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PRE-FEASIBILITY STUDY ON THE ESTABLISHMENT OF A MINERAL WATER AND SOFT DRINK BOTTLING PLANT IN THE GAMBIA

(FINAL REPORT)

By

Feasibility Studies Branch, Investment Services
Investment and Technology Promotion Division

Based on the work of the team of
UNIDO INTERNATIONAL CONSULTANTS

November 1994

TABLE OF CONTENTS

CHAPTER I EXECUTIVE SUMMARY

1.1. Project Background and Basic Idea (Chapter II)

The economy of the Gambia suffers from chronic problems like unemployment and underemployment,lack of technical and administrativel skills supplied to small and medium-size businesses, shortage of investment in manufacturing ventures and national cash crops to be sold abroad.

Investments in tourism have however been successful and their impact on employment has been beneficial. For various reasons, the holiday tourists like to spend on branded foods and drinks during the average two weeks they spend in the country. This has caused an increase in the import of industrial beverages, and although there are bottling plants supplying beer, soft drinks and mineral waters to the travellers and the local population, a project promoter active in the private business community, Mr. Dandeh-Njie, has considered the establishment of a bottling plant as an interesting opportunity. Mr. Dandeh-Njie has been encouraged by government officials and business associates to apply for technical assistance from the UNIDO project appraisal capacity.

A Unido team consisting of Mr. Olavi Heinonen and Mr. Olu Omosaye was commissioned and supervised by Ms. Patricia Scott, Industrial Development Officer, Feasibility Studies Branch, Investment Technology Promotion Division. The team, and headed by Mr. Heinonen, started working in Banjul, the Gambia, mid October 1994 and met one month later in Vienna with Ms Scott and with Mr. Felix Ugbor, Area Programme Officer, to give them a preliminary analysis of the salient features of the project.

Due to lengthy delays in acquiring the essential data on various bids and quotations by suppliers of machinery, equipment and know-how, the final report was delivered to UNIDO in January, 1995.

During the mission and observing expert advice and opinions, the team concluded that the original project terms of reference were modified to a considerable degree. On the basis of this information, the team formulated recommendations as to the importance of acquiring water of competitive quality and revising the originally sanguine assumptions concerning market opportunities and financial feasibility.

1.2. Market Analysis and Marketing Strategy (ChapterIII)

The Gambia is the smallest country in Africa, but well known as an attractive destination among holiday travellers from the UK, the Scandinavian countries, Germany and Holland.

Beverages bottling is a travel-oriented industry and it was started in Banjul in the late sixties. Today, two leading companies in the business dominate the tourist and the domestic markets. Between themselves, Chellarams (Bottlers of Coca-Cola etc) and Banjul Breweries (Beer,Pepsi-Cola etc), produce approximately 7.5 million litres a year of beverages mainly in glass bottles, while some 1,5 million litres a year are imported in different packages - cans, plastic bottles and the like.

Faced with excess capacity and weak financial performance, the bottlers have been testing their own labels of e.g. bottled, table, aerated or spring water, to cater to the tourists who are actively discouraged to drink local tap water.

Since the various distribution channels are crowded with this kind of products supplied from African and European bottlers,at widely differing prices, the consultants have revised their original assumptions of market potential and growth prospects.

A new, small and capital-cost burdened supplier would have to offer extraordinary product and price benefits to build a meaningful share in the domestic and export markets. Recent difficulties in the tourist business are not likely to improve the chances of a new entrant.

1.3. Raw Materials and Supplies (Chapter IV)

After discussions with and recommendations from the consultants, the project promoter has decided against looking for spring water in the interior and to locate his operations in Farato (Tanji Farms) at a site he has acquired earlier.

The consultants are stil recommending the use of class 1 category of spring water for the plant. The alternatives are more costly in terms of treatment and the consumers might not accept a product they experience as inferior, if the price is not remarkably lower. Even if the water "does not cost anything", the costs associated with the sinking of the borehole and the water treatment are considerable.

The consumer pays for the water, the bottler pays for the packaging. To produce 1 650 000 litres of water, the cost of packaging (bottles,caps,labels and cartons) will go up to 4.7 million dalasis which indicates that some 80 per cent of the factory price are costs involved with packaging. Conversion rate: 1 £ = 15 dalasis (D), $1,556.

In the Farato area, the government has difficulties to supply energy to the bottling plant. If the operation in Farato is using its own generators to supply the electricity needed, the annual cost will reach about 400 000 dalasis.

1.4. <u>Location, Site and Environmental Assessment(Chapter V)</u>

The promoter owns the land in the prospective location and he plans to place it at the disposal of the new bottling company, Farato Minerals.

The location of the Farato farm is near to consumption and supply sources. The quality of the borehole water has to be improved by treatment processes, but the promoter is not willing to consider alternatives with better water quality.

The consultants have suggested certain measures to be taken in order to acquire spring water.

The major problems with evironmental inputs are the protection against factory noise pollution and the handling of defective packaging materials. While glass bottles are returned to the distributors and the bottlers, the plastic bottles remain an environmental problem.

1.5. Engineering and Technology(Chapter VI)

The production programme discussed in this chapter is based on the assumption of a 10 per cent share of the total market (including beer, soft drinks and mineral waters) and an annual growth rate of 15 per cent (volume).

According to the 5-year sales forecast, the volume will reach nearly 3 000 000 litres by the year 5. The minimum economic capacity would require a production of 4 000 000 litres. The operating rate would be too low to ensure acceptable profitability.The financial analysis in chapter X will deal with the problem in detail.

In case the quality of the water does not meet the first class standards, this chapter gives a detailed description of the treatment processes required.

A very important question at hand is the choice of packaging material. PET bottles are stronger and easier to handle than the PVC bottles, but the cost is twice as high. Investment in the PET technology takes 30-40 per cent of the total water plant overall cost. Most competitive brands sold in the Gambia are packaged in PVC bottles. Since no meaningful quotations have been available, the cost estimates have been based on the PET technology.

The total cost of investment on plant and equipment would range between one million USD and 4 million USD. The consultants regard the investment package of Central Bottling as the most practical solution for Farato Minerals.

This chapter also describes the measures required to determine the soil quality, and construction suitability, including site investigation, water studies and analyses, test and actual drilling, pre-construction studies and plans, plant layout, technical and user requirements.

1.6. Organization and Overhead Costs (Chapter VII)

The new entrant in the water bottling business would try to invade a new market of small size and plenty of competition.

In order to perform the tasks of an efficient organization, the demands on labour will be highly ambitious. Skill and precision are necessary for the success of the production. Quality rather than quantity of the organization must be emphasized. In the simple and small structure, the general manager is in charge of production, sales, administration and finance. Reporting to him are the officers supervising and performing the tasks of production and marketing. Reporting to them there will be the specialists on sales and distribution, quality control, water treatment, the laboratory, the packaging and production line, maintenance and storekeeping.

The overheads in relation to direct labour costs will be kept at minimum level, but if employment in the private sector starts growing, the indirect costs of labour will be higher.

1.7. The Human Resources (Chapter VIII)

The total personnel of the new plant will number 25 people.

Five persons are responsible for top administration and marketing, 20 persons will perform the tasks of production. The annual payroll cost will be about 60 000 dalasis for labour and 150 000 dalasis for staff.
This chapter lists the requirements and qualifications of the key management and supervisory personnel. Since the operation will be partly green field, the management has to look very closely at the recruitment process and prepare for extensive training programmes.
The large amounts of money invested in plant and equipment can only be justified if the tasks of production, marketing and various internal and external services are performed competently.

Since the recruitment of key personnel may involve hiring skilled people from the food processing or beverage industry, it can be expected that the costs of salaries plus benefits will rise faster than the inflation.

1.8. Implementation Programme and Budgeting (Chapter IX)

The equity capital and long-term loans needed to start the company have been discussed with a prospective foreign partner, Shannon Minerals and Global

International. According to these discussions, the operation would be financed jointly by an equity input of 100 000 Pounds Sterling and and loans amounting to 60 000 pounds. Since the investment required to build a minimum capacity will scarcely be less than one million pounds, the proposed equity would not go a long way to ensure satisfactory solvency and liquidity.

During the year 1994 the attitudes of the would-be partners towards intensified cooperation seem to have developed in a negative direction. The original offers on plant and equipment as well as technical assistance have been neither confirmed nor revised.

Information about the venture and its conditions has been scarce indeed.
The implementation schedule stretches from market and feasibility studies during the first month to normalizing production in the months 12 and 13 counted from the start. The main partners in the project implementation would be Farato Minerals and the suppliers of equipment and services.

The cost of the implementation process would according to preliminary plans and estimates go up to 700 000 dalasis.

1.9. Financial Analysis and Investment Appraisal (Chapter X)

According to the calculation in Chapter VI., based on the costs estimated in various chapters, the production cost of one litre of water bottled by Farato would go up to 4.18 dalasis.

During the year One, when 1 650 000 litres would be produced, 1 650 000 litres sold at 3.5 dalasis a litre would add up to a total revenue of 5 775 000 dalasis.

The variable margin per litre would be 0.65 dalasis or 18.6 per cent of the factory price. This price assumption matches the import prices and is only slightly affected by the fact that a new entrant in a crowded market and with a highly ordinary product will have to sell cheap.

The financial result of this price and cost structure would however create a situation where the Farato operation would make a loss of 1.1 million dalasis on the level of the operational margin, after fixed costs including depreciation of machinery and equipment but before the costs of finance . The results will also be burdened by the overheads on marketing and administration.

CHAPTER II PROJECT BACKGROUND AND BASIC IDEA

The team leader and the technical expert were guided and assisted by the project promoter, Mr. Dandeh-Njie, who placed his contacts at the team's disposal, Annex 1.

In the project document called Background and Justification (from 1993) it was stated that
- the population of the Gambia was 890 000 and reaching one million in the year 2 000.

It was one million by April- 93. and currently growing at 4 per cent annually.

The GDP per capita has been decreasing since 1974.

The tourist traffic (charter flights) increased in 1989-93 by 18 per cent, whereas the number of hotel beds available went up 25 per cent.
During the Unido mission in October-November,the mood in the industry was "nervous" - the booking situation was uncertain and indicated a decline from the previous year 93/94.

In November, when the season of 1994/95 was about to get started, the British and the Scandinavian tour operators decided to cancel their reservations until further notice, which means they pulled off for the entire season till the autumn of 1995. The operators referred to the political destabilization following the military coup in July 1994.

For the Gambia, this was a catastrophe for the economy and for a large part of the population.
The pull-off hit approximately 80 per cent of the tourist market and it will seriously damage the linkage industries like food and drink processing etc.

The travel income of the country grew by nearly 80 per cent between 1989 and 1993. During the same period, the value of exports from the Gambia declined by 12 per cent. The ratio of exports to travel income changed as follows:

Year	1989	1993
Exports million dalasis	329	288
Travel income, "	290	514

The availability of high quality water was a tricky question which could not be answered during the Unido mission in October-November 1994.

As far as potential employment was concerned, the direct effect of building the bottling plant would only be jobs of some 25 people, most of them staff or skilled labour.

The imports of beer, soft drinks and mineral waters stood in 1993/94 at the level of 1.5 million litres, less than 20 per cent of the total supply of beer and non-alcohol beverages produced by the two major bottlers, Chellarams and Banjul Breweries, perfectly capable of serving the needs of the local market.

As for import substitution, a domestic producer of mineral water, still or spring water or other beverages in plastic bottles would face a stiff competition in both the domestic and the export markets, and even a hundred per cent market share in the Gambia would for a long time only absorb a minor part of the minimum economic production capacity.

The promoter, Mr. Dandeh-Njie has redefined the project terms of reference as follows:

- no glass bottles
- no beer
- bottler distribution to the trade to be replaced by customer collection

After eliminating the soft drink production because of the strong domination of the world brand competitors, the consultants investigated further the market for the product commonly known as still or spring water, usually packed in plastic bottles of 1.5 litres.

The imports of this category (redefined by the new nomenclature) reached in August 1993-June 1994 net 650 000 kilograms or litres worth 2 2 million dalasis. That was the equivalent of 433 000 bottles 1.5 litres each.
The average import price was 3.5 dalasis/litre.
The total imports in 1993/1994 were the equivalent of a little less than 10 per cent of the annual capacity of a small bottle blowing and filling plant.
Under the prevailing conditions, with no support from import duties (10 per cent on CIF), no other products to employ the filling and bottle blowing capacity,
PLUS
insufficient information on the total investment cost and consequently on the financial feasibility, the consultants can only recommend that the promoter completes the basic data on

- the availability of pure spring water,
- the cost of finding and pumping water,
- the cost of energy
- the demands on the infrastructure,
- the means of securing future orders.

For further recommendations, see Annex 2.

From the point of view of the national economy, the interest of the state would be better served by the growth of import duties on foreign-made beverages. That again would require a revival of the tourist market.

CHAPTER III MARKET ANALYSIS AND MARKETING STRATEGY

The consumption of industrial beverages in the Gambia

Beer, soft drinks and mineral waters are the major beverages bottled and imported for consumption in the Gambia. With the onset of tourism in the late sixties, the Coca-Cola Corporation started bottling soft drinks in Banjul in 1967.

Today the two major botlers and importers of beer and soft drinks, Chellaram Industries (Coca Cola) and Banjul Breweries (Pepsi), a bottling company owned by the German firm Gebrueder März, sell annually more than 7.5 million litres of beer, soft drinks and mineral waters.
With a population of one million, the per capita output of industrial beverages can be estimated at 7.5 litres per inhabitant.

Foreign buyers and sellers can be assessed as follows:

- net imports, re-exports excluded - 1.5 million litres,
- foreign consumers, ie tourists, consuming 7-8 litres per head during the average stay of two weeks.

This per capita consumption multiplied with the number of tourists (90 000 in 1993/94, July-June), goes up to some 800 000 litres a year.

Low level of consumption

The total market for beer, soft drinks and mineral waters can consequently be summed up as 9.0 million litres, including imports and the tourist consumption that is divided between the domestic and the foreign supply.
In the home countries of the German, British and Dutch as well as Scandinavian tourists the per capita consumption ranges between 131 litres a year in Sweden and 318 litres in Germany.

