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July 1998

**Identification of remaining eligible
Indian commercial refrigeration
appliance manufacturers whose ODS
phase-out projects are not yet
prepared for funding by Montreal
Protocol Multilateral Fund**

Final report

Final report

July 1998

Identification of remaining eligible Indian commercial refrigeration appliance manufacturers whose ODS phase-out projects are not yet prepared for funding by Montreal Protocol Multilateral Fund

Submitted to

**United Nations Industrial Development Organisation (UNIDO)
UNIDO Contract No. 98/065P
Project No. MP/IND/97/208**

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Identification of remaining eligible Indian commercial refrigeration
appliance manufacturers whose ODS phase-out projects are not yet prepared
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Abbreviations

AIACRA	All India Air Conditioning & Refrigeration Association
CII	Confederation of Indian Industry
CRAM	Commercial refrigeration appliance manufacturer
DCSSI	Development Commissioner, Small Scale Industries
IIT	Indian Institute of Technology
MOEF	Ministry of Environment & Forests
MPMF	Montreal Protocol Multilateral Fund
MT	Metric Ton
NCL	National Chemical Laboratory
NSIC	National Small Industries Corporation
PUF	Polyurethane foam
SME	Small & Micro enterprises

The United Nations Industrial Development Organisation (UNIDO) are carrying out the project "Preparation of an Investment Project for phasing out ODS in the Refrigeration Section" on the basis of the approval accorded by the Executive Committee of the Multilateral Fund for the implementation of the Montreal Protocol. In this connection, UNIDO have engaged TERI as contractor under Contract No.98/065P to identify remaining substantial commercial refrigeration appliance manufactures in the four metros (Mumbai, Calcutta, Chennai, Delhi) and Bangalore, which are eligible for funding under the Montreal Protocol but whose ODS phase out projects are not yet prepared. The terms of reference as given in Annexure E of the contract are as follows:

Quote

3 April 1998

Annex E

Terms of Reference

MP/IND/97/208

A. Project objective:

To identify if there are any remaining substantial Indian commercial refrigeration appliance manufacturers, which are eligible for funding under MP but whose ODS-phase out projects are not yet prepared.

B. Activities

1. Obtain a list of projects prepared and approved through implementing agencies: World Bank and UNDP.
2. Obtain a list of enterprises in the commercial sector from various sources, like All India Refrigeration and Air-conditioning Association, DC-SSI, Ministry of Industry, etc.
3. Compare the available lists to identify enterprises whose ODS-phaseout projects are not yet prepared. Contact such enterprises in the sector to explore their readiness/feasibility for ODS-phaseout project.
4. Generally explore and identify any other remaining eligible enterprises whose ODS phaseout projects have still not been made in the four metros Mumbai, Calcutta, Chennai, Delhi and also Bangalore.
5. Prepare and submit a report to UNIDO on the findings including:
 - available list of major enterprises in the sector,

- available list of approved projects and the total amount of CFC to be phased out through these projects.
- short description of the potential projects, names and contact address of the potential beneficiary enterprises, their current production level, type of their products, CFC consumption of these enterprises by types of CFCs and their foreseen substitutes.

C. The report should be submitted to UNIDO in three copies within two months after the award of the contract.

Unquote

The TERI study team consisted of:

D D Arora	Senior Visiting Fellow
Mohit Dua	Research Associate
K Y Valsa	Secretarial Assistance
Ritu Sharma	Secretarial Assistance

As per the terms of reference, a list of approved projects of commercial refrigeration appliance manufacturers was obtained from the implementing agency, World Bank. This list was supplemented with similar information informally collected from the Ozone Cell, Ministry of Environment and Forests. On checking with the implementing agency, UNDP it was found that they have not prepared any project of Indian commercial refrigeration appliance manufacturers so far.

For identifying remaining substantial commercial refrigeration appliance manufacturers in the four metros and Bangalore, whose projects have still not been prepared, full list of their members furnished by All India Air Conditioning and Refrigeration Association was scrutinized to extract the required information. DCSSI, Ministry of Industry was approached to get the information but his office regretted their inability to release any list for the present from the survey of small scale industries conducted by them earlier. In an effort to collect more names, lists were also obtained through special requests from the leading compressor suppliers, Kirloskar - Copeland, and from Expanded Incorporation, one of the Polyol suppliers to refrigeration and foam industries. Names of commercial refrigeration appliance manufacturers in each of the four metros and Bangalore derived from the above lists served as the starting base for further investigations and identification, as described in Chapter 4.

All the four metros and Bangalore were visited in the course of the investigations.

A list of 22 approved projects of Indian commercial refrigeration appliance manufacturers with ODP phaseout target of 298 MT is given in Chapter 3. One more project submitted for approval in July, 1998 Excom meeting is shown separately in the list.

Projects of a fairly large number of commercial refrigeration appliance manufacturers still remain to be prepared in the four metros and Bangalore. Investigations were made to find out which of these manufacturers are substantial consumers of ODS. After preliminary screening, nearly 68 manufacturers shortlisted for further scrutiny were contacted. It was found that the majority of them have very low ODS consumption, and that the cost effectiveness of their phaseout would not meet the current threshold value established by the Multilateral Fund. However, 7 manufacturers, having annual ODS consumption upwards of 2 MT, were identified as candidates for detailed examination to decide whether their projects can be prepared. Full particulars of these manufacturers, their production profile and level of their ODS consumption are given in Chapter 4.

Chapter 5 poses the problem of how to deal with conversion of the sizeable number of remaining commercial refrigeration appliance manufacturers with ODS consumption below 1-2 MT per annum, in the face of cost effectiveness threshold value limit of US \$ 15.21 imposed by MPMF. The issues concerning the selection of alternative refrigerant to R-12 by the small scale commercial refrigeration appliance manufacturers and the uncertain future availability of R-141b (as a replacement for R-11) after 2003, are also discussed in Chapter 5.



Approved ODS-phaseout projects in commercial refrigeration sub-sector in India

A list of the 22 investment projects of Indian commercial refrigeration appliance manufacturers approved by Montreal Protocol Multilateral Fund (MPMF) is given in appendix 3.1. All these projects were prepared through the implementing agency, World Bank.

This list has been obtained informally from the Ozone Cell, Ministry of Environment and Forests. At the time of collecting the information, a 23rd project (Sandeep Refrigeration, Kolhapur) was awaiting consideration of the Executive Committee of MPMF.

The implementing agency, UNDP has not been entrusted with the task of preparing projects in the refrigeration sector in India. However, services of the UNDP consultants engaged for preparing projects in the foam sector in India are also being availed of by the World Bank for the preparation of commercial refrigeration appliance manufacturer phaseout projects since ODS usage in PUF insulation is a significant part of ODS consumption in the manufacture of commercial refrigeration appliances.

A few of the CRAMs with approved projects were contacted to find out the current status of phaseout. All the manufacturers have been provided (or are being provided) with a set of basic equipment, including a small high pressure foam dispensing/pouring unit (cost US \$40,000), two-channel type manual charging board for alternative refrigerant R-134a (cost US \$6,000), vacuum pumps (cost US \$ 3,600) and R-134a leak detectors - 4 nos. (cost US \$2,000). Manufacturers who have received the equipment are still in the process of initiating commercial production, and have yet to commence full-scale supply to the market due to the problems associated with the use of POE oil with R-134a refrigerant.

Appendix 3.1

List of projects of Indian commercial refrigeration appliance manufacturers approved for funding under the Montreal Protocol

S.no.	Enterprise	ODP target (MT)	Grant (US \$)
1.	Meghdoot Refrigeration Industries Pvt. Ltd. 10, Kesakaka Compound I.B. Patel Road Goregaon (East) Mumbai - 400 063 (Factory at Palghar in Maharashtra state)	14.8	164,590
2.	Standard Refrigeration Appliances Cross Road 'C' Marol Pipeline (West) Behind SEEPZ Andheri (East) Mumbai - 400 093	20.0	170,180
3.	V. Krishna & Co. Motibaug V.N. Purau Marg Opposite R.K. Studios Chembur Mumbai - 400 071	14.8	147,020
4.	V. Krishna Engineers Ltd. New Mumbai factory in Vashi (Same group as in 3 above)	17.0	202,790
5.	Polar Enterprises 21, Nahar & Seth Industrial Estate L.B.S. Marg Bhandup (West) Mumbai - 400 078	11.5	138,190

S.no.	Enterprise	ODP target (MT)	Grant (US \$)
6.	Friz-Tech Pvt. Ltd. 213/208 Navyug Industrial Estate T.J. Road Sewri Mumbai - 400 015	11.5	132,900
7.	Sairkupa Industries 37, Nand Ghanshyam Industrial Estate Off Mahakali Caves Road Andheri (East) Mumbai - 400 093	14.8	135,618
8.	Aarkay Industries D/3/9 Mapusa Industrial Estate Mapusa Goa (Same group as in 14 above)	19.8	135,798
9.	Seepra Refrigeration Pvt. Ltd. H-2/8, MIDC Ambad Nasik (Maharashtra)	15.0	171,910
10.	Sarkar Refrigeration Industries D-62, MIDC Nagpur	12.0	117,100
11.	Sheetal Engineering Works Pvt. Ltd. G-8, Silver Spring Near St. Xavier's Ladies Hostel Navrangpura Ahmedabad (Factory in an industrial estate in Ahmedabad district)	9.2	127,630
12.	Rockwell Industries (P) Ltd. (Formerly Rockwell Devices (P) Ltd.) 218, Swapnalok S.D. Road Secunderabad - 500 003 (Factory outside Secunderabad)	18.0	181,004

S.no.	Enterprise	ODP target (MT)	Grant (US \$)
13.	Sethia Appliances Pvt. Ltd. P-6/1, IDA, Nacharam Opposite A.P. Foods Hyderabad - 500 076	16.0	173,384
14.	Rabi-Run Refrigeration Pvt. Ltd. No. 23C/A, J.C. Industrial Layout 3rd Main, Ist Stage, Elachenahalli Kanakapura Road Bangalore - 560 061	14.0	142,622
15.	Murali Refrigeration & Engineering Co. 2277-A, Kaniampuzha Road Vytila Cochin - 682 019	9.0	126,485
16.	Supercold Refrigeration Industries Plot No. 30, Industrial Estate Manvila, Kulathur P.O. Trivandrum - 825 583	11.0	133,770
17.	Sidwal Refrigeration Industries Plot No. 23, Sector 6 Faridabad - 121 006	14.1	169,744
18.	Hindustan Refrigeration Industries 4, Netaji Subhash Marg New Delhi - 110 002	10.2	132,320
19.	Refrigeration Components & Accessories (Same group as in 18 above)	9.5	125,370
20.	Refrigerators & Home Appliances (P) Ltd. 158, Anna Salai Chennai - 600 002 (Same group as in 18 and 19 above)	12.0	147,300
21.	Chandra Frig Co. Pvt. Ltd. Plot No. 290, Najafgarh (Paparwat) New Delhi - 110 043	9.9	130,984

S.no.	Enterprise	ODP target (MT)	Grant (US \$)
22.	Shakti Fabricators Chandra Industries Building Near BSF Chowk G.T. Road Jalandhar - 144 001 (Main marketing office: Anand Refrigeration Co. Pvt. Ltd. D-86, Lajpat Nagar I New Delhi - 110 024)	13.5	159,230
Total		297.6	3,265,939

Project submitted for approval in July, 1998 Excom meeting

23.	Sandeep Refrigeration 720/E, Shahupuri, 3rd Lane Kolhapur - 416 001 M/s Sandeep Engineering Co. G-101, MIDC, Gokul Shirgaon Kolhapur - 416 237		?
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4

Remaining substantial commercial refrigeration appliance manufacturers in the 4 metros and Bangalore whose ODS phase-out project preparation merits examination

4.1 Lists of commercial refrigeration appliance manufacturers (CRAMs)

The list furnished by All India Air-Conditioning & Refrigeration Association (AIACRA) is reproduced in appendix 4.1. Membership of this association includes both manufacturers, traders and repair shops, and has nearly 120 direct members. Besides, it has four zonal chapters (covering four regions of the country) which enrol their own members. For the purpose of this report, names of AICRA members in the four metros and Bangalore were extracted from the full list and the extracted names were initially scanned to segregate the traders and repair shops from the manufacturers.

The office of Director (ODS) in the DCSSI, Ministry of Industry was approached to obtain their list of commercial refrigeration appliance manufacturers. Such a list should have by now been available from the country-wide survey conducted by NSIC under the auspices of DCSSI to identify small scale industrial units all over the country which are using ODS. The Deputy Director (ODS) informed during a personal meeting that DCSSI's office had sent the survey report to Director (Ozone Cell) in the Ministry of Environment & Forests some time back, and until approval of the survey report is received from MOEF, the DCSSI office is not in a position to release the list of small scale industries included in the survey report.

In order to gather additional information on the existence of CRAMs in the four metros and Bangalore, requests were specially made to Kirloskar-Copeland, the leading supplier of compressors, and to Expanded Incorporation, who are one of the Polyol formulation suppliers in India catering to the needs of refrigeration and foam industries. The lists received from both these sources are given in appendices 4.2 and 4.3 respectively.

The names of commercial refrigeration appliance manufacturers on record with TERI (collected earlier at the time of Country Programme and Ecofrig conferences/workshops) were also examined to see if any enterprise located in the four metros and Bangalore did not figure in appendices 4.1 to 4.3.

4.2 Shortlisting of CRAMs in the 4 metros and Bangalore for further investigations

After going through the segregated list of CRAMs from appendix 4.1 and the lists contained in appendices 4.2 and 4.3 as well as in TERI records, names of few refrigerator manufacturers and those CRAMs whose projects have already been approved by MPMF were set aside. The lists were further pruned to eliminate some parties who are either not involved in any tangible manufacturing activities or are untraceable. The shortlisted enterprises thus identified at each of the four metros and Bangalore were subsequently kept under focus for a closer investigation of the nature and scale of their operations.

The picture emerging from visits to the shortlisted enterprises or in some cases through telephone conversations, including long distance calls where factories are located at stations other than the five cities, is summarized separately for each metro and Bangalore as follows:

4.2.1 Mumbai

The enterprises shortlisted and outcome of interaction with them is tabulated below:

1. Frigcool Industries

It is not a manufacturing unit but a godown for Videocon refrigerators.

2. Remi Instruments

Merits consideration for a possible project. Details are provided later.

3. Blue Star Ltd.

Manufacture chillers for which an investment project for conversion from R-11 to HCFC-123 prepared by the World Bank some time back was approved. They have a water cooler manufacturing unit at Bharuch in Gujarat State which merits consideration for a possible project. Details of this unit are provided later.

4. Industrial Refrigeration (P) Ltd.

Their manufacturing activities are in the arena of industrial refrigeration and besides undertaking projects themselves, they also represent a few foreign companies who manufacture industrial refrigeration equipment, Ice Flake machines and PUF panels for cold stores. Their main activity comprises construction of water chillers and cold storages of different sizes by associating with manufacturers of insulation panels who carry out construction of panels. The refrigerant primarily used by them is R-22. Use of R-12 is confined to small cold rooms for which consumption is limited to about 700 kg per annum.

They have two factories at Pune and Silvassa at some distance from Mumbai. A note describing their activities is appended as appendix 4.4.

5. Acme Refrigeration Company

Their factory is located at Margoa in Goa state which is being run under the name of 'Acme Airfrost'. Deep freezers and bottle coolers are manufactured in this factory and the production is reportedly around 250-300 units per annum. Despite several reminders, they have been unable to furnish their ODS consumption which, at the level of their reported production, is not expected to be large.

6. Frig India Air Cooler (Penguin Refrigeration)

A very small manufacturer of deep freezers and water coolers who draws even his R-12 requirements in 2-3 kg repacked small cylinders.

