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**Final Report**  
**22/05/2005**

**Prepared by :**

Eng. Hisham Rawashdeh / Project Director  
Eng. Mahmoud Abu Khadra / Field Works Supervisor  
Refrigerant Recovery & Recycling Project  
Vocational Training Corporation  
Amman / Jordan

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## **Final Report**

### **I. Introduction**

This is the final report for (N.R.R.R) project in Jordan as conducted by VTC in accordance with the contract signed with UNIDO on 21/01/2002 to provide services for implementing planned activities related to the aforementioned project.

While the first and second progress reports covered project's progress up to 31/03/2004 and the third and fourth progress reports covered project activities during the period from 1/04/2004-31/09/2004, this report covers detailed project activities during the period from 1/10/2004-31/12/2004 as well as a summary for the main activities and main outcomes achieved during the project period from 21/10/2002 – 31/12/2004.

### **II- Activities performed during the period form 1/10-31/12/2004**

#### **II-1 Collection data and information related to R.R.R processes from maintenance companies and workshops during the period form 1/10/2004 to 31/12/2004.**

Through field visits conducted by the assigned field trainers to the maintenance companies and workshops on monthly basis, the (8) field trainers collected the filled data forms regarding R.R.R processes from workshops and discussed with employers and technician problems / difficulties encountered if any. The monthly report with the collected data and observations regarding projects activities progress from the (8) field trainers/ supervisors were forwarded to Project Management Unit in VTC Head Quarter, where a collective monthly form is filled by Project Management Unit.

The collective form contains relevant data and information regarding R.R.R project in all over Jordan.

Appendix (A) shows monthly data and information related to the period from 1/10/2004-31/12/2004.

The total amounts of recovered and recycled refrigerants in different areas in Jordan during that period were as following;

No	Area	Recovered CFCs Refrigerant (g)	Recycled CFCs Refrigerant (g)
1-	Aqaba	93345	93345
2-	Karak+ Ghor Safi	26175	26175
3-	Tafila	17750	17750
4-	Amman	86095	86095
5-	Zarka+Rusaifa+Hashimia	65745	65745
6-	Irbid+Ramtha+Mafrag	139140	139140
7	Mashareh	59875	59875
Total		488125	488125

## II-2 Staff Training

A training course of 2 days was conducted during the period from 8-9/3/2005 for (8) new trainers form VTC who didn't receive training on R.R.R equipment at the beginning stage of the project. By completing this training course all VTC refrigeration and air conditioning trainers are now fully aware of the harms resulting from releasing refrigerants to atmosphere and well trained on operation, using and maintaining RRR equipment, consequently, are ready and capable of transferring knowledge and skills to trainees .

The following list shows names of trainers participated in the above mentioned training course:

No	Trainer	Training Center
1-	Fahmi Husain Hafaga	Mashareh
2-	Najeh Omar Alsawa	Ghor Safi
3-	Emad Monawer Alhrub	Muab
4-	Ma'an Noor Tarawneh	Karak
5-	Khaled Mahmoud Alsheih	Ain Albasha
6-	Azzam Yousef shaheen	Ain Albasha
7-	Jebreen Muhamed KutKut	Sahab
8-	Belal Ameen Alhihi	Sahab

Since training on RRR equipment (operation, usage and maintenance) became part of Refrigeration and Air Conditioning training program in VTC, (274) trainees were trained in VTC centers during the project period as shown in the following table :

No	VTC center	Area	No. of trainees
1-	Ramtha	Ramtha	15
2-	Mashareh	Mashareh	10
3-	Tafila	Tafila	3
4-	Ghor Safi	Ghor Safi	7
5-	Ma'ab	Karak	7
6-	Ain Albasha	Amman	26
7-	Aqaba	Aqaba	15
8-	Hashimia	Zarka	65
9-	Ghor Alawsat	Ghor AlAawsat	20
10-	Sahab	Amman	106
Total			274

### **III- Summary of the main activities carried out during project period from 21/01/2002-31/12/2004.**

#### **1- provision of R.R equipment**

RR equipment were delivered to VTC in Feb/2002 from the supplier (STAG company/Spain). Instead of 80 machines planned to be provided according to TORs, 260 machines were delivered to VTC to be distributed to refrigerators maintenance workshops in Jordan, 250 of these machines were of Stag 990 type, while the remained (10) of Stage 99.

The delivered machines were operated and tested by Stag's expert, and accordingly were found ineffective for usage with regular domestic refrigerators more frequently used and thus maintained in Jordan. It was suggested by Stage company to modify received equipment to be used with domestic refrigerators.

Accessories for modification of RR machines were delivered in August/2003, then all machines were modified and operated by stage's expert and dealer technicians in Jordan by August/2003. The delay due to the modification of the equipment resulted in shifting schedule of services activities to be provided by VTC. The new adopted work plan for recovery and recycling project activities is shown in appendix (B).

## **2- Training of maintenance workshops technicians**

Initially selected maintenance workshops / companies to receive RR equipment were invited by VTC to attend training courses on operating and maintaining RR machines.

Out of (339)workshops/ companies invited to attend the training courses, (239) workshops/ companies had participated in those courses with one or two participants, (18) training courses of (2) days each were conducted in most cities/ towns all over Jordan, and number of participants in these courses was (296). Training courses aimed at raising awareness among employers and technicians working in refrigerators maintenance regarding pollution caused by releasing refrigerants to atmosphere as well as training of employers and workers in refrigerators maintenance workshops on operating, using and maintaining RR equipment.

Appendix (c) shows list of implemented training courses, cities/ towns covered, training centers where courses were held, implementation dates for each course and number of participants.

