Mysore Dairy,
A Unit of Mysore – Chamarajanagara District Co-operative Milk Producers' Societies' Union Ltd

UNIT PROFILE:

MYSORE DAIRY, A UNIT OF Mysore – Chamarajanagara District Co-Operative Milk producers. Union Limited registered under the Karnataka co-operative act and has been commissioned in the year 1980. The rated when constructed was 60 TKPD (Thousand Kgs per day) and was subsequently expanded to 150 TKPD by NDDB under the turn key project in the year 1996.

The dairy receives milk in cans and in tankers from village co-operatives located in the districts of Mysore and Chamarajanagara districts. The milk in tankers from the three chilling centers located in Hunsur, Kollegala and Chamarajanagara towns. Also the dairy receives milk in tankers from 11 Bulk Milk Coolers. As on date the per day quantity of milk received through cans directly from dairy co-operatives, tankers from chilling centers and tankers from bulk milk coolers is as follows:

- In cans from village dairy co-operatives 69600 Kgs
- In tankers from chilling centers 126250 Kgs
- In tankers from bulk milk coolers 21500 Kgs

The dairy processes the milk and packs the following qualities of milk:

1. Toned milk with 3.1% Fat & 8.5% Solids not fat
2. Standardised milk with 4.6% Fat & 8.5% Solids not fat
3. Double toned milk with 1.6% Fat & 9% Solids not fat
4. Full cream milk with 6.1% Fat & 9% Solids not fat

In addition, the following milk products are manufactured in smaller quantities:

- Ghee 735.421 Metric Tonnes per year
- Butter 961.60 Metric Tonnes per year in bulk packings of 25 Kgs
- Curd 4640.57 Metric Tonnes per year
- Peda 45.20 Metric Tonnes per year
- Mysore pak 15.52 Metric Tonnes per year
- Sweet Lassi 137.75 Metric Tonnes per year
- Butter milk 130.89 Metric Tonnes per year

The dairy markets milk and milk products under the trade name "NANDINI" a registered trade name of "Karnataka Milk Federation", the apex institution at the state level.

The technical and financial assistance comes from National Dairy Development Board, Anand, Gujarath under opeartion flood and vision schemes.

The dairy had taken up market development activities for which the famous cine actor Mr. Upendra was brand ambassdor and the dairy has recorded a 13.60%, &

Mr. Upendra as Brand ambassador


Sales Graph (2002-2005)


Energy Conservation day (14-12-04)

4.0 % increase in sale during the years 2003-2004 & 2004-2005 respectively. Energy conservation day was observed on 14 th December 2004. The other market developing activities taken up by the dairy are Creating awareness about milk in public especially among the women folk and school children through **"ARIVU"**

Training by HRD expert

School children Progarm

Award Ceremony of ISO Certificate

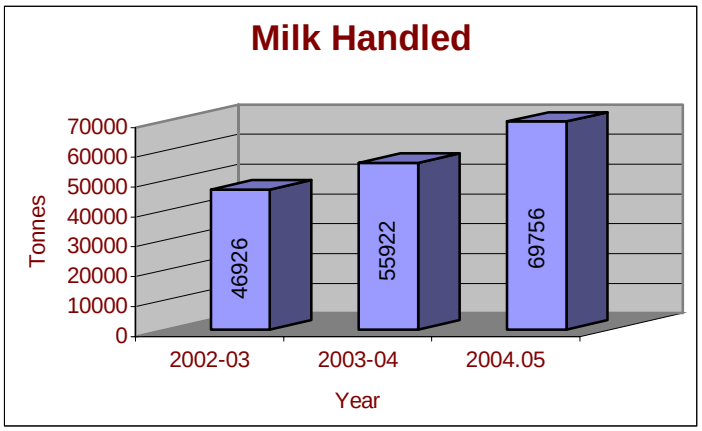
programmes to which HRD experts were invited and the dairy has conducted 81 "ARIVU" programs wherein 9295 people took part and also under the consumers and school children awareness programmes 7421 members participated and 8782 houses were visited under door to door campaign during 2004-05. One of the agenda in all the above programs was educating the participants on energy conservation. The cartoon film on "Save Energy" was screened at the school children programs.

The dairy secured the ISO-9001 : 2000 certificate for the years 2004-2008.