7. Spectrum Scientific

The promoter of this unit is an ex-employee of Remi Instruments (no. 2 above) and they manufacture a similar type of refrigerated laboratory equipment, though on a much smaller scale. Having come to know that data of ODS consumption was also being gathered from Remi Instruments, they hesitate to furnish their own consumption figures in view of their small operations.

8. Fast Freeze Products

Construct large storage rooms, tunnel freezers, etc. having a temperature of -40° C and below using Ammonia. These are used by exporters for storage of fish and other perishable foodstuff. R-12 is not used by them as refrigerant.

9. Asea Brown Boveri

They had a unit in Pimpri, Pune which has been reconstituted into a new company from April 1, 1998 under the name of Sabrol Refrigeration India Ltd. in which ABB has no holding.

Sabrol Refrigeration undertake refrigeration of industrial units using chilling plants mainly operating on Ammonia and at times on R-22 as refrigerant. R-12 is not used by them as refrigerant.

10. Cools Well

Mostly handle repairs and servicing of commercial refrigeration appliances, and only very occasionally manufacture these appliances. Supplies of R-12 are purchased by them in small 10 kg repacked cylinders. They also attend to upkeep of cold storage plants which use R-22 as refrigerant.

11. Weather Works (Kalol) Pvt. Ltd.

Though they have their main marketing office at Mumbai, their two factories are

at Kalol and Partap Nagar near Baroda in Gujarat State.

At Mumbai, they also operate a servicing, maintenance and repair workshop for commercial refrigeration appliances under the firm name of 'Weather Works' which is a sister concern.

ODS consumption at the two factories as well as Mumbai service/repairs centre is sizeable and merits consideration for a possible project. Details are provided later.

Weather Works, Mumbai also assemble and service/repair a full range of air conditioners in a separate workshop for which they use a sizeable quantity of R-22.

12. Intercool Western Refrigeration (India) Ltd.

They have recently formed this joint venture company and set up a new factory at village Lahe on the road from Mumbai to Nasik to manufacture Visi-coolers and bottle coolers exclusively for the multinational, Coca Cola. It is a sizeable factory having capacity to manufacture over 40,000 units per annum with technical assistance from Sanden.

As a matter of policy, Coca Cola procures only CFC free appliances for retail marketing of their range of cold drinks. Intercool Western are their major suppliers (the only other supplier being Amtrex Appliances Ltd., Ahmedabad) and are using R-134a as refrigerant and R-141b as blowing agent for PUF insulation. Compressors using R-134a as refrigerant are imported or accessed from local manufacturers, and PU foam formulations based on HCFC-141b are available from local Polyol suppliers.

They have set up 25 service stations all over the country to service appliances in use with Coca Cola retailers. The number of service stations is being enlarged. They have not sought any financial support from the MPMF, and are not eligible for such support as they commenced production after the MPMF cutoff date.

13. Amtrex Appliances Ltd.

Their head office is at Ahmedabad, and factories for both air conditioners as well as commercial refrigeration appliances are outside Ahmedabad within Gujarat state. Manufacture and sale of air conditioners is their major activity.

They make Visi-coolers and bottle coolers exclusively for Coca Cola, their level of production ranging from 5,000 to 10,000 units per annum. About 25% of Coca Cola's requirement of refrigeration appliances is met by them, the balance coming from Intercool Western. All these appliances are CFC free, as described under item 12 above.

Amtrex also import Fountains of 'Cornelius' make from USA to make its supplies available to Coca Cola. They have large number of dealers and service stations for marketing and servicing Amtrex air conditioners all over the country.

Like Intercool Western, they also service refrigeration appliances in use with Coca Cola retailers through a chain of 40 service stations. They too are not eligible for MPMF support as their production commenced after the cutoff date.

14. Allwyn (a unit of Voltas Ltd.)

Voltas have their head office in Mumbai and their manufacturing units for air conditioners and chillers are at Thane, about 30 kms from Mumbai.

They have three refrigerator plants at Warora, near Nagpur in Maharashtra state, Sanatnagar in Hyderabad and at Nandalur, both in the state of Andhra Pradesh. Compressors for the refrigerators are manufactured by them in a separate plant at Sanatnagar. Phase I of their project prepared by the World Bank for conversion of foam insulation from R-11 to cyclopentane has been approved by MPMF. Change of refrigerant from R-12 to either R-134a or Hydrocarbons will form Phase II of the project which they have undertaken to submit in due course. A pilot plant for foam insulation with cyclopentane set up under the Ecofrig project at Sanatnagar refrigerator factory is already in operation.

Negotiations are at a final stage between Voltas and the multinational, Electrolux whereby the latter will acquire majority stake and take over Warora and Nandalur refrigerator factories as well as Sanatnagar compressor plant for their own manufacture. Electrolux will also acquire from Voltas the right to market refrigerators under the brand name 'Allwyn' which is in use for marketing refrigerators presently produced at the Sanatnagar and Nandalur refrigerator factories.

On the above acquisition by Electrolux materializing, Voltas will be left with only the Sanatnagar refrigerator factory, including the cyclopentane foam insulation pilot plant, without the use of 'Allwyn' trademark. Voltas are thereafter planning to give up their own production and marketing of refrigerators and use the Sanatnagar plant to manufacture direct cooled models of refrigerators possibly for Whirlpool and LG Electronics, which they have been partly doing for some time.

The Sanatnagar plant is also manufacturing commercial refrigeration appliances for multinational companies on a large scale. This activity is likely to continue and in fact get enlarged. The entire requirement of Pepsi for visi-coolers and coolers with insulated doors is currently being met from this plant. Additionally, chocolate coolers are being manufactured here for Nestle, Cadbury and Candoss. Change of refrigerant in the commercial refrigeration appliances from R-12 to an alternative, still to be decided upon, may justify preparation of an individual project. This can be separate from Phase II of the project for refrigerator manufacture still to be submitted to cover the change in refrigerant. Whether both the projects will need to be prepared by a common implementing

agency is a matter for consideration.

Data pertaining to ODS usage in the production of commercial refrigeration appliances is provided later.

4.2.2 Calcutta

The enterprises shortlisted and outcome of interaction with them is tabulated below:

1. Crystal Refrigeration Pvt. Ltd.

Manufacture air conditioners

2. R.E. Air-Tech Industries Pvt. Ltd.

Manufacture air conditioners

3. Weather Makers

Primarily manufacture air conditioners. Make only a few commercial refrigeration appliances against specific orders.

4. Himalaya Cooling Industries

Manufacture deep freezers and bottle coolers; annual production 250-300 units. Annual CFC consumption: 200-250 kg of R-12 and 35 kg of R-11 in PUF formulation. Partly use glass wool and thermocol for insulation.

5. Imperial Refrigeration Industries

Manufacture deep freezers (75 nos.), bottle coolers (70 nos.), water coolers (20 nos.) and other appliances (20 nos.) per annum. Claim annual CFC consumption of 400-500 kg of R-12 and 35 kg of R-11 in PUF formulation.

6. Rajal Refrigeration

Manufacture small number of 25-30 deep freezers and bottle coolers per annum. Use glass wool and thermocol for insulation. Claim use of 75 kg of R-12 per annum.

Following additional names of CRAMs were gathered during visit to Calcutta.

7. Amar Cooling Industries

46, Chakravaria Road

Calcutta - 700 020

Manufacture small number of 30-50 deep freezers and bottle coolers per annum. Use glass wool and thermocol for insulation. R-12 usage is about 50 kg per annum.

8. Unique Refrigeration Company

½ A, Beni Nandan Street

Calcutta - 700 025

Tel: 455 1542

Manufacture small number of deep freezers, ice candy plants, water coolers and bottle coolers per annum. Use glass wool and thermocol for insulation. R-12 usage is 50-60 kg per annum.

9. Cold Craft

Manufacture the following refrigeration appliances:

- Adjustable shelf type vertical cabinets of stainless steel with 2 or 3 doors. Refrigerant used is R-22 and in a few cases R-502: Production is 10-20 units per annum
- Chilling plants of 0.5 to 80 tonnes capacity
 - 0.5 tonne plant (Refrigerant R-12): Production: 10-20 units per annum
 - Bigger plants (Refrigerant R-22): Production: 30-50 units per annum
- Ultra low temperature cabinets and cold baths for special applications (Refrigerant R-13): Production: Few numbers

For insulation, they use pre-foamed PU slabs and do not undertake any formulation mixing themselves. Their consumption of refrigerants is of the following order:

R-12	:	75-150 kg per annum
R-13	:	20/30 kg per annum
R-22	:	2,500-3,000 kg per annum
R-502	:	15-20 kg per annum.

They manufacture refrigeration appliances for specific usage and these appliances are marketed all over the eastern region of the country. However, their CFC consumption is not large.

4.2.3 Chennai

The enterprises shortlisted and outcome of interaction with them is tabulated below:

1. Neptune Refrigeration Co. Pvt. Ltd.

Construct cold storages and big refrigeration plants based on Ammonia. In a few cases, R-22 is used as a refrigerant on request. R-12 is not being used by them.

2. Richardson & Cruddas

Manufacture four models of open type compressors of 0.5 HP, 1 HP, 3 HP and 7.5 HP capacity for use by their customers in deep freezers, cold rooms, ice candy

plants, mortuaries, etc. Only the smallest 0.5 HP compressor operates exclusively on R-12 but they claim that it can be operated on R-134a equally well. The bigger 1 HP, 3 HP and 7.5 HP compressors are designed to operate on R-22 and R-502 and can switch to R-12. Their total annual production is 500-750 compressor units per annum of which 100-120 units per annum is of the smallest compressor of 0.5 HP capacity.

They only fill the first oil charge in the compressors and leave it to their customers to charge the refrigerant. Their own manufacture of refrigeration appliances using their own compressors is very small; confined to occasional government orders. As such, their own consumption of R-12 as refrigerant is only about 20 kg per annum.

3. Krishna Agro Industries Corporation

They are one of the prominent manufactures of commercial refrigeration appliances in Chennai and also operate a second unit in the same industrial estate under the name of Upfront Engineering Industries Pvt. Ltd. (item 4 below). The active partner in the firm of Krishna Agro Industries is also a Director in Upfront Engineering, a limited company. Other close members of the same family own and operate three other separate and well known factories in and around Mumbai for manufacture of commercial refrigeration appliances.

Between Krishna and Upfront, the two factories manufacture a full range of made to order appliances like deep freezers, visi-coolers, bottle coolers, water coolers, table top refrigerators, pastries and sweet counters.

They also manufacture small chilling plants which use R-22 and R-12 as refrigerant. In a few cases, R-502 is also used.

PUF insulation is generally used. Total production of appliances between the two factories exceeds 500 units per annum. Additionally, Upfront Engineering also produce condensers and evaporators for captive consumption. Annual ODS consumption of Krishna Agro is at a level of 900 kg of R-12 and 300-400 kg of R-11 in PUF formulation.

4. Upfront Engineering Industries Pvt. Ltd.

B-8, SIDCO Industrial Estate

Villivakkam

Chennai - 600 049

The position of this company is described above. Their ODS consumption is at a level of 750 kg of R-12 and 300 kg of R-11 per annum.

Preparation of a combined project for Krishna Agro and Upfront Engineering merits examination. Provision of equipment to be made in the project report could be on a shared basis in view of the proximity of the two factories and their operations being complementary.

5. Gem Equipments

Coimbatore

(Coimbatore is in the same state of Tamil Nadu of which Chennai is the capital city)

Manufacture chillers and industrial coolers using mostly R-22 and small quantity of R-12 as refrigerants. PU foam is used for insulation. Current consumption of R-22 is around 500 kg and R-12 about 75 kg per annum. In addition, about 50 kg of R-11 is consumed in PUF formulation.

During visit to Chennai, additional names of the following two CRAMs were gathered and investigations made:

6. Freeze Tech

52, Nehru Nagar

Kottivakkam Village

Chennai - 600 041

Tel: 4925711

Persons concerned: H. Moiz, Derek D'crus

Manufacture around 200 units of commercial appliances per annum comprising deep freezers, bottle coolers, water coolers, chilling plants and other refrigeration equipment. Their factory is well equipped and has an employee strength of around 20 persons. Production capacity of this unit is much larger than the present production.

Their consumption of R-12 is at a level of 400 kg per annum and they additionally use about 150 kg of R-11 in PUF systems. They also run a mobile air-conditioning workshop next door under a separate firm name of 'Auto Ref' which does gas recharging of car and bus air-conditioners with R-12. This yields sizeable consumption of R-12 over and above the figures given above. They also undertake recharging of R-134a compressors in imported cars fitted with such compressors.

Though their ODS consumption is not substantial in the manufacture of commercial refrigeration appliances, they do merit a look on the basis of their overall consumption of R-12 to see if preparation of a project is possible to offer them some equipment which can be useful to convert from the use of R-12. Mr Moiz is a keen operator closely interested in keeping track of developments covering CFC phase out in refrigeration sector.

7. Refrigeration Centre**27/1, New Baug Road****T. Nagar, Chennai - 600 017****Tel: 4340327****Person concerned: Mr Swaminathan**

Manufacture around 350 assorted commercial refrigeration appliances per annum using both R-12 and R-22 as refrigerants. Only thermocol is used for insulation. Their refrigerant consumption, including for servicing and repairs, is reported at a level of about 600 kg of R-12 and 350-400 kg of R-22 per annum.

4.2.4 Delhi

Delhi being the headquarter of AIACRA and its northern zone chapter, its list of members given in appendix 4.1 includes a large number of 74 members from this city. The few names of enterprises in Delhi appearing in appendices 4.2 and 4.3 also figure in AIACRA's list. A preliminary scrutiny of the above 74 enterprises revealed that 9 of them are traders, a few more are only making equipment like cooling coils, condensers and heat exchangers used for refrigeration while some others have either closed down or are not traceable. Furthermore, three enterprises construct large ammonia plants; one manufacturer making open type compressors has an approved MPMF conversion project, and is converting his R-12 models to R-22; and another manufacturer making large central air-conditioning plants and chilling units has dispensed with small usage of R-12 by totally switching to R-22 as refrigerant. After eliminating these enterprises and those whose projects have been approved, the profile of remaining manufacturers emerging from further investigations is summed up as is provided later.:

Air-conditioner assemblers and enterprises dealing with only servicing/repair of appliances

1. Abhishek Aircon Appliances (P) Ltd.
2. Aircare
3. Centron airconditioners
4. Citi House air conditioners
5. Climatic Equipment
6. Hemkunt Electricals
7. Ice Machinery Mart
8. M.S. airconditioners
9. R.K. refrigeration
10. Shiva Airconditioning company
11. Shubh
12. Sumit Refrigeration industry

13. United Technical Service
14. Vardaan Aircon
15. Vishesh Appliances
16. National Refrigeration Co.

Small manufacturers of commercial refrigeration appliances

Following is the list of manufacturers making refrigeration appliances in the range of 25 to 150 units per annum. Their annual R-12 consumption varies from 40 kg to 250 kg and R-11 usage goes upto 70 kg in PUF formulations out of total quantity upto 400 kg of formulations used per annum:

1. Asian refrigeration
2. Avon refrigeration
3. Friends refrigeration works
4. Mittal refrigeration
5. Nirmal refrigeration works
6. Osho Home appliances
7. Paramount industries
8. Scientific Instrument industries
9. Sheetal aircon
10. Super refrigeration company
11. Thakar equipment company
12. Advance refrigeration
13. Dataref Industries
14. Royal refrigeration works

CRAMs manufacturing over 150 units per annum

1. Dafoo Engineers

Make ice-candy plants using open type compressors as well as other commercial refrigeration appliances. Annually consume around 250 kg of R-12, small quantity of R-502 and about 80 kg of R-11 in PUF formulations.

