ECO-COOL™

BULLETIN FOR REFRIGERATION TECHNICIANS

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Editorial

The last quarter covered many project activities. This issue focuses on the various kinds of training conducted in the last few months, as well as on other aspects connected with training. A lean season for the domestic refrigeration and air-conditioning servicing business, NCCoPP has, therefore, increased the volume of training programmes held, covering more than 1500 technicians from this sector. Training was held for technicians servicing Mobile Air Conditioning (MAC), as well as specifically designed day-workshops devoted to the needs of the railways sector and for employees maintaining equipment using Open Type Compressors (OTCs). Many of the eligible, trained Refrigeration Servicing enterprises have now received the equipment they applied for under the ESS scheme of which technicians can make full use in the upcoming high season.

A first-time event of importance was NCCoPP's presence and participation at ACREX 2006, south Asia's largest international exhibition on air-conditioning, refrigeration and building services. A large number of persons converged at the NCCoPP stand which provided information about the project. NCCoPP's presence at this forum enhanced its visibility amongst the RAC industries, which responded with a keen interest in assisting and taking forward the aims of the project. Interestingly, several servicing and manufacturing firms also showed a positive interest in undergoing training in best practices, which is offered under NCCoPP.

Eco Cool wishes a very profitable season to you all and urges you to make the best use of the training that you have received!

Newsflashes from NCCoPP

Recent Events

Inter Agency Meeting	6th March 2006	Heritage Village	Manesar
5th Core Group Meeting	7th March 2006	Heritage Village	Manesar
2nd Training Partners Meet	8th March 2006	Indian Institute of Technology	New Delhi
3rd ITAC Meet	9th March 2006	Indian Institute of Technology	New Delhi

Business Opportunity

NCCoPP invites expression of interest for starting a business centre in Recovery & Recycling of refrigerants. For further details please refer to www.nccopp.info

Technicians Corner

What you say to us Q and A

How do we charge HC blend by pressure method?

If no data on the original refrigerant charge in the appliance is available on the appliance's nameplate, charging, by reading the back pressure (suction side) may have to be done. One must have access to the P-T chart of the HC blend so that against the desired evaporating temperature (say -23° C), the corresponding saturation pressure is read off. It may be desirable to have the evaporating temperature as the mean of the Dew and BubblePoint and read the corresponding saturation pressure on the P-T chart. This should be the suction pressure at which the appliance should operate. Based on this, for a mean evaporator temperature of -23° C at an ambient temperature of 32° C, the suction pressure would approximately be 5 psig. Other parameters like suction (return gas) line temperature and observance of frost in the evaporator will also have to be kept in view to ensure a reasonably correct charge. Care has to be taken to see that the charge is introduced in very small quantities and checked for pressure every time to avoid getting into the situation of charging excessively and then trying to leak off the excess gas. Also it is worthwhile to use accurate electronic weighing scales, record the weight of the gas finally charged, and present this information on a nameplate or sticker for future reference and servicing. However, this makeshift method of charging will never be the equivalent of charging by weight if the correct charge is known in advance.

Quotes

We have captured some spontaneous remarks from participants about the training they attended:

After training I really felt ashamed that we have spoiled the ozone layer by using R-12 and letting it out in the air. But now, we a team of 7 technicians in the workshop are really committed to collect (recover) R-12 and save the ozone layer. I will like to write here that there was a big problem of choking in deep freezers at my workshop, say 4 out of 10, but after learning the process of flushing with nitrogen using double stage regulator and then going for good vacuum of less than 1500 microns, has reduced the choking problem near to 0% and the customer satisfaction has gone up. Thanks goes to the NCCoPP project, which comes to us via Chandigarh Training Cell, Chandigarh.

Kuldeep Singh S/o. Sh. Tara Singh
Foreman, Modern Refrigeration, Ludhiana

I am in Refrigeration & Air Conditioning profession from the last 18-19 years, but unfortunately I did not know (unknowingly) that I am losing customers, the environment & myself. But after the training programme I attended at Ludhiana for "Good Service Practices & Retrofitting," I came to know what is the best. Thanks goes to the NCCoPP project that now, by adopting better service practices I have again won the faith of my customers & am now actively in support of saving the ozone layer & reducing global warming. I've also started retrofitting of other ice candy plants in Ludhiana.