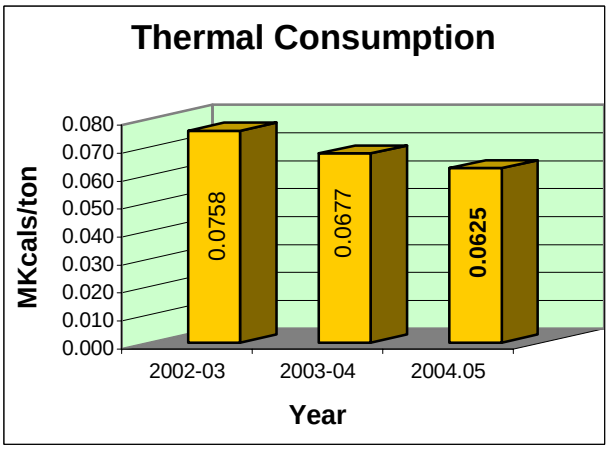
ENERGY CONSUMPTION:

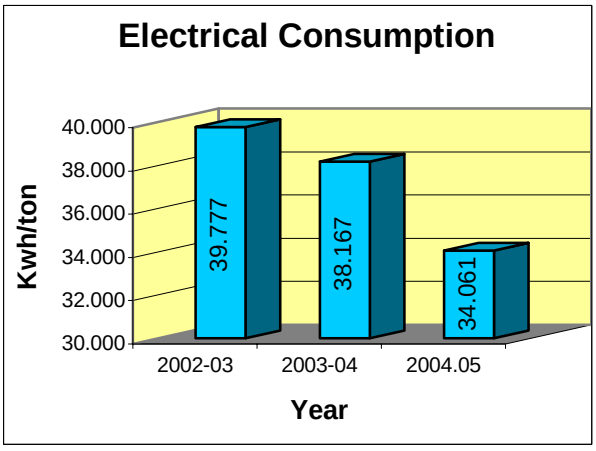
The energy consumption and milk handles at the dairy in the years 2002-2003,2003-2004 and 2004-2005 is as follows:

DESCRIPTION	UNIT	2002-2003	2003-2004	2004-2005
Milk Handled	Metric Tonnes	46926.26	55922.06	69755.95
Total energy cost	Rs in Lakhs	127.859	148.038	167.716
Energy cost v/s Manufacturing expenses	Percent	23.74	42.07	19.71
Total energy consumption – Electrical	Lakhs kWh	18.666	21.344	23.759
Specific energy consumption – Electrical	KWh/Tonne	39.777	38.167	34.061
Total energy consumption – Thermal	Million Kcals	3557.45	3786.24	4358.33
Specific energy consumption – Thermal	Million Kcals	0.0758	0.06771	0.06248



Year	Qty Milk Handled	Capacity Utilisation	Electrical Energy (Lakh KWHR)	Thermal Energy (MK cals)
2002-2003	46926.26	93.64	18.666	3557.45
2003-2004	55922.06	104.67	21.344	3786.24
2004-2005	69755.95	118.64	23.759	4358.33





During the years 2002-2005 it can be noted that there has been a steady increase in milk handled and decrease in consumption of energy. The dairy had launched the Energy Conservation Programme in the year 2001. National Dairy Development Board (NDDB), Institute Of Rural Management, Anand (IRMA) & Karnataka Milk Federation (KMF) facilitated the launching of the said programme. The outcome of this programme was that the dairy was able to gear up the employees towards saving of energy. The energy team was setup and this team was responsible in conducting Awareness and orientation programs to all the employees. The members of this team were trained by the IRMA Faculty , leading HRD personnel & eminent energy auditors. The energy team initially conducted an in house energy audit and was able to identify few energy saving opportunities. This has been a continuous process and the objectives of this team has been slightly modified and this team is heading towards “TOTAL QUALITY MANAGEMENT”.

ENERGY CONSERVATION COMMITMENT, POLICY AND ORGANISATIONAL SET UP

Mysore dairy transformed the Energy conservation team to

“TOTAL QUALITY MANAGEMENT TEAM”

which is putting forth a continuous approach to sustain the achievements made on energy conservation with due stress on improvement of product quality. Hence, the product quality was not sacrificed while saving energy.