2. International refrigeration industries

Make about 500-600 units of refrigeration appliances like bottle coolers and deep freezers per annum, consuming approximately 500 kg of R-12 and 40 kg of R-11 in PUF formulations. Also, partly use glass wool and thermocol for insulation.

Apart from manufacturing refrigeration appliances, they use R-12 for recharging bus air-conditioning units and claim a usage of 5000 kg per annum for this purpose.

3. Refrigeration Marketing Company

Mentioned in the list as Lucky refrigeration since they sell appliances under 'Lucky' trade name. Making about 350-400 units of refrigeration appliances like deep freezers, water coolers, display cases, etc. per annum for which they claim consumption of 600 kg of R-12 and about 200 kg of R-11 in PUF formulations. Thermocol is also partly used for insulation. Place of production is behind the shop.

4. York Scientific

Makers of Biomedical scientific equipment for over three decades, they have been trying to get funds under the Protocol for switchover. They have corresponded with consultants, Ozone cell, AIACRA and CII. Make about 250 units of equipment per annum for which they consume approximately 600 kg of R-12, 250 kg of R-22, 100 kg of R-502 and 15 kg of R-13, besides 250 kg of R-11 in PUF formulations.

5. Mittal International

**Works: 598, Shahbad Dularpur
Delhi Bawana Road
Delhi - 110 042**

Contact Person: Mr Vinod Mittal

Tel: 91-11-729 2640, 729 3640

This enterprise was earlier based in Noida under the name Antarctica. Make refrigeration appliances like deep freezers, bottle coolers, display counters, etc. as well as low temperature refrigeration equipment used in R&D laboratories. Consume approximately 300 kg of R-12 and 150 kg of R-11 in PUF formulations for making about 500 units per annum. Besides PUF, thermocol and glass wool are also used for insulation though to a lesser extent.

6. Commercial Refrigeration Company

Make 200-250 units of refrigeration appliances yearly in the works at F-25, Sector-8, Noida. Consume about 375 kg of R-12 and 100 kg of R-11 in PUF formulations per annum. Thermocol and glass wool are also used partly for insulation.

7. Natwest Control (P) Ltd.

Make refrigeration appliances like deep freezers, water coolers, etc. Number of units produced ranges between 400-500 units per year for which claim consumption of about 500 kg of R-12 and over 100 kg of R-11 in PUF formulation. Fibre glass and thermocol are also partly used for insulation.

8. Natco Control

Make large chilling plants. Approximately 25-30 plants are assembled on site per year. Reported R-12 consumption is around 450 kg per annum. Do not use PUF insulation.

This enterprise has common ownership with Natwest control (no. 7). They also assemble air-conditioners under the name of National Refrigeration Co. (no. 16 under AC assemblers on pages 20 and 21).

9. Trikuta Coolings Pvt. Ltd.

10. National Enterprises

Both enterprises have common ownership, are located in the same premises and are therefore being dealt with together. They have been in production since long but due to labour unrest, the operations were shut down during the years 1995-96 and 1996-97. Production has started again since last year and according to the owner, Mr Kamal Sahdev, it is now picking up. He estimates that the two units manufacture around 350 commercial refrigeration appliances per annum comprising deep freezers, bottle coolers, display cabinets and softy machines but it appears such a level of production will take more time to materialize.

Manufacture of some jointly mounted bottle coolers and deep freezers for railway pantry cars is under promotion for which PUF insulation is used. Glass wool and thermocol are used for insulation of most of the other production. Mr Sahdev claims that they also service and repair about 700 commercial refrigeration appliances per annum.

Reported annual consumption of R-12, including recharge of appliances for repair, is 1500-2000 kg which appears comparatively high. Additionally, R-11 usage is around 100 kg in PUF formulations.

The owner, Mr Kamal Sahdev is President of AIACRA and he always takes up the cause of small CRAMs, making 200-500 appliance per annum, by recommending assistance to them from MPMF to provide basic equipment for converting from CFCs to non-ODS alternatives. A look at the feasibility of preparing a combined project for his two concerns will also provide an opportunity to hear his views on treatment required for small CRAMs.

11. SIEL Aircon Ltd.

The name of this enterprise has been added on the basis of TERI's past interaction with this enterprise.

SIEL belonging to Shriram group of industries is a company which was till recently operating in Sanatnagar, Hyderabad in the state of Andhra Pradesh. They were one of the two independent compressor manufacturers (the other being Kirloskar-Copeland) who have been supplying compressors to CRAMs. SIEL were also making water coolers in the premises of their Sanatnagar

compressor factory.

The SIEL Sanatnagar compressor plant was recently taken over by Tecumseh where the latter are now making their own range of compressors. Upon this take-over, SIEL have shifted their water cooler production to a factory at Faridabad near Delhi which is now operating under the name of SIEL Aircon Ltd. They are also making air-conditioners (mostly sheet work and assembly) in this factory for which manufacturing facilities were shifted to Faridabad from their Silvassa air-conditioners plant near Mumbai. Bulk of air-conditioners made in Faridabad factory are still being sent to Silvassa factory for finishing before sale in western India.

Whereas R-22 is used in compressors of air-conditioners, water cooler production makes use of both R-12 and R-22 as refrigerant in different models and partly uses PUF insulation containing R-11.

Estimate of R-12 annual consumption is placed around 2000 kg and additionally about 400-500 kg of R-11 is consumed through the use of PUF formulations. ODS consumption merits consideration for preparation of a project. Details are provided later.

4.2.5 Bangalore

The enterprises shortlisted and outcome of interaction with them is tabulated below:

1. Frig Crafters Pvt. Ltd.

**Factory: D 101, 3rd Main Rajajinagar Industrial Estate,
Bangalore - 560 044**

Their primary manufacture is of kitchen equipment, sweet counters, working tables, etc. Annual production of such equipment is 400 units. Also make about 150-200 commercial refrigeration appliances per annum comprising deep freezers, bottle coolers, water coolers and display cabinets. For insulation, they partly use PUF slabs and at times, mix the PU formulations themselves. Besides manufacture of new appliances, they also service their appliances in use with customers. Their ODS consumption is of the order of 400 kg of R-12 and 40 kg of R-11 in PU formulation.

2. Coastal Cools

Contact person: Mr K Prakashchandra

This is a marketing office in Bangalore for commercial refrigeration appliances manufactured at Udipi in the same state of Karnataka in two factories belonging to other members of Mr Prakashchandra's family. Part of the space in office premises is utilised to charge the new appliances received from Udipi with the refrigerant R-12 before delivery to customers in Bangalore. Odd air conditioners

are also assembled in the same premises. Mr Prakash Chandra provided the following details about the two factories at Udupi:

- (i) Names: Canara Refrigeration Works, Udupi: Factory behind the office.
Proprietor: Mr K. Gopal
- (ii) Uday Enterprises, Udupi: Factory subsequently put up on National Highway No. 17 by Mr K Vijayakumar, son of Mr K. Gopal.

Between the two units, they make 200-250 appliances per annum comprising deep freezers, bottle coolers, display cabinets, ice candy plants using open type compressors and chilling plants of 500-1000 litre capacity.

They were earlier using only glass wool and thermocol for insulation but started using PUF insulation from last year at Uday Enterprises. Around 20% of their production is now insulated with PUF.

About 50 appliances per year are sold through Bangalore office of Coastal Cools and the remaining larger number is marketed directly from Udupi in various parts of southern region.

Coastal Cools annually use 200-300 kg of R-12 for charging new appliances and servicing/repairs at Bangalore. The two factories at Udupi reportedly consume 700-800 kg of R-12 per annum but Mr Prakash Chandra could not indicate their consumption of PUF formulations.

3. Yeti Refrigeration

They were earlier manufacturing deep freezers and bottle coolers on a regular basis but have now confined their production to 15-20 units per annum against specific orders. For insulation, they use PUF slabs purchased from local suppliers.

They now use R-12 primarily for recharging mobile air-conditioners in cars. Additionally, they also undertake recharging of air-conditioners in buses and other refrigerated vehicles. They have access to Thermo-King of USA for technical advice on the use of 134a for mobile air conditioners in cars and on refrigerants like 404-A used for mobile refrigeration systems operating at lower temperatures.

Their current R-12 consumption is of the order of 400 kg per annum, mostly for recharging mobile air-conditioners.

4. Comet Environs

Manufacture specialized equipment like:

- Industrial water/oil coolers for cooling of die casting and injection moulding machines, welding equipment, etc.
- Ultra low-temperature (-80°C) chambers for long term storage of viruses, serum, etc.
- Sub-zero (-80°C) treatment chambers for dimensional stabilisation, age

hardening, etc.

- **Environmental test chambers**

Annual production against specific orders from customers like science institutes, Bharat Heavy Electric Ltd., Tata Institute of Fundamental Research and other leading institutions and research organizations, is around 75 units.

Refrigerants used by them are R-22, R-13 and HFC 23 and their consumption is not large. There is no usage of R-12. Consumption of R-11 in PUF formulations is around 100 kg per annum.

5. Raman Air Conditioners Pvt. Ltd.

They were earlier making deep freezers for an Indian cold drinks company but had to give up this work sometime back.

Their current activities are confined to servicing and maintenance of commercial refrigeration appliances and cold rooms. Consumption of R-12 is less than 100 kg per annum and they get its supply in repacked small cylinders.

6. Concept Solar & Composites Technologies Pvt. Ltd.

Manufacture solar water heater shells containing PUF insulation. These shells are supplied to Tata BP Solar who make solar water heaters.

Foaming is done with R-141b though a small Canon machine in a different premises. Use of refrigerant is not involved at any stage.

7. Solar Engineering Co.

Factory: Shampura, Arabic College Post, Bangalore - 560 045
Tel: 3438363

Manufacture deep freezers, bottle coolers, water coolers, ice-cream churners, pastry display units, ice candy units and ice making machines - the last two using open type compressors. Their annual production is about 150 units per annum. For insulation, they use PUF formulations. R-12 is generally used as refrigerant but small quantity of R-502 is also used in low temperature deep freezers.

Reported annual consumption of R-12 is around 700-800 kg per annum, including quantity used for servicing and repairs of old units in use with customers. R-11 usage in PUF formulations is of the order of 100 kg per annum. Small quantity of R-502 is also consumed.

8. Olympus Refrigeration and Engineering Corporation, Mangalore (located in the same state of Karnataka as Bangalore)

Manufacture 300-400 commercial refrigeration appliances per annum comprising deep freezers, bottle coolers, milk chillers, upright refrigeration systems and cold storage units. For insulation, they had partly taken on to PUF but have given it up and are now totally using thermocol. Consumption of R-12

is around 300-400 kg per annum.

9. Melcom Refrigeration Company, Mangalore

Small manufacturers of commercial refrigeration appliances, undertake production against orders. Their ODS consumption being low, they draw supplies of R-12 in repacked small cylinders .

10. Cheraag Fabrication (P) Ltd., Mysore (located in Karnataka state)

They were earlier operating under the name of the firm, Perfect Engineering Works which was founded in the year 1978. From the year 1988, they set up another firm under the name of Diana Refrigeration to supplement the production of Perfect Engineering Works. Between these two concerns, they developed very good business as suppliers of commercial refrigeration appliances to leading cold drink, beverage and ice-cream sellers all over the country and had attained a production level of 800-1000 units per annum.

Thereafter, the person owning the above two firms - Mr Cusrow Chothia, unfortunately got seriously ill with a brain tumour and he had to undergo major surgery. On the advice of his doctors, Mr Chothia closed down both the firms in the year 1992 and totally stopped production since he was advised complete rest.

After a shutdown of five years, Mr Chothia has restarted his business from August 1997 by setting up a new limited company, Cheraag Fabrication (P) Ltd. In less than a year's time, he has reached a level of 150 units and the company's production is on the increase with the revival of Mr Cusrow's business contacts. Consumption of R-12 of this company, including the quantity used for servicing and repairs of old appliances in use with their customers, is currently over 700 kg per annum. In addition, the company is consuming about 400 kg of R-11 in PUF formulations. Due to fast increase in production, the ODS consumption is expected to be substantially higher within the coming few months.

Keeping in view the past record of this enterprise and their mounting ODS consumption, possibility of preparation of a project for them merits consideration. Details are provided later.

11. Bhaskar Refrigeration Services, Belgaum (In Karnataka state but away from Bangalore)

Manufacture small quantity of around 30 deep freezers, bottle coolers and milk coolers per annum and assembler air conditioners. Also hold dealerships to sell compressors of the two major manufacturers, Kirloskar-Copeland and Tecumseh as well as Allwyn brand of refrigerators. Act as service dealers for a couple of other popular brands of refrigerators and maintain small stock of R-12 for sale to local servicing units. Their direct consumption of CFCs is small.

12. Freeze Mat Machines, Belgaum

Make ice-cream churners using hermetically sealed Kirloskar-Copeland compressors. This is a seasonal business and annual production is reported to be around 100-150 units. Only 25% of refrigerant charging with R-12 is done at the manufacturing stage, leaving the balance to be charged by the buyer of the appliance. Use PUF for insulation.

CFC consumption is small, in view of low production of appliances and part charging of refrigerant by the manufacturer.

13. Kalkura Cooling Machines, Udupi (Karnataka state)

Though contact could not be established with this manufacturer on telephone, information gathered from their compressor supplier indicates that they produce 300-350 units per annum. They are reportedly using a PUF mixing machine which is almost an exceptional case, since all CRAMs are hand mixing the PUF formulations based on R-11. ODS consumption data of this enterprise could not be gathered.

4.3 Substantial CRAMs meriting examination for project preparation

Keeping in view the cost effective threshold value of US \$ 15.21 per kg ODP fixed by MPMF, an ODS consumption level of 2 MT per annum has been considered as the bare minimum for an enterprise to merit closer examination for project preparation. It is realised that at this level of ODS usage, not all the required equipment for conversion to a non-ODS refrigerant and an alternative blowing agent can by any means be accommodated in the project. Yet, above this size, it is possible for the enterprise to viably meet the financial costs of equipment not covered by the MPMF. However, it would be unrealistic to expect smaller enterprises to meet phaseout costs beyond the cost-effectiveness threshold of the MPMF.

The CRAMs identified on the above basis for closer scrutiny before their project preparation is taken in hand are as follows:

1. Remi Instruments

14, Shah Industrial Estate

Veera Desai Road

Andheri (West)

Mumbai - 400 053

Director: Mr Sunil Saraf

Tel: 91-22-636 7419, 636 7736, 636 7424

Fax: 91-22-631 1038

A profile of REMI group and the laboratory instruments and other equipment

made by different divisions under this group are given in appendix 4.5. The specialized refrigeration equipment they manufacture includes microprocessor based centrifuges, blood bank refrigerators, deep freezers with temperature regulators, humidity chambers, etc. Their production of such equipment is over 600 units per annum as shown below:

Appliance	Production		
	1995-96	1996-97	1997-98
Blood bank refrigerators	108	169	192
Deep freezers	114	95	121
Refrigerated centrifuges	135	159	138
Ultra-cryostate baths	31	31	16
B.O.D. Incubators	154	132	144
Humidity chambers	26	30	32
Total	568	616	643

The refrigerant primarily used by them is R-12 and they also use small quantity of R-13. PUF formulations based on R-11 are hand mixed by them for insulation of the appliances. Their consumption of R-12 and PUF systems during the past 3 years is given below:

	1995-96	1996-97	1997-98
R-12	453 kg	531 kg	511 kg
PUF systems (containing part R-11)	2,800 kg	2,775 kg	3,325 kg
R-13	---Around 10-15 kg per annum----		

They also use R-12 for servicing and repair of their appliances in use with customers which is done from their various servicing units at major cities all over the country. This is presumably not reflected in R-12 consumption figures given above.

