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Environmental and Social Impact Assessment (ESIA) and Environmental and Social Environmental Plan (EMSP) Jordan HCFC Phase-Out Project/ Ozone Depleting Substances Phase 3 (ODS3)

1. Executive Summary

Jordan received funding in April 2010 by the Multilateral Fund (MLF) Executive Committee (under the United National Industrial Development Organization, or UNIDO) to phase-out HCFC use at one AC manufacturer by the end of 2011 (Petra Engineering). Although the project presented the opportunity to demonstrate improved energy efficiency in appliances when converting operations from HCFC, the national impact of this project in terms of energy efficiency and HCFC phase-out will be negligible and not enforceable given that the remaining AC manufacturing base continues to grow at a rapid pace based on the production of cheaper, energy inefficient HCFC-based units to maximize profits from high demand for air-conditioning. It is in the context that the Government of Jordan decided to prioritize HCFC phase-out in the entire AC manufacturing sector for meeting its first two MP obligations to be able to ban both manufacturing and importation of AC units, while pursuing, in close coordination with other Government agencies, an intervention that aims to transform the AC sector to the production of energy efficient appliances.

The Executive Committee approved the Jordan HCFC Phase-Out Management Plan (HPMP) in November 2011. US$2.34 million was approved for the implementation of an AC Sector Plan. Out of the US$2.34 million for the AC sector plan, US$1.99 million is dedicated to the conversion of manufacturing at three enterprises (Middle East Complex for Engineering, Electronics, and Heavy Industries, PLG (MEC); National Refrigeration Company (NRC); and Abu Haltam Group).

The project will put a special focus on strengthening Jordan's capacity to implement energy conservation and energy efficiency in the residential air-conditioning sector by reaching out to the Ministry of Energy and Mineral Resources (MEMR), National Energy Research Center (NERC), and related agencies to ensure there is complementarity and synchronization of initiatives on energy efficiency for the sector. In addition, through the sector plan, additional TA will be pursued to help the sector including non-eligible enterprises improve and optimize energy performance of components and the entire system to achieve Energy Efficiency Ratios (EERs) that meet the country's new performance requirements for "A" grade products.

An import quota system to curb the supply of HCFCs will be established by January 1, 2013 through support to Jordan's overall HPMP which is managed by UNIDO. Under the proposed project, Jordan will receive support to establish a policy structure that ensures HCFC phase-out in its priority sector, residential air-conditioning, is permanent and sustainable, and to promote the transfer and dissemination of suitable substitute technologies. This includes the introduction of a ban on the use of HCFC-22 in manufacturing AC as well as a ban on imports of HCFC-22-based AC units by the end of 2016. The project focal point in the Ministry of Environment (MOE) will also work with relevant agencies to pursue regulations regarding minimum energy efficiency standards to complement Jordan's new AC appliance labeling system and the work being undertaken with USAID and other donors. In addition, the National Ozone Unit (NOU) will work with agencies to promote the uptake of more efficient air-conditioning and stimulate local manufacturers to compete on Energy Efficiency (EE).

The project will provide support to the focal point, the NOU within MOE so that it may build a dedicated project team responsible for AC sector plan implementation. The staff and consultants in the NOU will manage activities related to the implementation of investments and Technical Assistance (TA) activities, and ensure that MLF and

World Bank policies regarding social and environmental safeguards, including supervision, monitoring, reporting, consultations, and information dissemination.

This Executive Summary includes:

(i) Institutional responsibilities for implementation and supervision of this ESMP;

(ii) Subproject contracting design and implementation specifics relating to ESMP implementation;

(iii) ESMP monitoring and reporting specifics; and

(iv) the identified potential environmental and social impact and mitigation measures for each of the three sites, as well as a monitoring plan during the conversion and operational phases of implementation for each of the three sites.

Consultation Meetings have been held with stakeholder industries, including management as well as workers, to discuss relevant environmental health and social safeguards issues in May and September 2012.

Organization	**Responsibilities of Stakeholders for Implementation and Supervision of this ESMP**
Three AC companies	Bear all responsibility, but under monitoring and supervision of the NOU/PMU and the World Bank, for the conversion from HCFC-22 to HFC-410A in AC manufacturing. Technical assistance will be provided through the project. Request chemical suppliers to provide safety data sheets for the R-410A and full guidance and training on safely handling these chemicals Follow stringently the safety data sheets when handling these chemicals Assign technical staff to monitor the compliance with the safety occupational health and environment requirements on using chemicals Keep workers continuously trained, in cooperation with the NOU and chemical and equipment suppliers on safe AC production; Take all necessary measures to prevent leakage of HFC-410A during the manufacturing process. Carry out the mitigation measures described in the parts 4 above for the chemical substance and in case of chemical leakage. Contract local services for collection and disposal of the empty chemical drums in accordance with national regulations. Prepare an EIA following the national regulations in the event that a new plant is constructed to implement the HCFC phase-out subproject.
Jordan NOU/PMU in the MOE	Sign the subproject grant agreement (SGA) with each participating enterprise. The SGA annex will list enterprise responsibilities and documents / plans it is obligated to adhere to in implementation of the ESMP. Coordinate and supervise subproject implementation, including all environmental and safety requirements listed in Section 4 by hiring technical consultants as necessary. Ensure project implementation will achieve the HCFC-22 phase-out target and safety requirements for the use of chemicals in accordance with national regulations and World Bank safeguard policies and guidelines Cooperate with relevant Government and municipal agencies and departments to carry out

	enforcement of environmental and worker safety regulations. Prepare project progress and environmental and social monitoring reports
Equipment Suppliers	Provide safe and environmentally sound design and installation of the AC production line Provide adequate training and guidance on safe operation of the supplied equipment taking into account any environmental and health risks and mitigation measures Provide adequate after-sale service and warranty in the case of accident due to the technical faults.
Gov. enforcement Agencies	Joint inspection of the three factories by Ministry of Environment, Ministry of Labor, Civil Defense, Health to detect any shortfalls from the regulatory requirements of those agencies will be repeated annually for the duration of the project, or more frequently if requested by MOE.

The main environment and safety monitoring requirement for the HCFC phase out subproject is to ensure that any negative impacts of the conversion on occupational health and the local environment could be minimized or prevented.

Pre-Conversion Phase

Domestic Review and Approval: The NOU will review the subproject package submitted by enterprise. If the environmental documents do not meet all the requirements, sub-project owners will be asked to provide additional information.

Related Conditions and Responsibilities: The NOU will ensure that an appropriate clause is included in enterprises contract obligating the sub-project owner to implement the mitigation, monitoring, and reporting measures specified in the ESMP and strictly follow the procedures according to related Jordanian laws and regulations. Warranty of the equipment supplier and its responsibility in case of fire risk, accidents happening due to the fault of the system will be defined in the contract for equipment supply.

Review and Approval from World Bank: The environmental and social documents will be post- reviewed by World Bank. The review will include prior review during the early stages of project pre-conversion with respect to ESMP implementation, and post review after the enterprises and NOU have shown compliance with the ESMP.

I**mplementation Phase:**

Supervision from the Jordan NOU/MOE: The Jordan NOU in the Ministry of Environment will be responsible for supervision of the implementation of subprojects, with support from a technical consultant to be engaged through the project management unit (PMU) with funding from the AC Sector Plan. Each enterprise is responsible for ensuring that all the requirements of the ESMP are properly implemented. It is the responsibility of the enterprises to ensure that relevant tender documents and contracts include requirements put forward in the ESMP. During sub-project implementation, the NOU has the right to check the documents and contracts to verify this condition has been satisfied.

Enterprise Responsibilities: During conversion period of 2013 – 2017, enterprises should detail all activities of conversion in the Progress Report such as implementation timing, testing, trials and proto sample to be produced, and progress and results of mitigation and monitoring measures. Frequency and duration of mitigation measures and monitoring as well as remedial actions, if any, showing consequences in accordance with the phasing-out targets and schedule should be included. Similarly, a breakdown timetable consisting of detailed activities should

be included in the report. The Environmental and Social Report prepared by enterprises should be submitted annually to the NOU as part of the Subproject Implementation Progress Reporting activities. The Project Implementation Progress report is to be submitted semi-annually to NOU by January 31 and July 30 each year to the World Bank.

Monitoring: During the project implementation, the NOU will be responsible for monitoring the implementation of HCFC phase-out subprojects and ensuring that all the specified ESMPs are implemented properly.

Reporting: The NOU will be responsible for supervising and preparing an aggregate social and environmental safeguards monitoring reports for MOE, and MOPIC. Such reports will include, at least annually, a detailed report on the implementation of this ESMP.

The implementation schedule and reporting procedure are summarized as follows:

Stakeholder/ Organization	Implementing schedule	Report on/to	Time	Frequency
NOU	2013-2017	**Subproject Implementation Progress Reports** of the conversion sub-project and submit to World Bank **Project Environment and Social Monitoring Report** (with inputs from the enterprises), including environment and social monitoring requirements/indicators including compliance with all environmental health and safety regulations	*31 July and 31 January*	*Semi-annually*
Enterprises	2013-2016	**Subproject Implementation Progress Report** to NOU - Environment and safety issues, especially accidents, fires, or lost time injuries, if any, to local authority and to PMU - Notification to the chemicals and equipment suppliers and copy to the NOU on any issues during the conversion and after conversion -EIA report for any enterprise building new factories	1 month after each quarter When needed When the fault takes place One-time reporting and approved by local EPA before construction starts	Quarterly (year 1)

Safeguards performance reporting will be made public as part of the Implementation Status Reporting (ISR) dissemination process, available on the www.worldbank.org website, on the Jordan country page, under the "projects" tab.

Table 4-A: Potential Environmental and Social Impacts & Proposed Mitigation Measures for NRC Company

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
1) Risk of handling compressed gases	➢ The storage of R22 and oxy acetylene cylinders does **not comply** with MSDS, where no control measures are adopted against compressed gas storage, need alert signs, and a chained storage areas. ➢ Need flash back arrestor devices on cylinders (**not installed)** as a kind of fire prevention during welding	➢ Follow manufacturer's safety data sheet of the compressed gases. ➢ Oxy acetylene gas cylinders shall be handled in a chained manner.	➢ Full compliance with safety data sheet. ➢ All cylinders must be chained	Regular inspection
2) Air emissions	➢ Adequate ventilation is provided in the production area, ➢ However the **ventilation observed efficiency condition is not sufficient** in the maintenance area.	➢ Provide adequate indoor ventilation for fugitive emissions. ➢ Collection of Volatile Organic Compounds (VOCs) through air extractors and remove VOCs with control devices such as condensers or activated carbon absorption.	➢ Workers suffer from odor in the workplace ➢ Test results (VOC) report by certified laboratory. ➢ Tested VOC shall be compared with OSHA regulation for industry sector	VOC measurements 2 times/year Annual respiratory examination for the workers
3) Water emissions	➢ The wastewater is connected with municipal sewage network.	No issue	No issue	No issue
4) Noise	➢ All assembly equipment is complying with lower noise level. ➢ Metal machines generate higher noise levels (> 85 dB (A)) and not equipped with silencers. ➢ No ambient and occupational sound power levels were measured before.	➢ Selecting equipment with lower sound power level; ➢ Installing silencers for fans; ➢ Installing acoustic enclosures for equipment; ➢ Reduce working time to less than 8 hours according to the measured noise level ➢ Installing vibration isolation for mechanical equipment	➢ Compliance of the measured noise level at 1 m from machine (Leq (A)) with Labour law No. 8, 1996 ➢ Workers suffer from the noise level at workplace	Noise measurements 2 times/year Annual hearing examination for workers
5) Hazardous chemicals	➢ Foaming chemicals are stored in the storage area without taking any spill containment measures, no alert signs are placed. ➢ No documented procedure to display	➢ Follow Management, Transportation and Handling of Harmful and Hazardous Substances Regulation, no. 24, 2005 (see Table 6)	Compliance with the regulation during the inspection	Regular inspection

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
	to the workers how to manage these chemicals to prevent any possible of occurrence of chemical spills.			
6) Non-hazardous waste	➢ Most of the non- hazardous wastes from the production area such; cartoons, metal, plastic are stored at the backyard and then sold to collectors. Work place clutter is cited ➢ The backyard is not covered and asphalt paved	➢ Evaluate of waste production process and identification of potentially recyclable material, then recycle and/or reuse it; ➢ Non-hazardous waste should be stored in separate watertight storage area and then disposed of via approved collector(s) by MoEnv	Proper storage according to solid waste management law 2005, and labour law no. 8 , 1996	Regular inspection
7) Hazardous waste	➢ The barrels containing foaming chemicals are stored at the backyard and are sold as metal junk. ➢ The wastes of polystyrene and faulting foam pieces are mixed with non-hazardous wastes, to be ultimately dumped into landfill. ➢ No designated labels/ signs/ MSDS are placed at the barrels to alert the handlers and collectors. ➢ No secondary containment for hazardous waste storage facility. ➢ No emergency response plan is documented and undertaken by all personnel when spills/ accidents might occur.	➢ Hazardous waste should be stored segregated from non-hazardous waste ➢ Store closed containers away from direct sunlight, wind and rain; ➢ Provide adequate ventilation ➢ Conducting periodic inspections of storage areas and documenting the findings; ➢ Preparing and implementing spill response and emergency plans to address accidental releases; ➢ Provide secondary containment for all on-site hazardous waste and waste storage facilities; ➢ Equip facility with adequate fire fighting equipment	Visual inspection to ensure hazardous waste is stored appropriately according related regulation no. 24, 2005	Regular inspection
8) Occupational health and safety	➢ No worker commitment to wearing the personnel protective equipment against fugitive emission, hand injuries, slip hazard, manual handling is observed. ➢ Fire extinguishers are insufficient, and some cylinders are expired (CO_2). ➢ No emergency response and evacuation plan is observed to be in place at the workplace. ➢ No health and safety senior supervisor assigned in the facility as per the	➢ Under operating conditions, workers should wear personal protective equipment, e.g. gas masks, PE gloves and other personal protection equipment. Appropriate measures such as ventilation, fire prevention and cooling should be planned and installed to accommodate the use of different chemicals. ➢ The workers should receive proper safety training and proved to be qualified through tests before	Regularly inspection to ensure compliance with labour law and OSHA regulation for industrial sector. Accident/incident records of workers should be well maintained (done) Worker complains	Regular inspection

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
	labour law. ➢ No health and safety committee is formed as per the labour law. ➢ The workers received only once training on fire prevention which was conducted by the civil defence directorate. ➢ However, the other safety training topics are not provided to workers; such as ergonomics, electrical safety, manual handling, hazardous substances handling, ….etc. ➢ Smoking and food are not allowed in the workplace. However, no alert signs are placed at the workplace ➢ Electrical management/safety aspects are very poor where improper wiring/sockets/appliance and cables are on the ground across the walkways. ➢ Safeguard is installed at one metal forming machine but not on others.	assuming the position; when the use of hazardous chemicals is involved, a safety facilitator/officer with adequate knowledge of safety operations and of hazardous chemicals should be recruited. ➢ No Smoking, No Food and No open Fire should be allowed on project site; ➢ Mark the caution signs both in Arabic and in English; ➢ Ensure safety use of electrical appliance.	records should be available	
9) Training of workers in environment, health and safety	➢ No periodic training for HSE aspects are provided ➢ No HSE orientation for new workers is adopted	➢ Project training requirements and Jordanian labour law	➢ Training records and attendance sheet	Monthly
10) Environmental risks	➢ No spill containment at the workplace, backyard, storage area is implemented ➢ No documented emergency response plan is in place	➢ Install spill containment area; ➢ Provide spill tool kit at workplace ➢ Provide emergency response plan.	➢ Spill accident records ➢ Inspection checklist ➢ Emergency response plan is in place ➢ Training records for emergency response plan	Regular inspection

Table 1-B: Monitoring Plan during Conversion and Operation for NRC Co.

