

67. PROFILE ON SILVER RECOVERY

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I. SUMMARY

This profile envisages the establishment of a plant for the recovery of silver from the waste produced during photograph film processing with a capacity of 50 kg per annum. Silver is shining white metal used for ornaments, coins, utensils, etc.

The country's requirement of silver is met through import. The present (2012) demand for silver is estimated at 645 kg. The demand for the product is projected to reach 1,382 kg and 2,226 kg in 2020 and 2025, respectively.

The principal raw materials required are wastes produced during processing of film such as hospital/ clinic x-ray & industrial x-ray, sonography, photo studio etc. which are available locally.

The total investment cost of the project including working capital is estimated at Birr 1.17 million. From the total investment cost, the highest share (Birr 964.45 thousand or 82.04%) accounted by fixed investment cost followed by pre operation cost (Birr 178.72 thousand or 15.20%) and initial working capital (Birr 32.39 thousand or 2.76%). From the total investment cost Birr 45.34 thousand or 3.86% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 32.40% and a net present value (NPV) of Birr 1.33 million, discounted at 10%.

The project can create employment for 5 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Silver is shining white metal used for ornaments, coins, utensils, etc. Sources of silver include; silver mined directly, silver mined as a by-product of gold, copper, lead and zinc mining, and silver extracted from recycled materials, primarily used photographic materials.

The demand for silver comes primarily from three areas; industrial uses, jewelry and silverware, and photography. These industries represent 95 percent of annual silver consumption. Silver's superior properties make it a highly desirable industrial component. Silver's artistic beauty and status make it one of the most romantic and sought after precious metals.

Diversity is silver's primary asset. Its unique properties include beauty, strength, sensitivity to light, malleability and ductility, electrical and thermal conductivity, reflectivity and the ability to endure extreme temperature changes. These properties allow groundbreaking research to be conducted by scientists and engineers that affect the way we live.

Silver more than other precious metals, has significant demand rooted in sectors as diverse as imaging, electronics, jewellery, coinage, superconductivity, silver paints, silver batteries (as watch batteries), silver catalyst; brazing alloys (silver-copper), mirrors, dental amalgam, silver nitrates as antiseptics, etc. water purification. For this reason, silver is no longer known as just a precious metal, a store of value, a work of art or an industrial metal. It is all of these. Today silver is indispensable, working all around us to improve the quality of our lives

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Silver (Ag), is one of the precious metals having a wide range of applications. It conducts heat and electricity better than any other metal. Silver has been known and valued as an ornamental and coinage metal since ancient times. With the exception of gold, silver is the most malleable and ductile of all metals. It is harder than gold but softer than copper. In addition to its ornamental value it is used for silver paints, silver batteries (watch battery), brazing alloys, mirrors, dental amalgam, etc.

Due to its wide applications and limited supply, it is highly demanded all over the world. Despite its wide application and wide market, Ethiopia does not produce the product. As a result the country's requirement for silver nitrate is met through import. The amount of silver nitrate imported during the period 2002--2011 is presented in Table 3.1.

Table 3.1
IMPORT OF SILVER NITRATE (K.G)

Year	Import
2002	82
2003	530
2004	72
2005	249
2006	511
2007	585
2008	406
2009	710
2010	639
2011	585

Source: - Ethiopian Revenue and Customs Authority.

The import data provided in Table 3.1 is highly erratic ranging from 72kg to 710kg. However, the county was importing about 645 kg of silver nitrate per annum in the recent three years (2009-2011). Hence, this could be taken as a faire approximate of the present (2012) effective demand for the product.

2. Demand Projection

The domestic demand for silver nitrate is influenced by economic development. GDP of the country is expected to grow at an average annual growth rate of 11.2% during the GTP period (2011 – 2015). However, in order to be conservative a growth rate of 10% which is slightly lower than the expected growth rate of GDP during the GTP period is used to project the local demand for silver nitrate. Accordingly, the projected demand for silver nitrate estimated on the basis of the above assumption and using the estimated present demand as a base is presented in Table 3.2.