If we can assume there is a correlation between the GNP per capita and beverage consumption, the Gambia would seem to be country where the beverage consumption is proportionately higher than the GNP compared with the North European levels.

Another comparison shows that five million Finns consumed in 1993, when the industry went through a recession, appr. 650 million litres or 130 litres per capita. The total volume was distributed as follows:

BEER	67 per cent
SOFT DRINKS	29
MINERAL WATERS	4

At the bottlers in the Gambia, the largest part of the sales consists of soft drinks. Even the Banjul Brewery, with a dominant position in the beer market, trades only one third of the volume from beer sales.

The national economy of the Gambia - outside the tourist sector that grew at double the speed of the population increase - cannot unfortunately be characterized as a growth market. It is hard to forecast any bright prospects for the beverage industry.

Imports - a free for all

Beverages, including bottled "spring" or still water are imported from Europe and some neighbouring countries by wholesalers, supermarkets,hotels and restaurants and even beverage bottlers looking for a supplementary product niche. The imports are mostly packed in metal cans or plastic bottles.

Some of the still water brands are private labels purchased and marketed by distribution chains. Tesco, UK sells beverages under a private label through the French-African chain of CFAO.

Banjul breweries ordered an Own Label brand from a bottler in the Canary Islands, agreeing to certain quota of monthly shipments. The price was undercut by other importers and even wholesalers. The warehouses are full of unsold merchandize. A bottling plant in Senegal sells a brand of spring water for an import price that is higher than the RETAIL price in a supermarket.

Bleak prospects

According to official and semi-official sources, the market for mineral waters and soft drinks was characterized as a rare opportunity with great financial rewards.

After discussions with Mr. Dandeh-Njie, the project promoter, it could be concluded that the market was too small for profitable utilization of the minimum economic capacity and that the competition was more intense than originally assumed.

Traditional soft drinks and mineral waters are packed in glass bottles. This proportion of the market, over four fifths of the total supply, is shared between the two dominating companies with an investment to protect and a strong financial background. An entry into this competitive field was not regarded advisable.

The alternative option was the vision of invading the market for waters, especially pure spring water packed in plastic bottles.
The marketplace for this product is crowded, but a domestic bottler would have the advantage of producing locally without the burden of import duties and capable - given the sufficient volume - of undercutting the competition.

One further advantage would be the ability to operate the only domestic bottle-blowing machinery as well as the filling machinery.

This would strengthen the new entrant as a supplier to different local and near-by export markets.

Export potential

Traditionally, beverages like beer and soft drinks have been produced and consumed locally, and the raw materials like water,malt and sugar have been supplied by local sources.

Today, the beverage industry is concentrating into bigger and fewer production and storage units, but the proportion exported and imported is still fairly small.

International companies in the industry are represented in many markets by their franchised bottling companies.
The volume of foreign trade as a proportion of beverage production and employment tends to be smaller than the share of foreign trade in all industries. After all, why carry water across the seas.

Since the Gambia imports beverages from Britain, Spain, Senegal and other countries, why should it not be able to export waters to those markets?

The answer is the lack of customers.

Gambian beverages of whatever description would scarcely appeal to consumers in the Mediterranean countries, a huge premium market. Even if they did, the cost leadership of competing sources would make small-scale production and export unprofitable.

British tourists as well as other visitors to the Gambia might be curious to try Gambian beverages, unless they are frightened by the stomach disorder called the Banjul Belly. But would they be likely to bring a new consumption item to the home country?
In Britain, the average consumer drinks annually some hundred litres of beer, 70 litres of soft drinks and two (2) litres of mineral water. Any Gambian entry would face formidable competition from the established suppliers.

<u>Abundant capacity</u>

As far as the neighbouring markets of West Africa are concerned, the tourists and expats likely to consume spring water are limited in numbers and spoiled by competition.

There are spring water bottlers in Senegal, Guinea-Conakry and the Canary Islands. One bottling plant in Sierra Leone has been closed. According to a Unido study conducted in 1990 in Niger, production capacity exists in

Nigeria, two plants
Burkina Faso, import ban
Algeria,

Benin,
Ivory Coast,
Togo (advanced project).

The dominating producers in Britain, France and Spain are shipping beverages to the Gambia by container loads. The goods can be re-exported to minor destinations.

Conclusions on markets

The domestic market in the Gambia for beer, soft drinks and mineral waters is well served and dominated by the existing bottling companies.

Even the export markets are saturated. The conditions of entry would be high volume, superior technology and a cost structure to allow low prices, low investment costs, high quality and agressive marketing.

The markets in terms of value

Domestic

In the domestic markets of the Gambia, the bottlers charge their customers
a brewery price excl. transport
a sales tax of 10 per cent
a wholesale price

The wholesale price is marked up at 7 per cent to arrive at the retail/consumer "total selling price".
One crate of Pepsi-Cola containing 24 bottles of 30 cl would cost
the brewery price of Dalasi 40.91-
the sales tax of 4.09-
the total wholesale price of 45.00-
the total selling price of 48.00-.

Beer would cost Dalasi 114.00- per crate.
The high price is protected by an import duty of 87 per cent on the value.

The retail value per litre is 14.47- for beer and 5.64- dalasis for Pepsi.
The mark-up on domestic beers and soft drinks is rather small since the bottlers are selling their premium brand products in large volumes, targeting the mass consumer market.

With agressive sales and promotion efforts combined with a wide distribution network, the two major suppliers have achieved a market share of over 80 per cent.

Imports

The prices of imported soft drinks and and mineral waters fluctuate widely even in homogeneous product categories. A case in point is the spring water, sold at different prices in one single outlet.

CFAO in Banjul October 1994:
PLASTIC BOTTLES 1.50 litres:Dalasis

French premium brand	14.40-
Dito	13.50-
Dito less known	10.00-
Dito/ Senegalese	7.90-

In the same shop, a British bottle of two litres cost 13.50.- for a private label. One litre of carbonated mineral water under a famous brand in a glass bottle cost 17.50-

The variations in prices may reflect different market forces:

- consumer preferences
- retail strategy aiming at stock turnover
- price wars
- need to fill price gaps
- offers from competing sources

Opportunity review

According to a local expert, a new entrant would have a chance to invade the market, "if it is properly done and the price is right".

On the other hand, a local brand might be met with some suspicion by the major customer group, i.e.the tourists and expatriates purchasing the goods in hotels/restaurants and supermarkets.

The strategy would have to be

- to build market share by offering competitive quality
- and availability at the expense of the imports
- and penetrating the outlets serving tourists and expats at the right prices.

IMPORT PRICES, dalasis per litre CIF in July-June

Year/season	1990/91	1991/92	1992/93
Beer	3.9-	4.4-	4.7
Soft drinks,mineral	4.9-	4.2-	5,7-

The statistics available with information about the period August 1993-June 1994 are not comparable with the figures from previous years since the new harmonized nomenclature has been adopted.

According to the breakdown of product categories, however, the import volume of beer in 1993/94 has gone down and the litre-price has gone up, while the litre-price of waters has gone down.

Since we do not have access to information of sales volume and value per product category, comparisons between domestic and imported products can only be attempted by lumping both beer and non-alcoholic beverages together.

	volume million litres	value million dalasis
Domestic	7.6	45.6
Imports CIF	1.7	9.5
Total	9.3	55.1

According to local calculations, the import value increased by 128 per cent from 1989/90 to 1991/92. During the same period, the number of air-charter tourists went up from 47 012 to 63 940.

Imported mineral waters accounted in 1991/92 for less than five per cent of the total beverage supply.

Introduction to a sales budget

The minimum economic capacity of a water bottling plant, which would allow for a year-round production, is according to experts and suppliers, in the region of 5 000 000 bottles of 1.5 litres each, that is 7 500 000 litres.

The total market for ALL BEVERAGES consumed in the Gambia is now 9.3 million litres for domestic and imported products.

The bottling plant in the Gambia would have to gain a market share of 80 per cent of the TOTAL MARKET in order to utilize the capacity.That is the share divided now by the two largest producers.

As we have pointed out earlier, a head-on collision with the major players is not to be recommended.

The markets for imported mineral waters may be easier to penetrate, but the volumes are low and the competition is extremely fierce. Even a dominant position in that market would not be enough to utilize the plant capacity.

The Tourist market in the Gambia

The number of tourists (charter flights) to the Gambia has doubled in the ten years from 1985 to 1994.
During the financial year July-June 1984/85, 45 862 charter tourists made holidays in the Gambia.Ten years later the number was 89 997.
The increase of British tourists was 150 per cent, their number went up from one half to two thirds.
The share of Scandinavian tourists is now up to 13 per cent and their number went up by 25 per cent.
The Germans are now the third largest group with a ten-year growth of ca 250 per cent, from 2106 to 7435 persons. A part of the German tourists travel to the Gambia on scheduled flights. The three largest groups account now for 89 per cent of the total.

In 1988/89, the number of fhotels was 18 and the corresponding amount of beds was 4 607.
In 1992/93 there were 30 hotels offering 5 760 beds.
The seasonal fluctuations have decreased, although the rains are concentrated in the period of July-September.
The annual occupancy rate (occupied beds as a percentage of beds available) is now about 50 per cent. There are ca two million nights for sale, the occupancy is more than one million nights.
There are plans for adding to the present capacity, but they are shelved for the time being Annexes 3-6

CHAPTER IV.

RAW MATERIALS AND SUPPLIES.

Raw Materials.

The production of wholesome, potable drinking water requires Water as the key raw material. However, the raw water must be treated, in order to make it potable, by physical and chemical means. The choice of treatment is dependent on the source and composition of the raw water, and the quality of final product desired.

In this project, raw water will be derived from an underground source (borehole) at TANJI farms in FARATO, some five miles South of the international airport.

The following are the general characteristics of all borehole water around the FARATO water table.

- Moderately acid, PH 4-5, requiring dosing with lime.
- Fairly low iron content, may require aeration and filtration.
- Low level microbial load, which requires dosing with chlorine.

Specifically the results of the analysis of the water ANNEX.7... undertaken at the GROUPE LABORATORIES DE LA DIRECTION DES MINES ET SE LA GEOLOGIE, DAKAR, SENEGAL confirm a low PH of 5.5, a low iron content, but unfortunately the microbiological analysis was not undertaken. However, the analysis would have to be repeated/vetted in a separate laboratory given the quality, nature of the sample of water taken to Dakar and the circumstances under which the sample was taken. When the sample was taken, it contained suspended, coloured solids, which upon submission to the laboratory the following day, had turned into orange-coloured precipitates of ferric particles.

There are three categories of water within acceptable limits for consumption in the Gambia, according to Water Resources, Hydromet. These are:

Class 1 type water, which is generally very light, naturally aerated, with a lot of gas.

Class 2 A little heavier than class 1; and generally considered as normal water taken by consumers, usually obtained through the process of natural filtration through sand or sand-clay structures. The water around FARATO falls into this category. It is generally believed that FARATO is in the heart of the water terrain and therefore has lots of water year round; with an insignificant rate of draw-down or depletion over the years.

Class 3 Heavier than class 2; taste and odour rather swampy.

These general characteristics not withstanding, the primary objective of the project is the production of Bottled Natural Spring Water, requiring no chemical treatment and class 1 type water would appear to fit into this category.

Class 1 type water is available further inland, and detailed work (Survey, feasibility studies, categorisation) is required to locate the source(s).

However, natural spring water has been located at SANKWIA (one and a half hours drive from Banjul) at a sandstone aquifer, 450 meters deep. The promoter would rather locate the factory at FARATO because of cost implications of moving to a distance far away from Banjul and the lack of the necessary industrial infrastructure at SANKWIA.

The quantity of water required is as follows:

-	Total liters required for bottling in 1996	1,650,000
-	Total liters required for rinsing of bottles	275,000
-	Plant sanitation (approximately 1,000liter/day x 200 operating days).	200,000
-	Toilets, washroom, canteen other facilities. (approximately 1,000 liter/day x 200 operating days).	200,000
-	Backwash of pressure sandfilter for 10min. daily at $4cm^3/hr$.	134,000
	TOTAL IN LITERS.	2,459,000

For the first year the total quantity of water required is about 2.5million liters.

Energy.

There is a shortage of power output from the municipal grid, although it is the policy of government to give priority in supply to industrial users. One of the recommendations of the Task Force on Industrial Policy, is to ease the cost of energy accessible to Industry, by lowering the price of fuel so as to stimulate industrial development. Farato Minerals will apply for a supply line from the municipal grid. However, this will be complemented by the installation at the factory site of a 250KVA generator, in addition to the 145KVA generator at the farm, to provide steady, uninterruptible power to the plant. Therefore a much higher portion of energy costs will arise from running the generators.

Total Energy Consumption.

Blow Moulding Unit	95 kw
Filling line	90 kw
Water treatment plant	5 kw
Service equipment (compressor etc)	10 kw
Lighting, Air Conditioning	10 kw
	210 kw.

Costs from the municipal grid as follows:

1 kw = 10 units

1 unit costs D2.54

Therefore 210kw = 2100 units x D2.54 = D5334/hr.

Running 8 hrs/day = D5334 x 8 = D42672.

Running 200days = D8,534,400

By comparison, running a 250KVA generator for 8hrs to provide electricity requires approximately

30 lits fuel/hr	=	240 lit/day
at 6D per liter	=	D1440
for 200 days production	=	D2880,000
Add 10% for maintenance	=	D 28,800
TOTAL	=	D316800

To run the 911 Benz routing truck requires about 200 liters of diesel fuel per week or 40lit/day. For 200 days,
40 x 200 = 8000liters diesel fuel.
At 6D/liter, this amounts to D48000.

To run the pick-up truck requires about 15 liters/day of petrol or 3000 liters/annum.
At 8D/liter, this amounts to D24,000.

The policy of FARATO minerals as far as energy supply is concerned will be to have sustainable power at all times. The policy will be a supply mix between the municipal grid and the factory's generators. Since it is cheaper to run the generators, the factory will rely 95% of the time on its own power source. Even a 5% dependence on the municipal grid costs about D386,080 to run the factory.

For economic reasons it will be cost effective to rely on power supply solely from generators, especially for an 8 hour operation/day .
Therefore, the cost of total energy required in the first year is
D316,800 + D48,000 + D24,000 = D388,800

For detailed cost estimates see Annex 8(2).