Parameters to be monitored	Includes Table 5 Impacts	Location	Method of Monitoring	Monitoring Frequency	Standard Applied	Monitoring Cost	Responsible Party	Party to Report to
AC manufacturing equipment specifications and design (charging machine, leak detectors)		Production area	Verification of specs & design in implementation & procurement plans	Before procurement	TBD	Included in conversion costs financed by the project	Enterprise and Technical Consultant	NOU
A/C production lines	Occupational health & safety	Production area	Inspection by safety officer	Daily	Labour Law No. 8, 1996,		Enterprise, Supplier	NOU
Manufacturing (leakage of refrigerant)	Air emissions, water emissions, noise, soil	Production area	• Internal and external visual inspection. • Indoor measurements regarding noise and VOC emissions	2 times/year	Labour Law No. 8, 1996, OSHA regulation		Enterprise	Local authorities, NOU
Empty drums and waste	Hazardous chemicals & Non-hazardous waste	Store and Production area	Joint inspection	Monthly	• Solid Waste Management Law 2005 • Labor Law no. 8, 1996 • Regulations No. (24) of 2005: Management, Transportation and Handling of Harmful and Hazardous Substances Regulation		Enterprise	Local authorities, NOU
Storage of R-410a	Hazardous chemicals	Store	Joint inspection	Monthly	Regulations No. (24) of 2005: Management, Transportation and Handling of		Enterprise	Local authorities, NOU

Parameters to be monitored	Includes Table 5 Impacts	Location	Method of Monitoring	Monitoring Frequency	Standard Applied	Monitoring Cost	Responsible Party	Party to Report to
					Harmful and Hazardous Substances Regulation			
Implementation of Action Plans	Occupational health & safety, Training of workers in environment, health &safety, Environmental risks	Enterprise	Joint inspection	2 times/year (see Table 7)	Jordanian Laws: • Environmental Protection law No 52, 2006. • Labour Law No. 8, 1996 • Fire prevention Codes (Civil Defense Directorate)	Operating costs of the regulatory authorities	Ministry of Environment, Ministry of Labor, Civil Defense, Health	NOU

Table 2-A: Potential Environmental and Social Impacts & Mitigation Measures for MEC Company

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
1) Risk of handling compressed gases	➢ The storage of R22 and oxy acetylene cylinders **comply** with MSDS, where the compressed gas cylinders are separated in separate storage rooms and all are chained. ➢ The flash back arrestor devices are **installed** as kind of fire prevention during welding	N/A	➢ Check to the compliance with safety data sheet. ➢ Check all cylinders are chained	Regular inspection
2) Air emissions	➢ **Adequate ventilation** is provided in the production area. ➢ **No VOC emissions are measured in the workplace** ➢ **No ambient air quality measurements are conducted**	➢ For workers, workplace VOC measurements shall be conducted ➢ For environment, ambient air quality measurements shall be conducted	➢ Worker complain against bad odor in the workplace ➢ Test results (VOC) report by certified laboratory. ➢ Test results of ambient air quality by a certified laboratory	➢ VOC measurements 2 time/year ➢ Annual respiratory examination for the workers
3) Water emissions	➢ The wastewater is discharged into a septic tank, and emptied/evacuated via mobile septic tanker into nearest treatment plant.	➢ **A documented receipt** from treatment plant department to assure the actual **disposal (manifest needed).**	Records of the disposal of the wastewater	Regular inspection
4) Noise	➢ All assembly equipment is complying with lower noise level. ➢ **No ambient and occupational sound power levels were measured before.**	➢ Ambient and occupational noise level measurements shall be conducted by certified party	➢ Compliance of the measured noise level at 1 m from machine (Leq (A)) with Labour law No. 8, 1996 ➢ Workers complains against the noise level at workplace	Noise measurements 2 times/year Annual hearing examination for workers
5) Hazardous chemicals	➢ Foaming chemicals are stored in the storage area under proper spill prevention consideration. ➢ There is sign to display to worker how to manage these substances.	N/A	Compliance with the regulation during the inspection	Regular inspection

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
6) Non-hazardous waste	➢ Most of the non- hazardous wastes from the production area such; cartoons, metal, plastic are stored at the backyard and then selling to the collector person. ➢ **The backyard is not covered and asphalt paved** ➢ **This area suffers from poor housekeeping**	➢ Evaluate of waste production process and identification of potentially recyclable material, then recycle and reuse it; ➢ **Non-hazardous waste will be stored in separate watertight storage area and then disposed vial approved collector by MoEnv** ➢ **Maintain good housekeeping frequently**	Proper storage according to solid waste management law 2005, and labour law no. 8 , 1996	Regular inspection
7) Hazardous waste	➢ The empty barrels containing foaming chemicals are washed and stored at the backyard and are sold as metal junk. ➢ The wastes of polystyrene and faulting foam pieces are stored separately from non-hazardous wastes, at designated area ➢ MSDS are placed at the barrels to alert the handlers and collectors. ➢ The emergency response plan is documented and placed at the workplace which is undertaken by all personnel when spill accident will occur ➢ The personnel lack of knowledge how to dispose these wastes.	➢ The disposal of these waste shall be carried out thorough Ministry of Environment for approval to disposal into Sawaqa Hazardous Wastes Treatment Center ➢ **Manifest is needed**	Visual inspection to ensure hazardous waste is stored appropriately according related regulation no. 24, 2005	Regular inspection
8) Occupational health and safety	➢ Fully commitment to wearing the personnel protective equipment against fugitive emission, hand injuries, slip hazard, manual handling. ➢ Fire extinguishers are distributed in a well manner. ➢ Emergency response and evacuation plan is in place at the workplace. ➢ Health and safety senior supervisor and five officers		➢ Regularly inspection to ensure compliance with labour law and OSHA regulation for industry sector. ➢ Accident/incident records of workers ➢ Worker complains records	Regular inspection

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
	assigned in the company. ➢ Health and safety committee is formed. ➢ The workers receive periodically fire prevention and first aid training. ➢ New comers are receiving safety and environment orientation prior to starting job ➢ Restriction signs for Smoking and food are distributed properly in the workplace. ➢ Electrical management/safety is good where cables are placed in the designated trenches area way of the walkways. ➢ Safe guards are installed on dangerous machinery.			
9) Training of workers in environment, health and safety	➢ Certain Safety training aspects can **be intensified** and **provided to workers**; such as ergonomics, electrical safety, manual handling, hazardous substances handling, ….etc	➢ Project training requirements and Jordanian labour law	➢ Training records and attendance sheet	Monthly
10) Environmental risks	➢ Spill containment plan and measures at the workplace is implemented		➢ Spill accident records ➢ Inspection checklist ➢ Emergency response plan is in place ➢ Training records for emergency response plan	Regular inspection

Table 5-B: Monitoring Plan during Conversion and Operation at MEC Company

Parameters to be monitored	Includes Table 5 Impacts	Location	Method of Monitoring	Monitoring Frequency	Standard Applied	Monitoring Cost	Responsible Party	Party to Report to
AC manufacturing equipment specifications and design (charging machine, leak detectors)		Production area	Verification of specs & design in implementation & procurement plans	Before procurement	TBD	Included in conversion costs financed by the project	Enterprise and Technical Consultant	NOU
A/C production lines	Occupational health & safety	Production area	Inspection by safety officer	Daily	Labour Law No. 8, 1996,		Enterprise, Supplier	NOU
Manufacturing (leakage of refrigerant)	Air emissions, water emissions, noise, soil	Production area	• Internal and external visual inspection. • Indoor measurements regarding noise and VOC emissions	2 times/year	Labour Law No. 8, 1996, OSHA regulation		Enterprise	Local authorities, NOU
Empty drums and waste	Hazardous chemicals & Non-hazardous waste	Store and Production area	Joint inspection	Monthly	• Solid Waste Management Law 2005 • Labor Law no. 8, 1996 • Regulations No. (24) of 2005: Management, Transportation and Handling of Harmful and Hazardous Substances Regulation		Enterprise	Local authorities, NOU
Storage of R-410a	Hazardous chemicals	Store	Joint inspection	Monthly	Regulations No. (24) of 2005: Management, Transportation and Handling of Harmful and Hazardous		Enterprise	Local authorities, NOU

Parameters to be monitored	Includes Table 5 Impacts	Location	Method of Monitoring	Monitoring Frequency	Standard Applied	Monitoring Cost	Responsible Party	Party to Report to
					Substances Regulation			
Implementation of Action Plans	Occupational health & safety, Training of workers in environment, health &safety, Environmental risks	Enterprise	Joint inspection	2 times/year (see Table 7)	Jordanian Laws: • Environmental Protection law No 52, 2006. • Labour Law No. 8, 1996 • Fire prevention Codes (Civil Defense directorate)	Operating costs of the regulatory authorities	Ministry of Environment, Ministry of Labor, Civil Defense, Health	NOU

Table 6-A: Potential Environmental and Social Impacts & Mitigation Measures for General Deluxe Company

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
1) Risk of handling compressed gases	➢ The storage of R22 and oxy acetylene cylinders **comply** with MSDS, where the compressed gas cylinders are separated in separate storage rooms and all are chained. ➢ The flash back arrestor devices are **installed** as kind of fire prevention during welding	N/A	➢ Check to the compliance with safety data sheet. ➢ Check all cylinders are chained	Regular inspection
2) Air emissions	➢ **Adequate ventilation is provided** in the production area. ➢ **No VOC emissions are measured in the workplace** ➢ **No ambient air quality measurements are conducted**	➢ For workers, workplace VOC measurements shall be conducted ➢ For environment, ambient air quality measurements shall be conducted	➢ Worker complain against bad odor in the workplace ➢ Test results (VOC) report by certified laboratory. ➢ Test results of ambient air quality by certified laboratory	➢ VOC measurements 2 time/year ➢ Annual respiratory examination for the workers
3) Water emissions	➢ The wastewater is discharged into Municipal Sewage Network.	N/A		
4) Noise	➢ All assembly equipment is complying with lower noise level. ➢ No ambient and occupational sound power levels were measured before.	➢ Ambient and occupational noise level measurements shall be conducted by certified party	➢ Compliance of the measured noise level at 1 m from machine (Leq (A)) with Labour law No. 8, 1996 ➢ Workers complains against the noise level at workplace	Noise measurements 2 times/year Annual hearing examination for workers
5) Hazardous chemicals	➢ Foaming chemicals (Iso and Poly) are **stored in the storage area under proper spill prevention consideration**. ➢ There are signs to display to worker how to manage these substances.		Compliance with the regulation during the inspection	Regular inspection
6) Non-hazardous waste	➢ Most of the non- hazardous	➢ Evaluate of waste production	Proper storage	Regular

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
	wastes from the production area such; cartoons, metal, plastic are stored at the backyard and then sold to collector(s).**Company has a comprehensive recycling/reuse system in place** ➢ This area suffers can use enhanced storage and ventilation although currently a temporary area until new storage is utilized	process and identification of potentially recyclable material, then recycle and reuse it; ➢ Non-hazardous waste will be stored in separate watertight storage area and then disposed vial approved collector by MoEnv ➢ Maintain good housekeeping frequently	according to solid waste management law 2005, and labour law no. 8 , 1996	inspection
7) Hazardous waste	➢ The empty barrels containing foaming chemicals are washed and stored at the backyard and are sold as metal junk. ➢ The wastes of polystyrene and faulting foam pieces are mixed with non-hazardous wastes, at designated area. ➢ MSDS are not placed at the barrels to alert the handlers and collectors. However company perforates barrels to prevent reuse as is ➢ The emergency response plan is documented and placed at the workplace which is undertaken by all personnel when spill accident will occur	➢ The wastes of polystyrene and faulted foam pieces shall be stored separately from non-hazardous wastes. ➢ The disposal of these waste shall be carried out thorough Ministry of Environment for approval to disposal into Sawaqa Hazardous Wastes Treatment Center. Manifest system should be used or documented disposal.	Visual inspection to ensure hazardous waste is stored appropriately according related regulation no. 24, 2005	Regular inspection
8) Occupational health and safety	➢ Personnel and workers are fully committed to wearing the personnel protective equipment against fugitive emission, hand injuries, slip hazard, manual handling. ➢ Fire extinguishers are distributed in well manner. ➢ Emergency response and evacuation plan in place at the workplace.		➢ Regularly inspection to ensure compliance with labour law and OSHA regulation for industry sector. ➢ Accident/incident records of workers ➢ Worker complains records	Regular inspection

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
	➢ Health and safety senior supervisor and two officers assigned in the company. ➢ Health and safety committee is formed. ➢ The workers received periodically fire prevention and first aid training. ➢ New comers receive safety and environment orientation prior to starting their job ➢ Restriction signs for Smoking and food are distributed properly in the workplace. ➢ Electrical management is good and away of the walkways. ➢ Safe guards are installed on machinery.			
9) Training of workers in environment, health and safety	➢ Safety training aspects are provided to workers; but need refreshers on aspects such as ergonomics, electrical safety, manual handling, hazardous substances handling, ….etc	➢ Project training requirements and Jordanian labour law	➢ Training records and attendance sheet	Monthly
10) Environmental risks	➢ Spill containment at the workplace is implemented		➢ Spill accident records ➢ Inspection checklist ➢ Emergency response plan is in place ➢ Training records for emergency response plan	Regular inspection

Table 3-B: Monitoring Plan during Conversion and Operation at General Deluxe Co.

Parameters to be monitored	Includes Table 5 Impacts	Location	Method of Monitoring	Monitoring Frequency	Standard Applied	Monitoring Cost	Responsible Party	Party to Report to
AC manufacturing equipment specifications and design (charging machine, leak detectors)		Production area	Verification of specs & design in implementation & procurement plans	Before procurement	TBD	Included in conversion costs financed by the project	Enterprise and Technical Consultant	NOU
A/C production lines	Occupational health & safety	Production area	Inspection by safety officer	Daily	Labour Law No. 8, 1996,		Enterprise, Supplier	NOU
Manufacturing (leakage of refrigerant)	Air emissions, water emissions, noise, soil	Production area	• Internal and external visual inspection. • Indoor measurements regarding noise and VOC emissions	2 times/year	Labour Law No. 8, 1996, OSHA regulation		Enterprise	Local authorities, NOU
Empty drums and waste	Hazardous chemicals & Non-hazardous waste	Store and Production area	Joint inspection	Monthly	• Solid Waste Management Law 2005 • Labor Law no. 8, 1996 • Regulations No. (24) of 2005: Management, Transportation and Handling of Harmful and Hazardous Substances Regulation		Enterprise	Local authorities, NOU
Storage of R-410a	Hazardous chemicals	Store	Joint inspection	Monthly	Regulations No. (24) of 2005: Management, Transportation and Handling of Harmful and		Enterprise	Local authorities, NOU

Parameters to be monitored	Includes Table 5 Impacts	Location	Method of Monitoring	Monitoring Frequency	Standard Applied	Monitoring Cost	Responsible Party	Party to Report to
					Hazardous Substances Regulation			
Implementation of Action Plans	Occupational health & safety, Training of workers in environment, health &safety, Environmental risks	Enterprise	Joint inspection	2 times/year (see Table 7)	Jordanian Laws: • Environmental Protection law No 52, 2006. • Labour Law No. 8, 1996 • Fire prevention Codes (Civil Defense directorate)	Operating costs of the regulatory authorities	Ministry of Environment, Ministry of Labor, Civil Defense, Health	NOU

2. Introduction

Hydro chlorofluorocarbons (HCFCs) are substances used in several manufacturing sectors but primarily as refrigerants in refrigeration and air-conditioning (AC) equipment and as blowing agents for producing foam. HCFCs were introduced as transitional substances to chlorofluorocarbons (CFCs) given that they have a much lower ozone depleting potential (ODP). Nonetheless, as ozone-depleting substances (ODS), HCFCs are now also subject to control measures of the Montreal Protocol (MP) on Substances that Deplete the Ozone Layer (an international environmental treaty with universal ratification) following the complete elimination of CFCs in 2010.