Table 3.2
PROJECTED DEMAND FOR SILVER NITRATE (KG.)

Year	Projected Demand
2013	709
2014	780
2015	858
2016	944
2017	1,039
2018	1,142
2019	1,257
2020	1,382
2021	1,520
2022	1,673
2023	1,840
2024	2,024
2025	2,226

However, it has to be noted that if the hypo solution (from which silver nitrate is to be extracted) is available the market in the international market is very wide.

3. Pricing and Distribution

Based on the current international price of the product, an ex- factory price of Birr 18 per gram is recommended. The product can be sold directly to the end users.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

The annual production capacity of the plant, working 8 hours a day (single shift), and 300 days per annum is recommended to be 50 kg of silver taking into consideration the existing demand and the availability of the hypo solution . However, production can be increased by introducing additional shifts of operation as far the hypo solution is available.

2. Production Program

The production programme is scheduled in such a way that the plant operates at 75% and 85% of the installed capacity during the first and second year, respectively, and at full capacity on the third year and thereafter. The production programme is set by deducting Sundays and public holidays in a year and assuming that machine repair and maintenance will be carried out during off-production hours.

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

The major raw materials required for recovery of silver are the waste/recycled materials and hypo solution. The overall sources of these materials and their yield rate is tabulated in The 3.1. A minimum quantity of silver estimation paper is also required.

Table 3.1
SOURCES OF RAW MATERIAL & SILVER CONTENT IN FIXER SOLUTION
(APPROX.) PER LITER

Clinic X-Ray & Industrial X-Ray	3 to 10 gms/ltr,
Sonography	3 to 10 gms/ltr,
Photo Studio (Black & White) Hypo	1 to 2.5gms/ltr,
Offset graphic film processors	6 to 20 gms/ltr,
Block Makers -	2 to 3 gms/ltr,
Color Bleach -	2 to 5 gms/ltr
Color LAB, Color Fixer	3 to 8 gms/ltr
CD Developer Solutions:	0.5 to 2 gms/ltr

The annual cost of these raw materials is Birr 46,720, out of which Birr 18,000 will be required in foreign currency.

B. UTILITIES

The total installed electric power of the plant (automatic machine for silver recovery) is 0.5 kW. Annual consumption of electric power for a single shift operation of the plant is 1,200 kWh, and total estimated cost of electricity is Birr 1,096. The water consumption of the plant is very minimal and the cost to be incurred is negligible.

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The process of silver extraction from the waste hypo solution involves two methods and the operations of the two are briefly stated below.

➤ **Chemical Processing**

- ✓ Take fixer solution.
- ✓ Estimate gm/litter of fixer solution using silver estimation paper.
- ✓ Take 1 litter of solution and add approximate amount of sodium sulphate.
- ✓ (Na₂S) and caustic soda (NaOH), due to common ion effect silver cannot be removed from it.
- ✓ Using the proper proportion as per the upper estimation add proper amount of sodium sulphide and caustic soda to all the solution.
- ✓ Get a black residue at bottom due to reaction and the solution at the top becomes yellow in colour. Filter the solution and retain the black residue.
- ✓ Dry the residue using filter paper. Get it melted and molded. While melting we can use borax/Na₂CO₃/CaCO₃ etc. at last shiny silver is recovered from black silver residue.

➤ **Electrolysis Method**

- ✓ Condition the electrolysis machine.
- ✓ Use anode as carbon or graphite and cathode as stainless steel plate.
- ✓ Filling the waste solution to the machine and connect electricity.

- ✓ Silver present in the solution starts depositing on cathode

The machine should be operated till all the silver present in the solution gets deposited on cathode plates as black flakes.

From the two methods of recovery/extraction, the automatic machine based on electrochemical process is found to be economical. The concentration of silver in the solution is checked in grams per litre with the help of silver estimation papers within 15 seconds.

The waste hypo solution is fed to the machine. A 500 grams/day capacity machine has a maximum tank capacity of 75 litres and electric load of 300 watts. The silver is recovered and collected after specified time period. Silver extracted through this process is directly marketable.

