

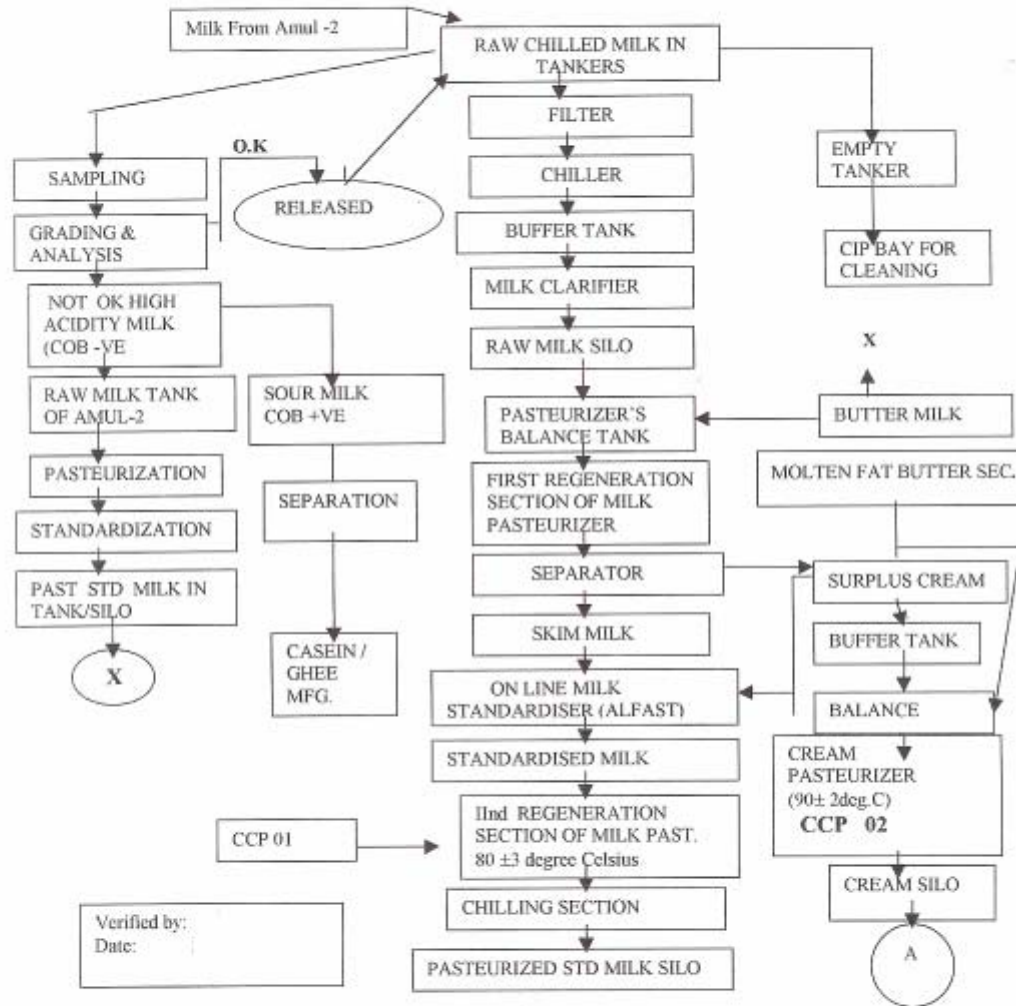



Kaira Dist. Co-Operative Milk Producers' Union Ltd., Anand

Annex B.