HCFCs are not only ODS, but they also are high global warming gases with global warming potential (GWP) ranging from several hundred to several thousand times that of carbon dioxide. The conversion of HCFC-based manufacturers to alternative, advanced technologies in fact usually leads to improved energy efficiency, particularly in the refrigeration and air-conditioning sectors. Thus, phasing out HCFCs provides two types of potential benefit to the climate. Synergies with the climate agenda were duly recognized by the Parties to the Montreal Protocol when they decided to accelerate HCFC phase-out in 2007 through Decision XIX/6 for both developed and developing countries also known as "Article 5" countries.

As a Party to the Montreal Protocol operating under Article 5, the Hashemite Kingdom of Jordan must also phase out HCFCs by 2030 in accordance with the accelerated HCFC phase-out schedule. This entails meeting stepped reduction targets on consumption, including the first – a 2013 freeze on its 2009-2010 average consumption of 83 ODP tones.

Jordan received funding in April 2010 by the Multilateral Fund (MLF) Executive Committee (under the United National Industrial Development Organization, or UNIDO) to phase-out HCFC use at one AC manufacturer by the end of 2011 (Petra Engineering). Although the project presented the opportunity to demonstrate improved energy efficiency in appliances when converting operations from HCFC, the national impact of this project in terms of energy efficiency and HCFC phase-out will be negligible and not enforceable given that the remaining AC manufacturing base continues to grow at a rapid pace based on the production of cheaper, energy inefficient HCFC-based units to maximize profits from high demand for air-conditioning. It is in the context that the Government of Jordan decided to prioritize HCFC phase-out in the entire AC manufacturing sector for meeting its first two MP obligations to be able to ban both manufacturing and importation of AC units, while pursuing, in close coordination with other Government agencies, an intervention that aims to transform the AC sector to the production of energy efficient appliances.

The Executive Committee approved the Jordan HCFC Phase-Out Management Plan (HPMP) in November 2011. US$2.34 million was approved for the implementation of an AC Sector Plan. Out of the US$2.34 million for the AC sector plan, US$1.99 million is dedicated to the conversion of manufacturing at three enterprises (Middle East Complex for Engineering, Electronics, and Heavy Industries, PLG (MEC); National Refrigeration Company (NRC); and Abu Haltam Group).

The project will put a special focus on strengthening Jordan's capacity to implement energy conservation and energy efficiency in the residential air-conditioning sector by reaching out to the Ministry of Energy and Mineral Resources (MEMR), National Energy Research Center (NERC), and related agencies to ensure there is complementarity and synchronization of initiatives on energy efficiency for the sector. In addition, through the sector plan, additional TA will be pursued to help the sector including non-eligible enterprises improve and optimize energy performance of components and the entire system to achieve Energy Efficiency Ratios (EERs) that meet the country's new performance requirements for "A" grade products.

An import quota system to curb the supply of HCFCs will be established by January 1, 2013 through support to Jordan's overall HPMP which is managed by UNIDO. Under the proposed project, Jordan will receive support to establish a policy structure that ensures HCFC phase-out in its priority sector, residential air-conditioning, is

permanent and sustainable, and to promote the transfer and dissemination of suitable substitute technologies. This includes the introduction of a ban on the use of HCFC-22 in manufacturing AC as well as a ban on imports of HCFC-22-based AC units by the end of 2016. The project focal point in the Ministry of Environment (MOE) will also work with relevant agencies to pursue regulations regarding minimum energy efficiency standards to complement Jordan's new AC appliance labeling system and the work being undertaken with USAID and other donors. In addition, the National Ozone Unit (NOU) will work with agencies to promote the uptake of more efficient air-conditioning and stimulate local manufacturers to compete on Energy Efficiency (EE).

The project will provide support to the focal point, the NOU within MOE so that it may build a dedicated project team responsible for AC sector plan implementation. The staff and consultants in the NOU will manage activities related to the implementation of investments and Technical Assistance (TA) activities, and ensure that MLF and World Bank policies regarding financial management, use of funds and procurement are followed when implementing subprojects.

3. Project Location and Physical Characteristics

The project has three components: Component 1 (Investment in HCFC Consumption Reductions), Component 2 (Technical Assistance, Policy and AC Sector Plan Management), and Component 3 (Institutional Strengthening). The ESIA/EMP concerns Component 1 and consequently focuses on the AC manufacturing sector.

Investments will be made in residential AC manufacturers in Jordan and complement the already approved Petra project. This component therefore includes coordination of conversions of six enterprises: one under UNIDO, three under this project, and two, which are not eligible for MLF financing, will convert on their own in compliance with future Government regulatory actions to ban HCFC-based manufacturing. The conversion entails a change in HCFC-22-based technology to, what is considered by industry as currently the only commercially viable alternative technology on the market, R-410A. The analysis of alternative technologies is treated in more detail in Section 4 below.

The project covers three air-conditioning manufacturers. They are:-

Middle East Electrical Industries Co. (MEC):

MEC is the leading producer, distributor and exporter of consumer electronic and electric home appliances in Jordan and the region. Based on multiple agreements with major appliance manufacturers, LG, Haier, Daewoo, Samsung and ACMA are the main brands which MEC produces, besides other models. Year of establishment is 1994. It has land with size of 200,000 sq. m, building with 110,000 sq. m and 761 Employees.

The company is the second largest air conditioner manufacturer in Jordan. It is a part of a larger industrial complex producing electrical appliances, including televisions, washing machines, dishwashing machines, and domestic refrigerators. The domestic refrigeration line was converted to HFC-134a for the refrigeration part and Cyclopentane for the foam part with the assistance from the MLF. The company has two production lines. It has testing capacity for performance of its appliances, including basic testing facilities for AC. In 2010, it consumed 115 tons of HCFC-22.

General Deluxe Co. - Abu Haltam Group

GENERAL DELUXE is the brand name of their products, that are manufactured based on international standards, including air conditioning units, refrigerators, water dispenser, freezers, TVs, washing machines, satellite receiver units, vacuum cleaners and microwave ovens. It has a building with 20,000 sq. m and101 Employees.

The company is a 50-year old family business but only entered the AC business in 2001, when it started with assembly only. It gradually built its manufacturing capacity until fully functional in 2006 as an air conditioner manufacturer. It has five models ranging from 12,000 to 300,000 BTU, with EERs of about 2.7. It sources its compressors from three different Japanese companies. It is a 100% Jordanian owned company and its production

was started before 2007 and eligible for MLF assistance. The company imports HCFC-22 directly from China. Upon being asked about alternatives, it stated that R-407 seems like a more likely choice, given the costs of R-410A. Abu Haltam also manufactures domestic refrigerators, which use HFC-134a as a refrigerant and HCFC-141b as the foaming agent. HCFC-141b pre-blended polyol is purchased from Syria. In 2010, it consumed 20 tons of HCFC-22 and of 6 tons of HCFC-141b contained in the polyol.

National Refrigeration Company (NRC):

NATIONAL ELECTRIC is the brand name of their products. They are manufactured based on international standards, including air conditioning units, domestic refrigerators, coolers and washing machines. Date of Establishment: 1976. Building size: 9,000 sq. m No. of Employees: 50

NRC is a 100% owned Jordanian company. It produces domestic refrigerators, washing machines and split type air conditioners of the sizes 1, 1-1/2 and 2 tons of refrigeration. The production of air conditioners is using the same production line as the production of domestic refrigerators. The annual production is 5000 units. Components for the ACs are sourced from the international market, mainly from China. Production of air conditioners takes place during the warm season where the demand for air conditioners in Jordan is high, i.e. from April to November. Production of domestic refrigerators takes place from November to April. However, due to tough competition, the sales of domestic refrigerators are going down. NRC export around 30-40% of its production to Syria and Iraq. The domestic refrigeration line was converted from CFCs to HFC-134a and cyclopentane with financial support from the Multilateral Fund.

A summary of key enterprise information is found in the table below.

Table 4: AC Enterprises Information

Company Name	Year AC Manufacturing Started	Art. 5 Ownership	Trade Name	Refrigerant Used	Units Produced 2010	HCFC Consumed 2010	Address
MEC Persons were met with 1. Nassim Saada- Quality System Manager 2. Mohammad Alayyan- Quality System Officer 3. Faten Hassan- Technical Department Engineer 4. Mahmoud Hneiti- HSE Manager	1994	100%	MEC and others (LG, Haier, Daewoo, Samsung and ACMA)	R-22	74870	115	Amman, Dhuhaishiba villages/Al-Mwaqar
General Deluxe Persons were met with: 1. Ziad Abu Haltam- Purchasing Manager 2. Badr Imreish- Production Manager 3. Raed Eishe-	1994	100%	General Deluxe	R-22	22000	20	Amman – Marka, P.O. Box 340611 Amman 11134 Jordan

Engineering Department Manager							
NRC CEO of the company; Eng. Husam Hafez is met	1976	100%	NATIONAL ELECTRIC	R-22	3005	6	P.O. Box 2813, Amman 11181, Jordan

4. Analysis of Alternative Technologies

For the purposes of the Jordan Air-conditioning Sector Plan, air conditioners are defined in accordance with the definition established by the Refrigeration, Air-conditioning and Heat Pumps Technical Options Committee (RTOC) and which range in size from 2.0kW to 420kW. This therefore comprises air conditioners and air-to-air heat pumps that directly heat air and together can be referred to as air-cooled or unitary equipment.

According to the findings of the 2010 Assessment report of the RTOC, the majority of non-HCFC alternative technologies for unitary air-conditioning systems employ HFC blends as the refrigerant with a small number of units using hydrocarbon refrigerants (portable and small split systems AC units). Commercialization of HFC-134a and R-744 (CO_2) in this type of product has been very limited.

A summary of the HCFC-22 replacement technologies for air-conditioners is contained in the table that follows.

Refrigerant	State of Technology
HFC-134a	HFC-134a is not a *drop-in* replacement for HCFC-22. To achieve the same capacity as an HCFC-22 system, the compressor displacement must be increased approximately 40 percent to compensate for the lower volumetric refrigeration capacity of HFC-134a. Significant equipment redesign is necessary to achieve efficiency and capacity equivalent to HCFC-22 systems. These design changes include larger heat exchangers, larger diameter interconnecting refrigerant tubing, and re-sized compressor motors. While HFC-134a is a potential HCFC-22 replacement in air-cooled applications, it has not seen broad use because manufacturers have been able to develop lower cost air-cooled air-conditioning systems using HFC blends such as R-407C and R-410A. The predominant use of HFC-134a has been in water chillers and mobile air-conditioning applications. It therefore appears that HFC-134a will have very limited application in air-cooled air-conditioning applications.
R-407C	R-407C is a blend (23% R-32, 25% R-125 and 52% R-134a) with a high temperature glide and GWP of 1610. Performance tests with R-407C indicate that in properly designed air conditioners, R-407C will have capacities and efficiencies within ± 5% of equivalent HCFC-22 systems. It has been reported that the deviation from HCFC-22, under retrofit conditions, increases above these nominal values as the outdoor ambient increases. There are currently R-407C air-conditioning products widely available in Europe, Japan and other parts of Asia. R-407C has also seen some limited usage in the United States and Canada, primarily in commercial applications. Since R-407C refrigerant requires only modest modifications to existing HCFC-22 systems, it has been used as a transitional refrigerant in equipment originally designed for HCFC-22 where the transition was moving faster than the design of new equipment tailored for HFC-410A (Europe and Japan). R-407C may also be an attractive alternative for large capacity (greater than 50 kW) unitary products that would require extensive design modification and high capital equipment investments to be converted to a higher-pressure refrigerant such as R-410A. In Europe, R-407C has been used as the dominant replacement for HCFC-22 in air-cooled air-conditioning applications. In Japan, R-407C has been used primarily in the larger capacity duct-free and multi-split products and VRF systems. However, many of these products are now beginning to transition from R-407C to R-410A to obtain improved serviceability (lower glide) and higher efficiencies, resulting in size and cost reductions.
R-410A	R-410A is a binary blend that can replace HCFC-22 in new equipment production. This blend has a low temperature glide (near azeotropic). The normal boiling points are approximately 10°C lower than HCFC-22,

Refrigerant	State of Technology
	resulting in condensing pressures up to 4000 kPa. R-410A has higher volumetric refrigeration capacity than HCFC-22. The refrigeration charge size of R-410A is about 80% of HCFC-22 for the same refrigerating capacity and because of its relatively high density and high efficiency, the size of system components such as condensers, compressors, and evaporators can be reduced. R-410A air conditioners (up to 175 kW) are currently commercially available in the US, Asia and Europe. A significant portion of the duct-free products sold in Japan and Europe now use R-410A as the preferred refrigerant. Approximately 8% of the US ducted residential market in 2004 used R-410A as the refrigerant. After 1 January 2010, air conditioners sold in the US ducted residential market will predominately utilize R-410A as the HCFC-22 replacement (with the ban on new HCFC-based equipment). System pressures with this blend are approximately 50 percent higher than with HCFC-22. System designers have addressed the higher operating pressures of R-410A through design changes such as heavier wall compressor shells, pressure vessels (accumulators, receivers, filter driers etc.), heat exchangers and copper refrigerant tubing. R-410A is a global warming gas with a GWP of 2100 CO_2eq. which is slightly higher than HCFC-22 (GWP of 1810).
R-417A	R-417A refrigerant (GWP of over 1900) combines two HFC refrigerants with a small amount of HC-600 (butane) refrigerant. R-417A is a zeotropic blend having a glide similar to R-407C. The HC-600 is added to the blend to enable this refrigerant to utilize standard naphthenic mineral-oil-based and alkyl benzene lubricants. This refrigerant has primarily been promoted as a *drop-in* and *retrofit* refrigerant for HCFC-22 in air-conditioning and refrigeration applications. Published data for air-conditioning and heat pump applications suggests this refrigerant exhibits approximately a 12% lower COP and 20% lower capacity than HCFC-22 when used as service fluid in systems originally designed to use HCFC-22. Other similar blends have been proposed as potential service refrigerants including R-419A and R-422B.
HFC-32	HFC-32 is a single component refrigerant with a GWP of 675 times CO_2. It is one of the two main components of R-410A. Its working pressure is higher than R-410A. It has good heat transfer properties, higher volumetric refrigeration capacity. HFC-32 is mildly flammable therefore safety measures must be introduced in manufacturing, installation, and servicing.
R-290	There have been a number of performance comparisons made between HC-290 (propane) and HCFC-22. The results of these comparisons suggest that the HC-290 systems have 2-9% higher efficiency than the HCFC-22 baseline systems during drop-in and soft optimized unit performance comparisons excluding indirect systems. Compared to HFCs, hydrocarbon refrigerants offer reduced charge levels (approximately 0.10 - 0.15kg/kW of cooling capacity), miscibility with mineral oils (synthetic lubricants are not required), reduced compressor discharge temperatures, and improved heat transfer due to favorable thermo-physical properties. The factors that work against application of the hydrocarbon refrigerants in air-conditioning systems are the safety concerns, handling, installation practices and field service skills and practices. European and international standards generally limit the use of hydrocarbon refrigerants to applications having refrigerant charge levels below 1 kg. In systems with charge levels below 150g the design requirements necessary to meet current and future safety requirements can generally be applied cost effectively. When designing new air-conditioning systems with HC-290 or other flammable refrigerants, the designer should be sure to comply with all applicable safety standards and regulations, as there can be significant regional differences in codes and standards. Service practices will also need to be modified to avoid exposing service technicians to the additional risks associated with working with flammable refrigerants.
Carbon Dioxide	Carbon dioxide (R-744) offers a number of desirable properties as a refrigerant: readily available, low-toxicity, low GWP and low cost. R-744 systems are also likely to be very compact; though not necessarily lower cost than HCFC-22 systems. These desirable characteristics are offset by the fact that R-744 air-conditioning systems can have low operating efficiencies and very high operating pressures. The refrigerant R-744 cycle differs from the conventional vapor compression cycle in that the condenser is replaced with a gas cooler since the R-744 will not condense at the typical air-conditioning operating temperatures, which are above the critical point of R-744. Typical gas cooler operating pressures for R-744 systems will be as high as 14,000 kPa. The literature has a significant amount of conflicting data on the performance of R-744 air-conditioning

Refrigerant	State of Technology
	systems. Some of these data shows a significant loss of efficiency with R-744 when compared to HCFC-22, while other papers suggest equal or better performance. Another indicator of current state of the art is the fact that commercially available air-cooled R-744 air conditioners have not been introduced into the market. A significant barrier to the commercialization of R-744-based air conditioners continues to be the limited availability of compatible components such as compressors, heat exchangers and refrigerant controls. However, a number of compressor manufacturers have presented papers in journals and conferences indicating active development programs on R-744 compressors. The efficiency of R-744 systems can be improved through optimized system designs, the use of refrigerant expanders, various inter-cycle heat exchangers, and cross-counter-flow heat exchangers, which take advantage of the favorable thermo physical properties of R-744. Considering the current state of the art and limited commercial availability of R-744 components, R-744 is not expected to play a significant role in the replacement of HCFC-22 in non-mobile air-conditioning applications for many years.

