REPUBLIC OF LEBANON

الجمهورية اللبنانية
مكتب وزير الدولة لشؤون التنمية الإدارية
مركز مشاريع ودراسات القطاع العام

Implementation Plan for SIU-3 Technical & Policy Support to the Ministry of Environment

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Republic of Lebanon
Office of the Minister of State for Administrative Reform
Center for Public Sector Projects and Studies
(C.P.S.P.S.)

by

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Transtec - Fichtner Consortium
Sector Implementation Unit - 3

Implementation Plan for SIU-3
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the Ministry of Environment

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1. Mission Objectives

1.1 A two man-months mission to Lebanon was undertaken on behalf of the Transtec-Fichtner Consortium (SIU-3) during the period between June and October 1996. The initial objectives of the mission were the preparation of Terms of Reference for the Development of a National Waste Management Plan for Lebanon on behalf of the Ministry of Environment (MoE).

1.2 The above mission objectives were re-formulated in consultation with the MoE towards the preparation of a revised technical assistance strategy for the SIU-3 for the remaining period of their involvement in Lebanon (i.e. 14 months starting July 1st, 1996). This assistance strategy was submitted to the Council for Development and Reconstruction (CDR) on August 10, 1996 for review and approval[1].

1.3 This mission report will attempt to present the main elements of the revised technical assistance strategy in addition to the associated project briefs for the various relevant technical and policy studies.

1.4 The author wishes to express his gratitude to the office of H.E. the Minister of Environment, the Director General, MoE staff and UNDP representatives for their contribution during the preparation of this document .

2. Background to the SIU-3 Involvement at the MoE

2.1 The involvement of the Sector Implementation Unit-3 (SIU-3) with the MoE and the CDR started on June 22, 1994 following the decision by the Council of Ministers to delegate the implementation of all National Emergency and Recovery Programme (NERP) projects related to the solid waste sector in Lebanon to the MoE[2].

2.2 The decision by the Council of Ministers stipulated also that the responsibility of municipal waste collection and disposal will be gradually delegated to the municipalities which operate under the tutelage of the newly-created Ministry of Municipal and Rural Affairs (MMRA) (Law No.197, February 1993[3]).

2.3 In line with the above mentioned decision, the Lebanese Parliament has recently approved a US$135million Solid Waste Environmental Management Project (SWEMP) to be funded jointly by the Government of Lebanon (GoL), the World Bank and Japan and to be implemented by the CDR and MMRA[4]. A Project Coordination Unit (PCU) will be established at MMRA , to train the Ministry's staff and coordinate project implementation.

2.4 In view of the encouraging development of the SWM sector in Lebanon, mainly in Greater Beirut and the Chouf areas , the intervention by the SIU-3 in the supervision and monitoring of the implementation of the SWEMP and other on-going municipal solid waste projects will be gradually delegated to the PCU which is expected to be in place at MMRA by January 1997[4].

2.5 Based on the reduced MoE municipal waste sector investment programme for 1996/1997, the SIU-3 has agreed with the MoE and the CDR to focus its assistance efforts on three levels of intervention. These include the provision of Policy & Technical Support to the core management and decision makers at the MoE in addition to Human Resource Development and Institutional Strengthening at the Ministries concerned and in coordination with the UNDP Capacity 21 project[1]. However, the management of hazardous and special waste streams in Lebanon and the monitoring of the environmental impact of SWM related projects will remain a priority area for the SIU-3.

2.6 The objectives of the SIU-3 proposed technical support strategy are in line with the Terms of Reference of the unit[2] and complement on-going efforts at the MoE and other sector Ministries in addressing key environmental priority areas as identified by the METAP study (refer to Table 1).

Table 1 - Priority Action Areas as identified by the METAP study and Key Stakeholders

		SECTOR & PRIORITY AREA	*IMPLEMENTING AGENCY*	*FUNDING AGENCY*
A)- BROWN ENVIRONMENT	*1.*	*Sewerage and waste water management*	*CDR / MHER*	*WB / EIB*
	2.	*Municipal & hospital waste management*	*CDR / MMRA*	*WB*
	3.	*Hazardous industrial waste management*	*MoE*	*MoE*
	4.	*Air quality management*	*MoE*	*METAP Capacity 21*
B)- GREEN ENVIRONMENT	*5.*	*Water resource management*	*CDR / MHER*	*WB*
	6.	*Control of soil erosion & reforestation*	*CDR / MoAgr*	*WB*
	7.	*Development of Land Use Planning (coastal zone management plan)*	*CDR / MMRA / MoE / MPW*	*WB*

Note: *MPW = Ministry of Public Works*
MHER = Ministry of Hydraulics and Electric Resources
MoAgr = Ministry of Agriculture
WB = World Bank

3. Areas of Support to the Ministry of Environment

3.1 Technical & Policy Support

3.1.1 The assistance package will contribute to the development and implementation of the MoE's National Environmental Strategy in line with the recommendations of the METAP study on the state of the environment in Lebanon[5,6]. Furthermore, and in order to streamline the institutional structure for environmental management in Lebanon, the SIU-3 will assist the MoE to focus on research, analysis and strategic policy making while improving coordination with other line Ministries and developing linkages with national and international institutions and organizations.

3.1.2 In addition to the above, the SIU-3 will help the MoE to achieve progress on key environmental areas identified by the METAP study and not addressed to date by other sector ministries. These include the management of special waste streams such as waste oil, used tires and scrap metal in addition to air quality management . Advice on a number of key policy options will be undertaken by the SIU-3 on behalf of the MoE and in joint collaboration with other Ministries concerned (refer to Table 2).

(a)- Management of Special Waste Streams:

Waste Oil: Improper waste oil disposal in Lebanon has become a serious waste management challenge. The consequences of this indiscriminate practice can be devastating and creates a high potential for contamination of both surface water and groundwater since it is well known that 4 litres of waste oil in a single oil change can ruin 4 million litres of fresh water. Waste oil is reported to be currently disposed of to sewers, drains, waste land, waterways, municipal dumps, and some is burned. Some service stations in Lebanon employ an oil/water separator to trap used oil, however, this approach is not common.

Waste Tires: Open dumping of waste tires is widely practiced in Lebanon and although this practice does not pollute the environment by any emission, the resistance of waste tires to any kind of decomposition and the danger of fire hazards when these are piled up turn them into an environmental problem. In solid waste dump sites, waste tires take-up large volumes of space and tend to float to the surface due to their buoyancy and create spongy ground surface which becomes unstable and therefore renders dump sites inadequate for subsequent use. On the other hand, heap of waste tires are shelters for rodents and insect proliferation and burning tires produce noxious gases and are extremely difficult to extinguish.

Scrap Metal: The landscape in Lebanon is dotted with abandoned vehicles, especially in areas where open dumping is practiced. It has been reported that used car dealers strip old vehicles of usable parts and dump the remains. Cars and miscellaneous post-consumer steel products in Lebanon are usually processed by scrap dealers and auto dismantlers, who consolidate and bale the material for brokers and end users.

Waste Vehicle Batteries: Approximately 0.50 to 0.75 million automotive batteries are consumed and replaced annually in Lebanon resulting in the improper disposal of lead and acid into the nature, public sewers and municipal dumps. The consequences of this indiscriminate practice creates a high potential for surface and groundwater contamination. A limited informal lead-acid battery recycling industry exists and individual waste batteries are being purchased in the market at the rate of US$7 each or US$150 to US$180/ton. Batteries are crushed and then the lead, plastic, and sulfuric acid are separated. Acid is discharged into public sewers, whereas, all lead components are charged into a furnace for smelting.

Voir le travail déjà fait par Dar El Handasah et jumelés les informations et mais infirmes

(b)- Urban Air Quality Management:

Recent studies on the state of the environment in Lebanon[5,6] have indicated that air pollution resulting from vehicular emissions in urban areas is the most important issue for air quality in the country. Emissions from industrial and power sector point sources pose localized problems and are outweighed in health terms by emissions from vehicles. Air pollution is damaging to human health, agricultural crops, forests, aquatic systems and buildings. Primary pollutants often react to form acidic compounds with damaging effects on respiratory tracts in humans, degradation of building material such as metal, stone and concrete, decline in forests due to leaf damage, damage to crop and vegetation by injury to plant tissue, increasing susceptibility to disease.

The direct level of exposure of the population to airborne pollutants is difficult to assess due to the lack of available data on air quality in Lebanon. Previous analyses have relied on the knowledge of emissions in order to make predictions of existing air quality. As a result, it is becoming clear that the most urgent need is the establishment of an air quality monitoring programme in major urban centres in Lebanon. The SIU-3 will advise the MoE on developing clear sets of environmental targets and standards and will set-up basic monitoring programmes for air quality possibly through local Universities and NGOs.

