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FINAL REPORT FOR PROJECT NO: MP/EGY/95/038

Training Course for Service Technicians relating to Phasing out ODS at the Domestic Refrigerator Plants of Alaska, Helwan, Ibema, El Nasr, Sital and Super Bosh in Egypt.

The following final report is submitted in accordance with paragraph 2.07 of Contract No. 98/199, Project No. MP/EGY/95/038.

Ellis Training Consultancy fielded John Ellis for this project, a very experienced trainer and consultant, well used to delivering this type of training. Prior to departing for Cairo the training manuals were developed and sent to the Egyptian Environmental Affairs Agency for translation. (Sent Express on 29th August 1998). The request from EEAA for postponement of the training from September to October and then from October to end November were complied with.

The equipment specified was purchased in the UK and shipped as per the instructions issued by UNIDO. Agreement for the training dates was received from EEAA via UNIDO office in Vienna thus all preparations were completed as agreed and specified.

Several facsimiles and e-mails were sent to EEAA seeking their co-operation on a number of points, no responses were forthcoming due apparently to the 'meeting of the parties' taking place in Cairo during that time.

John Ellis arrived in Cairo Friday 27th November 1998.

Saturday 28th November 1998

John Ellis tried to make contact with Engr Salwa El-Tayeb (EEAA) during Saturday at both her office and home numbers without success. Made contact with Dr Abdel Rahman Fahmi who agreed to check the status of the training programme. Saturday evening received a call from Engr Salwa El-Tayeb who arranged to collect John Ellis from hotel Sunday morning. It became clear that no preparations had been made in Cairo for collecting the training equipment from customs or indeed in arranging the delegates for the first two day workshop.

Sunday 29th November 1998

John Ellis collected by Engr Salwa El-Tayeb and attended meeting at EEAA offices where the preparations for the training programme were commenced. Also enquiries were made as to the status of the training equipment in Customs, via UNDP's office and the UNIDO Resident Representative.

Attended meeting at Electrostar's offices in Cairo. Electrostar had agreed to 'host' the training programme at their facility in 6th of October City and during the discussions Engr Farouq Hosni the Technical Director offered to provide the Training Room, and their servicing equipment would be made available if required in the absence of the UNIDO provision.

Arranged for a further meeting on Monday 30th November when a trip out to the Electrostar plant would enable preparations to be made for a revised training programme. It was agreed that a combined three day training programme would be developed and delivered to a mixed audience of technicians from after sales service and managers.

Monday 30th November 1998

John Ellis attended meeting with Farouq Hosni at Electrostar and proceeded to the Electrostar plant at 6th October City to make preparations for the training programme. Discussions took place with Engr Aiman Taha, Lab engineer with Electrostar who was tasked with providing support to the training programme and to providing English Language support to the delegates as necessary. Viewed the service equipment and made provisional plans to use it if necessary. This required some programme changes, which were discussed and agreed.

Tuesday 1st December, Wednesday 2nd December and Thursday 3rd December.

Delivered three day training programme as per the attached programme.

Despite repeated enquiries there was to be no sign of the training equipment due to difficulties in communication between EEAA and UNDP offices in Cairo. This created some problems since the training programme was developed around the equipment schedule, the equipment supplied by Electrostar was not the same specification and also of lower quality. The part of the training that was concerned with accessing domestic refrigerators by the service technician in the work place could not be delivered by demonstration or practice because the access equipment that was made available was suitable for factory work and not for the 'after sales service' environment. However, John Ellis supplied the delegates with additional information to enhance their knowledge of the availability of such equipment.

It became clear that very few of the delegates were able to communicate in English although a majority had sufficient English to understand the presentations and

demonstrations. The manuals provided for translation were helpful as far as providing support to the delegates were concerned. However, only part of one manual had been translated, leaving the delegates without textual support for much of the practical part of the programme.

Attendance was very good with 26 people attending at various times over the three day training programme. The delegates were attentive, enthusiastic and took an active part in the demonstrations and discussions. Not all the delegates were from a domestic refrigerator background and therefore had slightly different needs and interests.

On the final day of the training Engr Salwa El-Tayeb attended together with Dr Abdel Rahmen Fahmi to overview the training and to gather some feedback from the delegates. According to Engr Salwa El-Tayeb the training equipment would clear customs that day, but it was unlikely to be available at the Electrostar plant. However, she was happy to sign the proforma to confirm that the equipment was now in the care and control of EEAA.