The main use of HCFC-22 in Jordan is for air-conditioners and air-conditioning equipment and for larger industrial and commercial refrigeration equipment. For the air-conditioning and refrigeration sectors, technologies, unfortunately HFC-based, are readily available and used globally. New low carbon technologies like the CO_2, hydrocarbons and HFOs are emerging, but the timeframe for their global penetration seems more likely to be in the order of ten years or more. Moreover, in the case of HC technology for air-conditioning, its safety and efficiency is yet to be proven to the market.

Thus, the current state of alternative technologies indicates that HFC blends (R-410A in particular) are the most likely refrigerants to be used in air-cooled systems during the next 10 to 15 years. This is supported by the fact that basically all AC units sold in the US, EU and Japan are R-410A based since January 1, 2010 given the mandatory transition from HCFC-22. HFC-32-based air-conditioning is not commercially available in these regions for market reasons where R-410A has been further developed after it was established for performance and safety reasons (R-32 is mildly flammable). However several Japanese companies plan on using Art. 5 countries to test this proprietary technology starting in Indonesia. Commercialization is expected in 2015.

A critical element in the phase-out of HCFC-22 is availability of compressors, thicker-wall piping, and other components for substitutes, particularly for high pressure gases. R-410A compressors are now produced and supplied by all major compressor manufacturers globally and R-410A and R-407C air-conditioning systems and associated parts are now also available in Article 5 countries. R-32, once deemed commercially viable, would require dedicated compressors and some parts; as the sizing would be smaller, existing casings could be theoretically used by industry.

Hydrocarbon refrigerants may be suitable replacements for HCFC-22 in some categories of products, mostly larger-sized air-conditioning. There are international and some regional standards that permit the use of hydrocarbon refrigerants depending on the charge and the size of the room in which it is installed. The safety requirements limit the use to very low charge levels, i.e. smaller rooms or rooms with low cooling requirements. However, local codes or national standards might set requirements which are more stringent than international and regional standards. Jordan currently does not have such requirements.

Another consideration in technology options, particularly in the case of Jordan, is ambient temperature. Performance of R-290 refrigerant would not be affected by the high ambient temperatures characteristic of the country (particularly in Aqaba). However, R-410A would require optimization of the compressor, airflow, condenser design and expansion device in order to reduce performance losses at high ambient temperatures. When applying R-410A systems that will operate a significant number of hours at high ambient temperatures and that have already been optimized, the reduced high ambient capacity needs to be taken into account when sizing the equipment.

5. Assessment of Socio-Economic Impact at Household Level

Phasing out the HCFCs AC models and transforming into the more efficient AC models will increase the price of the AC units. The expected price increase of AC units per cooling capacity over the coming 20 years is expected to increase by around 160% by 2034. This additional cost of AC units might impinge on the affordability on air conditioning, particularly on individual Jordanian households' ability to replace current units with newer EE AC models. However, this scenario is unlikely to happen for different reasons that include the following:

1. The expected saving in the electricity bill in the first year of installing EE AC model exceeds the additional cost of purchasing EE AC unit. Even if the increase in AC unit price is doubled than the estimated one, this increase will be paid back over two years utmost. Making a comparison between the incremental cost of AC and the forecasted electricity cost saving provides a clear indication that this additional cost will be recovered quickly by the AC users.

2. This additional cost is paid only once when the user purchases the AC unit while the saving in electricity cost continues over the lifetime of the AC unit at 10 years.

3. This price increase in AC unit is expected to be around 10-20% of the current prices of the HCFCs AC units, which will not be of a significant obstacle to AC users considering the expected income growth of the Jordanian households. \

4. By year 2014, the AC users will have only the option of buying EE AC models because the GoJ plans to ban using HCFCs in manufacturing and importing AC units.

5. Electricity tariffs are most likely to increase at a higher rate in Jordan which will make the option of using EE AC models more feasible.

The relevant costs and benefits to Jordanian households of the phaseout of HCFCs in the AC sector are summarized as follows.

Costs:

- ***Incremental cost of buying energy efficient models of AC (Continuous):*** The AC users will most likely pay additional cost for purchasing the energy efficient models of AC as a result of the incremental operating cost incurred by the local factories or the additional cost of importing

Benefits:

- ***Electricity bill reduction (Continuous):*** A major benefit of the AC users is the reduction of their electricity bill as a result of energy saving. The saving will depend on the grade level of the AC .

- ***Maintenance cost reduction (continuous):*** As a result of using R-410A refrigerant and a more advanced components and equipment, the leakage rate of the refrigerant will be decreased from the current rate estimated at 10-30% in Jordan to a 5% leakage rate. The saving will come from the difference between the cost of the HCFC refrigerant lost and the R-410A refrigerant lost annually. Additionally, the frequency of the maintenance service required might be decreased.

In terms of overall macroeconomic impact estimation, results show that AC users and government sectors have a positive net present value (NPV), while electric utilities and the AC industry have a negative NPV. The AC users enjoy a great net benefit mainly because of large saving on their electricity bill, which substantially overcomes the additional cost for buying more EE AC units. The government also has a large net benefit as a result of the fuel cost reduction. On the other hand, the electric utilities are the largest loser. The AC industry loses very little compared to the electric utilities, which mainly occurs during the years of upgrading the production lines between 2013 and 2015. On the overall macroeconomic impact, the results of the assessment show that employing EE AC

units in Jordan is not a locally economic efficient option. This result is mainly driven by the large reduction in the private consumption caused by the significant energy saving and reduces the AC users expenditure on electricity, which overcomes the benefits of reducing the import amount through reducing the fuel cost. One of the justifications is that there is an added value in the economy of converting fuel to electricity.

6. Applicable Environmental Legislative Framework

Of the ten safeguard policies of the World Bank, only Environmental Assessment OP 4.01 is triggered for the proposed project. In addition, the implementation of the ESMP must follow the World Bank Group EHS (Environment, Health and Safety) Guidelines to address safety requirements associated with the hydrocarbon technology.

Relevant International legal documents

The Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol on Substances that Deplete the Ozone Layer, as well as the London (1990), Copenhagen (1992), Beijing (1997) and Montreal (1999) Amendments to the Protocol.

National laws and regulations

The National laws and regulations listed below should be applied for the environmental management (including worker health and safety) of the conversion to HFC-410A technology in the air-conditioning manufacturing enterprises. The related articles are shown in Annex (1)

Table 5: Relevant National Laws and Regulations

National Laws and Regulations	Area	Relevant Articles
Environment Protection law No. 52 for year 2006	Environmental management	• Article 6 paragraph (A,B,C,D) [a] • Article 7 • paragraph (C) [b] • Article 11 (A "1", "2") • Article 19 Paragraph (A), (B)[d]
Labor law and Amendment No. 8 for year 1996	Worker health and safety	• Chapters 9 Article 78: Paragraph (1,2,3) • Article 79 (A,B,C) • Article 82, Article 87, Article 88 • Article 90 (A,B,C,D)
Regulation No. (43) of the Year 1998 The Regulation of Protection and Safety from Industrial Tools and Machines and Work Sites (issued by virtue of the Provisions of Paragraph (C) of Article (85) of the Labor Law No. (8) of the Year 1996)	Worker health and safety	• Article 2, Article 3 paragraph B , Article 5, Article 6. Article 8, Article 9, Article 10.
Regulations No. (37) of 2005: Environmental Impact Assessment Regulations (issued by virtue of Sub-paragraphs 9 and 11 of Paragraph A of Article 23 of the Environmental Protection Law No. (1) of 2003)	EIA	• Article 4 paragraph (A,B) • Article 8 Paragraph (A,B) • Article 12, Article 17 • Article 18, Article 22, Article 23. Article 25, Article 26, Article 29

National Laws and Regulations	Area	Relevant Articles
Regulations No. (24) of 2005[1]: Management, Transportation and Handling of Harmful and Hazardous Substances Regulations (Issued by virtue of Sub-paragraph 7 of Paragraph A of Article 23of the Environmental Protection Law No. (1) of 2003)	Transport of hazardous chemicals	Article 6, 7,8
Regulations No. (28) of 2005: Regulations for the Protection of the Air (issued by Virtue of Subparagraph 4 of Paragraph A of Article 23 of the Environmental Protection Law No. (1) of 2003)	Refrigerants Emission	Article 3, Article 4 paragraph (A,B), Article 5 Paragraph (C) Article 13 (A,B)

Applicable National Technical Guidelines/Standards

AC manufacturing does not normally involve significant pollution to water, air, or ground, provided the applicable regulations are followed. Residual release of gases in manufacturing and servicing is possible and can result in incremental global warming (R-410A has a high GWP).

Jordan has issued an Instruction for the Monitoring and Control of Ozone Depleting Substances, issued pursuant to Article (8) paragraph (f) of the Environment Protection Law No. (12) for 1995., These instructions are now under processing in order to be updated according to Montreal Amendment in 2007 for the phase out of HCFCs; specifically, Article (17) prohibits venting of ODS to the atmosphere.

The related articles are shown in Annex (1)

Table 3: Relevant National Technical Guidelines and Standards

National Technical Guidelines and Standards	Area	Relevant Articles
Instruction for the control, use, import and re-export of ozone Depleting Substances and all equipment and appliances that contain these substances, issued pursuant to Article (4) paragraph (D) of the Environment Protection Law No. (52) for 2006 (updated version under processing)	Protection the Ozone layer	• Article 5, Article 6, Article 12, Article 14, Article 17, Article 20
Code for fire prevention (2003) by civil defense	Fire prevention	All

Jordan Action Plan for the phase-out of Hydro chlorofluorocarbons HCFC use:

The Goal	Year of Achievement
[1] Freeze of Annex A CFCs	**1999**
[2] Freeze of Halons and Methyl bromide; Bromo-chloro-methane phase out	**2002**
[3] Annex B CFCs reduced by 20 %; freeze of	**2003**

[1] Note: apart from this regulation, Jordan does not yet have comprehensive regulations for the import, production, use or disposal of hazardous waste.

	methyl chloroform	
[4]	Annex A CFCs reduced by 50%; Halons by 50 %; Carbon tetrachloride by 85 %; Methyl chloroform by 30%; Methyl bromide by 20 %	**2005**
[5]	All CFCs, Halons and Carbons tetrachloride phased out; Methyl chloroform reduced by 70 %	**2010**
[6]	Freeze HCFCs	**2013**
[7]	Reduce HCFCs by 10%; Methyl bromide and methyl chloroform phase out	**2015**
[8]	Reduce HCFCs by 35 %	**2020**
[9]	Reduce HCFCs by 67.5 %	**2025**
[10]	HCFCs phase out	**2030**
[11]	Complete Phase Out	**2040**

Table 4-A: Potential Environmental and Social Impacts & Proposed Mitigation Measures for NRC Company

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
11) Risk of handling compressed gases	➢ The storage of R22 and oxy acetylene cylinders does **not comply** with MSDS, where no control measures are adopted against compressed gas storage, need alert signs, and a chained storage areas. ➢ Need flash back arrestor devices on cylinders (**not installed)** as a kind of fire prevention during welding	➢ Follow manufacturer's safety data sheet of the compressed gases. ➢ Oxy acetylene gas cylinders shall be handled in a chained manner.	➢ Full compliance with safety data sheet. ➢ All cylinders must be chained	Regular inspection
12) Air emissions	➢ Adequate ventilation is provided in the production area, ➢ However the **ventilation observed efficiency condition is not sufficient** in the maintenance area.	➢ Provide adequate indoor ventilation for fugitive emissions. ➢ Collection of Volatile Organic Compounds (VOCs) through air extractors and remove VOCs with control devices such as condensers or activated carbon absorption.	➢ Workers suffer from odor in the workplace ➢ Test results (VOC) report by certified laboratory. ➢ Tested VOC shall be compared with OSHA regulation for industry sector	VOC measurements 2 times/year Annual respiratory examination for the workers
13) Water emissions	➢ The wastewater is connected with municipal sewage network.	No issue	No issue	No issue
14) Noise	➢ All assembly equipment is complying with lower noise level. ➢ Metal machines generate higher noise levels (> 85 dB (A)) and not equipped with silencers. ➢ No ambient and occupational sound power levels were measured before.	➢ Selecting equipment with lower sound power level; ➢ Installing silencers for fans; ➢ Installing acoustic enclosures for equipment; ➢ Reduce working time to less than 8 hours according to the measured noise level ➢ Installing vibration isolation for mechanical equipment	➢ Compliance of the measured noise level at 1 m from machine (Leq (A)) with Labour law No. 8, 1996 ➢ Workers suffer from the noise level at workplace	Noise measurements 2 times/year Annual hearing examination for workers
15) Hazardous chemicals	➢ Foaming chemicals are stored in the storage area without taking any spill containment measures, no alert signs are placed. ➢ No documented procedure to display to	➢ Follow Management, Transportation and Handling of Harmful and Hazardous Substances Regulation, no. 24, 2005 (see Table 6)	Compliance with the regulation during the inspection	Regular inspection

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
	the workers how to manage these chemicals to prevent any possible of occurrence of chemical spills.			
16) Non-hazardous waste	➢ Most of the non- hazardous wastes from the production area such; cartoons, metal, plastic are stored at the backyard and then sold to collectors. Work place clutter is cited ➢ The backyard is not covered and asphalt paved	➢ Evaluate of waste production process and identification of potentially recyclable material, then recycle and/or reuse it; ➢ Non-hazardous waste should be stored in separate watertight storage area and then disposed of via approved collector(s) by MoEnv	Proper storage according to solid waste management law 2005, and labour law no. 8 , 1996	Regular inspection
17) Hazardous waste	➢ The barrels containing foaming chemicals are stored at the backyard and are sold as metal junk. ➢ The wastes of polystyrene and faulting foam pieces are mixed with non-hazardous wastes, to be ultimately dumped into landfill. ➢ No designated labels/ signs/ MSDS are placed at the barrels to alert the handlers and collectors. ➢ No secondary containment for hazardous waste storage facility. ➢ No emergency response plan is documented and undertaken by all personnel when spills/ accidents might occur.	➢ Hazardous waste should be stored segregated from non-hazardous waste ➢ Store closed containers away from direct sunlight, wind and rain; ➢ Provide adequate ventilation ➢ Conducting periodic inspections of storage areas and documenting the findings; ➢ Preparing and implementing spill response and emergency plans to address accidental releases; ➢ Provide secondary containment for all on-site hazardous waste and waste storage facilities; ➢ Equip facility with adequate fire fighting equipment	Visual inspection to ensure hazardous waste is stored appropriately according related regulation no. 24, 2005	Regular inspection
18) Occupational health and safety	➢ No worker commitment to wearing the personnel protective equipment against fugitive emission, hand injuries, slip hazard, manual handling is observed. ➢ Fire extinguishers are insufficient, and some cylinders are expired (CO_2). ➢ No emergency response and evacuation plan is observed to be in place at the workplace. ➢ No health and safety senior supervisor assigned in the facility as per the labour law. ➢ No health and safety committee is	➢ Under operating conditions, workers should wear personal protective equipment, e.g. gas masks, PE gloves and other personal protection equipment. Appropriate measures such as ventilation, fire prevention and cooling should be planned and installed to accommodate the use of different chemicals. ➢ The workers should receive proper safety training and proved to be qualified through tests before assuming the position; when the use	Regularly inspection to ensure compliance with labour law and OSHA regulation for industrial sector. Accident/incident records of workers should be well maintained (done) Worker complains records should be	Regular inspection

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
	formed as per the labour law. ➢ The workers received only once training on fire prevention which was conducted by the civil defence directorate. ➢ However, the other safety training topics are not provided to workers; such as ergonomics, electrical safety, manual handling, hazardous substances handling, ….etc. ➢ Smoking and food are not allowed in the workplace. However, no alert signs are placed at the workplace ➢ Electrical management/safety aspects are very poor where improper wiring/sockets/appliance and cables are on the ground across the walkways. ➢ Safeguard is installed at one metal forming machine but not on others.	of hazardous chemicals is involved, a safety facilitator/officer with adequate knowledge of safety operations and of hazardous chemicals should be recruited. ➢ No Smoking, No Food and No open Fire should be allowed on project site; ➢ Mark the caution signs both in Arabic and in English; ➢ Ensure safety use of electrical appliance.	available	
19) Training of workers in environment, health and safety	➢ No periodic training for HSE aspects are provided ➢ No HSE orientation for new workers is adopted	➢ Project training requirements and Jordanian labour law	➢ Training records and attendance sheet	Monthly
20) Environmental risks	➢ No spill containment at the workplace, backyard, storage area is implemented ➢ No documented emergency response plan is in place	➢ Install spill containment area; ➢ Provide spill tool kit at workplace ➢ Provide emergency response plan.	➢ Spill accident records ➢ Inspection checklist ➢ Emergency response plan is in place ➢ Training records for emergency response plan	Regular inspection

Table 6-B: Monitoring Plan during Conversion and Operation for NRC Co.