Table 2 - Key Policy Options already identified by the METAP study and to be Evaluated by the SIU-3 on behalf of the MoE

ENVIRONMENTAL ISSUES	*POLICY OPTIONS*
1. MANAGEMENT OF SPECIAL WASTE STREAMS	• *Deposit refund schemes for special waste streams* • *Product or raw material charges (a)* • *Support/ subsidies for waste minimization or establishment of waste treatment facilities (a), (b)* • *Identification and registration of hazardous waste generators (b))* • *Promote private sector involvement in the management of special waste streams (a)*
2. AIR QUALITY MANAGEMENT	• *Selective reduction of excise/import duty on new vehicles with catalytic converters (a), (c)* • *Differential pricing in favor of unleaded gasoline (a), (c)* • *Enforcement of requirements for vehicle inspection (c)* • *Mandatory emission standards for new cars(c)* • *Registration and de-registration of vehicles (c)* • *Establishing air quality monitoring network (c)*

Note: *(a)* *To be jointly evaluated with the Ministry of Finance*
(b) *To be jointly evaluated with the Ministry of Industry & Commerce and IDAL.*
(c) *To be jointly evaluated with the Ministry of Transport*

(c)- Regional Environmental Disaster Response Plan:

The Government of Lebanon has the overall responsibility of organizing and maintaining adequate levels of preparedness for facing emergencies throughout the country. One of the main duties of the Ministry of Environment as stipulated in Article 2 of Law No. 216 is the preparation of natural disaster emergency protection and relief plans. Lebanon is ill-prepared to respond to local, regional and national environmental hazards such as severe environmental pollution and chemical and industrial accidents. The "Protection Against Natural and

Technology Hazards Service" at the MoE has the responsibility of ensuring the safety of citizens and the protection of nature and the environment from pollution.

The current organizational structure at the Ministry does not have any provisions for protection against natural and environmental hazards. The SIU-3 will address this issue through the preparation of a detailed pilot Regional Environmental Disaster Response Plan (REDRP) for the Caza of Metn in the Mohafazat of Mount Lebanon. The REDRP will serve as a pilot model for the preparation, later on, of a national environmental disaster response plan (NEDRP) by the MoE in close collaboration with sector Ministries concerned and The High Relief Committee.

3.1.3 The new SIU-3 advisory approach will allow the use of national consultants (42 man-months) and international consultants (83 man-months), thus, allowing the transfer of know-how and expertise and allowing the MoE to build a national database on local environmental capacities and human resources. Staff from the MoE and other line ministries will be seconded to the SIU-3 to work alongside national and international consultants on environmental issues of common interest. Services at the MoE that will benefit from the SIU-3 technical and policy support are shown in Table 3.

Table 3 - Technical Services at the MoE to benefit from SIU-3 Technical and Policy Support

	TECHNICAL SERVICES CONCERNED		
AREAS OF TECHNICAL & POLICY SUPPORT	*Protection of Urban Environment*	*Nature Conservation*	*Protection Against Natural and Technological Hazards*
1. Management of Special Waste Streams	■	■	
2. Air Quality Management	■		
3. National Disaster Response Plan			■

3.2 Human Resource Development

3.2.1 The current levels of staffing at the MoE is very small. At present, the Ministry has a full time staff of 13 compared with the 139 specified in the establishing law (i.e. 91% vacancy). In May 1995, the Ministry was allowed to recruit up to 20 technical staff on salaries beyond the public sector pay scales, but even that still represents a small body of expertize. Most of the current staff is young and willing to learn and acquire new expertize. The SIU-3 intends to work closely with both MoE and MMRA staff in order to build local capacities by providing on- and off-the-job training.

3.2.2 There is also an urgent need to develop the capabilities of the MoE staff in areas such as environmental auditing including water, air and soil sampling and testing techniques; environmental economics analyses; information technology and project management. The SIU-3 has already embarked on the design of specific and appropriate training courses. On-the-job and off-the-job training in environmental auditing will be undertaken by the SIU-3 with emphasis on waste minimization in polluting industries. Training in environmental economics will provide the auditors with the tools to formulate solutions and recommendations. Finally, training in information technology and project management techniques will improve work efficiency and provide senior management at the MoE and MMRA with a reliable decision support system.

3.3 *Institutional Strengthening*

3.3.1 As mentioned earlier, the range of duties with which the MoE is charged are beyond the capacity of the organization at the present time. The UNDP is leading the Capacity 21 institutional building Programme for Lebanon, which is focusing on strengthening existing organizations, such as the MoE. The SIU-3 in coordination with the UNDP, will help the MoE to accelerate the on-going process of establishing a regulatory framework for environmental management and the development of methodologies and tools for sectoral environmental impact assessment (EIA) procedures following the completion of the general EIA guidelines for Lebanon[7] .

3.3.2 The assistance package will involve the promotion of greater levels of consultation between policy makers and affected groups within the governmental and non-governmental sectors (NGOs).

4. Implementation Plan

4.1 The implementation of the technical and policy support component in parallel to the human resource development and institutional strengthening components will require considerable coordination and planning on the side of the SIU-3 team and MoE staff. While all the four technical and policy support packages shown in Figure-1 could be implemented simultaneously, it is recommended that these be implemented in series while taking into consideration the priority ranking detailed in Table 4 and the overlap in the data collection requirements.

Table 4 - Priority Ranking of Environmental Hazards to be Addressed by the SIU-3

ENVIRONMENTAL HAZARDS	*Irreversibility (a)*	*Health (b)*	*Loss of amenity (c)*	*Number of people affected (d)*	*Ranking*
1. Special Waste Streams			■		C
2. Air Pollution		■		■	B
3. Environmental Disasters	■	■	■	■	A

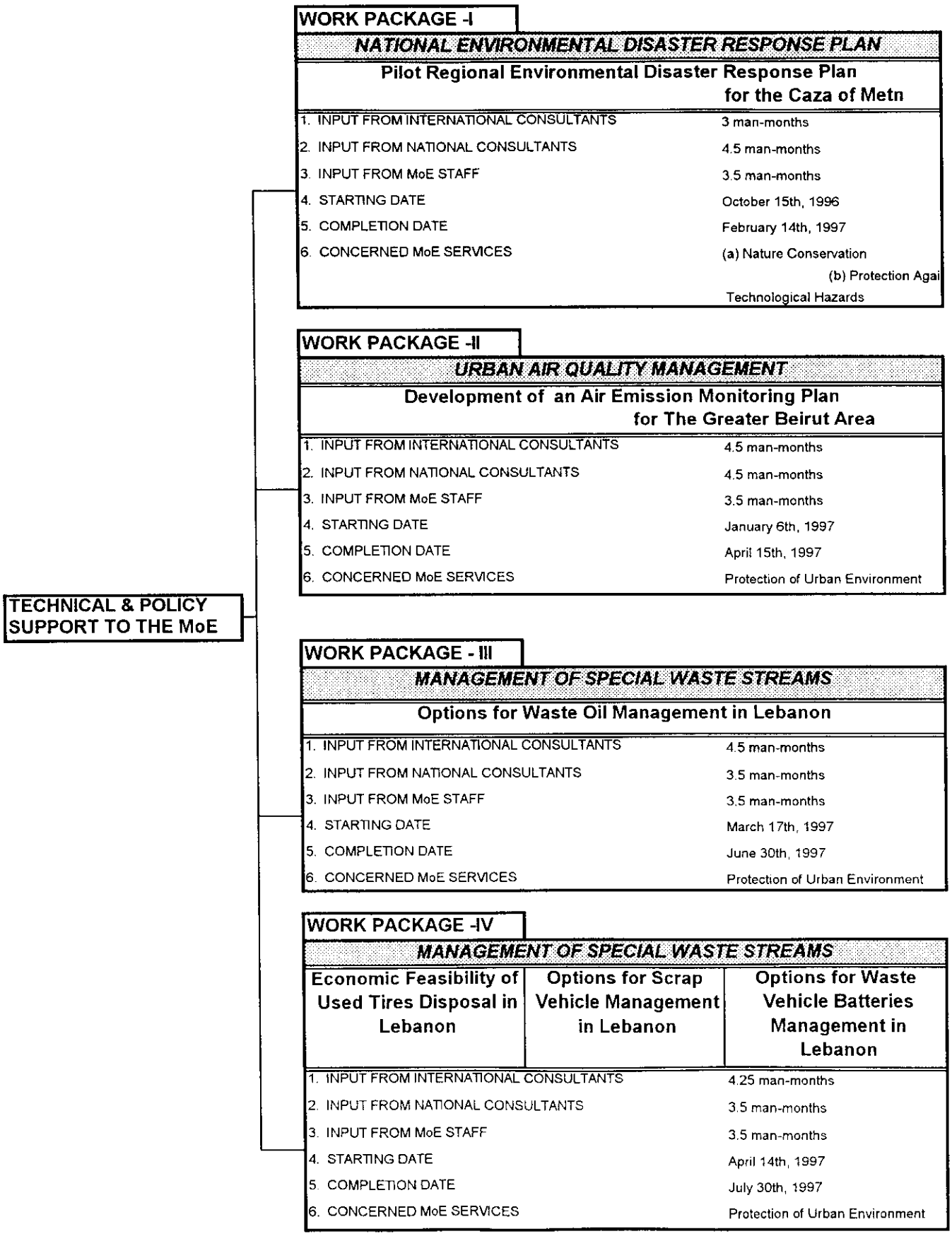
Note:

(a) where damage or loss of a resource is irreversible
(b) where human health is at risk if no action is taken
(c) where quality of life is affected such as impact on landscape, clean beaches and rivers for recreation and fishing
(d) a measure of how widespread the impact is in terms of health, amenity and quality of life

4.2 The Environmental Management and Planning Specialist (EMPS) will be responsible for the implementation of all four technical and policy support packages. The EMPS in coordination with the SIU-3 Team Leader will brief and de-brief international and national consultants; organize field visits; arrange for meetings at various Ministries and institutions concerned; assist in the collection of baseline data; mitigate any problems that the study team may face; coordinate with MoE staff and participate actively in the analysis of the findings. Finally, the EMPS will ensure the timely completion of project activities and monitor work quality and progress. A provisional planning of the technical and policy support work packages is included in Figure 2.

4.3 The identfied work packages involve considerable desk and field work in order to review previous work done by consultants and to collect baseline data. Project briefs for the relevant work packages are included in this section and should serve as a guideline to the consultant on work methodology and expected outputs.

Figure 1 - Work Packaging of Technical Policy Support to the MoE



SATI ARNAOUT, SIU-3

ID	Project Name	Duration	Start	Finish
1	Mobilization period including identification of MoE staff and national and expatriate consultants	21d	9/16/96	10/14/96
2	**WORK PACKAGE-I: NATIONAL ENVIRONMENTAL DISASTER RESPONSE**	**89d**	**10/15/96**	**2/14/97**
3	Pilot Regional Environmental Disaster Response Plan for the Caza of Meln	89d	10/15/96	2/14/97
4	**WORK PACKAGE-II: URBAN AIR QUALITY MANAGEMENT**	**72d**	**1/6/97**	**4/15/97**
5	Development of an Air Emission Monitoring Plan for the Greater Beirut Area	72d	1/6/97	4/15/97
6	**WORK PACKAGE-III: MANAGEMENT OF SPECIAL WASTE STREAMS**	**76d**	**3/17/97**	**6/30/97**
7	Options for Waste Oil Management in Lebanon	76d	3/17/97	6/30/97
8	**WORK PACKAGE-IV: MANAGEMENT OF SPECIAL WASTE STREAMS**	**78d**	**4/14/97**	**7/30/97**
9	Economic Feasibility of Used Tires Disposal in Lebanon	78d	4/14/97	7/30/97
10	Options for Scrap Vehicle Management in Lebanon	78d	4/14/97	7/30/97
11	Options for Waste Vehicle Batteries Management in Lebanon	78d	4/14/97	7/30/97

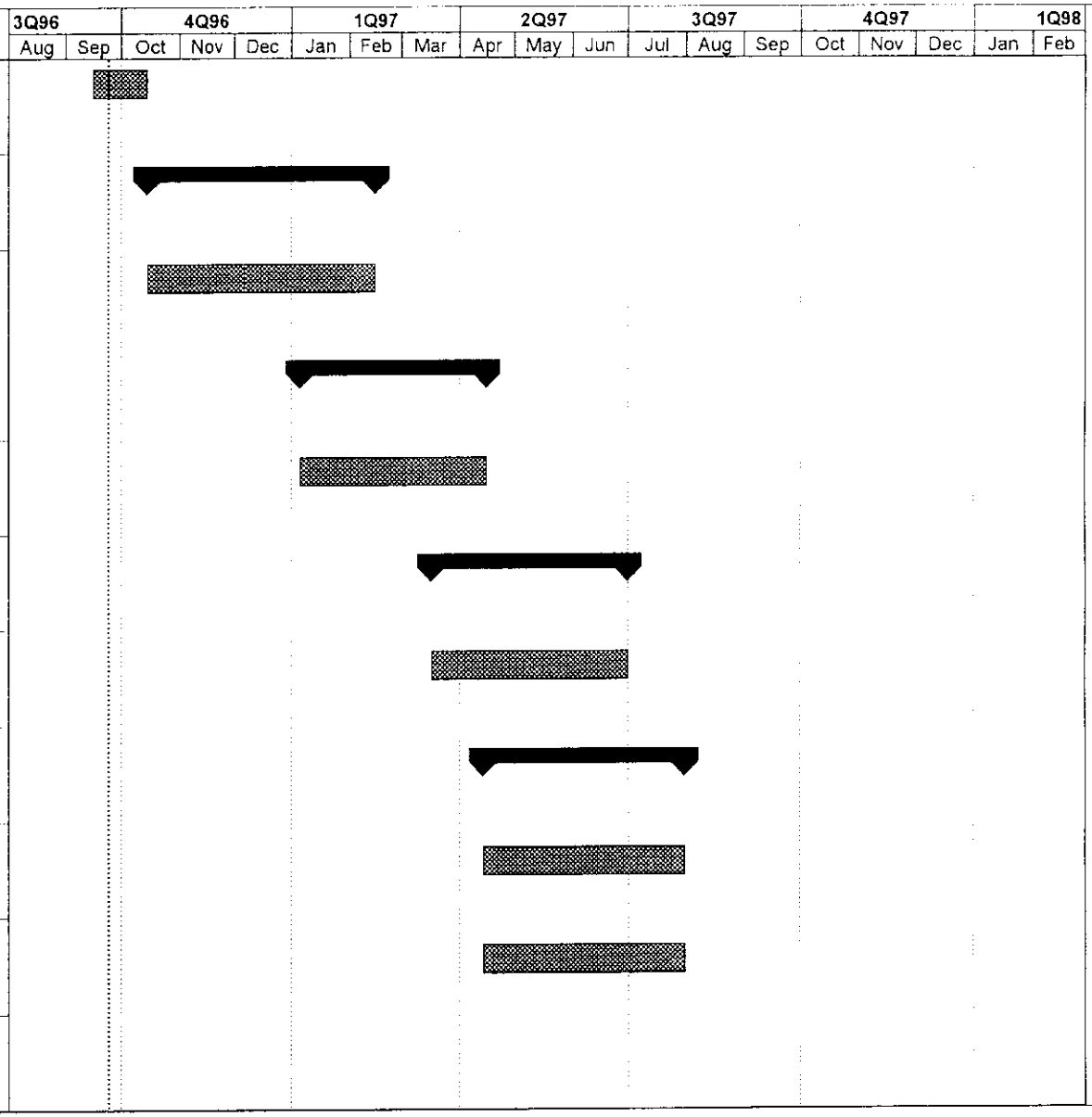


Figure 2 - Provisional Planning of Technical & Policy Support Work Packages

Task — *Rolled Up Task*

Progress — *Rolled Up Milestone*

Milestone — *Rolled Up Progress*

Summary

NATIONAL ENVIRONMENTAL DISASTER RESPONSE PLAN

PILOT REGIONAL ENVIRONMENTAL ACCIDENT DISASTER RESPONSE PLAN FOR THE CAZA OF METN

Level of Intervention	*TECHNICAL & POLICY SUPPORT*
Component	*NATIONAL ENVIRONMENTAL DISASTER RESPONSE PLAN*
1. Project Background & Objectives	*1.1 The Government of Lebanon has the overall responsibility of organizing and maintaining and adequate level of preparedness for facing emergencies throughout the country. One of the main duties of the Ministry of Environment as stipulated in Article 2 of Law No. 216 is the preparation of natural disaster emergency protection and relief plans.* *1.2 The Protection Against Natural and Technology Hazards Service at the MoE has the responsibility of ensuring the safety of citizens and the protection of nature and the environment from pollution. However, the current organizational structure at the Ministry does not have any provisions for protection against natural and environmental hazards.* *1.3 Lebanon is ill-prepared to respond to local, regional and national environmental hazards such as severe environmental pollution and chemical and industrial accidents. This study aims at addressing the above issues through the preparation of a detailed Regional Environmental Disaster Response Plan (REDRP) for the Caza of Metn in the Mohafazat of Mount Lebanon.* *1.4 The REDRP will serve as a pilot model for the preparation, later on, of a national response plan by the MoE. The involvement of the ministry's staff in the preparatory work is very important in order to ensure the sustainability of this activity.* *1.5 The types of environmental hazards that will be considered in the study include man-made environmental pollution resulting from chemical and industrial emergencies that may arise in a number of ways such as:* • *fire or explosion in a plant handling or producing toxic substances.* • *accidents in storage facilities handling large and various quantities of chemicals.* • *accidents during the transportation of chemicals from one site to another.* • *improper waste management such as un-controlled dumping of toxic chemicals, failure in waste management systems.* • *human error, arson or sabotage.* • *failure of plant safety design or plant components.* • *technological system failures.*