Jagjit Singh Mann
Mann Refrigeration, Ludhiana – 9914217720

I came to know about the project when Mr. A. Kumar, a trainer from the Chandigarh Training Cell visited my plant. First of all I was worried about whether things would work correctly or my plant would be at risk? But I took a chance and agreed to retrofit my Ice Candy unit. When I, along with my technician Mr. J.S. Mann, saw the way it was working, I was astonished to see the quality of equipment used and the sequence they performed. No doubt my technician also learned lot of new things like flushing with nitrogen and use of double stage vacuum pump. I was more worried about temperature but ultimately I got –24 degree Celsius while before that I was getting only –17 degree Celsius. Thanks for ultimately saving my plant energy by more than 20%.

Aman Sahiwal
Owner, Polka Ice creams, Ludhiana

NCCoPP contributes to CFC Phase-out

NCCoPP contributes to the Phase-out of CFCs in the RAC servicing sector by 2010 through:

- Targeting CFC-Consuming RAC servicing sector firms
- Encouraging good servicing practices for CFC-based appliances
- Training the servicing sector technicians in handling new non-CFC technologies

NCCoPP 2-day practical training programmes scheduled from 2005-2009 propose to cover:

- CFC and ODS phase-out processes
- Servicing new HFC-134a and HC-based refrigerators and other commercial appliances, including retrofitting
- "Recovery & Recycling" (R&R) of CFC refrigerants
- Updates on technology and market changes, appropriate tools/equipment
- Best Practices in servicing of Mobile Air-Conditioning (MAC)
- Retrofitting, review of retrofit options and good servicing practices for large commercial appliances using open-type compressors.

All domestic and commercial Refrigeration Servicing Enterprises can apply for training. Specialised 1 day training workshops will be held for MAC service enterprises. All training contacts can be found on page 6.

Update: Equipment Support Scheme (ESS)

An important component of NCCoPP is ESS for Refrigeration Service Enterprises (RSEs). The objective of ESS is to enable RSEs to upgrade their tools and equipment through the financial assistance provided by the project and to encourage them to adopt good servicing practices taught during training programmes. It is worth mentioning that all the servicing enterprises cannot be provided with equipment support due to limited funds. Certain criteria are applied to select eligible RSEs for benefit from the ESS. The scheme is being introduced in phases across the country, and will eventually cover the entire country.

ESS Phase 1 (2004-05): Andhra Pradesh, Karnataka, Tamil Nadu and Pondicherry

Equipment is being collected by all RSEs who were short-listed under the scheme.

ESS Phase 2 (2005-06): Gujarat, Maharashtra, and Kerala

ESS workshops are held as an initial step to inform RSEs about the scheme offered and were held as follows:

Summary of ESS Workshops

Region	State	City	Date	No. of RSE Participants
South	Kerala	Kochi	21-May-05	81
West	Maharashtra	Mumbai	30-May-05	50
West	Gujarat	Ahmedabad	01-June-05	100
West	Maharashtra	Kolhapur	19-July-05	177
West	Gujarat	Rajkot	23- July-05	99
West	Maharashtra	Aurangabad	06-August-05	150
			Total	**657**

Out of 671 RSE applicants, 430 RSEs have been shortlisted for availing the ESS and state wise breakup of information regarding packages were presented in the table below. RSEs should start receiving the equipment between March-end and early April.

Number of Applicants and Package Details

State	No Response*	Package A	Package B	Grand Total
Gujarat		135	27	162
Kerala	1	72	74	147
Maharashtra		61	82	143
Total	**1**	**268**	**183**	**452**

ESS Phase 3 (2005-06): Rajasthan, Uttar Pradesh, Chandigarh, Uttaranchal, Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir, and Delhi

ESS workshops have been held as follows:

Summary of ESS Workshops

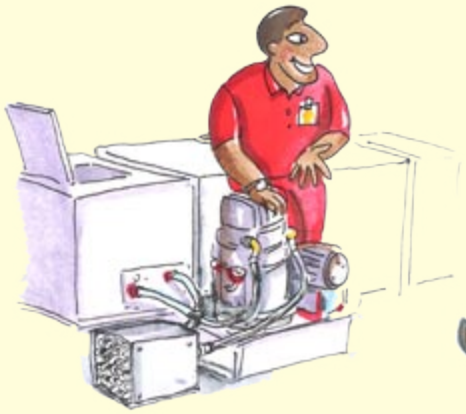
Region	State	City	Date	No. of RSE Participants
North	Rajasthan	Kota	01 Dec 05	157
North	Rajasthan	Jaipur	03 Dec 05	140
North	Punjab	Jalandhar	19 Dec 05	110
North	Chandigarh	Chandigarh	20 Dec 05	128
North	Uttar Pradesh	Lucknow	22 Dec 05	35
North	Uttar Pradesh	Varanasi	24 Dec 05	60
			Total	**630**

There has been an overwhelming response to the ESS workshops in all these states. The RSEs are sending the expression of interest forms. The forms are currently being verified and after the due diligence process the short-listed RSEs will be informed about the selection results. It is proposed that RSEs covered under Phase 3 would also receive the equipment by mid-April 2006 so that they can use it during the upcoming high season in the summer.