It is reckoned that their total ODS annual consumption may not be far below the 2 MT yardstick. Besides, they are engaged in manufacture of specialized refrigeration appliances where the higher value addition of the products may lead to financial viability of partially supported phaseout. Some of their important

customers, including WHO and UNICEF, listed in appendix 4.5 have already started asking them to undertake supplies of CFC free appliances. REMI are therefore anxious to get their project prepared for conversion.

2. Blue Star Ltd.

Plot Nos. 4 & 5

GIDC Industrial Estate

Narmadanagar

Bharuch - 392 015

(Gujarat State)

General Manager: Mr D.M. Reddy

Tel: 91-2642-46116, 47517, 47408 (Dir)

Fax: 91-2642-49732

Blue Star are distributors in India of commercial refrigeration appliances manufactured by West Frost of Denmark and arrange imports against orders. The appliances presently available from Denmark are CFC free.

Water coolers, mineral water dispensers and room air-conditioners are being manufactured by Blue Star in their factory at Bharuch in Gujarat State. The models of these appliances with their respective capacities and their level of production are contained in a fax message received from Blue Star annexed in appendix 4.6. The current ODS consumption for each category of appliance is also incorporated in the above fax message.

Water coolers upto 40 litres per hour cooling capacity use R-12 as refrigerant, whereas water coolers of bigger capacity make use of R-22. The refrigerant used for mineral water dispensers is R-12. Only glass wool and thermocol was being used earlier for insulation but for the past one year, nearly 15% of water coolers produced have PUF insulation.

Consumption of R-12 and R-11 is currently at a level of 600+300=900 kg per month or 10,800 kg per annum.

3. Weather Works (Kalol) Pvt. Ltd.

Units No.11-12, 339 Udyog Mandir Industrial Estate

7-C, Pitamber Lane

Mahim, Mumbai - 400 016

Tel: 91-22-4467 293, 4467 061

Director: Mr Ramesh Advani

Factory: Weather Works (Kalol) Pvt. Ltd.

26/1, GIDC Area, Kalol
District Panchmahal (Gujarat State)
Tel: 91-2676-35634, 35813
Baroda Office: 91-265-460084, 460 406
Director: Mr M.R. Gurubuxani

Weather Works
339, Udyog Mandir
Block No.11/12, Ground Floor
Bhagoji Keer Marg
Mahim
Mumbai- 400 016
Tel: 91-22-4455703, 4467 293, 4466 260
Proprietor: Mr J.R. Gurubuxani

(He is also on the board of Weather Works (Kalol) Pvt. Ltd.

Copies of two letters dated July 15, 1998 annexed as appendices 4.7(a) and 4.7(b) from the above two sister concerns indicate that their production of commercial refrigeration appliances and chilling units at Kalol and Partapnagar factories exceeds 1,200 units per annum and their total CFC consumption, including quantity used by Weather Works for servicing and maintenance, is of the order of 4,500 kg per annum. A combined project for the production units and the servicing/maintenance firm at Mumbai is indicated.

4. Allwyn (A unit of Voltas Ltd.)

Allwyn Bhawan
Sanatnagar Post
Hyderabad - 500 018
Tel: 91-40-2732 289, 273293, 273305, 272468
Fax: 91-40-273942
Chief Executive: Mr S.N. Tripathi
Executive Director (Tech.): Mr S. James

Current production of commercial refrigeration appliances is reported to be as follows:

		Per annum
Visi-coolers (for Pepsi)	=	15-20,000 nos.
Coolers with insulated doors (for Pepsi)	=	10-15,000 nos.
Chocolate coolers (for Nestle, Cadbury and		
Candoss)	=	5,000 nos.
Total	=	30-40,000 nos.
		=====

R-12 is being used as refrigerant and its annual consumption is reportedly

around 12,000 kg.

For insulation, a cyclopentane foaming pilot plant is already in operation and MPMF's approval to convert the entire foaming operations at the Sanatnagar refrigerator plant to cyclopentane has been received on the basis of project prepared through the World Bank. It would be logical to assume that this project will also cover conversion of PUF insulation from R-11 to cyclopentane in the manufacture of commercial refrigeration appliances.

The aforesaid approved project for refrigerators generally states that conversion of refrigerant from R-12 to either R-134 a or Hydrocarbons will form Phase II of the project for which a second project report is yet to be submitted. Commercial refrigeration appliances did not find any mention in the approved project because it was a consolidated approval to cover manufacture of refrigerators at all the three plants of Voltas Ltd. at Sanatnagar, Warora and Nandalur. As such, there would appear to be scope for a separate project to be prepared for conversion of manufacture of commercial refrigeration appliances from refrigerant R-12 to a non-ODS alternative. Whether such a separate project will necessarily have to be made by a common implementing agency is a matter for interpretation and consideration.

5. Krishna Agro Industries

L-12, SIDCO Industrial Estate

Villivakkam, Chennai - 600 049

Tel: 91-44-626 4627

Fax: 91-44-626 5622

Upfront Engineering Industries Pvt. Ltd.

B-8, SIDCO Industrial Estate

Villivakkam, Chennai - 600 049

Tel: 91-44-626 4627

Fax: 91-44-626 5622

Common Partner/Director in Charge: Mr K. Srinivasan

Detailed description of their activities is given in the preceding write-up on page 8. Production of refrigeration appliances between the two factories exceeds 500 units per annum. Copies of letters dated July 6, 1998 from both parties annexed as appendices 4.8(a) and 4.8(b) indicate their consumption of R-12 and PUF formulations. A third appendix 4.8© shows the common partners/directors in the two units.

Feasibility of preparation of a combined project may be looked into.

6. SIEL Aircon Ltd.**Plot No.14****Sector 4, Faridabad - 121 001****Tel: 91-129-248 497, 242 347****Fax: 91-129-248 497****Director in-charge: Mr P.K. Mahindra**

They are manufacturing the following models of water coolers:

Cooling capacity (litres per hour)	Water storage capacity (litres)	Insulation	Refrigerant
10	30	PUF	R-12
15	15	PUF	R-12
20	40	PUF	R-12
40	80	Glass wool	R-12
60	120	Glass wool	R-22
150	150	Glass wool	R-22

Current level of total production is reported around 10,000 units per annum. The CFC consumption is estimated at 2,500 kg per annum, as described earlier.

7. Cheraag Fabrication (P) Ltd.**D91-92, Industrial Estate****Yadavagiri, Mysore - 570 020****Tel: 91-821-514 372, 519 615****Fax; 91-821-514 372****Managing Director: Mr Cusrow Chothia**

Copies of two letters dated July 10 & 11, 1998 annexed as appendices 4.9(a) and 4.9(b) provide details of past and present production of commercial refrigeration appliances, the reasons for break in operations of this enterprise and quantum of CFC consumption past as well as current. A brief account from these letters is given earlier.

CFC consumption before closure of the factory for five years was over 4,500 kg per annum and after its reopening, it is currently around 1,100 kg per annum, with a fast revival and growth. Possibility of preparing a project may be worth examining.

In addition to the above, a look at Trikuta Coolings Pvt. Ltd. in conjunction with National Enterprises (page 23), Natwest Control (P) Ltd. in conjunction with Natco Control (also on page 22 and 23) and a couple of other CRAMs in Delhi metro may prove illustrative, though their ODS consumption apparently

falls below the assumed minimum level of 2,000 kg per annum. One of these other CRAMs could be, International Refrigeration Industries who claim an annual consumption of 5,000 kg of R-12 for recharging bus air-conditioners which does not fall under the category of commercial refrigeration and the enterprise would expect advice on how to deal with phasing out this CFC usage. For similar reasons, the position of Freeze Tech, Chennai may be worth looking into.

Appendix 4.1

**List of members received from All India Air-Conditioning &
Refrigeration Association**

S. no.	Name of Enterprise	Contact person	Tel no.
1.	Aarkay Refrigeration B-12, Harikothi, Kirtinagar New Delhi – 110 015		
2.	Abhishek Aircon Appliances P. Ltd. 49, Shopping Complex Community Centre New Friends Colony New Delhi - 110 065	Mr Rajnish Behl	6848213 6929421
3.	ABM Air conditioning and Refrigeration Industries Anandita 33/20, Lane No 7 Prabhat Road Pune – 411 004	Mr Uday Bhende	335535 332291
4.	ACR Enterprises 1, Birds Road Cantonment Tiruchirapalli - 620 001	Mr N Raghavan	460978
5.	Air-N-Gas Control 27 DLF Industrial Area Moti Nagar New Delhi - 110 015	Mr Yash Pal Sanddhu	5457876
6.	Aircare 265, Flyover Market Defence Colony New Delhi - 110 024	Mr Sanjeev Kumar	4617988 4633144
7.	Airconditioner Point Priyam Airconditioners III-M-27/2 Nehru Nagar Marg Kalka Garhi Chowk Ghaziabad	Mr Sarang Agrawala	718084

S. no.	Name of Enterprise	Contact person	Tel no.
8.	Airtemp & Allied Agencies Chandra – Kiran, 1195 Sadashiv Peth Near Bharat Natya Mandir Pune – 411 030	Mr S B Sathe Mr Vasant Jogalekar	478088
9.	Amancio Lab. Equipment Basement R.K. Centre Near Narhari Arogya Kendra Fatehgunj Baroda – 390 002		
10.	Amtrex Appliances Ltd. Ashima Complex Karan Nagar Village Taluka: Kadi Distt: Mehsana - 382 737		
11.	Anand Refrigeration Company E-108-109, Lajpat Nagar-I New Delhi - 110 024	Mrs Vinita Anand	
12.	Antartica Equipments B-48, Sector V Noida (UP)	Mr Vinod K. Mittal	520795
13.	Ashwin Engineering 4109/1 B/H New Nirma Plant GIDC Vatwa Phase IV Ahmedabad		
14.	Asian Refrigeration 12, Pandav Nagar Opp. Janki Dass Kapur Hospital Nariana Depot Road New Delhi - 110 008	Mr Gurmail Singh	5708852 5701165
15.	Avon Refrigeration 13, Pandav Nagar Naraina Road Opp. Janki Dass Kapur Hospital New Delhi - 110 008	Mr Amit Gulati	5708842

S. no.	Name of Enterprise	Contact person	Tel no.
16.	Babajee Enterprises Shop No. 4, Shiv Mandir Titar Pur, Main Najafgarh Road New Delhi - 110 027	Mr Suresh Kumar Satya	5466308 5191502
17.	Bajaj Traders Nachan Road Benachitty Durgapur - 713 213	Mr Deep Bajaj Mr Rakesh Bajaj	84207 84663
18.	Besto Cooling Cabinets 14/7, Mewla Maharajpur Mathura Road Faridabad		
19.	Bharat Refrigeration Mfg. Co. 2151/E-4/C-1, New Patel Nagar Opp. Shadipur Depot (Red Light) New Delhi	Mr Hemant Aneja	5707452 5758236 5730688
20.	Bharat Refrigeration Service Centre 1, Diwanpara Bhupendra Road Rajkot - 360 001	Mr Karetha	28181 32115
21.	Bharat Refrigeration Services 1, Diwanpara Bhupendra Road Rajkot - 360 001		
22.	Bhargava Refrigeration Inds. Pvt. Ltd. Baraf Khana Tansen Road Gwalior	Mr B B Bhargava	331940
23.	Blue Star Ltd. Plot No. 4&5, G.I.D.C. Narmadanagar Bharuch - 392 015	Mr P H Kapadia	46116 46471 46569 47517
24.	Mumbai Refrigeration Factory: Lal Taki Road Near Amar Hotel Ahmednagar	Mr Yunus Tambatkar	341840 341786

S. no.	Name of Enterprise	Contact person	Tel no.
25.	Breeze Master N-40, Kirti Nagar Scooter Market New Delhi - 110 015	Mr Rupinder Singh Sareen	5464881 5195453
26.	Centron Airconditioners A, DLF Industrial Area Moti Nagar New Delhi	Mr Sanjay Bhatia	5457767
27.	Citi House Airconditioner 13/16B Subhash Nagar New Delhi - 110 027	Mr M Rekhi	5134140 5137196
28.	Climatic Equipments 842, Joshi Road Karol Bagh New Delhi - 110 005	Mr Amarjeet Singh	7770695 7537973
29.	Commercial Refrigeration Centre Shop No. 6, Saran Building Ram Nagar New Delhi		
30.	Continental Industries 1, Community Centre Naraina Phase - 1 New Delhi		
31.	Cool Makers 1, Tennur High Road Tennur Trichurappalli - 620017	Mr Ct. Arunagiri	29795
32.	Cool Connections Shop F-39+40, LSC Mansrover Garden New Delhi - 110 015	Mr Brij Bhushan Khurana	5124004 5124005
33.	Cool Engineering A-19, MIDC Station Road Aurangabad - 431005	Mr Abhyankar Mr Sathe Mr Kale	25772-O 482014-R 336821-R

S. no.	Name of Enterprise	Contact person	Tel no.
34.	Cosmic Coldpoint Pvt. Ltd. Buttepatil Plaza Nal Stop Off Karve Road Erndawane Pune – 411 004	Mr Shivaprashad K	364152
35.	Cosmic Refrigeration 146/7/1, Village Dhayari Pune – 411 037	Mr K Shankaran Mr K Raghavan	802828
36.	Crown Steel Fabricators Crown House, 24 Furniture Block, Kirti Nagar New Delhi - 110 015		
37.	Crystal Refrigeration Co. 7A, Acharya J C Bose Road Calcutta - 700 017	Mr D V Lamba	2475559 2476488
38.	D D Refrigeration 2151/17, DMS Shadipur Depot New Delhi		
39.	D.D. Refrigeration 2151/17 & 2151/17CA/3A Opp. D.M.S. Shadipur Depot New Delhi - 110 008	Mr Devender Ali	5700115 5703039 5702815
40.	Dafoo Engineers T-466/B-2, Baljit Nagar Near West Patel Nagar New Delhi - 110 008		
41.	Dairy Den (I) Pvt. Ltd. 25, Madhuvan Ellise Bridge Ahmedabad - 380 006		
42.	DATA Refrigeration D-47, Jhilmil New Delhi		

S. no.	Name of Enterprise	Contact person	Tel no.
43.	Dee Pee Cooling Products C-1/6230, GIDC Estate Sachin Distt: Surat – 394 230		
44.	Deep Refrigeration 11 Mandir Shopping Centre Sector – 5 , R K Puram New Delhi		
45.	Delair (India) Pvt. Ltd. 100-101, Udyog Vihar Phase IV Gurgaon (Haryana)		
46.	Dharnendra Industries 908, GIDC Engg. Estate Near Mumbai Tablet Sector 28 Gandhi Nagar – 382 028		
47.	Elite Refrigeration Industries No.4, Animal Hospital Complex Main Rangpuri Road Mahilpur New Delhi		
48.	EVA Engineers 15-B, Shakti Society Opp. Arora Textiles Opp. Horabaz factory B/H Nava Dhor Bazar Dani Limda Ahmedabad - 380 029		
49.	Finlay Sales 113/5, Navyug Market Ghaziabad - 201 001	Mr P N Arora	790678
50.	Flowcecn Products Company 19/228B, Old Rohtak Road Delhi - 110 035	Mr Jasbir Singh	732737 773264