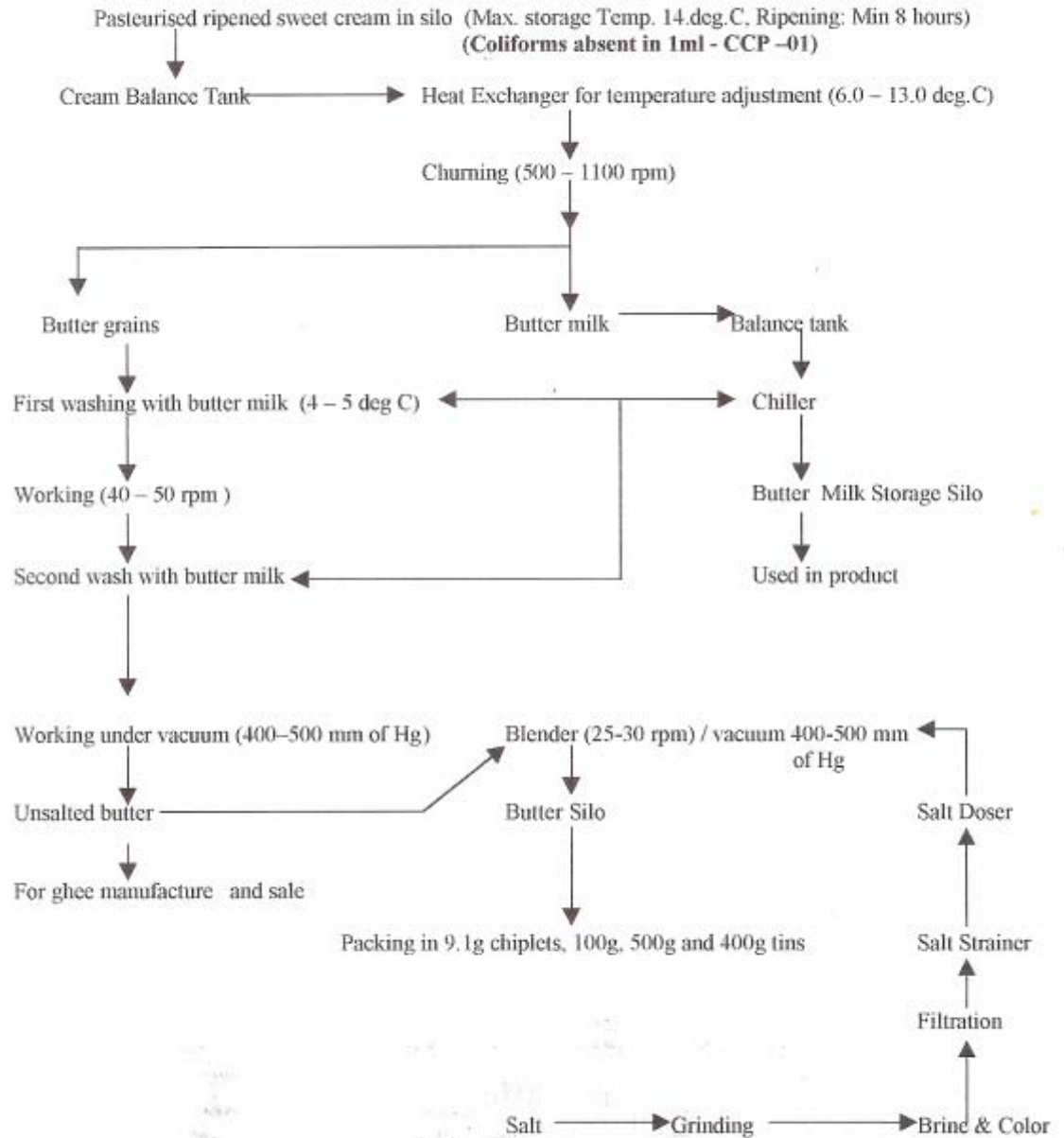
FLOW CHART: RAW CHILLED MILK / CREAM (TANKER)

Annex E



	Doc. No. DP:BUT:7.1	Issue No. 04	Date: 15 September 2002
	Revision No. Nil		Date:

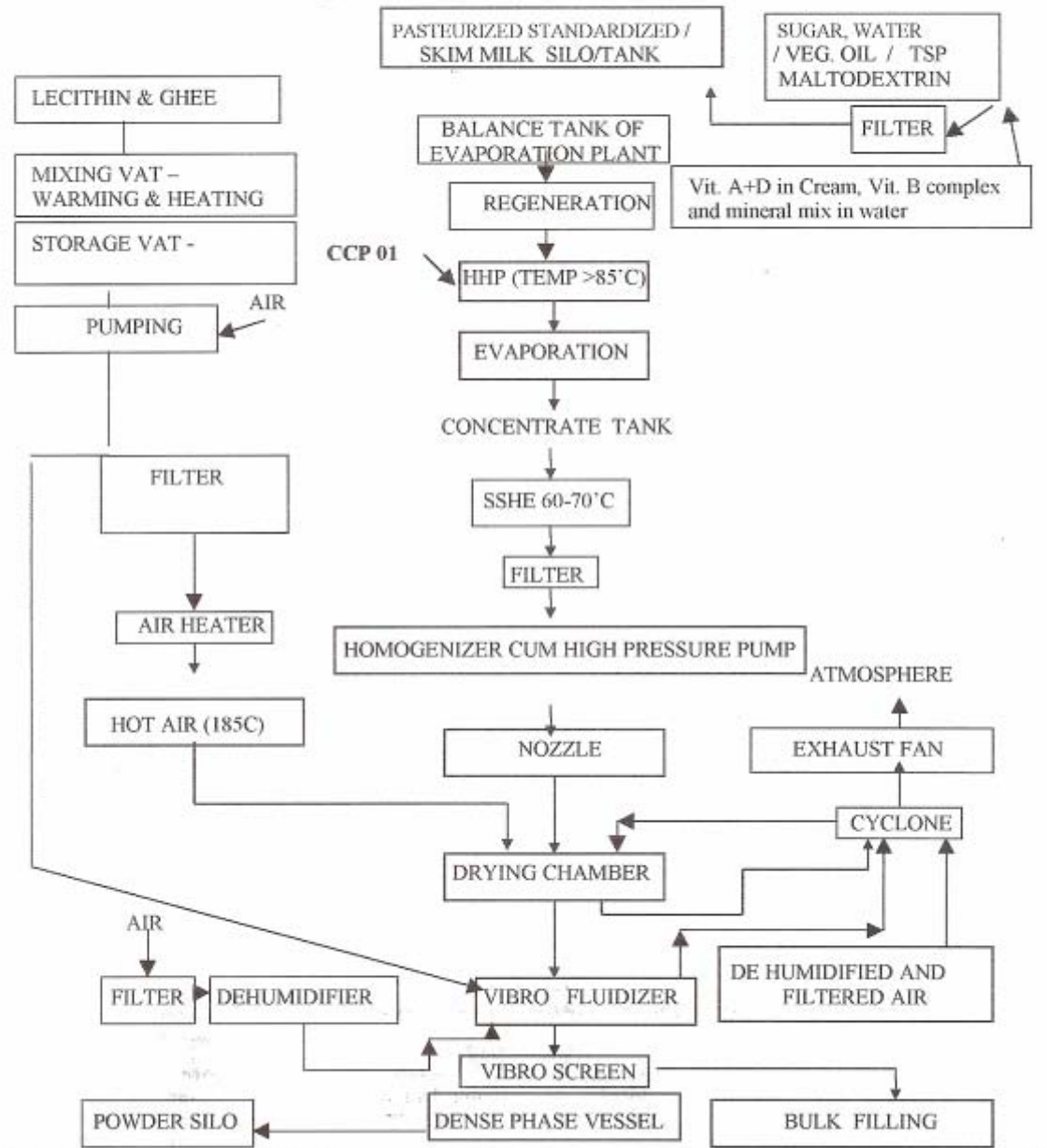
7.2 Process flow chart – butter manufacturing