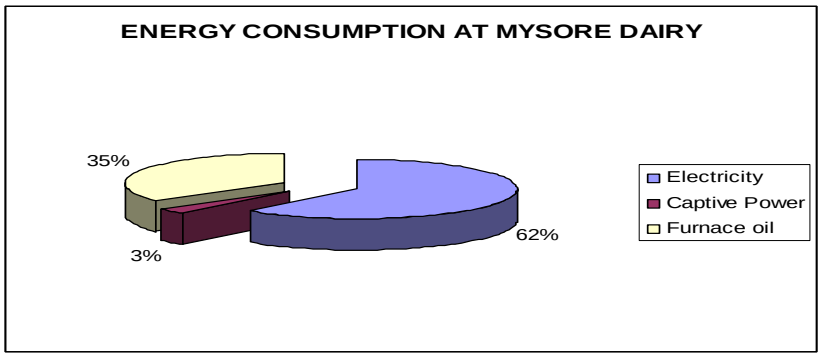
At this juncture ISO - 9001 : 2000 quality accredation was obtained during which cross functional teams were formed and the philosophy of energy conservation and quality improvement and sustainability were inculcated among all the employees by way of lectures and discussions. HRD experts were also invited to

help building up of leadership qualities in the employees. The dairy also follows the 5 “S” house keeping principles with due stress on kaizen-a continual improvement. Two 5 S teams have been formed who inspect and suggest the principles of 5 S wherever necessary. The ideas from the employees were sought, considered in achieving cost reduction and quality improvement.

The sources of energy in the dairy are Electricity and Furnace oil. The energy cost is 68 to 72% of the total manufacturing cost of the dairy.

The total connected load is 1151 KW or 1798 KVA and maximum demand is 500 KVA.

Electricity occupies the top position in the energy profile, since 65% of the energy is generated with the help of electricity. The refrigeration section is the major user



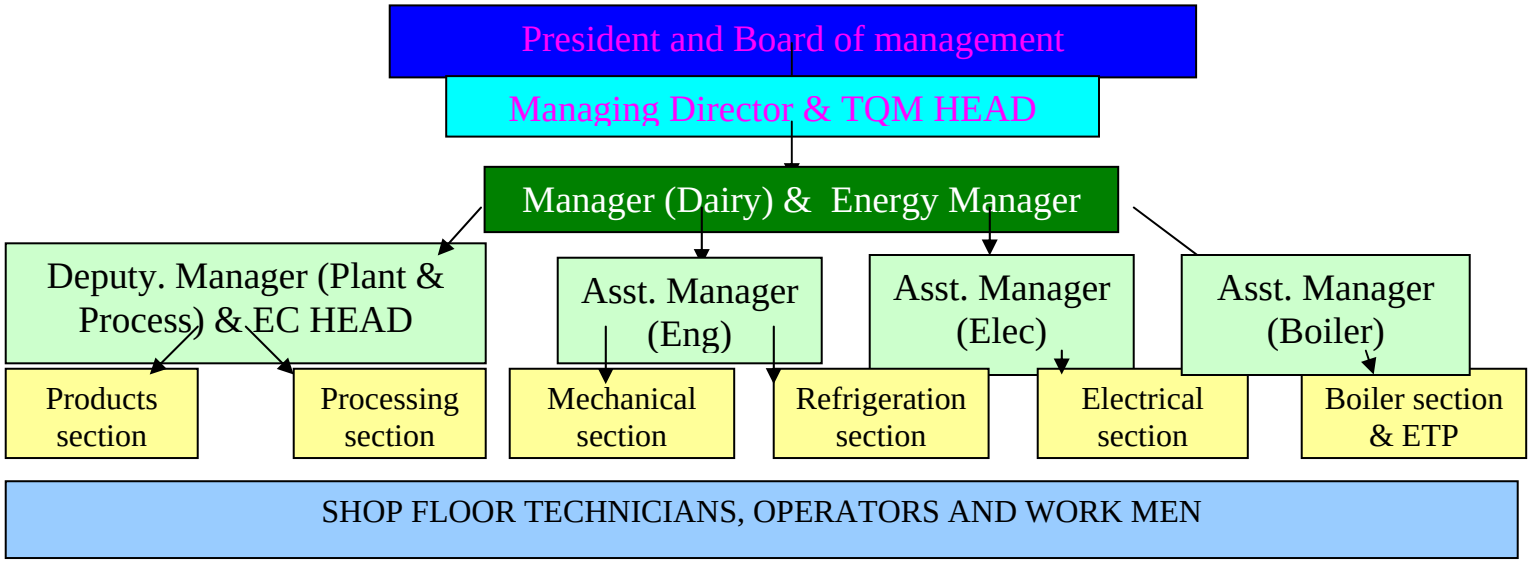
of this source of energy, wherein more than 50% of the total electrical energy is used by this section. Hence, major thrust was given in conserving energy in this section. This section has 4 ammonia compressors, two driven by 2 Nos 100 Hp, one driven by 125 Hp and one by 120 Hp motor. In addition the dairy has 2 booster compressors driven 2 Nos. 20 Hp motors. Also there are 4 Nos. chilled water pumps driven by 4 Nos. 10 Hp motors. Thus, the connected load in this section is 420 KW. The total running hours of ammonia compressors and chilled water pumps ranges between 21-23 hours per day. At any given point of time 2 ammonia compressors and 3 chilled water pumps will be in operation while the rest are utilised as standby.

