning of the maintenance measures and preliminary engineering of the future installations.

8.1.2 Immediate Production Program

In order to keep the mill running at the present level, two investment items are needed urgently. First, the environmental protection has to be improved including effluent treatment and dumping of ash from the power plant. The other larger investment needed is to reduce the energy costs when the paper machine 1 is down and only the corrugated board and sack plants are running.

The present situation gives the only possibility to run one coal boiler producing 25 tons of steam per hour, when only 5 - 10 tons steam is necessary for the production.
The solution for this situation is either to lease or to buy a so called compact boiler of the right size for this purpose. The cost for this investment is within two million DM. However, it is very important to make the immediate phase short, because it will be close to impossibility to make this phase profitable as long as the corrugated board and box plant only are running intermittently and the sack and bags plant produces only from purchased paper.
The investment during the immediate program have been estimated at;

- 1.0 million DM for effluent treatment and dumping areas
- 0.2 million DM for ash dumping
- 2.0 million DM for compact boiler (this can also be leased)

Total 3.2 million DM

8.1.3 Short Term Production Program and Survival Plan

The improvement in the short term is to get the paper machine 3 up running. This is not a very big deal since the machine has already been producing after the war. The main task except for some normal maintenance is to get the Yankee cylinder properly ground to make a good MG surface on the paper. This whole business for the restart would be done with approximately 0.5 million DM.
If there is an investor, this phase in the restart program is suggested to last about eighteen months and then continue to the long term phase. This suggested time frame corresponds with the delivery time for many major investment items to be made in this phase. It also means that purchase orders of a number of equipment must be placed early in the beginning of the short term phase, and will heavily load this low production, eighteen months period with high investment costs for the next higher production phase, and gives a negative cash flow for the first years.
The investment during the short term program have been estimated at;

- 0.5 million DM for restarting PM3
- 1.4 million DM for improvement of PM1
- 25.8 million DM for preparing to start the pulp mill and PM4

Total 27.7 million DM

If no investor is found, the short term production program should continue as a survival plan. This plan is based on waste paper, domestic and imported, for making liner and fluting on PM1 for own converting, and also to continue to improve the board and box plant operations for the domestic market. PM3 will be restarted on purchased pulp to make MG paper for export and also small bags and sacks for the domestic market. The sack mill will make sacks for export and domestic markets on purchased sack paper.

The investment for the survival plan is estimated at DM13 millions the investments are included in the long-term plan for the mill, so that no investment will be wasted.

PM1	Electrical maintenance		0.5MDM
	Fibre recovery		0.2 MDM
	Heat recovery		0.7 MDM
		Total	1.4 MDM
PM3	Maintenance total		0.5 MDM

as already done in the short term production plan.

In addition, some improvement investment is necessary for board and box plant.

Maintenance		1.5 MDM
Die cutter line		4.8 MDM
	Total	6.3 MDM

and for sack mill

Maintenance		0.4 MDM
Automation		1.2 MDM
	Total	1.6 MDM

Together with the investment for the immediate production plan;

Effluent treatment		1.0 MDM
Ash dumping		0.2 MDM
Compact boiler		2.0 MDM
	Total	3.2 MDM

This gives total investment demand for the survival plan of DM13.0 million.

However, the big investment of 4.8 million DM for the die cutter can be delayed and it would not be necessary to be made in the first two or three years of the survival plan. That means the investment for the first three years of the survival plan will be DM8.2 million.

8.1.4 Long Term Production Program

In this phase, two pulp lines in the pulp mill, the woodyard, the recovery island, the entire environment system based on European standards regarding pollution, the whole power plant for energy production, and the recovery boiler for production of chemicals for the process and also for energy, will be started up.

On the paper side it means that the paper machine 1, 3 and 4 will be running with higher capacities than before. In other words, the whole mill will be started with high capacity.

The plan for maintenance cost, investment cost, time table, and necessary human resources are shown below.

The costs during the long term program have been estimated at

- 20.5 million DM for maintenance, rehabilitation, and start up.
- 88.1 million DM for new investment including new wood handling, bark boiler, effluent treatment to meet European standards.

Total DM 108.6 million.

Major part of the investments, around DM 69 million, are made later, year 6 and onwards, when the mill is expected to have a positive cash flow. Main part of these, around DM 40 million are intended for the new wood handling plant, to improve product quality. The rest is intended to increase the capacity.

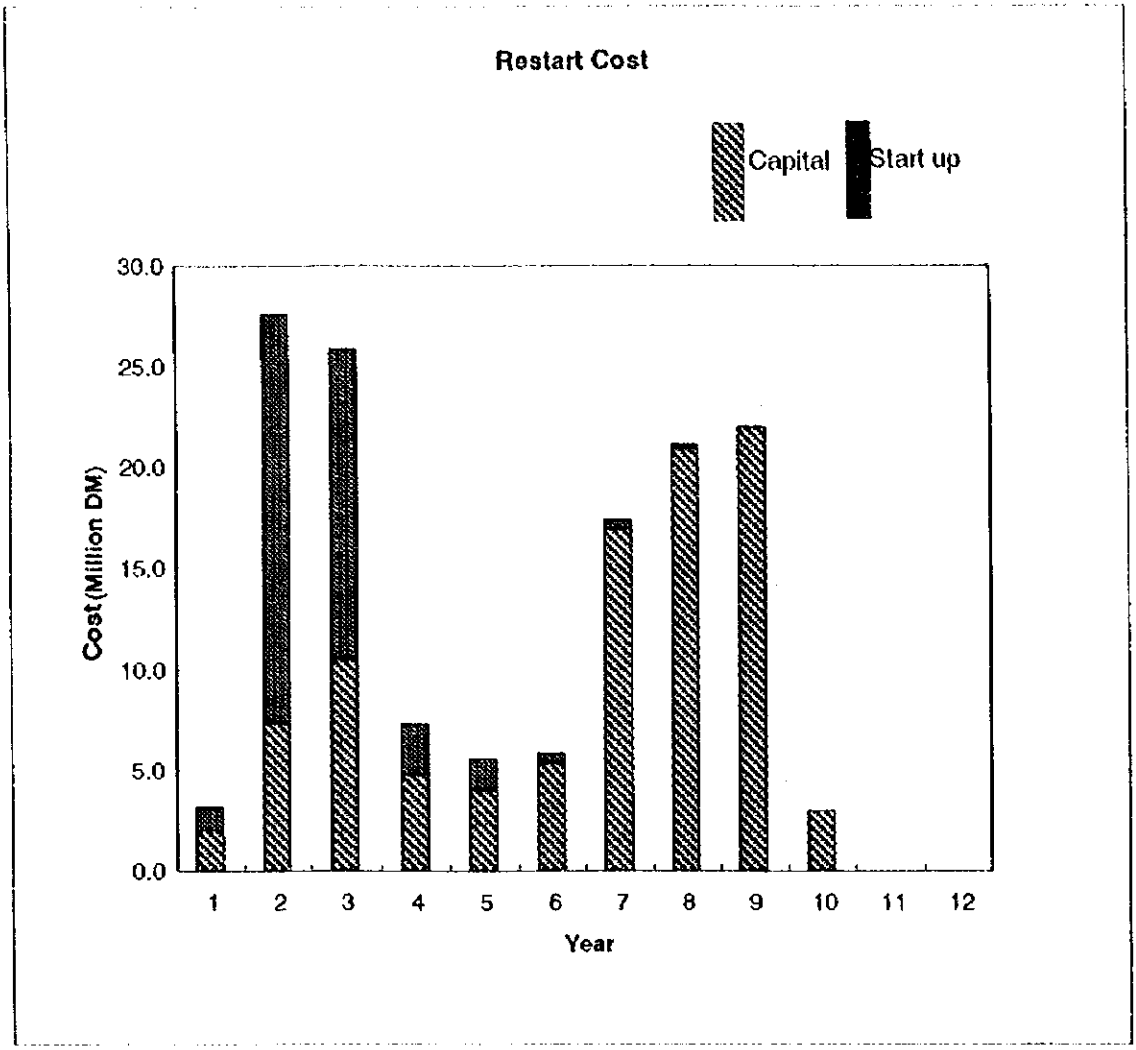
In the event that PM2 is started up, it will add another 5.4 million to the investment plan. It can be considered as maintenance and reinvestments.
Main jobs are maintenance, change of hydrocyclones and a second hand winder. PM1 has to be equipped with a new disc filter for fibre saving which is included in the DM 5.4 million.
The summary of the investments is presented in the Table 8-1.
The disbursement schedule of capital expenditures has been illustrated in Fig. 8/1. Main part of the investment requirement occurs in years 2-3 and 7-9.

TABLE 8-1

Summary of Investment (in million DM)

year	1	2	3	4	5	6	7	8	9	10	11	12	Total
Woodyard		2.7											2.7
New wood handling line							**7.0**	**14.0**	**16.0**	**3.0**			**40.0**
Kamyr Pulp Line		1.0	0.4										1.4
New Refiner motors		0.4	0.2										0.6
Level indicators		0.2	0.1										0.3
Heat exchanger		0.1	0.1										0.2
Flash tank pump		0.1	0.1										0.2
Spare Screen		0.4	0.1										0.5
Recovery Island		3.7											3.7
Batch Line		2.1											2.1
Cold Blow						**4.0**	**2.0**						**6.0**
Recovery Boiler		1.3	2.9										4.2
Super-concentrator		**1.0**	**1.0**										**2.0**
Water Treatment		0.4											0.4
Environmental		0.5	2.5										3.0
State Money	1.2												1.2
Power Plant		1.7	1.4										3.1
Generator Parts		0.8											0.8
Paper Machine No.1		0.5											0.5
Fiber		0.1	0.1										0.2
Heat		0.4	0.3										0.7
Wire section & Head box		**0.3**											**0.3**
Dryer Part extension		**1.8**	**2.7**										**4.5**
Scanner		**0.3**	**1.1**										**1.4**
Paper Machine No.3		0.5											0.5
Paper Machine No. 4		0.5	4.0										4.5
New Winder		**3.0**	**3.0**	**0.9**									**6.9**
Scanner		**1.0**	**0.4**										**1.4**
Board & Box Plant			1.5										1.5
Compact boiler	**2.0**												**2.0**
Die cutter & additional			**0.8**	**2.0**	**2.0**								**4.8**
Sack Mill			0.2	0.2									0.4
Automation				**0.4**	**0.6**	**0.2**							**1.2**
Mobile Equipment		2.2	1.2	1.2	0.6								5.2
Common System													0
Corrosion Painting			0.2	0.4	0.4	0.4	0.4	0.2					2.0
Office			0.3	0.2									0.5
Lighting		0.2	0.2										0.4
Insulation			0.2	0.1									0.3
Electrical System		0.3		0.4	0.3								1.0
Pipes & Pipe Bridges					0.3								0.3
Compressed Air		0.2											0.2
Laboratory Equipment			**0.5**	**0.3**	**0.2**								**1.0**
Office Equipment			**0.4**	**0.2**	**0.2**	**0.2**							**1.0**
Work shop machinery				**1.0**	**1.0**	**1.0**	**1.0**						**4.0**
Bark Boiler							**7.0**	**7.0**	**6.0**				**20.0**
Start up Costs	1.2	21.3	17.0	2.5	1.6	0.4	0.4	0.2	0	0	0	0	44.6
Investment	**2.0**	**7.4**	**9.9**	**4.8**	**4.0**	**5.4**	**17.0**	**21.0**	**22.0**	**3.0**	**0**	**0**	**96.5**
Total Cost	3.2	27.7	25.9	7.3	5.6	5.8	17.4	21.2	22.0	3.0	0	0	139.1

Remarks: **Bold Figures** are capital investment. Others are maintenance cost.


Restart Cost
Capital
Start up
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Cost (Million DM)
1
2
3
4
5
6
7
8
9
10
11
12
Year

8.2 Tentative Restarting Time schedule

Our proposed program to restart the operation at Natron is based on the assumption that finance can be arranged during 1998 so that the rehabilitation can commence within shortest realistic time. Weather conditions have also been taken into consideration in that respect that check-out and start-up will be executed during the warm period of the year so as not to risk water freezing in the systems while they are filled up and checked.

The rehabilitation work will be initiated by repairing effluent treatment system, waste dumping and ash handling systems so that the mil can operate based on waste paper and purchased pulp. This will be followed by the repair of the two pulp lines. Then will follow the repair of the power plant and the paper machines.

Several of these activities overlap in time to reduce the total time of the project. The maximum labor requirement has also been considered to be able to primarily utilize the personnel available at the mill. The total rehabilitation will then be completed within 24 months and mill started up by the middle of year 2000. The overall time schedule is presented in Fig. 8/2 and the detailed schedules by departments in Appendix 8-I, Restarting Costs and Time Schedule by Department.

8.2 Tentative Time Schedule

Year	Year-1						Year-2												Year-3					
Department	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Woodyard							Maintenance					Conveyer repair												
Kamyr pulp line													Maintenance			New refiner motor installation, Level indicators Heat exchanger, Flash tank pump, Spare screen								
Recovery island							Maintenance + repair instruments and bldg from war damage																	
Batch line							Maintenance			Installation of cold blow														
Recovery boiler Gotuvelken																Maintenence								
																Installation super-concentrator								
Water treatment							Maintenance																	
Environment				Maintenance, Effluent + ash															Maintenance stripping column					
				Maintenance, Industrial waste															+ treatment of gases					
Power plant													Maintenance											
																Generator parts								
Paper machine 1																Maintenance + heat recovery								
																Dryer part extention + wire section & head box +scanner								
																			Fibre recovery					
Paper machine 3							Maintenance																	
Paper machine 4																			Maintenance					
																			Installation of new winder					
																			HD Refiner + Heat recovery					
																			Installation of new scanner					
																			Clupak + Heat recovery					
Corrugated board + Bag plant																								

8.3 Manpower and Training Requirement for Rehabilitation

(1) Number of Personnel

The total manpower requirement to rehabilitate and start-up the mill is estimated to about 870,000 man-hours. The program is expected to be executed over a 22 months period. All the estimations have been made together with Natron maintenance management. To the estimated time, 20% was added in the maintenance plan. The wage has been based on 10 DM per hour. The cost for maintenance material has been set to 1.2 - 1.5 times the amount of money for the maintenance, depending on how big the damages are in the different departments. To this, has been added another 10% for foreign expertise as help for a successful maintenance and restart of Natron.

The number of available skilled workers for this program is;

172 mechanics
24 electrician
21 instrument
31 civil
Total 248 craftsmen

There is also a possibility to hire people from production as helpers. Suggestions for the number of personnel to be hired are:

Power plant	76
Pulp plant	40
Paper mill	15
Wood yard	11
Total	142

The problem with manpower will occur from September year 2 up to April year 3, when the need is bigger than the number now. The biggest problem will be in the instrument and electrical side. The production people can most possibly be trained to assist civil side. If no more craftsman can be found or trained for instrument and electrical tasks, there may be a need for 12 hour shift during this period. This all means that the maintenance management team has to be properly trained and educated in modern planning and get access to computerized planning systems, before the rehabilitation program starts. Manpower requirement is presented in Fig.8.3.