2. Methodology & Terms of Reference

Upon his arrival to Lebanon, the Consultant shall submit to the MoE a detailed work plan for the implementation of the project. The work plan shall be prepared in consultation with the Director General and counterpart staff at the MoE in addition to the SIU-3 experts. The contents of the work plan shall include among others the following topics:

2.1 Review of the Selection of the Pilot Area

2.1.1 The Consultant shall review the adequacy of the proposed pilot area (Caza of Metn) for the preparation of a Regional Environmental Disaster Response Plan. This area has been selected based on the following criteria:

- *important area for tourism and entertainment.*
- *presence of large number of industries .*
- *presence of an important potable water treatment plant (Dbayeh).*
- *presence of a vital potable water supply line to Greater Beirut.*
- *presence of important underground and surface water rivers and streams.*
- *presence of large urban developments in forest areas.*
- *presence of highly urbanized and densely populated areas at proximity to industries.*
- *heavy passenger traffic within and through the Caza.*
- *includes a large sea front with a number of sea outfalls.*
- *includes a large solid waste dump, one waste incinerator and compost plant.*
- *includes large fuel and gaz storage tanks on the sea front.*
- *includes a number of quarries.*

2.1.2 The Consultant shall collect all relevant baseline indicators related to the demographic, socio-economic, land use and environmental aspects of the selected pilot area. Information related to past environmental accidents and emergencies shall be collected and reviewed.

2.2 Hazard Identification, Evaluation and Ranking[8]

2.2.1 The Consultant shall identify the type of hazardous material present in the area that may result in an emergency situation within the Caza and shall inspect the plants and storage facilities that are deemed hazardous. These could be toxic, flammable, reactive, explosive, natural or a combination of several hazards resulting from industrial facilities, natural disasters, transportation activities, oil spills, etc... . The Consultant shall familiarize himself with the Dar Al-Handasah study entitled " National Industrial Waste Management Plan"[9].

2.2.2 The Consultant shall define the magnitude of the risk and the potential severity of the impact by evaluating the size of potential zone of impact, the number of people at risk and the type of risk (toxic, chronic, injury, etc..) in addition to the long-term impacts on sensitive environmental areas (air, land, underground and surface water, maritime life, etc.)

	2.2.3 The Consultant shall carry out a "hazard mapping" by clearly identifying these hazards on a Caza map with a "hazard inventory". The susceptibility or vulnerability of the risk zones and the impact on the population shall be clearly determined on the map. Finally, the severity of the impact and level of emergency response shall be also classified and ranked. *2.2.4 The Consultant shall determine the probability of occurrence of individual or simultaneous events (i.e. natural disaster resulting in release of hazardous materials) and shall prepare a list of scenarios that could be expected to occur.* *2.3 Review of Current Organizational Structure* *2.3.1 The Consultant shall review existing organizational structure for handling environmental emergencies in Mount Lebanon and the Caza of Metn in particular. The Consultant shall establish the current status of community planning and coordination for hazardous materials emergency preparedness including procedures for protecting citizens during environmental emergencies.* *2.3.2 The Consultant shall identify also local agencies making up the community's local response preparedness network (fire department, police, civil defence, public health, NGOs, etc..) and shall review the available resources such as personnel, training, equipment, facilities and other sources available for responding to hazardous materials emergencies.* *2.3.3 The Consultant shall review existing emergency plans for their adequacy and shall list the types of equipment and materials which are available at the Caza level to respond to environmental emergencies and shall determine if all reasonable risks have been addressed.* *2.4 Develop a Regional Environmental Disaster Response Plan*[10] *2.4.1 The Consultant shall identify the risk reduction measures and the required response tasks which are not covered by existing plans and make recommendations for the necessary changes to improve existing plans. This shall include the assignment of complementary tasks to stakeholders based on authority, jurisdiction, expertize or resources and the identification of organizations outside the Caza and Mohafazat that could be called upon for additional assistance. Finally, the Consultant shall establish procedures for periodic testing, review and updating of the plan by local authorities.*
3. Project Inputs	*3.1 One International Consultant with strong environmental disaster management background.* *3.2 The Consultant will be assisted by one seconded technical staff from the MoE in addition to one local short-term expert that will undertake the data and information gathering and participate in the analysis and preparation of the REDRP study* .

	3.3 The Consultant will study the relevant documents provided by the MoE and will collect additional information by contacting institutions such as the UNDP office in Beirut, The High Relief Committee, Ministry of Interior, Ministry of Municipal and Rural Affairs, Ministry of Health, Ministry of Social Affairs, Ministry of Industry and Petroleum, Ministry of Hydraulics and Electric Resources, Ministry of Transport, the Central Statistics Office, The Governor of the Mohafazat of Mount Lebanon and representatives of active NGOs in the selected pilot area. *3.4 The MoE and the SIU-3 will support the Consultant in providing Lebanese counterpart(s), existing documentation, detailed maps and transport during the mission.* *3.5 The Consultant will attend briefing and de-briefing sessions with the SIU-3 and senior MoE staff and will offer a series of presentations and lectures related to environmental disaster management (films and slides) involving a number of appropriate case studies from other developing countries. The presentation material and a comprehensive list of references on environmental disaster management would remain at the MoE Library.*
4. Project Outputs	*4.1 Hazard map and hazard inventory for the Caza of Metn* *4.2 Risk reduction measures and emergency response* *4.3 Regional Disaster Response Plan for the Caza of Metn* *4.4 Seminars on "Regional Environmental Emergency Respone Planning"*
5. Project Duration	*5.1 Four months starting latest October 15th, 1996.*

URBAN AIR QUALITY MANAGEMENT

DEVELOPMENT OF AN AIR EMISSION MONITORING PLAN FOR THE GREATER BEIRUT AREA	
Level of Intervention	TECHNICAL & POLICY SUPPORT
Component	URBAN AIR QUALITY MANAGEMENT
1. Project Background & Objectives	1.1 Recent studies funded by the World Bank on the state of the environment in Lebanon have indicated that air pollution resulting from vehicular emissions in urban areas is the most important issue for air quality in the country. Emissions from industrial and power sector point sources pose localised problems and are outweighed in health terms by emissions from vehicles[5,6]. 1.2 Significant industrial emitters of air pollutants in Lebanon are concentrated in the coastal zone and industrial establishments concerned include cement plants, power stations, oil refineries and one fertilizer plant. 1.3 Air pollution is damaging to human health, agricultural crops, forests, aquatic systems and buildings. Primary pollutants often react to form acidic compounds with damaging effects on respiratory tracts in humans, degradation of building material such as metal and concrete, decline in forests due to leaf damage, damage to crop and vegetation by injury to plant tissue, increasing susceptibility to disease. 1.4 Urban centres in Lebanon are at times saturated with traffic and as the number of vehicles increases, peak hours will become longer in duration and longer-term ambient concentrations are to be expected. A recent Beirut Transportation Study has identified a number of proposed actions for traffic reduction in Beirut. Successful implementation of the recommendations of this study will have some positive impact on the emissions of pollutants from the existing vehicle fleet, however, it is expected that the effects on ambient air pollution will depend entirely on the success of the scheme to increase journeys by public vehicles. 1.5 The direct level of exposure of the population to airborne pollutants is difficult to assess due to the lack of available data on air quality in Lebanon. Previous analyses have relied on the knowledge of emissions in order to make predictions of existing air quality. However, it is becoming clear that the most urgent need is the establishment of an air quality monitoring programme in major urban centres in Lebanon. The baseline data that will be gathered from an air quality monitoring programme will provide essential information on the pollutant concentrations and help to assess the need for control measures and the effectiveness of future policy measures. It can be also a useful tool for raising public awareness and making future policy changes.