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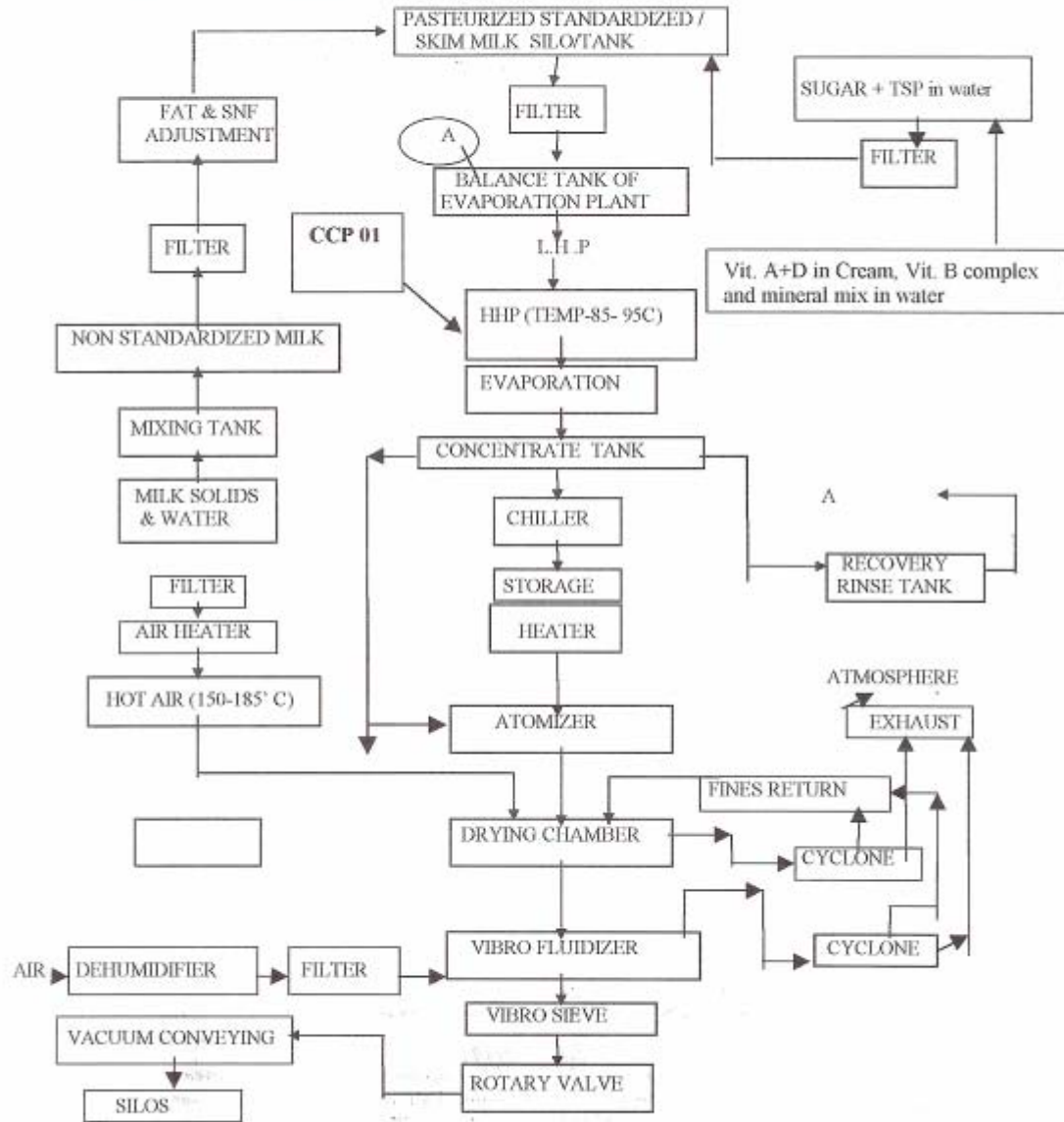


7.2.1 Process flow chart for dried products manufacturing (TFD Plant)




	Doc. No. DP:SDP:7.1	Issue No. 04	Date: 15 September 2002
	Revision No. Nil		Date:

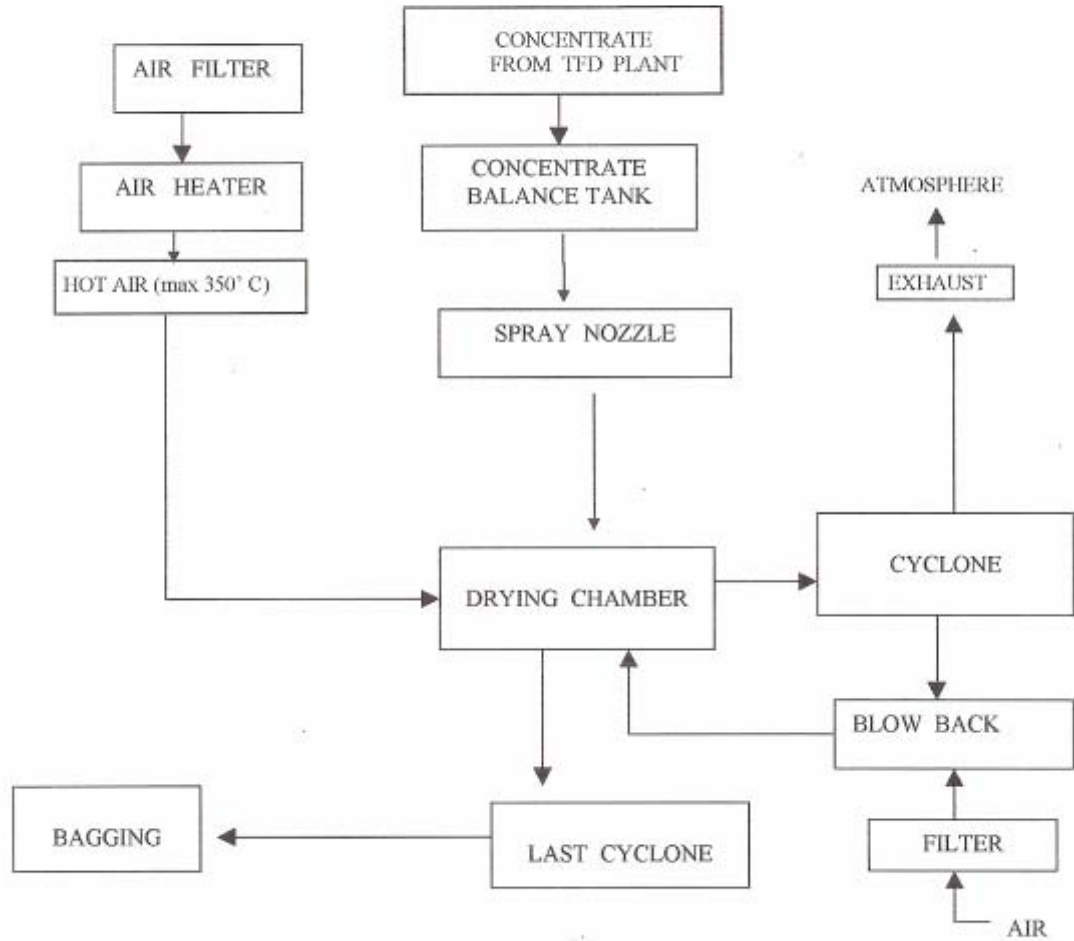
7.2.2 Process flow chart for dried products manufacturing (F 60 Plant)



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	Doc. No. DP:SDP:7.1	Issue No. 04	Date: 15 September 2002
	Revision No. Nil		Date:20 February 2004

