Workshop Report

Recovery & Recycling Seminar
Antigua & Barbuda

Organized by:
Government of Antigua & Barbuda
United Nations Environment Programme (UNEP),
Division of Technology, Industry & Economics (DTIE)
Environment Canada

St John's, Antigua & Barbuda, 5 December 2000
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Executive Summary

Antigua & Barbuda’s recovery & recycling (R&R) programme is funded through Canada’s contribution to the Multilateral Fund for the Implementation of the Montreal Protocol and was approved at the 26th Meeting of the Executive Committee for Environment Canada. UNEP manages the implementation of the programme on behalf of Environment Canada and provides technical and policy support.

The programme is part of a comprehensive approach to reduce the CFC consumption in the refrigeration servicing sector. Such an approach is defined in Antigua & Barbuda’s Refrigerant Management Plan (RMP).

The main objective of the R&R programme is to create a R&R network for CFC refrigerants through the training of refrigeration technicians and trainers from the local training institutes in the use, maintenance and repair of R&R equipment and the transfer of R&R equipment to selected service workshops and R&R centers.

The programme consists of three phases: Phase I includes the design and documentation of the operational details of the R&R system and the preparation of a “R&R presentation”, Phase II the R&R seminar and Phase III the operation and monitoring of the R&R system.

The immediate result of the R&R seminar is the availability of 28 trained senior refrigeration technicians and supervisors from selected service companies and 2 trainers from technical training institutes as well as the hand-over of the R&R equipment to selected service companies.

The long term results will include the integration of R&R in the established training modules on good practices in refrigeration of the local training institutes. These modules were created as part of the training programme on good practices in refrigeration. In addition, the consumption of virgin CFC will be reduced and recovered & recycled CFC be made available for reuse. This will allow existing CFC equipment to run to the end of its economic life and contribute to a smooth transition to non-CFC technologies.

During the group discussions, the participants agreed on a set of recommendations for Phase III, the operation and monitoring of the R&R system, which will ensure the participants’ commitment, support and ownership. The National Ozone Unit will consider how to implement the recommendations and establish a monitoring mechanism to ensure that the objectives of the R&R programme are met.

The overall evaluation of the seminar was very positive. 27 out 30 (90%) returned their evaluation questionnaire. Out of the 27 evaluations, 10 participants (33%) rated the seminar as “good” and 15 participants (45%) as “excellent”.

The workshop report will be disseminated to the participants and other stakeholders and placed on UNEP’s homepage at: http://www.uneptie.org/ozonaction.html.
1. Background

The recovery and recycling (R&R) programme is part of a comprehensive approach to reduce the CFC consumption in the refrigeration servicing sector. Such an approach is defined in Antigua & Barbuda’s Refrigerant Management Plan (RMP).

The R&R programme is funded through Canada’s contribution to the Multilateral Fund for the Implementation of the Montreal Protocol and was approved at the 26th Meeting of the Executive Committee for Environment Canada. UNEP provides policy and technical support to Environment Canada.

Antigua & Barbuda’s RMP includes - and prioritizes - activities such as public awareness raising, training and certification of service technicians, training of customs officers to prevent illegal trade of ozone depleting substances, the establishment of a national R&R system, policy and regulatory frameworks, data collection and control and monitoring of the CFC consumption.

In general, the most important sector in which ozone-depleting substances are used in developing countries is the refrigeration sector, predominantly for the servicing of CFC-containing equipment. Poor servicing procedures such as flushing and venting often lead to the release of significant quantities of CFCs directly into the atmosphere.

The release of CFCs during repair and servicing can be avoided through recovery & recycling. The consumption of virgin CFC refrigerants is reduced once recovered or recycled refrigerant is used for recharging of refrigeration systems instead of virgin refrigerants. The availability of recovered or recycled refrigerant will allow to run existing refrigeration systems until the end of their economic life and thus contribute to a smooth phase-out of CFC refrigerants. This is especially important once the availability of virgin CFC refrigerants is controlled through the import / export licensing system, which Antigua & Barbuda has recently established.

However, the supply of R&R equipment and the establishment of the R&R system alone does not ensure the successful operation of the system. It must be supported by a regulatory framework including command & control measures, voluntary measures as well as incentive schemes. A successful RMP will ensure that recovered or recycled refrigerant can compete with virgin refrigerants and that recovery & recycling is profitable for the individual service company as well as for the recycling center.

A sudden non-availability of CFC refrigerants in the future may affect the ability of industries to perform. It is essential for the CFC users to be able to reduce and subsequently phase-out their consumption in a coordinated, planned and cost-effective manner. A combination of containment practices such as recovery and recycling and conversion to alternative technologies are expected to ease the economic consequences of the phase-out.