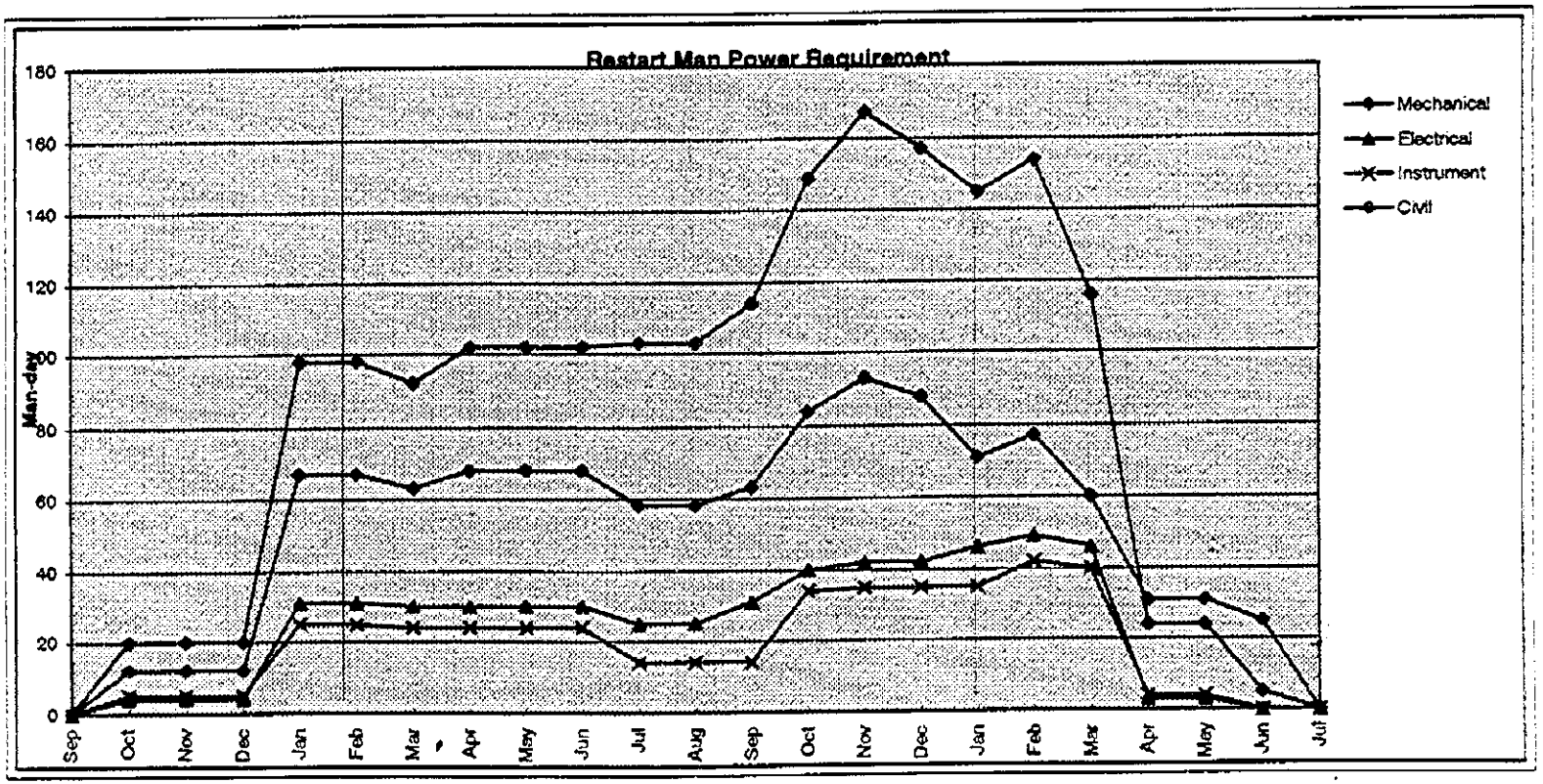
(2) Training

The need of immediate training for the entire maintenance management team at Natron is critical. There is a tremendous need of training in modern planning, warehouse storage systems for spare parts, and also education in how to update and train the maintenance crew how to work with modern equipment and in a western style. To do this, the management team also needs to be trained how to handle computers. Laser alignment of pumps and motors as well as diamond

drilling of concrete walls and floors and proper erection of bearings are some of the items for the crew to learn. The most important point is to get people to understand that there is no time or money to make any provisional repairs. The job must be right the first time. This is easy said, but it requires a lot of skill and morale to do.

8. 3 Man-day based on 48 hour a week work

	Year 2																Year 3											
	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
Mechanical	0	20	20	20	98	98	92	102	102	102	103	103	114	149	167	157	145	154	116	24	24	5	0					
Electrical	0	4	4	4	31	31	30	30	30	30	25	25	31	40	42	42	46	49	46	3	3	0	0					
Instrument	0	5	5	5	25	25	24	24	24	24	14	14	14	34	35	35	35	42	40	4	4	0	0					
Civil	0	12	12	12	67	67	63	68	68	68	58	58	63	84	93	88	71	77	60	31	31	25	0					
Total	0	41	41	41	221	221	209	224	224	224	200	200	222	307	337	322	297	322	262	62	62	30	0	0	0	0	0	0



9. PRODUCTION COSTS AND CASH FLOW ANALYSIS

9 PRODUCTION COSTS AND CASH FLOW ANALYSIS

9.1 Basis for the Calculations

The profitability of the restarting project has been calculated as Internal Rate of Return (IRR), which illustrates the average interest which the project is able to pay for the invested capital during the calculation period. In other words, IRR is the factor, which gives zero present value for the cash flow, when used in discounting the future annual cash flows during the life time of the investment to the present moment. It illustrates the financial profitability, which do not necessarily reflect the value of the project to Bosnian society. Therefore, a separate socio-economic analysis has been prepared (Chapter 10.5).

The following definitions have been used when calculating the annual cash flow:

- annual cash flow = operating margin - fixed investments
- fixed investments = restarting costs (incl. maintenance and essential replacements) + development investments
- operating margin = sales margin - fixed costs
- fixed costs = personnel costs + maintenance materials + replacement investments + general administration costs
- sales margin = net sales income - variable costs
- variable costs = costs of raw materials + chemicals + purchased fuels + purchased (or condensing) power + fresh water + effluent treatment + operating materials + packaging materials

When calculating the IRR in this chapter (technical approach), the terminal value of the mill and financing activity have not been considered. Working capital, interest, depreciation, repayments and terminal value have not included in the IRR calculation. Those are included in IRR by financial approach shown in Chapter 10.

Because main part of the plant and equipment is old and technically poorly equipped, the life time of the plant in the cash flow calculations has been selected at 12 years. It has been assumed, that the mill can be operated 12 years with the development measures and investments considered in the calculation. After that period more comprehensive measures would be needed in order to continue competitive operations. The life time expectation for new, green field mills in cash flow calculation is normally 15 - 18 years. Technically and mechanically the mills are capable to be operated much longer time, but the technical development is so fast, that the mill would loose competitiveness if not modernised completely after this period.

Present cost level with constant money value has been used in the profitability calculations.

Three production scenarios have been considered. In the main alternative three paper machines, PM1, PM3 and PM4 will be in operation, and no waste paper will be used. In the second

alternative four paper machines, including PM2 producing schrenz of waste paper will be operated. The third alternative refers to the Survival Plan, where the pulping lines will not be started, and the mill continues according to the Short Term Program producing only converted products and MG paper.

9.2 Variable Costs

The costs of raw materials and chemicals are based on consumption per ton of product and unit prices.

The costs of energy include purchased fuel and purchased electric power. In addition to the purchased energy, NATRON mill will after the start-up of the pulping lines in the future use own bark from softwood and black liquor as fuel. The fuel consumed includes the energy used in back pressure generation, which has been priced according to the fuel consumed. Condensing power generation is based on purchased fuel, and therefore the price of condensing power equals the price of purchased power.

Water consumption will be reduced. The costs of water, effluent, operation materials and packaging materials have been estimated according to experience.

At present, when only one paper machine and the converting plant is operated discontinuously, the cost-efficiency is low. In the future, when the mill is operated normally, the frequent shut downs and start ups are avoided and the operational efficiency is higher. The stabilised production will result in lower specific consumption of materials and energy, when reducing the down-time and the amount of rejected paper, which is circulated back to the process. Further savings in purchased fuels will be achieved when installing the new debarking plant and using bark from hardwood as fuel.

To summarise, reductions in variable production costs will be achieved by the following means:

- Own fuels (liquor, bark) will be used in steam and power generation. Energy generation and supply will be optimised
- Material losses and energy consumption will be reduced when improving operation efficiency by technical process improvements, by changing to continuous operation, by improving quality and by stabilising the processes. Because some power and steam is consumed even during machine shut down period, energy consumption per ton of product will be reduced by increasing operating time and production. All rejected paper has consumed energy without increasing sales production. By reducing the quantity of rejected paper, the consumption of energy per ton of product will be reduced further.

- Water consumption per ton of product will be reduced by technical and operational modifications. Water costs, fibre losses and heat losses will be reduced further.

At present all effluent is discharged to the river without any treatment. The costs for effluent treatment will be higher in the future.

The unit prices and variable cost calculations are presented in Appendix 9-1. The summary of costs is given below, separately for pulp (Table 9-1), paper (Tables 9-2 and 9-3) and converted products (Table 9-4):

TABLE 9-1
Variable Costs of Pulp

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 9-2
Variable Costs of Corrugated Board Materials

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	223	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	344	333

TABLE 9-3
Variable Costs of Sack Paper and MG Paper

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 9-4
Variable Costs of Converted Products

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	633	535	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	748	651	1454	826

9.3 Fixed Costs

(1) Personnel

The personnel costs have been calculated by estimating the number of personnel required to operate the mill and salaries and wages per person with 80 % added for social costs of the company.

Before war the number of personnel was some 4,500. In the Long Term PROGROM, after restarting the mill with two pulping lines, three paper machines, the converting plant, the power plant and other departments, except waste paper plant, the number of personnel is estimated at

1,170 (specified in Appendix 7-III). Later on, when approaching normal conditions comparable with other mills on Western Europe the personnel is expected to be reduced further. The target has been set at 930. In the optional alternative, when four paper machines - including PM4 - and the waste paper plant is in operation, the corresponding number of personnel is estimated at 1,280 and 1,045.

If the pulping lines are not started, and the mill continues production according to the Survival Plan, the number of personnel will be reduced gradually to 500.

The personnel costs per person are currently some 20 % of the pre-war level, and are assumed to grow gradually to the pre-war level, corresponding to 1800 DM/person per year in operation and maintenance, when reaching continuous operation of the mill. The escalation of personnel costs is presented in the cash flow analysis, Tables 9-10, 9-11 and 9-12.

In some cases the companies are paying bonuses or incentives to the personnel. They are intended to improve the motivation and productivity. However, the highest benefit of such incentives or bonuses can be achieved, when the personnel has tools available to increase production or improve product quality. In NATRON mill the production is now, and probably still for many years to come, limited by markets and other circumstances, which are outside of the control of the operating or maintenance personnel. According to the Long Term PROGROM the salaries and wages are anyhow increasing considerably, up to 10 - 40 % per year. Therefore incentives or bonuses can be recommended only in the future, when the salaries and wages have reached the pre-war level and when the capacity of the mill has been fully utilised.

NATRON is at present paying low salaries to extra, unemployed labour and to families suffered by the war. In the future it is expected that these costs are covered by public funds and not the responsibility of NATRON.

(2) Maintenance materials and Replacement Investments

The costs of maintenance materials have been estimated by experiences, based on similar circumstances in other mills. The replacement investments, in addition to normal maintenance, are required to maintain the technical level of the processes, in comparison with the competitors, and have been estimated by experience.

(3) General Administration

General administration costs cover such items as insurance, telecommunications, computer services, license fees, payments for various external services, office materials, business trips, housing and other general costs. The estimate is based on the information collected from the mill and on experiences.

When having reached normal operation and normal manning level of the mill, the fixed costs in these scenarios are estimated (Table 9-5):

TABLE 9-5
Fixed Costs

	Excl. PM2 1,000 DM/a	Survival Plan 1,000 DM/a
Personnel	21,600	11,700
Maintenance materials	10,000	2,000
Replacement investment	7,000	1,000
General administration	6,500	2,500
Total	45.100	17,200

9.4 Sales Prices

The sales income has been calculated using the estimated mill net prices. Weighed average trend prices have been used for sack paper and fluting, considering the delivered prices, market distribution, sales commission and transport costs, Table 9-6 and 9-7. The delivered trend prices and market distribution are based on the separate market study.

Other product prices have been estimated mainly on the basis of mill information, Table 9-8.

TABLE 9-6
Sack Paper Pricing

	Quantity TONs	Delivered Price DM/t	Sales Com. DM/t	Transport Costs DM/t	Ex. Mill Price DM/t
Italy	13,000	1,280	51	64	1,165
France	4,000	1,280	51	100	1,129
Greece	2,000	1,280	51	55	1,174
Turkey	5,000	1,120	45	100	975
Syria	2,000	1,240	50	127	1,063
Saudi-Arabia	3,000	1,240	50	145	1,045
Egypt	3,000	1,200	48	118	1,034
Algeria	2,000	1,200	48	127	1,025
Morocco	3,000	1,200	48	145	1,007
Total	37 000				
Average					1,090

TABLE 9-7
Fluting Pricing

	Quantity TONs	Delivered Price DM/t	Sales Com. DM/t	Transport Costs DM/t	Ex. Mill Price DM/t
Italy	20,000	805	24	64	717
Spain	5,000	805	24	118	663
Greece	5,000	805	24	55	726
Turkey	5,000	750	23	100	628
Saudi-Arabia	5,000	790	24	145	621
Morocco	5,000	760	23	145	592
Tunisia	3,000	760	23	118	619
Egypt	2,000	760	23	118	619
Total	50,000			117	
Average					672

TABLE 9-8
Pricing of Converted Products and MG Paper

	Delivered price	Sales com, transport	Mll net price
	DM/t	DM/t	DM/t
Schrenz	40	88	352
Corr.prod. recycled fibre	1,380	60	1,320
Corr.prod.virgin +schrenz	1,565	60	1,505
Corr.prod.virgin fibre	1,680	60	1,620
Sacks	1,780	60	1,720
MG paper	1,250	100	1,150

9.5 Cash Flow

The annual production, sales income, costs and cash flow in the three alternative production scenarios are presented in Tables 9-9, 9-10 and 9-11 in the next pages. Without using waste paper and PM2 the IRR in the Long Term PROGROM will be 36.9%. When using waste paper and producing schrenz on PM2 the IRR will be 28.2%.

The Survival Plan is not a normal investment project, because the production development is not depending on the investments. Therefore the IRR for this plan has not been presented. The production of converted products and MG paper can be increased practically without any investments, by only increasing the running time, which do not depend on capital expenditure but only marketing possibilities.

The IRR figures in the Long Term PROGROM are high, compared with normal expansion projects or green field projects in pulp and paper industry. The reason is, that the investment costs used in the calculation do not include any capital allocation for the existing facilities in the mill. Main part of the plant and equipment is already available, and the only capital costs included in the calculation are maintenance, restarting and essential replacement and development investments.