## **3- Distribution of RR equipment to workplaces**

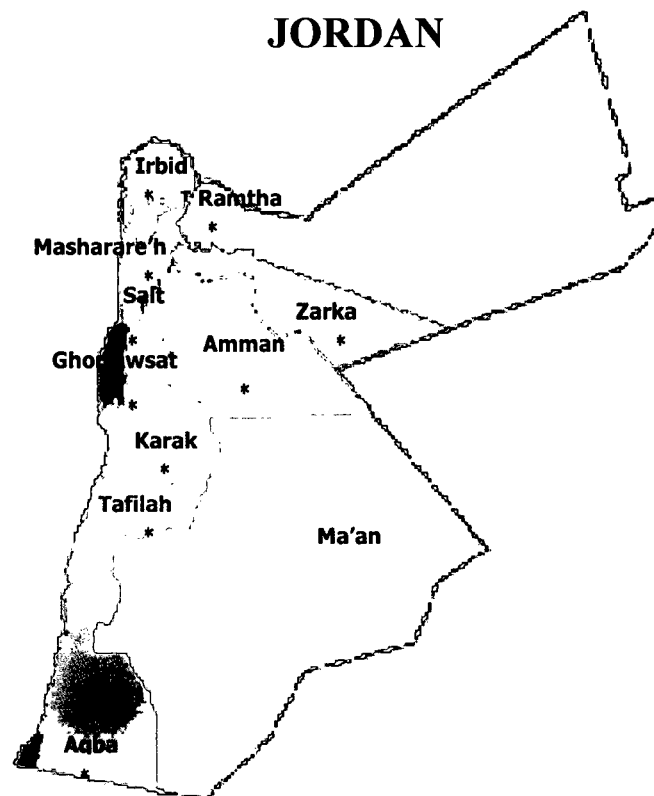
Information regarding refrigeration service sector was updated through collecting data related to workplaces addresses, number of workers, refrigerant consumption, licensing and willingness to cooperate in refrigerant recovery and recycling project activities. The survey covered (500) companies & workshops in all over Jordan, collected information were necessary to select refrigerators maintenance workshops/ companies to receive RR equipment.

Specific criteria for selection of workplaces to receive R.R equipment were identified as follows:

- 1- Refrigerant consumption rate in maintenance workshops.
- 2- Geographical distribution of selected workshops/ companies, so it covers most of populated regions.
- 3- Willingness of workshops/ companies to cooperate in project activities.
- 4- Availability of legal licenses for working in refrigerator maintenance services in the labour market.

Depending upon above mentioned criteria, work places were classified according to their priority to receive RR equipment, then those who participated in the training courses were provided with RR equipment after signing an agreement with VTC indicating their commitment for using and maintaining RR equipment as well as providing maintenance related data to VTC.

(260) RR equipment were distributed to companies workshops / training centers as shown in appendix (D), and the following map of Jordan shows their locations.



\* : LOCATION OF RR EQUIPMENT DESTRPUTION



#### **4- Recovery and Recycling scheme local arrangements**

To ensure continuity in the recovery and recycling scheme activities in Jordan, VTC carried out some arrangements, which included signing cooperation agreements with service workshops and establishing a system for follow up and monitoring refrigerants recovery and recycling activities in those workshops.

Following are details concerning those arrangements.

##### **a- Cooperation agreements with service workshops**

Service workshops provided with RR equipment had signed cooperation agreements with VTC as a contractor for implementing recovery and recycling scheme in Jordan. According to the signed agreements, service workshops responsibilities are:

- 1- To facilitate training their staff on using and maintaining RR equipment in cooperation with VTC.
- 2- To use RR equipment in servicing refrigerators so that refrigerants are not released to atmosphere.
- 3- To maintain the RR equipments and keeping them in good conditions.
- 4- To keep records regarding number of refrigerators serviced, quantities of refrigerants recovered, recycled, and reused as well as the un recycle quantities .
- 5- To provide recorded data on monthly basis to VTC field work supervisor and trainers using formats provided by VTC for this purpose.

Regarding VTC, responsibilities are:

- 1- To provide RR equipment to the selected workshops according to the set criteria.
- 2- To train technicians in service workshops on operating and using RR equipment.
- 3- To provide advise for maintenance workshops on using and maintaining RR equipment.
- 4- To collect recorded data regarding recovery and recycling refrigerants on monthly basis from maintenance

workshops for further study and analysis in order to draw conclusions and provide feed back to the field.

**b- Follow up and monitoring Recovery and Recycling scheme activities**

To follow up and monitor refrigerant recovery and recycling activities within service workshops, VTC had taken the following measures :

1- Assigned (8) trainers under the supervision of field work supervisor to follow and monitor the service workshops as following :

- One trainer for Aqaba Area.
- One trainer for Tafila Area.
- One trainer for Karak Area.
- One trainer for Zarka Area.
- Two trainers for Amman Area.
- Two trainers for Irbid Area.

2- Developed formats to be used by service workshops for filling required data regarding recovery and recycling of refrigerants. The developed formats cover the following:

- Type, capacity and numbers of serviced refrigerators in the workshops.
- Quantity of recovered refrigerants.
- Quantity of recycled refrigerants.
- Quantity of reused refrigerants.
- Quantity of un recycle refrigerants.

3- Developed a schedule for field visits for VTC assigned trainers. The schedule included monthly visit to each workshop.

4- A monthly report regarding recovered and recycled refrigerants to be prepared and forwarded to project director by each field team members/ trainers, each about his area.