Therefore, training on good practices in refrigeration and an effective R&R programme combined with prudent retrofitting and timely replacement are part of the overall phase-out
strategy and will assist Antigua & Barbuda in meeting the control measures under the Montreal Protocol - sustaining the freeze of Annex A CFCs from 1999 and the 50% reduction in 2005, the 85% reduction in 2007 and the phase-out in 2010.

2. Objectives

The main objective of the R&R programme is to reduce the CFC consumption in the refrigeration and air-conditioning sector in Antigua & Barbuda and to assist the country in complying with the phase-out schedule applicable to CFCs under the Montreal Protocol by:

I. Increasing participants’ awareness about ozone depletion and the Montreal Protocol
II. Increasing participants’ awareness about the environmental and economic benefits of recovery and recycling of CFC refrigerant
III. Defining selection criteria for the selected service workshops and R&R center
IV. Training of refrigeration technicians and trainers from the local training institutes in the use, maintenance and repair of R&R equipment
V. Transferring R&R equipment to the selected service workshops and R&R centers
VI. Creating a R&R network for CFC refrigerants
VII. Stimulating the development of a network for information sharing throughout the sector
VIII. Helping the country to achieve the planned phase-out in a coordinated, planned and cost-effective manner
IX. Allowing to run existing CFC equipment until the end of its economic life by using recovered & recycled CFC refrigerants
X. Reducing the consumption of virgin CFC-12.

3. Expected results

The expected results of the R&R seminar include the achievement of the above mentioned objectives as well as:

- Availability of trained trainers and technicians in the use, maintenance and repair of recovery & recycling machines for CFC-12.
- Availability of R&R equipment in the country
- Workshop recommendations on implementation of Phase II and III of the R&R programme

The following assumption for successful project implementation are outlined in the RMP:

- 5 recovery machines will operate
- Each recovery machine will recover 1 kg of CFC-12 per day in average
- Each recovery machine will operate 250 days a year
- 80% of the recovered CFC-12 can be recycled and reused
• Planned reduction of CFC-12 consumption is 1.0 metric ton per year.

4. Participants

In total 30 participants attended the R&R seminar - 28 were senior refrigeration technicians and supervisors from selected service companies and 2 were trainers from technical training institutes. All participants were required to have more than 5 years of relevant work experience.

The instructor for the workshop was Mr. Ron Verch of the Heating, Refrigeration and Air-conditioning Institute of Canada, who already provided instruction for the train-the-trainers workshop on good practices in refrigeration, held in June 1999 as part of the RMP.

The list of participants is attached as Annex B.

5. Methodology

The project will be implemented in three phases:

Phase I: Design and documentation of the R&R system

The R&R seminar required the preparation of a “R&R Presentation” describing the design, operational details and logistics of the R&R system. The Ozone Officer and a technical consultant prepared this presentation.

Phase II: Organisation of the 1-day seminar on use, maintenance and repair of R&R equipment.

The training seminar addressed both the senior technicians and supervisors who are expected to use the R&R equipment as well as local refrigeration trainers in order to make the training on R&R practices sustainable.

The trainers had participated in the 5-day train-the-trainers workshop on good practices in refrigeration and introduced themselves relevant modules into the training curricula of the local training institutes. Complementary information from the R&R seminar will be integrated into these training modules.

UNEP’s “Guidelines for Recovery & Recycling Systems”, “Guidebook for Implementation of Codes of Good Practices” and “Training Manual on Good Practices in Refrigeration” were used as resource documents.

During group discussions, the participants planned Phase III of the project – the operational and monitoring phase and prepared detailed workshop recommendations on the operation of
the R&R system and its proper functioning. The agreed recommendations will ensure the involvement, ownership and support of all participants. They are included as Annex C.

A practical hands-on session was included in the seminar to apply the theoretical knowledge provided by the instructor and to practice the use of the different R&R equipment.

Each participant received a certificate of participation from the Government of Antigua & Barbuda.

The R&R equipment has been handed over to selected service companies and the corresponding agreements established.

Participants evaluated the different aspects of the R&R seminar.

The workshop report will be disseminated to all participants. It will also be placed on UNEP’s homepage at: http://www.uneptie.org/ozonaction.html.

**Phase III: Operation and monitoring of the R&R network**

The National Ozone Unit will co-ordinate, monitor and follow-up on the operation of the R&R system and prepare a follow-up report.

**6. Content**

The training agenda was designed to ensure that the objectives set out for the seminar (see Section 2) were achieved.

The seminar included the following sessions:

- Session 1: Antigua & Barbuda's RMP
- Session 2: Good reasons to recover & recycle CFC refrigerants
- Session 3: Design and functioning of the R&R system
- Session 4: Introduction to R&R equipment and tools
- Session 5: Use of recovered or recycled refrigerants
- Session 6: Practical sessions of R&R equipment and tools
- Session 7: Final discussion
- Session 8: Closing session

The workshop agenda is attached as Annex A.
7. Results

The objectives set out for the seminar have been fully met through the appropriate design of the workshop agenda whose sessions addressed all relevant issues. A detailed evaluation of the most relevant issues is included in Annex D.