* Although the RSE sent an EoI, no response was received from the applicant after revision of packages post Core Group Sep '05.

RSE Training Programmes (2005-06) in Northern and Eastern India

The RSE Training Programmes under NCCoPP for the year 2005-06 began in Kangra, one of the most picturesque valleys of the country in the state of Himachal Pradesh, on 24th & 25th of September 2005 with about 22 participants. Soon it picked up speed and by the end of February '06, more than 1000 technicians were trained across the northern and eastern parts of the country.



One of the significant changes in this year's programme is that its span has extended to a number of new locations in each state. Towns like Kangra (Himachal Pradesh), Haridwar (Uttaranchal), Yamunanagar (Haryana), Barnala (Punjab), Jaunpur, Gorakpur & Moradabad (Uttar Pradesh), Chittaurgarh, Swaimadhupur & Ganganagar (Rajasthan), Cuttack & Angul (Orissa), Asansol (West Bengal) and Ranchi (Jharkhand), have been covered for the first time.

While planning for programme expansion in various states, an analysis was carried out based on the concentration of RSE technicians in different towns, and on the basis of past coverage. An empirical statistical tool called TSI (Training Scope Index), developed by CIMI, New Delhi, was used to select appropriate towns for conducting training. Further, consultation with industry partners has helped avoiding duplication in training dates and locations. This has ensured that the training programmes are well-spread and the success can be seen from the overwhelming participation in all towns.

Commitment by RSEs

The time has come for the RSE community to respond quickly by reducing the environmental effects arising out of ODS. This fact was appreciated by all participants as the deadline for 50% reduction in consumption of CFCs ended 2005. The participants admitted that though they were in the business for many decades, for a variety of reasons they could not follow best service practices. They have also unanimously acknowledged the fact that for the first time a project like NCCoPP is conducting very comprehensive training programmes covering both theory and practical sessions. They have expressed their full support and commitment to the fact that if industry, the Government, and international agencies work together in removing the hurdles and providing assistance at all stages of development, then they will be able to equip themselves more professionally.

Standardization holds the Key

Many participants acknowledged that for effective servicing, systems standardization is a must. This will help customers to know what to expect when they visit different workshops. Such uniformity is achieved by standardizing various services practices. The NCCoPP training programmes provide a platform for technicians to achieve this standardization.

Emphasis on Safety

During training, both in theoretical & practical sessions, greater emphasis was given to the safety aspects one should keep in mind while servicing refrigeration systems. Wearing hand gloves and goggles whilst brazing and handling refrigerants, and thorough evacuation of refrigeration systems using HC refrigerants were stressed repeatedly and demonstrated in the workshops. Participants in Amritsar highlighted how non-usage of Double Stage Regulator with nitrogen cylinder proved fatal to a couple of technicians while working in their workshop. How can you be safe? With the **use of proper equipment** and **tools** for one's own and others **safety** were **reinforced** in these programmes.

Contact: *V. Subramaniam*
Email: *questvs@vsnl.net*

OTC Training Programme (2005-2006)

There are a number of practical applications of OTC based systems, e.g. ice candy plants, cold storage cold rooms, menthol plants, railway air-conditioning systems, etc. The poor servicing procedures used by the service technicians like topping-up of refrigerant in leaking systems, venting out the refrigerant, using system compressor or single stage vacuum pump for evacuation, flushing of system with refrigerant and purging of charging lines and other connecting lines result in the release of a significant amount of CFCs directly into the environment.