5- Accumulated data collected from different areas to be studied and analyzed by project director and field supervisor. Findings, observations and conclusions are used either for feed back and

directions to the field trainers and maintenance workshops or for reporting purposes to UNIDO.

#### **5- The need for establishing the recycling center**

The original plan according to the project TORs included establishing (6) recycling center equipped with required recycling equipment.

Those six recycling center were planned to be set up at six Vocational Training Center [Sahab Trade Training Center (Amman), Hashimieh Trade Training Center (Zarka), Ramtha Trade Training Center (East Irbid), Mashareh Trade Training Center (West Irbid), Ma'an Trade Training Center (Ma'an) and Aqaba Trade Training center (Aqaba)].

The recovered refrigerants in the service workshops were to be collected, recycled and then redistributed to the workshops to be reused in the maintained refrigerators as needed.

Business criteria of refrigerant recycling centers were to be developed to establish self trusted national scheme for recovery, collecting, recycling, and redistributing of refrigerants, of which all parties will benefit and achieve good results.

Actually, such arrangements were not needed, since the equipment delivered through the project and distributed to service workshops were having the capability of recovering and recycling. Therefore, refrigerants can be reused directly after recovery and recycling by RR equipment in the service workshop it self without transferring them to recycling centers.

#### **6- Data and information collection related to RRR processes in maintenance companies and workshops**

The total amounts of recovered, recycled and un-recycled refrigerants in different areas in Jordan during the period from 1/8/2003 to 1/10/2004 were as following:

No	Area	Recovered CFCs Refrigerant (g)	Recycled CFCs Refrigerant (g)	Unrecycled CFCs Refrigerant (g)
1-	Aqaba	181511	171465	1282
2-	Karak+ Ghor Safi	187670	176888	20703
3-	Tafila	81870	80530	1390
4-	Amman	527688	514542	9481
5-	Zarka+Rusaifa+Hashimia	565350	533230	-
6-	Irbid+Ramtha+Mafrag	789340	789340	-
7-	Mashareh	237203	229427	5861
Total		2570632	2495422	38717

Appendix (E) shows monthly data and information related to the period form 1/8/2003-1/10/2004.

#### **7- Introducing RRR equipment operation and usage as a training element within VTC training programs**

In order to develop awareness among trainees in refrigeration and air-conditioning program regarding effects of CFCs on environment, and to provide them with skills and knowledge on safe practices of refrigeration and cooling equipment maintenance, new training elements focusing on those issues were introduced to training programs in VTC. Such step is very important due to its impact on developing attitudes and positive safe-practices-in-labour-market-work places in Jordan.

#### **IV Results & Findings**

On studying the collected data and information and observations received from the field trainers/ supervisors during the period from 1/8/2003-31/12/2004, the following results and findings were concluded:

- 1- Total number of repaired refrigerators in maintenance workshops involved in the RR project in Jordan was (13450).

- 2- Total amount of recovered refrigerants was(3058.757)kg.
- 3- Total amount of recycled refrigerants was (2983,547)kg.
- 4- Total amount of un-recycled refrigerant was (38,717) kg.
- 5- Percentage of un-recycled to the recovered refrigerant was low i.e  $\frac{38,717}{3058.757} = 0.01266 = 1.266 \%$
- 6- No additional cost for the recovery and recycling for refrigerants was introduced to maintenance workshops since the provided equipment were having capability for performing both the recycling and recovery without the need to transport the recovered refrigerant to recycling centers which usually lead to additional cost.
- 7- In general RR equipment were working properly and non of the working places complained of serious maintenance problems, although as mentioned in previous progress reports some technicians indicated the following comments/ shortcoming of the RR equipment:
  - The Unavailability of an instrument for weighing the recovered & recycled amounts of refrigerants in the RR equipment. Therefore recorded amounts of the recovered and recycled refrigerants in workshops are approximate as estimated by maintenance workshops technicians.
  - The relatively long time needed for recovering and recycling of the refrigerant.
  - Shortage of means for ensuring the purity/ quality of the recycled refrigerant.

## V – Sustainability of RRR project

To check sustainability of RRR project after completion of its main activities as planned by December 31,2004, project manager and field supervisor visited all vocational training centers and some of companies / work shops involved in project's activities. Field visits took place during February & March of 2005 and aimed at checking and evaluating the following aspects:

- Availability readiness and working conditions of the RRR equipment in VTCs and maintenance workshops.
- Training on operation, using and maintenance of RRR equipment in VTCs.
- Benefites achieved to employers and technicians from using RRR equipment in maintenance workshops.
- Willingness of refrigerators maintenance workshops to continue using RRR equipment in the future.
- Workshops owners and technicians impressions /comments related to RRR project in general and distributed equipment in particular.

Followings are the main observations and conclusions resulted from above mentioned field visits:

- Distributed RRR equipment are in good conditions and are frequently used by workshops.
- Trainees in refrigeration and air conditioning specialization are receiving training on using RRR equipment as part of their regular training program.
- Technicians in refrigerators maintenance workshops are capable of using and maintaining RRR equipment.
- Refrigerators maintenance workshops / companies are intending to continue using RRR equipment due to the following advantages as expressed by employers and technicians:
  - = Cut down of maintenance costs due to the reuse of the recovered and recycled refrigerants in maintaining refrigerators.
  - = Reductions of personal health risks usually refrigerators maintenance technicians are exposed to when releasing

refrigerants to atmosphere especially when working in confined places.

= Technicians awareness and perspectives regarding risks and harms resulted from releasing refrigerants to atmosphere.

- Some technicians pointed to technical shortcomings related to the efficiency of the distributed RRR equipment.