<table>
<thead>
<tr>
<th>OBJECTIVES SET OUT</th>
<th>RESULTS ACHIEVED</th>
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<tbody>
<tr>
<td>I. Increasing awareness of ozone depletion issues</td>
<td>Fully - through Sessions 1 and 2</td>
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<tr>
<td>II. Increasing participants’ awareness about the</td>
<td>Fully – through Sessions 1 and 2</td>
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<td>environmental and economic benefits of recovery and</td>
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<td>recycling of CFC refrigerant</td>
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<td>III. Definition of selection criteria for the</td>
<td>Fully - as part of the preparatory Phase I and the R&amp;R</td>
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<td>selected service workshops and R&amp;R center</td>
<td>presentation</td>
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<td>IV. Training of refrigeration technicians and</td>
<td>Fully - through Sessions 4, 5 and 6</td>
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<td>trainers from the local training institutes in the</td>
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<td>use, maintenance and repair of R&amp;R equipment</td>
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<tr>
<td>V. Transfer of R&amp;R equipment to the selected</td>
<td>Fully - as part of the preparatory Phase I and the hand-over during Session 8</td>
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<td>service workshops and R&amp;R centers</td>
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<td>VI. Creation of a R&amp;R network for CFC refrigerants</td>
<td>Potentially - through the availability of trained</td>
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<td></td>
<td>technicians and the hand-over of R&amp;R equipment</td>
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<tr>
<td>VII. Stimulating the development of a network for</td>
<td>Potentially - through the set-up of the R&amp;R system in</td>
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<td>information sharing throughout the sector</td>
<td>Session 3 and the group discussions during Session 7</td>
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<td>VIII. Helping the country to achieve the planned</td>
<td>Fully - through the implementation of the RMP as planned</td>
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<td>phase-out in a coordinated, planned and</td>
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<td>cost-effective manner</td>
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<tr>
<td>IX. Allowing to run existing CFC equipment until the</td>
<td>Potentially - subject of the availability of recovered</td>
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<td>end of its economic life by using recovered &amp;</td>
<td>recycled refrigerant during the operational and</td>
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<td>recycled CFC refrigerants</td>
<td>monitoring phase Phase III</td>
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<td>X. Reduction of the consumption of virgin CFC-12.</td>
<td>Potentially - subject of the operational and monitoring</td>
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<td>Phase III</td>
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In addition, the following specific outcome could be achieved:

- Availability of 28 trained senior technicians and supervisors in R&R practices, as well as 2 professional trainers from the technical training institute.
• Availability of R&R equipment in the country including 3 recovery machines, 2 recovery & recycling machines, 2 recovery & recycling machines for the mobile air-conditioning (MAC) sector, 1 refrigerant analyser and 1 manual recovery kit.

• Workshop recommendations on implementation of Phase II and III of the R&R programme as included in Annex C.

• Enabling conditions for the establishment of an operational the R&R system by promoting networking between the involved stakeholders and service companies participating in the R&R system.

The agenda was very ambitious compared with the time allocation. This resulted in the closure of the workshop to be delayed by 3 hours. This demonstrates the strong interest and commitment of the participants in the R&R issue. Budget constraints did not allow a 2-day workshop.

8. Follow-up

The R&R programme is part of Antigua & Barbuda’s RMP. As such it will be accompanied by other RMP elements such as public awareness raising, training and policy development.

The NOU will establish a monitoring mechanism to ensure that the objectives of the R&R programme are met and will produce a follow-up report on the operation and performance of the system.

The National Ozone Unit will consider and, as far as possible, implement the recommendations which were adopted by the seminar participants. They should also be communicated to the relevant decision-makers and politicians.

9. Evaluation by Participants

The overall evaluation of the seminar was very positive. 27 out 30 (90%) returned their evaluation questionnaire. Out of the 27 evaluations, 10 participants (33%) rated the seminar as “good” and 15 participants (45%) as “excellent”.

A graphic analysis of the received evaluation questionnaires is included in Annex

The following section includes feedback and suggestions received from the participants:

- The course could have been longer.
- Further meeting with the trade association will help to know more about the R&R.
- More seminars should be arranged.
- The seminar was of a high standard and very well presented.
- More practical time was needed.
- Follow-up sessions should be done.
- More representation from the wholesale groups.