CHAPTER V.

LOCATION, SITE AND ENVIRONMENTAL ASSESSMENT.

Location And Site.

The promoter showed the team two sites, and both were evaluated on their merits. The first site is at TANJI farms in FARATO, some five miles South of the international airport and eight miles South of Serekunda, a major market town on the highway that goes to BRIKAMA and The FONI. Below are a few characteristics of the areas: TANJI FARMS:

The plot of land (about 50ha of farmland) is available and has already been acquired by the promoter.

Although there are no other factories in the area, manufacturing establishments are not prohibited.

The plot is large enough to accommodate the plant and allow for future expansion bearing in mind necessary truck entry and exit driveways, parking facilities for visitors and employees.

There are no unusual traffic hazards in getting on or off the route leading to the site. There is considerable space for warehousing and goods handling, distribution and efficient coverage of routes.

Although there is no public power supply on the farm, the promoter owns two generating sets with capacities 145KVA and 56KVA. These will reduce the initial value of capital investment for power.

There is the potential to contribute to the industrial development of FARATO. Most of the labour force are likely to live in and around FARATO if the factory is located there.

Production costs at FARATO are likely to be relatively low because labour is expected to be cheap around there.

The new factory will be able to pass on to its clients the cost savings which result from a locally manufactured rather than imported product.

The group considered another location at KANNIFING Industrial Estate. The site,approximately 7000m², is also the property of the promoter. The site is strategic in terms of its location within an existing industrial estate with the requisite infrastructure - electricity, water, good roads, transportation and nearness to the market and consumers.

However, the site is rather small, and offers no potentials for expansion.

A good determinant in the choice of the site is the presence of water, the critical raw material for the factory.

The borehole water at Kaniffing, even at 80-100m deep, has been found to be of low quality, and unsuitable for industrial use. Consequently, the site at Kaniffing was eliminated.

There is currently a 70m deep borehole at the farm in FARATO, supplying 60m³/hr. of water at full utility. The depth of the borehole is at the second aquifer generally considered to be the level where good quality water is available, as any attempt to drill the borehole further will lead to salt infusion, because the FARATO area is very close to the ATLANTIC OCEAN.

The general characteristics of the water are provided in chapter IV - Raw Materials and Supplies. Thus, it would appear that the site at FARATO is not a good source of underground spring water, as spring water requires no chemical treatment.

The authorities at the geological/hydrogeological departments in the Gambia have indicated that spring water is copiously available at the sandstone aquifer (450m deep) at SANKWIA - a location, one and a half hours drive from Banjul.

The promoter would rather stay at FARATO because of the cost implications of transportation, relocation etc.

The point should be made however that only TABLE WATER can be bottled at FARATO and not spring water, the quality attributes of which focus particularly on its NATURALNESS.

Further Developments.

If and when the decision is taken to source for underground spring water, the following basic steps will have to be taken at any given site.

(a) Site investigation:
Using geological surveys to provide information on soil and rock conditions or geophysical methods to provide some reliable subsurface information which must be complemented by a few calibration borings - using electrical resistivity and seismic techniques.

(b) Hydrogeological studies for underground borehole water at the project site, involving determination of appropriate location for the sinking of borehole to supply spring water.

(c) Test drilling of appropriate sites and determination of sub-soil and aquifer structure to sustain prolonged uninterruptable supply of water.

(d) Actual drilling to suitable depth and determination of static and volume of spring water from the aquifer.

(e) Physical, Chemical and Microbiological analysis of water.

Environmental Assessment.

The topography of the TANJI farmland at FARATO does not require that extensive grading and/or filling be done before it can be built on. It is a naturally draining land, and water from surrounding lots does not drain onto it.

There is a good, high gradient drainage system to take away used water.

An updated National Environment Management Act (1994) has been drafted for Government's consideration. The sections on Factory Siting, Factory/Industrial Act and other environmental related Acts are based on existing regulations or guidelines from UNEP.

Against this background, the water bottling plant is unlikely to have a high potential environmental impact, given a major raw material which is water - a natural product, which demands equally natural manufacturing conditions. Such conditions are void of heavy industry and its customary airborne waste. Strong, pungent odours can pollute the clean fresh taste of water and therefore nearby sites must be free of wastes and pollution so as not to jeopardise the product. For the moment, this risk does not exist.

During processing, the pollution load of the waste water on the environment is not a potential risk as chemical treatment will be minimal. The rinse water will also be recycled.

Sewer facility will have to be provided by the factory as no municipal sewer system is available, since the site is not yet an industrial area.

Noise pollution and its effect on employee health and safety is one of special concern within the plant - especially the bottle blowing section, refigeration and air compressors. Isolation of the refigeration and air compressors from the production area will eliminate one of the major sources of noise from the production line. Ear protection devices should be made available to those employees who must service these units in isolated areas.

An equally important environmental concern is defective PET bottles, preforms and caps. A good disposal system must be in place to cart them away to other plastic manufacturing companies to be recycled since they are not bio-degradable, and the promoter cannot at this stage, invest in the preform making plant.

CHAPTER VI.

ENGINEERING AND TECHNOLOGY.

(a) Production Programme:

The data used to establish the production programme is based on sales projections derived from the estimated market potential for the product. Given a total market volume of 9.5million liters/year for all beverages (beer, soft drinks, mineral water), and a relatively small and competitive market, a new product entering the market can only hope to capture about 10% share of the market or approximately 1 million liters in the first year. This is relatively small in terms of production volume and not enough to suitain production for any length of time. The figures below are optimistic assumptions in the hope that with aggressive marketing, the product will find a niche in the market place in the first year, and is expected to grow at an average rate of 15% per annum. Two sizes are proposed - the 1.5 liter for home and regular consumption, and the 0.5 liter for mass drinkers especially tourists. A competitive price cut on the 0.5 liter, it is hoped, will attract more consumers.

The table below shows the sales programme for five years. A fifteen year projection is unrealistic given the uncertainties and the difficulties in the economy.

(b) SALES PROGRAMME.

1.5 Liter	1996	1997	1998	1999	2000
Local Sales	700	800	950	1,100	1,200
Export	300	350	400	500	600
Total(bottles)	1,000	1,150	1,350	1,600	1,800
In Liters	1,500,000	1,725,000	2,025,000	2,400,000	2,700,000
0.5 Liter					
Local Sales	200	230	270	320	370
Export	100	120	140	160	190
Total(bottles)	300	350	410	480	560
In Liters	150,000	175,000	205,000	240,000	280,000
TOTAL LITERS	1,650,000	1,900,000	2,230,000	2,640,000	2,980,000

Average growth = 15% per annum.

C. PLANT CAPACITY.

The figures given under the sales programme represent the feasible normal capacity for one year under the prevailing economic conditions assuming an average rate of growth per year of 15%. For the fifth year of operation, this figure is about 3 million liters.

The normal maximum capacity corresponding to the installed capacity guaranteed by the manufacturer/supplier of the plant is 8.16m liters/year and is higher than the feasible normal capacity by about 270%, even in the fifth year of operation.

The minimum economic size plant however should require a plant capacity treating 2500 - 3000 liters/hr of water. This corresponds to 20 - 24cm^3 of water per 8 hour shift or a minimum of 4 million liters/year working 200 days without undue excessive capacity under-utilisation.

D. OPTIMUM TECHNOLOGY.

1. Water Treatment.

The choice of process technology depends mostly on the quality of raw water (e.g. level and type of impurities present), the flexibility of the technology to cope with seasonal/periodic changes in the quality of the raw water and the capital cost of the complete treatment plant along with unit operation costs necessary to deliver good quality water.

There are various water treatment processes including:

i. Process involving aeration of the water, filtration, chlorination, pH adjustment, alkanility reduction, filtration (secondary), dechlorination and micro filtration through special polishers.

ii. Distillation

Distillation is a process in which the water is heated and boiled in a closed container or still. Thus the water is converted into a vapour which is carried away from the still and condensed to distilled water. The unwanted minerals or other impurities are left in the still.

Where extremely high dissolved solids are present in the available water (e.g. sea water or brackish water), and an abundant supply of cheap fuel is available, distillation can be considered as a last resort. After the distillation process the distillate should be mixed with non distilled water to provide some taste and hardness.

iii. Ion Exchange

This unit is a chemical process with many variations and can be useful in certain locations where the available water supply has an unusually high alkalinity content or unusually high dissolved solids content. The simple and more common ion exchange process is called: "base exchange water softening". This process removes the calcium and magnesium hardness and replaces it with sodium, using common salt. The resulting "softened water" will not cause hard scale deposits and is useful for boiler water make-up treatment, bottle washing and equipment cleaning in the plant, although it has no value as product water.

The ion exchange process that have an application in Product Water Treatment are dealkalizing and demineralizing or deionizing.

The result is mineral free water. However, demineralizing equipment is expensive, and to be reliable requires either a high level of operator control or alternatively automated operation.

There are a number of practical adaptations of demineralizing for handling a variety of requirements, but in each case the process removes or reduces the dissolved mineral content in the water. The process does not remove or reduce any colloids, bacteria, organic matter, taste or odours. In fact, some of these types of contaminants will seriously affect the ion exchange resins and must be removed by a pre-treatment system to maintain efficient ion exchange operation. Where the total dissolved mineral content of a specific available water supply is excessively high, the demineralizing process can be useful as one component of a Product Water Treatment System. However, instrumentation for proper control and monitoring, the potential problems with the regenerant mineral acids and alkalis, and the disposal problem of the excess waste chemical must be evaluated carefully when considering these processes.

iv. Reverse Osmosis

This is a relatively recent process for reducing or removing an excessively high dissolved mineral content from water (even sea water) without heating. In practice, the process will desalt or demineralize up to 75% of the incoming water for product use, but the remaining 25% must be sent to drain.

The basis for this process is the use of selective synthetic semi-permeable membranes that operate at 27 to 67 atm. hydraulic pressure. These membranes are capable of passing water, but they reject dissolved minerals, other organic or semi-ionizable contaminants or bacteria that may be present.

As part of a properly engineered water treatment system, these Reverse Osmosis Membrane Modules operating at 27 atm. are capable of reducing the total dissolved mineral contents by 95%.

However, the membranes can become clogged and fouled by foreign substances found in natural water and sea water;

accordingly they must be carefully and completely protected by adequate pre-treatment equipment to maintain their efficiency and to prevent permanent damage. As the membrane modules are very expensive the degree of pre-treatment will depend on the condition of the available water supply, and could require one or more of the following component units:

1. sand and carbon bed filters;
2. sodium cycle water softener;
3. heat exchanger;
4. pH controlled acid feed and
5. even a coagulation unit where an extremely high level of dirt and organic matter are present.

In certain areas of the world where the only available water supply is extremely high in dissolved mineral content, the Reverse Osmosis process can be seriously considered as part of a complete system. However, the equipment and the total system is still expensive, is operated at a high hydraulic pressure and must be maintained carefully for continual efficient operation. Where the available water supply is scarce as well as extremely high in total dissolved minerals, the loss of 20 to 25% of the inlet water to sewer is also a consideration.

v. Electrodialysis

This is a process using selective synthetic semipermeable membranes, but it further requires direct current to reduce the mineral content from natural water, rather than high hydraulic pressures as in Reverse Osmosis. In many ways the electrodialysis process of desalting or demineralizing water has similar advantages and disadvantages to Reverse Osmosis. Electrodialysis does not remove turbidity, colloidal matter, iron, organic matter or bacteria.

These other contaminants must be removed by pretreatment or post-treatment equipment unit before it can be used as product water. Electrodialysis will remove up to 95% of the dissovled mineral content of highly mineralized water, but it may require several series to do so, depending on the level of mineral solids. As with Reverse Osmosis, appromximately 80% of the inlet water is delivered to product uses with 20% sent to drain.

Where the available water supply is high in mineral solids and electricity is inexpensive, this process could be incorporated in a water treatment system to deliver satisfactory product water. The high capital cost of the system, including all of the other treatment components necessary to deliver good product water, limits the application of this process.

Choice Of Water Treatment

The principal source of water to be treated and bottled at FARATO Minerals is from a borehole, 70 meters deep.

The characteristics of the water are as follows:

- low pH 5.5, requiring dosing with lime (chemical treatment)
- low level microbial load, requiring chlorination (chemical treatment)
- fairly low iron content, requiring aeration and filtration.

The characteristics of the water call for the conventional and most widely used system of chemically treating product/potable water namely chlorination - alkalinity reduction when required, filtration - dechlorination. It is the preferred inexpensive treatment process because it will deal with most of the contaminants found in almost all available water supplies.

It is a flexible system, capable of accommodating seasonal changes in the available water supply, and providing safe protection for the product under a wide variety of operating circumstances.

It is essentially an uncomplicated and straight forward system, therefore plant personnel require minimal training to understand, operate and maintain the water treatment plant on a shift basis to ensure that product water quality is suitable for good table water bottling. The cost of maintenance is expected to be lower than the equivalent cost for other technologies (distillation, ion exchange, reverse osmosis and electrodialysis). The technology has no adverse ecological or environmental impact. It is time tested and appropriate to the needs of the borehole water under consideration.

The characteristics of water from natural spring are such that chemical treatment (pH adjustment, chlorination, dechlorination) is not required. Water from natural spring is pumped through pressure sand filters and treated in Katadyn micro-filters to kill bacteria and further sterilized through UV light before filling into bottles.

Under the circumstances FARATO Minerals will be producing Table Water.

Brief Description Of The Process

Given the charasteristics of the borehole, the following basic steps are necessary in order to produce 8000 liters per hour treated water, as recommended by Central Bottling International, UK.

(a) Sand filter unit (complete with back wash facility)
(b) Resin filter unit (only required if iron content is a problem)
(c) In line chlorine dosing unit.
(d) 10,000 liters stainless steel stock tank.
(e) Alkaline dosing unit.
(f) K.D.F. filter (removes excess chlorine and kills bacteria) complete with back wash.
(g) Ozone treatment.

Physical Treatment

The process flow chart for the selected technology is given in fig 9. To ensure continuity of water supply, water is pumped from the borehole to an underground reservoir with capacity to hold up to 100 cubic meters. It may be necessary to subject the water to pretreatment involving aeration before the water is stored provided the iron content of the water is high. Aeration serves to oxidise the ferrous ions in the water to insoluble ferric ions which is easily filtered when pumping through the sand filter unit.