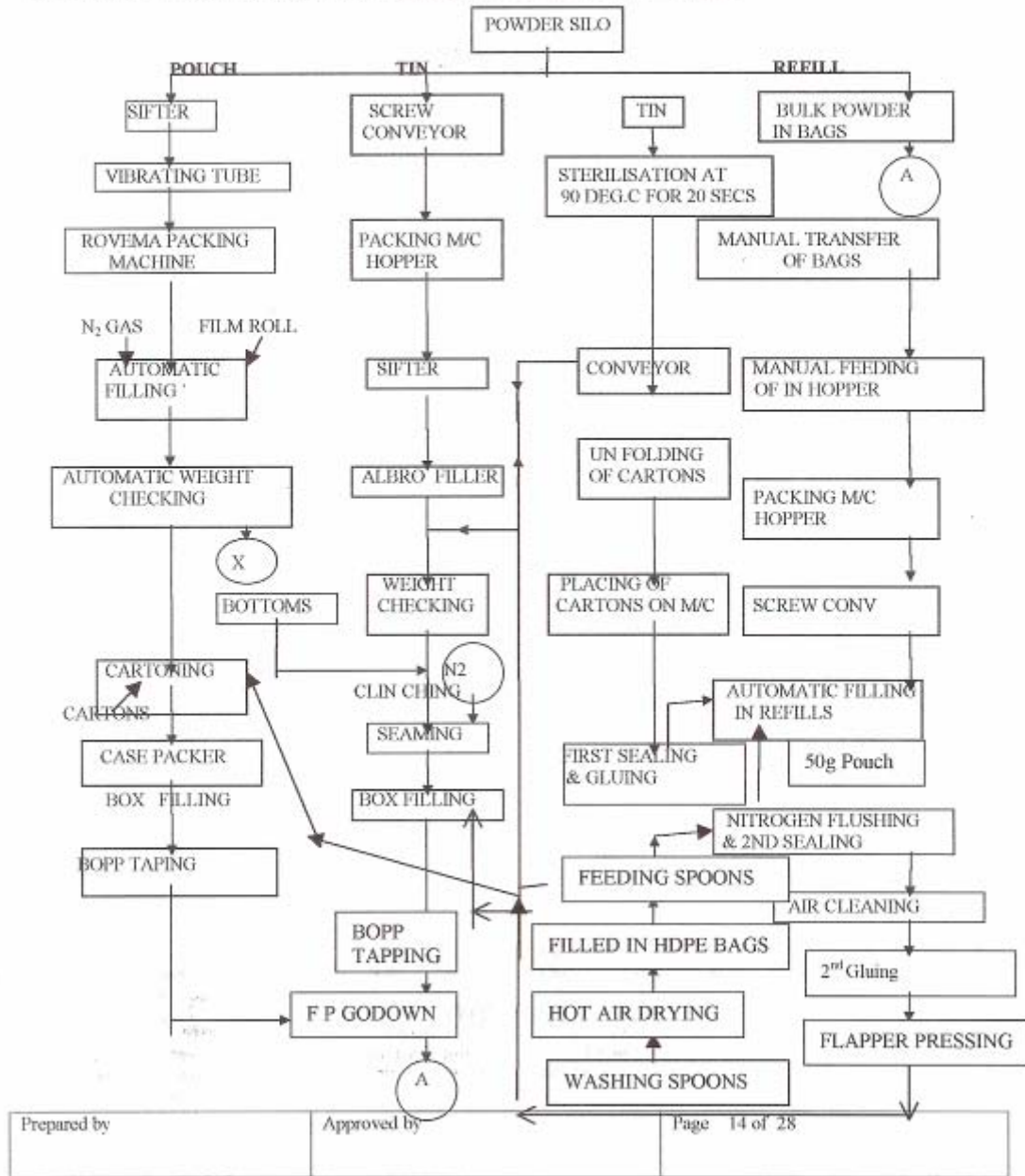
7.2.3 Process flow chart for dried products manufacturing (F 35 Plant)




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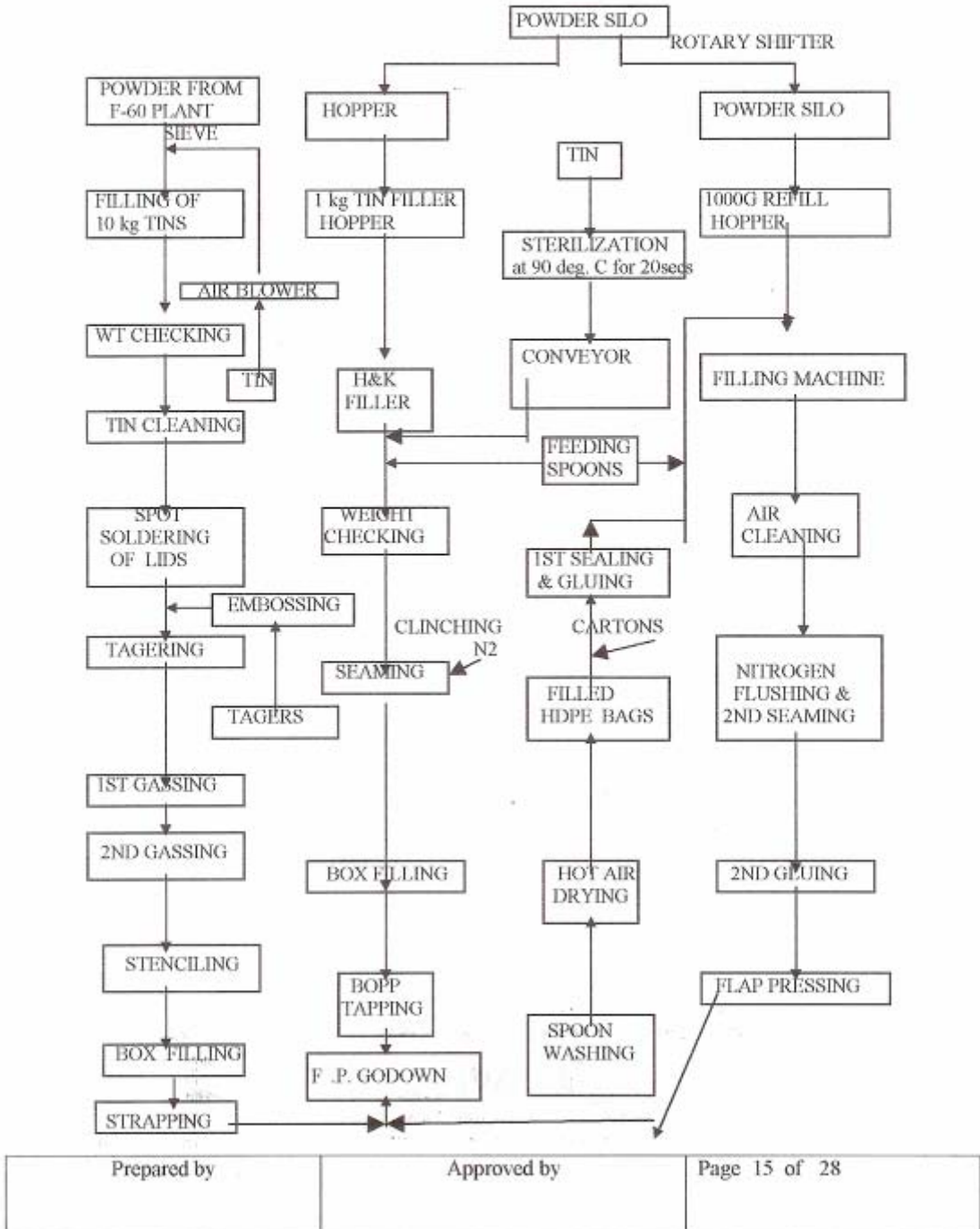