S. no.	Name of Enterprise	Contact person	Tel no.
51.	Freezland Refrigeration Corporation 17, Ashok Nagar Ludhiana - 141001	Mr N K Walia	27126 33567
52.	Friends Refrigeration Works L/487, Laxman Puri Gali Tel Mill Ram Nagar New Delhi - 110 055	Mr Sushil Sethi Mr Amarjit Singh	7516642 736193
53.	Frigcool Engineering Co. 78/79, Municipal Industrial Estate 2nd Floor, Shivner Road Gandhi Nagar, Worli Mumbai - 400 018	Mr R D Patel Mr Prakash R Patel	3862745 3868874
54.	Frigtools Refgn. & Engineering Company 1, Ansari Road, Daryaganj New Delhi	Mr G Singh	
55.	Friz-Tech Private Ltd. 213/208, Navyug Industrial Estate T J Road Sewari Mumbai - 400 015	Mr Mohan V Prabhu	4122209 4139593
56.	Goodluck Marketing Outside Astodia Darwaza S.T. Road Ahmedabad - 380 002		
57.	Havmor Restaruant & Ice Cream Near Krishna Cinema, Relief Road Ahmedabad - 380 001		
58.	Hemkunt Electricals 662/4, A.B. Punjabi Basti Ghati Road Anand Parbat New Delhi	Mr Sukhwant Singh	5712458 5761258

S. no.	Name of Enterprise	Contact person	Tel no.
59.	Himalaya Refrigeration Co. Opp. Jai Hind Weigh Bridge, Kuwadawa Road Rajkot - 360 003		
60.	Himalaya Cooling Industries 138-D, Picnic Garden Road Calcutta - 700 039	Mr Ajay Kumar Lamba	3434208
61.	Hindustan Refrigeration Industries 4, Netaji Subhash marg, Daryaganj New Delhi- 110 002	Mr Jaspal Singh	3288884 3288886
62.	Ice-Make Refrigeration 15, Techno Estate Near Nirala Washing Behind J.K. Steel N.H. Road, Amraiwadi Ahmedabad - 380 026		2876526
63.	Imperial Refrigeration 9th Floor Maker Chambers V Nariman Point Mumbai	Mr Surjit Singh	48-4727
64.	Industrial Refrigeration 9th Floor Maker Chambers V Nariman Point Mumbai - 400 021	Mr Ajay Ruia	2041183-85,89 2872379
65.	International Refrigeration Industries 7, Netaji Subhash Marg Daryaganj New Delhi - 110 002	Mr K N Babbar	3270320 3275651
66.	Jagkumar & Co. S.No. 35/3 & 4, Mumbai Bangalore Road, Ambegaon Gavthan, Tal. Haveli Pune - 411046	Mr Kulkarni Mr Haval	435825

S. no.	Name of Enterprise	Contact person	Tel no.
67.	Jerome & Co 6, Ujagar Industrial Estate, Sundar Buildg. Behind Duke & Sons Off Waman Tukaram Patil Marg Deonar Mumbai - 400 088	Mr Mathey Fernades	5560362 5565930
68.	Jindal Refrigerations 26, Netaji Subhash Marg New Delhi - 110 002	Mr Chaman Jindal	3277878
69.	Joy Enterprises C/o Refrigeration Centre 45,CO-OP Industrial Shopping Complex. Old MIDC Jalgaon - 425 003	Mr Joy MV	40889 40730
70.	Kanpur Airconditioning and Refrigeration Association 17, Kamla Nagar Market J K Temple Road Kanpur	Mr Manjeet Singh	218644
71.	Khanna Cooling Systems 9, Geeta Ashram Railway Road NIT Faridabad - 121 001		
72.	Lucky Refrigeration 9 Saran Building, Ram Nagar New Delhi		
73.	M & G Engineers Godbole Chambers, Plot No. 1 Parijat Society, Bibwewadi Pune - 411 037	Mr Paresh Godbole	418862 440177
74.	M.S. Airconditioners A-12, 1521, Wazir Nagar Kotla Mubarakpur New Delhi	Mr Manish Ranjan	4644125 4601856 4628133

S. no.	Name of Enterprise	Contact person	Tel no.
75.	Machinery Sales Corporation 3, Marine Chambers, 43, New Marine Lines Mumbai – 400 020	Mr S S Ahuja	2035966
76.	Manku Traders Pvt. Ltd. 194-A, Arjun Nagar Safdarjung Enclave New Delhi - 110 029	Mr Sukhvinder Singh Manku	6193191 6193192
77.	Marpex Appliances 195, GIDC Industrial Estate Ankleshwar – 393 002		
78.	Mechlec Steel Products 3-13, Gorwa Industrial Estate Baroda		
79.	Metro Engg. Co. 8, Haitek Commercial Centre Basement of Hotel Aram Opp. Paldi Museum Paldi Ahmedabad - 380 007		
80.	Mittal International (India) Pvt. Ltd. 7, Netaji Subhash Marg Daryaganj New Delhi - 110 002	Mr Rajinder Mittal	3271810 3276339
81.	Mittal Refrigeration 7, Netaji Subhash Marg New Delhi - 110 002	Mr Rajinder Mittal	3271810 3276339
82.	Mittal Refrigeration 2283, Chuna Mandi Pahar Ganj New Delhi - 110 005	Mr Suresh Mittal	
83.	Multifrig Marketing Co. Pvt. Ltd. 1/12, Kirtinagar (WHS) New Timber Market New Delhi		

S. no.	Name of Enterprise	Contact person	Tel no.
84.	Natco Controls 2, Netaji Subhash Marg Daryaganj New Delhi - 110 002	Mr Ashok Kumar Sahdev	3274041 3271252
85.	National Enterprises 60 Okhla Industrial Estate New Delhi - 110 020	Mr Kamal Sahdev	6836008 6910784
86.	National Refrigeration Company 2&3 Netaji Subhash Marg New Delhi - 110 002	Mr Ashok Kumar Sahdev	3274041 3274042 3271252
87.	Natwest Control (P) Ltd. A-19, Sector 57, Phase III Noida U.P.	Mr Ashok Kumar Sahdev	
88.	New India Refrigeration WC 11-12, Saran Building Ram Nagar New Delhi - 110 055	Mr Jaswinder Singh	7770874
89.	New Commercial Refrigeration Co. 3 Saran Building, Ram Nagar New Delhi		
90.	New India Refrigeration Co. 11-12, Saran Building Ram Nagar New Delhi		
91.	Newtech Controls Pvt. Ltd. E-5, Greater Kailash Enclave – II New Delhi	Mr R C Malhotra	6415157 6841826
92.	Nikhil Enterprises 1539, C- Royal Talkies Road Laxmipuri Kolhapur		642759

S. no.	Name of Enterprise	Contact person	Tel no.
93.	Nirmal Refrigeration Works L-296, Gali Tel Mill Laxman Puri, Ram Nagar Paharganj New Delhi - 110 055	Mr Gurmeet Singh	7779613
94.	Nirmal Refrigeration Works 1-2-96, Laxman Puri Ram Nagar New Delhi		
95.	Osho Home Appliances 620, Suneja Tower - II Janakpuri New Delhi - 110 058	Mr Mahendra Tandon	5509732 5597915
96.	Paramount Industries Motiram Road Shahdara Delhi - 110 032		
97.	Parkair Engineering Co. (P) Ltd D-15/4, Okhla Industrial Area Phase -2 New Delhi - 110 020		
98.	Phelix Appliances Ltd. Plot No-5, GIDC POR Ramanagamdi Baroda	Mr Bharat K Desai	
99.	Phelix Appliances Limited Patel Ashwamegh Near Sardar Patel Statue Sayajigunj Baroda - 390 006		
100.	Prachi Enterprises C-1/2, First Floor Fateh Singh Market Opp, Railway Stn. Post office	Mr Jagat Paul Gaur	

S. no.	Name of Enterprise	Contact person	Tel no.
101.	Prashant Refrigeration Appliances Plot No G-29 Addl. MIDC Kodoli Satara – 415 004	Mr S N Motewar	44223 44922
102.	Prestair Systems Pvt. Ltd. H-43, Sector – 9 Noida - 201 301		
103.	Prestige Equipment Co. WZ-25,Basai Darapur Najafgarh Road New Delhi - 110 015		
104.	Pury's Refrigerations 46/11, Old Bhopal House Lalbagh Lucknow	Mr Mahesh Puri	225025 226866
105.	R K Refrigeration B-12, Hari Kothi Kirti Nagar New Delhi - 110 015		
106.	R E Air-Tech Industries Pvt. Ltd. 5, Clive Row, Room No. 20 Ground Floor Calcutta	Mr Pramod Mehta	2204508
107.	Rakesh Industries Shop No. 66-67 Pandav Nagar	Mr Harish Kumar	5703122 5705042
108.	Rams Refrigeration Industries XXXV/2209-Ravipuram Road Cochin - 682 016	Mr Hariram	368655 371673
109.	Rasika Electronics and Refrigeration Systems Pvt. Ltd. Survey No. 146/3/4 Wadgaon Dhayari Garmal Pune – 411 041	Mr Madhekar Mr Joshi Mr Chhatre	802709

S. no.	Name of Enterprise	Contact person	Tel no.
110.	Refco & Wassamat Appliances Ltd 248, Okhla Industrial Estate New Delhi	Mr C Mohan	6832156
111.	Refrigerating Machinery Mart 51/1, Nirmal Chandra Street (Wellington St) Calcutta - 700 012	Mr Surinder Mohan Bhardwaj	264185 274013
112.	Refrigeration Mkt. Co. 4&5 Saran Building Ram Nagar New Delhi - 110 055	Mr Baljinder Singh	7519944 3541209
113.	Refrigeration Service Centre Samans Manzil, Athwa Gate Surat - 395 001		
114.	Refrigeration Engineers 5, Clive Row, Room No. 20 Ground Floor Calcutta	Mr P K Mehta	2209294 2204508
115.	Refrigeration and Engineering Co. 34, Ajay Mittal Industrial Premises Co-opp, Society Building No 1 Marol (E) Mumbai	Mr M V Gokhale	
116.	Rite Equipments Pvt. Ltd. G-36, II Floor Green Park Main New Delhi - 110 016		
117.	Rockwell Industries (P) Ltd. (Formerly Rockwell Devices (P) Ltd.) 218, Swapnalok, S.D. Road Secunderabad - 500 003	Mr Ashok K Gupta	843041 842732
118.	Royal Refrigeration Works 2151/E4/3A, New Patel Nagar Shadipur Depot New Delhi - 110 008		

S. no.	Name of Enterprise	Contact person	Tel no.
119.	Royal Refrigeration Works 2151/E4/3A, New Patel Nagar Shadipur Depot New Delhi - 110 008	Mr Parminder Singh	5700586 5708126
120.	Rumi Refrigeration Industries 2358, Chuna Mandi Paharganj New Delhi	Mr Manjit Singh	
121.	Sagar Enterprises Ameen Chambers 39/4172 Karimpatta Cross Road Ernakulam Kochi-682016	Mr P Prakashan	362135
122.	Sandeep Refrigeration 720-E, Shahupuri, 3rd Lane Near M Vinayak Kolhapur -416001	Mr Shivajirad Sutar	653785 653736
123.	Sansaz Industries 4, Mahagujrat Industrial Nagar Sarkhej-Bawala Highway Village Moriya Tal Sanand Ahmedabad		
124.	Sarkar Refrigeration Industries 69, Yashwant Stadieum. Dhantoli Nagpur - 440012	Mr A B Sarkar	530182
125.	Scientific Instrument Industries 2251/AE, New Ranjit Nagar New Delhi	Mr Mohinder Paul	5708307
126.	Sethia Appliances Pvt. Ltd. P-6/1, IDA, Nacharam Opp. A.P. Foods Hyderabad - 500 076	Mr Narendra Sethia	851637
127.	Shankar Refrigeration Rampuri Camp. Amravati	Mr B Basantwani	76523

S. no.	Name of Enterprise	Contact person	Tel no.
128.	Sheena Industries Shed No. 4514, Phase IV GIDC Vatwa Ahmedabad		
129.	Sheetal Aircon L-2/106, New Mahavir Nagar Outer Ring Road New Delhi - 110 008	Mr H S Bhatia	5110399 5153483
130.	Sheetal Engineering Works Pvt. Ltd. 7, Vanshree Co. Opp Housing Society Ltd Opp Sardar Patel Institute Thaltj Ahmedabad-54		464294
131.	Sheetal Refrigeration Industries Niyogi Mansion Jathar Peth Akola		29019
132.	Shishir Traders Pvt. Ltd. G-8, Silver Springs Near St. Xavier Ladies Hostel Navarangpura Ahmedabad		
133.	Shiv Shakti Engineering Co. Ltd. A-347, Industrial Area Bhilwadi – 301019 Dist: Alwar Rajasthan	Mr C B Marwah	01493-20494 20594
134.	Shiva Airconditioning Co. 2&11, A-Blockmarket Poorni Marg New Delhi - 110 057	Mr Arun Talwar	6141860 6142044
135.	Shree Refrigeration Plot No. 10. Opp Bhupesh Apartment Opp S G M College, Vidya Nagar Karad – 415 001	Mr M B Joshi mr Shende	71082 71002-R

S. no.	Name of Enterprise	Contact person	Tel no.
136.	Shubh 136-A, Una Enclave Mayur Vihar - I Delhi - 110 091	Mr Sandip Kalia	2250202
137.	Sidwal Refgn. Industries (P) Ltd. Plot No. 23, Sector 6 Faridabad - 121 006 Haryana	Mr S S Sidhu	241240 242060
138.	Snow Freeze Opp. GPO, Slapore Road Ahmedabad - 380 001		
139.	Sumit Refrigeration Inds. 12, DDA Market Rajouri Garden New Delhi - 110 027	Mr Ravi Khurana	5434856 5192971
140.	Super Refrigeration Pvt. Ltd. Samrat Bhawan (2nd floor) Behind Satyam Cinema Ranjit Nagar New Delhi - 110 008	Mr Maini	
141.	Super Refrigeration Industries 2151/4 New Patel Nagar Opp. Shadipur Depot New Delhi - 110 008		
142.	Super Refrigeration Ind. 2151/7, New Patel Nagar Off. Shadipur Depot New Delhi	Mr H S Bawa	5704343 5705656
143.	Surat Refrigeration & Engg. Co. Opp. Nariman Home Shahpore Surat - 395 003		
144.	Thakar Equipment Company 66, Okhla Industrial Estate New Delhi - 110 020		

S. no.	Name of Enterprise	Contact person	Tel no.
145.	The Ice Machinery Mart 37, Netaji Subhash Marg Daryaganj New Delhi - 110 002	Mr Pankaj Bhargava	3271491 3269551
146.	Trikuta Coolings P Ltd. 60, Okhla Industrial Estate New Delhi - 110 020	Mr Kamal Sahdev	6910784 6836008
147.	United Refrigeration Works 302 Hemkoot Complex Opp. Capital	Mr Mahendra S Bhalavat	401824
148.	United Technical Service GC-8, Shivaji Enclave New Delhi - 110 027	Mr Ravi M Anand	5111836 5111837
149.	Vactal Engineers Pvt. Ltd. C-140, Flatted Factory Complex Okhla Estate New Delhi - 110 020	Mr Vimal Uppal	6928916 6835761
150.	Vadilal Enterprises Ltd. Near Daryakhan Ghummat Solid Ice Factory Compound Dhudheswzar, Shahibaug Ahmedabad - 380 004		
151.	Vallabh Engg. Co. Prabhu Ice Factory Compound Near Hokabaz Factory Opp. Nava Dhor Bazar Dani Limba Ahmedabad - 380 029		
152.	Vardaan Aircon B11/11, Ramesh Nagar New Delhi - 110 015	Mr Davinder Taneja	5154762
153.	Veerms Engineering Opp Nagpur Mahavidyalaya Nagpur	Mr Edward Palkandy	524809

S. no.	Name of Enterprise	Contact person	Tel no.
154.	Vidarbha Food & Dairy Industries Nr. Teerath Apartments Tapadia Nagar Akola - 444 005	Mr C B Laddha	27426 58150
155.	Vishesh Appliances (India) P. Ltd. A-76, Jhilmil Industrial Area Delhi - 110 095	Mr Abhay Singhal	2111505 2114613 2273150
156.	Volga Air Technics Ltd. Plot No, 472-478 Changodar Tajpur Road Opp M N Desai Petrol Pump Sarkej Bawla Highway Changodar - 389 330	Mr P R Kasrekar	
157.	Weather Works (Kalol) Pvt. Ltd. 26/1, GIDC Kalol		5818 5634
158.	Weather Makers (Airconditoning) Behind Industrial Estate 620, Diamond Maxbou Road Calcutta - 700 034	Mr S K Das	4685297 4685495
159.	York Scientific Industries 7513/4 Tel Mill Marg Pahar Gang New Delhi - 110 055		

Appendix 4.2

Fax from : 00 91 212 326350
04-JUL-1998 11:47

KIRLOSKAR COPELAND

07/03/98 03:25 Pg:
00 91 212 326350 P.01

KIRLOSKAR COPELAND LIMITED

Ref : KCL/MHO/98

1st July '98

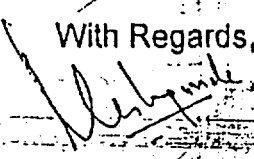
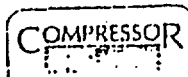
To,
Mr.D.D.Arora
Senior Fellow 'TERI'
Flat No.404, HIBISCUS - A,
Off Yari Road,
Versova,
Mumbai - 400 061

Dear Sir,

This has reference to your discussion with Mr.G.S.Sahasrabudhe, on 30th June '98. We are giving herewith the list of OEMs pertaining to Bangalore, Calcutta, Sec'bad and Ahmedabad region.