These harmful CFC emissions could be arrested by adopting good practices during operation, servicing and decommissioning of refrigeration and air-conditioning plants. Good service practices include preventive maintenance, recovery of refrigerant, flushing and leak testing with dry nitrogen, evacuation and charging of refrigerant in the system. It is easy to follow such good service practices. Retrofitting of these plants with either low Ozone Depleting Products (ODP) or zero ODP solutions is also an option, which will reduce the recurring demand of CFCs for servicing of such units. Therefore, training on good service practices and retrofitting of OTC based CFC-12 refrigeration systems would help in reducing the CFC consumption in this sub-sector.

To achieve the above objectives, a two-fold approach was followed. **Firstly, an ice candy plant working on CFC-12 was retrofitted with HCFC-22.** Only a few system components were changed during the conversion. The retrofitted unit's performance was reported excellent. **The unit is now providing 20% more cooling than the system operating on CFC-12. This has encouraged the owner of the ice candy plant as his production of ice candies has increased by 20% or so, which has quite a significant impact on profits especially during the summer season.** There are no changes in the other system components as these are similar to CFC12 units. The steps used to retrofit are as follows:

Step 1: Inspection of Ice-candy plant to be retrofitted
Step 2: Recovery of CFC-12
Step 3: Cleaning and flushing the system
Step 4: Repair and replacement of defective components
Step 5: Compensation of oil
Step 6: Replacement of components to convert CFC-12 Ice-candy plant to HCFC-22
Step 7: Leak testing and evacuation
Step 8: Charging with HCFC-22
Step 9: Performance testing
Step 10: Labeling

Secondly, a workshop on good service practices and retrofitting of OTC based open systems was organized at Bangalore on 28 December 2005. The one day workshop covered both theoretical and practical aspects of good service practices and retrofitting. The theory sessions included the following topics:

- Environmental impact of CFCs and its alternatives
- Alternative refrigerants to CFC-12 for OTC based Refrigeration and air-conditioning systems
- Good service practices for OTC based units
- Retrofitting of Ice candy plants (similar units) to HCFC-22

The practical session was conducted on site where the Ice candy unit was converted from CFC-12 to HCFC-22. The complete process of retrofitting and good service practices was demonstrated to the participants at site. The main objective of the workshop was to train the technicians who are involved in servicing and installation of such units and to motivate the plant owners for getting their **CFC-12 based units retrofitted to HCFC-22**. Another objective was to train some of the trainers from northern training partners who will be conducting such training programmes in the near future. The workshop was well attended. A total of 20 technical personnel were trained including three trainers who will conduct similar training programmes in their respective regions. Furthermore, two ice candy CFC-12 plants were retrofitted at Ludhiana & Delhi and three workshops were organized. The details are given below:

OTC Training Programmes

Place	Training Date	No. of Participants	Contact Person / Org.
Bangalore, Karnataka	28 Dec. 05	17+3 (Trainers)	Dew Point Services (Mr. C. J. Mathew)
Ludhiana, Punjab	3 Feb. 06	18	Anant Enterprises (Mr. A. Kumar)
New Delhi	12 Feb. 06	13	S.G.T. B. I.T.I. (Mr. Surinder Singh)
New Delhi	13 Feb. 06	20	S.G.T. B. I.T.I. (Mr. Surinder Singh)

MAC Training Programmes (2005-2006)

MAC ToT

Under this year's programmes, six Mobile Air Conditioning (MAC) training programmes have been conducted. As a start, a Training of Trainers (ToT) programme took place at Chennai under the NCCoPP project from 10th to 12th December 2005. The key objective of the programme was to prepare the trainers of those training cells wherein RSE trainees' rate was high, i.e. Tamil Nadu, Andhra Pradesh, Karnataka, Chandigarh and Rajasthan States, to conduct MAC training on a regular basis. Another objective was to strengthen the practical skills of these trainers by involving them in at least two (11th and 12th Dec 05) of the MAC training programmes and gearing them towards conducting one-day MAC training programmes themselves.

The standard pattern of MAC ToT programme outline was followed on the 1st day with minor changes to suit wider involvement of trainers and their suggestions in upgrading the slides content. On the 2nd and 3rd days (i.e. 11th and 12th Dec 05) the standard training module was followed.

A ***total of 16 persons*** attended the programme. These included two trainers from the Chandigarh and Jaipur training cells respectively, one from the Delhi training cell with the objective to avail his services as trainer for the Chandigarh and Jaipur MAC programmes, six trainers from Andhra Pradesh, four from the Tamil Nadu training cell and finally, one trainer from the Karnataka training cell.