7.3.1 Process flow chart for packing dried products in 500g tin /500g refill / pouch



	Doc. No. DP:SDP:7.1	Issue No. 04	Date: 15 September 2002
	Revision No. 1		Date: 25 June 2004

7.3.2 Process flow chart for packing dried products in 1kg, 10kg tin & 1kg refill



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Amul and its Special Achievements

Amul - Asia's largest Dairy Co-operative was created way back in 1946 to make the milk producer self-reliant and conduct milk business with pride. Amul has always been the trend setter in bringing and adapting the most modern technology to the door steps of rural farmers.

Amul created history in following areas:

- a) First self motivated and autonomous farmers' organization comprising of more than 500,000 marginal milk producers of Kaira District.
- b) Created dairy co-operatives at village level functioning with milk collection centres owned by them.
- c) Provided state-of-art milk fat measuring system.
- d) Computerized milk collection system with electronic scale and computerized accounting system.
- e) Artificial insemination facility right at farmers door step through frozen semen in stored liquid nitrogen.
- f) Veterinary services through mobile van equipped with dedicated Radio frequency wireless telephone system.
- g) The first and only organization in world to get ISO 9000 standard for its farmer co-operative.
- h) First to produce milk powder from surplus milk.
- i) First to produce cheese from buffalo milk.
- j) First to formulate infant milk food in the country with indigenous technology.
- k) First farmer owned and managed Dairy Co-operative integrating milk production, processing and marketing under one roof.
- l) Leading fully automated dairy plant.
- m) First to set up 600 MT Cattle Feed Plant for providing balanced (formulated) Cattle Feed Plant.

Gujarat is floating on rich natural gas and oil reserves. The natural resources could not be put to full use 20 years ago by the ONGC and therefore were offered to Amul. Amul as ever, took the initiative and was the first and the only organization to lay a 52 KM long own gas transportation pipeline and set up a Co-generation Plant to produce power using gas and generate steam, deploying waste heat of the flue-gases. The turbine is in use since 1983. The gas turbine is a combined cycle co-generation system providing reliable and quality power, making farmers of Kaira self-reliant in milk business.

Optimum utilization of natural resources has been deployed at Cattle Feed Plant, Kanjari by installation of 54000 LPD Solar Water Heater System which was later extended to its Chilling Centres.

Amul is a live example of how co-operation amongst the poor marginal farmers can provide means for the socio-economic development of the under-privileged marginal farmers.

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AMUL

CREATOR OF

INFRASTRUCTURE

AT VILLAGE LEVEL

Village Co-Operative With Own Building - With Solar Power Lighting System for supporting Automation



Computerized milk collection and accounting system at Village Co-operative



An ISO 9000 certified Village Co-operative
A Trend Setter



Village level milk cooling system for sustaining milk quality by cooling milk at 4 deg.C.



Solar Hot Water System for Chilling Centres



Broad Band Antenna for Video Conferencing at village level



55 KL Solar Heating system for harnessing natural resources at Cattle Feed Plant

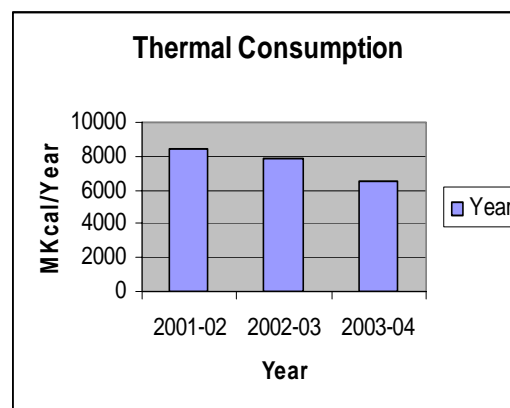
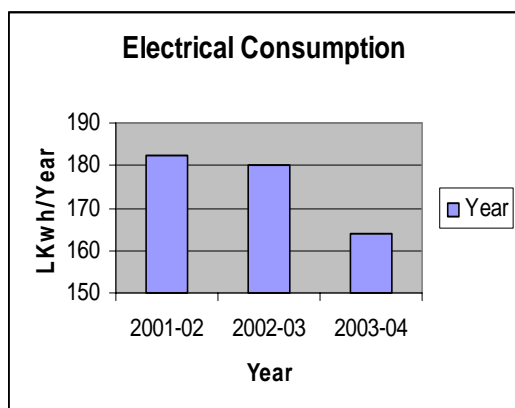


Energy Utilization:

Concerted efforts have resulted in to significant reduction in power and fuel consumption over the years. This has also added to profitability of operations.