During the Training Programme the following points were raised and need to be considered for future action:

- To reduce the emissions of ODS to atmosphere, the delegates were convinced that recovery was a sensible process but raised the issue of what to do with the recovered refrigerant? Various methods of first line recycling were discussed and the difference between recycling and reclamation were explored.
- Delegates were shown how to manufacture recovery machines suitable for workshop use, utilising standard components.
- Retrofitting and retrofilling were issues of great importance and delegates were interested in the potential future role of hydrocarbons in reducing ODS emissions.
- Safe handling techniques assumed greater importance when servicing refrigeration systems that utilise flammable and potentially explosive refrigerants.
- Refrigerant identification during the 'after sales service' function is an issue of concern, especially if the service technician does not permanently mark the system with suitable labels after changing the original refrigerant in the system.
- The proliferation of refrigerant replacements gives great concern because of the risk that refrigerants will inadvertently become mixed and the resultant cocktail would then be unfit for re-use or recycling.

Conclusion

At the conclusion of the training programme the following points are raised for consideration by UNIDO:

- Although the training programme was well received the group size was much larger than anticipated because of the inability of the Egyptian counterparts to organise the training programme for 3 separate groups as previously agreed.
- Not having the equipment supplied available in time for the training also impeded the training in that the programme was developed to deal with the type of equipment that should be used to enable after sales service to be carried out using equipment and techniques, which reduce emissions of ODS to atmosphere.
- If there are to be further UNIDO sponsored training programmes the following recommendations are made:-

The international expert should provide training to a very small (say 8 maximum) group of fluent, English speaking, engineers who would be used to deliver training programmes in Arabic to technicians in the country.

The EEAA should formulate an action plan for implementing a recovery, recycling, reclamation service, which must be supported by analysis and where necessary an incineration facility. It is very important to ensure that the whole structure is in place so that there are strong incentives to recover refrigerant in the first place.

Alternatively the following points are offered for consideration for future projects in Egypt.

Having addressed the issue of refrigerator manufacture and reducing the quantity of ozone depleting substances used in the charging and insulation of domestic refrigerators and freezers it would be appropriate to further consider the usage of refrigerant away from the manufacturing plant. During this training programme the needs of the manufacturers 'in house' after sales service teams were addressed and it became obvious that although the facility to recover refrigerant could be made available, there was no infrastructure for dealing with the recovered refrigerant.

Technicians do not have the facilities or knowledge to assess the recovered refrigerant for contamination so that a decision can be made to either re-use the refrigerant or not. If the refrigerant is NOT fit for re-use, there is no facility to analyse reprocess and then re-use the contaminated refrigerant.

A significant proportion of the refrigerant sold to workshops and other after sales service and maintenance organisations is to replace refrigerant that has already escaped to atmosphere either by leakage from systems or by bad practice. There is no

doubt that access to recovery machines can create extremely beneficial situations while technicians are breaking into systems to carry out service and repair. However if there is no infrastructure to deal with the recovered refrigerant and no regulation to prevent deliberate venting to atmosphere there are no incentives to recover the refrigerant in the first place.

While it is necessary to have a comprehensive infrastructure in order to RECLAIM refrigerant and to set up National Reclaim systems, it is possible to create small (often very small) local, RECYCLING centres which, being company based, offer sufficient low cost advantages to succeed in most Article 5 countries.

These local RECYCLING centres could be equipped with a combination recovery/recycling machine while each technician would be equipped with a low cost (constructed from recycled material maybe) recovery machine and sufficient recovery cylinders to collect contaminated refrigerant from those systems that require it. The field technicians will be trained in safe handling techniques and will be instructed by their company to recover refrigerant from contaminated systems, ensure that it is correctly identified and stored in a safe, properly labelled container to be returned to the workshop for recycling. Once refrigerant has been recycled it would then be available for re-use in other similar systems. There are sufficient commercial advantages in such a local scheme to merit serious consideration by any company that operated from a workshop base with say two or three technicians.

Training needs for such a programme:

- 1) Use and maintenance of appropriate recovery equipment
- 2) Fabrication of suitable low cost recovery machines
- 3) Use and maintenance of appropriate recycling machines
- 4) Safe handling of refrigerants
 - a) charging systems
 - b) recovery refrigerant
 - c) recycling refrigerant
 - d) storage
 - e) transportation
- 5) Assessing refrigerant quality in the field and workshop
- 6) Management of local recycling centre

Of course any such scheme would depend on sensible incentive schemes being in place. Alternatively there would need to be strong disincentives to venting refrigerant to atmosphere. National Ozone Units and their governments would have a major role to play in putting the Refrigerant Management Plan in place and then regulating the use and possibly the price of refrigerant to industry.

National certification schemes for technicians as a 'licence to practice' would also reinforce the industry attitude to refrigerant use.

In conclusion I would say that the technicians training carried out at Electrostar's factory was successful in meeting its revised aims. The delegates who were in attendance, albeit from mixed backgrounds, gained the necessary knowledge and

were introduced to the required practices for reducing the emission of Ozone Depleting Substances to atmosphere. The suggestions offered above would, if taken up, provide the next logical step in reducing ODS emissions in the field during after sales service and maintenance of domestic refrigerators and freezers and in addition reduce emissions of ODS throughout the commercial and industrial sectors of the refrigeration and air conditioning industry in Egypt.