The sand filter unit removes all particulate matter from the water. To operate efficiently, the sand bed filter must be as clean as possible. Therefore the unit should be backwashed once a day or according to manufacturer's specification.
Backwashing loosens and scours the collected particulate matter from the sand grains. In addition, the rising backwash water breaks up any compressed areas that tend to form in the sand bed during the filtration operation. This maintains a loose, evenly grained and efficient sand-bed filter that will not develop cracks that could allow unfiltered water to short circuit the bed.

Following the backwashing operation, the sand bed should be rinsed with treated water, to settle the sand bed and flush out the subfill and underdrain system of the filter.

Chemical Treatment

In a low level reaction tank, the raw water will be chemically dosed in-line with chlorine to kill water-borne bacteria and with lime to adjust the pH from 5.5 to at least 7.2. The dosage required will be determined using a jar test initially and scaling up according to flow rates.

Filtration

The chemically treated water is subjected to another sand filter to remove any particulates remaining in the system.
Passing the water through a second sand filter allows additional contact time for the chlorine. From the second sand filter, the water is pumped into an 8000 liter storage tank.

However, if iron content is particularly problematic, a resin filter unit will be installed to remove residual iron.

Filtration Through K.D.F.Filter (KATADYN)

From the 8000 liter tank, the water is pumped through a K.D.F filter to remove excess chlorine and kill bacteria and other germs that may remain in the water.
The nett ex-works price for the above from Central Bottling International Ltd. UK is £42,000 (forty two thousand pounds sterling, including all pipework, pumps and electric controls necessary from sand filter to filter inlet.

Ozonization

The water passing through the Katadyn filter is further treated by sterilising with ozone at the rate of 2mg ozone/liter of water; as well as the rinse water for the bottles.

The nett cost of equipment ex-works is £26,520 (Twenty six thousand, five hundred and twenty pounds sterling.
Details are given in Annexes 10 & 11.

PACKAGING.

The major packaging materials are the bottles and caps with seals/ tamper proof device. There are two main types of bottles - the PVC and PET.(polyethylene therepthalate)

The unit cost of PVC bottles is less than that of PET bottles. PET bottles are however stronger, sturdier and will withstand stress/abuse in the market place. The production technology of PVC bottles is less complicated than that of PET bottles. Whereas in the production of PVC bottles, all that is required is PVC resin, the blow moulding equipment and moulds, the PET production assembly requires a preform making plant, the bottle making plant, and the PET raw materials. The unit cost of a 1.5 liter PET bottle is more than twice the cost of its equivalent PVC bottle.

The current trend however is that Europe is moving away from PVC bottles. This notwithstanding, it makes economic sense to recommend the PVC bottle because the investment cost in PET bottle production is usually about thirty to forty percent of the overall cost of investment of water bottling projects.
In addition, most of the brands of bottled water in the competitive market place in Banjul are packed in PVC bottles.

At this stage unfortunately, no meaningful quotation has been received from makers of Blow Moulding Machines for PVC bottles and there is no other choice than to use the quotation for PET bottle production.

Two suppliers - Central Bottling International Ltd (UK) and MAG - PLASTIC (Switzerland) supplied quotations for PET bottle production. Other suppliers are required to supply quotations for preforms and caps with seals.SIDEL (France) supplied a complete quotation - from water treatment to preform production, bottle blowing, filling and shrink wrapping lines. SIDEL's quotation at about USD 4m is too expensive for the level of this project. MAG - PLASTIC will only supply machinery for bottle blowing and no other support. This is not particularly encouraging for a promoter just entering the competition.

The technology package selected at this stage is from Central Bottling International whose quotation contained relevant information except the quotation for preforms and caps to be sourced from another supplier. For the level of operation the price is much cheaper than that of SIDEL. Moreover SIDEL's process does not provide for the adjustment of the pH of the water.

The Annex 12 shows the list of selected equipment, alternatives and their costs. The following comments are noteworthy:

- The quotation from Shannon Minerals (now International Drinks Corporation) is an old one dated January 29, 1994 and efforts to get the company to review/update the quotation have not succeeded. It is the only company that provided the quotation for a PVC bottle blowing equipment.

- George Stow PLC are UK based water engineers and contractors with representation in Banjul. Their quotation for a drilled cased borehole (65m) is about £35,510. The decision to drill a new borehole or repair the current one will be taken during preliminary activities for project implementation.

- SIDEL's quotation is a complete one - based on general characteristics of the water and not the detailed analysis which needs to be vetted. SIDEL's process gives no room for pH adjustment of the water and the process may have to be revisited. In any case, the quotation (especially for the PET bottle production) is the minimum economic size that SIDEL can offer.

  The investment cost of the project is given in table 13(2).

(g) OPTIMUM SCOPE OF CIVIL ENGINEERING WORKS AND ESTIMATED COSTS.

Preliminary Activities For Soil Qualities And Construction Suitability.

1. Site Investigation: Using geological surveys to provide information on soil and rock conditions or geophysical methods to provide some reliable subsurface information but must be complimented by a few calibration borings - using electrical resistivity and seismic techniques.

2. Hydrogeological studies for underground water, at the project site, involving determination of appropriate location for the sinking of borehole to supply water.

3. Test drilling of appropriate sites and determination of sub-soil and acquifer structure to sustain prolonged uninterruptible supply of water.

4. Actual drilling to suitable depth and determination of state and volume of spring water from the aquifer.

5. Chemical and microbiological analysis of water.

In addition to the preliminary activities for determining soil quality and construction suitability, the following activities will be undertaken by the civil engineering crew for the factory building.

- Design
- Foundation up to floor slab
- Steel works
- Floor slab
- Block wall
- Aluminium panel and grills
- Steel columns
- Roofing
- Carpentry and joinery
- Doors, windows

- Metal works
- Plumbing installation
- Electrical installation
- Finishing
- Floor
- Ceiling
- Walls
- Painting and decoration

Preliminary Plant Layout.

The factory will consist of several areas, each strategically positioned to serve a specific phase of the production process (ANNEXES 10 & 11).

The site covers a total area of $14,000m^2$; with an initial plant size of $2250m^2$ and a proposed expanded plant size of $3600m^2$ and consists of the following key areas:

- The borehole area, collection point (underground tank) and sand filter equipment outside the building.
- Water treatment area
- The bottle blow moulding room
- Bottle packing, casing line
- Cases storage
- Production material store (preforms, crowns, labels, carton, glue)
- Filling room (rinser, filler, capper and labeller)
- Quality control laboratory
- Workshop
- Offices for production staff
- General offices
- Locker and toilets for plant employees
- Canteen
- Truck loading, unloading and aisle space

Preferred Room And Area Physical Standards.

(a) Filling Room - "A clean room" within the production facility. In this area, the sterilized water is filled into bottles and capped - all equipment in the room is stainless steel - in compliance with good manufacturing practice expected in a food plant.

Floors: (a) 20cm(8") reinforced concrete stab typical.
(b) Quarry tile - acid proof grout and setting bed. Alternate brick paver quarry tile floor and base.
(c) Sloped to drains (2%).

Drainage: Spot drains.

Wall: Glazed ceramic wall tile full height of room. Alternate: glazed ceramic wall tile 2.44m (8ft) high above the finished floor, above tile, concrete block pointed up and painted with semi-gloss epoxy enamel paint up to finished ceiling.

Ceiling: (a) Suspended/hung ceiling, vinyl covered acoustical tile.
(b) Minimum height 3.05m (10ft), dependent on equipment.

Lighting: Flush mounted fluoroscent vapour proof type fixtures.

All electrical outlets shall be water proofed.

(b) General Work Areas

Floor: (a) 15cm to 20cm (6" to 8") reinforced concrete depending on weight of equipment-typical.
(b) Smooth troweled, dust free finish.
(c) Sloped to spot drains (2%) where applicable.

Drainage: Spot drains.

Walls: No particular finish - painting suggested.

Ceiling: Roof of structure.

Lighting: (a) Flourescent
(b) 538 lux (50 foot candles)

(c) Water Treatment Area

Floor:
(a) 15cm to 20cm (6" to 8") reinforced concrete floor typical.
(b) Smooth troweled, dust free finish.
(c) Sloped to sump drain.

Drainage:
(a) Sump drain for backwashing.
(b) Spot drain as required.

Walls: No particular finish - painted with semi-gloss epoxy enamel white paint.

Ceiling: Roof of structure.

Lighting:
(a) Flourescent, vapour proof type light fixtures hung from steel above.
(b) 538 lux (50 foot candles).

(d) Warehouse

Floor:
(a) 15cm (6") reinforced concrete slab typical
(b) 20cm to 25cm (8" to 10") reinforced concrete slab recommended for truck drive-thru areas dependent on weight of truck.
(c) Level floor in warehouse, smooth troweled, dust free.
(d) 1% slope of floor in truck drive-thru area.

Drainage:
(a) Covered channel drain in truck drive-thru area.
(b) Spot drain in warehouse flush with floor

Walls: No particular finish - painting suggested.

Ceiling: Unobstructed minimum (6.1m) 20' clear height.

Lighting:
(a) Flourescent
(b) 108 - 215 lux (10 - 20 foot candles)

(e) Office And Administrative Areas

Floor: (a) 10cm (4") reinforced concrete slab typical
(b) Vinyl asbestors floor tile

Drainage: As required by lavatories

Walls: Gypsum block, insulated stud partition with plaster board, or panelling.

Ceiling: (a) Suspended
(b) 2.5m to 3.05m (8ft. to 10ft.)

Lighting: (a) Flush type - flourescent
(b) 1076 lux (100 foot candles)

Services: (a) Water in lavatories
(b) Electrical - Convenience outlets as required.

(f) Quality Control Laboratory

Floor: (a) 20cm (8" reinforced concrete slab (depending on location in plant).
10cm (4") reinforced concrete slab also acceptable; quarry tile floor and base.

Drainage: As required by equipment

Walls: Gypsum block or insulated stud partition with plaster board.

Ceiling: (a) Suspended, acoustical tile, insulated.
(b) 2.5m to 3.05m (8ft. to 10ft.)

Lighting: (a) Flush type - fluorescent
(b) 1076 lux (100 foot candles)

Services: (a) Hot and cold water
(b) Treated water
(c) Electrical - Convenience outlets and lab bench bus-bar connection.

The summary of the bill of quantities, prepared under the supervision of the promoter is presented below. The project investment cost follows:

STILL WATER PRODUCTION PROJECT
SUMMARY OF BILL OF QUANTITIES
RE: FACTORY BUILDING AT FARATO

NATURE OF WORK	%	VALUE IN DALASI
Design	3.00	87,426.00
Foundation And Concrete Works	48.00	1,398,816.00
Roofing	13.00	378,846.00
Doors, Windows etc	8.00	233,136.00
Plumbing	6.00	174,852.00
Electricity	4.00	116,568.00
Tiling	9.00	262,278.00
Painting	5.00	145,710.00
Land Scaping	3.00	87,426.00
Other Works	1.00	29,142.00
	100.00	2,914,200.00

MATERIALS	D	=	2,039,940.00
WORKMANSHIP	D	=	874,260.00

VII.

ORGANIZATION AND OVERHEAD COSTS.

ORGANIZATION STRUCTURE.

The goals and objectives of the business are the production of bottled water of good and consistent quality.

The product is expected to satisfy consumer demand at all times, cost effective to produce and value for money.

In setting up the organigram (Annex 14) some comments are noteworthy:

- The business is small; the market is small, limited and highly competitive from imports of bottled water.
- The plant will be a new plant in the Gambia.
- To remain competitive and grow the new product must be of the highest quality. Therefore, the technology should be handled with skill and precision.
- Therefore personnel should be trained and knowledgeable.
- As a result of the small size of the business, personnel numbers/overheads are kept to a minimum economic size, with few people combining many functions.

The defined areas of activity within the organigram are as follows:

General Management.

The overall management of the enterprise will be the responsibility of the General Manager. He is also responsible for administration, personnel and finance, working with a Secretary/Bookkeeper, who is a few steps above the Supervisory level on the organigram.

Two officers reporting to the General Manager will be responsible for the line functions of Sales/Marketing and Production.

Production Officer:

The defined areas of activity within the overall production department include production, maintenance, warehousing, quality control, inventory and materials control. The production officer oversees the overall supervision of the aforementioned activities, with supervisors, manning the defined areas reporting to him. The responsibility of the production officer is to see that an effective line of communication exists between the various departments. The Sales and Marketing information is processed through the production officer into a production planning schedule which is then reviewed by all of the other personnel in the production meeting; with the production officer passing the information down to the line supervisor and the rest of his team.

Sales/Marketing Officer:

The Sales/Marketing Officer will be responsible for all sales and marketing activities such as:
area sales, export order handling, pricing, shipping forecasting etc., reporting to the General Manager. Given the small size of the plant and the initial hurdles in penetrating a small, highly competitive market, there is the need to evolve aggressive marketing strategy.

He will be assisted by a salesman, who will visit supermarkets and retail outlets, ensuring the products prominent display on the shelves. He will also be responsible for adverts. The salesman's remuneration will be based on commission on sales plus his salary.

Maintenance is a critical production support requiring the expertise of a highly specialized personnel. He will receive training before installation, during installation and in-service training, and will be responsible for:

- General maintenance
- Electrical maintenance
- Production machinery and plant
- Bottle blowing machinery and molds.

Inventory control, stores, purchasing and warehousing will be the responsibility of another supervisor reporting to the production officer. He is constantly monitoring both production and marketing to co-ordinate their activities, maintaining a constant line of communications to efficiently run the production, maintenance and marketing activities.

The Quality Control supervisor, reporting to the production officer, is responsible for product quality, safety, hygiene and standards including enivronmental issues. He monitors water treatment, oversees the laboratory, as well as packaging materials.