2. Environmental Impact

The recovery process does not have any adverse impact to the environment.

B. ENGINEERING

1. Machinery and Equipment

Major plant machinery and equipment required for silver extraction are the silver extraction plant, packing & sealing machine, and storage tanks for hypo (PVC, 1,000 litres). The total lump sum cost of machinery and equipment is estimated at Birr 60,455 out of which Birr 45,341 will be required in foreign currency.

2. Land, Building and Civil Works

Total land requirement of the plant is estimated to be 150 sq. metres. Total requirement for built-up area is estimated at 75 sq. metres. Cost of building at the rate of Birr 5,000 per metre square is estimated at Birr 375,000.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 721/2004) in principle, urban land permit by lease is on auction or negotiation basis, however, the time and condition of applying the proclamation shall be determined by the concerned regional or city government depending on the level of development.

The legislation has also set the maximum on lease period and the payment of lease prices. The lease period ranges from 99 years for education, cultural research health, sport, NGO , religious and residential area to 80 years for industry and 70 years for trade while the lease payment period ranges from 10 years to 60 years based on the towns grade and type of investment.

Moreover, advance payment of lease based on the type of investment ranges from 5% to 10%.The lease price is payable after the grace period annually. For those that pay the entire amount of the lease will receive 0.5% discount from the total lease value and those that pay in installments will be charged interest based on the prevailing interest rate of banks. Moreover, based on the type of investment, two to seven years grace period shall also be provided.

However, the Federal Legislation on the Lease Holding of Urban Land apart from setting the maximum has conferred on regional and city governments the power to issue regulations on the exact terms based on the development level of each region.

In Addis Ababa, the City's Land Administration and Development Authority is directly responsible in dealing with matters concerning land. However, regarding the manufacturing sector, industrial zone preparation is one of the strategic intervention measures adopted by the City Administration for the promotion of the sector and all manufacturing projects are assumed to be located in the developed industrial zones.

Regarding land allocation of industrial zones if the land requirement of the project is below 5,000 m², the land lease request is evaluated and decided upon by the Industrial Zone Development and Coordination Committee of the City's Investment Authority. However, if the land request is above 5,000 m² , the request is evaluated by the City's Investment Authority and passed with recommendation to the Land Development and Administration Authority for decision, while the lease price is the same for both cases.

Moreover, the Addis Ababa City Administration has recently adopted a new land lease floor price for plots in the city. The new prices will be used as a benchmark for plots that are going to be auctioned by the city government or transferred under the new "Urban Lands Lease Holding Proclamation."

The new regulation classified the city into three zones. The first Zone is Central Market District Zone, which is classified in five levels and the floor land lease price ranges from Birr 1,686 to Birr 894 per m². The rate for Central Market District Zone will be applicable in most areas of the city that are considered to be main business areas that entertain high level of business activities.

The second zone, Transitional Zone, will also have five levels and the floor land lease price ranges from Birr 1,035 to Birr 555 per m². This zone includes places that are surrounding the city and are occupied by mainly residential units and industries.

The last and the third zone, Expansion Zone, is classified into four levels and covers areas that are considered to be in the outskirts of the city, where the city is expected to expand in the future. The floor land lease price in the Expansion Zone ranges from Birr 355 to Birr 191 per m² (see Table 5.2).

Table 5.2

NEW LAND LEASE FLOOR PRICE FOR PLOTS IN ADDIS ABABA

Zone	Level	Floor
Central Market District	1 st	1686
	2 nd	1535
	3 rd	1323
	4 th	1085
	5 th	894
Transitional zone	1 st	1035
	2 nd	935
	3 rd	809
	4 th	685
	5 th	555
Expansion zone	1 st	355
	2 nd	299
	3 rd	217
	4 th	191

Accordingly, in order to estimate the land lease cost of the project profiles it is assumed that all new manufacturing projects will be located in industrial zones located in expansion zones. Therefore, for the profile a land lease rate of Birr 266 per m², which is equivalent to the average floor price of plots located in expansion zone, is adopted.