## **VI – Conclusion**

It can be concluded from previous three progress reports and this final one that RRR project was fully successful and achieved its preset goals. Indicators for project's success are as following:

- All project's main activities were fully implemented in accordance with the preset plan, never mind the delay occurred at the starting stage of the project due to the modification on the received RRR equipment to match the domestic small refrigerators mostly available in Jordan.
- 260 RRR equipment are distributed to selected refrigerators maintenance companies/ workshops, and are used by them.
- Technicians in maintenance workshops are capable of using and maintaining RRR equipment.
- Technicians working in involved workshops are fully aware and appreciate advantages of using RRR equipment regarding : saving on maintenance costs and eliminating hazards of refrigerants to their personal health in particular and to atmosphere pollution in general.
- Training on operation, using and maintaining of RRR equipment is now part of refrigeration and air conditioning specialization training program in VTC.

So, from above mentioned indicators, its is obvious that in addition to successful achievement of project's preset objectives, sustainability of project's activities beyond its planned duration can be observed through continuance use of RRR equipment in maintenance workshops in Jordan.

# Appendices

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## Appendix A.1

### Monthly Collected Data for National Recovery and Recycling Project ( Oct /2004 )

No	Area	Amount of recycled CFC refrigerants (g)	Amount of Recycled CFC refrigerants (g)	Amount of un-recycled CFC refrigerants (g)
1	Aqaba	27015	27015	-
2	Karak + Ghor Safi	9625	9625	-
3	Tafila	5600	5600	-
4	Amman	38190	38190	-
5	Zarka+Rusaifa+ Hashimia	30445	30445	-
6	Irbid + Ramtha + Mafraq	59050	59050	-
7	Mashareh	19400	19400	-
Total		189325	189325	-

## Appendix A2

### Monthly Collected Data for National Recovery and Recycling Project ( Nov /2004 )

No	Area	Amount of recycled CFC refrigerants (g)	Amount of Recycled CFC refrigerants (g)	Amount of un- recycled CFC refrigerants (g)
1	Aqaba	34830	34830	-
2	Karak + Ghor Safi	8000	8000	-
3	Tafila	6000	6000	-
4	Amman	27905	27905	-
5	Zarka+Rusaifa+ Hashimia	17490	17490	-
6	Irbid + Ramtha + Mafraq	35815	35815	-
7	Mashareh	20629	20629	-
Total		146669	146669	-

### Appendix A3

#### Monthly Collected Data for National Recovery and Recycling Project (Dec /2004 )

No	Area	Amount of recycled CFC refrigerants (g)	Amount of Recycled CFC refrigerants (g)	Amount of un-recycled CFC refrigerants (g)
1	Aqaba	31500	31500	-
2	Karak + Ghor Safi	8550	8550	-
3	Tafila	6150	6150	-
4	Amman	20000	20000	-
5	Zarka+Rusaifa+ Hashimia	17810	17810	-
6	Irbid + Ramtha + Mafrq	44275	44275	-
7	Mashareh	19846	19846	-
Total		148131	148131	-



Appendix (C):

List of training courses implemented during the period (5/7/2003-9/3/2005 ) for refrigerators maintenance workshops / companies on operating and maintaining RR equipment .

No	City / Town	Training Center / Institute	Period	No of Participants
1	Amman	Training & Testing Institute	5-6/7/2003	17
2	Zarka	Al-Hashemieh T.C	12-13/7/2003	16
3	Tafleh	Tafleh T.C	15-16/7/2003	11
4	Zarka	Al-Hashemieh T.C	19-20/7/2003	16
5	Sweileh & Ain El -Basha	Ain El -Basha T.C	26-27/2003	15
6	Amman	Training & Testing Institute	2-3/8/2003	12
7	Karak	Moa'ab T.C.	2-3/8/2003	15
8	Irbid	Hakama T.C.	16-17/8/2003	22
9	Irbid	Hakama T.C.	23-24/8/2003	19
10	Ramtha	Ramtha T.C.	30-31/8/2003	16
11	Masharea	Masharea T.C.	2-3/9/2003	11
12	Zarka	Al-Hashemieh T.C	17-18/9/2003	19
13	Irbid	Hakama T.C.	21-22/9/2003	22
14	Sweileh & Ein Elbasha	Ain El -Basha T.C	28-29/9/2003	19
15	Agaba	Agaba T.C	6-7/10/2003	19
16	Amman	Training & Testing Institute	12-13/10/2003	28
17	Amman	Training & Testing Institute	25-26/10/2003	11
18	Amman	Training & Testing Institute	8-9/3/2005	8
Total				296

Appendix D :

List of Refrigerators Maintenance workshop / Centers in Jordan Labour market which were provided with Refrigerants Recovery & Recycling equipment within UNIDO project No. MP/JOR/99/145

Maintenance Workshop / Center	City / Town	Maintenance workshop / Center	City / Town
1. Al Nour workshop for maintenance	Amman	14. Alshahrinin for air conditioning	Al karamah
2. Al – Etikal workshop	Amman	15. Alleflawi for refrigeration	Wadi Sir South shunah
3. Zowaid workshop	Amman	16. Hatem Taha for domestic appliances maintenance	Wadi Sir
4 Khaled jalanbo workshop	Amman	17. Technical workshop for maintenance & refrigeration	Fuhejase
5. Hanzeh workshop	Amman	18. Quassy & Mihkal Co.	Jubeiha
6. Naef workshop	Amman	19. Asaad technical workshop	Amman
7. Al-salam workshop	Amman	20. Al Ghanem for air conditioning and refrigeration	Amman
8. Iyad workshop for refrigeration	Amman	21. Ramadan technical work shop	Amman
9. Al-Qaser center for maintenance	Amman	22. Al – Taqwa for A.C & R	Amman
10. Al- Amarah workshop	Amman	23. Kareem workshop	Jerash
11. Samha workshop	Amman	24. Sufain workshop	Al – Menshiah
12. Abu Elkheil for refrigeration	Salt	25. Al – Besani workshop	Al-Kraemeh
13. Mahmoud for air conditioning and refrigeration	Salt	26. Soboh workshop	Al – Msher'ea