Parameters to be monitored	Includes Table 5 Impacts	Location	Method of Monitoring	Monitoring Frequency	Standard Applied	Monitoring Cost	Responsible Party	Party to Report to
AC manufacturing equipment specifications and design (charging machine, leak detectors)		Production area	Verification of specs & design in implementation & procurement plans	Before procurement	TBD	Included in conversion costs financed by the project	Enterprise and Technical Consultant	NOU
A/C production lines	Occupational health & safety	Production area	Inspection by safety officer	Daily	Labour Law No. 8, 1996,		Enterprise, Supplier	NOU
Manufacturing (leakage of refrigerant)	Air emissions, water emissions, noise, soil	Production area	• Internal and external visual inspection. • Indoor measurements regarding noise and VOC emissions	2 times/year	Labour Law No. 8, 1996, OSHA regulation		Enterprise	Local authorities, NOU
Empty drums and waste	Hazardous chemicals & Non-hazardous waste	Store and Production area	Joint inspection	Monthly	• Solid Waste Management Law 2005 • Labor Law no. 8, 1996 • Regulations No. (24) of 2005: Management, Transportation and Handling of Harmful and Hazardous Substances Regulation		Enterprise	Local authorities, NOU
Storage of R-410a	Hazardous chemicals	Store	Joint inspection	Monthly	Regulations No. (24) of 2005: Management, Transportation and Handling of Harmful and Hazardous		Enterprise	Local authorities, NOU

Parameters to be monitored	Includes Table 5 Impacts	Location	Method of Monitoring	Monitoring Frequency	Standard Applied	Monitoring Cost	Responsible Party	Party to Report to
					Substances Regulation			
Implementation of Action Plans	Occupational health & safety, Training of workers in environment, health &safety, Environmental risks	Enterprise	Joint inspection	2 times/year (see Table 7)	Jordanian Laws: • Environmental Protection law No 52, 2006. • Labour Law No. 8, 1996 • Fire prevention Codes (Civil Defense Directorate)	Operating costs of the regulatory authorities	Ministry of Environment, Ministry of Labor, Civil Defense, Health	NOU

Table 7-A: Potential Environmental and Social Impacts & Mitigation Measures for MEC Company

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
11) Risk of handling compressed gases	➢ The storage of R22 and oxy acetylene cylinders **comply** with MSDS, where the compressed gas cylinders are separated in separate storage rooms and all are chained. ➢ The flash back arrestor devices are **installed** as kind of fire prevention during welding	N/A	➢ Check to the compliance with safety data sheet. ➢ Check all cylinders are chained	Regular inspection
12) Air emissions	➢ **Adequate ventilation** is provided in the production area. ➢ **No VOC emissions are measured in the workplace** ➢ **No ambient air quality measurements are conducted**	➢ For workers, workplace VOC measurements shall be conducted ➢ For environment, ambient air quality measurements shall be conducted	➢ Worker complain against bad odor in the workplace ➢ Test results (VOC) report by certified laboratory. ➢ Test results of ambient air quality by a certified laboratory	➢ VOC measurements 2 time/year ➢ Annual respiratory examination for the workers
13) Water emissions	➢ The wastewater is discharged into a septic tank, and emptied/evacuated via mobile septic tanker into nearest treatment plant.	**A documented receipt** from treatment plant department to assure the actual **disposal (manifest needed).**	Records of the disposal of the wastewater	Regular inspection
14) Noise	➢ All assembly equipment is complying with lower noise level. ➢ **No ambient and occupational sound power levels were measured before.**	➢ Ambient and occupational noise level measurements shall be conducted by certified party	➢ Compliance of the measured noise level at 1 m from machine (Leq (A)) with Labour law No. 8, 1996 ➢ Workers complains against the noise level at workplace	Noise measurements 2 times/year Annual hearing examination for workers
15) Hazardous chemicals	➢ Foaming chemicals are stored in the storage area under proper spill prevention consideration. ➢ There is sign to display to worker how to manage these substances.	N/A	Compliance with the regulation during the inspection	Regular inspection

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
16) Non-hazardous waste	➢ Most of the non- hazardous wastes from the production area such; cartoons, metal, plastic are stored at the backyard and then selling to the collector person. ➢ **The backyard is not covered and asphalt paved** ➢ **This area suffers from poor housekeeping**	➢ Evaluate of waste production process and identification of potentially recyclable material, then recycle and reuse it; ➢ **Non-hazardous waste will be stored in separate watertight storage area and then disposed vial approved collector by MoEnv** ➢ **Maintain good housekeeping frequently**	Proper storage according to solid waste management law 2005, and labour law no. 8 , 1996	Regular inspection
17) Hazardous waste	➢ The empty barrels containing foaming chemicals are washed and stored at the backyard and are sold as metal junk. ➢ The wastes of polystyrene and faulting foam pieces are stored separately from non-hazardous wastes, at designated area ➢ MSDS are placed at the barrels to alert the handlers and collectors. ➢ The emergency response plan is documented and placed at the workplace which is undertaken by all personnel when spill accident will occur ➢ The personnel lack of knowledge how to dispose these wastes.	➢ The disposal of these waste shall be carried out thorough Ministry of Environment for approval to disposal into Sawaqa Hazardous Wastes Treatment Center ➢ **Manifest is needed**	Visual inspection to ensure hazardous waste is stored appropriately according related regulation no. 24, 2005	Regular inspection
18) Occupational health and safety	➢ Fully commitment to wearing the personnel protective equipment against fugitive emission, hand injuries, slip hazard, manual handling. ➢ Fire extinguishers are distributed in a well manner. ➢ Emergency response and evacuation plan is in place at the workplace. ➢ Health and safety senior supervisor and five officers		➢ Regularly inspection to ensure compliance with labour law and OSHA regulation for industry sector. ➢ Accident/incident records of workers ➢ Worker complains records	Regular inspection

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
	assigned in the company. ➢ Health and safety committee is formed. ➢ The workers receive periodically fire prevention and first aid training. ➢ New comers are receiving safety and environment orientation prior to starting job ➢ Restriction signs for Smoking and food are distributed properly in the workplace. ➢ Electrical management/safety is good where cables are placed in the designated trenches area way of the walkways. ➢ Safe guards are installed on dangerous machinery.			
19) Training of workers in environment, health and safety	➢ Certain Safety training aspects can **be intensified** and **provided to workers**; such as ergonomics, electrical safety, manual handling, hazardous substances handling, ….etc	➢ Project training requirements and Jordanian labour law	➢ Training records and attendance sheet	Monthly
20) Environmental risks	➢ Spill containment plan and measures at the workplace is implemented		➢ Spill accident records ➢ Inspection checklist ➢ Emergency response plan is in place ➢ Training records for emergency response plan	Regular inspection

Table 5-B: Monitoring Plan during Conversion and Operation at MEC Company

Parameters to be monitored	Includes Table 5 Impacts	Location	Method of Monitoring	Monitoring Frequency	Standard Applied	Monitoring Cost	Responsible Party	Party to Report to
AC manufacturing equipment specifications and design (charging machine, leak detectors)		Production area	Verification of specs & design in implementation & procurement plans	Before procurement	TBD	Included in conversion costs financed by the project	Enterprise and Technical Consultant	NOU
A/C production lines	Occupational health & safety	Production area	Inspection by safety officer	Daily	Labour Law No. 8, 1996,		Enterprise, Supplier	NOU
Manufacturing (leakage of refrigerant)	Air emissions, water emissions, noise, soil	Production area	• Internal and external visual inspection. • Indoor measurements regarding noise and VOC emissions	2 times/year	Labour Law No. 8, 1996, OSHA regulation		Enterprise	Local authorities, NOU
Empty drums and waste	Hazardous chemicals & Non-hazardous waste	Store and Production area	Joint inspection	Monthly	• Solid Waste Management Law 2005 • Labor Law no. 8, 1996 • Regulations No. (24) of 2005: Management, Transportation and Handling of Harmful and Hazardous Substances Regulation		Enterprise	Local authorities, NOU
Storage of R-410a	Hazardous chemicals	Store	Joint inspection	Monthly	Regulations No. (24) of 2005: Management, Transportation and Handling of Harmful and Hazardous		Enterprise	Local authorities, NOU

Parameters to be monitored	Includes Table 5 Impacts	Location	Method of Monitoring	Monitoring Frequency	Standard Applied	Monitoring Cost	Responsible Party	Party to Report to
					Substances Regulation			
Implementation of Action Plans	Occupational health & safety, Training of workers in environment, health &safety, Environmental risks	Enterprise	Joint inspection	2 times/year (see Table 7)	Jordanian Laws: • Environmental Protection law No 52, 2006. • Labour Law No. 8, 1996 • Fire prevention Codes (Civil Defense directorate)	Operating costs of the regulatory authorities	Ministry of Environment, Ministry of Labor, Civil Defense, Health	NOU

Table 6-A: Potential Environmental and Social Impacts & Mitigation Measures for General Deluxe Company

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
11) Risk of handling compressed gases	➢ The storage of R22 and oxy acetylene cylinders **comply** with MSDS, where the compressed gas cylinders are separated in separate storage rooms and all are chained. ➢ The flash back arrestor devices are **installed** as kind of fire prevention during welding	N/A	➢ Check to the compliance with safety data sheet. ➢ Check all cylinders are chained	Regular inspection
12) Air emissions	➢ **Adequate ventilation is provided** in the production area. ➢ **No VOC emissions are measured in the workplace** ➢ **No ambient air quality measurements are conducted**	➢ For workers, workplace VOC measurements shall be conducted ➢ For environment, ambient air quality measurements shall be conducted	➢ Worker complain against bad odor in the workplace ➢ Test results (VOC) report by certified laboratory. ➢ Test results of ambient air quality by certified laboratory	➢ VOC measurements 2 time/year ➢ Annual respiratory examination for the workers
13) Water emissions	➢ The wastewater is discharged into Municipal Sewage Network.	N/A		
14) Noise	➢ All assembly equipment is complying with lower noise level. ➢ No ambient and occupational sound power levels were measured before.	➢ Ambient and occupational noise level measurements shall be conducted by certified party	➢ Compliance of the measured noise level at 1 m from machine (Leq (A)) with Labour law No. 8, 1996 ➢ Workers complains against the noise level at workplace	Noise measurements 2 times/year Annual hearing examination for workers
15) Hazardous chemicals	➢ Foaming chemicals (Iso and Poly) are **stored in the storage area under proper spill prevention consideration**. ➢ There are signs to display to worker how to manage these substances.		Compliance with the regulation during the inspection	Regular inspection
16) Non-hazardous waste	➢ Most of the non- hazardous	➢ Evaluate of waste production	Proper storage	Regular

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
	wastes from the production area such; cartoons, metal, plastic are stored at the backyard and then sold to collector(s).**Company has a comprehensive recycling/reuse system in place** ➢ This area suffers can use enhanced storage and ventilation although currently a temporary area until new storage is utilized	process and identification of potentially recyclable material, then recycle and reuse it; ➢ Non-hazardous waste will be stored in separate watertight storage area and then disposed vial approved collector by MoEnv ➢ Maintain good housekeeping frequently	according to solid waste management law 2005, and labour law no. 8 , 1996	inspection
17) Hazardous waste	➢ The empty barrels containing foaming chemicals are washed and stored at the backyard and are sold as metal junk. ➢ The wastes of polystyrene and faulting foam pieces are mixed with non-hazardous wastes, at designated area. ➢ MSDS are not placed at the barrels to alert the handlers and collectors. However company perforates barrels to prevent reuse as is ➢ The emergency response plan is documented and placed at the workplace which is undertaken by all personnel when spill accident will occur	➢ The wastes of polystyrene and faulted foam pieces shall be stored separately from non-hazardous wastes. ➢ The disposal of these waste shall be carried out thorough Ministry of Environment for approval to disposal into Sawaqa Hazardous Wastes Treatment Center. Manifest system should be used or documented disposal.	Visual inspection to ensure hazardous waste is stored appropriately according related regulation no. 24, 2005	Regular inspection
18) Occupational health and safety	➢ Personnel and workers are fully committed to wearing the personnel protective equipment against fugitive emission, hand injuries, slip hazard, manual handling. ➢ Fire extinguishers are distributed in well manner. ➢ Emergency response and evacuation plan in place at the workplace.		➢ Regularly inspection to ensure compliance with labour law and OSHA regulation for industry sector. ➢ Accident/incident records of workers ➢ Worker complains records	Regular inspection

Potential Negative Impact	Health, Safety and Environmental Assessment	Mitigation Measures	Compliance Indicator	Monitoring
	➢ Health and safety senior supervisor and two officers assigned in the company. ➢ Health and safety committee is formed. ➢ The workers received periodically fire prevention and first aid training. ➢ New comers receive safety and environment orientation prior to starting their job ➢ Restriction signs for Smoking and food are distributed properly in the workplace. ➢ Electrical management is good and away of the walkways. ➢ Safe guards are installed on machinery.			
19) Training of workers in environment, health and safety	➢ Safety training aspects are provided to workers; but need refreshers on aspects such as ergonomics, electrical safety, manual handling, hazardous substances handling, ….etc	➢ Project training requirements and Jordanian labour law	➢ Training records and attendance sheet	Monthly
20) Environmental risks	➢ Spill containment at the workplace is implemented		➢ Spill accident records ➢ Inspection checklist ➢ Emergency response plan is in place ➢ Training records for emergency response plan	Regular inspection

Table 8-B: Monitoring Plan during Conversion and Operation at General Deluxe Co.