The remaining list of other locations will be sent to you within a day or two.

With Regards,


R.V.Deshpande

Regd Office : 102/11, 11th Road, Pune 411 005
Phone : (0212) 326350
Korad Plant : Korad, 11th Road, Korad 415 110 (Maharashtra) In
Change : 0212 326350 Fax : 0212 326350

List of CRAMs received from Kirloskar-Copeland, Pune and Bangalore

S.no.	Name of enterprise	Contact person	Tel no.	Fax no.
First List				
1.	M/s Friz-Tech 2213, Navyug Industrial T.J. Road, Sewri Mumbai - 400 015	Mr Vaman Nayak Mr Mohan V Prabhu (BE Mech.)	022-4122209/ 4139593	
2.	M/s Meghdoot Refrigeration Industries Pvt. Ltd. 10, Kasakaka Compound I.B. Patel Road Goregaon (East) Mumbai - 400 063	Mr Ajay Sagar Managing Director	022-8732977/ 8731631	022-8750763
3.	M/s Rockwell Industries (P) Ltd. 218, Swapnalok, S.D. Road Secunderabad - 500 003	Mr Ashok K Gupta Managing Director	040-843041/ 842732	040-842732
4.	M/s Sethia Appliances (P) Ltd. P-6/1, IDA, Nacharam Opp. A.P. Foods Hyderabad - 500 076	Mr Mohammed G Haqqani Manager	040-572797	040-572797
5.	M/s Anand Ref. Company D-86, Lajpat Nagar Part I New Delhi - 110 024	Mr Ajay Anand		
6.	M/s V Krishna & Co. Motibaug, V N Purav Marg Opp R K Studios, Chembur Mumbai - 400 071	Mr K Sivi	022-5568688/ 5563589	
7.	M/s Intercool Western Ref. Limited 4, Ready Money Terrace Dr. Annie Besant Road Mumbai - 400 018	Mr Hari Singh Managing Director	022-4374084/ 4935684	022- 4934940/ 4934109

S.no.	Name of enterprise	Contact person	Tel no.	Fax no.
8.	M/s Allwyn Limited Allwyn Bhavan Sanathnagar Hyderabad - 500 018	Mr S N Tripathi VP (White Goods)	040-272468/ 273746	040-276942

Second list

9.	Vadilal Enterprises Ltd. Solid Ice Factory compound Near Dariyakhan Ghumma Shahibaug Ahmedabad - 380 004	Mr Shailesh Chautalia	079-5621813	079-5625449
10.	Metro Engineering Co. 8, Cellar Hitek Complex Opp. Paldi Museum Paldi Ahmedabad - 380 007	Mr Rahim Bhai	6589240, 6589698	
11.	Himalaya Refrigeration Co. Trikon Baug Rajkot - 360 001	Mr Abhey Singh Bhai Dodia	0281-233483	
12.	Eva Enterprises Plot No. 4/2, Panchratna Ind. Estate (Unit-2) Opp. Chehar Mata Temple Near Laxmi Narayan Petrol Pump Near Changodar Village Ahmedabad - 382 210	Mr Ansari Bhai	079-902717 75385, 9021775162	
13.	Himalaya Cooling Industries 138 D, Picnic Garden Industries Calcutta - 700 034	Mr B L Lamba		
14.	Airconditioning Comm Ind. 17, Taratolla Road Calcutta - 700 083	Mr H C Jain		

S.no.	Name of enterprise	Contact person	Tel no.	Fax no.
15.	Rajal Industries 6 B, Ist Lane Picnic Garden Road Calcutta - 700 034	Mr Chetan Malhotra		
16.	A R Corporation Samadhi Patna Road Cuttack - 753 003	Mr R C Biswal		
17.	Rockwell Devices Pvt. Ltd. No. 218, Swapnalok Complex Sarojini Devi Road Secunderabad - 500 003	Mr Ashok Gupta	842732, 843041 844855 (R)	842732
18.	Perfect Refn. Pvt. Ltd. Plot No. 1215, Phase-2 Indl. Development Area Cherlapally Hyderabad - 500 551	Mr Suresh Kinar Mr Vidya Sagar	7121927	
19.	Coolex Industries P. No. 40-1-129 Near Benz Circle M.G. Road Vijaywada - 520 010	Mr P Radhakrishna	0866-473080 0866-470745 (R)	0866-476226
20.	Jagan Refrigeration Ind. Besides Navrang Theatre Governorpet Vijayawada - 520 012	Mr Jagan Mohan Rao	0866-575939	0866-575939
21.	Sethia Appliances Pvt. Ltd. No. 6/1, Industrial Devl. Area Nacharam Hyderabad - 501 507	Mr Narender Sethia	7172797	476226

List furnished by Bangalore office of Kirloskar-Copeland

S.no.	Name of enterprise	Contact person	Tel no.	Fax no.
1.	Frig Crafters Pvt. Ltd. 48, S.C. Road, 2nd Cross Bangalore - 560 009 (Factory at Rajajinagar)	Mr Vijay Kumar	3351651 (R) 2870209	2251359 3357465 (Factory)
2.	Yeti Refrigeration 24, Leonard Lane Bangalore - 560 025	Mr Gopalakrishnan	214160	
3.	Kalkura Cooling Machines Thangadagadi Ambagilu Udupi - 576 102	Mr Ranjan Kalkura	80119	
4.	Olympus Refn. & Engg. Corpn. Yayyadi Indl Estate Mangalore - 575 008	Mr Sumeet Rao	0824-412285	
5.	Bhaskar Refn. Services 12th Cross, Sadashiv Nagar Belgaum - 590 001	Mr Bhaskar K	472419	
6.	Melcom Refn. Co. N.H. 17, Coconut Garden Maroli Mangalore - 575 005	Mr Melwyn Desouza	217100 (R) 215421	
7.	Comet Environs B-57, III Stage Peenya Indl. Estate Bangalore - 560 058	Mr Vivek Hegdekatte	8360198	8362970

S.no.	Name of enterprise	Contact person	Tel no.	Fax no.
8.	Coastal Cools No. 77/1, 5th Cross Okalipuram Bangalore - 560 021 (Factory in Udipi)	Mr K Prakashchandra 3200549 (R) 3381155	3307584	
9.	Cheraag Fabrication P Ltd. D, 91-92, Indl. Estate Yadavagir Mysore - 570 020	Mr Cusrow C	0821-564370	

Appendix 4.3

Jun-25-98 11:43A 1


P.01
Page 1/4

With Best Compliments

Attn: Mr. D. D. ARORA

As instructed by Mr. Mukesh Bhuta, please find faxed herewith a list of deep freezer manufacturers

Cannon

Best Regards
Vijaysinh Thakur
25th June 98
 EXPANDED
INCORPORATION

List of CRAMs received from Expanded Incorporation, Mumbai

S.no.	Name of enterprise	Contact person	Tel no.	Fax no.
1.	M/s Frig India Air Cooler (Penguin Refrigeration) 19, J.N. Heredia Marg Ballard Estate Mumbai - 400 038	Mr C V John	022-5431789	
2.	M/s Pushpam Refrigeration Ulhasnagar (near Mumbai)	Mr V B Multani	0251-549945	
3.	M/s Remi Instruments 14, Shah Indl. Estate Veera Desai Road Andheri (W) Mumbai - 400 059	Mr Sunil Saraf, Director Mr Sanjay Maheshwari	022-6367419	
4.	M/s Sandeep Refrigeration 720 E, Shahupuri 3rd Lane, Kolhapur - 416 001	Mr Sandeep Sutar	0231-653785	0231-653736
	M/s Sandeep Engineering Co. G-101, MIDC, Gokul Shirgaon Kolhapur - 416 237		0231-672288	
5.	M/s Fast Freeze Products 2, Satyam Indl. Annexe Opp. Satyam Indl. Estate B.S Devshi Marg, Govandi Mumbai - 400 088	Mr R F Tata	022-5565629	
6.	M/s Spectrum Scientific B3/12, Punit Nagar 3 S.V. Road, Borivali (W) Mumbai - 400 092)		022-8087260, 8064641	022-8651485
	M/s Spectrum Scientific Bhatia Complex Lala Equipment Kandivali, Mumbai	Mr Shailendra Shah	8051166 (R) 8051010, 8064641	
7.	M/s Asea Brown Boveri 22-A, Shah Indl Estate Off Veera Desai Road Andheri, Mumbai - 400 058	Mr A D Patel, Purchase Manager Kini, Assistant	022-6269148, 6269125	

S.no.	Name of enterprise	Contact person	Tel no.	Fax no.
8.	M/s Bhaskar Refrigeration Services Off 2nd Main, 5th Cross Sadashivnagar Belgaum - 590 001	Mr B K Kadekodi	451419	
	Factory Girish Complex (Car park) 1697, Ramdev Galli Belgaum - 590 001		427607 (Factory)	
9.	M/s Chandra Frig Co. P. Ltd. Plot No. 290 Najafgarh (Paprawat) New Delhi - 110 043	Mr K B Wahi	5017127	
10.	M/s Concept Solar & Composites 21/5, Vasanthapura Cross Konanakunte, Off Konakapura Road Bangalore - 560 062	Mr Suresh	080-6645253, 6663328	
11.	M/s Coolswell Shop No. 2, Shabir Niwas Next to Hotel Shashikant Near Holy Spirit Hospital Mahakali Road, Andheri (E) Mumbai - 400 093	Mr D' Souza Mr Anand	8378036	
12.	M/s Freeze Mat Machines 605/37, Machhe Indl. Estate Jamboti Road Belgaum - 590 014		0831-411016/7	
13.	M/s Friz-Tech P. Ltd. 213/208, Navyug Indl. Estate T.J. Road, Sewri Mumbai - 400 015	Mr Mohan V Prabhu Director	4139593, 4122209	
14.	M/s Gem Equipments S.F. No. 103, Arasur Coimbatore - 641 407		888513	

S.no.	Name of enterprise	Contact person	Tel no.	Fax no.
15.	M/s Hindustan General Equipments 98, Mohamedali Road Mumbai - 400 003	Mr Kudil	3449212	
16.	M/s Kulkit Engineering Co. 21, Sai Niwas, Carnac Bunder Mumbai - 400 001	Mr Satish Kumar	2658229, 2654104	
17.	M/s Metal Fabricators of India D-17, Udyog Sadan No. 2 MIDC, Andheri Mumbai - 400 093	Mr Potnis Purchase Manager	8300613, 8343904	
18.	M/s Modern Airconditioning Service 18, Anand Bldg. Sitladevi Temple Road, Mahim Mumbai - 400 016	Mr A J Valles		
19.	M/s Polar Enterprises 21, Nahar & Seth Industrial Estate L.B.S. Marg, Bhandup (West) Mumbai - 400 078	Mr A U Jayaraman	5619030, 5687512	
20.	M/s Rabi-Run Refrigeration P. Ltd. 1012/1060, Puttaiah Indl. Estate Kamakshipalya Vijayanagar North Post Bangalore - 560 079	Mr Umashankar	080-3483333 080-8397907 (R)	
21.	M/s Raman Air-Conditioners P Ltd. 1012/1060, Puttaiah Indl. Estate Kamakshipalya, Vijayanagar North Post Bangalore - 560 079	Mr Shankar Rama	080-3483333 080-8397907 (R)	

S.no.	Name of enterprise	Contact person	Tel no.	Fax no.
22.	M/s Reliance Incorporation 26, Apollo Ind. Estate Ground Floor Off Mahakali Caves Road Andheri (E), Chakala Mumbai - 400 093	Mr S S Walke Mr Ram Pillai	022-8353199	022-8351296
23.	M/s Sarkar Refrigeration Industries 69, Yeshwant Stadium Nagpur - 440 012 Factory: D-62, MIDC Nagpur		07104-530182	
24.	M/s Solar Engineering Co. No. 54, 60 Feet Road Salem Railway Parallel Road Shampura, Arabic College Post Bangalore - 560 045		080-2260182 080-2283697 (R)	
25.	M/s Sujata Air Control Engg. Shop No. 27/28 C Burnal Market Saki Naka Link Road, Saki Naka, Mumbai - 400 072	Mr Shankar Mr Shetty		
26.	M/s Thakor S Patel C-Group, 8/9 Shivaji Nagar Vakola Bridge, Santacruz (E) Mumbai - 400 055		022-6140676	
27.	M/s V Krishna & Co. Motibagu, V.N. Parav Marg Mumbai	Mr Prathapan	022-5563588, 5563589	

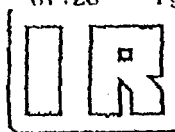
Appendix 4.4

Fax From : 2044944

07/07/98 07:28

Pg: 1

INDUSTRIAL REFRIGERATION (P) LTD.



ALLSTATE
C R O U P
(since 1958)

Office : 901, Maker Chambers V, Nariman Point, Mumbai - 400 021.
Phones : 2041183/85/89/2872363/2872379 • Gram : KOOLFAST
Fax : (91-22)2044944 • E-mail : allstate.finance@gemys.vsnl.net.in
Factory : 23, Govt. Ind. Est., Phase II, Piparia, Silvassa 396 230.

Industrial Refrigeration (IRPL) offers complete process refrigeration (particularly food processing) contracting service under the engineering expertise of JACKSTONE (formerly APV) and GRASSO. IRPL offers complete food processing plants & ultra modern cold storages on near-turnkey basis.

IRPL handles projects ranging from supply of equipment to complete turnkey contracts including design, procurement of plant and materials, delivery to site, installation, commissioning, sales and spares service throughout the country. We assist the client at every step from concept to commissioning. We also assist in marketing in some cases. We have a tradition of committed and sincere after-sales service. In addition to providing systems for the sea food, dairy, beverage and food industries, we can also contribute in the chemical, plastics and pharmaceuticals industries.

IRPL represents:

Jackstone Food System - Freezers
Grasso International - Refrigeration Equipment
FrigoFrance S.A. - Ice Flake Machines
Refrigeration SPA - Puf Panels for cold stores.

All installations are supported by service agreements executed by a team of trained technical staff.

Industrial Refrigeration is also at the forefront promoting and supplying systems working on environmentally friendly non-ozone depleting refrigerants.