Furnace oil is another source of energy. This constitutes 35% of the total energy. The major user of this energy is the milk processing section wherein more than 75% of the thermal energy is utilised. Thus this was the major section wherein the thermal energy saving efforts were put forth.

ENERGY CONSERVATION POLICY:

THE EMPLOYEES & MANAGEMENT OF MYSORE-CHAMARAJANAGAR MILK UNION ARE COMITTED TO CONSERVE & SUSTAIN THE CONSERVED ENERGY AT ALL LEVELS OF PROCESSING OF MILK & MILK PRODUCTS BY ADOPTING MODERN, ECO-FRIENDLY & ENERGY EFFICIENT TECHNOLOGIES TO OFFER THE SUPREME QUALITY MILK & MILK PRODUCTS TO CUSTOMERS AT COMPETITIVE PRICE WHILE TRANSFERING REMUNERATIVE PRICE TO THE PRODUCERS.

ORGANISATIONAL SETUP:



ENERGY CONSERVATION ACHIEVEMENTS:

During 2002-2005, Mysore dairy has implemented 11 energy saving projects through engineers initiatives, sub section team suggestions and innovative ideas by officers and have achieved savings of Rs. 28.21 Lakhs with a meager investment of Rs. 19.56 Lakhs resulting in 14.37% reduction in specific electrical energy consumption and 17.58% in specific thermal energy consumption.

The energy saving projects implemented during 2004-05:

Chilled Water Management:- The refrigeration section has 4 chilled water pumps driven by 4 Nos. 10 Hp motors. Study on the running hours of these motors revealed that these motors were run more than required resulting in an abnormal milk to chilled water ratio. The ratio when worked out was 1:23.85 as against the standard of 1:9.25 to this dairy. Efforts were put to curtail the running of the chilled water pumps with close watch on the chilling temperature of milk. Finally the ratio was brought down to 1:13.99. The further reduction requires changes in the pipe line system. Hence, the same is targeted for 2004-05.

- Initial Milk to Chilled water ratio — 1:25.85
- Achieved Milk to chilled water ratio — 1:10.99
- Total quantity of milk handled — 69755.95 Thousand Kgs
- Water pumped if ratio 1:25.85 — 1803191 Thousand litres
- Electricity required — 225398 kWh
- Water pumped when ratio reduced to 1:10.99 — 766617 thousand litres
- Electricity required — 95827 kWh
- Electricity saved — 129570 kWh
- Savings per annum — Rs. 5.95 Lakhs.

Auto Controls for Milk Pasteurisers:- There were 2 Nos 10 TKPH pateurisers in the dairy. These pasteurizers were running without auto controls. The third new pasteurizer was purchased and this pasteurizer was supplied with auto controls. On running these pasteurizer we observed lesser consumption of steam since the heating temperature was maintained between 73 ^{0} C to 75 ^{0} C.

- Furnace oil required to generate 1000 Kgs steam — 76.92 Litres
- Steam consumed by 10 TKPD pasteuriser if the Pasteurization temperature is 78-85^{0} C — 200.00 Kgs
- Furnace oil requirement to run the pasteurizer for 1 hour — 15.38 Kgs

- Steam consumed by 10 TKPD pasteuriser when the Pasteurization temperature is 73-75^0 C — 198.00 Kgs
- Running hour of each pasteurizer per day — 8.0 Hrs.
- Furnace oil saved by one pasteurizer/day — 16.0 Lts.
- Furnace oil saved by two pasteurizers/day — 32.0 Lts.
- Furnace oil saved for 1 year — 11680.0 Lts.
- Savings per annum — Rs. 1.58 Lakhs

Co-efficient Of Performance (COP) of ammonia compressors:- The study revealed that the COP of the system was as low as 4.0 as against the stipulated standard 5.0 fixed by the manufacturer. Reasons for the reduced COP were identified and corrective measures were implemented by which the COP improved resulting in lesser running hours of ammonia compressors. The reduction was little less than 1 hour and with this reduced running hour the total energy saved was 60472 kWh resulting in monitory saving of Rs. 2.78 Lakhs per annum. Further improvement is expected once the new Plate Heat Exchange type ammonia condensers are made operative during the year 2005-06.