MAC Training Programmes

Place	Training Date	No. of Participants	Contact Person / Org.
Chennai, Tamil Nadu	11 Dec. 05	23	Siva Refrigeration (Mr. S.Kanaga Sabapathi)
Chennai, Tamil Nadu	12 Dec. 05	24	Siva Refrigeration (Mr. S.Kanaga Sabapathi)
Hyderabad, Andhra Pradesh	04 Jan. 06	22	Maega Services (Mr. T. Veerender Nath)
Hyderabad, Andhra Pradesh	05 Jan. 06	23	Maega Services (Mr. T. Veerender Nath)
Jaipur, Rajasthan	09 Jan. 06	22	Bohra Services (Mr. Surendra Bohra)
Chandigarh	11 Jan. 06	22	Anant Enterprises (Mr. A. Kumar)
Chennai, Tamil Nadu	12 Mar. 06	26	Siva Refrigeration (Mr. S.Kanaga Sabapathi)

Good Service Practices in RAC

Following Good Service Practices (**GSP**) is the key to becoming a good service technician. Through them the Refrigeration Technician (**RT**) projects his skills and confidence that earn him a reputation and contribute to increased business. Remember, the RT is to the refrigerator what a medical surgeon is to the human body. You have learnt by now about CFC as an ozone depleting substance (ODS). The different steps of Good Service Practices for phasing out CFCs include: practicing Recovery and Recycling (R&R), use of Dry Nitrogen in flushing and leak testing, thorough evacuation and accurate charging of refrigerant, retrofitting and changeover to ozone friendly refrigerants. However, for cleaning system components like the condenser, evaporator and connecting tubes, the refrigeration sector has been using another ODS - Carbon tetrachloride (**CTC**) whose ozone depletion potential (**ODP**) is 10% higher than CFC-12. The ill effects of ozone depletion are familiar to us all. Additionally, exposure to high concentrations of CTC can cause dizziness, headache and vomiting while chronic exposure can damage the liver and kidneys. CTC is also suspected to be a human carcinogen. Therefore, we as a community have ample reason to phase it out.

To rid the RAC sector of ODSs, CFC has been successfully substituted by the ozone friendly alternatives like HFC and HCs. This, however, has resulted in another problem. While CFC had a high tolerance for system contamination, it is not true in the case of HFC+POE combination. During the transition from CFC-12 to HFC-134a even manufacturing industries have encountered the problem of capillary choking. Most of them overcame this difficulty by better manufacturing processes and by ensuring system cleanliness. However, during servicing, circuit components accumulate greasy, oily and solid deposits on their inner surfaces that react chemically with the HFC+POE combination resulting in the formation of sludge. This in turn accumulates in the tubing and causes choking of capillaries - a major problem for the RTs during servicing of HFC based systems. Hence, the RTs need an effective chemical cleaner. CTC has been popular amongst us as such a cleaner.

However, CTC is not only an ODS but a hazard to human health and so it too needs to be phased out. The Montreal Protocol has set the phase-out deadline to the end of 2009. With the planned decrease in CTC production since 1 January 2005, thousands of small-scale industries across India will face a considerable challenge in the form of CTC shortage. It is therefore imperative to rapidly identify suitable alternatives. GTZ, a lead implementing agency under NCCoPP, is also mandated to assist small-scale industries in the process of CTC phase-out. The objective of this cost-free assistance is to competently guide such industries in CTC phase-out while safeguarding quality standards and cost effectiveness. As a first step, it has developed a practical booklet to assist CTC users in taking informed decisions while selecting CTC alternatives.

CTC is being substituted by Trichloroethylene (**TCE**), but it is found to be a severe skin irritant and a potential human carcinogen. Long-term TCE exposure can cause altered mood, loss of memory, and inability to concentrate or sleep. Hexane-based cleaning agents may be considered as possible alternatives. To check on the properties of Hexane, please refer to the GTZ booklet mentioned above.

We hereby invite you to provide us your valuable feedback on consumption of CTC or of any other solvents used in servicing. Please call the CTC-phase out project office at 0413-4201241 between 2 and 6 pm on any week day and we will call you back to save on STD costs. **This booklet will be provided free to all those who call before 30 April 2006.**

Mathew. C.J. *- mandated by GTZ*
Email: cjmathew@vsnl.com

Newsflashes from the Ozone Hole

Nasa's Aura satellite peers into Earth's Ozone Hole

Using data from the agency's Aura satellite, NASA researchers have determined a smaller size for this year's seasonal ozone hole (that has been developing over Antarctica for the past 2 decades).