Products and Services:

We are representing leading international companies for

- Plate Freezers
- Individual Quick Freezers (IQF's)
- Freezing Tunnels
- Ice Making Machines
- Refrigeration Equipment for Trawlers and Fishing Complexes.
- Turnkey refrigeration plants for Aquaculture, fruits and vegetable Processing Industries.

Jackstone Food System

M/s Jackstone Food System is a 209 year old U.K. based multinational company, manufacturing equipments for the Food processing industry as per International standards. Jackstone manufactures IQFs, tunnel & spiral freezers, fluid belt freezers and box freezers with capacities ranging from 100 Kg. to 10 T/hour.

Clients serviced by Jackstone Food System :

- M/s Amar Cold Storage, Porbandar
- M/s. Cham Ice & Cold Storage, Porbandar
- M/s Tasty Bite Eatables Ltd., Pune
- M/s Pennar Aqua Exports Ltd., Nellore
- M/s Hindustan Lever Ltd. (Walls Ice Cream)

Grasso International

Grasso is a 138 year old multinational company from GEA group manufacturing a complete range of Refrigeration Equipment. Grasso manufactures single stage and two stage screw compressors as well as Piston Compressors for Ammonia, R22 and R502 Refrigerant. All these compressors are manufactured as per international standards.

Clients serviced by Grasso :

- M/s Apex Foods Ltd., Chitagong, Bangladesh
- M/s Bay Fishing Corp., Chitagong, Bangladesh
- M/s Chowdhry & Co., Chitagong, Bangladesh.
- M/s Pennar Aqua Exports Ltd., Nellore, INDIA.

FrigoFrance S.A.

FrigoFrance S.A. manufactures Ice Generators as per international standards. FrigoFrance S.A. Ice Generators range from 2 T/day to 32 T/day. FrigoFrance S.A. also manufactures self contained units with capacities ranging from 150 Kg. to 15 T/day. These Ice Generators can use either Ammonia or R22 refrigerant.

Refrigeration SPA

Refrigeration SPA manufactures Puf Sandwich Panels for Cold Rooms. Panels with different options like corrugated, plain surfaces, pre-painted, food-safe quality are available in different thicknesses ranging from 40mm to 200mm. Cam locking technique is used for locking of panels.

Service With Integrity.

Appendix 4.5

PROFILE OF REMI GROUP

REMI, Rajendra Electric Motor Industries, was founded in 1960 by Shri Chiranjilal Saraf, the present, Chairman, for manufacturing fractional H.P. Motors and laboratory Stirrers. From this small beginning of less than rupees 1 Lac turnover in the first year, REMI Group has gone on from strength to strength with multi crore sales. From a small factory in 1960, Remi's manufacturing activity is now occupying premises totaling 2 lacs sq. ft. starting with 10 workers and only 2 products, Remi had diversified into a multi product Manufacturing group with consumer durables, process plants and equipments, motors, pipes, laboratory instruments, fans, mixie, gear boxes, oil field equipments etc. with marketing by its Sales and Service organisation in 10 major cities i.e. Ahmedabad, Bombay, Bangalore, Calcutta, Madras, Hyderabad, New Delhi, Nagpur, Pune and Kochin. As of date, Remi has successfully implemented 7 foreign collaborations and earned sizable foreign exchange annually. "REMI" manufacture 75% of the Laboratory Stirrers and Centrifuges of the total Indian market. Remi Group has set up @Rs.220 Crores seamless pipes project including in-house manufacturing of billets & Bars for pipes from sponge iron at Bharuch district in the state of Gujarat.

Laboratory Instruments production commenced in 1960 by introducing Magnetic Stirrers for the first time in India, with a complete range of laboratory stirrers.

Laboratory Centrifuges production commenced from 1962. In 1968 'K' series of Refrigerated and non-refrigerated Centrifuges were introduced in technical collaboration with "Janetzki" of Germany, which were subsequently replaced by our own improved 'R' series in 1981. These are now internationally accepted and exported. MERIT Certificate by EEPC for outstanding performance for highest export of Instruments has been awarded to REMI. In 1983 REMI introduced BOD Incubators and other Environmental Cabinets. In 1985 REMI has further introduced a complete range of sophisticated Environmental Cabinets Bacteriological Incubators, Constant Temperature Water Baths, V.D.R.L., Shakers, Lab. Blenders, Laboratory Shakers Blood Bank and High speed Centrifuges. The Division has four manufacturing units in a built up area of 20,000 square feet equipped with sheetmetal fabrication shop, machine shop, High speed vertical balancing machined, testing as per ISI/VDE/BSS specifications.

In 1987, REMI further introduced :

- 1) DEEP FREEZERS (LOW TEMP. CABINETS WITH TEMP REGULATORS)/
- 2) FLASK SHAKERS.
- 3) BLOOD BANK REFRIGERATORS
- 4) MICRO CENTRIFUGES

REMI as on date has further diversified in offering Microprocessor based Centrifuges, Blood Bank Refrigerators, Humidity Chamber Ultra low Temp. freezer up to -70°C and pharmaceutical testing machines like Tablet Disintegrating, Tablet Dissolution Tester, Melting Point Apparatus and Karl Fischer Titrator etc.

REMI has got up-to-date Modern testing facilities and inhouse R & D facilities to ensure strict quality and life test for instruments. All important parts of the instruments like electric motor etc. are designed to suit the particular application and are made inhouse to exacting specifications.

Today REMI produces more than 25,000 instruments per year of different sizes and varieties to suit individual requirement. REMI is synonymous for RELIABILITY.

+PROFILE OF LABORATORY INSTRUMENTS

+DIVISION OF REMI GROUP

With reference to the above, we are enclosing herewith our offer against the above Tender along with all the necessary documents listed below.

We would like to emphasize here that we are the biggest and oldest manufacturer of the items offered in India. Manufacturing of Laboratory Instruments was started by us in 1960 and since then we have been expanding and diversifying. We cater to more than 50% of the demand of these products in India. Our Laboratory Instruments are regularly exported to Countries like Shri Lanka, Jordan, Syria, Nigeria, Mauritius & other middle east countries. In India, we are regular suppliers to most of the big and prestigious customer/buyers, some of the names are given below and order copies received are enclosed.

- 1) World Health Organisation (W.H.O.)*
- 2) D.G.S. & D. for Project of National Aids Control organisation (NACCO) through World Bank Assistance.*
- 3) Director General of Armed Forces Medical Stores (DBAFMS), Ministry of Defence.*
- 4) Military Hospitals, Ministry of defence.*
- 5) U.N.I.C.E.F.*
- 6) All Major Universities of India.*
- 7) All Major Council of Scientific & Indl.Res (CSIR) Labs.*
- 8) All Major Research Instt. Like BARC, Haffkine Instt, etc.*
- 9) All Major Hospitals like AIIMS Delhi, Bombay Hospital, Jaslok hospital, Appolo Hospital, Tata Cancer.*
- 10) All leading Chemical, Pharmaceutical Industries.*

We manufacture approx. 25000 Laboratory Instruments per year and it is difficult to find a Research Lab. in India which is not having Remi Instruments.

Our manufacturing division of Lab.Instruments is divided in Mumbai. The Quality Control measures adapted and plant & machinery list with details of man-power is enclosed. All our products are optimized by leading Compressor manufacturer M/s Siel Compressors Ltd. (Shriram). The digital Controllers used are tested by SRTL (Govt.of India Testing Lab). All Electric Motors which are the heart of Laboratory instruments are manufactured in house, and are tested for reliability & performance by independent testing organisations. In short all important raw materials for instruments are either made in house & tested or optimised and tested by reputed Organisations.

*To summarise, we would only like to say one sentence
"REMI FOR RELIABILITY"*

Fax from : 91 2642 46026
18/07 '98 11:32 91 2812 18028

07/18/98 00:57 Pg: 1
[] nnt

BLUE STAR BRH

Sheet1



BLUE STAR LTD. BHARUCH.

CC : D. Ravindra.

To : / Mr. D D Arora

From : DM Reddy - BSL, Bharuch

This refers to your fax/telecon. The details are as follows:

CONSUMPTION OF CFC REFRIGERANTS

Refrigerant	Consumption [monthly]	Products	Monthly Production (Nos.)
R-12	600 Kgs.	[1] Water Coolers - SST2-40 - WST2-15 - ST4-40 - ST4-80 [2] Mineral Water Dispensers	700 400
R-22	500 Kgs.	[1] Water Coolers - ST5-120 - ST8-150 - 36P-100 [2] Room Airconditioners - 1.0 TON - 1.5 TON	300 150
R-11	300 Kgs.	[1] PU Foaming of Water Cooler Tanks [2] Panel foaming for Air Handling Units	100 50
	for PU foaming (indirect consumption with blended polyol)		

Description of water cooler models

DM REDDY

Example: SST2-40: This number 2, after SST, denotes 20 litres per hour cooling capacity and figure 40 at the end, denotes 40 litre storage capacity

ST5-120: The number 5 after ST denotes 50 litres per hour cooling capacity and figure 120 at the end denotes 120 litre storage capacity

4467293-4467061



WEATHERWORKS

KALOL PVT. LTD.

Dealers in : AIRCONDITIONING & REFRIGERATION

Unit Nos. 11-12, 339, Udyog Mandir Ind. Estate, 7-C, Pitamber Lane, Mahim, Mumbai-400 016.

Ref. No. _____

Date 15th July, 1998.

For

Mr.D.D.Arora, Teri, Mumbai

- Our works are at
- 1) 26/1 G.I.D.C., Kalol,
D.Panchmahal, GUJARAT
Tel:02676 - 35813 - 35634
 - 2) Partap Nagar,
Tal - Savli, BARODA,
02667-51346

We manufacture Deep Freezer, Bottle Cooler, Water Cooler, Display Cabinet and Chilling unit in various sizes. Our Freon 12 consumption for year 1995-96 has been 1280 kg.

For 1996-97 the consumption was 2000 kg and for 1997-98 it was somewhat lesser at 1400 kg.

*FORMULATIONS * kias **
Additionally, we consume P.U.F.formules in the three years as given below:-

1995-96	-	1000
1996-97	-	1500
1997-98	-	1200

On the above basis the number of applicances we have manufactured during each of the three years are of the following order:-

<u>YEAR</u>	<u>Deep Freezer/ Bottle-Cooler</u>	<u>Water Cooler</u>	<u>Display Deep Freezer</u>	<u>Chilling unit</u>
1995-96	922	60	10	08
1996-97	1387	80	15	18
1997-98	1073	100	12	15

4467293-4467061



WEATHERWORKS

KALOL PVT. LTD.

Dealers in : AIRCONDITIONING & REFRIGERATION

Unit Nos. 11-12, 339, Udyog Mandir Ind. Estate, 7-C, Pitamber Lane, Mahim, Mumbai-400 016.

Ref. No. _____

Date _____

Copeland
Our compressor purchases are both from Kirloskar/
Copeland and Tecumseh. (TECUMSEH.)

We also assembled and service Airconditioners for which Freon 22 is used as refrigerant. Compressors for Airconditioners are taken by us from Carrier/Kirloskars.

We are Private Limited Company with Gurbuxani family members as share holders. Our annual turn-over is of the order of approx Rs.4 crores.

for WEATHER WORKS (KALOL) PVT.LTD.


DIRECTOR.

Appendix 4.7(b)



WEATHERWORKS

Dealers in :

AIRCONDITIONING & REFRIGERATION

Tel.: 4 4 5 5 7 0 3
4 4 6 7 2 9 3
4 4 6 6 2 6 0
4 4 6 7 0 6 1
4 4 6 7 0 2 3

339, Udyog Mandir
Block No. 11/12, Ground Floor,
Bhagoji Keer Marg,
Mahim, BOMBAY-400 016.

Ref No. _____

Date 15th July, 1998.

For

Mr.D.D.Arora, Teri, Mumbai

As we are in Servicing, maintenance, repairing of our Deep Freezer/Bottle Cooler, Water Cooler, Display Cabinet and Chilling unit since over 25 years, we are averagely consuming 200-250 kg of Freon 12 gas for our repairing/servicing job. As such annually the consumption is in a range of 2500 kg approx. *per month*

for WEATHER WORKS

[Signature]
PROPRIETOR.

Appendix 4.8(a)

Krishna Agro Industries Corporation

Mfrs. of :
"FROSTLINE" Deep Freezers, Bottle Coolers,
Water Coolers and other Refrigeration Equipments.

Works L-12, SIDCO Industrial Estate, Villivakkam, Chennai-600 049. Phone: 6264627, Grams: FROSTLINE Tele Fax: 6265622

6/7/98

Mr. D.D. Arora.,

I am enclosing herewith the Consumption details for the
year 97-98.

Consumption of Polyurethane Chemicals : 1½ Ton
Consumption of R-12 Gas : 900 Kgs.

for KRISHNA AGRO INDUSTRIES CORPORATION.,


Partner.

FROSTLINE

Appendix 4.8(b)



UPFRONT

Upfront Engineering Industries Pvt. Ltd.

B-8, SIDCO Industrial Estate, Villivakkam, Madras - 600 049.

6/7/98

Mr. D.D. Arora.,

I am enclosing herewith the Consumption details for the year 97-98

Consumption of Polyurethane Chemicals : 1.25 Tons
Consumption of R-12 Gas : 750 Kgs

for UPFRONT ENGG INDUSTRIES PVT LTD.,

Ravi Kumar
A Director.

Appendix 4.8(c)

**Constitution of Krishna Agro Industries Corporation and Upfront
Engg. Industries Pvt. Ltd.**

6/7/98

Dear Arora,

UPFRONT ENGG INDUSTRIES PVT LTD is a Private Limited Company
consisting of three Directors.

1. K. SRINIVASAN
2. LALITHA SRINIVASAN
3. K. SIVA SUBRAMANIAN

KRISHNA AGRO INDUSTRIES CORPORATION is a Partnership Company
consisting of two Partners.

1. K. SRINIVASAN
2. K. VENKATESWARAN.

Appendix 4.9(a)

Cheraag

FABRICATION [P] LTD.,

FACTORY :

D 91-92. Industrial Estate,
Yadavagiri,
Mysore - 570 020

T : 514372

: 519815

Fax : 0821-514372

SHOW ROOM :

11/13, New Sayyaji Rao Road,
Bamboo Bazaar, Mysore - 570 021
Phone No. : 34270

Ref No. : 281/98-99

Date : 10.07.98

Mr. D.D. Arora,
Flat No. 404,
Hiviscus A,
Off Yari Road,
Versova,
BOMBAY-400061.

Dear Mr. Arora,

This is in connection with the telephonic conversation which you have had with the undersigned..As required by you I am furnishing the details for my previous industry M/s. Perfect Engineering Works (Started in 1978) which I had to close down on Doctor's advice, after I underwent a Brain Tumour Surgery. Five years later I restarted this industry as a Private Limited Company in the name and style of M/s. Cheraag Fabrication (P) Ltd.

As required by you I am giving you a list of Deep Freezers and Beverage Coolers manufactured by us using R-12 Gas for the year 1989-90 and 1990-91. This is prior to my brain surgery.

In 1989-90 we manufactured Deep Freezers and Beverage Coolers to the tune of 700 to 800 numbers approximately. Again in 1990-91 it had exceeded 800 and above. Since I was under Modvat, I had to start a sister concern in the name and style of M/s. Diana Refrigeration, D - 170, Industrial Estate, Yadavagiri, Mysore. This unit was started in the year 1988 and I closed it the same year when I closed M/s. Perfect Engineering Works. Hence both the companies put together my total production was as mentioned before.