Parameters to be monitored	Includes Table 5 Impacts	Location	Method of Monitoring	Monitoring Frequency	Standard Applied	Monitoring Cost	Responsible Party	Party to Report to
AC manufacturing equipment specifications and design (charging machine, leak detectors)		Production area	Verification of specs & design in implementation & procurement plans	Before procurement	TBD	Included in conversion costs financed by the project	Enterprise and Technical Consultant	NOU
A/C production lines	Occupational health & safety	Production area	Inspection by safety officer	Daily	Labour Law No. 8, 1996,		Enterprise, Supplier	NOU
Manufacturing (leakage of refrigerant)	Air emissions, water emissions, noise, soil	Production area	• Internal and external visual inspection. • Indoor measurements regarding noise and VOC emissions	2 times/year	Labour Law No. 8, 1996, OSHA regulation		Enterprise	Local authorities, NOU
Empty drums and waste	Hazardous chemicals & Non-hazardous waste	Store and Production area	Joint inspection	Monthly	• Solid Waste Management Law 2005 • Labor Law no. 8, 1996 • Regulations No. (24) of 2005: Management, Transportation and Handling of Harmful and Hazardous Substances Regulation		Enterprise	Local authorities, NOU
Storage of R-410a	Hazardous chemicals	Store	Joint inspection	Monthly	Regulations No. (24) of 2005: Management, Transportation and Handling of Harmful and		Enterprise	Local authorities, NOU

Parameters to be monitored	Includes Table 5 Impacts	Location	Method of Monitoring	Monitoring Frequency	Standard Applied	Monitoring Cost	Responsible Party	Party to Report to
					Hazardous Substances Regulation			
Implementation of Action Plans	Occupational health & safety, Training of workers in environment, health &safety, Environmental risks	Enterprise	Joint inspection	2 times/year (see Table 7)	Jordanian Laws: • Environmental Protection law No 52, 2006. • Labour Law No. 8, 1996 • Fire prevention Codes (Civil Defense directorate)	Operating costs of the regulatory authorities	Ministry of Environment, Ministry of Labor, Civil Defense, Health	NOU

6. Institutional Arrangements

Organization	Responsibilities of Stakeholders for Implementation and Supervision of this ESMP
Three AC companies	Bear all responsibility, but under monitoring and supervision of the NOU/PMU and the World Bank, for the conversion from HCFC-22 to HFC-410A in AC manufacturing. Technical assistance will be provided through the project. Request chemical suppliers to provide safety data sheets for the R-410A and full guidance and training on safely handling these chemicals Follow stringently the safety data sheets when handling these chemicals Assign technical staff to monitor the compliance with the safety occupational health and environment requirements on using chemicals Keep workers continuously trained, in cooperation with the NOU and chemical and equipment suppliers on safe AC production; Take all necessary measures to prevent leakage of HFC-410A during the manufacturing process. Carry out the mitigation measures described in the parts 4 above for the chemical substance and in case of chemical leakage. Contract local services for collection and disposal of the empty chemical drums in accordance with national regulations. Prepare an EIA following the national regulations in the event that a new plant is constructed to implement the HCFC phase-out subproject.
Jordan NOU/PMU in the MOE	Sign the subproject grant agreement (SGA) with each participating enterprise. The SGA annex will list enterprise responsibilities and documents / plans it is obligated to adhere to in implementation of the ESMP. Coordinate and supervise subproject implementation, including all environmental and safety requirements listed in Section 4 by hiring technical consultants as necessary. Ensure project implementation will achieve the HCFC-22 phase-out target and safety requirements for the use and disposal of chemicals in accordance with national regulations and World Bank safeguard policies and guidelines Cooperate with relevant Government and municipal agencies and departments to carry out enforcement of environmental and worker safety regulations. Prepare project progress and environmental and social monitoring reports
Equipment Suppliers	Provide safe and environmentally sound design and installation of the AC production line Provide adequate training and guidance on safe operation of the supplied equipment taking into account any environmental and health risks and mitigation measures Provide adequate after-sale service and warranty in the case of accident due to the technical faults.
Gov. enforcement Agencies	Joint inspection of the three factories by Ministry of Environment, Ministry of Labor, Civil Defense, Health to detect any shortfalls from the regulatory requirements of those agencies will be repeated annually for the duration of the project, or more frequently if requested by MOE.

7. ESMP Requirements and Subproject Contracts

The main environment and safety monitoring requirement for the HCFC phase out subproject is to ensure that any negative impacts of the conversion on occupational health and the local environment could be minimized or prevented.

Pre-Conversion Phase

Domestic Review and Approval: The NOU will review the subproject package submitted by enterprise. If the environmental documents do not meet all the requirements, sub-project owners will be asked to provide additional information.

Related Conditions and Responsibilities: The NOU will ensure that an appropriate clause is included in enterprises contract obligating the sub-project owner to implement the mitigation, monitoring, and reporting measures specified in the ESMP and strictly follow the procedures according to related Jordanian laws and regulations. Warranty of the equipment supplier and its responsibility in case of fire risk, accidents happening due to the fault of the system will be defined in the contract for equipment supply.

Review and Approval from World Bank: The environmental and social documents will be post- reviewed by World Bank. The review will include prior review during the early stages of project pre-conversion with respect to ESMP implementation, and post review after the enterprises and NOU have shown compliance with the ESMP.

Implementation Phase:

Supervision from the Jordan NOU/MOE: The Jordan NOU in the Ministry of Environment will be responsible for supervision of the implementation of subprojects, with support from a technical consultant to be engaged through the project management unit (PMU) with funding from the AC Sector Plan. Each enterprise is responsible for ensuring that all the requirements of the ESMP are properly implemented. It is the responsibility of the enterprises to ensure that relevant tender documents and contracts include requirements put forward in the ESMP. During sub-project implementation, the NOU has the right to check the documents and contracts to verify this condition has been satisfied.

8. ESMP Monitoring and Reporting Specifics

Enterprise Responsibilities: During conversion period of 2013 – 2017, enterprises should detail all activities of conversion in the Progress Report such as implementation timing, testing, trials and proto sample to be produced, and progress and results of mitigation and monitoring measures. Frequency and duration of mitigation measures and monitoring as well as remedial actions, if any, showing consequences in accordance with the phasing-out targets and schedule should be included. Similarly, a breakdown timetable consisting of detailed activities should be included in the report. The Environmental and Social Report prepared by enterprises should be submitted annually to the NOU as part of the Subproject Implementation Progress Reporting activities. The Project Implementation Progress report is to be submitted semi-annually to NOU by January 31 and July 30 each year to the World Bank.

Monitoring: During the project implementation, the NOU will work with local environmental authorities and its consultants to monitor the implementation of HCFC phase-out subprojects and to ensure that all the specified ESMPs are implemented properly.

Reporting: The technical consultant will supervise and prepare an aggregate social and environmental safeguards monitoring reports for the NOU, MOE, and MOPIC. Such reports will include, at least twice annually, a detailed report on the implementation of this ESMP.

The implementation schedule and reporting procedure are summarized as follows:

Stakeholder/ Organization	Implementing schedule	Report on/to	Time	Frequency
NOU	2013-2017	**Subproject Implementation Progress Reports** of the conversion sub-project and submit to World Bank **Project Environment and Social Monitoring Report** (with inputs from the enterprises), including environment and social monitoring requirements/indicators including compliance with all environmental health and safety regulations	*31 July and 31 January*	*Semi-annually*
Enterprises	2013-2016	**Subproject Implementation Progress Report** to NOU - Environment and safety issues, especially accidents, fires, or lost time injuries, if any, to local authority and to PMU - Notification to the chemicals and equipment suppliers and copy to the NOU on any issues during the conversion and after conversion -EIA report for any enterprise building new factories	1 month after each quarter When needed When the fault takes place One-time reporting and approved by local EPA before construction starts	Quarterly (year 1)

9. Capacity Building/Training

The Project will be administered by the NOU, which will designate staff to manage environmental risk and assure that procedures specified in the EMF are properly followed during implementation. In addition, qualified environmental/social consultants will be contracted to support the PMO to perform the tasks required under this Framework in the identification and management of environmental risk in subproject evaluation and implementation. The contracted experts and qualified consultants will provide environmental safeguard training to sub-project owners or other stakeholders. The training shall include (1) relevant requirements of environmental laws and regulations; (2) environmental assessment procedures; (3) environmental issues which may be caused by sub-project preparation and implementation. The NOU, through its technical consultant, will also provide training on the safe handling and management of R-410A and related aspects of the conversion process.

Organizer	Number of Courses	Participants	Frequency	Duration	Content	Budget
NOU	2	MEC, NRC, Abu Haltam		2 days	Regulations specific to conversion processes Safety in working area Handling of R410 Safeguards measures for laborers.	Included in the project costs (approx. US$ 10,000)

Annex (1) Governing Laws and Regulations (Environmental Health and Safety)

1. ENVIRONMENTAL PROTECTION LAW NO. 52 OF 2006

Article 6:

A- Materials prohibited from being entered into the Kingdom shall be set by instructions issued by the Council of Ministers upon the recommendation of the Minister.

B- Hazardous waste is not permitted to be entered into Jordan. This waste shall be defined by virtue of instructions issued by the Council of Ministers upon recommendation of the Minister.

C- In the event of the discovery of hazardous waste entered into the Kingdom or the entry of any environmental pollutant in an illegal manner, the Ministry, in coordination with the concerned authorities, shall return same to its origin at the expense of the party who entered it into the Kingdom and shall levy fines and recoup costs and losses suffered by the Kingdom.

D- Any person violating the provisions of this Article shall by fined an amount of not less than (20,000) Twenty Thousand Dinars or by imprisonment for a period of not less than 3 years and not exceeding fifteen years, or both.

Article 7:

A- For the purposes of this Law, the specialized officer named by the Minister in writing upon the recommendation of the Secretary General shall be granted police powers and he may enter any industrial, commercial, handicraft or agricultural shop or any establishment or corporation or any other entity whose activities may affect in any way the Element and components of the Environment to ensure its 5compliance and the compliance of its activities with the standard environmental conditions.

C- The perpetrator of any of the violations provided in this Article, after the end of the period of notification and the failure to remove the violation shall be punished by imprisonment for a period of not less than thirty days and not exceeding 3 months or by a fine of not less than Three Hundred Dinars and not exceeding Five Thousand Dinars. In case of a repeat of the violation, the fine shall be doubled. If the violation is repeated a third time, the entity shall be shut down until the violation is removed

Article 11:

A- 1- It is forbidden to dump, dispose of, or collect any materials harmful to the Environment, whether such materials are solid, liquid, gaseous, radioactive or thermal, in the sources of water.

2- It is forbidden to store any of the materials listed in Paragraph 1 thereof in the proximity of water sources within the safe limits set by the Ministers by virtue of instructions issued for that purpose, including the protection of water basins, in coordination with the concerned parties.

Article 19:

A- The owners of factories or vehicles or workshops or any entity that conducts activities with a negative impact on the Environment and environmental pollutants must install equipment or take the necessary measures to prevent or reduce the emission of such pollutants there from, and to control such pollutants before emission from such factories or vehicles into the air to within the limits permitted based on the set standards.

B- The owner of a factory who commits a violation referred to in Paragraph A hereof and does not remove such a violation within the period set by the Minister or whoever he delegates, shall be referred to the Court, who is entitled to issue a decision to shut down such factory and punish the perpetrator by imprisonment for a period of not less than one week and not exceeding thirty days, or by a fine of not less than One Hundred Dinars and not exceeding One Thousand Dinars, or both. He shall also be obligated to remove the violation within the period set for that purpose, and he shall be fined an amount of not less than Fifty Dinars and not exceeding One Hundred Dinars for each day that he fails to remove the violation after the end of the period set for that purpose.

2. Labour Law and its Amendments No. 8 of the Year 1996

Article 79:

After consulting the competent official authorities, the Minister shall determine in the instructions that he shall issue the following:

A. Precautions that should be taken or provided in all establishments or in any of them to protect the employees and establishments from the dangers of work and the occupational diseases.

B. The equipment that shall be provided in the establishments or any of them to protect the employees from the dangers of work and the occupational diseases.

C. The basis and standards that should be available in the industrial establishments to secure an environment free of pollution, noise, vibrations and all what may endanger the health of the employee in accordance with the approved international standards and determine the methods of check and test related to controlling these standards

Article 78:

A. The employer shall do the following:

1. Provide the required precautions to protect the employees from the dangers and diseases that may result from the work and the used equipment.

2. Provide personal protection equipment for the employees to protect them against the work dangers and occupational diseases such as clothes, glasses, gloves, shoes and others, in addition to guiding them how to use, keep them and keep their cleanliness.

3. Acquainting the employee before his/her employment with the dangers of his/her occupation and the protective means that shall be taken in accordance with the regulations and decisions issued in this regards

Article 82:

The employees working in any establishment shall abide by the provisions, instructions and decisions related to the precautions of protection, vocational health and safety, using and maintaining the equipment of vocational health and safety, and refraining from any act that may hinder the execution of such provisions, decisions and instructions and refraining from misusing the equipment of protection and vocational health and safety or destroying them at the risk of being subject to the disciplinary penalties stipulated in the bylaw of establishment.

Article 87:

A. If the employee was injured because of work an injury that led to his/her death or caused him/her a serious body injury that hindered his/her continuation in work, the employer shall transfer the injured to the hospital or any medical center and notify the competent security authorities of the accident and send a notification to the Ministry during a period not exceeding (48) hours from the occurrence of the accident, the employer shall bear the expenses of transferring the injured to the hospital or the medical center to treat him/her.

Article 88:

The employer shall be responsible for paying the compensation stated in this law for the employee who has been infected with an occupational disease resulting from his/her work based on a report of the medical authority.

Article 90:

A. If the work injury has resulted in the death of the employee or his/her total disability, the employer shall compensate the employee with the wage of one thousand and two hundred working days provided that the compensation shall not exceed five thousand JDs and not less than two thousand JDs.

B. If the work injury has led to temporary disability of the employee, then he/she shall be entitled to a daily remuneration equaling (75%) of the rate of his/her daily wage as of the date in which the injury has taken place during the period of medication which shall be determined based on a report of the medical authority if his/her medication was outside the hospital, the remuneration shall be reduced to (65%) of that wage if the injured was treated at one of the approved medication centers.

C. If the work injury has resulted in permanent partial disability in accordance with the report of the medical authority, the employee shall be paid compensation at the rate of that disability to the compensation decided for the total disability by virtue of table No. (2) annexed to this law.

D. If the one work injury has resulted in more than one body injury, the injured employee shall be entitled to compensation for each injury in accordance with the basis stipulated in this law provided that the total of that amount payable shall not exceed the amount of the compensation payable in case of total disability.

3. Regulation No. (43) o-f the Year 1998 - The Regulation of Protection and Safety from Industrial Tools and Machines and Work Sites Issued by virtue of the Provisions of Paragraph (C) of Article (85) of the Labour Law No. (80) Of the Year 1996

Article (2)

The employer or the director of the establishment should take the precautionary measures and procedures that guarantee protection and safety from the mechanical, electrical, chemical dangers of industrial tools and machines and work sites, pursuant to the provisions of this regulation and the instructions that were issued accordingly

Article (3)

B- During the setup of the barriers mentioned in paragraph (A) of this article, the following should be taken into consideration:

1. They should prevent the worker or any part of his/her body from reaching the danger area during work.
2. They should constrict and enclose the danger area.
3. They should not disturb the worker and hinder him/her from work.
4. They should be suitable for the work, machine and the tool, so that they will not cause a delay in production.
5. They should not hinder oiling, checking, adjusting or fixing the machine or the tool.
6. They should not have sharp corners, dangerous or rough edges or ends and they should not be a source of any kind of accidents.
7. They should prevent flying splinters from reaching the workers.

Article (5):

The chemical dangers:

A- All necessary precautionary measures should be taken to protect workers from the hazards of being subjected to chemical materials that are used or that leak to the work environment, such as gases and dusts and from the liquids and acids that they may contain, so that they will not exceed the allowed limits in accordance with the table which is attached to this regulation.

B- Taking the appropriate procedures which prevent workers from being harmed or injured when gas, dust, wastes or any impurities are generated during work.

C- The work chambers inside the productive establishments should have good ventilation in accordance with the health requirements that are approved by the Directorate of Environmental and Vocational Health and Safety at the Ministry of Labour, in order to get rid of dusts, gases and other materials that are harmful to the health from where they are originated by using sucking machines or industrial ventilation system.

D- Providing all personal protective tools that fit the nature of working in chemical industries, including filtered masks, suitable shoes, head helmets, hand gloves, work clothes, leather coats and protective glasses.