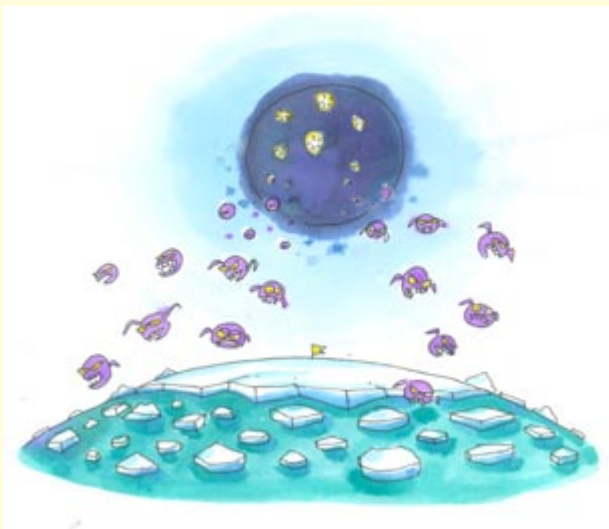
NASA's 2005 assessment of the size and thickness of the ozone layer was the first, based on observations from the Ozone Monitoring Instrument on the agency's Aura spacecraft. Aura was launched in 2004.

This year's ozone hole measured 9.4 million square miles at its peak between September and mid-October, which was slightly larger than last year's peak. The size of the ozone hole in 1998, the largest ever recorded, averaged 10.1 million square miles. For 10 of the past 12 years, the Antarctic ozone hole has been larger than 7.7 million square miles. Before 1985, it measured less than 4 million square miles. The protective ozone layer over Antarctica annually undergoes a seasonal change, but since the first satellite measurements in 1979, the ozone hole has gotten larger.

The Ozone Monitoring Instrument is the latest in a series of ozone-observing instruments flown by NASA over the last two decades. This instrument provides a more detailed view of ozone and is also able to monitor chemicals involved in ozone destruction. The instrument is a contribution to the mission from the Netherlands' Agency for Aerospace Programs in collaboration with the Finnish Meteorological Institute. The Royal Netherlands Meteorological Institute is the principal investigator on the instrument.

Source: http://www.brightsurf.com

For more information: http://www.brightsurf.com/news/headlines/view.article.php?ArticleID=22057



Promotional Meetings

In the coming months, a meeting will be held to generate awareness about the NCCop project and activities among decision makers who manage maintenance services about the NCCoPP project and its objectives. These maintenance service managers come from allied industries with extensive usage of CFCs for refrigeration: hotels, pharmaceutical companies, food processing units, hospitals, blood banks, large shopping complexes, to name a few. The meeting will highlight the crucial requirement for training, and advertise the kind of training which is offered through the Plan. The forum would also be used to disseminate awareness about Ozone depletion through screening the film "The World in Our Hands", produced under NCCoPP by UNEP.

The first such meeting, held at Ahmedabad, was attended by a wide audience from some of the industries mentioned above as well as NGOs, government bodies, members of the Gujarat pollution control board and other civil societies involved in a similar cause.

We would like to invite NCCoPP training partners across the country who may be interested in conducting such a meeting to promote their skills and experience towards furthering the outreach of training.

Contact: tpm@itpi.co.in or md@itpi.co.in

Training Contacts And Coverage

The following organisations manage all training in India through the appointed training partners:

Southern and Western Regional Management Organization:
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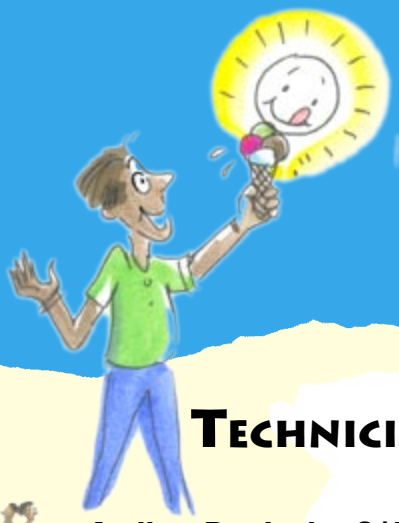

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Chandigarh	61	Chattisgarh	46	Gujarat	51
Haryana	126	Himachal Pradesh	51	Jammu & Kashmir	59
Karnataka	145	Kerala	313	Madhya Pradesh	236
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Punjab	76	Rajasthan	405	Tamil Nadu	135
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