Since I was operated for Brain Tumour surgery, I was advised by my Doctors to close down both my factories as it would count on my health and a recurrence of tumour would mean fatal. Taking his advice sincerely I closed it upto July 1997. I did not want to run two companies with two different names but preferred to have one Private Limited Firm wherein the other Directors are my mother, father, my wife and myself. Hence this is the description of my two previous factories. We had consumed R-12 to a total quantum of 50 - 52 cylinders of 73 Kgs. To mention in a proper way we were getting an equal number of machineries for servicing and repairs wherein we were also using R-12 Gas. For example Refrigerators, Deep Freezers, Beverage Coolers and other cooling equipments

.. 2 ..

Cheraag

FABRICATION [P] LTD.,

FACTORY :

D 91-92. Industrial Estate,
Yadavagiri,
Mysore - 570 020

☎ : 514372

: 519615

Fax : 0821-514372

SHOW ROOM :

11/13, New Sayyaji Rao Road,
Bamboo Bazaar, Mysore - 570 021
Phone No. : 34270

Ref No. :

.. 2 ..

Date :

where R-12 was used.

During the year 1989-90, 1990-91 our turnover which we crossed was above Rs. 1 Crore per annum. We were purchasing Polyurethane Foam from M/s. Expanded Incorporation, Bombay and M/s. Polynate Foams, Bangalore, which was approximately more than six metric tons per year.

Enclosed is a list of my prestigious customers to whom I was supplying my Freezers in bulk upto 1990-91. This is for your kind reference and enquiry can be made for your satisfaction as to what my capacity was.

Now as it stands I have reopened in July 1997 after an okay signal given by my Doctors. Therefore in the past twelve months I have managed to supply around 150 machines of various sizes as per the catalogue enclosed. I am making efforts to contact my old customers once again who had verbally assured me for their future patronage as done before. In the year 1997-98 we have consumed M-12 Gas purchased from Mettron Industries and purchasing M-12 gases from various dealers in Bangalore when required would total upto 35 - 40 cylinders of 73 Kgs each upto July 1998. Not to forget that we use M-12 for servicing of our old machines as well as machines of various makes using M-12.

Below mentioned are two enclosures of my customers when I was operating in the name and style of M/s. Perfect Engineering Works and M/s. Diana Refrigeration, Mysore.

Enclosed herewith is another list of the present customers to whom we have supplied Deep Freezers and Beverage Coolers under the name and style of M/s. Cheraag Fabrication (P) Ltd.

We are expecting to cross around 800 - 1000 machines on annual basis in future.

A sample of my freezer was supplied to M/s. Kwaliti Walts, Bangalore just before we closed M/s. Perfect Engineering Works. This Freezer was examined and tested by Mr. Vishnu Bhatt of M/s. Kwaliti Walts. After my closure they tried to contact us through Mr. Duke Flynn, Manager of M/s. Shriram Refrigeration Industries Ltd., Bangalore, but were informed that I am on the

.. 3 ..

Cheraag

FABRICATION [P] LTD.,

FACTORY :

D 91-92, Industrial Estate,
Yadavagiri,
Mysore - 570 020

☎ : 514372

: 519615

Fax : 0821-514372

SHOW ROOM :

11/13, New Sayyaji Rao Road,
Bamboo Bazaar, Mysore - 570 021
Phone No. : 34270

Ref No. : /

.. 3 ..

Date :

verge of closing on health grounds and hence to contact some other manufacturer. When my machine was tested by Mr. Vishnu Bhatt in Brooke Fields, Bangalore, there were two more sample cabinets under trial lying there. One was from M/s. Chandra Corporation, Jalandhar and the other one was from M/s. Rabirua, Bangalore. I was also informed by them that amongst the three cabinets my cabinet was the best and for approval two people from Uni Lever, Austria (the place is to the best of my knowledge) accompanied Mr. Vishnu Bhatt had come down to Mysore for inspection. It was very unfortunate that I was struck with the brain tumour surgery and had to close down. They even gave me their catalogues and description of Freezers made by them abroad. This is for your information.

The present quantum of Polyurethane Foam used by us would easily cross two metric tons per year since I have just started manufacturing once again. I procure this material from M/s. Shivathene Linopack, Parwanoo, M/s. Shivathene Linopack, Bombay and M/s. Polynate Foam, Bangalore. I expect to lift more than six metric tons in the near future as the strength of my old customers who have assured me business once again would come back to me as time passes.

We also manufacture using R-12 gas and Polyurethane insulation for tyre and tube companies and this machine has been ~~intended~~ ^{used} by us where Butyl Tube Rubber joints are cooled on a freezing bar without any meltage of Ice. This we have supplied to various Butyl Tube manufacturing companies in India. We also manufacture hardening cabinets used by Ice Cream manufacturers where the evaporation temperature is -40°F . We also made recently a new cabinet upto 7.5 Cft and supplied it to M/s. Kwaliti Walis (Mr. Berty Jacob) and their feed back was that it was okay and they would contact us sometimes next year as their current year's orders were already placed. We also contacted M/s. Amul India on Lavelle Road who got a very good picture of our manufacturing from their Amul distributor in Mysore, Mr. Bivakar. Amul people have approached us to take the service contract of their Freezers, ^{at} Mysore, Mandya Nanjangud and neighbouring towns and districts and have assured that all -40°F cabinets required by their distributors for

☎ commented

..4..

Cheraag

FABRICATION [P] LTD.,

FACTORY :

D 91-92. Industrial Estate,
Yadavagiri,
Mysore - 570 020

☎ : 514372
: 519615
Fax : 0821-514372

SHOW ROOM :

11/13, New Sayyaji Rao Road,
Bamboo Bazaar, Mysore - 570 021
Phone No. : 34270

Ref No. : /

.. 4 ..

Date :

storages shall also be purchased from us as and when the time comes and their distribution expands.

On behalf of M/s. Cheraag fabrication (P) Ltd., I, the Managing Director, Mr. Cusrow Chothia states that the information given to you is true to the best of my knowledge.

Assuring of our best services at all times.

We remain,

Yours sincerely,

for CHERAAG FABRICATION (P) LTD.,
(formerly Perfect Engineering Works &
Diana Refrigeration)



MANAGING DIRECTOR.

Encl: I, II & Catalogues.

Cheraag

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Ref No. : /

ENCLOSURE - I

Date :

Enclosed herewith are our valuable customers with whom we were dealing during the time of M/s. Perfect Engineering Works and Diana Refrigeration ~~Stxxxxxxx~~. They are as follows:

<u>Sl.No.</u>	<u>Company Name</u>
1.	M/s. Kwaliti Ice creams, Bombay
2.	M/s. Kwaliti Ice Creams, Pune
3.	M/s. Kwaliti Ice Creams, Nasik
4.	M/s. Kwaliti Ice Creams, Madras
5.	M/s. Kwaliti Ice Creams, Coimbatore.
6.	M/s. Suval Foods, Coimbatore (Joy Ice Creams)
7.	M/s. Sivitha Ice Creams, Madras (Joy Ice Creams)
8.	M/s. V.B.C. Foods, Vijayawada, (Kwaliti Ice Creams)
9.	M/s. Joy Ice creams (Vijayawads)
10.	M/s. Vadilal Ice creams, Bombay.
11.	M/s. Vadilal Ice Creams, Bangalore.
12.	M/s. Vadilal Ice Creams, Kolahpur
13.	M/s. Vadilal Ice Creams, Pune
14.	M/s. Ameet Creams, Pune, (Joy Ice Creams)
15.	M/s. Dollops Ice Creams, Bombay
16.	M/s. Dollops Ice Creams, Hyderabad
17.	M/s. Vadilal Ice creams, Ahmedabad
18.	M/s. Joy Ice creams, Nasik
19.	M/s. Sub-zero Ice creams, Bangalore
20.	M/s. V.B.C. Foods, Hyderabad (Kwaliti Ice creams)
21.	M/s. Coastal Dairy Foods, Vishakapatnam
22.	M/s. Kwaliti Milk Ice Creams, Vishakapatnam
23.	Dollops Ice creams, New Delhi
24.	M/s. Kwaliti Ice Creams, New Delhi,
25.	M/s. CEAT INDIA LTD., Bombay.
26.	M/s. Vikrant Tyres and Tubes, Mysore
27.	M/s. Shanthi Enterprises, Mysore (Joy Ice creams)
28.	M/s. Sub-zero Ice creams, Vishakapatnam
29.	M/s. Mysore Polymers, Mysore.
30.	M/s. Agarwal Rubber (P) Ltd., Hyderabad & Medak
31.	M/s. Dairy Frozen Foods, Hyderabad
32.	M/s. Appollo Tyres, Madurai
33.	M/s. Kwaliti Ice creams, Madurai
34.	M/s. Joy Ice creams, Madurai
35.	M/s. Scoop Ice creams, Hyderabad

There are many more such customers, but unable to recollect them of hand.

Cheraag

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Ref No. : /

ENCLOSURE II

Date :

Since we have started the industry once again twelve months back, we are continuing correspondence with all these customers. Out of these we have already started supplying machineries to the following customers:

Sl.No.

Name of the Company

1. M/s. Sivitha Ice creams, Madras (Joy Ice creams)
2. M/s. Suvai Foods, Coimbatore (Joy Ice creams)
3. M/s. Shanthi Enterprises, Mysore (Joy Ice creams)
4. A sample cabinet has been sent to M/s. Kwaliti Walts. We have also advertised on the Internet and E-mail for distribution and dealership of our product and we have got a healthy response from Bangalore. This message has been given just a day before.
5. Kwaliti Ice creams, Mysore.
6. Various hotels and bakeries in Mysore have already started reverting back to us. In the past five years due to change in telephone numbers and business addresses of many of our previous customers we are not able to correspond with them as the letter returns marked (address change).

We are making efforts to contact them through other sources for their kind patronage.

Appendix 4.9(b)

Cheraag

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Bamboo Bazaar, Mysore - 570 021
Phone No. : 34270

Ref No. : /

Date : 11.07.98

Past History of Perfect Engineering Works and Diana Refrigeration using F-11 and F-12.

F-12 used in Perfect Engineering Works and Diana Refrigeration without any Show-Room for Sales of Gas, but also used in servicing of all Refrigeration and Air-Conditioning equipments.

F-11 used in P.U.F. (inclusive of MDI)

During these years (1989-90, 1990-91) our production was between 800 - 1000 machines per annum.

*
45- 50 Cylinders
6 Metric Tons
(Containing part R-II)

Present History of Cheraag Fabrication (P) Ltd., using F-12 and F-11.

F-12 used by Cheraag Fabrication (P) Ltd., upto 150 machines in the first 12 months (July 1997-1998) is This includes the Show-Room where F-12 is also sold to customers. F-12 used by us is only 10 cylinders approximately which includes servicing of other Refrigeration appliances. Also includes servicing and maintenance of cold storages and other chilling units where F-12 is used. Expecting the production and sales to touch 1000 machines and also cross this target.

*
35- 40 Cylinders.

Intending to produce Executive Water Coolers (We have made a sample with us) size 10 litres wherein F-12 is used. When this project comes up we will be marketing approximately 500 - 1000 numbers per annum. I cannot estimate and let you know as to how much F-12 will be used thereafter.

(Containing part R-II)

nett
* 73 Kg
Capacity
per cylinder

P.U.F. used at present is about 2 Metric tons, but once we cross the 1000 machines mark and we start the Executive Water Coolers we may require more of both F-11 and F-12.

For CHERAAG FABRICATION (P) LTD.

Managing Director.

Issues concerning preparation of investment projects of commercial refrigeration appliance manufacturers

All the 22 projects of CRAMs listed in Chapter 3 have been approved on the basis that the refrigerant R-12 will be converted to R-134a and PUF blowing agent R-11 will be replaced by R-141b.

The efforts being made so far towards implementation of these projects are, however, confined to changing the PUF insulation from R-11 to R-141b. None of the beneficiary enterprises has taken any concrete steps to switch to the use of refrigerant R-134a due to major problems foreseen in handling the sensitive POE oil compatible with R-134a under the prevailing working conditions in the small factories of the CRAMs and more so, while servicing the appliances on site at the users' premises. The adverse experience faced by a couple of multinational user companies in maintaining some of their imported R-134a commercial appliances at the premises of retailers of their cold drinks or ice cream, has added to the apprehensions of the CRAMs. They are, therefore, earnestly looking at the option of converting from R-12 to Hydrocarbon (Isobutane - Propane mixture) refrigerant which makes use of the same mineral oil and similar technique, so long as proper safety measures are taken in handling the hydrocarbon refrigerant due to its flammable nature. In this connection, the development work going on in India under the Ecofrig project is being closely watched by CRAMs and they are awaiting the results of the projected field trials for which pilot scale production of commercial refrigeration appliances operating on Isobutane-Propane mixture has already been taken in hand. Leading institutes like IIT, Delhi, NCL, Pune and the compressor manufacturer Kirloskar-Copeland along with a well known CRAM, whose project is already approved, are partners in the Ecofrig project lending their support to this ongoing development work.

Barring a few exceptions, all the CRAMs in India are from the SME category and they face a number of impediments in converting from ODS usage. While nearly a score of enterprises have got their projects approved for conversion and a few more substantial ODS consumers out of those identified in Chapter 4 may follow suit, a fairly large number of remaining smaller CRAMs are uncertain of their position and not clear about the extent of assistance they can receive to enable them to stay in business and change over. The issues confronting such remaining CRAMs are briefly as follows:

1. Choice of alternative refrigerant to replace R-12

This will depend upon the outcome of trials with hydrocarbon refrigerant, as described above.

2. Choice of alternative blowing agent to replace R-11

Though cyclopentane offers a good one time replacement and all but one Indian refrigerator manufacturers belonging to organized sector have chosen to take this option, the CRAMs in the SME sector are not in a position to switch to this alternative given the type of small and congested factories they operate from. The CRAMs have, therefore, no option but convert to R-141b as an interim arrangement, knowing fully well that its availability after 2003, following discontinuation of its usage in U.S.A, will become uncertain.

Almost all CRAMs presently hand mix the R-11 PU foam formulations but it is now recognized that a foaming machine is needed to properly handle and mix R-141b formulations. At the prevailing high cost of even a small high pressure foaming machine, most CRAMs will find it hard to justify procurement of such a machine through MPMF grant.

3. Inadequate financial assistance under existing MPMF rules

The cost effective threshold value for commercial refrigeration projects presently allowed under the MPMF rules is US \$ 15.21 per kg ODP. With this limit, only a small number of CRAMs having individual ODS consumption not less than 5-6 MT per annum can justify projects which can yield sufficient grant to enable them to get a small foaming machine and other equipment needed for change over such as a suitable vacuum pumps, charging unit, etc. In the event of the alternative refrigerant chosen being hydrocarbon, some additional equipment will be required to ensure safety.

Outcome of the survey of a cross-section of CRAMs in the four metros and Bangalore, described in Chapter 4, clearly indicates that barring very few cases, most of the remaining CRAMs whose projects have still not been prepared have low ODS consumption at a level not exceeding 1 MT per annum. None of these CRAMs will be able to qualify for any worthwhile financial assistance from MPMF at the current cost effective threshold value and they will not be able to procure the equipment they need to change over.

To quote an example, a CRAM making 400-500 appliances per annum in India runs a small factory of his own employing 8-10 workers and managing the business personally to earn a reasonable income. He falls under the category of small scale industry which is given various incentives and encouragement by the government. His annual turnover is quite sizeable by Indian small scale industry standards and in terms of size, he is a much bigger entity than a micro industry. ODS consumption of such an enterprise, both as refrigerant and for PUF

insulation, is generally less than 1,000 kg per annum. At the cost effective threshold value of US \$ 15.21 per kg ODP, the enterprise will be entitled to a grant of around US \$ 15,000 which is grossly insufficient to be of any meaningful help to the enterprise to undertake conversion. Associations like AIACRA are of the view that such enterprises should be encouraged by MPMF to convert from CFC usage by providing each of them a basic set of new equipment which they require for conversion, regardless of their scale of entitlement being lower under the MPMF rules.