Overhead Costs

Assumptions

1. Factory Overheads

a. Wages And Salaries:

	Dalasi
Indirect labour:	
- Fitter/mechanic	4,200
- cleaner	4,200
- quality control	6,000
- fork lift driver	4,800
- driver	4,800
Production Officer	24,000
Production line supervisor	15,000
Quality control supervisor	12,000
Maintenance supervisor	9,000
	D84,000

b. Fuel:

- diesel foe electricity generator (25 KVA) (240lit/day at 6D/lit x 200 days)	288.000
- diesel for fork lift (30lit/day at 6D/lit x 200 days)	36,000
	D324,000

c. Stationery: conservative estimate

d. Depreciation:-

(10% of cost of equipment - 9,461,025D)	946,103
- fork lift (10% of 803, 850D)	80,385
- generator (10% of 1,212,300D)	121,230
	D1,147,718

e. Maintenance (5% of cost of equipment, fork lift and generator) D573,859

Maintenance includes the cost of spare parts, fuel, lubricants.

Overhead Costs

		Cost Estimate (Dalasi)
1.	Factory Overheads	
	Wages and salaries	84,000
	Factory supplies:	
	- fuel	324,000
	- stationery	5,000
	- depreciation on factory machinery, fork lift and generator	1,147,718
	Maintenance (5% of cost of equipment)	573,859
	Other factory expenses (1% of prime cost)	
2.	Administrative Overheads	
	Wages and salaries Depreciation	84,000
	Other administrative expenses (2% of sales Revenue)	
3.	Marketing Overheads	
	Wages and salaries Depreciation	45,000
	Other marketing expenses (3% of sales revenue)	

g. Other factory expenses include costs of detergents, sanitizers, soaps (for lubricating conveyor belts).

2. Administration Overheads

a. Wages and salaries

	Dalasi
- General manager	45,000
- Secretary/book-keeper	27,000
- Store-keeper	12,000
	D 84,000

b. Depreciation on the plant manager's car (10% of cost).

c. Other administration expenses include costs of communications, insurance, travel, taxation, utilities.

3. Marketing Overheads

a. Wages and salaries

- Sales/marketing officer	36,000
- Salesmen	9,000
	D 45,000

b. Depreciation

- truck (10%)
- pick-up van (10%)

c. Other marketing expenses include costs of communication, travel/motor vehicle expenses, public relations.

CHAPTER VIII.

HUMAN RESOURCES.

PERSONNEL.

About twenty five employees will be required to run the factory. The table below shows a breakdown of the personnel structure.

AREA	NO OF PERSONS.
General Management	3
Sales and Marketing	2
Production	7
Blow Moulding Machine (PET Bottles)	4
Maintenance	2
Quality Control/Packaging	2
Warehousing/Stores	2
Services (Cleaner, Fork lift driver, and driver)	3
TOTAL	25

The table below lists the number of personnel on a single shift as well as daily workers for each department and function.

DEPARTMENT	SHIFT	DAILY	TOTAL
GENERAL MANAGEMENT.			
General Manager	-	1	1
Secretary/Bookkeeper	-	1	1
Office attendant/asst.	-	1	1
			3

MARKETING.

Sales Marketing Officer	-	1	1
Salesman		1	1
			2

PRODUCTION.

Production Officer	-	1	1
Production Line Supervisor		1	1
Operatives	5	-	5
Blow Moulding Machine	4	-	4(2 per shift)
Maintenance	1	1	2
Quality Control/Packaging	1	1	2
Stores/Warehousing	1	1	2
Common Service	-	3	3
			20

TOTAL = 25.

MANNING LEVEL. (ONE SHIFT).

DIRECT LABOUR.		WAGES/MONTH(D)	WAGES/YEAR(D)
Bottle blowing	2	400	9600
Filling operator	1	500	6000
Labelling/Glueing	1	400	4800
Filled bottle Inspector	1	450	5400
Heat sealing	1	400	4800
Packing/Casing	1	400	4800

INDIRECT LABOUR.

Fitter/Mechanic	1	350	4200
Cleaner	1	350	4200
Quality Control	1	500	6000
Fork Lift Driver	1	400	4800

Driver	1	400	4800
			59,400.

MANNING LEVEL: STAFF.

	WAGES/MONTH(D)	ANNUALLY (D).
1. General Manager	3750	45,000
2. Sales Marketing Officer	3000	36,000
3. Secretary/Bookkeeper	2250	27,000
4. Production Officer	2000	24,000
5. Production Line Supervisor	1250	15,000
6. Storekeeper	1000	12,000
7. Quality Control Supervisor	1000	12,000
8. Maintenance Supervisor	750	9,000
9. Salesman	750	9,000
		D149,000

SKILLS REQUIREMENTS.

PRODUCTION OFFICER.

Responsibilities:

Directs and controls production activities to ensure that production meets required quantity, quality and cost effectiveness standards.

Manages the training and development of staff.

Reviews and analyzes production, quality maintenance and operational reports to determine the causes of non-conformity with established norms and goals.

Develops and implements operational methods and procedures to eliminate operating problems and improve product output.

Qualifications:

Technical education and a minimum of 5 years production management experience in the brewing or soft drinks industry and knowledge of bottling equipment.

Must be able to prepare budgets containing manpower and material requirements.

Must possess leadership abilities, expertise in oral and written communication and the capability to deal with people at all levels of responsibility.

Essential to have experience in the areas of production management and bottling/canning operations.

PRODUCTION SUPERVISOR/LINE SUPERVISOR.

Responsibilities:

Supervises the production line employees.

Directs equipment maintenance.

Monitors product and packaging quality.

Performs safety training and enforces safety procedures for line personnel.

Supervises housekeeping and employee practice program to meet sanitation standards.

Provides accurate and timely departmental reports.

Qualifications:

Technical education - at least 2 years production supervisory experience in soft drinks, brewing industry food production lines, or water treatment plants.

Must possess supervisory and people related skills.

Must be well versed in machine operation and maintenance.

Must be able to communicate both in oral and written form.

Ability to prepare and review production forms/reports and related material.

QUALITY CONTROL SUPERVISOR.

Responsibilities:

Supervises the quality control function.

Monitors and reports on product quality.

Ensures that all raw materials and finished goods meet quality standards.

Supervises staff members, responsible for water treatment, bottle blowing equipment, bottle quality, caps and seals and other packaging materials.

Manages housekeeping and sanitation procedures.

Oversees the laboratory records for all quality standards especially international quality.

Qualifications:

Three years experience in the food industry; soft drinks brewing or related industry, including supervisory/ people management experience.

Good knowledge of water treatment system.

Good knowledge of hygiene activities in the soft drinks or related bottling industry.

Must be able to communicate in written and oral form with all levels of management.

MAINTENANCE SUPERVISOR.

Responsibilities:

Superivses those involved in equipment and general plant building and facilities maintenance.

Ensures that proper preventive maintenance procedures are performed.

Ensures that proper records are kept on equipment and all maintenance activities.

Ensures an adequate spare parts inventory and supply.

Qualifications:

Must have at least 5 years of experience in the operation of bottling/canning line and auxilliary equipment.

Must have good oral and written communication skills.

Possess leadership qualities to direct and efficiently supervise a widely dispersed crew of technicians

Must have ability to read building, mechanical and electrical schematic diagrams.

STOREKEEPER.

Responsibilities:

Supervises staff.

Manages warehouse activities including: storing finished goods, raw materials and supplies; shipping and receiving; loading and unloading route and transport vehicles; controlling inventory and keeping records; inspecting incoming raw materials and supplies.

Manages the timely and orderly flow of product and materials through the bottling plant.

Qualifications:

Must have 5 years of warehouse management/supervisory experience, shipping and receiving documentation and scheduling.

Possess supervisory, oral and written communication skills.

Knowledgeable in distribution supervision.

Possess leadership qualities and be able to organize scheduled duties for warehouse personnel.

SALES/MARKETING OFFICER.

Responsibilities:

Responsible for overall marketing strategy, including brand positioning, product launch, advertising and pricing.

Responsible for strategic, tactical and distribution policy decisions.

Oversees market forecasts.

Monitors product performance including quality in the market place and the trade.

Assists Quality Control packaging to achieve category recognition, brand awareness and shelf presence to survive in the increasingly global marketplace of water bottling.

Qualifications:

A sound education (B.A. Marketing; MBA) with a minimum of 5 years management experience in the food drinks industry.

Must possess leadership abilities, expertise in oral and written communication and the capability to deal with people at all levels of responsibility.

A sound knowledge of the competitiveness of national and international marketing with regards to the evolution of the bottled water sector.

AVAILABILITY OF SKILLS REQUIRED.

(a) Managerial and supervisory staff.

The availability of management and supervisory staff is critical to the success of the project. With the literacy rate in the Gambia currently under 30%, the country suffers from an acute shortage of educated and skilled persons across the entire spectrum ot industrial activity. Enterpreneurs, managers, engineers, technologists middle and even lower level workers are lacking for modern activities. Therefore, the issue of personnel must be a top priority of management.

Given the nature and size of the business, the total number of managerial staff including supervisors is nine. It will not be difficult to appoint a General Manager, a Secretary/Bookkeeper and the Sales Marketing Officer as these can be employed from existing local companies, given the necessary incentives. In addition, their training requirements can be met locally.

As far as techncial staff is concerned, a good package of incentives must be offered to candidates especially those from local bottling plants to attract them to the job. In the absence of a similar operating plant in the Gambia, an aggressive recruitment drive will have to be undertaken, followed by a package of training related to good quality water bottling and good manufacturing practice.

(b) Labour (Skilled And Unskilled).

The three divisions of line personnel for the water bottling line are machine operators (a skilled position) machine tenders (Semi-skilled) and line labourers (non-skilled). Each position up to machine operator has more skills, abilities and responsibilities associated with it, requiring more training.

The most important or instrumental machine operator on the line is the filler operator who, not only keeps the filler running, but also runs the capper, watching and adjusting settings as necessary. The filler operator periodically performs quality control checks on the product, maintains the bottling line daily down time and production report.

The filler operator must have mechanical understanding, mathematical ability and an analytical mind.

The other machine operators on the line fall into a category together just below that of the filler operator. In operating the rest of the line equipment, the line crew members should ensure that their machines e.g. labeller, heat sealer are kept running and supplied with materials.

To employ a skilled filler operator, good incentives should be given to attract qualified personnel from existing brewery or the soft drinks company. On the other hand, someone with good basic education should be employed and trained.

TRAINING.

Training will be accomplished by several methods. These include :

MINIMUM TRAINING: When management staff already have sound knowledge of the job from previous positions. The minimum training will involve familiarization with the new facility, generally within one month preceding the start of production. Staff in this category are usually people from similar industries (i.e. food, soft drinks bottling, packaging) and they only need to become exposed to the new machine of a water bottling line.

IN-DEPTH TRAINING: At least two people - the main line bottling operator and the maintenance supervisor will be sent to the manufacturer or supplier for in depth training at least one month preceding installation and start up. This type of training will be valuable for preventive maintenance.

TRAINING ON-SITE. (During equipment installation, pre-start-up trials and start-up or commissioning). During this type of training, suppliers installation/ operation engineers can be helpful in answering questions and demonstrating procedures. This will further improve the technical knowledge and experience of the maintenance supervisor, his crew and the machine operators.

When the plant is fully staffed, training will continue after the start of production. The emphasis of such training will be on "Quality" which will be emphasised as everybody's business and the cornerstone of the success of the company in the market place. In particular, the Quality Control team will be trained to recognize critical control parameters to be monitored during production. Specifically, the training course for QC personnel will cover such areas as water treatment, water specifications, laboratory operations, bottling process, line process control, sanitation, specifications for Raw Materials, processes, Packaging material finished bottled water; peocess control via-a-vis production/maintenance; compliance with Regulations, Safety, Hygiene, Statistical Quality Control and Total Quality Management.

A quality control manual will be issued for the plant.

CHAPTER IX.

IMPLEMENTATION PROGRAMME AND BUDGETING.

The implementation process is divided into three phases:

- Pre - Investment Phase
- Investment Phase
- Operational Phase

The pre - investment phase started in April 1994 with opportunity studies (Marketing and Finance) and thoughts on company formation, organisation and equity participation. The promoter contacted Shannon Industries, Ireland, and negotiations are still on-going. The promoter proposes that the new company to be set up with Shannon participation will be known as FARATO Minerals. A £160,000 equity financing including loans is proposed as follows:

Global International Equity	-	£45,000
" " Loan	-	£30,000
Danco Equity	-	£55,000
Bank borrowing locally	-	£30,000

(Global International is the international arm of Shannon Minerals Limited while Danco Holdings Ltd. is the current Company of the promoter)

The foregoing are still on the drawing board and have not been legally sealed.

The investment phase will start based on the outcome of the feasibility studies and the investment climate of the Gambia. The investment will involve detailed arrangements for project financing - the negotiations and contracting to ensure the financial assets, and on the other hand, the construction of buildings, purchase installation of plant and machinery.

The investment phase will be followed by the construction period involving the following activities:

- Site preparation.
- Construction of buildings
- Installation of equipment.

At the end of the phase, the operational phase will begin with start-up of production.