DESCRIPTION	UNIT	2001-2002	2002-2003	2003-2004
Annual Production	M.Tons	26202	31955	25798
Total Electrical Energy Consumption	Lakhs kwh	182.28	180.28	164
Specific Energy Consumption – Electrical	Units/ton	6.95	5.64	6.35
Thermal Consumption / Annum	Mkcal	8469.66	7900.37	6480.89
Specific Energy Consumption – Thermal	Mkcal/ton	323	247	251

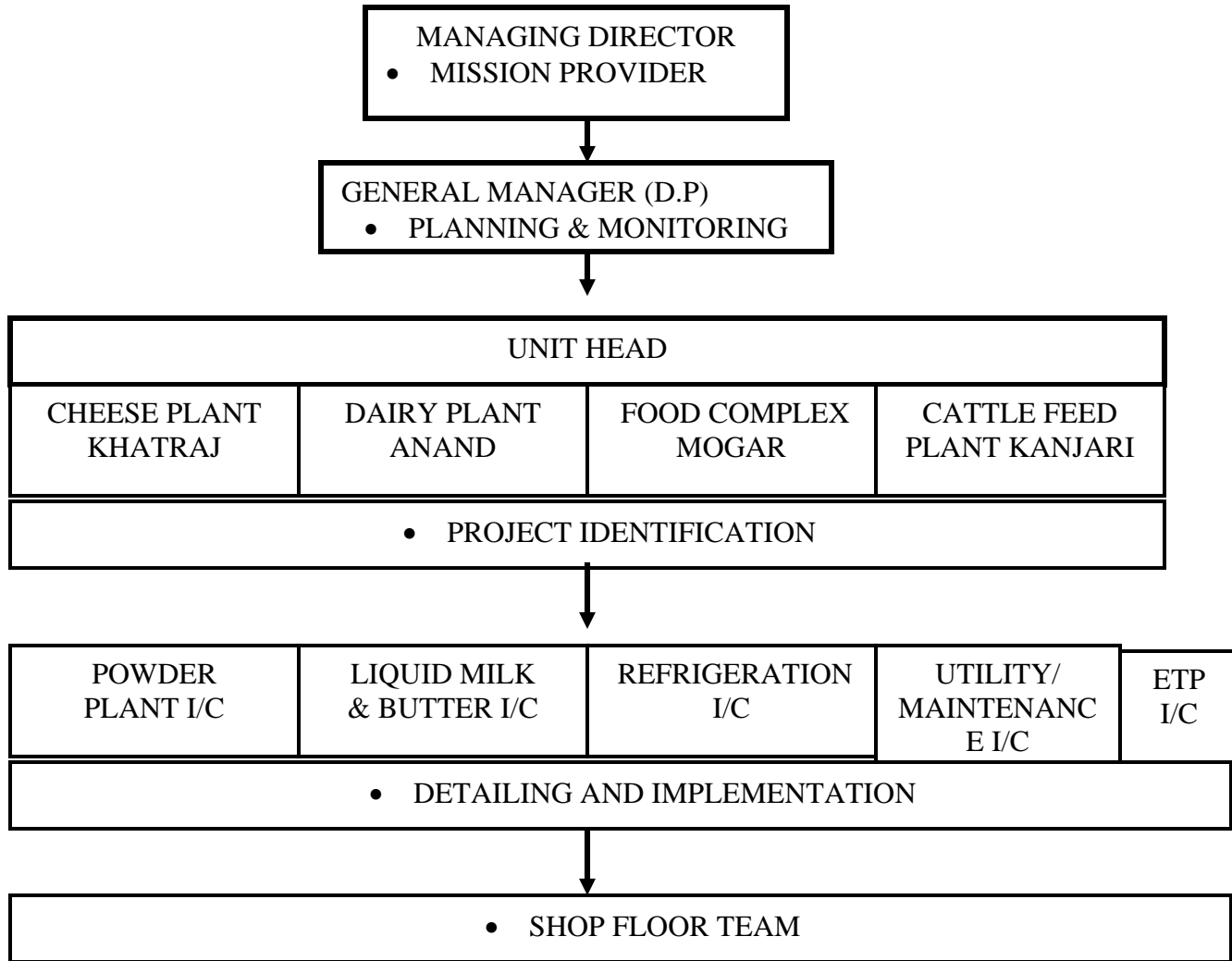
YEAR	ELECTRICITY		THERMAL (FUEL)	
	Consumption (kwh/ Ton)	% reduction over 2001-2002	Consumption Mkcal/ Ton	% reduction over 2001-2002
2001-2002	6.95	-	323	-
2002-2003	5.64	3%	247	0%
2003-2004	6.35	3%	251	0%



Energy conservation commitment, policy and setup.

Amul has made a policy to enhance energy efficiency through involvement and participation of its own employees. It empowers employees to make techno-economical decisions, plan for the same and implement through own staff. It encourages employees' participation without the fear of failure and support bold decision making.

ENERGY CONSERVATION ORGANIZATION



Energy Conservation Achievement

During the year 2003-04, our organization had taken a number of measures for energy conservation and the energy bill had reduced to the extent of 189 lakhs. The specific energy consumption reduced to the extent of 23.2 % compared to the base year 2001-02.