Condensate Recovery:- The dairy has three 10 KLPH pasteurizers out of which two are running with auto controls and the third one without the same. In all the three pasteurizers it was observed that considerable amount steam condensate and at times flash steam was running into the drain. The dairy requires hot water at around 80 ^{0} C for CIP and washing purpose. Hence, it was decided to reroute the condensate and flash steam into the hot water tank of the CIP system using available old C class pipes which were removed from old condensers. By doing this change we were able to recover around 3000 Litres of hot water for CIP & washing purpose.

- Quantity of hot water obtained/day — 3000 Litres
- Delta T for hot water — 51.5 ^{0} C
- Energy required for the above delta T — 153415 Kcals
- Furnace oil saved per day — 15.38 Litres
- Furnace oil saved per year — 5613.7 Litres
- Savings per annum — Rs. 75784.00

Liquid level indicators and float controls for Ice Bank tank and butter deep freeze:
The study revealed that the ammonia compressors were being run more than required since the level of the liquid was not being maintained at optimum level in the surge drums of ice bank tank and also it was found that more of liquid was being circulated in the butter deep freeze in the absence of float controls. Hence, the liquid level indicators along with the float controls were installed at the IBT and butter deep freeze. As a sequalae the running hours of compressors and allied equipments at the refrigeration section was reduced to slightly more than $^1/_2$ hour and this resulted in saving of around 120 Kwhr and this resulted in a net savings of Rs. 2.01 Lakhs per annum.

Installation of lower capacity pumps for milk pasteurizers:- The L&T pasteurizer with capacity of 10 KLPH was being run with 5 Hp milk & hot water pumps.Since this pasteurizer was connected to 5 KL homogenizer the 5 Hp pumps were replaced with 3 Hp pumps. Similarly 10 KLPH IDMC plant was being operated with 5 Hp monoblock hot water pump. This pump was replaced with coupled hot water pump driven with 2 Hp motor. Thus in all there was a reduction of 7 Hp. These pasteurizers run on an average 12 hours per day. The net savings in Kwhr is 22995 resulting in an annual savings of Rs. 1.06 Lakhs.

Replacement of old batch type curd milk pasteurizer with continuous curd milk pasteurizer:-
The milk for preparation of curd was being pasteurized with the conventional batch type curd milk pasteurizer. This was consuming considerable quantity of steam. Hence, this was replaced with continuous PHE type curd milk pasteurizer.

- Steam consumed by batch type pasteurizer — 170 Kgs/2000 kgs milk
- Steam required per Kg milk — 0.085 Kgs
- Steam consumed by 3000 LPH pasteurizer — 100 Kgs/Hour
- Steam required per kg of milk — 0.033 Kgs
- Steam savings per kg of milk — 0.0517 Kgs
- Quantity of curd milk pasteurized — 4843.74 MT
- Steam saved — 250259.9 Kgs
- Furnace oil required to generate the steam — 19251 Litres
- Savings per annum — Rs .2.60 Lakhs

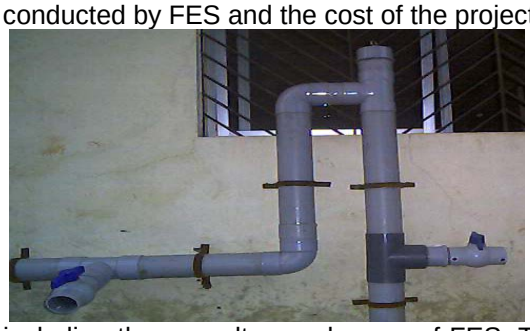
ENERGY CONSERVATION PLANS AND TARGETS:

1) Renovation of effluent treatment plant & Methane Gas Utilisation:- The dairy is being expanded by addition of efficient energy conserving equipments.