On the other hand, some of the investment incentives arranged by the Addis Ababa City Administration on lease payment for industrial projects are granting longer grace period and extending the lease payment period. The criteria are creation of job opportunity, foreign exchange saving, investment capital and land utilization tendency etc. Accordingly, Table 5.3 shows incentives for lease payment.

Table 5.3
INCENTIVES FOR LEASE PAYMENT OF INDUSTRIAL PROJECTS

Scored Point	Grace Period	Payment Completion Period	Down Payment
Above 75%	5 Years	30 Years	10%
From 50 - 75%	5 Years	28 Years	10%
From 25 - 49%	4 Years	25 Years	10%

For the purpose of this project profile, the average i.e. five years grace period, 28 years payment completion period and 10% down payment is used. The land lease period for industry is 60 years.

Accordingly, the total land lease cost at a rate of Birr 266 per m² is estimated at Birr 39,900 of which 10% or Birr 3,990 will be paid in advance. The remaining Birr 35,910 will be paid in equal installments within 28 years i.e. Birr 1,283 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

Total human resource requirement of the plant is estimated to be 5 persons. Table 6.1 depicts details of the manpower requirement and the related cost estimates.

Table 6.1
HUMAN RESOURCE REQUIREMENT AND LABOR COST

Sr. No.	Position	Req. No.	Salary (Birr)	
			Monthly	Annual
1	Manager/supervisor	1	4500	54,000
2	Accountant/typist	1	1250	15,000
3	Operator/production worker	2	2000	24000
4	Driver	1	1000	12000
Sub- total		5	8750	105,000
Employees' Benefit (15% of Basic Salary)			870	15,840
Total			5,120.00	121,440

B. TRAINING REQUIREMENT

The project does not need a special training as such and no training costs would be incurred by the plant.

VII. FINANCIAL ANALYSIS

The financial analysis of the silver recovery project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity & 70% loan
Tax holidays	3 years
Bank interest	10%
Discount cash flow	10%
Accounts receivable	30 days
Raw material local	30 days
Work in progress	1 day
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days
Repair and maintenance	5% of machinery cost

A. TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 1.17 million (see Table 7.1). From the total investment cost, the highest share (Birr 964.45 thousand or 82.04%) accounted by fixed investment cost followed by pre operation cost (Birr 178.72 thousand or 15.20%) and initial working capital (Birr 32.39 thousand or 2.76%). From the total investment cost Birr 45.34 thousand or 3.86% is required in foreign currency.

Table 7.1

INITIAL INVESTMENT COST ('000 Birr)

Sr. No	Cost Items	Local Cost	Foreign Cost	Total Cost	% Share
1	Fixed investment				
1.1	Land Lease	3.99		3.99	0.34
1.2	Building and civil work	375.00		375.00	31.90
1.3	Machinery and equipment	15.12	45.34	60.46	5.14
1.4	Vehicles	450.00		450.00	38.28
1.5	Office furniture and equipment	75.00		75.00	6.38
	Sub total	919.11	45.34	964.45	82.04
2	Pre operating cost *				
2.1	Pre operating cost	101.81		101.81	8.66
2.2	Interest during construction	76.91		76.91	6.54
	Sub total	178.72		178.72	15.20
3	Working capital **	32.39		32.39	2.76
	Grand Total	1,130.22	45.34	1,175.56	100

* *N.B Pre operating cost include project implementation cost such as installation, startup, commissioning, project engineering, project management etc and capitalized interest during construction.*

** *The total working capital required at full capacity operation is Birr 48.40 million. However, only the initial working capital of Birr 32.29 million during the first year of production is assumed to be funded through external sources. During the remaining years the working capital requirement will be financed by funds to be generated internally (for detail working capital requirement see Appendix 7.A.1).*

B. PRODUCTION COST

The annual production cost at full operation capacity is estimated at Birr 640.05 thousand (see Table 7.2). The major components of the production cost are marketing and distribution, depreciation, labor and administration cost which account for 23.44, 22.65%, 16.50% and 15.62%, respectively. The remaining 21.79% is the share of raw material, utility, repair and maintenance, labor overhead and administration cost. For detail production cost see Appendix 7.A.2.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY (YEAR THREE)