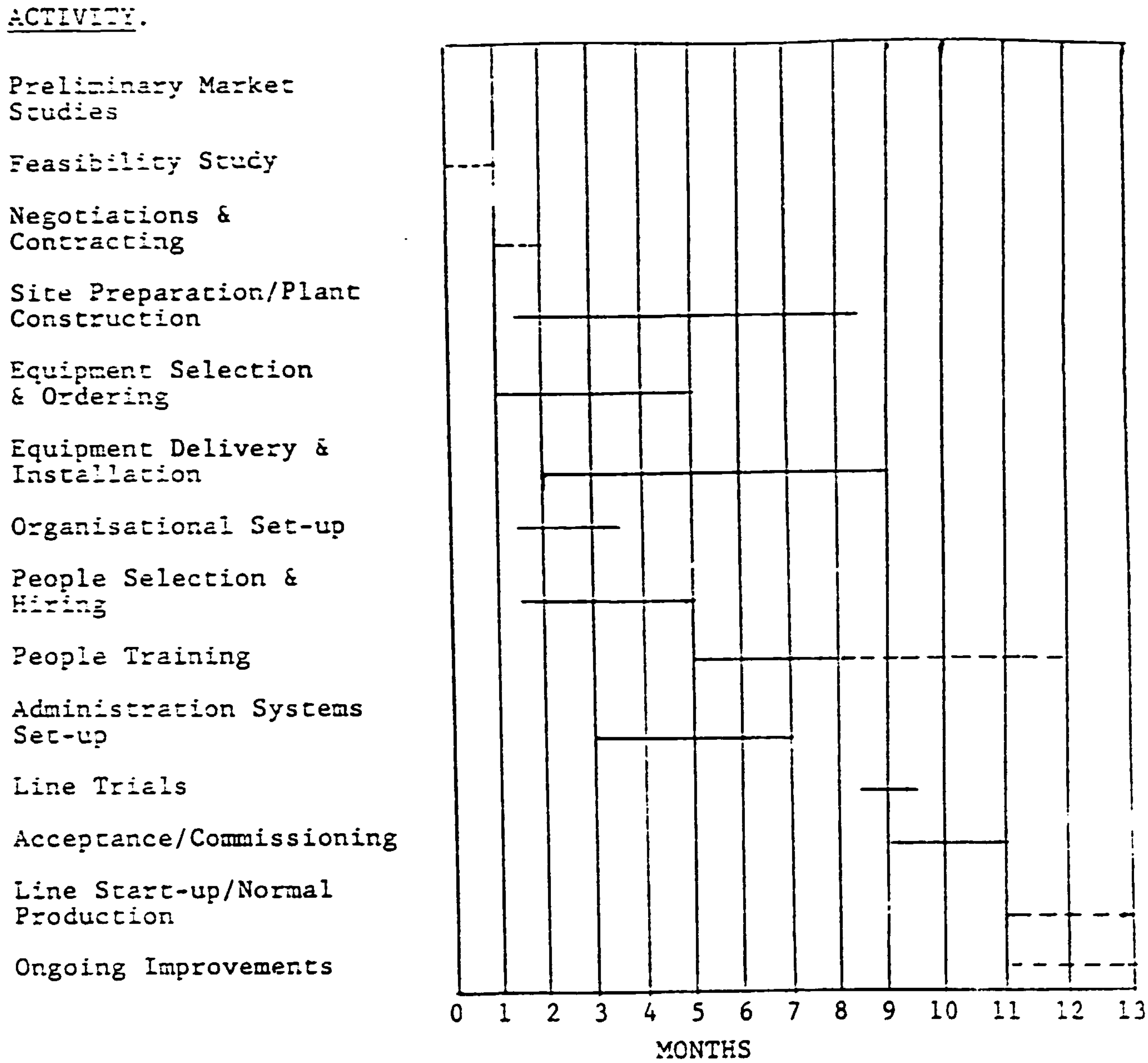
During the investment phase, the entire documentation for site preparation, ordering of plant and machinery civil works and plant erection will be elaborated. Equipment selection and ordering should begin early so as to allow the manufacturers enough room for delivery and installation.

During the organizational set up, the recruitment of human resources should be initiated. Given the manpower situation in the Gambia, it is critical to begin the people selection and hiring early in the process so that training can begin at a very early stage, and resources mobilized.

The first step to hiring is to define the job requirements. This would be formalised through the development of job descriptions.

To cut costs, the promoter has decided to personally supervise the various steps of the project. Therefore the need to c[illegible]ate a separate Project Management Team, does not [illegible]

IMPLEMENTATION SCHEDULE.



IMPLEMENTATION SCHEDULE.

ACTIVITY.	RESPONSIBLE PARTY.
Preliminary Market Studies.	Farato Minerals (FM).
Feasibility Study.	UNIDO
Negotiations & Contracting.	FM/Tech. Partner.
Site Preparation/Plant Construction.	FM, Tech. Partner.
Equipment Selection & Ordering.	FM, Tech. Partner.
Equipment Delivery & Installation.	Tech. Partner.
Organisational Set-up.	FM
People Selection & Hiring.	FM
People Training.	FM, Tech. Partner.
Administration Systems Set-up.	FM
Line Trials.	Tech. Partner, FM
Acceptance/Commissioning.	Tech. Partner, FM
Line Start-up/Normal Production.	Tech. Partner, FM
Ongoing Improvements.	FM

IMPLEMENTATION COSTS.

The cost of Installation, Commissioning and Training in operation and maintenance is £37,550 (D563250) for a team of four engineers from Central Bottling International who provided costs for capital equipment.

Added costs include local facilities during installation and start up for the engineers estimated at about D46200 (Hotel rate at D550/night for 21 days per engineer).

Other activities to be undertaken by the promoter include negotiations and contracting, equipment selection and ordering, organisational set up, people selection and hiring, administration systems set-up and ongoing improvements, conservatively estimated at D100,000.

Site preparation and plant construction are included in the costs of factory building. Thus the total budget for programme implementation is (D563250 + 46200 + 100,000) = D709450.

CHAPTER X FINANCIAL ANALYSIS AND INVESTMENT APPRAISAL

Concerning marketing and financial information from Gambian or foreign sources, the first major obstacles were

- the availability of sufficient amounts of preferably pure spring water

- the picture of demand and supply in the beverage industry and trade

The information had to be collected from suppliers to the international food and drink industry, predominantly the engineering companies. Understandably the main concern of those businesses was not to give objective data on the major cost factors or on the competitive scene in various markets. Their main interest was to help their clients invest the right amounts of the money available in the right (ie the suppliers') kind of machinery and equipment.

While "objective" information was hard to receive in the local and even the foreign public and private communities, the experts had to apply time-consuming methods of personal interviews an extensive correspondence even after the official project deadline.
It should be borne in mind that this study can only pass for a pre-feasibility investigation with the aim to establish whether further study in a near future can be justified.

The three following calculations

1. unit production cost, Annex 15
2. profit and loss statement, Annex 16 and
3 basic cash-flow analysis, Annex 17

can be seen as rudimentary evidence on the feasibility of the project at hand. The major conclusions are to be made as follows:

- the domestic market in the Gambia is too small to support another domestic bottling plant in the present competitive situation;

- the export markets are equally crowded with competitors disposing over abundant capacity;

- the minimum economic size of a bottling plant requires an investment cost ranging from 15 million to 40 million dalasis;

- the cost of (imported) packaging materials makes the variable margin vulnerable to competition from bottlers who can use their economics of scale to purchase cheaper components and gain cost leadership

- the cost of depreciation of the fixed assets exceeding 15 million dalasis plus the interest on borrowed capital is easily far too large to be carried by the operating income.

Alternatives explained

- sales first year 1 650 000 litres at D 3.50, same as average import price
- sales revenue (utilization of capacity and sales prices) decisive factor of profitability

- the alternatives are all very bold when viewed from the market, but very modest when it comes to the operating rate of capacity utilization

Alternative 1

- Alt 1 multiplies the present volume of imports - mineral, aerated waters - by 2.5, and alternative 2 doubles alt 1 and is doubled again by alt 3.

- the price per litre is reduced because of quality problems and the competitive situation

- the variable (direct) costs of packaging may be revised downwards, but that would require another round of quotations and negotiations

Alternative 2

- at a revenue growth rate of 15 per cent a year, the alternative 2 would require 6 years to double the revenue and to make a zero operational margin

- at 10 per cent annual growth of revenue, alternative 2 would require some 9 years to materialize

Alternative 3

- in order to reach the alternative 3 revenue of 23 000 000 dalasis, Farato would have practically to wipe out all imports of beverages (including soft drinks and beer) and a sizable part of the domestic production

General comments

It seems to be generally accepted by researchers and officials that sales curves and the corresponding financial ratios climb very quickly to a high level and stay there for another 12-15 years till the plant has returned the original investment. This is the world view of Unido manuals and studies.

No doubt this view can be right in many instances. But there are many cases with a different testimony. Capacities are often not economically utilized, because:

- raw material supplies are irregular;
- liquidity is short;
- maintenance is neglected;
- spare parts and components missing;
- sales are fluctuating;
- labour productivity is low;
- managers and owners lack of experience;

<u>Net cash flow negative for a long time</u>

As indicated in chapters III,IV and VI, a new enterprise in the Gambian market would have to start with

- high unit costs for materials
- low capacity utilization
- unproportionately high investment costs
- a debt/equity ratio adding to vulnerability
- a negative cash flow for far too many years
- fierce competition from domestic and foreign suppliers

The capital assets earmarked by the promoter and his would-be partners would be devastated rapidly during the first years when the costs would be maximized and the revenues minimized.The debt service would become very onerous since the variable and fixed margins would produce scant or no contribution towards payments required.

According to the calculation in Annex 17,a fairly rapid real growth of the main component of the cash inflow or the sales revenue, would only cover the costs in year 2004 with a very modest margin.

The main cost elements are the variable and fixed operating costs and the costs of financing. The return of investment would require profitable operations and a rapid turnover of the assets to be financially competitive with other projects.

In order to simplify the analysis, the team has computed the cost of investment and debt service as equal with depreciation. In 2006, ten years after starting the project, the cumulated cash flow would still be negative, to the tune of 2,3 million dalasis. It should be noted that the consultants have in their calculations based their reasoning on the assumption that sales would grow faster than the market. Recent history does not support these assumptions.

A comparison of the original scheme of equity financing with actual money flows indicates that the equity capital of £ 160 000 or 2.4 million dalasis would be lost during the first 2-3 years of operation.

Without infusions of fresh equity or long-term debt,the company would not be liquid enough to pay for the investment cost estimated to go up to at least 15 million dalasis.

Another practical consequence of the weak financial performance of the project would be the fact that the bottling plant would have to stand still for considerable periods during the initial years of operation.

Investment alternatives to consider

Together with the growth of imports in most industries, there normally occurs a diversification of the supply for sale. New product types and brands are struggling to identify and win customers. In spite of the simultaneous market concentration towards fewer and bigger dominating competitors, many smaller-share special products can invade small segments of the market.

As the project promoter has been looking for suitable investment partners, a thinkable solution might be to join forces with a company that has a proven record of launching successful product or packaging innovations in other markets.

Another concept would be to close long-term contracts with drink manufacturers and marketers to service different manufacturer and distributor brands on a subcontracting base. This would give the plant a better chance of continuity of operation and employment. The plant would sell bottling services and related materials to mineral-water and soft-drink distributors.

As has been pointed out before in this report, however, there is abundant capacity in the mineral waters and soft drinks manufacturing in West Africa.

In the industrialized countries of Western Europe, the tendency is to cut down the number of delivery points

(bottling plants and warehouses) and to increase the scope and the volume of the markets served. This requires large sums to be invested, but the result is a smaller cost per unit produced.

Since a new entrant in the market is likely to lack the resources of money and know-how to lead in this kind of development, the course most advisable is to seek cooperation with an organization possessing the experience and the international links needed.

ANNEX NROS:

1. LIST OF PERSONS INTERVIEWED
2. RECOMMENDATIONS
3. BEVERAGE IMPORTS TO THE GAMBIA
4. THE ECONOMY OF THE GAMBIA
5. ARRIVALS PER NATIONALITY
6. ARRIVALS PER MONTH
7. WATER ANALYSIS
8. ESTIMATED COSTS
9. PROCESS FLOW
10. PLANT LAYOUT
11. PLANT LAYOUT (PRELIMINARY)
12. LIST OF SELECTED EQUIPMENT
13. INVESTMENT COSTS
14. PROPOSED ORGANISATION STRUCTURE
15. UNIT COST CALCULATIONS
16. NET INCOME STATEMENT
18. FARATO, DISCOUNTED CASH FLOW

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ANNEX 1

The following persons were interviewed during the mission:

Ms. Beatrice Allen, UNDP programme assistant

Mr. Sako Mboge, NIPA, National investment promotion authority

Mr. Derek Clarke, George Stow & Co, Water engineers

Mr. Pierre Sarr, National marketing officer, Banjul Breweries

Mr. Balde, Management services, MSG water production dept

Mr. Toure, Office of the Chairman

Mr. Mel Johnson, Water resources, Hydromet

Mr. Sanyang, Ministry of Trader

Mr. Huberts, General Manager, Banjul Breweries

Mr. Blell, Soft drinks importer

Mr. Ranju Mandlik, Production manager, Chellarams (Coca-Cola)

Mr. Tunkara, Statistics division, Ministry of Finance and Economic Affairs

Mr. Malang, " "

Mr. Shammad " "

Mr. Durand, General manager, CFAO supermarkets

Mr. Kanj, Atson supermarket

Mr. Kuusela, private contractor

The General manager, SAEMS, Dakar, Senegal

Mr. Carlin, General manager, the Atlantic hotel, Banjul
Mr. A.B. Dandeh-Njie, Project promoter, Danco Holdings

ANNEX 2

RECOMMENDATIONS

1. The source of water and the quality characteristics should be established in greater details - physical, chemical and microbiological analysis so that the plant proposed is the most appropriate for the treatment of the water. At this stage, the report of the water analysis undertaken in Dakar should be repeated and all parameters necessary for a detailed diagnosis of the water firmly established.

2. Farato Minerals cannot lay any claims to producing natural spring water since the water from the borehole (70 meters deep) has to be chemically treated. The treatment does not necessarily jeopardise the quality of the water but aggressive marketing will be required to push it through the market. Natural spring waters require physical filtration and steriliztion systems.

3. Natural Springs are available in the Gambia, but at locations far away from Banjul. The cost of investment in exploring these is not attrative to the promoter at this stage. As and when the situation changes, steps to be taken to source the spring water are listed under section "g" - Engineering and Technology; Preliminary Activities for soil Qualities and Construction Suitability.

4. The most pressing constraint is packaging. It is available but very expensive and further work is required to get the most appropriate mix in terms of "minimum economic size package", especially for the production of PVC bottles. The quotation used in the studies was provided by a supplier of PET bottles and normally, the cost of production of PET bottles is much higher than that of PVC, and these high costs could throw the studies out of balance.

For calculation purposes, we have assumed that the factory price will be 5.- dalasis for a 1.5-litre bottle. If the producer settles for different quality like the table water treated in Farato, the price will have to be still lower.

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BEVERAGE IMPORTS TO THE GAMBIA

Source: The Central Office of Statistics

August 1993-June 1994 (new nomenclature)
22011 mineral, aerated waters

Country	1 000 D	1 000 kg	D/kg
France	755	313	2.4
Senegal	610	61	10.0
Spain	247	77	3.2
Holland	179	44	4.1
Belgium	177	72	2.5
Total	2 266	650	3.5

France, Senegal and Spain account for over 70 per cent of the total import value.