2. Methodology & Terms of Reference

Upon his arrival to Lebanon, the Consultant shall submit to the MoE a detailed work plan for the implementation of the project. The work plan will be prepared in consultation with the Director General and counterpart staff at the MoE in addition to the SIU-3 experts. The contents of the work plan shall include among others the following topics:

2.1 Overview and Analysis of Existing Situation

2.1.1 The Consultant shall collect, gather and study available documents and information related to air quality in the Greater Beirut Area (GBA).

HOW

2.1.2 The Consultant shall locate major air pollution sources in the GBA and define the magnitude of pollution these sources are likely to produce. The estimated emission of the five basic air pollutants (carbon monoxide, hydrocarbons, oxides of nitrogen, particulates, and oxides of sulfur), and the frequency, duration, and relative contribution of pollutant emissions from each source shall be also determined.

WHAT PROCEDURE

2.1.3 In carrying out an emission inventory, the Consultant shall classify the pollutants emitted into the community, classify the sources of those pollutants, determine the quality and quantity of the materials being handled, processed, or burned, determine the emission factors for those materials, and compute the rate at which each pollutant is emitted. A prime requirement must be to assess the pollutant concentrations experienced by the majority of citizens in the GBA.

2.2 Develop a Simulation Model and Air Quality Monitoring Programme

TECHNIQUE

2.2.1 On the basis of the emission inventories and information and data gathered (i.e., Beirut Transportation Study-Team International and the Road Rehabilitation Programme-Dar Al-Handasah) , the Consultant shall develop an air emission simulation model that will predict background and extreme concentrations at various locations in the GBA.

2.2.2 The Consultant shall develop an air quality monitoring program that will establish background and extreme concentrations with the aim of calibrating the above simulation model at a later stage. Furthermore, it is expected that the results of the monitoring program would help the MoE to establish emission standards, provide basic inputs for the simulation model, estimate baseline air pollutant concentrations with various meteorological conditions, establish baseline levels of air pollutant concentrations and to relate these to future trends, to indicate seasonal and geographic distribution of air pollutants and to assist in establishing priorities for a control program.

2.2.3 The Consultant shall locate sampling locations that are representative for the entire air-quality region. Hence, specific sampling sites should be representative of the area, with some stations established at points of highest pollution levels to measure population exposure to specific source pollution and others placed away from such sources for non-urban or background readings.

2.2.4 Monitoring stations for urban background measurement shall be located over 30m from the nearest significant road, to provide continuous, on-line automatic analysis. Monitoring stations to measure roadside concentrations, possibly limited to NO_x , CO and particulate matter (i.e. pollutants associated with vehicular pollution) and passive monitoring for VOCs (particularly benzene) and NO_2 shall be located near the curb of major roads.

2.2.5 In the absence of air emissions monitoring data, the Consultant shall review the Beirut Transportation Study and rely on the knowledge of fuel use and appropriate empirical factors. Sufficient information is available on the transport system, industries, population density, topography, climate and wind direction to identify key issues and define their relative significance. The key data available for the quantification of atmospheric emissions by the Consultant are as follows:

- *number and age profile of vehicles*
- *vehicle flows on the roads of Beirut*
- *fuel type and use*
- *location and type of major industries*
- *population statistics*
- *energy use*

2.2.6 Routine air quality monitoring requires significant expenditure and the largest single constraint to the establishment of a viable air quality monitoring network in the GBA is the limited capital available at the MoE and the lack of trained operators and technical resources to operate and maintain the equipment.

2.2.7 The Consultant shall identify the appropriate air monitoring and testing equipment required for project implementation taking into account the budgetary constraints at the MoE. The Consultant shall prepare the necessary tender documents for the procurement of the above mentioned equipment and help the MoE to identify sources of funding for the procurement of the identified air quality monitoring equipment. The recommended equipment shall have maintenance requirement kept to a minimum and the Consultant shall define the training required for operators on operations and maintenance.

2.3 Develop Regulatory Needs and Enforcement Standards

2.3.1 The Consultant shall develop ambient air quality standards and advise on the phasing and means of enforcing these standards.

2.3.2 Emissions from hazardous pollutants and those air contaminants which in the judgment of the Consultant might cause or contribute to an increase in mortality or an increase in serious , irreversible or incapacitating illness shall be also identified.

	2.3.3 The Consultant shall review existing legislation related to air quality management with an analysis of their short-comings and propose changes to existing legislation, or the enactment of new legislation that would provide the legal framework within which the proposals may be implemented.
3. Project Inputs	*3.1 One International Consultant with strong urban air quality management background.* *3.2 The Consultant will be assisted by one seconded technical staff from the MoE in addition to one local short-term expert that will undertake the data and information gathering and participate in the analysis and preparation of the feasibility study.* *3.3 The Consultant will study the relevant documents provided by the MoE and will collect additional information by contacting institutions such as the Public Health and Mechanical Engineering Departments at the American University of Beirut, Ministry of Industry and Petroleum, Ministry of Finance, Electricite du Liban, Ministry of Transport, the Central Statistics Office, the Customs Office and the Vehicle Registration Office.* *3.4 The MoE and the SIU-3 will support the Consultant in providing Lebanese counterpart(s), existing documentation and transport during the mission.* *3.5 The Consultant will attend briefing and de-briefing sessions with the SIU-3 and senior MoE staff and will offer a series of presentations and lectures related to air quality management (films and slides) involving a number of case studies from other developing countries. The presentation material and a comprehensive list of references on air quality management would remain at the MoE Library.*
4. Project Outputs	*4.1 Air emission prediction model for the Greater Beirut Area (GBA).* *4.2 Air quality monitoring programme (AQMP) for the GBA.* *4.3 Tender Documents for the procurement of air quality monitoring equipment.* *4.4 Cost estimates for the (AQMP) and associated equipment.* *4.5 Sources of funding for the AQMP equipment (EU or bilateral grants, etc..).* *4.6 Regulatory needs and air quality standards* *4.7 Air quality management seminars to staff of MoE, MoT, MoPH, MoIP and other ministries concerned .*
5. Project Duration	*5.1 Three and a half months starting latest January 6th, 1997*

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SATI ARNAOUT, SIU-3

MANAGEMENT OF SPECIAL WASTE STREAMS

OPTIONS FOR WASTE OIL MANAGEMENT IN LEBANON	
Level of Intervention	TECHNICAL & POLICY SUPPORT
Component	MANAGEMENT OF SPECIAL WASTE STREAMS
1. Project Background & Objectives	1.1 Improper vehicle waste oil disposal in Lebanon has become a serious waste management challenge. The consequences of this indiscriminate practice can be devastating and creates a high potential for contamination of both surface water and groundwater in the country since it is well known that 4 litres of waste oil in a single oil change can ruin 4 million litres of fresh water. Waste oil means any oil which has been refined from crude petroleum or any re-refined oil which, through use or contamination has become unsuitable for continued service in the application for which it was originally intended. 1.2 Although there are no statistics on the amount and disposal routes for waste oil in Lebanon, it is estimated that the power sector generates about 300 tons/year, whereas, the transportation sector is by far the largest consumer of lubricant oil with waste oil from vehicles amounting to about 7,000 tons/year. 1.3 Waste oil is reported to be currently disposed of to sewers, drains, waste land, waterways, municipal dumps, and some is burned. Some service stations employ an oil/water separator to trap used oil, however, this approach is not universal. 1.4 The proposed project offers considerable environmental benefits in terms of providing the MoE with policy options that will help reduce the potential for soil and water contamination and encourage the participation of the private sector in waste oil management (collection and disposal).
2. Methodology & Terms of Reference	Upon his arrival to Lebanon, the Consultant shall submit to the MoE a detailed work plan for the implementation of the project. The work plan will be prepared in consultation with the Director General and counterpart staff at the MoE and SIU-3 experts. The contents of the work plan shall include among others the following topics: 2.1 <u>Overview and Analysis of Existing Situation</u> DAR AL HANDASA 2.1.1 The Consultant shall establish the waste oil generation sources and estimates of the total amount generated per major urban centre in Lebanon. This would include among others, service stations, private garages, power plants, the military, government and municipal workshops, public transport workshops, rural irrigation and water supply pumps, industries, etc... An inventory of lubricant oil retailers, waste oil haulers (if any?) and potential waste oil collection points shall be prepared. 2.1.2 The Consultant shall establish the total volume of lubricating oil imported to the country in addition to investigating the presence and the volume of waste oil collected at present by private sector collectors.