Items	Cost (in 000 Birr)	%
Raw Material and Inputs	46.72	7.30
Utilities	1.10	0.17
Maintenance and repair	1.81	0.28
Labour direct	105.60	16.50
Labour overheads	15.84	2.47
Administration Costs	100.00	15.62
Land lease cost	-	-
Cost of marketing and distribution	150.00	23.44
Total Operating Costs	421.07	65.79
Depreciation	144.95	22.65
Cost of Finance	74.02	11.57
Total Production Cost	640.05	100

C. FINANCIAL EVALUATION

1. Profitability

Based on the projected profit and loss statement, the project will generate a profit throughout its operation life. Annual net profit after tax will grow from Birr 189 thousand to Birr 319 thousand during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 2.83 million. For profit and loss statement and cash flow projection see Appendix 7.A.3 and 7.A.4, respectively.

2. Ratios

In financial analysis, financial ratios and efficiency ratios are used as an index or yardstick for evaluating the financial position of a firm. It is also an indicator for the strength and weakness of the firm or a project. Using the year-end balance sheet figures and other relevant data, the most important ratios such as return on sales which is computed by dividing net income by revenue, return on assets (operating income divided by assets), return on equity (net profit divided by equity) and return on total investment (net profit plus interest divided by total investment) has been carried out over the period of the project life and all the results are found to be satisfactory.

3. Break-even Analysis

The break-even analysis establishes a relationship between operation costs and revenues. It indicates the level at which costs and revenue are in equilibrium. To this end, the break-even point for capacity utilization and sales value estimated by using income statement projection are computed as followed.

$$\text{Break -Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 378,000$$

$$\text{Break - Even Capacity utilization} = \frac{\text{Break - even Sales Value}}{\text{Sales revenue}} \times 100 = 46.90\%$$

4. Pay-back Period

The pay- back period, also called pay – off period is defined as the period required for recovering the original investment outlay through the accumulated net cash flows earned by the project.

Accordingly, based on the projected cash flow it is estimated that the project's initial investment will be fully recovered within 3 years.

5. Internal Rate of Return

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money in a bank account. Accordingly, the IRR of this project is computed to be 32.40% indicating the viability of the project.

6. Net Present Value

Net present value (NPV) is defined as the total present (discounted) value of a time series of cash flows. NPV aggregates cash flows that occur during different periods of time during the life of a project in to a common measuring unit i.e. present value. It is a standard method for using the time value of money to appraise long-term projects. NPV is an indicator of how much value an investment or project adds to the capital invested. In principle, a project is accepted if the NPV is non-negative. Accordingly, the net present value of the project at 10% discount rate is found to be Birr 1.33 million which is acceptable. For detail discounted cash flow see Appendix 7.A.5.

D. ECONOMIC AND SOCIAL BENEFITS

The project can create employment for 5 persons. The project will generate Birr 816 thousand in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports and also generates income for the Government in terms of payroll tax.

Appendix 7.A

FINANCIAL ANALYSES SUPPORTING TABLES

Appendix 7.A.2
PRODUCTION COST (in 000 Birr)

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Raw Material and Inputs	33	42	47	47	47	47	47	47	47	47
Utilities	1	1	1	1	1	1	1	1	1	1
Maintenance and repair	1	2	2	2	2	2	2	2	2	2
Labour direct	74	95	106	106	106	106	106	106	106	106
Labour overheads	11	14	16	16	16	16	16	16	16	16
Administration Costs	70	90	100	100	100	100	100	100	100	100
Land lease cost	0	0	0	0	1	1	1	1	1	1
Cost of marketing and distribution	150	150	150	150	150	150	150	150	150	150
Total Operating Costs	340	394	421	421	422	422	422	422	422	422
Depreciation	145	145	145	145	145	23	23	23	23	23
Cost of Finance	0	85	74	63	53	42	32	21	11	0
Total Production Cost	485	624	640	629	620	487	477	466	455	445