E- Providing appropriate warehouses that are suitable to store raw and synthesized chemical materials separately, as well as providing all the requirements needed for the storage.

F- Preparing special places or buildings that are isolated from the work places for the industrial processes, machines or tools which could generate harmful vapors, dusts and gases when they are operated, on the condition that these places and buildings are supplied with the necessary protective means that guarantee the prevention of spreading these materials into the work environment.

G- Placing a sticker on each chemical material, specifying the material name, the chemical composition, the trade name, the way it is used and stored, the dangers, the procedures to be protected from and any other necessary information.

Article (6)

Every establishment should be obligated to do the following:

A- Providing instructional and warning plates around the used raw materials, synthesized materials, machines and different processes that indicate the dangers resulting from dealing with these materials and machines, on the condition that they will include the technical instructions that are necessary to prevent injuries and work accidents. These plates should be posted in visible places, as well as in the places of different operations.

B- Carrying out regular maintenance needed for tools, devices and machines by specialized technicians, in a way to secure the safety. The maintenance procedures should be documented in special records that are prepared for this purpose.

C- Preventing any person from removing or assembling any protective barrier or any part of a protective device, unless the tool or the machine failed to work, on the condition that each part should be put back to its original place before re-operating the tool or the machine.

D- Not to possess, sell, rent or transfer tools, machines and devices that have dangerous parts which do not have adequate protection.

Article (8)

When the employer or the in charge director employs a worker in a dangerous industry, the employer should explain to him/her the dangers that he/she might be subjected to as a result of his/her work. The

employer or the director should also train the worker for a period not less than one month under his direct supervision or under the supervision of the responsible section director.

Article (9)

The vocational health and safety inspectors at the Ministry of Labour have the right to examine the technical and scientific specifications of the raw chemical materials, compounds and aids that are used in industrial processes, in order to determine the safety levels of the materials which are dangerous and harmful to health that are allowed to exist at the work environment.

Article (10)

Based on a recommendation from the Directorate of Environmental and Vocational Health and Safety at the Ministry of Labour, the Minister of Labour may add, delete or modify any material from the permitted names or levels that are mentioned in the table attached to this regulation, on the condition that it will be published in the official gazette.

4. Regulation No. (37) of 2005 Environmental Impact Assessment Regulations- Issued by Virtue of Sub-paragraphs 9 and 11 of Paragraph A of Article 23 of the Environmental Protection Law No. (1) of 2003

Article 4

A. No industrial, agricultural, commercial, housing or tourism project or any construction development project or any of the projects specified in Annexes 2 and 3 of these Regulations may commence operations with the services relevant thereto, until it obtains the Environmental Approval required for this purpose from the Ministry.

B. The Ministry, upon the recommendation of the Secretary General, may require the owner of the project not from among those specified in Annexes 2 and 3 of these Regulations to conduct an environmental impact assessment study based on the nature or location of the project, or the nature of the impact that may result therefrom.

Article 8

A. The project owner shall submit an application to the Ministry to obtain the Environmental Approval needed to establish his project, in accordance with the special form prepared for this purpose, and shall present with it all the necessary information and data, and attaching thereto the preliminary maps, designs and specifications referred to in Annex 1 of these Regulations.

B. The project shall be classified in any of the following categories by decision of the Secretary General on the basis of the recommendations of the competent party at the Ministry:

1. Category 1: includes the projects referred to in Annex 2 of these Regulations and which require a comprehensive environmental impact assessment.

2. Category 2: includes the projects referred to in Annex 3 of these Regulations and which require a preliminary environmental impact assessment, based on which the need to conduct a comprehensive environmental impact assessment will be determined.

3. Category 3: includes the projects that require neither a preliminary nor a comprehensive environmental impact assessment.

Article 12

When launching his project and during all the implementation and operation phases, the project owner shall abide by the contents of the Environmental Impact Assessment Document and any other conditions issued by the Ministry when granting its approval.

Article 17

The Ministry shall regularly monitor the extent of the compliance of the project owner with all the conditions and requirements stipulated in the Environmental Approval during any of the activities of the project including its implementation, operation, and disassembling.

Article 18

The Ministry shall make available to the concerned entities and upon their request, the information and data related to the Environment provided by project owner during the phases of the environmental impact assessment study. In specific cases dictated by the public interest or the provider's own interest, the Ministry may consider some of the data or information provided as confidential.

Annex (2) On-site Inspection on the Sub-project Facilities

1 National Refrigeration Company (NRC):

Location: National Refrigeration Company (NRC);

Date and Time: Monday September 10, 2012 9:30 am-12pm

Attendees from NRC: Mr Husam Al Hafez (CEO) and Mr Hisham Al Hafez (NRC Founder)

NATIONAL ELECTRIC is the brand name of their products. They are manufactured based on international standards, including air conditioning units, domestic refrigerators, coolers and washing machines. Date of Establishment: 1976. Building size: 9,000 sq. m No. of Employees: 50

NRC is a 100% owned Jordanian company. It produces domestic refrigerators, washing machines and split type air conditioners of the sizes 1, 1-1/2 and 2 tons of refrigeration. The production of air conditioners is using the same production line as the production of domestic refrigerators. The annual production is 5000 units. Components for the ACs are sourced from the international market, mainly from China. Production of air conditioners takes place during the warm season where the demand for air conditioners in Jordan is high, i.e. from April to November. Production of domestic refrigerators takes place from November to April. However, due to tough competition, the sales of domestic refrigerators are going down. NRC export around 30-40% of its production to Syria and Iraq. The domestic refrigeration line was converted from CFCs to HFC-134a and cyclopentane with financial support from the Multilateral Fund.

A meeting in the CEO office was held were the Jordan HCFC Phase-Out Management Plan (HPMP) "Phase-out of HCFC-22 under the ODS project , were explained to the management and that to ensure WB funding goes to entities that are compliant with H&S and Environmental and have the relevant WB safeguards in place and that their service technicians employ good practice in servicing HCFC-22 air-conditioning units to avoid excess leakage over time, to retrofit AC units to alternative refrigerants and, to be prepared for handling alternative refrigerants ranging from HFCs to natural refrigerants, in anticipation of evolving technologies worldwide.

Background:

- Company uses around 6 tons of R22 /yr
- CEO have met with Mr Ghazi Odat and Eng Hanadi from the ODS and the equipment to be replaced was well explained by the ODS team which will be the vacuum pumps, Gas charging machine.
- Facility has three shops: 1) Metal Fabrication Shop, and plastic/thermo forming 2) Assembly shop and 3) Vaccum and Gas Charging Shop and have recently purchased a computerized QA/QC room for automated random sampling.
- The company gets visited by the Greater Amman Municipality, Ministry of Health, Civil Defense, M. of Labor, Standards and Metrology Institute, and the social security corporation staff on an annual basis.

H&S-Environmental/Social Issues cited:

- The H&S/Environmental consultant of the WB then asked to see their records of health and safety to check their accident records for the past 3 yrs, which under the Jordanian labor and social security laws have to be maintained. It was noted that the last incident took place in 2011 but the last serious accident

took place in 2010 where an injury causing parts of four hand fingers to be chopped from to one hand to a worker occurred due to an accident using the iron press .

- Later the company installed ***safeguards to the machine which appeared to be tamper prone***. Other machines did not seem to have effective safeguards.
- Company ***does not have an appointed Health and Safety Officer and workers are enrolled in the Social Security System.***
- There exists ***serious electrical problem with sockets***, ***as well as earthing*** noticed only on foam machine but not on the machinery
- ***Insufficient safety signage and no safety committee is formed.***
- Facility suffers from ***product and waste cluttering and needs enhanced housekeeping***, improper ***storage practices***
- The Civil Defense gives the facility training on a regular basis on ***fire extinguishing and evacuation but it is apparent that the facility needs to implement the recommended practices and recommendations***
- ***Fire extinguishers inspection validity period have expired 6 months ago*** on March 14, 2012. Due diligence needs to be practiced.
- ***Personal Protective Equipment provided to workers did not seem to be in full compliance with the national H&S requirement***
- ***First Aid box was almost empty and not re-charged as per the civil defense requirements***
- ***Signage for evacuation was insufficient and product boxes blocked locations where emergency alarms are installed.***
- ***Facility did not seem to have any female staff employees*** neither in the production or management departments
- ***All facilities did not have proper signage, nor well marked Material Safety Data Sheets MSDS, nor well managed gas cylinders that are not with fire absorber devices installed on them***

Recommendation: It is possible for this facility to be a beneficiary of the ODS if and only when the above issues are fully rectified and it is envisaged to take not less than six months of work for mitigation measures.

2 Middle East Electrical Industries Co. (Middle East Complex for Engineering, Electronics, and Heavy Industries, PLG (MEC)

Location: MEC Industries in Muwaqqar Governorate

Date and Time: Monday September 10, 2012 12:30 am-3:30pm

Attendees from MEC:

- Engineer Nasseem Saada-Director of QA/QC,
- Eng Faten Hasan, Technical Department,
- Eng Mahmoud Allayan Quality Systems Director, and
- Eng Mahmoud Huneiti, Head of Health and Safety and has 5 H&S officers
- Mr Ammar Shehtou-Head of personnel Directorate

A meeting in the company facility meeting room with the above mentioned staff attendees was held were the Jordan HCFC Phase-Out Management Plan (HPMP) "Phase-out of HCFC-22 under the ODS project , were explained to the management and that to ensure WB funding goes to entities that are compliant with H&S and Environmental and have the relevant WB safeguards in place and that their service technicians employ good practice in servicing HCFC-22 air-conditioning units to avoid excess leakage over time, to retrofit AC units to alternative refrigerants and, to be prepared for handling alternative refrigerants ranging from HFCs to natural refrigerants, in anticipation of evolving technologies worldwide.

MEC is the leading producer, distributor and exporter of consumer electronic and electric home appliances in Jordan and the region. Based on multiple agreements with major appliance manufacturers, LG, Haier, Daewoo, Samsung and ACMA are the main brands which MEC produces, besides other models. Year of establishment is 1994. It has land with size of 200,000 sq. m, building with 110,000 sq. m and 761 Employees.

The company is the second largest air conditioner manufacturer in Jordan. It is a part of a larger industrial complex producing electrical appliances, including televisions, washing machines, dishwashing machines, and domestic refrigerators. The domestic refrigeration line was converted to HFC-134a for the refrigeration part and Cyclopentane for the foam part with the assistance from the MLF. The company has two production lines. It has testing capacity for performance of its appliances, including basic testing facilities for AC. In 2010, it consumed 115 tons of HCFC-22.

Production takes place at the following facilities: 1) Plastic granules are molded into the various component s and parts needed for the productions , 2) washing machines, refrigerators and air conditioners and 3) Raw material storage. See Attached Company Brochure for more details.

Background

- The company operates under 4 shifts while H&S operates in two shifts. The company has ISO 14001 and 9001 valid accreditation and the last visit by Lloyds Company for interim visit in Nov 2011.
- The company currently exports to Iraq, PA, and Egypt,
- Total # of employees is 204 and employs female staff in managerial, admin and technical departments.
- The company conducts Internal audits every 6 months by the quality assurance directorate and External audits every year by Lloyds

H&S-Environmental/Social Issues cited:

- The H&S Head is an ex Civil Defense Retired employee, specialized in fire and safety, and CPR and conducts evacuation training, mock exercises with the Civil defense for the facility employees.
- All prospective employees must take an ***induction H&S debriefing*** and all employees must undergo fire extinguishing training, use of sprinklers and basic first aid.
- Last Civil Defense training took place on May 9, 2012 where all employees participated.
- Staff are progressively trained with orientation and an induction course done by the quality management directorate on H&S.
- Facility has a clinic with a resident doctor and nurse.
- Facility employs females both in management and in production
- All employees have access and custody of the needed personal protective equipment (shoes, coats, gloves and goggles)
- Fire extinguishers and hydrants and alarm systems are regularly checked with records well maintained and the same for the labels which are proper and valid.
- There is a designated spent oils and waste collection area that is well marked and designated for the collection of the collection contractors, ***However it was noted that no waste collection has taken place from that area and the safety officer was guided on the need to conduct the Ministry of Environment to guide them on where to dispose of the hazardous spent oils and chemicals. This should be done through official modes of communication***
- ***The last visit by Lloyds auditors cited a need for them to update their Environmental Impact Assessment but the company has not done so yet***
- H&S/Social and Environmental consultant of the WB then asked to see their records of health and safety to check their accident records for the past 3 yrs, which under the Jordanian labor and social security laws have to be maintained. ***It was noted that this years list included incidents related to falls, minor chemical leaks, moving behind vehicles at the blind spot location of the vehicle reversing and maintenance accidents yet no major accidents took place***
- During the visit a spill was noted to have occurred and the proper measures had taken place (proper marking, damping with sand, and circulation of the spill area).
- Machines in the metal fabrication and plastic molding had proper safeguards to the machine.
- All facilities had proper signage, well marked Material Safety Data Sheets MSDS, gas leak procedures, and well managed gas cylinders with fire absorber devices installed on them

Recommendation: It is possible for this facility to be a beneficiary of the ODS if the above cited minor issues cited above are rectified and it is envisaged to take not more than one month of work for mitigation measures.

Abu Haltam Group: GENERAL DELUXE

Location: General Deluxe Industries in Marka

Date and Time: Tuesday September 11, 2012 9:30 am-1:30pm

Attendees from General Deluxe-Abu Haltam Group:

- Engineer Ziad Abu Haltam-Purchasing Manager,
- Eng Bader Imreish, Production Department Manager,
- Eng Raed Eishe Engineering Dept Manager
- Eng Ahmad Abu Saimeh, Head of Health and Safety

GENERAL DELUXE is the brand name of their products, that are manufactured based on international standards, including air conditioning units, refrigerators, water dispenser, freezers, TVs, washing machines, satellite receiver units, vacuum cleaners and microwave ovens. It has a building with 20,000 sq. m and101 Employees.

The company is a 50-year old family business but only entered the AC business in 2001, when it started with assembly only. It gradually built its manufacturing capacity until fully functional in 2006 as an air conditioner manufacturer. It has five models ranging from 12,000 to 300,000 BTU, with EERs of about 2.7. It sources its compressors from three different Japanese companies. It is a 100% Jordanian owned company and its production was started before 2007 and eligible for MLF assistance. The company imports HCFC-22 directly from China. Upon being asked about alternatives, it stated that R-407 seems like a more likely choice, given the costs of R-410A. Abu Haltam also manufactures domestic refrigerators, which use HFC-134a as a refrigerant and HCFC-141b as the foaming agent. HCFC-141b pre-blended polyol is purchased from Syria. In 2010, it consumed 20 tons of HCFC-22 and of 6 tons of HCFC-141b contained in the polyol. ***See attached brochure on the company for more details***.

Background

- Company was ISO 9001 and 14001 accredited in 2003 by the Dutch Council for Accreditation, but has not enrolled in maintaining this accreditation since then but has a quality management system that is enforced and in place.
- Facility has a quality Management and procedures stem overlooked and managed by a local staff
- Company has a certified safety officer and a H&S Management Committee, holds regular training courses for the staff and the facility has an internal H&S plan on firefighting, first aid and evacuation
- Company has plans to build a new air conditioning facility and it was witnessed today the electrical installations plus new storage facility. All these new facilities will have modern fixtures, features and installations that will take into account Occupational Safety/health and environmental protection measures in the design considerations.
- Abu Haltam Co. is waiting to receive the support from the WB/ODS project for the following :
- Charging machines, leak detection equipment, vacuum pumps and testing equipment. So they are awaiting to receive the WB grant in order to procure the above mentioned equipment

H&S-Environmental/Social Issues cited:

Positive Citations:

- The company work injury log is minor

- Company participated in a JICA initiative under JEDCO to apply the Caisen System which they completed in 5 months. Staff are assigned various H&S responsibilities under teams.
- Company employs women in administrative and technical departments
- Company has a resident doctor and nurse as well as a clinic
- Company has annual occupational checkups for staff
- Has Material Safety Data sheets posted on walls near chemical usage stations
- Every 2-3 months the factory workers get a refresher H&S practical debrief and practical training course and the Civil Defense is invited to a mock fire fighting using extinguishers
- Facility has a comprehensive recycling system for wooden stools, cardboard boxes, packaging materials, etc. Spent materials containers are perforated to prevent reuse but sold as scrap.
- Facility generates about 20l/yr of spend oils and chemicals which get collected by local recyclers and taken to the refinery

Negative Citations

- M. of labor inspected the facility and instructed a correction of the noise problem
- No manifest system is kept on records for spent oils and chemicals, collection is incidental and not well documented.
- Until a new storage facility is fully in operation, the H&S officer is encouraged to keep a close scrutiny of the temporary facility for enhanced ventilation and electrical safety.