The dependence of the IRR on changes in various parameters has been illustrated in the attached Figures 9/1 and 9/2. Product prices and production rate have the highest importance in project profitability. The IRR is sensitive to the prices of raw material and total fixed costs, too.

The Break Even in the three production alternatives, is illustrated in the Figures 9/3, 9/4 and 9/5. In the Short Term PROGROM, corresponding the estimated production in year 2, the production is still lower than break even, and the operating profit will be negative. In the Long Term PROGROM and in the Survival Plan the break even production is some 55 % of the estimated full production state. If the production would be continued at the same product mix and cost structure as estimated for the 2nd year, the production level at 24,000 t/a would give zero operating margin. Higher productions would result in positive operating margin.

9.6 Risks

Main risks of the project are, that the important assumptions used in the estimates will not be fulfilled on time:

- marketing possibilities
- availability of financial resources

Local markets are essential for production of converted products. Development of local markets depends on the future political and economical situation in Bosnia-Herzegovina and in other former Yugoslavian areas. Stabilisation of the political situation and developing normal relationship within the new states in the region is essential for favourable economical growth and market development. The assumption concerning local market development is based on forecast growth in GNP.

Export markets for sack paper, semichemical fluting and MG paper, as well as possibilities to produce competitive quality exist, and so no special risks in production or marketing of these grades needs to be considered. However, existence and availability of transport facilities in Bosnia-Herzegovina and in other former Yugoslavian region, including roads, railways and harbours, are essential for exporting from Maglaj. The assumption concerning export markets for sack paper and semichemical fluting are based on a separate market study.

Outside financing is essential to implement the outlined long term development PROGROM. The financing institutions might be more interested to allocate funds for the PROGROM, if NATRON has a partner with strong technical, commercial and financing background involved to the development of the enterprise. The support of the Government, considering taxation, duty regulations, social welfare of unemployed extra personnel and infrastructure conditions in the country, is important. Favourable development of political and economical conditions as well as possibilities for profitable and competitive production are essential prerequisites for having the partner interested to be involved in NATRON. An evident risk of political disturbances or even war would prevent to implement the PROGROM as planned.

Only minor capital expenditure would be required to implement the Survival Plan, and a partner would not necessarily be needed. Such financial resources might be easy to find. However, favourable development of the markets in Bosnia-Herzegovina and in the neighbouring countries is essential to achieve profitable operations. Moreover, this plan does not meet the national economical targets regarding employment (including mill, forestry and transport operations), usage of wood and coal resources and utilisation of the existing technical facilities now available in NATRON.

Production and Sales Margin, excl. PM2

		Year 1	2	3	4	5	6	7	8	9	10	11	12
Sales Production, units per annum	unit												
Schrenz	t												
Corrugated board, recycl. fibre	t		10,000	8,000									
Corrugated board, own NSSC fluting	t			7,000	20,000	26,000	32,000	35,000	38,000	38,000	38,000	38,000	38,000
Sacks of purchased paper	t		5,000	4,000									
Sacks of own pulp, own paper	t			4,000	10,000	13,000	16,000	18,000	20,000	20,000	20,000	20,000	20,000
Sack paper of own pulp	t			23,000	28,000	28,000	31,000	35,000	37,000	37,000	37,000	37,000	37,000
Semichemical fluting	t			24,000	53,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
MG paper from purchased pulp	t		4,800	4,000									
MG paper form own pulp	t			3,000	7,500	8,000	8,400	8,400	8,400	8,400	8,400	8,400	8,400
Production total	t		19,800	77,000	118,500	125,000	137,400	146,400	153,400	153,400	153,400	153,400	153,400
Net Sales Income, 1000 DEM per annum, excl. PM2	DM per unit												
Schrenz	352												
Corrugated board, recycl. fibre	1320		13,200	10,560									
Corrugated board, own NSSC	1620			11,340	32,400	42,120	51,840	56,700	61,560	61,560	61,560	61,560	61,560
Sacks of purchased paper	1720		8,600	6,880									
Sacks of own pulp, own paper	1720			6,880	17,200	22,360	27,520	30,960	34,400	34,400	34,400	34,400	34,400
Sack paper of own pulp	1090			25,070	30,520	30,520	33,790	38,150	40,330	40,330	40,330	40,330	40,330
Semichemical fluting	672			16,128	35,616	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600
MG paper, purchased pulp	1150		5,520	4,600									
MG paper, own pulp	1150			3,450	8,625	9,200	9,660	9,660	9,660	9,660	9,660	9,660	9,660
Net sales income total			27,320	84,908	124,361	137,800	156,410	169,070	179,550	179,550	179,550	179,550	179,550
Sales Margin, 1000 DEM per annum, excl. PM2													
Schrenz	-46												
Corrugated board, recycl. fibre	717		7,172	5,737									
Corrugated board, own semich. fluting	872			6,103	17,438	22,669	27,900	30,516	33,131	33,131			
Corrugated board, own semich. fluting	877										33,338	33,338	33,338
Sacks of purchased paper	266		1,330	1,064									
Sacks of own pulp, own paper	894			3,575	8,937	11,618	14,299	16,087	17,874	17,874	17,874	17,874	17,874
Sack paper of own pulp	318			7,300	8,897	8,897	9,850	11,121	11,756	11,756	11,756	11,756	11,756
Semichemical fluting	328			7,878	17,396	16,412	16,412	16,412	16,412	16,412			
Semichemical fluting	339										16,950	16,950	16,950
MG paper, purchased pulp	159		765	637									
MG paper, own pulp	420			1,259	3,148	3,358	3,526	3,526	3,526	3,526	3,526	3,526	3,526
Sales margin total			9,266	33,561	55,816	62,953	71,987	77,661	82,699	82,699	83,445	83,445	83,445

Fixed Costs 1000 DEM per annum, excl. PM2

	DM per person per annum 8th year onwards	Year 1	2	3	4	5	6	7	8	9	10	11	12
Personnel													
production	21600		4,536	7,646	9,176	10,705	12,010	13,219	14,472	14,472	14,472	14,472	14,472
maintenance	21600		2,268	3,910	4,692	4,914	5,184	5,346	5,400	4,320	4,104	4,104	4,104
administration	43200		907	2,160	2,592	3,024	2,938	2,916	3,024	3,024	3,024	3,024	3,024
personnel for mill operation total			7,711	13,716	16,459	18,643	20,131	21,481	22,896	21,816	21,600	21,600	21,600
Personnel costs	% of max.	25	35	50	60	70	80	90	100	100	100	100	100
Maintenance materials			1,000	3,500	5,500	6,500	8,500	9,500	10,000	10,000	10,000	10,000	10,000
Replacement investments							3,000	5,000	7,000	7,000	7,000	7,000	7,000
General administration			2,500	3,000	6,200	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500
Fixed costs total			11,246	20,266	28,219	31,713	38,211	42,571	46,496	45,416	45,200	45,200	45,200
Contribution Margin, 1000 DEM per annum, excl. PM2			-1,980	13,295	27,597	31,240	33,776	35,090	36,203	37,283	38,245	38,245	38,245
Fixed Investments 1000 DEM, excl. PM2													
Restaning costs		1,200	20,300	15,400	2,500	1,600	400	400	200				
Development investments		2,000	7,400	10,500	4,800	4,000	5,400	17,000	21,000	22,000	3,000		
Fixed investments total		3,200	27,700	25,900	7,300	5,600	5,800	17,400	21,200	22,000	3,000		
Cash Flow, 1000 DM per annum, excl. PM2		-3,200	-29,680	-12,605	20,297	25,640	27,976	17,690	15,003	15,283	35,245	38,245	38,245
IRR (years 1 - 12)	%		36,9										

	Year 1	2	3	4	5	6	7	8	9	10	11	12
Personnel number, excl. PM2												
production	450	600	708	708	708	695	680	670	670	670	670	670
maintenance	200	300	362	362	325	300	275	250	200	190	190	190
administration	50	60	100	100	100	85	75	70	70	70	70	70
personnel for mill operation total	700	960	1170	1170	1133	1080	1030	990	940	930	930	930

Production and Sales Margin, incl. PM2

	unit	Year 1	2	3	4	5	6	7	8	9	10	11	12
Sales Production, units per annum													
Schrenz	t			4000	5,000	6,000	9,000	11,000	11,000	11,000	11,000	11,000	11,000
Corrugated board, recycl. fibre	t		10,000	8,000									
Corrugated board, own NSSC	t			7,000	20,000	26,000	32,000	35,000	38,000	38,000	38,000	38,000	38,000
Sacks of purchased paper	t		5,000	4,000									
Sacks of own pulp, own paper	t			4,000	10,000	13,000	16,000	18,000	20,000	20,000	20,000	20,000	20,000
Sack paper of own pulp	t			23,000	28,000	28,000	31,000	35,000	37,000	37,000	37,000	37,000	37,000
Semichemical fluting	t			24,000	53,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
MG paper from purchased pulp	t		4,800	4,000									
MG paper form own pulp	t			3,000	7,500	8,000	8,400	8,400	8,400	8,400	8,400	8,400	8,400
Production total	t		19,800	81,000	123,500	131,000	146,400	157,400	164,400	164,400	164,400	164,400	164,400
Net Sales Income, 1000 DEM per annum													
	DEM per unit												
Schrenz	352			1,408	1,760	2,112	3,168	3,872	3,872	3,872	3,872	3,872	3,872
Corrugated board, recycl. fibre	1320		13,200	10,560									
Corrugated board, own NSSC	1320			9,240	26,400	34,320	42,240	46,200	50,160	50,160	50,160	50,160	50,160
Sacks of purchased paper	1620		8,100	6,480									
Sacks of own pulp, own paper	1620			6,480	16,200	21,060	25,920	29,160	32,400	32,400	32,400	32,400	32,400
Sack paper of own pulp	1090			25,070	30,520	30,520	33,790	38,150	40,330	40,330	40,330	40,330	40,330
Semichemical fluting	672			16,128	35,616	33,600	33,600	33,600	33,600	33,600	33,600	33,600	33,600
MG paper, purchased pulp	1150		5,520	4,600									
MG paper, own pulp	1150			3,450	8,625	9,200	9,660	9,660	9,660	9,660	9,660	9,660	9,660
Net sales income total			26,820	83,416	119,121	130,812	148,378	160,642	170,022	170,022	170,022	170,022	170,022
Sales Margin, 1000 DEM per annum													
Schrenz	-46			-182	-228	-273	-410	-501	-501	-501	-501	-501	-501
Corrugated board, recycl. fibre	717		7,172	5,737									
Corrugated board, own semich. fluting	854			5,979	17,084	22,209	27,334	29,897	32,460	32,460			
Corrugated board, own semich. fluting	859										32,657	32,657	32,657
Sacks of purchased paper	266		1,330	1,064									
Sacks of own pulp, own paper	894			3,575	8,937	11,618	14,299	16,087	17,874	17,874	17,874	17,874	17,874
Sack paper of own pulp	318			7,308	8,897	8,897	9,850	11,121	11,756	11,756	11,756	11,756	11,756
Semichemical fluting	328			7,878	17,396	16,412	16,412	16,412	16,412	16,412			
Semichemical fluting	339										16,950	16,950	16,950
MG paper, purchased pulp	159		765	637									
MG paper, own pulp	420			1,259	3,148	3,358	3,526	3,526	3,526	3,526	3,526	3,526	3,526
Sales margin total			9,266	33,255	55,234	62,220	71,011	76,541	81,527	81,527	82,262	82,262	82,262

Fixed Costs 1000 DEM per annum, incl. PM2

	DEM per person per annum 8th year onwards	Year 1	2	3	4	5	6	7	8	9	10	11	12
Personnel													
production	21600		4,158	8,186	10,472	12,217	13,738	16,848	16,632	16,632	16,632	16,632	16,632
maintenance	21600		1,890	3,964	4,821	5,065	5,357	6,156	5,616	4,536	4,320	4,320	4,320
administration	43200		907	1,512	2,592	3,024	3,110	3,456	3,240	3,240	3,240	3,240	3,240
personnel for mill operation total			6,955	13,662	17,885	20,306	22,205	26,460	25,488	24,408	24,192	24,192	24,192
Personnel costs	% of max.	25	35	50	60	70	80	90	100	100	100	100	100
Maintenance materials			1,000	4,000	6,000	7,000	9,000	10,000	11,000	11,000	11,000	11,000	11,000
Replacement investments							3,000	5,000	7,000	7,000	7,000	7,000	7,000
General administration			2,500	3,000	6,200	6,700	6,700	6,700	6,700	6,700	6,700	6,700	6,700
Fixed costs total			10,490	20,712	30,145	34,076	40,985	48,250	50,288	49,208	48,992	48,992	48,992
Contribution Margin, 1000 DEM per annum			-1,224	12,543	25,090	28,144	30,026	28,291	31,239	32,319	33,270	33,270	33,270
Fixed Investments 1000 DEM													
Restarting costs		1,200	21,200	15,700	2,500	1,600	400	400	200				
Development investments		2,000	9,200	12,900	4,800	4,000	5,400	17,000	21,000	22,000	3,000		
Fixed investments total		3,200	30,400	28,600	7,300	5,600	5,800	17,400	21,200	22,000	3,000		
Cash Flow, 1000 DM per annum		-3,200	-31,624	-16,057	17,790	22,544	24,226	10,891	10,039	10,319	30,270	33,270	33,270
IRR (years 1 - 12)	%		28.2										

Year	1	2	3	4	5	6	7	8	9	10	11
Personnel number, incl. PM2											
production	450	550	758	808	808	795	780	770	770	770	770
maintenance	200	250	367	372	335	310	285	260	210	200	200
administration	50	60	70	100	100	90	80	75	75	75	75
personnel for mill operation total	700	860	1195	1280	1243	1195	1145	1105	1055	1045	1045

Production and Sales Margin, Survival Plan

		Year 1	2	3	4	5	6	7	8	9	10	11	12
Sales Production, units per annum	unit												
Schrenz	t												
Corrugated board, recycl. fibre	t		10,000	15,000	20,000	26,000	32,000	35,000	38,000	38,000	38,000	38,000	38,000
Corrugated board, own NSSC fluting	t												
Sacks of purchased paper	t		5,000	8,000	10,000	13,000	16,000	18,000	20,000	20,000	20,000	20,000	20,000
Sacks of own pulp, own paper	t												
Sack paper of own pulp	t												
Semichemical fluting	t												
MG paper from purchased pulp	t		4,800	7,000	7,500	8,000	8,400	8,400	8,400	8,400	8,400	8,400	8,400
MG paper form own pulp	t												
Production total*	t		19,800	30,000	37,500	47,000	56,400	61,400	66,400	66,400	66,400	66,400	66,400
Net Sales Income, 1000 DM per annum, Survival Plan	DEM per unit												
Schrenz	352												
Corrugated board, recycl. fibre	1320		13,200	19,800	26,400	34,320	42,240	46,200	50,160	50,160	50,160	50,160	50,160
Corrugated board, own NSSC	1620												
Sacks of purchased paper	1720		8,600	13,760	17,200	22,360	27,520	30,960	34,400	34,400	34,400	34,400	34,400
Sacks of own pulp, own paper	1720												
Sack paper of own pulp	1090												
Semichemical fluting	672												
MG paper, purchased pulp	1150		5,520	8,050	8,625	9,200	9,660	9,660	9,660	9,660	9,660	9,660	9,660
MG paper, own pulp	1150												
Net sales income total			27,320	41,610	52,225	65,880	79,420	86,820	94,220	94,220	94,220	94,220	94,220
Sales Margin, 1000 DM per annum, Survival Plan													
Schrenz	-46												
Corrugated board, recycl. fibre	717		7,172	10,757	14,343	18,646	22,949	25,101	27,252	27,252	27,252	27,252	27,252
Corrugated board, own semich. fluting	872												
Corrugated board, own semich. fluting	877												
Sacks of purchased paper	266		1,330	2,128	2,660	3,458	4,256	4,788	5,320	5,320	5,320	5,320	5,320
Sacks of own pulp, own paper	894												
Sack paper of own pulp	318												
Semichemical fluting	328												
Semichemical fluting	339												
MG paper, purchased pulp	159		765	1,115	1,195	1,275	1,338	1,338	1,338	1,338	1,338	1,338	1,338
MG paper, own pulp	420												
Sales margin total			9,266	14,001	18,198	23,379	28,543	31,227	33,910	33,910	33,910	33,910	33,910