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27. Technical workshop	Al – Mash/e	43. Alghawi workshop	Irbid
28. Al – Amaneh workshop	Wagas	44. Wasfla.tal T.S	Irbid
29. Wadi Al – Sear electricity workshop	Al honeh	45. Zean Al – Abedeen workshop	Irbid
30. Eleoah workshop	Al – Shoneh Alshamaleih	46. Al-El-Beat U.	Mafraq
31. Saed Alarabi workshop	Al – Shoneh Alshamaleih	47. Al – talafha workshop	Irbid
32. Technical Center for A.C.&R.	Kofor yoba	48. Abu Qamar workshop	Irbid
33. Al – Somy workshop	Irbid	49. Abu Areash workshop	Irbid
34. Technical refrigeration workshop	Hofa	50. Daaghneh workshop	Irbid
35. Sohael workshop	Qnaim	51. Almadenah Al monawarah workshop	Irbid
36. Qais workshop	Dear Abu S'ed	52. Al Huson College W.S	Irbid
37. Bador workshop	Dear Abu S'ed	53. Eyad workshop	Irbid
38. Technical workshop	Dear Abu S'ed	54. Eyad workshop	Irbid
39. Khaled workshop	Amman	55. Al – Abrar workshop	Irbid
40. Jordan Vally authority w.s.	North Ghore	56. Al – Noor workshop	Irbid
41. Amer workshop	Irbid	57. Al – Aseary workshop	Irbid
42. Belal workshop	Irbid	58. Al – Falogeh workshop	Irbid

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List of Refrigerators Maintenance workshop / Centers in Jordan Labour market which were provided with Refrigerants Recovery & Recycling equipment within UNIDO project No. MP/JOR/99/145

Maintenance Workshop / Center	City / Town	Maintenance workshop / Center	City / Town
59.. Al-Betar Center workshop	Irbid	76. Technical maintenance workshop	Irbid
60..Al-Aseal Center workshop	Irbid	77. Yarmouk university workshop	Irbid
61. Technical maintenance workshop	Irbid	78. Adnanco workshop	Irbid
62.. Al – Jamal	Irbid	97. Abu hasnah workshop	Irbid
63. Barada workshop	North Irbid	80. Modern workshop	Irbid
64. Howarah workshop	Howarah	81. Abu Mustafa workshop	Irbid
65..Al – Ajlony workshop	Al – sareh	82. Dorrak bek workshop	Irbid
66..S&T university	Al – Ramtha	83. Abu Samer workshop	Irbid
67.. Al – share ‘e for electricity and refrigeration workshop	Al- Ramtha	84. Rzoog workshop	Irbid
68 Engineering workshop for maintenance	Al – Ramtha	85. Al – Eklass workshop	Irbid
69. Alwafa’ e technical workshop	Al – Ramtha	86. Al anwar workshop	Irbid
70. Althegah workshop	Al – Ramtha	87. Luskor workshop	Irbid
71. noor Alquds workshop	Al – Mafrag	88. palestine workshop	Irbid
72. Alkramah workshop for refrigeration	Al – Mafrag	89. Al wafa’ e workshop	Irbid
73. Dar workshop for refrigeration	Al- Mafrag	90. Repairing and maintenance center	Irbid
74. Ra’ed workshop for refrigeration	Al- Mafrag	91. Al shara’ e workshop	Irbid
75. Al- atheer workshop for electricity and refrigeration	Al- Mafrag	92. Al- Fareed workshop	Irbid



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List of Refrigerators Maintenance workshop / Centers in Jordan Labour market which were provided with Refrigerants Recovery & Recycling equipment within UNIDO project No. MP/JOR/99/145

Maintenance Workshop / Center	City / Town	Maintenance workshop / Center	City / Town
93. Al- Omary workshop	Irbid	117. Abdal – Hamead sharaf school	Amman
94. Al- Neimry workshop	Irbid	118. Balabki workshop	Amman
95. Al Tawakol workshop	Irbid	119. Khalikd Al-Shawabkeh workshop	Madaba
96. Al Omary workshop and exhibition	Irbid	120. Al Khalily for refrigeration	Madaba
97. Yousef workshop	Amman	121. Refrigeration house	Amman
98. Madaba Industry school	Madaba	122. Al-Mansour	Sahap
99. Al- Scham workshop	Amman	123. Salwad for refrigeration	Almgablen
100. Hamzah workshop	Amman	124. AL – Shagnoby workshop for refrigeration	Sweleh
101. Al-hendi and Al-Ashal workshop	Amman	125. Al-Tawakul workshop	Sweleh
102. Al-bothaina center for modern industrial technology	Amman	126. Technical Services Center	Sweleh
103. Al-hurop workshop	Amman	127. Al-Ajouri center for electronics	Sweleh
104. Aii sido Alkurdy school	Amman	128. Jamal dwekworkshop	Sweleh
105. Nedal workshop	Amman	129. Asteta workshop	Jabal Alhusain
106. Al-Jabali workshop	Amman	130. Omar and shamia co.	Jabal Alhusain
107. Emad workshop	Amman	131. Nabeal Kamal workshop	Jabal Alhusain
108. Hassan Khalid Abu hawa school	Amman	132. Al-Ramah for refrigeration	Al-Ashrafiah
109. Al- fadi workshop	Amman	133. Jaber albashar for refrigeration	Alwehadat
110. AlKhalily workshops for refrigeration	Amman	134. Eyad for refrigeration	Al-Ashrafiah
111. Al-Talha workshop for maintenance	Amman	135. Nassar for refrigeration .	Eltaj
112. Burhan Kamal school	Amman	136. Al- Eman	Al-wehadada
113. Ahmad Tugan School	Amman	137. Al- Batra	Al-wehadada
114. Wafa Al. Dajani company .	Amman	138. Abu Waseam workshop	Hy Nazzal
115. Al-Sumi workshop	Irbid	139. Amer Abu mayaleh	Hy Nazzal
116. Al-Agsa workshop	Amman	140. Khalid Al-Awamleh	Hy Nazzal