Recommendation: It is possible for this facility to be a beneficiary of the ODS grant if the above cited minor issues cited above are rectified and it is envisaged to take not more than one month of work for mitigation measures. It is also highly recommended for the facility to revive its ISO 14001 and 9001 accreditations with a certified international body.

1 National Refrigeration Company (NRC):

Location: National Refrigeration Company (NRC);

Date and Time: Monday September 10, 2012 9:30 am-12pm

Attendees from NRC: Mr Husam Al Hafez (CEO) and Mr Hisham Al Hafez (NRC Founder)

NATIONAL ELECTRIC is the brand name of their products. They are manufactured based on international standards, including air conditioning units, domestic refrigerators, coolers and washing machines. Date of Establishment: 1976. Building size: 9,000 sq. m No. of Employees: 50

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- The company gets visited by the Greater Amman Municipality, Ministry of Health, Civil Defense, M. of Labor, Standards and Metrology Institute, and the social security corporation staff on an annual basis.

H&S-Environmental/Social Issues cited:

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- Later the company installed ***safeguards to the machine which appeared to be tamper prone***. Other machines did not seem to have effective safeguards.

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- ***Insufficient safety signage and no safety committee is formed.***
- Facility suffers from ***product and waste cluttering and needs enhanced housekeeping***, improper ***storage practices***
- The Civil Defense gives the facility training on a regular basis on ***fire extinguishing and evacuation but it is apparent that the facility needs to implement the recommended practices and recommendations***
- ***Fire extinguishers inspection validity period have expired 6 months ago*** on March 14, 2012. Due diligence needs to be practiced.
- ***Personal Protective Equipment provided to workers did not seem to be in full compliance with the national H&S requirement***
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- ***All facilities did not have proper signage, nor well marked Material Safety Data Sheets MSDS, nor well managed gas cylinders that are not with fire absorber devices installed on them***

Recommendation: It is possible for this facility to be a beneficiary of the ODS if and only when the above issues are fully rectified and it is envisaged to take not less than six months of work for mitigation measures.

Consultation Meeting with Stakeholders Industries to Discuss the NRC Environmental Health and Safety Social Safeguards Report - Individual Industry

Date: September 22, 2012
Time: 10-12am
Location: National Refrigeration Company (NRC) Fascility
Attendees from NRC: Mr. Husam Al Hafez (CEO)

- ***The HSE WB consultant Dr Hijazi went over the issues cited in the inspection visit report and the need to comply with WB health, Safety ,Environment and Social safeguards before the ODS grant funds disbursement.***
- ***The CEO Mr Al Hafez was responsive to the issues cited in the report in relation to Health, Safety and Environment.***
  - Facility will designate a Health/Safety/Environment/Social Safeguards Officer and will establish a HSE committee from the administrative and technical/production departments and will provide for their training)
  - Material Safety Data Sheets will be requested from the supplier and posted on the walls near where chemicals are in use or stored.
  - HSE Signage from the Occupational Safety and Health Institute (OSHI) and Ministry of Labor (Inspection Directorate) in Jordan will be posted on walls around the production fascilites.
  - Enhanced and proper housekeeping issues will be conducted and clutter will be removed and cleared
  - Fire Extinguishers maintenance and validity issues will be adhered to and the responsibility of the HSE officer. Fire fighting / Alarm systems will be checked. Gas cylinders with fire absorber devices installed on them,
  - The company providing that service is called Rustom Fire Fighting Services.- شركة رستم لصيانة الطفايات
    -متطلبات السلامة والإطفاء \ برنامج من الدفاع المدني
  - Personal Protective Equipment will be purchased as needed and made Available.
  - First Aid Box will be well maintained and stocked with needed first aid materials and medications.
  - Spill containment procedures / ambient indoor air measurements + noise measurements will be carried out by a certified lab and upon the findings a system will be in place for the future monitoring purposes.
  - Machine safeguards will be installed.
  - VOC, Noise will be measured & if deviation is cited from national standards then more monitoring frequency will be in place.
  - Backyard storage will be cleared.
  - Spent Chemicals / drums will be disposed of according the Ministry of Environment instructions and the National manifest system for tracking will be implemented according to a letter seeking feedback from MOE.
  - Industrial Electrical Wiring safeguards and sockets will be installed.
  - Response letter on the schedule for mitigation measures identified and requiring action will be sent by CEO/management to consultant before the WB mission arrives on the 5th of October.

2 Middle East Electrical Industries Co. (Middle East Complex for Engineering, Electronics, and Heavy Industries, PLG (MEC)

Location: MEC Industries in Muwaqqar Governorate

Date and Time: Monday September 10, 2012 12:30 am-3:30pm

Attendees from MEC:

- Engineer Nasseem Saada-Director of QA/QC,
- Eng Faten Hasan, Technical Department,
- Eng Mahmoud Allayan Quality Systems Director, and
- Eng Mahmoud Huneiti, Head of Health and Safety and has 5 H&S officers
- Mr Ammar Shehtou-Head of Personnel Directorate

A meeting in the company facility meeting room with the above mentioned staff attendees was held where the Jordan HCFC Phase-Out Management Plan (HPMP) "Phase-out of HCFC-22" under the ODS project, were explained to the management and that to ensure WB funding goes to entities that are compliant with H&S and Environmental and have the relevant WB safeguards in place and that their service technicians employ good practice in servicing HCFC-22 air-conditioning units to avoid excess leakage over time, to retrofit AC units to alternative refrigerants and, to be prepared for handling alternative refrigerants ranging from HFCs to natural refrigerants, in anticipation of evolving technologies worldwide.

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Production takes place at the following facilities: 1) Plastic granules are molded into the various component s and parts needed for the productions , 2) washing machines, refrigerators and air conditioners and 3) Raw material storage. See Attached Company Brochure for more details.

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- The company currently exports to Iraq, PA, and Egypt,
- Total # of employees is 204 and employs female staff in managerial, admin and technical departments.
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H&S-Environmental/Social Issues cited:

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- All employees have access and custody of the needed personal protective equipment (shoes, coats, gloves and goggles)
- Fire extinguishers and hydrants and alarm systems are regularly checked with records well maintained and the same for the labels which are proper and valid.
- There is a designated spent oils and waste collection area that is well marked and designated for the collection of the collection contractors, ***However it was noted that no waste collection has taken place from that area and the safety officer was guided on the need to conduct the Ministry of Environment to guide them on where to dispose of the hazardous spent oils and chemicals. This should be done through official modes of communication***
- ***The last visit by Lloyds auditors cited a need for them to update their Environmental Impact Assessment but the company has not done so yet***
- H&S/Social and Environmental consultant of the WB then asked to see their records of health and safety to check their accident records for the past 3 yrs, which under the Jordanian labor and social security laws have to be maintained. ***It was noted that this years list included incidents related to falls, minor chemical leaks, moving behind vehicles at the blind spot location of the vehicle reversing and maintenance accidents yet no major accidents took place***
- During the visit a spill was noted to have occurred and the proper measures had taken place (proper marking, damping with sand, and circulation of the spill area).
- Machines in the metal fabrication and plastic molding had proper safeguards to the machine.
- All facilities had proper signage, well marked Material Safety Data Sheets MSDS, gas leak procedures, and well managed gas cylinders with fire absorber devices installed on them

Recommendation: It is possible for this facility to be a beneficiary of the ODS if the above cited minor issues cited above are rectified and it is envisaged to take not more than one month of work for mitigation measures.

Consultation Meeting with Stakeholders Industries to Discuss the MEC Environmental Health and Safety Social Safeguards Report - Individual Industry

Date: September 23, 2012
Time: 1-3pm
Location: MEC Industries in Muwaqqar Governorate
Attendees from MEC:

- Eng. Zyad Aljakhem, Factory Manager
- Eng. Nasseem Saada-Director of QA/QC,
- Eng. Faten Hasan, Technical Department,
- Eng. Mahmoud Allayan Quality Systems Director, and
- Eng. Husain Alnajar, Planing Director
- Eng. Mahmoud Huneiti, Head of Health and Safety and has 5 H&S officers (0772097399)

- ***The HSE WB consultant Dr Hijazi went over the issues cited in the inspection visit report and the need to comply with WB health, Safety ,Environment and Social safeguards before the ODS grant funds disbursement.***
- ***The Plant manager was responsive to the issues cited in the report in relation to Health, Safety and Environment.***

- On the issue of the spent hazardous materials found in the facility the company had in the past imported foaming materials that was not up to standard as these materials caused problems (Polio and polyol ISO (MDI) Methyl Di Iso) –so the company enclosed the materials of 4 barrels in 80 fridges as an enclosement measures (Materials were converted to rigid form, now in 80 fridges to be deposed in Ghabawi). WB consultant requested that these spent Chemicals / drums/fridges be disposed of according the Ministry of Environment instructions and the National Manifest System for tracking to be implemented according to a letter seeking feedback from MOE.
- Lloyds company conducts an external audit every year and had conducted an external audit last November and cited some mitigation measures to be implemented and had requested that an update to the facility EA be conducted about mitigation measures. (The company conducts Internal Audits every 6 months by the quality assurance directorate). Facility management committed to sending WB HSE consultant an update of the EA mitigation measures
- VOC, Noise will be measured & if deviation is cited from national standards then more monitoring frequency will be in place.
- Backyard storage will be cleared.
- Response letter on the schedule for mitigation measures identified and requiring action will be sent by management to consultant before the WB mission arrives on the 5th of October.

3 Abu Haltam Group: GENERAL DELUXE

Location: General Deluxe Industries in Marka

Date and Time: Tuesday September 11, 2012 9:30 am-1:30pm

Attendees from General Deluxe-Abu Haltam Group:

- Engineer Ziad Abu Haltam-Purchasing Manager,
- Eng Bader Imreish, Production Department Manager,
- Eng Raed Eishe Engineering Dept Manager
- Eng Ahmad Abu Saimeh, Head of Health and Safety

GENERAL DELUXE is the brand name of their products, that are manufactured based on international standards, including air conditioning units, refrigerators, water dispenser, freezers, TVs, washing machines, satellite receiver units, vacuum cleaners and microwave ovens. It has a building with 20,000 sq. m and101 Employees.

The company is a 50-year old family business but only entered the AC business in 2001, when it started with assembly only. It gradually built its manufacturing capacity until fully functional in 2006 as an air conditioner manufacturer. It has five models ranging from 12,000 to 300,000 BTU, with EERs of about 2.7. It sources its compressors from three different Japanese companies. It is a 100% Jordanian owned company and its production was started before 2007 and eligible for MLF assistance. The company imports HCFC-22 directly from China. Upon being asked about alternatives, it stated that R-407 seems like a more likely choice, given the costs of R-410A. Abu Haltam also manufactures domestic refrigerators, which use HFC-134a as a refrigerant and HCFC-141b as the foaming agent. HCFC-141b pre-blended polyol is purchased from Syria. In 2010, it consumed 20 tons of HCFC-22 and of 6 tons of HCFC-141b contained in the polyol. ***See attached brochure on the company for more details***.

Background

- Company was ISO 9001 and 14001 accredited in 2003 by the Dutch Council for Accreditation, but has not enrolled in maintaining this accreditation since then but has a quality management system that is enforced and in place.
- Facility has a quality Management and procedures stem overlooked and managed by a local staff
- Company has a certified safety officer and a H&S Management Committee, holds regular training courses for the staff and the facility has an internal H&S plan on firefighting, first aid and evacuation
- Company has plans to build a new air conditioning facility and it was witnessed today the electrical installations plus new storage facility. All these new facilities will have modern fixtures, features and installations that will take into account Occupational Safety/health and environmental protection measures in the design considerations.
- Abu Haltam Co. is waiting to receive the support from the WB/ODS project for the following :
- Charging machines, leak detection equipment, vacuum pumps and testing equipment. So they are awaiting to receive the WB grant in order to procure the above mentioned equipment

H&S-Environmental/Social Issues cited:

Positive Citations:

- The company work injury log is minor
- Company participated in a JICA initiative under JEDCO to apply the Caisen System which they completed in 5 months. Staff are assigned various H&S responsibilities under teams.
- Company employs women in administrative and technical departments
- Company has a resident doctor and nurse as well as a clinic
- Company has annual occupational checkups for staff
- Has Material Safety Data sheets posted on walls near chemical usage stations
- Every 2-3 months the factory workers get a refresher H&S practical debrief and practical training course and the Civil Defense is invited to a mock fire fighting using extinguishers
- Facility has a comprehensive recycling system for wooden stools, cardboard boxes, packaging materials, etc. Spent materials containers are perforated to prevent reuse but sold as scrap.
- Facility generates about 20l/yr of spend oils and chemicals which get collected by local recyclers and taken to the refinery

Negative Citations

- M. of labor inspected the facility and instructed a correction of the noise problem
- No manifest system is kept on records for spent oils and chemicals, collection is incidental and not well documented.
- Until a new storage facility is fully in operation, the H&S officer is encouraged to keep a close scrutiny of the temporary facility for enhanced ventilation and electrical safety.

Recommendation: It is possible for this facility to be a beneficiary of the ODS grant if the above cited minor issues cited above are rectified and it is envisaged to take not more than one month of work for mitigation measures. It is also highly recommended for the facility to revive its ISO 14001 and 9001 accreditations with a certified international body.

Consultation Meeting with Stakeholders Industries to Discuss the General Deluxe Environmental Health and Safety Social Safeguards Report - Individual Industry

Date: September 22, 2012
Time: 10 am-12 pm
Location: General Deluxe Industries in Marka

Attendees from General Deluxe:

- Eng. Ziad Abu Haltam, Purchasing Manager.
- Dr. Iyad Abu Haltam, Deputy General Manger.
- Eng. Raed Eishe, Engineering Dept Manager.

The HSE WB consultant Dr Hijazi went over the issues cited in the inspection visit report and the need to comply with WB health, Safety ,Environment and Social safeguards before the ODS grant funds disbursement.

The Plant management was responsive to the issues cited in the report in relation to Health, Safety and Environment.

- On the issue of **Spent oils**, chemicals, facility will contact MOE waste Directorate to inform of quantities and qualities of the spent oils and chemicals and seek recommendation of certified collectors names and how they can apply the manifest system, and request copy of manifest system.
- **Noise level**s: A letter will be sent by the facility to M. of labor. Inspection Directorate to re-conduct a noise assessment/ measurement and a measure of VOCs at the facility with recommendations for mitigation measures to be taken.
- **On the issue of storage**: a new storage facility has been designated for the chemicals away from the plastic boxes and packing materials.
- **Facility has built an extra 5000 m^2 designated** for storage of raw materials and finished products. Any storage problem between production lines and facilities has been overcome totally.
- After inauguration of the new facility, the company will invite MOE to check on new storage facilities and seek their feedback on their trade and hazardous management system situation if any.
- ISO 9001 re-instatement is in planning and will commence in Jan, 2013. The company will consider the renewal 14000 certification during the 1st half of 2013.
- Response letter on the schedule for mitigation measures identified and requiring action will be sent by management to consultant before the WB mission arrives on the 5th of October.
- Company has successfully undertaken all agreed mitigation measures action and has e-mailed physical documentation which demonstrates their fast action and adherence to time lines identified in the HS&E report (received 2 October 2012).