To arrive at the price per bottle, the kilo price has to be multiplied by 1.5. A 1.5-liter bottle costs thus 5.25- dalasis .
To arrive at trade prices, a customs duty of 10 per cent as well as a sales tax of 10 per cent must be added. The margin between the retail price and the brewery price in the case of the domestic product is appr. 15 per cent, including the sales tax. Import prices allow for higher margins, which means price cutting in both the wholesale and the retail trade.The importer pays the landed cost CIF plus the customs duty plus the sales tax.

If a 1.5-litre bottle of spring water costs e.g. 10.00- dalasis in the retail outlet, the margin between the retailer and importer/wholesaler prices can be 35-40 per cent. To penetrate these markets, a domestic producer would have to either cut his retail and wholesale prices or to offer the high margins but cut his producer price. Whatever pricing policy he will pursue his factory prices have to be competitive in relation to the import prices.

ANNEX 4

THE ECONOMY OF THE GAMBIA

statistics	1989	1993	index
GDP at constant			
Market prices(million D)	499.1	572.2	115
Per capita dalasis	577.7	564.4	98
Population 1 000 inhabitants	864	1014	117
Exchange rate D/USD	7.0	8.8	126
Consumer price index	373.7	784.6	210
Components of the GDP, 76/77 market prices			
Crop production in 1 000 D	85115	67746	80
Manufacturing	31635	34334	109
Construction	24901	30323	122
Trade	136313	158023	116
Hotels and Restaurants	20026	26039	130
Transport	44755	55777	125
Government income from			
Import duties	212928	353800	166
Sales tax	112420	238800	212
VA/hotels and restaurants current prices	70573	99160	141
Travel income (million D)	290	514	177

YEARLY NUMBER OF AIR-CHARTER TOURIST ARRIVALS BY NATIONALITY, 1989/90 - 1994/95

Nationality	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
British	26 901	33 192	32 247	36 298	61 062	
French	4 229	5 222	3 311	2 244	1 507	
Swedish	6 198	7 659	7 909	5 818	6 746	
Danish	2 336	2 901	2 499	3 406	2 903	
Finnish	217	287	1 976	1 536	993	
Norwegian	868	1 102	1 900	834	955	
German	4 322	5 338	8 061	7 138	7 435	
Austrian	122	174	267	193	376	
Swiss	250	293	2 546	773	761	
Italian	92	110	651	250	421	
Belgian	63	59	1 443	1 486	1 989	
American	350	407	328	626	697	
Canadian	99	113	116	292	171	
Gambian	102	119	455	308	601	
Other Africans	112	122	222	660	843	
Other nationalities	751	928	1 840	2 078	2 537	
Total	**47 012**	**58 026**	**65 771**	**63 940**	**89 997**	

Source: Central Statistics Dept; BANJUL

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COMPARATIVE NO. OF AIR-CHARTER TOURIST ARRIVALS IN THE GAMBIA, 1989/90 - 1994/95

Month	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
July	945	1 760	1 328	1 426	4 217	
August	937	1 584	1 561	2 110	3 725	
September	644	1 484	1 426	1 597	4 239	
October	1 380	2 348	2 911	3 684	5 795	
November	8 795	9 905	8 126	9 736	9 623	
December	8 122	9 594	11 098	9 278	12 786	
January	7 683	8 772	10 151	8 206	11 375	
February	5 493	8 046	8 776	6 731	10 398	
March	6 871	8 114	10 444	8 642	11 174	
April	4 666	4 776	6 608	5 950	8 073	
May	1 028	1 122	1 821	3 294	4 558	
June	448	521	1 515	3 286	4 034	
Total	**47 012**	**58 026**	**65 771**	**63 940**	**89 997**	
Average daily out-of-pocket expenditure per tourist (dalasi)	251,00	273,00	302,00	311,63		
Average duration of stay per tourist (days)	12,80	12,80	11,80	12,12		

Source: Central Statistics Dept; BANJUL

GROUPE LABORATOIRES
DE LA
DIRECTION DES MINES
ET DE LA GEOLOGIE
B.P. 268 - Tél. 22-52-78
DAKAR

Demande d'Analyse N° 001566

de M

Bulletin d'Analyse N° 92

Echantillons reçus au laboratoire

Echantillons envoyés le 03/11/94

Le 03/11/94 N° 32

Echantillon	Echantillon d'eau		ANNEX 7	
Date de prélève.	-			
P H	5,5			
Teneur par litre	mg	meq		
Cl^-	8,9	0,25	Conductivité en s	
SO_4^{--}	-	-	Oxygène dissous	
CO_3H^-	48,8	0,80	Oxygène cédé par KMnO4 (M.O.)	
CO_3^{--}	-	-	Silice ionique	
NO_3^-	3,0	0,05	Silice totale	
F^-	< 0,1	-	Bore	
P_2O_5			Aluminium	
			Cadmium	
Total anions		1,10	Manganèse	
Ca ++	3,2	0,16		
Mg ++	1,4	0,12		
Na +	14,9	0,65	INTERPRETATION DES RESULTATS	
K +	0,4	0,01		
NH_4 +	< 0,1	-	Eau de très bonne qualité chimique	
Fe	0,2			
Total cations		0,94		
Extrait sec	70			
Dureté	d°Fr	mmn		

A DAKAR, le 03 Novembre 94

Le Demandeur.

Le Chimiste.

M. SARR

A DAKAR, le 09 Novembre 19 94

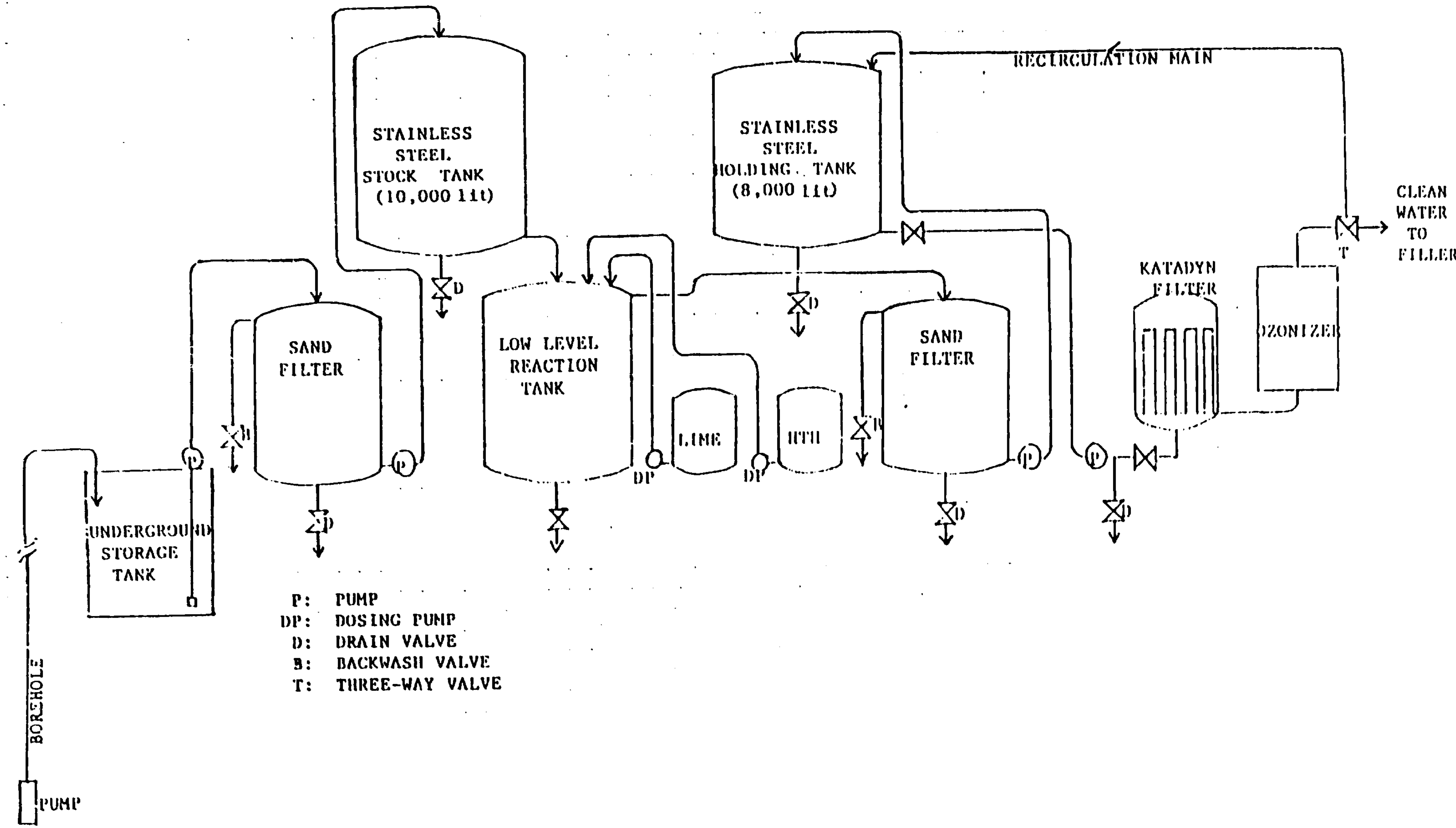
Le Chef de laboratoire

ESTIMATED COSTS OF AUXILIARY RAW MATERIALS AND SUPPLIES FOR YEAR 1.

(1.3 million bottles).

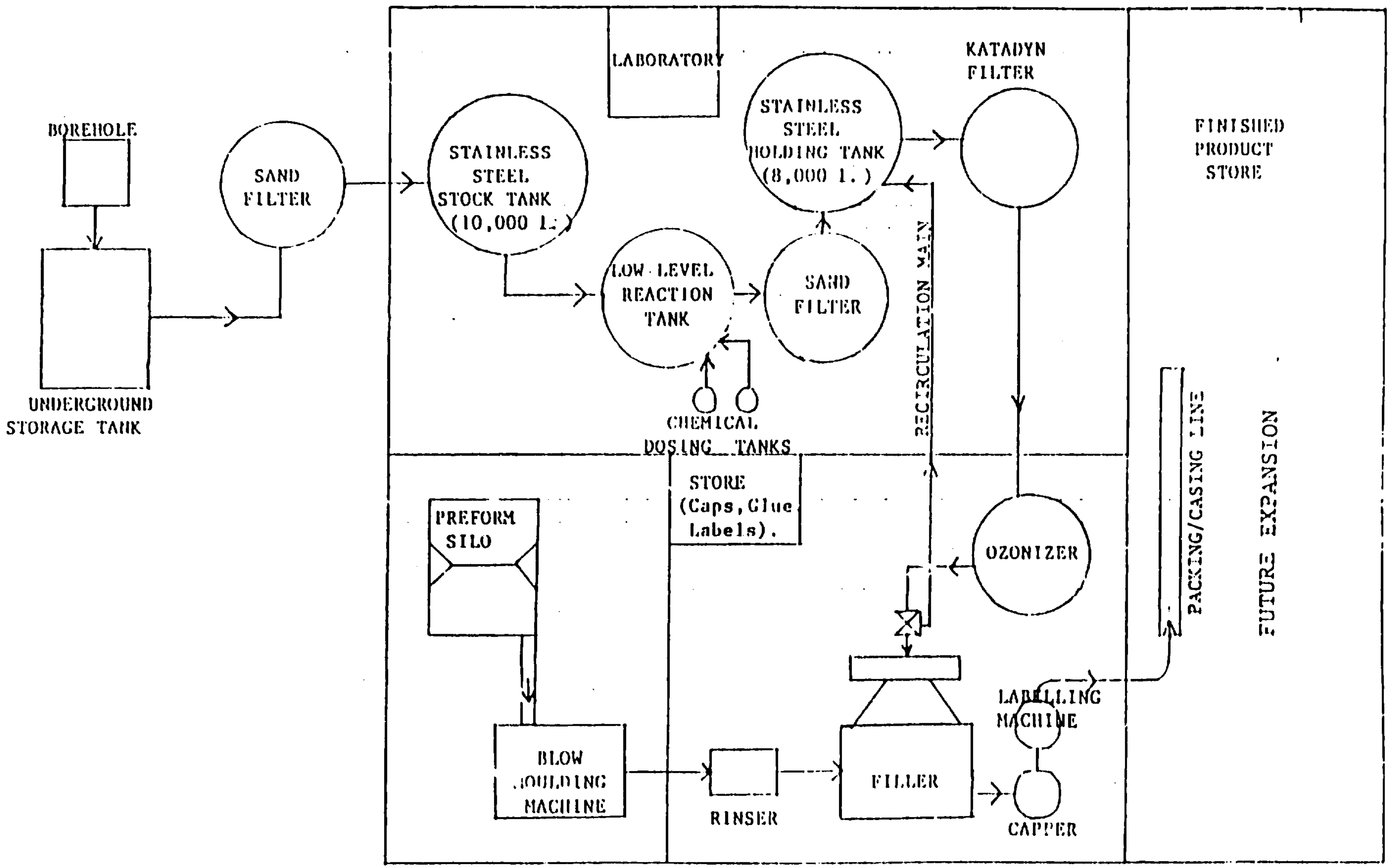
S/NO.	MATERIAL	SPECIFICATION	PACKAGING/ SOURCE	PRICE (BANJUL)	QUANTITY REQUIRED	ESTIMATED COST (D)
1.	CHEMICALS					
	(a) Hydrate Lime	White amorphous powder. Purity =90%. Not more than 10% $CaCo_3$	50kg bag. ICI, UK.	D200/bag	15kg	60
	(b) H + H	White granular substance, available chlorine 65 - 70%.	50kg, bottle ICI, UK	D329/ bottle	5kg	35
2.	PACKAGING MATERIALS					
	(a) PET bottles	1.5 & 0.5 liter capacity; shapes, bottoms and caps to be agreed with manufacturer/partner later.	To be imported; source to be agreed later.	1.8D/ bottle	1,300,100pcs	2,340,180
	(b) Caps with seals.	To fit PET bottles as in 2(a)	To be imported; source to be agreed later.	0.6D/pc.	1,300,500	780,300