2.1.3 The Consultant shall make an overview of existing recycling procedures and industries that are based on raw materials obtained from the recycling of automotive and industrial oil . Automotive oil includes crankcase oil and transmission, brake, and power steering fluids, whereas, industrial waste oil includes metal working oils, hydraulic oils, process oils, lubricating oils, and engine crankcase oil.

2.1.4 The Consultant shall estimate the demand for treated waste oil. These industries include among others, cement factories, fuel powered electricity stations, oil refineries, waste incinerators, etc... .

2.1.5 Samples of waste oil from different locations shall be collected and analyzed in order to determine their composition and characteristics. This in turn will determine the adequacy of their re-use as fuel in power stations and cement factories as pre-treatment may prove necessary.

2.2 <u>Recommend Waste Oil Management Options</u>

2.2.1 The Consultant shall identify means of encouraging the private sector to participate in waste oil management and advise on potential incentives for the proper collection and disposal of waste oil. The management options should consider and evaluate the economics of the following disposal alternatives:

- *Source reduction (change oil less frequently)*
- *Reuse (re-refine used oil for lube oil use)*
- *Reclamation (use waste oil as a fuel)*
- *Properly treat and/or dispose*

2.2.2 For all the elements of the recycling of waste oil where benefits can be expressed in monetary terms, the Consultant shall carry-out an economic evaluation using the present value technique, with the final results expressed in terms of an economic rate of return (ERR). All detailed assumptions made in the economic evaluation, including the shadow price of fuel and energy, etc.., shall be provided in the study report. One factor that is often overlooked in evaluating waste oil management is the liability associated with improper management of the oil (i.e. degrading water and land resources).

2.2.3 The Consultant shall design a waste oil treatment plant and estimate its cost, and, advise on the means of encouraging the private sector to participate in the project and in managing it. The Consultant shall proceed with the preparation of detailed designs, specifications and tender documents of all components of the project including the waste oil recycling and treatment plant and the necessary administration and workshop facilities. The tender documents shall be divided into packages for ease of contract award and implementation.

2.2.4 Finally, the Consultant shall submit a study report including final recommendations on the system and technology to be used in the light of the results of the economic evaluation.

	2.3 Develop Regulatory Needs *2.3.1 The Consultant shall review existing legislation related to waste oil management with an analysis of their short-comings and propose changes to existing legislation, or the enactment of new legislation that would provide the legal framework within which the proposals may be implemented, including proposals for resource mobilization to ensure the self-sufficiency of these services, such as overall cost recovery, direct charges to beneficiaries of waste oil collection.*
3. Project Inputs	*3.1 One International Consultant with strong chemical engineering and economics background, having experience with industrial and hazardous waste management and the organization of collection and recycling/disposal of waste oil.* *3.2 The Consultant will be assisted by one seconded technical staff from the MoE in addition to one local short-term expert that will undertake the data and information gathering and participate in the analysis and preparation of the feasibility study.* *3.3 The Consultant will study the relevant documents provided by the MoE and will collect additional information by contacting institutions such as the Chamber of Commerce, Ministry of Industry and Petroleum, Ministry of Finance, Electricite du Liban, Ministry of Transport, the Central Statistics Office, the Customs Office, cement factories and fuel powered electricity stations, the operators of the Amroussieh and Karantina incinerators, IDAL and private waste oil collectors.* *3.4 The MoE and the SIU-3 will support the Consultant in providing Lebanese counterpart(s), existing documentation , funding for limited waste oil laboratory tests and transport during the mission.* *3.5 The Consultant will attend briefing and de-briefing sessions with the SIU-3 and senior MoE staff and will offer a series of presentations and lectures related to waste oil management practices (films and slides) involving a number of case studies from other developing countries. The presentation material and a comprehensive list of references on waste oil management would remain at the MoE Library.*
4. Project Outputs	*4.1 Waste oil generation sources and estimates of total amount per major urban centre* *4.2 Actual and projected demand for waste oil in Lebanon* *4.3 Sampling and laboratory analyses of waste oil* *4.4 Economic evaluation of waste oil management options* *4.5 Design of a waste oil treatment plant with cost estimates* *4.6 Develop regulatory needs and propose changes to existing legislation* *4.7 Draft Policy Paper* *4.8 Seminars to MoE staff and other ministries concerned on waste oil management.*
5. Project Duration	*5.1 Three and a half months starting latest March 17th, 1997.*
6. Contact Names	*Mr. Pierre Abi-Chahine (Cora Penn-Motor oil) - Operator of an oil recycling plant-Chekka - Lebanon - Tel: 645 161 & 645 410*

SATI ARNAOUT, SIU-3

ECONOMIC FEASIBILITY OF USED TIRES DISPOSAL IN LEBANON	
Level of Intervention	TECHNICAL & POLICY SUPPORT
Component	MANAGEMENT OF SPECIAL WASTE STREAMS
1. Project Background & Objectives	1.1 Although the storage or dumping of used tires does not pollute the environment by any emission, their resistance to any kind of decomposition and the danger of fire hazards when the waste tires are piled up turn them into an environmental problem. 1.2 In solid waste dump sites in Lebanon, waste tires take-up large volumes of space and tend to float to the surface due to their buoyancy and create spongy ground surface which may be unstable and therefore inadequate for subsequent use. On the other hand, heap of waste tires are shelters for rodents and insect proliferation and burning tires produce noxious gases and are extremely difficult to extinguish. Indiscriminate open dumping of waste tires create environmental conditions which discourage tourism in Lebanon. 1.3 Estimates of scrap tires in Lebanon vary between 1.3million to 1.8million (10,400 tons to 14,400 tons) of tires scattered throughout the country[6,11]. Over recent years, large numbers of used tires have been imported to Lebanon from Europe[11]. Although these tires have a limited life, they are inexpensive and a market for them has been established. However, the rate of scrap tire generation is expected to decrease following a recent Council of Ministers decree to ban the import of used tires (on 6/3/1996). Most of the locally generated waste tires(20%) are unfit for retreading, and therefore not enough quantities will be available for retreading if ban on imports of used tires is strictly enforced. 1.4 The size of the vehicle fleet in Lebanon cannot be estimated reliably. The Vehicle Registration Office (VRO) has indicated that the actual number of vehicles is between 1.2 and 1.3million. Other estimates put the figure at 0.8million excluding non-passenger private and public cars. According to VRO statistics, new vehicle registrations are currently running at about 50,000 cars/year. The current registration rate combined with a vehicle life of 10-12 years, would suggest a future fleet of 500,000 to 600,000. It is expected that the vehicle fleet will stabilize at about current levels and that rising incomes in the future are more likely to be expressed through replacement and modernization of the existing fleet. 1.5 A recent study entitled "Discarded rubber tire disposal options for Lebanon" undertaken by a local private consulting firm on behalf of the MoE has identified a number of disposal / re-use options. Furthermore, the MoE has been approached two years ago by one cement factory in North Lebanon with a proposal to burn municipal waste including waste tires.

2. Methodology & Terms of Reference	*Upon his arrival to Lebanon, the Consultant shall submit to the MoE a detailed work plan for the implementation of the project. The work plan will be prepared in consultation with the Director General and counterpart staff at the MoE and SIU-3 experts. The contents of the work plan shall include among others the following topics:* *2.1 Overview and Analysis of Existing Situation* *2.1.1 The Consultant shall review the assumptions made in the above mentioned study related to waste tire generation sources and estimates of the total amount generated per major urban centre in Lebanon. Estimates of private and public vehicles in addition to special vehicles such as trucks, ambulances, agricultural tractors and military vehicles shall be also reviewed.* *2.1.2 The Consultant shall establish and confirm the total amount of tires imported to the country in addition to investigating the presence and the volume of waste tires collected at present by private sector collectors.* *2.1.3 The Consultant shall review existing waste tires recycling procedures in Lebanon and shall review the estimates made in relation to the demand for waste tires. Interested industries such as cement factories, fuel powered electricity stations, oil refineries, waste incinerators, tire retreading companies, rubber factories, etc... shall be approached and surveyed.* *2.2 Recommend Waste Tires Management Options* *2.2.1 The Consultant shall identify means of encouraging the private sector to participate in waste tire management and advise on potential incentives for the proper collection and disposal of waste tires. For all the elements of the recycling of used tires where benefits can be expressed in monetary terms, the Consultant shall carry-out an economic evaluation using the present value technique, with the final results expressed in terms of an economic rate of return (ERR). All detailed assumptions made in the economic evaluation, including the shadow price of fuel and energy, etc.., shall be provided in the study report.* *2.2.2 The Consultant shall consider a number of management options and evaluate the economics of the following disposal alternatives:* • *Burning rubber shreds in cement kilns* • *Establishing a scrap rubber grinding plant* • *Imposing taxes on new tires to raise revenue for managing scrap tires* • *Building waste-to-energy facilities to burn chips.* • *Promoting better use of tires to increase lifetime.* • *Promoting the re-use of used tires and retreading* • *Promoting procurement guidelines that encourage the use of retreated tires by government agencies , the military and the public sector.*

2.2.3 The Consultant shall consider the economic feasibility of burning tires while taking into account the price of the competing fuel in cement kilns and power stations. Scrap tires make an excellent fuel because they have a calorific value ranging from 28,000kJ/kg to 31,000kJ/kg which is similar to coal and represent a significant energy source. Although whole tires require less processing costs as a fuel source, most plants will incinerate only tires shredded into tire derives fuels.