Fixed Costs 1000 DM per annum, Survival Plan

	DEM per person per annum 8th year onwards	Year 1	2	3	4	5	6	7	8	9	10	11	12
Personnel													
production	21600		3,024	4,104	4,666	5,443	6,221	6,998	7,776	7,776	7,776	7,776	7,776
maintenance	21600		1,512	1,836	1,944	1,966	1,901	1,944	2,160	2,160	2,160	2,160	2,160
administration	43200		756	972	1,037	1,210	1,382	1,555	1,728	1,728	1,728	1,728	1,728
personnel for mill operation total			5,292	6,912	7,646	8,618	9,504	10,498	11,664	11,664	11,664	11,664	11,664
Personnel costs	% of max.	25	35	50	60	70	80	90	100	100	100	100	100
Maintenance materials			1,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Replacement investments				500	1,000	1,400	1,500	1,500	1,500	1,500	1,500	1,500	1,500
General administration			2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Fixed costs total			8,827	11,962	13,206	14,588	15,584	16,588	17,764	17,764	17,764	17,764	17,764
Contribution Margin, 1000 DM per annum			439	2,039	4,992	8,791	12,959	14,639	16,146	16,146	16,146	16,146	16,146

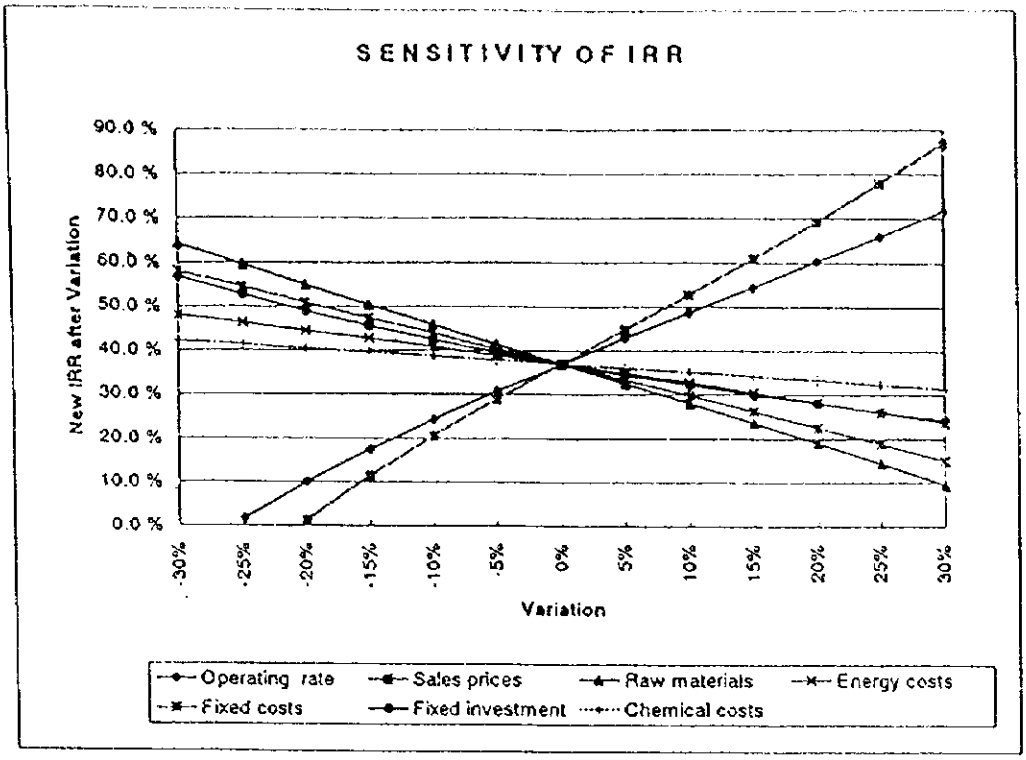
Fixed Investments 1000 DM, Survival Plan

Restarting costs	1,200											
Development investments	2,000	4,200	800	2,900	1,900							
Fixed investments total	3,200	4,200	800	2,900	1,900							
Cash Flow, 1000 DM per annum,	-3,200	-3,761	1,239	2,092	6,890	12,959	14,639	16,146	16,146	16,146	16,146	16,146

Personnel number, Survival Plan

	1	2	3	4	5	6	7	8	9	10	11	12
production		400	380	360	360	360	360	360	360	360	360	360
maintenance		200	170	150	130	110	100	100	100	100	100	100
administration		50	45	40	40	40	40	40	40	40	40	40
personnel for mill operation total		650	595	550	530	510	500	500	500	500	500	500

FIG 9-1



SENSITIVITY OF IRR

Cash Flow, excl. PM2

Variation	-30%	-25%	-20%	-15%	-10%	-5%	0%
			New IRR after Variation				
Operating rate		1.6 %	10.0 %	17.4 %	24.3 %	30.7 %	36.9 %
Sales prices			1.2 %	11.5 %	20.5 %	28.8 %	36.9 %
Raw materials	64.2 %	59.5 %	54.8 %	50.3 %	45.8 %	41.3 %	36.9 %
Energy costs	48.0 %	46.3 %	44.5 %	42.7 %	40.8 %	38.9 %	36.9 %
Chemical costs	42.2 %	41.3 %	40.4 %	39.5 %	38.7 %	37.8 %	36.9 %
Fixed costs	58.0 %	54.5 %	50.9 %	47.4 %	43.9 %	40.4 %	36.9 %
Fixed investment	56.9 %	52.7 %	48.9 %	45.5 %	42.4 %	39.5 %	36.9 %

Variation	0%	5%	10%	15%	20%	25%	30%
Operating rate	36.9 %	42.8 %	48.7 %	54.5 %	60.2 %	66.0 %	71.7 %
Sales prices	36.9 %	44.8 %	52.7 %	60.8 %	69.2 %	77.8 %	86.9 %
Raw materials	36.9 %	32.4 %	28.0 %	23.5 %	18.9 %	14.2 %	9.3 %
Energy costs	36.9 %	34.8 %	32.7 %	30.5 %	28.3 %	26.0 %	23.6 %
Chemical costs	36.9 %	36.0 %	35.1 %	34.2 %	33.2 %	32.3 %	31.4 %
Fixed costs	36.9 %	33.3 %	29.8 %	26.2 %	22.5 %	18.8 %	14.9 %
Fixed investment	36.9 %	34.4 %	32.1 %	29.9 %	27.9 %	26.0 %	24.2 %

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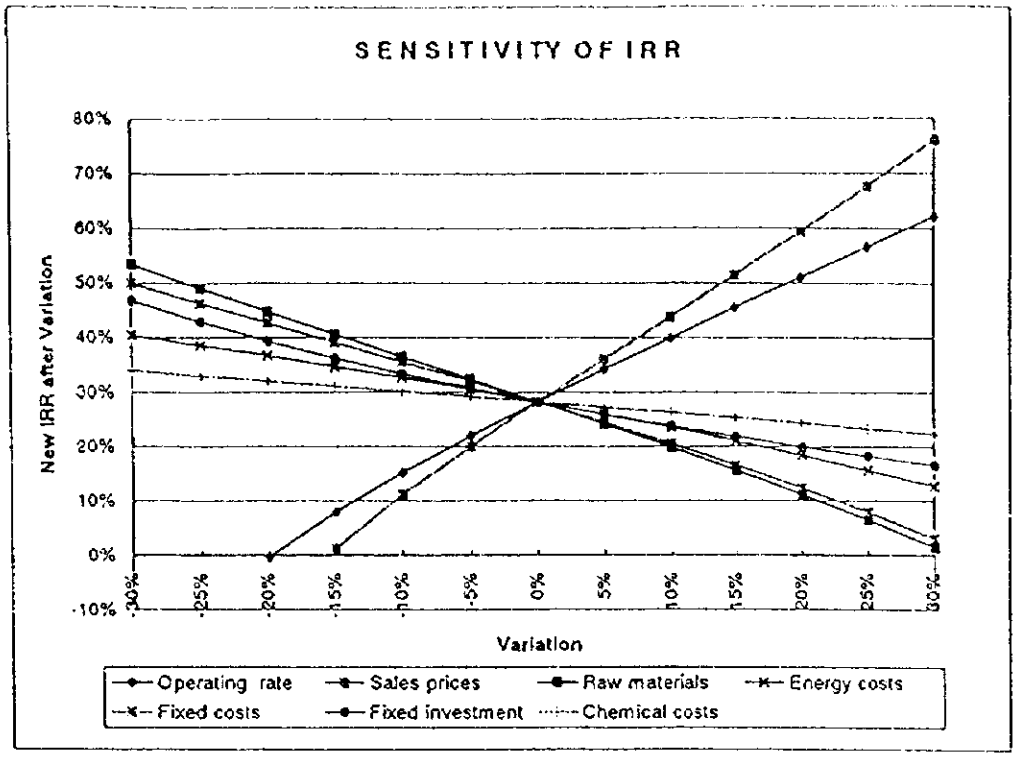
FIG 9-2



SENSITIVITY OF IRR

Cash Flow, incl. PM2

Variation	-30%	-25%	-20%	-15%	-10%	-5%	0%
			New IRR after Variation				
Operating rate			-0.4 %	7.9 %	15.2 %	21.9 %	28.2 %
Sales prices				1.1 %	11.2 %	20.0 %	28.2 %
Raw materials	53.4 %	49.0 %	44.8 %	40.6 %	36.5 %	32.3 %	28.2 %
Energy costs	40.4 %	38.6 %	36.6 %	34.6 %	32.5 %	30.4 %	28.2 %
Chemical costs	33.9 %	32.9 %	32.0 %	31.0 %	30.1 %	29.1 %	28.2 %
Fixed costs	49.9 %	46.3 %	42.7 %	39.1 %	35.5 %	31.9 %	28.2 %
Fixed investment	46.8 %	42.9 %	39.4 %	36.2 %	33.3 %	30.6 %	28.2 %

Variation	0%	5%	10%	15%	20%	25%	30%
Operating rate	28.2 %	34.2 %	39.9 %	45.6 %	51.2 %	56.7 %	62.1 %
Sales prices	28.2 %	36.0 %	43.8 %	51.5 %	59.4 %	67.6 %	76.0 %
Raw materials	28.2 %	24.0 %	19.8 %	15.5 %	11.0 %	6.4 %	1.5 %
Energy costs	28.2 %	25.8 %	23.4 %	20.9 %	18.3 %	15.6 %	12.7 %
Chemical costs	28.2 %	27.2 %	26.2 %	25.2 %	24.3 %	23.3 %	22.3 %
Fixed costs	28.2 %	24.4 %	20.5 %	16.5 %	12.2 %	7.8 %	3.0 %
Fixed investment	28.2 %	25.9 %	23.7 %	21.8 %	19.9 %	18.1 %	16.4 %

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FIG. 9/3
Break Even, Short Term Programme
2nd year

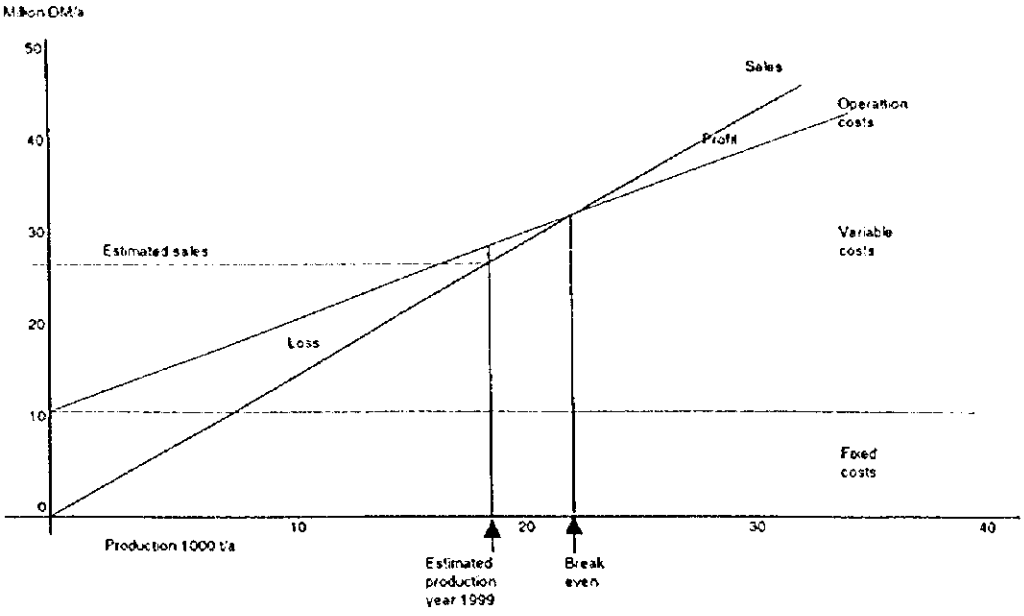


FIG. 9/4
Break Even, Long Term Programme

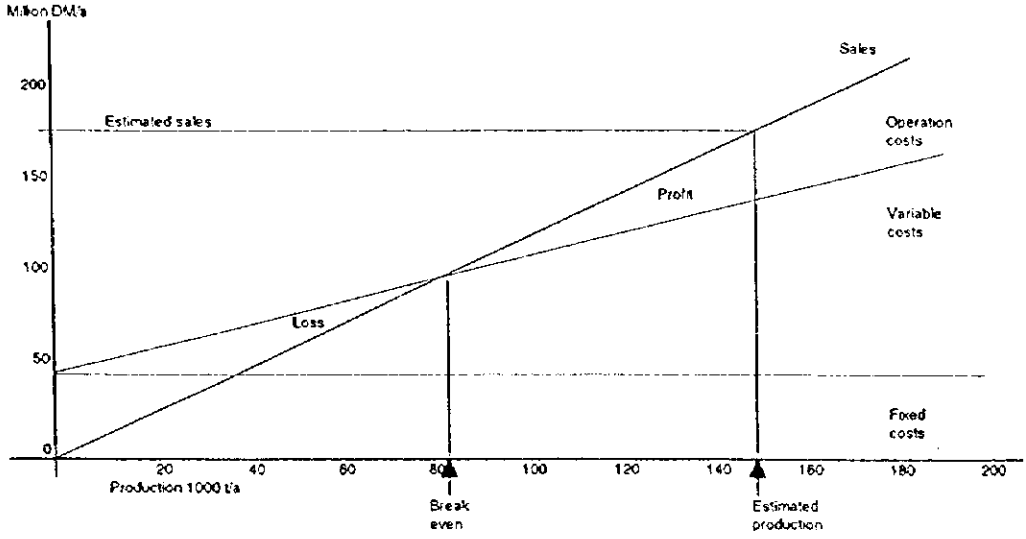
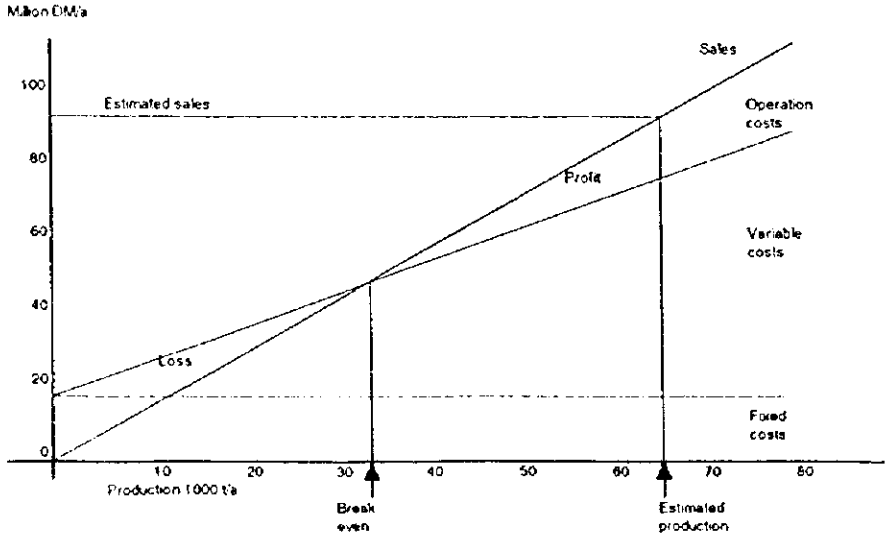