Annexes

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Annex A: Agenda

Lead Consultant: Mr. Ron Verch
Heating Refrigeration and Air-conditioning Institute of Canada (HRAI)

TUESDAY, 5 December 2000

8:30 Registration of participants
9:00 Opening statement
   Mr. Dunstan Sorhaindo, Ozone officer
9:10 Introduction- Objectives of R&R seminar and overview
   Terminology

9:20 Session 1: Antigua & Barbuda's RMP
   Status of RMP implementation-Legislative framework and import export licensing system
   Implications of ODS phase-out for Antigua & Barbuda's RAC sector
   R&R programme in the context of the RMP
   Discussion
   Mr. Dunstan Sorhaindo, Ozone officer

9:50 Session 2: Good reasons to recover & recycle CFC refrigerants
   Antigua & Barbuda's phase-out obligation
   Impact of ozone depletion-Availability of recycled CFC for service tail
   Profitability of R&R and pay-back time
   Discussion

10:15 Coffee break

10:30 Session 3: Design and functioning of the R&R system-
   Design and operational details
   Feasibility and profitability
   Data collection; Monitoring, evaluation & review
   Outlook and project duration
   Discussion

12:00 Session 4: Introduction to R&R equipment and tools
   Technical components of the R&R system-Equipment specifications
   Use, maintenance and repair
   Methods of refrigerant identification and analysis
   Local assembly of R&R equipment

12:30 Lunch
1:30  **Session 5: Use of recovered or recycled refrigerants**  
Labelling - Use of recovered refrigerants in same system  
Use of recycled refrigerants in same / different systems  
Quality control and liabilities

1:50  **Session 6: Practical sessions of R&R equipment and tools**  
Maintenance and repair of R&R equipment

4:30  **Coffee break**

4:45  **Session 7: Final discussion**  
Lessons learned from other R&R programmes  
Advice to end-users on replacement, retrofitting and use-until-end of economic-life options  
Discussion on the set-up of R&R programme in Antigua & Barbuda  
Seminar recommendations

5:30  **Session 8: Closing session**  
Signature ceremony  
Hand-over of R&R equipment  
Closing remarks  
Questions & answers by the media

6:00  **Closure of the seminar**
## Annex B: List of Participants

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Company/Institution</th>
<th>Telephone number</th>
</tr>
</thead>
<tbody>
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<td>1</td>
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<td>11</td>
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<td>12</td>
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<td>13</td>
<td>Mr. Desroy Maile</td>
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<td>15</td>
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<td>21</td>
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<td>22</td>
<td>Mr. William Green</td>
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<td>25</td>
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<td>26</td>
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</tr>
</tbody>
</table>
Annex C: Recommendations

1. A semi-centralized system should be set-up at a local wholesaler and another at a major auto dealership. Four outlet centers should be set-up in total.

2. Minimum accepted amount of recovered CFC would be 30 lbs.

3. Trade association would work out details on how and who would store contaminated returned CFCs. 200 lb cylinders would be used for storage.

4. Once the CFC has been recycled, it could be purchased at a reduced price on a first-come first-serve basis.

5. There would be no charge for accepting CFCs for recycling at each of the centers.

6. There would be no charge for the use of recovery units held at the recycling centers during the initial warranty period.

7. After the warranty date, centers would charge a small rental fee and would be responsible for all minor and major repairs to equipment.

8. The Trade Association would like to eventually restrict sales of CFCs to certified personnel. This would need to be worked out in future.

9. The refrigerant analyzer should be held at one of the recycling centers where most of the identification of cocktails would be performed. There would be no charge for this service.

10. Government to impose higher import taxes or duties on CFC’s and reduce duties on HCFC refrigerants to help promote retrofitting among the industry.

11. Proper documentation is required for refrigerant control at recycling centers. Documentation forms were handed out at seminar.

12. Before an individual could sign out a recovery machine, he/she would have to demonstrate capability in use of the machine.

13. The New Trade Association is committed to working closely with the Government’s Ozone Unit as well as wholesalers and suppliers to ensure they exceed their reduction commitment by 2005 or sooner.
Annex D: Evaluation by Participants

Evaluation questionnaire

The following questionnaire was given to participants to evaluate the training course. The responses are tabled in a graph in the following page. The rating “1” stands for poor performance and the rating “5” for excellent performance.

1. Overall quality and usefulness of the R&R seminar
2. Coverage of relevant subjects
3. Overall organisation and logistics of the R&R seminar
4. Quality of training materials
5. Competence and training skills of the lead trainer
6. Composition of the target audience
7. Time allocation
8. Practical sessions on use, maintenance and repair of R&R equipment
9. Quality of the R&R equipment
10. Discussion on seminar recommendations
11. As far as the contents of the presentation are concerned, did you find them adequate in explaining:
   a) good reasons why recovery & recycling is important
   b) national Refrigerant Management Plan
   c) design and functioning of the national R&R system and your role
   d) use, maintenance and repair of R&R equipment
EVALUATION R&R SEMINAR ANTIGUA & BARBUDA

27 of 30 questionnaires returned