2.2.4 Cement kilns can thoroughly combust scrap tires because they operate at very high temperatures. In addition, the cement production can utilize the iron contained in the tires steel belts and beads. The newest use of scrap tires is in conventional electricity-generating power plants as a partial substitute for coal in some types of boilers. Key consideration is ensuring that any air emissions or other by-products meet environmental limits. Cement operators who switch from coal to tires usually must conduct test burns with air pollution measurements and the resulting delays can affect the projected cost savings from changing fuels.

2.2.5 The Consultant shall evaluate funding of tire management programs through such means as a tax or surcharge on tires, added vehicle registration fees, or fees to transfer vehicle tires. These funds can be used to clean-up existing tire piles and to administer tire regulations. Funds may also be used to provide grants or loans to entrepreneurs who are recycling tires or incinerating them for energy recovery. Scrap tire users may benefit from a rebate system for recycling tires or burning them for energy recovery. These market incentives have proven to be very helpful in stimulating these uses for scrap tires. Retreadable tires cost on average around US$8 per imported tire whereas local retreadable tires cost around US$1.

2.2.6 Finally, the Consultant shall submit a study report including final recommendations on the system and technology to be used in the light of the results of the economic evaluation.

2.3 <u>Develop Regulatory Needs</u>

2.3.1 The Consultant shall review existing legislation related to waste tires management with an analysis of their short-comings and propose changes to existing legislation, or the enactment of new legislation that would provide the legal framework within which the proposals may be implemented, including proposals for resource mobilization to ensure the self-sufficiency of these services, such as overall cost recovery, direct charges to beneficiaries of waste tires collection.

3. Project Inputs	*3.1 One International Consultant with strong chemical engineering and economics background, having experience with industrial and hazardous waste management and the organization of collection and recycling/disposal of waste tires.* *3.2 The Consultant will be assisted by one seconded technical staff from the MoE in addition to one local short-term expert that will undertake the data and information gathering and participate in the analysis and preparation of the feasibility study.* *3.3 The Consultant will study the relevant documents provided by the MoE and will collect additional information by contacting institutions such as the Chamber of Commerce, Ministry of Industry and Petroleum, Ministry of Finance, Electricite du Liban, Ministry of Transport, the Central Statistics Office, the Customs Office, cement factories and fuel powered electricity stations, the operators of the Amroussieh and Karantina incinerators, tire retailing shops and private waste tires collectors.* *3.4 The MoE and the SIU-3 will support the Consultant in providing Lebanese counterpart(s), existing documentation and transport during the mission.* *3.5 The Consultant will attend briefing and de-briefing sessions with the SIU-3 and senior MoE staff and will offer a series of presentations and lectures related to waste tires management (films and slides) involving a number of case studies from other developing countries. The presentation material and a comprehensive list of references on waste tires management would remain at the MoE Library.*
4. Project Outputs	*4.1 Review the findings of the "Discarded rubber tire disposal options for Lebanon" study* *4.2 Review of exiting waste tire recycling procedures in Lebanon* *4.3 Recommend appropriate waste tire management options* *4.4 Establish and develop regulatory needs* *4.5 Draft Policy Paper* *4.6 Seminars to MoE staff and other ministries concerned on waste tire management*
5. Project Duration	*5.1 Four months starting latest May 1st, 1997.*
6. Contact Names	*Mr. Farid Salhab - Ministry of Transport - Verdun - Beirut - Tel: 01 - 371 640/4*

OPTIONS FOR SCRAP VEHICLE MANAGEMENT IN LEBANON	
Level of Intervention	TECHNICAL & POLICY SUPPORT
Component	MANAGEMENT OF SPECIAL WASTE STREAMS
1. Project Background & Objectives	1.1 The landscape in Lebanon is dotted with abandoned vehicles, especially in areas where open dumping is practiced. It has been reported that used car dealers strip old vehicles of usable parts and dump the remains. However, there are no statistics on scrapped vehicles in Lebanon and the MoE has been considering the feasibility of establishing a vehicle compaction plant which would sell the compacted cars as scrap metal. 1.2 Cars and miscellaneous post-consumer steel products in Lebanon are usually processed by scrap dealers and auto dismantlers, who consolidate and bale the material for brokers and end users. 1.3 Scrap dealers who process appliances remove motors (which may contain PCBs, formerly used in motor-starting capacitors) and compressor units which contain CFCs. Auto dismantlers remove gas tanks, batteries, tires and salable items such as windshields and radiators. Appliances, automobiles and bulky items are compacted and sent to a shredder. Shredding and magnetic separation are used because it is not economical to recover steel piece by piece; shredding also increases bulk density for economical shipment. Industrial shredders reduce autos to small chunks that are suitable for remelting in an electric furnace. 1.4 Not all scrap metal is shredded; industrial processors also prepare bundles of heavy steel scrap and bales of flattened sheet metal. Scrap dealers and processors consolidate and bale compacted and shredded materials according to buyer specifications.
2. Methodology & Terms of Reference	Upon his arrival to Lebanon, the Consultant shall submit to the MoE a detailed work plan for the implementation of the project. The work plan will be prepared in consultation with the Director General and counterpart staff at the MoE and SIU-3 experts. The contents of the work plan shall include among others the following topics: 2.1 <u>Overview and Analysis of Existing Situation</u> 2.1.1 The Consultant shall establish the scrap metal generation sources and estimates of the total amount generated per major urban centres in Lebanon. The Consultant shall establish the presence and the volume of scrap metal collected at present by private sector collectors. 2.1.2 The Consultant shall make an overview of existing recycling procedures and shall estimate the demand for scrap metal.

	2.2 Recommend Scrap Metal Management Options *2.2.1 The Consultant shall identify means of encouraging the private sector to participate in scrap metal management and advise on potential incentives for the proper collection and disposal of scrap metal. The management options should consider and evaluate the economics of the following disposal alternatives:* • *Baling* • *Shredding* • *Export* • *Local use* *2.2.4 Eventually, the Consultant shall submit a study report including recommendations on the system and technology to be used in the light of the results of the economic evaluation.* *2.3 Develop Regulatory Needs* *2.3.1 The Consultant shall review existing legislation related to scrap metal management with an analysis of their short-comings and propose changes to existing legislation, or the enactment of new legislation that would provide the legal framework within which the proposals may be implemented, including proposals for resource mobilization to ensure the self-sufficiency of these services, such as overall cost recovery, direct charges to beneficiaries of scrap metal collection.*
3. Project Inputs	*3.1 One International Consultant with strong chemical engineering and economics background, having experience in the organization of collection and recycling of automotive waste.* *3.2 The Consultant will be assisted by one seconded technical staff from the MoE in addition to one local short-term expert that will undertake the data and information gathering and participate in the analysis and preparation of the feasibility study.* *3.3 The Consultant will study the relevant documents provided by the MoE and will collect additional information by contacting institutions such as the Chamber of Commerce, Ministry of Industry and Petroleum, Vehicle Registration Office (VRO), Ministry of Finance, Ministry of Transport, the Central Statistics Office, the Customs Office, used cars dealers and private scrap metal collectors.* *3.4 The MoE and the SIU-3 will support the Consultant in providing Lebanese counterpart(s), existing documentation and transport during the mission.*