Fig. 9/5
Break Even, Survival Plan



10. FINANCIAL ANALYSIS

10. FINANCIAL ANALYSIS

10.1 Objective of Financial Analysis

Pro forma financial statements (income statements, balance sheets, and cash flow statements) for 12 years are prepared in order to estimate NATRON's future operating results, financial position, external financing required, and comprehensive feasibility of the proposed development program (hereafter, the program) by computing the internal rate of return (IRR) etc., and economic appraisal.

10.2 Preconditions for Preparing Pro Forma Statements

(1) Forecast Data and Period

Main data such as product mix, unit price and unit cost of products, production and sales volume, development investments (fixed assets), and number of employees etc. are in accordance with the program described in the preceding chapters. Forecast period is also same as the program, that is 12 years from 1998 to 2009.

(2) Price Level

Prices at April 1998 are adopted, and forecast is made using current values. So future inflation is not taken into account. Incidentally from 1996 inflation rate in Bosnia has slowed to below 10%.

(3) Currency

German marks (DM) is adopted for the estimation because DM circulates among Bosnia's economy, and the new currency KM (Convertible Marks) issued from April 1998 has been fixed to be equivalent to the DM.

(4) Payroll Cost

1) Number of employees

There are 1,640 on Feb.11, 1998, in which 77% are men and 23% are women. Among 1,640, actual working employees are 632 (38.5%) who are paid DM179/month average net salary, and other workers of 1,008 (61.5%) who are paid DM45/month don't come to the mill.

Number of employees required is technically assumed as follows:

(Basic Plan)

	1	2	3, 4	7	10~12
YEARS	1998	1999	2000, 2001	2004	2007~2009
Production	450	600	708	680	670
Maintenance	200	300	362	275	190
Administration	50	60	100	75	70
Total	700	960	1170	1030	930

(Survival Plan)

	1, 2	3	5	7~12
YEARS	1998, 1999	2000	2002	2004~2009
Production	400	380	360	360
Maintenance	200	170	130	100
Administration	50	45	40	40
Total	650	595	530	500

2) Wages

Wage costs are assumed to be net salary plus company borne welfare costs, that is 80% of net salary. Wage is assumed to recover to pre-war levels, that is DM1,000 of monthly net salary per person and its annual gross payroll cost is DM21,600 (= DM1,000 * 1.8 * 12 months), in 2005, step by step as follows:

	1	2	3	4	5	6	7	8~12
YEARS	1998	1999	2000	2001	2002	2003	2004	2005~9
Production	25%	35%	50%	60%	70%	80%	90%	DM21,600
Maintenance	25%	35%	50%	60%	70%	80%	90%	DM21,600
Administration	25%	35%	50%	60%	70%	80%	90%	DM43,200

Note: For example, 25% in 1998 means that annual gross salary per person is assumed to be DM5,400 (= DM1,000 * 25% * 1.8 * 12 months).

(5) Depreciation

Overall average useful life of planned development investments (fixed assets) in the program is estimated at 15 years. Depreciation of the existing fixed assets is estimated at the same amount of 1997 (DM5,871 thousand). From 2001 DM8,387 thousand (= 5,871 + 2,516) is charged because fixed assets out of use will be re-operated, and depreciation for such assets is estimated DM2,516 thousand (= 5,871 * 30/70, fixed assets out of use are equal to around 30% of whole fixed assets) (cf. 6.5.11).

Remaining useful life of the existing fixed assets is functionally estimated at 12 years on average with proper repairing and replacement activities. This is the reason why period of the program is determined for 12 years. The repair, maintenance and replacement expenses are included in

'Fixed costs' and 'Restarting costs' in the pro forma income statements.
Depreciation is allocated to each year by the straight-line method. Half year depreciation is allocated for the first year of investment,

(6) Interest Rate
Interest rate on long-term loan from some international financial institutions is assumed at 8% based on the current German interest rates as below:

Interest Rates in Germany

Term	May 1998	Bank Margin	Rate Assumed
1 year	4.78%	-	-
10 years	4.98%	3%	8%

Note: Bank Margin is an assumed markup required by international financial institutions.

(7) Taxes (cf. 6.5.16)

1) Corporate tax
5 years exemption from 1998 to 2002 is assumed based on Bosnian government's industrial supporting policy. Tax rate from 2003 is set at 30% same as the rate in 1997.

2) Import duty
Import duty for raw materials etc. is assumed to be free based on Bosnian government's supporting policy.

(8) Dividend
Dividends are assumed to be paid after 5 years, from the same year which the corporate taxation starts. Dividend payout ratio on net income is assumed at 50%.

(9) Financing Measures
Financing sources are assumed that around 80% of the necessary fund is financed by long-term loans and 20% is by equity (investment in capital stock) in consideration of investors' risk management policy. Considering difficulties to finance short-term loan in Bosnia, it is assumed that funds are mostly raised by long-term loan (cf. 6.5.1).
Repayment of long-term loan can be deferred for several years until full-scale production depending on negotiation with international financial institutions. So the repayment is assumed to be deferred for 2 years after borrowing.
All external funds raised are paid off by the end of the 12th year (2009).

(10) Terminal Value

In order to estimate terminal value, book value is adopted instead of forecasting perpetual cash flows from 2010, to avoid forecasting such distant future values and taking the safe side -book value is usually the most conservative method to estimate terminal value. At the end of 2009, average useful life of fixed assets would run out, and reconstruction of whole plant should be required. So terminal value is estimated as follows:

Terminal value = Book value at end of 2009 - Fixed assets at end of 2009

= 228,223 - 159,729 = DM68,494 thousand

Book value method assumes that from 2010 NATRON will perpetually earn cash flow at the same return on equity as its cost of capital.

10.3 Forecast Procedures of Pro Forma Statements

10.3.1 Income Statements (Table 10.3.1)

(1) Amounts of future sales, costs of sales, fixed costs, and restarting costs are in accordance with the program of preceding chapters except for 1998.

(2) Amounts of sales, and costs of sales of 1998 are estimated as 1.2 times the amount of 1997, based on real GDP growth rate of 21% estimated by the World Bank.

(3) Sales margin of 1998 is assumed at 20% based on current situation (cf. 6.5.7).

(4) Interest Expense

Interest expense for each year is calculated as follows, e.g.:

Interest expense '98 = Total loan balance '97 * 8%

Surplus money after full repayment of short-term loan accrued in each year of the program is assumed to be temporarily invested in marketable securities at 3% interest income rate.

(5) 30% of inventories (approximately DM3 million = (material 4.5 + finished products 5.3) * 30%), and DM1 million of fixed asset (recovery boiler) at end of 1997 are assumed to be written-down in 1998 due to obsolescence (cf. 6.5.9).

(6) Long-term loan of DM39 million from Paris and London Clubs at end of 1997 is too much burden on NATRON's future, and few strategic investors will be interested in such an enterprise. So the debt is assumed to be taken over by the Bosnian government in 1998 (cf. 6.5.13).

10.3.2 Balance Sheets (Table 10.3.2)

(1) Financial Structure

NATRON's current financial position is unusual affected by low operating rate of below 10%. So future financial structure is assumed to get close to that of a standard pulp and paper company gradually as the production will increase as follows:

Estimate of Future Balance Sheet Items (in DM1,000)

Accounts	Actual		EURO	Estimate		
	1997	%/sales	Co.	1998	1999	2000~2009
Cash	216	1.2%	4%	2%	2%	4%
Accounts receivable	5,391	29.0%	15%	25%	20%	15%
Inventories	9,813	52.9%	10%	30%	20%	10%
Prepaid expenses	676	-	-	700	800	1,000
Accounts payable	2,376	16.0%	15%	15%		
Accrued expenses	638	-	-	700	800	1,000
Sales	18,564	100%	100%	22,277	27,320	84,908~179,550

Note: EURO Co. means average ratio of balance sheet items on sales (only cost of sales for accounts payable) of some main European pulp and paper companies.

(2) Necessary Funds to be Financed

External funding required is computed as the difference between total assets and total liabilities & equity except the necessary fund. When the difference increases than the last year's balance, it shows money shortage. NATRON should plan to finance the amount in consideration of its financing ability, and advantages and disadvantages of various financing means. At the same time NATRON should consider to reduce its costs and working capital by streamlining operations.

(3) Retained Earnings

Retained earnings are calculated as below, e.g.:

Retained earnings '98 = Retained earnings '97 + Net income after dividends '98

10.3.3 Cash Flow Statements (Table 10.3.3)

(1) How to Prepare Cash Flow Statements

Cash flow statements explicitly show the cash flow of the business, namely sources and uses of funds. Cash flow statements are automatically prepared after income statements and balance sheets are prepared appropriately by quoting and rearranging those statements' accounting

figures.

(2) Working Capital

To run operation, not only investment money but also working capital is needed. As sales and investments increase, working capital required usually increases. So NATRON should plan to finance investments money and working capital at the same time. Additional working capital is shown as 'Working capital (changes in current accounts)' in cash flow statements. In some instances, working capital can be a key factor in deciding investments.

(3) Major Uses and Sources of Funds

Investment and financing are planned as follows:

Investment and Financing Plan (in DM1,000)

Year	1998	1999	2000	2001	2002	2003	2004
Restarting costs	1,200	20,300	15,400	2,500	1,600	400	400
Development investment	2,000	7,400	10,500	4,800	4,000	5,400	17,000
Total investment	3,200	27,700	25,900	7,300	5,600	5,800	17,400
Long-term Loan	15,000	26,000	16,000	0	0	0	0
Equity finance	0	5,000	10,000	0	0	0	0
Total financing	15,000	31,000	26,000	0	0	0	0
Year	**2005**	**2006**	**2007**	**2008**	**2009**	**Total**	**%**
Restarting costs	200	0	0	0	0	42,000	30.2%
Development investment	21,000	22,000	3,000	0	0	97,100	69.8%
Total investment	21,200	22,000	3,000	0	0	139,100	100.0%
Long-term Loan	0	11,000	0	0	0	68,000	81.9%
Equity finance	0	0	0	0	0	15,000	18.1%
Total financing	0	11,000	0	0	0	83,000	100%

As shown in the above table, NATRON needs investment of DM139,100 thousand, but needs only DM83,000 thousand for new external funds, around 60% of investment required, owing to earnings by recovery of production after 2000.

(4) Internal Rate of Return (IRR)

1) IRR on investment (IRROI)

Cash flow statement shows the sequence of future cash flow accrued in the program period. So the comprehensive profitability of the program can be computed as IRR. The calculated IRR is compared to NATRON's opportunity cost of capital, which is an expected rate of return, or a sufficient rate of return to justify the program's potential risks.

The IRR is defined as:
IRR = Discount rate at which the project's net present value equals zero
If the project's IRR exceeds the cost of capital, the project is attractive, otherwise it is rejected. The cost of capital is computed as a weighted average cost of debt and equity.

IRROI is calculated by adding up present value of yearly cash flows by operating and investing activities (free cash flow, FCF). Namely IRROI is not influenced by financing means or capital structure. International financial institutions usually adopt IRROI before tax because it shows objective profitability of the project (entity perspective), and they can compare it with other projects in many countries with different taxation system.

2) IRR on equity (IRROE)
IRROE is calculated by adding up present value of all cash flows, including financing activities except equity investment and dividend. It shows profitability from the shareholders viewpoint (equity perspective), so it is compared to cost of capital for shareholders.

10.4 Financial Appraisal of the Program

Accounting principles and procedures of NATRON have completely changed between before war and after war, and current operating ratio is unusual. So comparison of those data makes little sense. So data of 1997 is only analyzed as actual financial results.

10.4.1 Financial Analysis (Table 10.4.1)

(1) Profitability
The long-term program of full-scale production starts from July 2000, after when the whole mill sustains high profitability.
Return on invested capital (ROIC) is stable at around 7%, and gross margin is at a high level at around 46%. This shows that NATRON has potential to increase its ROIC by saving on fixed costs and/or raise turnover ratios of working capital and fixed assets still more, because
ROIC before tax = EBIT/Invested capital = EBIT/Sales * Sales/Assets (EBIT = earnings before interest and tax).

(2) Efficiency
Efficiency ratios of asset turnover and fixed asset turnover get higher steadily as production recovers.

(3) Solvency

The solvency gets better after 2000, shown in increases of ratios such as interest coverage and debt service coverage, and decrease of assets to equity and debt to equity.

Current ratio and acid test are also satisfactory.

10.4.2 Feasibility of the Program

(1) Internal Rate of Return (IRR) (Table 10.3.3, 10.3.6)

IRR and the Corresponding Cost of Capital

Types of IRR	Basic Plan		Survival Plan	
	IRR	**Cost of Capital**	IRR	Cost of Capital
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%

IRROI before tax is a standard index for feasibility study of projects. It should exceed the project's weighted average cost of capital (WACC):

WACC = (Loan * Interest rate + Equity * Expected return) / (Loan + Equity)

= (413,732*8%+2,261,382*15%)/(413,732+2,261,382) = 13.9%

Notes: Loan = DM413,732 thousand (total loan balance of each program year), Interest rate = 8%, Equity = DM2,261,382 thousand (total shareholders' equity of each program year), Expected return = 15% (8% + investors' risk premium 7%. The 7% is adopted the average annual return more than government bonds over the period from 1926 to 1995, which investors earned in the US's 500 stocks listed on New York Stock Exchange).