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List of Refrigerators Maintenance workshop / Centers in Jordan Labour market which were provided with Refrigerants Recovery & Recycling equipment within UNIDO project No. MP/JOR/99/145

Maintenance Workshop / Center	City / Town	Maintenance workshop / Center	City / Town
141. Al-sharbagy	Hy Nazzal	160. Al-bashar workshop for refrigeration	Aldoail
142. Technical workshop	Hy Nazzal	161. Esmal workshop for refrigeration	Rosaiifa
143. Dar Al- Seaneh	Hy Nazzal	162. Al-shallal workshop	Rosaiifah
144. Ashraf Al-Faniah	Marg Al-Hamam	163. Palesiin workshop	Rosaiifah
145. Al-Faida'e	Marg Al-Hamam	164. Al-fares workshop	Rosaiifah
146. Abd-Allah workshop	Madaba	165. Nader workshop	Rosaiifah
147. Awad workshop for refrigeration	Theban	166. Al-Khazaz workshop	Rosaiifa
148. Khalid workshop	Madaba	167. Dubai workshop	Rosaiifa
149. Dubai factory	Zarga	168. Abu zaitoon workshop	Zarga
150. Hani Abu Obead workshop for refrigeration	Zarga	169. Zahrat Al-mada'en workshop	Zarga
151. Abu husam technical workshop	Zarga	170. Al- Khanearah factories company	Zarga
152. Al-Kholoud corporation for refrigeration	Zarga	171. Emad workshop	Rosaiifah
153. Amer workshop for electricity	Zarga	172. Al-Shairy center	Zarga
154. Technical refrigeration workshop	Zarga	173. Al-tawkol workshop	Zarga
155. Palestine workshop	Zarga	174. Al-Tellawy workshop	Zarga
156. Al-Sawalmeh workshop for refrigeration	Zarga	175. Beasan workshop	Zarga
157. Mohammad Ahmad workshop	Zarga	176. Al-Maha workshop	Zarga
158. Electric technical workshop	Zarga	177. Technical Hatem for refrigeration	Zarga
159. Al-Agsa workshop	Zarga	178. Swedan workshop	Zarga

Appendix D :

List of Refrigerators Maintenance workshop / Centers in Jordan Labour market which were provided with Refrigerants Recovery & Recycling equipment within UNIDO project No. MP/JOR/99/145

Maintenance Workshop / Center	City / Town	Maintenance workshop / Center	City / Town
179. Ahmad tadros workshop for maintenance	Zarqa	199. Adeab workshop for refrigeration and electricity	Zarqa
180. Na'em Al-Agory workshop	Zarqa	200. Adeab workshop for refrigeration and electricity	Zarqa
181. Qublan technical workshop	Zarqa	201. Mustafa shabeen workshop	Zarqa
182. Abu Namrah workshop	Zarqa	202. Farag sibatat workshop	Zarqa
183. Musa workshop	Aldotail	203- Osama workshop	Zarqa
184. Abu Ashraf workshop	Zarqa	204. Al-Tafleh College for Engineering	Al-Tafleh
185. Baet Al-magdes workshop	Zarqa	205. Bashbear Al-Dalabeah workshop	Al-Tafleh
186. Palestine workshop	Al-Jabal Alabiad	206. Bseara workshop for refrigeration	Al - Tafleh
187. Abu Salen workshop	Zarqa	207. Arab Botash Co.	Al-Tafleh
188. Al Muhandes workshop	Zarqa	208. Wasif Al- Fal school	AL- Tafleh
189. Arab Botash Co.	Ghor Alsafi	209. MEC Co.	Aqaba
190. Alshahed workshop	Muta	210. HAMCo Co.	Aqaba
191. Ranea workshop	Ghor ALSafi	211. NRC Co.	Amman
192. Ayman Al-Qaaisy workshop	Karak	212. Moris Al – Deek co.	Zarqa
193. Al-Etgan workshop	Ghor ALSafi	213. Ajman for refrigeration	Amman
194. Al-Mazra'a workshop	Ghor ALSafi	214. Al-Tekani for AC and refrigeration	Amman
195. Murad workshop	Ghor ALSafi	215. Al-mallah center for refrigeration	Marka
196. Al-Amereah workshop	Ghor ALSafi		
197. Hamann workshop	Karak		
198. Hamann workshop	Karak		

Appendix D :

List of Refrigerators Maintenance workshop / Centers in Jordan Labour market which were provided with Refrigerants Recovery & Recycling equipment within UNIDO project No. MP/JOR/99/145