As a result of this the effluent treatment plant also is being expanded and renovated. The plant is proposed to have two Bio-reactors one an acidic phase reactor and the other alkali phase reactor. Since, the treated water from these reactors will have optimum BOD & COD it is planned to lend the treated water to Mysore Zoo for maintenance of garden at the Zoo. The reactors produce methane gas. It is intended to run a 30 KVA diesel generator by using the methane:diesel mixture. It is estimated that the methane gas production would suffice to run the generator around 10 hours a day. The power generated would propel the motors fit in ETP section also would cater to the lighting load of this section. The savings that could be turned out of this is estimated to be Rs. 2.26 Lakhs per annum. The investment that is being done on this project including the expansion of ETP is Rs. 27.26 Lakhs.

2) Water management & Rain water harvesting:- During the year 2005-06 the dairy has given major stress on water conservation. Hence, the rain water harvesting has been taken up. The study was conducted by FES and the cost of the project was estimated to be around Rs. 3.16 Lakhs




including the consultancy charges of FES. The work has been handed over to FES. The project includes drilling of three dummy bore wells to which the water harvested would be diverted. Apart from this a portion of water harvested will be diverted to water sump. The approximate quantity of water that would be diverted to sump would be around 2.5 lakh KL to 3.0 lakh KL per season. By this approximately Rs. 1.35 lakhs is expected to be saved per annum.

3) Auto Controls for Milk Pasteuriser:- The dairy has three pasteurisers and two have been equipped with auto controls and these auto controls have helped the dairy in saving Rs. 1.54 Lakhs during 2004-05. Hence, it is proposed to equip even the third pasteuriser with auto controls with an investment of Rs. 1.75 Lakhs. The proposed annual savings is Rs. 0.95 Lakhs.

4) Installation of New Plate Heat Type Condenser for refrigeration system:- The dairy has 4 Nos. 9X9 ammonia compressors. The hot ammonia gas that is discharged from these are being cooled with the help of 4 evaporative type condensers. The efficiency of cooling ammonia in these

condensers being very low and also the condensers were old and since they were to be replaced, new plate heat exchange type of condensers are being installed. These would cool the ammonia efficiently and would improve Co-efficient of Performance of ammonia compressors. This improvement would save energy to the tune of Rs. 2.17 Lakhs per annum by reducing the running hours of ammonia compresors. The investment on this project is Rs. 22.0 Lakhs.

5) Heat Recovery Units:- Heat recovery units can be introduced in the exhaust line of ammonia and air compressors. This would reduce the load on ammonia condensers and improves cooling efficiency in addition to yielding considerable quantity of hot water at around 70 – 75 ^{O} C. This hot water can be used as boiler feed water and also utilised for washing purposes.The expected savings per annum is Rs. 1.25 lakhs. Proposed investment is Rs. 5.0 Lakhs.

6) Renovation of existing milk cold store to avoid heat loss & to reduce the packing hours:- The existing cold store capacity is 60,000 Ltrs. Since this dairy markets more than 1.2 Lakh litres per day the cold store is intended to be expanded. The new cold store would be equipped with energy efficient equipments to maintain the required cold store temperature. With the cold store expansion the milk packing is expected to be completed by 5.00 PM everyday as against the present condition wherein the packing is being continued till 3.00 AM of the next day. By this the running hours of air compressor run by 75 Hp motor would be reduced by 10 hours. This project would result in an annual savings of Rs. 4.71 Lakhs. The proposed investment on this project is Rs. 18 lakhs.

7) Installation of butter pre-stratification tank & butter melting vat :- The dairy is manufacturing Ghee from butter by using ghee vat. The major energy is spent to evaporate the moisture present in butter. In order to save this thermal energy to an extent of 50% it is prosposed to install butter melting vat and a pr-stratification tank. Butter after being melted would be taken into the pre stratification tank wherein around 50% moisture can be removed by the process of sedimentation wherein no thermal energy is spent. The approximate savings expected is Rs. 3.30 lakhs and the proposed investment is Rs. 9 lakhs.

8) Hot water battery system for cream pasteurizer:- The cream pasteurizer installed at the dairy is being operated without hot water generation unit wherein considerable amount of steam is lost. To harness this wastage it is proposed to install a hot water battery system wherein the steam is used to generate hot water which would be circulated in closed circuit. The proposed investment is Rs. 0.75 lakhs and the expected savings per annum is Rs. 0.44 lakhs.

ENVIRONMENT AND SAFETY:

Actions have been initiated to get the HACCP & EMS 14000 certification. The target date is by the end of 2006.

All the safety measures suggested by the statutory authorities have been implemented. There has been no incidence of accidents from past 3 years. The ETP is being expanded to treat the additional effluent flowing due to increased milk handling. The rain water harvesting also is in progress.