ANNEX 9

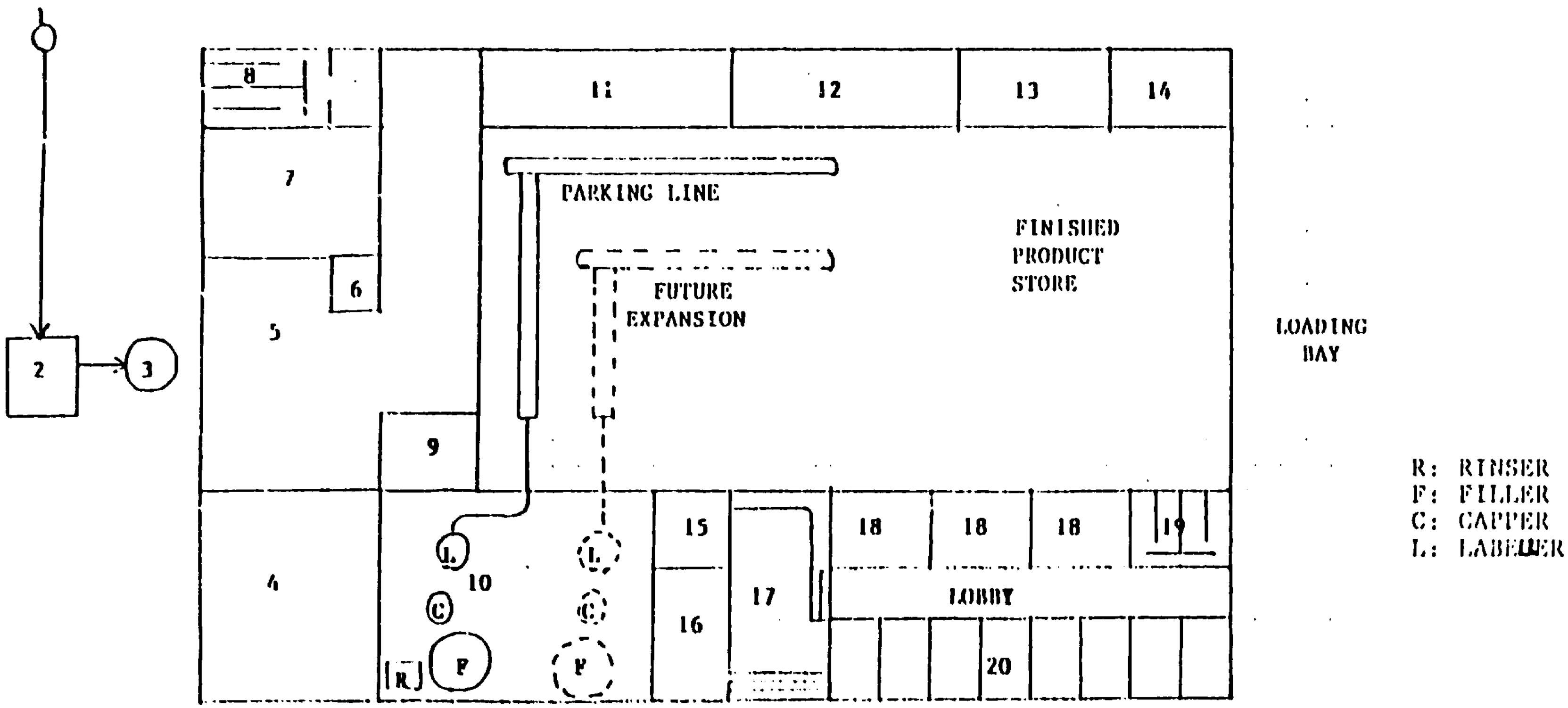


PROCESS FLOW FOR WATER TREATMENT AT FARATO (BOREHOLE DEPTH: 70 metres)

PLANT LAYOUT FOR MINERAL WATER BOTTLING PLANT



PRELIMINARY PLANT LAYOUT



1 BOREHOLE
2 UNDERGROUND TANK
3 SAND FILTER
4 BLOW MOULDER
5 WATER TREATMENT ROOM
6 ANALYSTS
7 WORKSHOP
8 TOILET/SHOWER/CLOSET
9 STORE (Caps, Labels, Glue)
10 FILLER ROOM (Rinsing, Filling, Capping and Labelling)
11 PLANT MANAGER'S OFFICE
12 LABORATORY
13 PRODUCTION SUPERVISOR
14 STORE KEEPER
15 KITCHEN
16 CANTEEN
17 RECEPTION
18 ADMIN. OFFICES
19 TOILET
20 PARKING SPACE

LIST OF SELECTED EQUIPMENT AND ALTERNATIVES WITH COSTS

EQUIPMENT	SELECTED	ALTERNATIVES			
	Central Bottling	Shannon Minerals	George Stow & Co	MAG PLASTIC	SIDEL
Water treatment	£42,000	-	£74,000	-	£282,180
Preform making	-	-	-	-	579,423
Bottle making	300,080	78,000	-	£346,859	321,667
Cap making	-	-	-	-	192,936
Filling line	192,085	45,000	-	-	382,320
Services/Auxillary	30,770	-	-	included in cost	308,525
Spare parts	11,500	-	-	included in cost	included in cost of each equipment
Electrical/Energy distribution	16,750	-	-	-	128,205
Installation, Commissioning and Training	37,550	21,000	12,000	-	316,026
CAPACITIES.					
Water treatment plant	8000lit/hr	-	10,000lit/hr	-	4,400lit/hr
Preform making	-	-	-	-	1,600b/h; 1.5lit
Bottle making	2500b/h 1.5lit PET	900b/h 1.5lit PVC	-	1800b/h 1.5lit PET	2,280b/h; 1.5lit PET
Cap making	-	-	-	-	2,265 caps/h
Filling line	2400b/h, 1.5lit 3000b/h, 0.5lit.	2400b/h, 1.5lit	-	-	2,280b/h; 1.5lit

Investment Cost	Dalasi	Dalasi	£	Source
Land: Already acquired				
Building (including design)		2,914,200	194,280	Mr. Dandeh - Njie
* Borehole (including pumps and accessories;)		532,650	35,510	G. Stow, UK.
* Transport equipment:				
- fork-lift (2.5 ton)		803,850	53,590	Afro Commerce, Nigeria.
* Laboratory equipment		479,750	31,990	SIDEL, France.
Plant machinery and equipment:-				
- Water treatment plant (8,000lit/hr)		630,000	42,000	Central Bottling, UK.
- Blow moulding equipment (2,500 bottles/hr x 1.5liters):				
- blow moulding machine	3,348,000			
- high pressure compressor	1,031,250			
- cooling unit	121,950			
		4,501,200	300,080	Central Bottling, UK.
- Filling line equipment:				
- conveyors	525,000			
- rinser (16 - head rinser)	292,500			
- filler/capper (2,400 bottles/hr x 1.5lit) (3,000 bottles/hr x 0.5lit)	1,387,500			
- Labeller	191,250			
- bottle and pack conveyors	396,000			
- bottle change parts	89,025			
		2,881,275	192,085	Central Bottling, UK.

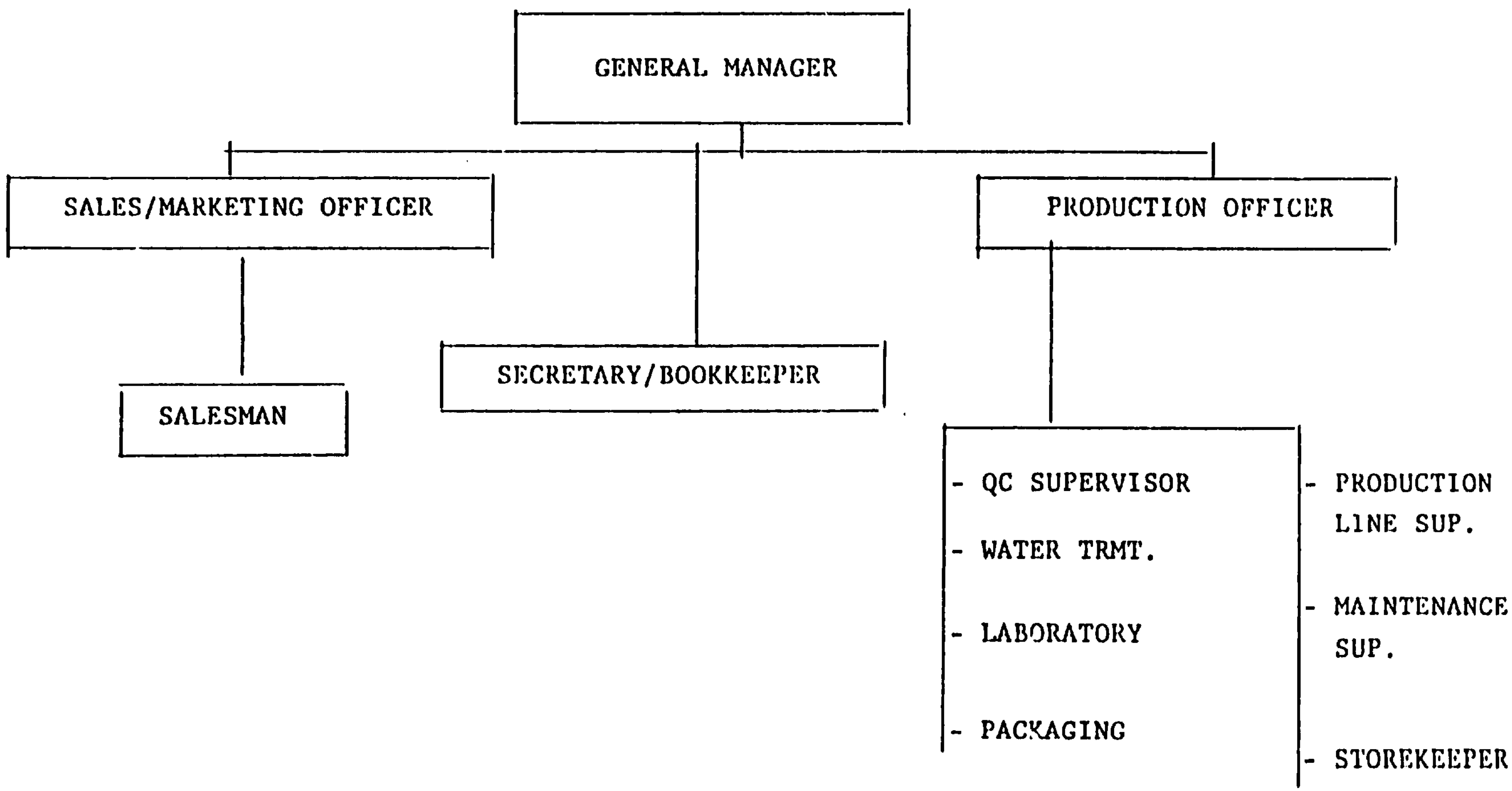
Investment Cost	Dalasi	Dalasi	£	Source
- General requirements:				
- ozone plant	397,800			
- low pressure compressor	63,750			
- Spare parts	172,500			
- electricals	251,250			
- installation, commissioning and training	563,250			
		1,448,550	96,570	Central Bottling, UK.
* - Electricity generator (250 KVA)		**(1,204,200)**	**(80,280)**	Lordmart (Nig) Ltd., Nigeria.
Furniture and fittings (office)		60,000	4,000	Gambia.
Pallets (100 at D 20)		2,000		Gambia.

* The sponsor presently owns the following transport equipment which he intends to employ in the proposed project:

- 1 No 911 Mercedes Benz truck
- 1 No pick-up van.

ANNEX 14

PROPOSED ORGANIZATIONAL STRUCTURE OF THE COMPANY.



ANNEX 15

UNIT COST CALCULATIONS

Computation of Production Cost: 1 000 dalasis

direct materials

a) Water, 1 650 000 litres	free
b) Packaging materials	
- bottles	2 340
- caps with seals	780
- labels	390
- glue	9
- cartons	1 151
- glue	8
total materials	**4 678**
- plus direct labour and expens	36
- factory overhead incl payroll,supplies,depreciation maintenance etc	2 180
total production cost rounded up	**6 894**
cost per litre in dalasis:	4,18

If the price per litre to compete with imported waters is set at 3.50- dalasis, the loss per litre will at this rate of production reach 0,68 dalasis.
The team has approached the revenue and cost items cautiously but in some cases even optimistically:

- rapid growth of sales volume and revenue
- there is no depreciation observed for the buildings
- the land owned by the sponsor; will the company buy/lease it?
- the generators and transport vehicles owned by the sponsor; what kind of arrangement?
- the equity capital reserved originally for the project (Chapter IX) must be considered modest when compared with the total cost of investment discussed in chapter VI.If a foreign or domestic partner can be identified, how would the project be financed?

ANNEX 16

NET INCOME STATEMENT, FARATO MINERALS

Thousands of dalasis

Alternatives	1	2	3
SALES REVENUE	5 775	2 x	4 x
Less variable costs:			
materiais, personnel,etc	4 713	2 x	4 x
VARIABLE MARGIN	1 062	2 124	4 248
% of income	18.4	18.4	18.4
Less fixed costs:			
material, personnel etc	2 180	2 180	2 180
OPERATIONAL MARGIN	(1 118)	(56)	2 068
Less costs of finance	1 500	1 500	1 500
PROFIT/LOSS	(2 618)	(1 556)	568

ANNEX 17

FARATO MINERALS, DISCOUNTED CASH FLOW

thousands of dalasis

INFLOW

	Construct		Production								
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
sales revenue			5775	6641	7637	8783	10100	11620	12782	14060	15686
groth rate % p.a.				15	15	15	15	15	10	10	10

OUTFLOW(investment calculated in depreciation of machinery)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Costs	-	-	6893	7599	8411	9345	10419	11654	12601	13643	14789
Net cash flow	-	-	(1118)	(958)	(774)	(562)	(319)	(34)	181	417	897
Accumulated	-	-	(1118)	(2076)	(2850)	(3412)	(3731)	(3765)	(3584)	(3167)	(2270)

In a situation where old trend curves cannot be converted into reliable sales forecasts, the experts agree that the Gambian market is now too small and too crowded to create a sound financial base for a domestic bottling plant for mineral waters and soft drinks.