Maintenance Workshop / Center	City / Town	Maintenance workshop / Center	City / Town
216. Al – Agaba workshop for refrigeration	Agaba	233. Qasrawir workshop	Zarqa
217. Al-Showekey center for refrigeration	Agaba	234. Abu – Ibrahim workshop	Rusaifa
218. Eslam workshop for refrigeration	Agaba	235. Jabari for refrigeration	Marka
219. Agaba Ports Corporation	Agaba	236. Al-Ajo maintenance workshop	Amman
220. Sobhy Al-Sousi Company	Agaba	237. Engineering maintenance workshop	Irbid
221. Agaba Special Economical Zone workshop	Agaba	238. Training & Testing Institute	Amman
222. Jordainian Cement Factories Company	Al-Tafleh	239. Hashimieh Training Center	Zarqa
223. Al-Eaman workshop	Al-Tafleh	240. Sahab Trining Center	Shaab
224. Al-Ekhlash workshop	Al-Tafleh	241. Ain Al-Basha Trining Center	Ain EL-Basha
225. Al Mashar'ea Training Center	AlMashar'ea	242. Abu – Alrub workshop	Rusaifa
226. AlRamtha Training Center	Al-Ramtha	243. Muntaha Refrigeration workshop	Zarqa
227. Hakama Training Center	Irbid	244. Technician workshop	Zarqa
228. Tafleleh Training Center	Tafleleh	245. Khaled Abd-Alhay & Raghheb Swalmeh company.	Zarqa
229. Agaba Training Center	Agaba	246. Habash Engineering Workshop	Yajooz
230. Chor Al-Safi Training center	Ghor Al-Safi	247. Yasser Abdullah workshop	Zarqa
231. Moa'ab Training Center	Karak	248. Hallaq corporation for Electrical and Air conditioning Equipment	Agaba
232. Ma'an Training Center	Ma'an	249. Nauras workshop for refrigerant maintenance	Karak
		250. Nidal Ahmed Harb Workshop	Zarqa
		251. Agaba ports Corporation	Agaba

## Appendix E 1

### Monthly Collected Data for National Recovery and Recycling Project ( August/2003 )

No	Area	Amount of recycled CFC refrigerants (g)	Amount of Recycled CFC refrigerants (g)	Amount of un- recycled CFC refrigerants (g)
1	Aqaba	-	-	-
2	Karak + Ghor Safi	30950	29543	4370
3	Tafila	-	-	-
4	Amman	45053	42042	3196
5	Zarka+Rusaifa+ Hashimia	-	-	-
6	Irbid + Ramtha + Mafrag	22910	22910	-
7	Mashareh	-	-	-
Total		98913	94495	7566

## Appendix E 2

### Monthly Collected Data for National Recovery and Recycling Project ( September /2003 )

No	Area	Amount of recycled CFC refrigerants (g)	Amount of Recycled CFC refrigerants (g)	Amount of un-recycled CFC refrigerants (g)
1	Aqaba	-	-	-
2	Karak + Ghor Safi	13665	13020	3575
3	Tafila	-	-	-
4	Amman	28405	27745	1310
5	Zarka+Rusaifa+ Hashimia	-	-	-
6	Irbid + Ramtha + Mafraq	100816	100816	-
7	Mashareh	-	-	-
Total		142886	141581	4885

### Appendix E 3

#### Monthly Collected Data for National Recovery and Recycling Project ( October /2003 )

No	Area	Amount of recycled CFC refrigerants (g)	Amount of Recycled CFC refrigerants (g)	Amount of un- recycled CFC refrigerants (g)
1	Aqaba	16635	14635	163
2	Karak + Ghor Safi	20925	15960	6275
3	Tafila	6180	5950	330
4	Amman	33660	27570	2970
5	Zarka+Rusaifa+ Hashimia	-	-	-
6	Irbid + Ramtha + Mafraq	72020	72020	-
7	Mashareh	15375	13570	1600
Total		164795	149705	11338

## Appendix E 4

### Monthly Collected Data for National Recovery and Recycling Project ( November/2003 )

No	Area	Amount of recycled CFC refrigerants (g)	Amount of Recycled CFC refrigerants (g)	Amount of un- recycled CFC refrigerants (g)
1	Aqaba	8566	8460	51
2	Karak + Ghor Safi	16470	15540	4090
3	Tafila	5110	4950	110
4	Amman	24095	21740	815
5	Zarka+Rusaifa+ Hashimia	105670	86200	-
6	Irbid + Ramtha + Mafraq	66364	66364	-
7	Mashareh	19265	17295	1600
Total		245540	220549	6666



## Appendix E 5

### Monthly Collected Data for National Recovery and Recycling Project ( December/2003 )

No	Area	Amount of recycled CFC refrigerants (g)	Amount of Recycled CFC refrigerants (g)	Amount of un- recycled CFC refrigerants (g)
1	Aqaba	12890	6670	1068
2	Karak + Ghor Safi	9565	7505	2060
3	Tafila	8930	8480	450
4	Amman	35435	36090	960
5	Zarka+Rusaifa+ Hashimia	42365	38540	-
6	Irbid + Ramtha + Mafraq	54034	54034	-
7	Mashareh	21105	17104	2661
Total		184324	168423	7199

## Appendix E 6

### Monthly Collected Data for National Recovery and Recycling Project (Jan /2004 )

No	Area	Amount of recycled CFC refrigerants (g)	Amount of Recycled CFC refrigerants (g)	Amount of un- recycled CFC refrigerants (g)
1	Aqaba	16340	14620	-
2	Karak + Ghor Safi	7425	7220	205
3	Tafila	8700	8400	300
4	Amman	36055	34480	230
5	Zarka+Rusaifa+ Hashimia	42315	39475	-
6	Irbid + Ramtha + Mafraq	47115	47115	-
7	Mashareh	15725	15725	-
Total		173675	167036	735