Appendix 7.A.3
INCOME STATEMENT (in 000 Birr)

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Sales revenue	630	810	900	900	900	900	900	900	900	900
Less variable costs	190	244	271	271	271	271	271	271	271	271
VARIABLE MARGIN	440	566	629	629	629	629	629	629	629	629
in % of sales revenue	69.88	69.88	69.88	69.88	69.88	69.88	69.88	69.88	69.88	69.88
Less fixed costs	295	295	295	295	296	174	174	174	174	174
OPERATIONAL MARGIN	145	271	334	334	333	455	455	455	455	455
in % of sales revenue	23.06	33.47	37.11	37.11	36.97	50.57	50.57	50.57	50.57	50.57
Financial costs		85	74	63	53	42	32	21	11	0
GROSS PROFIT	145	186	260	271	280	413	423	434	445	455
in % of sales revenue	23.06	23.02	28.88	30.06	31.09	45.87	47.05	48.22	49.40	50.57
Income (corporate) tax	0	0	0	81	84	124	127	130	133	137
NET PROFIT	145	186	260	189	196	289	296	304	311	319
in % of sales revenue	23.06	23.02	28.88	21.04	21.76	32.11	32.93	33.76	34.58	35.40

Appendix 7.A.4
CASH FLOW FOR FINANCIAL MANAGEMENT (in 000 Birr)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Scrap
TOTAL CASH INFLOW	1,066	746	812	901	900	900	900	900	900	900	900	347
Inflow funds	1,066	116	2	1	0	0	0	0	0	0	0	0
Inflow operation	0	630	810	900	900	900	900	900	900	900	900	0
Other income	0	0	0	0	0	0	0	0	0	0	0	347
TOTAL CASH OUTFLOW	1,066	455	592	605	671	665	694	687	679	672	559	0
Increase in fixed assets	1,066	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	39	7	4	0	0	0	0	0	0	0	0
Operating costs	0	190	244	271	271	272	272	272	272	272	272	0
Marketing and Distribution cost	0	150	150	150	150	150	150	150	150	150	150	0
Income tax	0	0	0	0	81	84	124	127	130	133	137	0
Financial costs	0	77	85	74	63	53	42	32	21	11	0	0
Loan repayment	0	0	106	106	106	106	106	106	106	106	0	0
SURPLUS (DEFICIT)	0	290	220	296	229	235	206	213	221	228	341	347
CUMULATIVE CASH BALANCE	0	290	510	807	1,035	1,270	1,476	1,689	1,910	2,138	2,479	2,826

Appendix 7.A.5
DISCOUNTED CASH FLOW (in 000 Birr)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Scrap
TOTAL CASH INFLOW	0	630	810	900	900	900	900	900	900	900	900	347
Inflow operation	0	630	810	900	900	900	900	900	900	900	900	0
Other income	0	0	0	0	0	0	0	0	0	0	0	347
TOTAL CASH OUTFLOW	1,099	345	397	421	502	506	546	549	553	556	559	0
Increase in fixed assets	1,066	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	32	6	3	0	0	0	0	0	0	0	0	0
Operating costs	0	190	244	271	271	272	272	272	272	272	272	0
Marketing and Distribution cost	0	150	150	150	150	150	150	150	150	150	150	0
Income (corporate) tax		0	0	0	81	84	124	127	130	133	137	0
NET CASH FLOW	-1,099	285	413	479	398	394	354	351	347	344	341	347
CUMULATIVE NET CASH FLOW	-1,099	-814	-401	78	476	869	1,223	1,574	1,921	2,266	2,607	2,954
Net present value	-1,099	259	341	360	272	244	200	180	162	146	132	134
Cumulative net present value	-1,099	-840	-498	-139	133	377	577	757	919	1,065	1,197	1,330

NET PRESENT VALUE	1,330
INTERNAL RATE OF RETURN	32.40%
NORMAL PAYBACK	3 years

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