	3.5 The Consultant will attend briefing and de-briefing sessions with the SIU-3 and senior MoE staff and will offer a series of presentations and lectures related to scrap metal management practices (films and slides) involving a number of case studies from other developing countries. The presentation material and a comprehensive list of references on scrap metal management would remain at the MoE Library.
4. Project Outputs	*4.1 Scrap metal generation sources and estimates of total amount* *4.2 Existing recycling procedures in Lebanon* *4.3 Appropriate scrap metal management options for Lebanon* *4.4 Regulatory needs* *4.5 Draft Policy Paper* *4.6 Seminars to the staff at the MoE and other ministries concerned on scrap metal management*
5. Project Duration	*5.1 Three and a half months starting latest March 17th, 1996.*
6. Contact Names	*Mr. Farid Salhab - Ministry of Transport - Verdun - Beirut - Lebanon - Tel: 01-371 640/4*

OPTIONS FOR WASTE VEHICLE BATTERIES MANAGEMENT IN LEBANON	
Level of Intervention	*TECHNICAL & POLICY SUPPORT*
Component	*MANAGEMENT OF SPECIAL WASTE STREAMS*
1. Project Background & Objectives	*1.1 Approximately 0.50 to 0.75 million automotive batteries are consumed and replaced annually in Lebanon resulting in the improper disposal of lead and acid into the nature, public sewers and municipal dumps. The consequences of this indiscriminate practice creates a high potential for surface and groundwater contamination.* *1.2 It is assumed that 50% of the estimated 1.5million cars in Lebanon change their batteries once a year, not including those used for large trucks and military vehicles. The size of the vehicle fleet in Lebanon cannot be estimated reliably. The Vehicle Registration Office (VRO) has indicated that the actual number of vehicles is between 1.2 and 1.3million. According to VRO statistics, new vehicle registrations are currently running at about 50,000 cars/year.* *1.3 In Lebanon, a limited informal lead-acid battery recycling industry exists and individual waste batteries are being purchased in the market at the rate of US$7 each or US$150 to US$180 per ton. Batteries are crushed and then the lead, plastic, and sulfuric acid are separated. Acid is discharged into public sewers, whereas, all lead components are charged into a furnace for smelting.* *1.4 The proposed project offers considerable environmental benefits in terms of providing the MoE with policy options that will help reduce the potential for soil and water contamination and encourage the participation of the private sector in waste batteries management (collection and disposal).*
2. Methodology & Terms of Reference	*Upon his arrival to Lebanon, the Consultant shall submit to the MoE a detailed work plan for the implementation of the project. The work plan will be prepared in consultation with the Director General and counterpart staff at the MoE and SIU-3 experts. The contents of the work plan shall include among others the following topics:* *2.1 <u>Overview and Analysis of Existing Situation</u>* *2.1.1 The Consultant shall establish the waste batteries generation sources and estimates of the total amount generated per major urban centre in Lebanon. This would include among others, service stations, private car electric garages, the military, government and municipal workshops, public transport workshops. An inventory of car battery retailers, waste battery haulers (if any?) and potential waste battery collection points shall be prepared.*

2.1.2 The Consultant shall establish the total number of car batteries imported to the country in addition to investigating the presence and the amount of waste batteries collected at present by private sector collectors.

2.1.3 The Consultant shall make an overview of existing waste batteries recycling procedures in Lebanon. In an effort to create a recycling infrastructure that is stable when prices of lead are depressed, the Consultant shall review options for levying fees on the use of virgin lead, mandatory take back programs, and a minimum recycled lead content in new batteries.

2.2 Recommend Waste Batteries Management Options

2.2.1 As mentioned above, lead and acid from waste batteries are reported to be currently disposed of to sewers, drains, waste land, waterways, municipal dumps, and some is burned. The Consultant shall identify means of encouraging the private sector to participate in waste batteries management and advise on potential incentives for the proper collection and disposal of waste batteries

2.2.2 The Consultant shall review recycling options by the consumer and propose battery processing techniques. It is expected that as far as the consumer is concerned, there are no special requirements for recycling a battery; it is simply turned into a dealer or retailer when a new one is purchased.

2.2.3 For all the elements of the recycling of waste batteries where benefits can be expressed in monetary terms, the Consultant shall carry-out an economic evaluation using the present value technique, with the final results expressed in terms of an economic rate of return (ERR). All detailed assumptions made in the economic evaluation, including the shadow price of fuel and energy, etc.., shall be provided in the study report.

2.2.4 Finally, the Consultant shall submit a study report including final recommendations on the system and technology to be used in the light of the results of the economic evaluation.

2.3 Develop Regulatory Needs

2.3.1 The Consultant shall review existing legislation related to waste batteries management with an analysis of their short-comings and propose changes to existing legislation, or the enactment of new legislation that would provide the legal framework within which the proposals may be implemented, including proposals for resource mobilization to ensure the self-sufficiency of these services, such as overall cost recovery, direct charges to beneficiaries of waste batteries collection.

3. Project Inputs	*3.1 One International Consultant with strong automotive waste management background.* *3.2 The Consultant will be assisted by one seconded technical staff from the MoE in addition to one local short-term expert that will undertake the data and information gathering and participate in the analysis and preparation of the feasibility study.* *3.3 The Consultant will study the relevant documents provided by the MoE and will collect additional information by contacting public and private institutions such as private car-electric garages and private waste battery collectors and recyclers, the Chamber of Commerce, Ministry of Finance, Ministry of Transport, Central Statistics Office, the Customs Office and the Vehicle Registration Office.* *3.4 The MoE and the SIU-3 will support the Consultant in providing Lebanese counterpart(s), existing documentation and transport during the mission.* *3.5 The Consultant will attend briefing and de-briefing sessions with the SIU-3 and senior MoE staff and will offer a series of presentations and lectures related to waste batteries management (films and slides) involving a number of case studies from other developing countries. The presentation material and a comprehensive list of references on waste batteries management would remain at the MoE Library.*
4. Project Outputs	*4.1 Waste batteries generation sources and estimates of total amount* *4.2 Overview of existing waste batteries recycling procedures* *4.3 Options for waste batteries recycling techniques* *4.4 Regulatory needs* *4.5 Draft Policy Paper* *4.6 Seminars to the staff at the MoE and other ministries concerned on waste batteries management*
5. Project Duration	*5.1 Three and a half months starting latest April 14, 1997.*
6. Contact Names	*International Metal - Borj Hammoud - Beirut - Lebanon.*

5. List of References

1. SIU-3 Technical Support to the MoE and MMRA for the period between July 1, 1996 and September 30, 1997, final draft submitted in August 1996.
2. SIU-3 Terms of Reference, June 1993.
3. SIU-3 Inception report, Transtec-Fichtner, March 1995.
4. Solid Waste/Environmental Management Project, Staff Appraisal Report, Report No. 13860-LE, The World Bank, May 5, 1995.
5. Mediterranean Environmental Technical Assistance Program - Lebanon: State of the Environment, MoE, Final Report, November 1995.
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7. Environmental Impact Assessment Procedural Guidelines - The Republic of Lebanon, UNDP - Capacity 21.
8. Hazard Identification and Evaluation in a Local Community,Technical Report No.12, UNEP.
9. National Industrial Waste Management Plan,Dar Al-Handasah,Phase-I Report,June 1996.
10. Awarness and Prepardness for Emergencies at Local Level, A process for responding to Technological Accidents, United Nations Environmental Programme.
11. Discarded rubber tire disposal options for Lebanon, Survey of existing situation, treatment technologies, Recommendations and equipment suppliers, Middle East Engineers and Architects (MEEA) s.a.r.l, on behalf of the Ministry of Environment, May 1996.

6. List of Persons Met on Mission

Name	Position
1. Dr. Elias Matly	*Director General , Ministry of Environment*
2. Dr. Mounkez Ziadeh	*Advisor to H.E. the Minister of Environmnent*
3. Dr. Gernot Ruths	*Program Monitoring, European Commission*
4. Miss. Dalal Barakat	*Head of Protection of Urban Environment Service, MoE*
5. Miss Sanaa Sairawane	*Head of Nature Conservation Service, MoE*
6. Mr. Hassan El-Nakib	*Civil Engineer, MoE*
7. Miss. Josette Awad	*Civil Engineer, MoE*
8. Miss. Randa Nemer	*Project Coordinator, Capacity 21 Program, UNDP*
9. Miss. Alia El-Husseini	*Project Coordinator, Sustainable Development Network, UNDP*
10. Mr. Walter Gebeshuber	*Team Leader - SIU-3, MoE*
11. Mr. Ignacio Manzanera	*Senior Cost Control Specialist - SIU-3, MoE*

الجمهورية اللبنانية
مكتب وزير الدولة لشؤون التنمية الإدارية
مركز مشاريع ودراسات القطاع العام

Republic of Lebanon
Office of the Minister of State for Administrative Reform
Center for Public Sector Projects and Studies
(C.P.S.P.S.)