## Appendix E7

### Monthly Collected Data for National Recovery and Recycling Project ( Feb/2004 )

No	Area	Amount of recycled CFC refrigerants (g)	Amount of Recycled CFC refrigerants (g)	Amount of un- recycled CFC refrigerants (g)
1	Aqaba	7220	7220	-
2	Karak + Ghor Safi	6900	6800	100
3	Tafila	7700	7600	100
4	Amman	25170	25265	-
5	Zarka+Rusaifa+ Hashimia	39760	35575	-
6	Irbid + Ramtha + Mafraq	39502	39502	-
7	Mashareh	17993	17993	-
Total		144245	139955	200

**Appendix E 8****Monthly Collected Data for National  
Recovery and Recycling Project ( March /2004 )**

<b>No</b>	<b>Area</b>	<b>Amount of recycled CFC refrigerants (g)</b>	<b>Amount of Recycled CFC refrigerants (g)</b>	<b>Amount of un- recycled CFC refrigerants (g)</b>
1	Aqaba	16845	16845	-
2	Karak + Ghor Safi	14930	14460	46
3	Tafila	8150	8050	100
4	Amman	49150	48945	-
5	Zarka+Rusaifa+ Hashimia	28330	26530	-
6	Irbid + Ramtha + Mafraq	50178	50178	-
7	Mashareh	16270	16270	-
<b>Total</b>		<b>184853</b>	<b>181278</b>	<b>146</b>

**Appendix E 9****Monthly Collected Data for National  
Recovery and Recycling Project ( April /2004 )**

<b>No</b>	<b>Area</b>	<b>Amount of recycled CFC refrigerants (g)</b>	<b>Amount of Recycled CFC refrigerants (g)</b>	<b>Amount of un- recycled CFC refrigerants (g)</b>
1	Aqaba	19400	19400	-
2	Karak + Ghor Safi	10840	10840	-
3	Tafila	7200	7200	-
4	Amman	40985	40985	-
5	Zarka+Rusaifa+ Hashimia	34220	34220	-
6	Irbid + Ramtha + Mafrq	56355	56355	-
7	Mashareh	19009	19009	-
Total		188009	188009	-

## Appendix E10

### Monthly Collected Data for National Recovery and Recycling Project ( May /2004 )

No	Area	Amount of recycled CFC refrigerants (g)	Amount of Recycled CFC refrigerants (g)	Amount of un-recycled CFC refrigerants (g)
1	Aqaba	33735	33735	-
2	Karak + Ghor Safi	6000	6000	-
3	Tafila	6670	6670	-
4	Amman	43810	43810	-
5	Zarka+Rusaifa+ Hashimia	55200	55200	-
6	Irbid + Ramtha + Mafraq	59160	59160	-
7	Mashareh	18640	18640	-
Total		223215	223215	-

**Appendix E11****Monthly Collected Data for National  
Recovery and Recycling Project (Jun /2004 )**

<b>No</b>	<b>Area</b>	<b>Amount of recycled CFC refrigerants (g)</b>	<b>Amount of Recycled CFC refrigerants (g)</b>	<b>Amount of un- recycled CFC refrigerants (g)</b>
1	Aqaba	13150	13150	-
2	Karak + Ghor Safi	11400	11400	-
3	Tafila	5430	5430	-
4	Amman	40005	40005	-
5	Zarka+Rusaifa+ Hashimia	70690	70690	-
6	Irbid + Ramtha + Mafrag	53609	53609	-
7	Mashareh	16075	16075	-
Total		210359	210359	-

## Appendix E12

### Monthly Collected Data for National Recovery and Recycling Project ( July /2004 )

No	Area	Amount of recycled CFC refrigerants (g)	Amount of Recycled CFC refrigerants (g)	Amount of un- recycled CFC refrigerants (g)
1	Aqaba	14630	14630	-
2	Karak + Ghor Safi	11700	11700	-
3	Tafila	5800	5800	-
4	Amman	39470	39470	-
5	Zarka+Rusaifa+ Hashimia	33800	33800	-
6	Irbid + Ramtha + Mafraq	57915	57915	-
7	Mashareh	24595	24595	-
Total		187910	187910	-



**Appendix E13****Monthly Collected Data for National  
Recovery and Recycling Project ( Aug. /2004 )**

<b>No</b>	<b>Area</b>	<b>Amount of recycled CFC refrigerants (g)</b>	<b>Amount of Recycled CFC refrigerants (g)</b>	<b>Amount of un- recycled CFC refrigerants (g)</b>
1	Aqaba	14000	14000	-
2	Karak + Ghor Safi	14000	14000	-
3	Tafila	6350	6350	-
4	Amman	36225	36225	-
5	Zarka+Rusaifa+ Hashimia	70800	70800	-
6	Irbid + Ramtha + Mafraq	54302	54302	-
7	Mashareh	27336	27336	-
Total		223013	223013	-

## Appendix E14

### Monthly Collected Data for National Recovery and Recycling Project ( Sept. /2004 )

No	Area	Amount of recycled CFC refrigerants (g)	Amount of Recycled CFC refrigerants (g)	Amount of un-recycled CFC refrigerants (g)
1	Aqaba	8100	8100	-
2	Karak + Ghor Safi	12900	12900	-
3	Tafila	5650	5650	-
4	Amman	50170	50170	-
5	Zarka+Rusaifa+ Hashimia	42200	42200	-
6	Irbid + Ramtha + Mafraq	55060	55060	-
7	Mashareh	25815	25815	-
Total		199895	199895	-