IRROI before tax of 27.1% exceeds by far the WACC of 13.9%. Even if all additional funds are financed by equity, the IRROI has yet enough advantage over the cost of capital of 15% for equity.

IRROI after tax of 22.9% gets closer to the WACC after tax of 13.8%, but it still has sufficient room over 13.8% and 15%. It also shows that the importance of government's supporting policy for taxation.

IRROE after tax of 39.8% also greatly exceeds the investors' expected return of 15%.

Therefore, the program can be appraised as satisfactorily feasible.

IRR of the survival plan is higher than the basic plan, 36.8% and its WACC is 14.5%, mainly because it needs less investments of DM13 million and fewer employees of 500 persons, and achieves only a reduced equilibrium. Therefore it has less social significance (cf. 10.5).

(2) Break-even Analysis (Table 10.4.2-1, 10.4.2-2)

The projected sales of whole mill under the full-scale production (from 2007 to 2009) is DM179,550 thousand, and break-even sales in the period is only DM97,259 thousand. As a result its margin of safety of 45.8% is also satisfactory to potential investors.

(3) Reasons for the Program's Results

The main reasons for the good performance should come from the following development policies of the program.

1) Small investment required

The program makes use of NATRON's existing plant by limited repairs and investment of DM139.1 million. It needs about DM1 billion to build similar scale of mill afresh, so the investment required equals to only 1/7 compared with new establishment (cf. 10.3.3 (3)).

2) Export-oriented marketing policy (cf. 10.5 (2))

The program plans to export 65.5% of products. Export markets are wider than domestic one, and can make bigger profit. On the other hand high quality is needed for exports, and such advancement in technical and managerial skills required will build up NATRON's corporate nature and competitiveness. Of course the promising domestic market supports the program, in which real GDP growth rate per year is estimated at 21% from 1996 to 2000 and 8.4% from 2001 to 2005 in accordance with forecast by IMF and IBRD.

3) Improvement in the production process

The program proposes specialized production for single product by each paper machine (PM1, PM3 and PM4), combined utilization of one recovery boiler for two pulp lines (cross recovery), and full capacity operation of whole plant etc. In addition the program proposes utilization of domestic hardwood besides softwood for main raw materials, which cost low transportation expenses. Such simple and efficient production processes bring about higher productivity, and remarkable cost reduction.

4) Plentiful labor force

The program can make use of NATRON's existing well-experienced plentiful employees with proper training (cf. 12.3 (4)).

(4) Essential Points to the Program

1) Financing first three years

NATRON should be in financial difficulty from 1998 to 2000 as shown in pro forma cash flow statements (Table 10.3.3). It should make good profit and be able to become self-financing after 2000, so it is crucial for NATRON to raise funds required from international finance institutions etc. in order to weather the first three years.

Money Shortage in First Three Years (in DM1,000)

Years	1998	1999	2000	Total
Net cash provided by operating activities	-11,033	-20,791	-7,410	-39,234
Net cash used in investing activities	-2,000	-7,400	-10,500	-19,900
Total money shortage	-13,033	-28,191	-17,910	-59,134

2) Tie-up with strategic investors

Employees of NATRON have good experience, but it should be better to make a technical tie-up with a strategic investor (advanced pulp and paper company) especially to produce new products such as fluting by hardwood semi-chemical (SC) pulp (cf. 12.4 (2)).

10.4.3 Sensitivity Analysis

(1) Sensitivity of IRROI (Table 10.4.3-1)

Sensitivity of IRROI before tax is tested by varying four factors listed below between minus 30% and plus 30% with the terminal values changed by each case of variations.

1) Sales prices
2) Operating rate (sales volume)
3) Fixed costs
4) Investments (restarting costs plus development investments)

By the test, sensitivity to the four factors is ranked as an order of sales prices, operating rate (sales volume), fixed costs and investments. Especially the sensitivity to sales prices is remarkably high. When sales price falls down by 5%, IRROI decreases to 14.7% which is almost same as its WACC 13.9%. NATRON should control prices as a first priority. On the other hand, if sales price is raised up by 5%, IRROI increases by over 10 points, that will be at 37.5%.

Such situation is similar to Japan. Average EBIT/Sales ratio in Japanese pulp and paper companies '96 was 6.08%. So many Japanese companies may make a deficit when those sales

prices decline at only 5% as shown below.

EBIT/Sales Ratio of Japanese Companies

Fiscal Years	1992	1993	1994	1995	1996
Pulp & Paper Companies (23)	3.13%	2.47%	3.57%	6.77%	6.08%
Manufacturing Industries (1060)	3.10%	2.54%	3.39%	4.05%	4.41%

Notes: Fiscal Year 1996 is from April 1st 1996 to end of March 1997; Pulp & Paper companies (23) is average EBIT/Sales of Japanese listed 23 pulp and paper companies.

Second, NATRON should be sensitive to the operating rate, and try to increase it or at least maintain it constantly.
Even in the range of increase of fixed costs by 15% and investment by 30%, IRROI are 17.1% and 16.8% respectively, so those can be kept above the WACC of 13.9%.

(2) Sensitivity of IRROE (Table 10.4.3-2)
Sensitivity of IRROE to eleven varieties of interest expense rates between 0% and 20% with interest income rates between 0% and 9%, is tested. By the test, even if the interest expense rate grows up to 20% with interest income rate 9%, IRROE is 19.5%, and still over the investors' cost of capital 15% by 4.5 points. It shows that the program is very attractive for equity investors (a precondition is assumed in this test, that is NATRON can borrow as much loans as needed to allot the money shortage accrued from assumed rise in interest expense rates).

10.5 Economic Appraisal of the Program

The program has not only financial feasibility but also socio-economic advantages. Therefore the feasibility and significance of the program for the Basic Plan should be promoted by the economic appraisal. The socio-economic advantages are:

(1) Employment
Unemployment is one of the crucial problems for current Bosnian economy. Especially as unemployment in Maglaj city is around 60%. The program employs about 1,000 persons at a normal salary.
By the survival plan, employees required are 500. So its effect on employment is limited to the extent (cf. 10.2 (4)).

(2) Export Promotion
The program intends to produce goods with high quality which can be exported. It will

contribute to Bosnian economic recovery through export promotion, and improvement in the balance of payments. The export proportion for each product and the foreign currency which can be acquired in 2005 are estimated as follows:

(Basic Plan) (in DM1,000)

Products	Unit Price	Quantity	Amount	Export %	Foreign Currency
Corrugated board	DM1,620	38,000t	61,560	5%	3,078
Sacks & bags	DM1,720	20,000t	34,400	20%	6,880
Sack paper	DM1,090	37,000t	40,330	100%	40,330
SC fluting	DM672	50,000t	33,600	100%	33,600
MG paper	DM1,150	8,400t	9,660	90%	8,694
Total	-	153,400t	179,550	**(65.5%)**	**92,582 (51.6%)**

(Survival Plan) (in DM1,000)

Products	Unit Price	Quantity	Amount	Export %	Foreign Currency
Corrugated. Board	DM1,320	38,000t	50,160	5%	2,508
Sacks & bags	DM1,720	20,000t	34,400	20%	6,880
MG paper	DM1,150	8,400t	9,660	90%	8,694
Total	-	66,400t	94,220	**(20.3%)**	**18,082 (19.2%)**

(3) Utilization of Domestic Natural Resource

Forest is a Bosnian main natural resource. The program utilizes a large quantity of domestic wood. It brings NATRON procurement advantage, and contributes to promotion of a main domestic industry i.e. forestry. The annual consumption of wood after 2004 is estimated as 355,364m^3sob (soil over bark) for softwood, and 151,643m^3sob for hardwood.

On the other hand, in the survival plan the pulping lines do not start, so no wood is directly needed.

(4) Inter-industry Contribution

The program utilizes a good deal of coal, electric power, machinery, parts and transport means etc. This contributes to many types of domestic industries and regional economy such as energy, water, machinery, construction and traffic. It also contributes to paper using industries such as sugar, flour, cement and distribution etc. through its products.

(5) Environmental Protection

The program includes proper anti-pollution and resource-saving investments such as waste water treatment, ashes dumping and a compact boiler. So it does little harm to the Bosnian environment, and contributes to its resource-saving.

Table 10.3.1 Pro Forma Income Statements (in DM 1,000)

	1997	1 1998	2 1999	3 2000	4 2001	5 2002	6 2003	7 2004	8 2005	9 2006	10 2007	11 2008	12 2009
Sales	18,564	22,277	27,320	84,908	124,361	137,800	156,410	169,070	179,550	179,550	179,550	179,550	179,550
Cost of sales	14,851	17,821	18,054	51,347	68,545	74,847	84,423	91,409	96,851	96,851	96,105	96,105	96,105
Gross margin	3,713	4,455	9,266	33,561	55,816	62,953	71,987	77,661	82,699	82,699	83,445	83,445	83,445
Fixed costs	11,059	14,445	11,246	20,266	28,219	31,713	38,211	42,571	46,496	45,416	45,200	45,200	45,200
Depreciation	5,871	5,938	6,251	6,848	9,874	10,167	10,480	11,227	12,494	13,927	14,760	14,860	14,860
Restarting costs (Repair & maintenance)	0	1,200	20,300	15,400	2,500	1,600	400	400	200	0	0	0	0
EBIT (Earnings Before Interest & Taxes)	-13,217	-17,128	-28,531	-8,953	15,223	19,473	22,896	23,463	23,509	23,356	23,485	23,385	23,385
Devaluation of inventories	0	3,000	0	0	0	0	0	0	0	0	0	0	0
Devaluation of fixed assets	0	1,000	0	0	0	0	0	0	0	0	0	0	0
Profit on released loan from Paris Club	0	39,000	0	0	0	0	0	0	0	0	0	0	0
Interest expense -net-	0	593	1,701	3,701	4,858	4,463	3,599	3,003	2,681	2,618	2,683	1,529	309
Corporate tax (30%, after 5 years)	0	0	0	0	0	0	5,789	6,138	6,249	6,222	6,241	6,557	6,923
Net income	-13,217	17,279	-30,232	-12,654	10,366	15,010	13,508	14,322	14,580	14,517	14,561	15,299	16,153
Dividend (50%, after 5 years)	0	0	0	0	0	0	6,754	7,161	7,290	7,258	7,281	7,649	8,077
Net income after dividend	-13,217	17,279	-30,232	-12,654	10,366	15,010	6,754	7,161	7,290	7,258	7,281	7,649	8,077
Development investments (Fixed assets)		2,000	7,400	10,500	4,800	4,000	5,400	17,000	21,000	22,000	3,000	0	0
Depreciation (Useful life: 15years)		67	247	350	160	133	180	567	700	733	100		
			133	133	133	133	133	133	133	133	133	133	133
				493	493	493	493	493	493	493	493	493	493
					700	700	700	700	700	700	700	700	700
						320	320	320	320	320	320	320	320
							267	267	267	267	267	267	267
								360	360	360	360	360	360
									1,133	1,133	1,133	1,133	1,133
										1,400	1,400	1,400	1,400
											1,467	1,467	1,467
												200	200
Total depreciation of develop. invest.		67	380	977	1,487	1,780	2,093	2,840	4,107	5,540	6,373	6,473	6,473
Depreciation of existing fixed assets	5,871	5,871	5,871	5,871	8,387	8,387	8,387	8,387	8,387	8,387	8,387	8,387	8,387
Total Depreciation	5,871	5,938	6,251	6,848	9,874	10,167	10,480	11,227	12,494	13,927	14,760	14,860	14,860

Table 10.3.2 Pro Forma Balance Sheets (in DM 1,000)

	1997	1 1998	2 1999	3 2000	4 2001	5 2002	6 2003	7 2004	8 2005	9 2006	10 2007	11 2008	12 2009
Assets:													
Cash	216	446	546	3,396	4,974	5,512	6,256	6,763	7,182	7,182	7,182	7,182	7,182
Marketable securities	0	0	0	0	2,618	14,510	15,194	6,768	0	0	7,214	18,823	30,840
Accounts receivable	5,391	5,569	5,464	12,736	18,654	20,670	23,462	25,361	26,933	26,933	26,933	26,933	26,933
Inventories	9,813	6,813	5,464	8,491	12,436	13,780	15,641	16,907	17,955	17,955	17,955	17,955	17,955
Prepaid expenses	676	700	800	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Total current assets	16,096	13,528	12,274	25,623	39,683	55,472	61,553	56,798	53,070	53,070	60,284	71,893	83,910
Net fixed assets	195,315	190,377	191,526	195,179	190,105	183,938	178,858	184,631	193,137	201,210	189,450	174,589	159,729
Total assets	211,411	203,905	203,801	220,802	229,788	239,410	240,411	241,429	246,207	254,280	249,733	246,482	243,639
Liabilities & Shareholders' equity:													
Short-term loan	298	576	993	877	0	-0	-0	-0	3,861	865	0	-0	-0
Accounts payable	2,376	2,673	2,708	7,702	10,282	11,227	12,663	13,711	14,528	14,528	14,416	14,416	14,416
Accrued expenses	638	700	800	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Total current liabilities	3,312	3,950	4,501	9,579	11,282	12,227	13,663	14,711	19,388	16,393	15,416	15,415	15,415
Long-term loan	7,115	20,692	45,269	59,846	56,763	50,430	43,240	36,050	28,860	32,670	21,820	10,920	0
Loan from Paris Club	39,000	0	0	0	0	0	0	0	0	0	0	0	0
Total liabilities	49,427	24,642	49,770	69,425	68,045	62,657	56,903	50,761	48,248	49,063	37,236	26,335	15,415
Capital	160,371	160,371	165,371	175,371	175,371	175,371	175,371	175,371	175,371	175,371	175,371	175,371	175,371
Retained earnings	1,613	18,892	-11,340	-23,994	-13,628	1,382	8,136	15,297	22,587	29,845	37,126	44,776	52,852
Total shareholders' equity	161,984	179,263	154,031	151,377	161,743	176,753	183,507	190,668	197,958	205,216	212,497	220,147	228,223
Total liabilities & equity	211,411	203,905	203,801	220,802	229,788	239,410	240,411	241,429	246,207	254,280	249,733	246,482	243,639
Cost of capital before tax		13.9%											
Cost of capital after tax		13.8%											
Balance of bank loan	298	576	993	877	0	-0	-0	-0	3,861	865	0	-0	-0
Borrowing of long-term loan		15,000	26,000	16,000						11,000			
Repayment of long-term loan		-1,423	-1,423	-1,423	-1,423	-1,423							
					-1,660	-1,660	-1,660	-1,660	-1,660	-1,660	-1,660	-1,690	-1,690
						-3,250	-3,250	-3,250	-3,250	-3,250	-3,250	-3,250	-3,250
							-2,280	-2,280	-2,280	-2,280	-2,280	-2,300	-2,300
											-3,660	-3,660	-3,680
Total repayment		-1,423	-1,423	-1,423	-3,083	-6,333	-7,190	-7,190	-7,190	-7,190	-10,850	-10,900	-10,920
Balance of long-term loan	7,115	20,692	45,269	59,846	56,763	50,430	43,240	36,050	28,860	32,670	21,820	10,920	0
Balance of total loan	7,413	21,268	46,262	60,723	56,763	50,430	43,240	36,050	32,721	33,535	21,820	10,920	-0
Interest expense (8%)		-593	-1,701	-3,701	-4,858	-4,541	-4,034	-3,459	-2,884	-2,618	-2,683	-1,746	-874
Interest income (3%)		0	0	0	0	79	435	456	203	0	0	216	565
Interest expense -net-		-593	-1,701	-3,701	-4,858	-4,463	-3,599	-3,003	-2,681	-2,618	-2,683	-1,529	-309