Energy Conservation Projects

2003-04

(1) A.C. Variable Frequency Drive for F 60
Powder Plant exhaust fan motor

Investment : Rs. 4.00 lakhs

Before installation

Power consumption: 3.00 lakhs KWH/month

After installation

Power consumption: 2.75 lakhs KWH/month

Savings in KWH : 0.25 lakhs KWH/month

Savings in Rupees : Rs.1.35 lakhs/month



2 A.C Variable Frequency Drive for Boiler
F.D.Fan Motor

Motor was running continuously at full speed.

Investment : Rs. 0.70 lakhs

Before installation : High firing position

18.5 KW

Low firing position

16.9 KW

After installation

Power consumption: High firing position

6.8 KW

Low firing position

4.32 KW

Saving in KW : 7800 KW/Month

Saving in Rupees : Rs.39000/Month

Total Savings

For 3 Fans : Rs.12.0 lakhs

Per annum



(2) Boiler Feed Pump Motor

Changed Pump from 30 to 20 HP

Investment : Nil

Saving in Rupees : Rs.2.0 lakhs
Per annum



(3) Installation of Computerized Energy Metering System for 2 Power Feeders

Investment : Rs. 8.0 lakhs

Before installation
Maximum Demand : 4900 KVA

After Installation
Maximum Demand : 3000 KVA

Saving in Demand
Charges : Rs.45.0 lakhs
Per annum



Other Projects implemented during 2003-2004

➡ Boiler tube and shell cleaning system improvement with HP Jet and Spray Ball



➡ Milk Line Insulation



➡ Milk Pasteurizer Plate Polishing for improved heat transfer



➡ Trimming of over sized impellers of water pumps



➡ Air compressor re-building



➡ Steam Line Re-insulation



➡ Pressure reducing valve up-gradation for steps less modulation



➡ Removing of damper for step less control for better combustion efficiency of boiler



➡ Condensate recovery and utilization in refrigeration system make up water



- ➡ Replacement of window Air conditioners with energy efficient Split Air ACs



- ➡ Energy efficient lighting in visitors' gallery.



- ➡ Micro and Macro level implementation of Energy Conservation measures at all levels of employees throughout the organization has resulted into the reduction of power and fuel cost reduction of around Rs. 1.8 crores.

Energy conservation Plans and Targets 2004-2005

Sr. No.	Energy Conservation Measures (Planned)	Anticipated savings In Energy (Rs.lakhs)	Approx. Investment (Rs.lakhs)	Project Commence-ment & completion year
1	Reshuffling compressed air system	20	1	2004-2005
2	Providing soft starter for spray drying plant fan 92 KW * 2 Nos.	2	4	2004-2005
3	Providing soft starter for screw compressor motor 400 KW * 2 Nos.	10	11	2004-2005
4	Variable frequency drive for exhaust fan motor for T F dryer 200KW	6	4	2004-2005
5	Redesigning of steam piping for optimum route length	10	10	2004-2005
6	Replace mercury vapour lamps with metal hallo lamps.	1	4	2004-2005
7	Insulation of holding tubes of milk pasteuriser.	1	0.5	2004-2005
8	Replace existing milk pasteuriser with energy efficient pasteuriser.	3	13	2004-2005
9	Installation of HP purging system for optimum milk solids recovery from road milk tankers.	1	2	2004-2005
10	Modernise ETP for improved treatment standards and gas generation.	15	25	2004-2005
11	Introduction of automatic control for constant circulation pressure of chilled water mains.	3	1.75	2004-2005

Environment and Safety

Amul had set up the Effluent Treatment Plant (ETP) way back in 1974 i.e. before the existence of State Pollution Control Board. Since then it has been taking utmost care in protecting the environment. Dairy has year after year reduced water consumption, improved solids recovery and now for many years has changed over from furnace oil to gas as a cleaner fuel in boilers and air heaters of the spray drier.

It is at the verge of renovating its plant for ensuring 100% recycling of its treated effluent and generates revenue through production of fodder for cattle.

Safety first is the slogan of the organization. Safety Committee ensures safe working environment through involvement of all employees in their respective work areas.

The safety concept is enhanced through - 1) Safety training, 2) Safety meetings and 3) Safety Day Celebrations.



Computerised Apex Metering – A trend Setter.

Amul Dairy is receiving power from more than two feeders and from two different sources. In conventional energy metering system, it was not possible for the State Electricity Board to vector sum the energy demand. Therefore, Dairy was paying arithmetical sum of Maximum Demand arising at different times and on different feeders. With the support of State Electricity Board, Amul got Computerized Apex Metering System developed specific to its requirements using electronic measuring and logging system.

The system included **Dial up Facility** for **Tele-metering** of data by the user as well as the State Electricity Board. The system with the special approval of the Member (Technical) of the State Electricity Board was introduced in industry for the **First Time** after six months extensive study.

This has brought about significant reduction in Maximum Demand and thereby savings to the extent of Rs.45 lakhs/annum.

This has also paved way for tele-metering and monitoring of electrical energy for the State Electricity Board for its major consumers. (Refer photograph in Energy Conservation Project – Annexure – "C")