Table 10.3.3 Pro forma Cash Flow Statements (in DM 1,000)

	1 1998	2 1999	3 2000	4 2001	5 2002	6 2003	7 2004	8 2005	9 2006	10 2007	11 2008	12 2009
EBIT (Earnings Before Interest & Taxes)	-17,128	-28,531	-8,953	15,223	19,473	22,896	23,463	23,509	23,356	23,485	23,385	23,385
Depreciation	5,938	6,251	6,848	9,874	10,167	10,480	11,227	12,494	13,927	14,760	14,860	14,860
(Increase) decrease in accounts receivable	-178	105	-7,272	-5,918	-2,016	-2,792	-1,899	-1,572	0	0	0	0
(Increase) decrease in inventories	0	1,349	-3,027	-3,945	-1,344	-1,861	-1,266	-1,048	0	0	0	0
(Increase) decrease in prepaid expenses	-24	-100	-200	0	0	0	0	0	0	0	0	0
Increase (decrease) in accounts payable	297	35	4,994	2,580	945	1,436	1,048	816	0	-112	0	0
Increase (decrease) in accrued expenses	62	100	200	0	0	0	0	0	0	0	0	0
Working capital (changes in current accounts	157	1,489	-5,305	-7,284	-2,414	-3,216	-2,117	-1,804	0	-112	0	0
Corporate tax (30%, after 5 years)	0	0	0	0	0	-5,789	-6,138	-6,249	-6,222	-6,241	-6,557	-6,923
Net cash provided by operating activities:	-11,033	-20,791	-7,410	17,813	27,226	24,371	26,435	27,951	31,061	31,893	31,688	31,322
Investment in fixed assets	-2,000	-7,400	-10,500	-4,800	-4,000	-5,400	-17,000	-21,000	-22,000	-3,000	0	0
Net cash used in investing activities:	-2,000	-7,400	-10,500	-4,800	-4,000	-5,400	-17,000	-21,000	-22,000	-3,000	0	0
Increase (decrease) in short-term loan	278	416	-116	-877	-0	0	-0	3,861	-2,995	-865	-1	0
(Increase) decrease in marketable securities	0	0	0	-2,618	-11,892	-684	8,426	6,768	0	-7,214	-11,609	-12,017
Long-term loan	15,000	26,000	16,000	0	0	0	0	0	11,000	0	0	0
Repayment of long-term loan	-1,423	-1,423	-1,423	-3,083	-6,333	-7,190	-7,190	-7,190	-7,190	-10,850	-10,900	-10,920
Interest expense -net-	-593	-1,701	-3,701	-4,858	-4,463	-3,599	-3,003	-2,681	-2,618	-2,683	-1,529	-309
Equity finance	0	5,000	10,000	0	0	0	0	0	0	0	0	0
Dividend (50%, after 5 years)	0	0	0	0	0	-6,754	-7,161	-7,290	-7,258	-7,281	-7,649	-8,077
Net cash provided by financing activities:	13,262	28,292	20,760	-11,435	-22,688	-18,227	-8,929	-6,532	-9,061	-28,893	-31,688	-31,322
Net increase (decrease) in cash:	230	101	2,850	1,578	538	744	506	419	0	-0	-0	0
Cash at beginning of year	216	446	546	3,396	4,974	5,512	6,256	6,763	7,182	7,182	7,182	7,182
Cash at end of year	446	546	3,396	4,974	5,512	6,256	6,763	7,182	7,182	7,182	7,182	7,182
IRR on Investment (IRROI) before tax	27.1%											
Net Cash Flows (Free Cash Flows before tax)	-13,033	-28,191	-17,910	13,013	23,226	24,760	15,573	13,199	15,283	35,133	38,245	106,739
IRR on Investment (IRROI) after tax	22.9%											
Net Cash Flows (Free Cash Flows)	-13,033	-28,191	-17,910	13,013	23,226	17,891	8,534	6,146	8,276	28,088	31,230	99,724
IRR on Equity (IRROE) after tax	39.8%											
Net Cash Flows	230	-4,899	-7,150	1,578	538	7,498	7,667	7,709	7,258	7,281	7,649	76,571

Note: Each net cash flow in 2009 includes terminal value of 68,494

Table 10.3.4 Pro Forma Income Statements -Survival Plan- (in DM 1,000)

	1997	1 1998	2 1999	3 2000	4 2001	5 2002	6 2003	7 2004	8 2005	9 2006	10 2007	11 2008	12 2009
Sales	18,564	22,277	27,320	41,610	52,225	65,880	79,420	86,820	94,220	94,220	94,220	94,220	94,220
Cost of sales	14,851	17,821	18,054	27,609	34,027	42,501	50,877	55,593	60,310	60,310	60,310	60,310	60,310
Gross margin	3,713	4,455	9,266	14,001	18,198	23,379	28,543	31,227	33,910	33,910	33,910	33,910	33,910
Fixed costs	11,059	14,445	8,827	11,962	13,206	14,588	15,584	16,588	17,764	17,764	17,764	17,764	17,764
Depreciation	5,871	5,938	6,144	6,311	6,434	6,594	6,684	6,758	6,791	6,824	6,858	6,891	6,924
Restarting costs (Repair & maintenance)	0	1,200	0	0	0	0	0	0	0	0	0	0	0
EBIT (Earnings Before Interest & Taxes)	-13,217	-17,128	-6,705	-4,272	-1,443	2,196	6,276	7,881	9,355	9,322	9,288	9,255	9,222
Devaluation of inventories	0	3,000	0	0	0	0	0	0	0	0	0	0	0
Devaluation of fixed assets	0	1,000	0	0	0	0	0	0	0	0	0	0	0
Profit on released loan from Paris Club	0	39,000	0	0	0	0	0	0	0	0	0	0	0
Interest expense -Net-	0	593	1,701	1,627	1,591	1,720	1,522	1,201	839	456	25	-411	-854
Corporate tax (30%, after 5 years)	0	0	0	0	0	0	1,426	2,004	2,555	2,660	2,779	2,900	3,023
Net income	-13,217	17,279	-7,407	-5,900	-3,034	475	3,327	4,676	5,961	6,206	6,484	6,766	7,053
Dividend (50%, after 5 years)	0	0	0	0	0	0	1,663	2,338	2,981	3,103	3,242	3,383	3,527
Net income after dividend	-13,217	17,279	-7,407	-5,900	-3,034	475	1,663	2,338	2,981	3,103	3,242	3,383	3,527
Development investments (Fixed assets)		2,000	4,200	800	2,900	1,900							
Depreciation (Useful life: 15years)		67	140	27	97	63							
			133	133	133	133	133	133	133	133	133	133	133
				280	280	280	280	280	280	280	280	280	280
					53	53	53	53	53	53	53	53	53
						193	193	193	193	193	193	193	193
							153	153	153	153	153	153	153
								73	73	73	73	73	73
									33	33	33	33	33
										33	33	33	33
											33	33	33
												33	33
													33
Total depreciation of develop. invest.		67	273	440	563	723	813	887	920	953	987	1,020	1,053
Depreciation of existing fixed assets	5,871	5,871	5,871	5,871	5,871	5,871	5,871	5,871	5,871	5,871	5,871	5,871	5,871
Total Depreciation	5,871	5,938	6,144	6,311	6,434	6,594	6,684	6,758	6,791	6,824	6,858	6,891	6,924

Table 10.3.5 Pro Forma Balance Sheets -Survival Plan- (in DM 1,000)

	1997	1 1998	2 1999	3 2000	4 2001	5 2002	6 2003	7 2004	8 2005	9 2006	10 2007	11 2008	12 2009
Assets:													
Cash	216	446	546	1,664	2,089	2,635	3,177	3,473	3,769	3,769	3,769	3,769	3,769
Marketable securities	0	0	0	0	0	0	2,673	7,670	13,343	20,610	28,050	35,634	43,395
Accounts receivable	5,391	5,569	5,464	6,242	7,834	9,882	11,913	13,023	14,133	14,133	14,133	14,133	14,133
Inventories	9,813	6,813	5,464	4,161	5,223	6,588	7,942	8,682	9,422	9,422	9,422	9,422	9,422
Prepaid expenses	676	700	800	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Total current assets	16,096	13,528	12,274	13,067	16,145	20,105	26,705	33,848	41,667	48,934	56,374	63,958	71,719
Net fixed assets	195,315	190,377	188,433	182,922	179,388	174,693	168,009	161,251	154,460	147,636	140,778	133,887	126,963
Totalassets	211,411	203,905	200,707	195,989	195,533	194,799	194,714	195,099	196,127	196,570	197,152	197,845	198,682
Liabilities & Shareholders' equity:													
Short-term loan	298	576	1,073	2,044	743	1,345	0	0	0	0	0	0	0
Accounts payable	2,376	2,673	2,708	4,141	5,104	6,375	7,632	8,339	9,046	9,046	9,046	9,046	9,046
Accrued expenses	638	700	800	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Total current liabilities	3,312	3,950	4,581	7,186	6,847	8,720	8,632	9,339	10,047	10,047	10,047	10,047	10,047
Long-term loan	7,115	20,692	19,269	17,846	20,763	17,680	16,020	13,360	10,700	8,040	5,380	2,690	0
Loan from Paris Club	39,000	0	0	0	0	0	0	0	0	0	0	0	0
Total liabilities	49,427	24,642	23,850	25,032	27,610	26,400	24,652	22,699	20,747	18,086	15,426	12,736	10,047
Capital	160,371	160,371	165,371	165,371	165,371	165,371	165,371	165,371	165,371	165,371	165,371	165,371	165,371
Retained earnings	1,613	18,892	11,486	5,586	2,552	3,027	4,691	7,029	10,009	13,113	16,355	19,738	23,265
Total shareholders' equity	161,984	179,263	176,857	170,957	167,923	168,398	170,062	172,400	175,380	178,484	181,726	185,109	188,636
Total liabilities & equity	211,411	203,905	200,707	195,989	195,533	194,799	194,714	195,099	196,127	196,570	197,152	197,845	198,682
Cost of capital before tax		14.5%											
Cost of capital after tax		14.5%											
Balance of bank loan	298	576	1,073	2,044	743	1,345	0	0	0	0	0	0	0
Borrowing of Long-term loan		15,000			6,000								
Repayment of long-term loan		-1,423	-1,423	-1,423	-1,423	-1,423							
					-1,660	-1,660	-1,660	-1,660	-1,660	-1,660	-1,660	-1,690	-1,690
								-1,000	-1,000	-1,000	-1,000	-1,000	-1,000
Total repayment		-1,423	-1,423	-1,423	-3,083	-3,083	-1,660	-2,660	-2,660	-2,660	-2,660	-2,690	-2,690
Balance of long-term loan	7,115	20,692	19,269	17,846	20,763	17,680	16,020	13,360	10,700	8,040	5,380	2,690	0
Balance of total loan	7,413	21,268	20,342	19,890	21,506	19,025	16,020	13,360	10,700	8,040	5,380	2,690	0
Interest expense (8%)		-593	-1,701	-1,627	-1,591	-1,720	-1,522	-1,282	-1,069	-856	-643	-430	-215
Interest income (3%)		0	0	0	0	0	0	80	230	400	618	842	1,069
Interest expense -Net-		-593	-1,701	-1,627	-1,591	-1,720	-1,522	-1,201	-839	-456	-25	411	854

Table 10.3.6 Pro Forma Cash Flow Statements -Survival Plan- (in DM 1,000)

	1 1998	2 1999	3 2000	4 2001	5 2002	6 2003	7 2004	8 2005	9 2006	10 2007	11 2008	12 2009
EBIT (Earnings Before Interest & Taxes)	-17,128	-5,705	-4,272	-1,443	2,196	6,275	7,881	9,355	9,322	9,288	9,255	9,222
Depreciation	5,938	6,144	6,311	6,434	6,594	6,684	6,758	6,791	6,824	6,858	6,891	6,924
(Increase) decrease in accounts receivable	-178	105	-778	-1,592	-2,048	-2,031	-1,110	-1,110	0	0	0	0
(Increase) decrease in inventories	0	1,349	1,303	-1,062	-1,366	-1,354	-740	-740	0	0	0	0
(Increase) decrease in prepaid expenses	-24	-100	-200	0	0	0	0	0	0	0	0	0
Increase (decrease) in accounts payable	297	35	1,433	963	1,271	1,256	707	707	0	0	0	0
Increase (decrease) in accrued expenses	62	100	200	0	0	0	0	0	0	0	0	0
Working capital (changes in current accounts)	157	1,489	1,959	-1,691	-2,143	-2,129	-1,143	-1,143	0	0	0	0
Corporate tax (30%, after 5 years)	0	0	0	0	0	-1,426	-2,004	-2,555	-2,660	-2,779	-2,900	-3,023
Net cash provided by operating activities:	-11,033	1,928	3,997	3,300	6,648	9,405	11,493	12,449	13,486	13,367	13,246	13,123
Investment in fixed assets	-2,000	-4,200	-800	-2,900	-1,900	0	0	0	0	0	0	0
Net cash used in investing activities:	-2,000	-4,200	-800	-2,900	-1,900	0	0	0	0	0	0	0
Increase (decrease) in short-term loan	278	497	971	-1,302	602	-1,345	0	0	0	0	0	0
(Increase) decrease in marketable securities	0	0	0	0	0	-2,673	-4,997	-5,673	-7,267	-7,440	-7,584	-7,761
Long-term loan	15,000	0	0	6,000	0	0	0	0	0	0	0	0
Repayment of long-term loan	-1,423	-1,423	-1,423	-3,083	-3,083	-1,660	-2,660	-2,660	-2,660	-2,660	-2,690	-2,690
Interest expense -Net-	-593	-1,701	-1,627	-1,591	-1,720	-1,522	-1,201	-839	-456	-25	411	854
Equity finance	0	5,000	0	0	0	0	0	0	0	0	0	0
Dividend (50%, after 5 years)	0	0	0	0	0	-1,663	-2,338	-2,981	-3,103	-3,242	-3,383	-3,527
Net cash provided by financing activities:	13,262	2,373	-2,079	24	-4,201	-8,863	-11,196	-12,152	-13,486	-13,367	-13,246	-13,124
Net increase (decrease) in cash:	230	101	1,118	425	546	542	296	296	0	0	0	0
Cash at beginning of year	216	446	546	1,664	2,089	2,635	3,177	3,473	3,769	3,769	3,769	3,769
Cash at end of year	446	546	1,664	2,089	2,635	3,177	3,473	3,769	3,769	3,769	3,769	3,769
IRR on Investment (IRROI) before tax	36.8%											
Net Cash Flows (Free Cash Flows before tax)	-13,033	-2,272	3,197	400	4,748	10,830	13,497	15,004	16,146	16,146	16,146	77,819
IRR on Investment (IRROI) after tax	33.6%											
Net Cash Flows (Free Cash Flows)	-13,033	-2,272	3,197	400	4,748	8,948	11,132	12,197	13,350	13,360	13,370	61,673
IRR on Equity (IRROE) after tax	44.3%											
Net Cash Flows	230	-4,899	1,118	425	546	2,205	2,634	3,277	3,104	3,242	3,383	61,673

Note: Each net cash flow in 2009 includes terminal value of 61,673

Table 10.4.1 Ratio Analysis

	1997	1 1998	2 1999	3 2000	4 2001	5 2002	6 2003	7 2004	8 2005	9 2006	10 2007	11 2008	12 2009
Profitability ratios:													
Return on invested capital (ROIC %)	-7.8%	-9.2%	-16.3%	-4.5%	6.8%	8.3%	6.9%	7.0%	7.0%	6.9%	6.7%	6.8%	6.8%
Return on equity (ROE %)	-8.2%	9.6%	-19.6%	-8.4%	6.4%	8.5%	7.4%	7.5%	7.4%	7.1%	6.9%	6.9%	7.1%
Return on assets (ROA %)	-6.3%	8.5%	-14.8%	-5.7%	4.5%	6.3%	5.6%	5.9%	5.9%	5.7%	5.8%	6.2%	6.6%
Gross margin (%)	20.0%	20.0%	33.9%	39.5%	44.9%	45.7%	46.0%	45.9%	46.1%	46.1%	46.5%	46.5%	46.5%
Profit margin (%)	-71.2%	77.6%	-110.7%	-14.9%	8.3%	10.9%	8.6%	8.5%	8.1%	8.1%	8.1%	8.5%	9.0%
Efficiency ratios:													
Asset turnover (*)	0.09	0.11	0.13	0.38	0.54	0.58	0.65	0.70	0.73	0.71	0.72	0.73	0.74
Fixed-asset turnover (*)	0.10	0.12	0.14	0.44	0.65	0.75	0.87	0.92	0.93	0.89	0.95	1.03	1.12
Solvency ratios:													
Interest coverage (*)	-	-28.9	-16.8	-2.4	3.1	4.4	6.4	7.8	8.8	8.9	8.8	15.3	75.7
Debt service coverage (*)	-	-8.5	-9.1	-1.7	1.9	1.8	1.7	1.8	1.8	1.8	1.3	1.4	1.5
Current ratio (*)	4.9	3.4	2.7	2.7	3.5	4.5	4.5	3.9	2.7	3.2	3.9	4.7	5.4
Acid test (*)	1.9	1.7	1.5	1.8	2.4	3.4	3.4	2.7	1.8	2.1	2.7	3.5	4.3
Assets to equity (*)	1.31	1.14	1.32	1.46	1.42	1.35	1.31	1.27	1.24	1.24	1.18	1.12	1.07
Debt to equity (%)	30.5%	13.7%	32.3%	45.9%	42.1%	35.4%	31.0%	26.6%	24.4%	23.9%	17.5%	12.0%	6.8%

Notes:
ROIC = EBIT/Invested capital = EBIT(1 - Tax rate)/(Interest-bearing debt(D) + Equity(E))
ROE = Net income/Shareholders' equity = Net income/Sales * Sales/Assets * Assets/Equity
ROE = Profit margin * Asset turnover * Financial leverage = Net income/Assets(ROA) * Financial leverage
ROE = ROIC + (ROIC - Interest rate-after tax) * D/E = ROIC - (ROIC - ii) * Financial leverage
Gross margin = Gross margin/Sales
Profit margin = Net income/Sales
Fixed-asset turnover = Sales/Fixed-asset
Interest coverage = EBIT/Interest expense
Debt service coverage = EBIT/(Interest + Principal repayment/(1-Tax rate))
Current ratio = Current assets/Current liabilities
Acid test = (Current assets - Inventory)/Current liabilities

Table 10.4.2-1 Margin of Safety -Sales Mix from 2007 to 2009 (in DM 1,000)-

Products	Corrugated board by own SC fluting		Sacks of own pulp & paper		Sack paper of own Kraft pulp		SC fluting by own SC pulp		MG paper by own Kraft pulp		TOTAL
	Amount	unit @	Amount	unit @	Amount	unit @	Amount	unit @	Amount	unit @	
Sales(units)	38,000t		20,000t		37,000t		50,000t		8,400t		153,400t
Sales(DM)	61,560	1,620	34,400	1,720	40,330	1,090	33,600	672	9,660	1,150	179,550
											(@1,170)
Variable cots	28,222	743	16,526	826	28,574	772	16,650	333	6,134	730	96,106
(% of Sales)	46%		48%		71%		50%		63%		54%
											(@ 626)
Contribution margin	33,338	877	17,874	894	11,756	318	16,950	339	3,526	420	83,444
(% of Sales)	54%		52%		29%		50%		37%		46%
											(@ 544)
Sales mix	34%		19%		22%		19%		5%		100%
Fixed costs	9,040		9,040		9,040		9,040		9,040		45,200
Break-Even (DM)	16,699		17,392		30,986		17,920		24,752		97,259
Break-Even (units)	10,308t		10,112t		28,428t		26,667t		21,523t		83,094t

Margin of Safety ratio = (179,550 - 97,259) / 179,550 = 45.8%

Notes: SC is Semichemical, MG is Machine glazed

Table 10.4.2-2 Break-Even Point -Whole Mill-

Volume (thou-t)	F.costs (thouDM)	V.costs (thouDM)	Total C. (thouDM)	T.Sales (thouDM)
0	45,200	0	45,200	0
20	45,200	12,530	57,730	23,409
40	45,200	25,060	70,260	46,819
60	45,200	37,590	82,790	70,228
80	45,200	50,120	95,320	93,638
100	45,200	62,651	107,851	117,047
120	45,200	75,181	120,381	140,456
140	45,200	87,711	132,911	163,866
160	45,200	100,241	145,441	187,275
180	45,200	112,771	157,971	210,684
200	45,200	125,301	170,501	234,094
Break-Even Point of Whole Mill = 83,094t	45,200	52,059	97,259	97,259

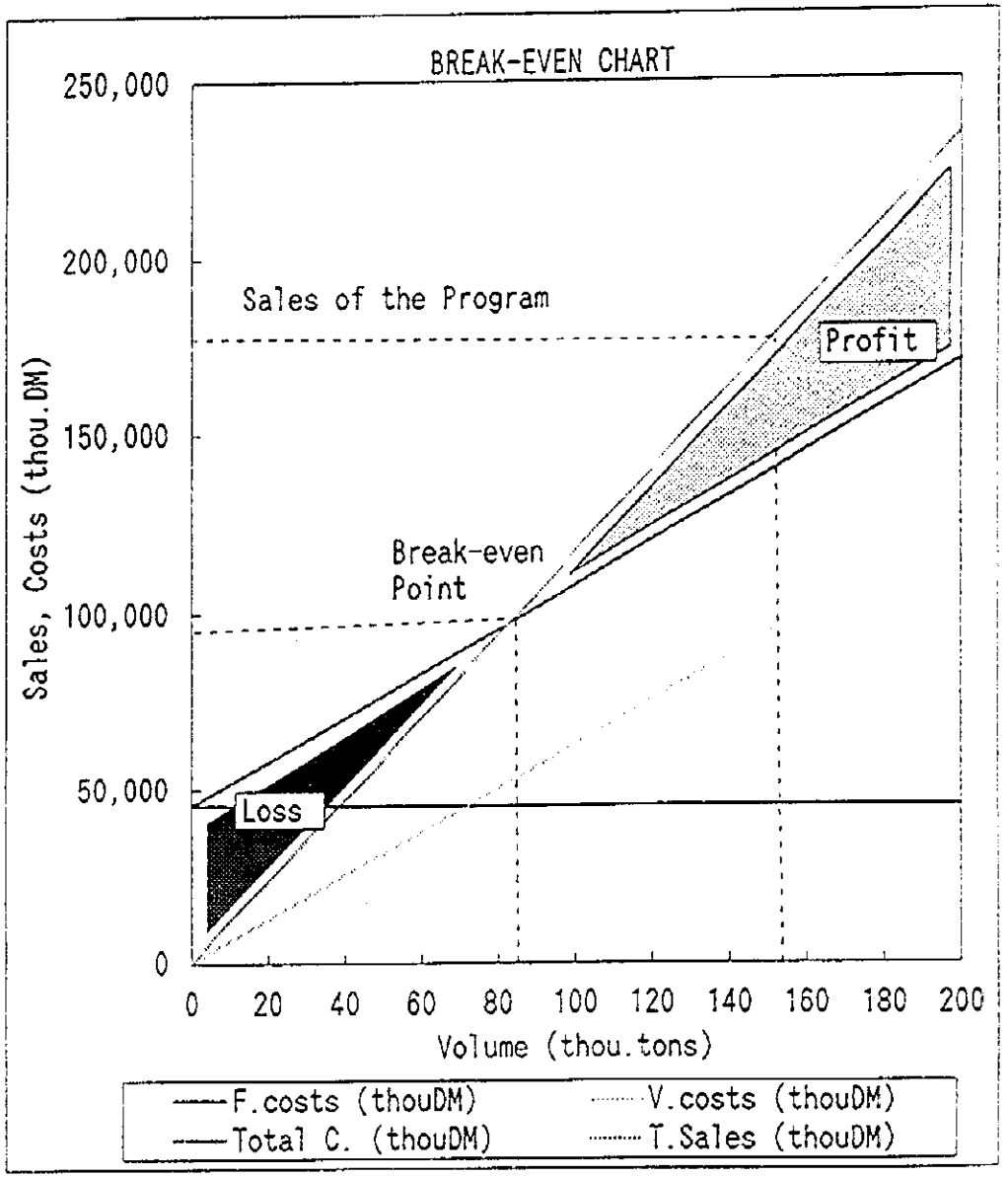


Table 10.4.3-1 SENSITIVITY OF IRROI BEFORE TAX

Variation	-30%	-25%	-20%	-15%	-10%	-5%	0%	5%	10%	15%	20%	25%	30%
Sales prices					-8.2%	14.7%	27.1%	37.5%	47.3%	57.1%	67.2%	78.0%	89.5%
Operating rate			0.4%	10.0%	16.7%	22.2%	27.1%	31.5%	35.6%	39.5%	43.2%	46.8%	50.3%
Fixed costs	46.4%	43.0%	39.8%	36.5%	33.4%	30.2%	27.1%	23.9%	20.6%	17.1%	13.3%	9.2%	4.2%
Investment	38.8%	36.7%	34.6%	32.6%	30.7%	28.9%	27.1%	25.3%	23.6%	21.9%	20.2%	18.5%	16.8%

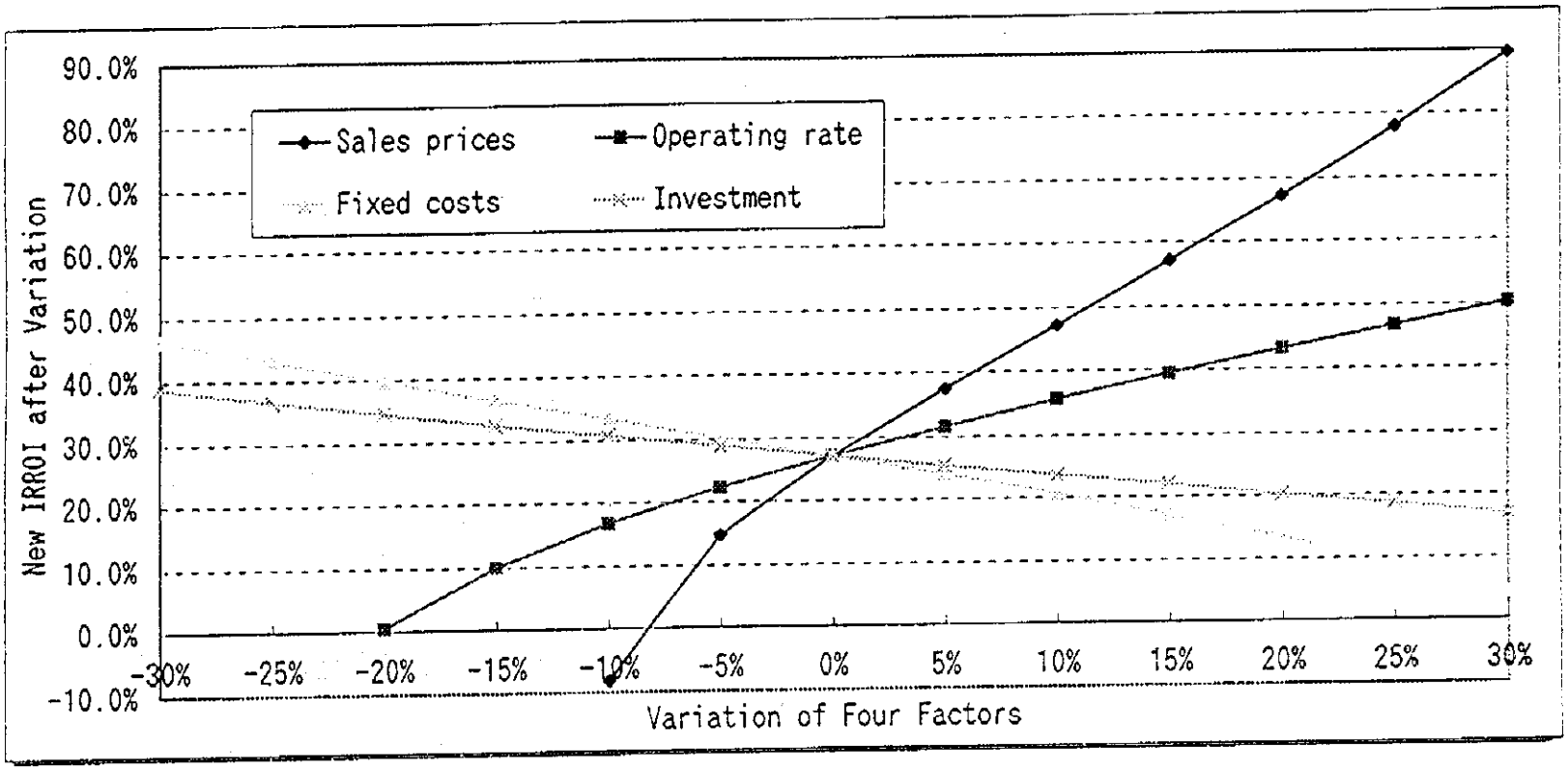


Table 10.4.3-2 SENSITIVITY OF IRROE AFTER TAX

Variation of Interest expense rate (with Interest income rate	20% 9%	18% 8%	16% 7%	14% 6%	12% 5%	10% 4%	8% 3%	6% 2%	4% 1%	2% 0%	0% 0%)
IRROE after tax	19.5%	26.3%	30.7%	33.9%	36.4%	38.3%	39.8%	41.0%	42.0%	42.7%	43.4%