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INTERNATIONAL DEVELOPMENT ASSOCIATION

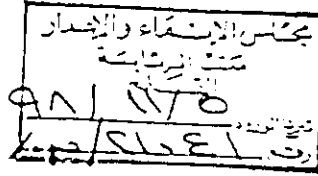
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الجمهورية اللبنانية
مكتب وزير الدولة لشؤون التنمية الإدارية
مركز مشاريع ودراسات القطاع العام

August 11, 1998

His Excellency Akram Chehayeb
Minister
Ministry of Environment
Tallat Al-Saray
P. O. Box 5351/116
Beirut, Lebanon



Your Excellency:

LEBANON - Strategy Note: A Waste Management Action Plan

I am very pleased to learn about the results of the mission to Lebanon that took place June 14-25, 1998, for the start up of the above referenced Strategy Note. As you realize, the objective of this activity supported by the Bank, is to prepare a concise document on the strategic actions for the waste sector in Lebanon. The mission's main finding, that the amount of hazardous waste is less than expected is very encouraging and we believe that actions affordable to the Lebanese industry will be recommended in the Strategy Note. I concur with the content of the Aide-Memoire (see attached), discussed between you and the mission on June 25, 1998.

The Strategy Note will describe an integrated waste management system, and will include the management of hazardous wastes produced by industries and households. The regulation, handling, disposal, and final treatment of industrial and household generated hazardous wastes will be detailed in the Strategy Note. We initially planned that the content of the Strategy Note would be discussed at a workshop during late 1998. However, we now feel that the best timing is in January-February 1999, when the new Government will be in place following the October general elections, and when the different ministries concerned with industrial pollution will have become familiar with the issues.

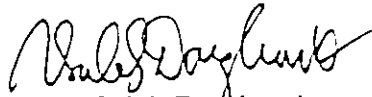
The mission also indicated the need for strengthening the institutional and legal framework to regulate waste management issues through a system of environmental permits. The stronger framework should give the Ministry of Environment more power to regulate and control pollution from industrial activities. The Bank finds it important that new laws and regulations are established in order to implement a future waste management strategy.

We would appreciate at this early stage in preparing the Strategy Note, your comments on the timing of the workshop proposed for early 1999 and your guidance on

how to achieve clear regulations for a modern system of integrated waste management in Lebanon.

With your indulgence we are also distributing copies of this letter to H. E. Al-Sabeh and Mr. El-Jisr.

Sincerely,



Salah Daughouth
Acting Director

Rural Development, Water, and Environment Department
Middle East and North Africa Region

Attachment:

Cc: H. E. Bassem Al-Sabeh
Acting Minister
Ministry of Municipalities and Rural Affairs
Beirut, Lebanon

✓ Mr. Nabil A. El-Jisr
President
Council for Development & Reconstruction
Beirut, Lebanon

Mr. Khalid M. Al-Saad
Executive Director
The World Bank
Washington, D.C. 20433

LEBANESE REPUBLIC

WASTE MANAGEMENT STRATEGY NOTE

AIDE-MEMOIRE - MISSION JUNE 15-25, 1998

I. INTRODUCTION

1. A World Bank mission consisting of Messrs./Mmes.: Anders Halldin (Mission Leader), Maria Sarraf (Economist), Frank van Woerden (Waste Management Specialist - Consultant), René Boesten (Institutional Specialist - Consultant), and Maikel Jagroep (Waste Classification Specialist) visited Lebanon between June 14-25, 1998 to start up the preparation of Solid Waste Management Strategy Note (SWMSN). The mission met with the Minister of the Environment, H.E. Mr. Akram Chehayeb; the Minister of Industry, H.E. Mr. Nadim Salem; the Governor of Mount Lebanon, Mr. Suheil Yamout; and representatives for CDR, IDAL, DEVCO, Association of Lebanese Industries, and the Lebanese Businessman Association. The mission also met with representatives for Industrial organizations (waste generators and waste management companies) such as Solidere, Sukkar Group, Societe des Cements Libanais, and SIDEM, and NGOs. A list of People Met is enclosed as Attachment 1.

2. This Aide-Memoire summarizes the findings and recommendations of the Mission, which are subject to confirmation by Bank Senior Management. The Mission would like to express its appreciation to all parties involved and in particular to H.E. Mr. Akram Chehayeb and his advisors and staff, for their support and assistance. The Mission also appreciated the dedication and assistance of Dr. Naji Chamieh, manager, unit of policy and programming (UPP) in MOE.

II. OBJECTIVE

3. The objective of the mission was to start up the preparation of a waste management strategy note covering the waste management all over Lebanon, with particular emphasis on industrial non-hazardous and hazardous waste. The strategy note will be the basis for a future waste management strategy addressing all necessary requirements regarding physical installations in order to meet the industries' demand, and outline the necessary changes and additions in laws and regulations to make the strategy implementable. A draft outline of the strategy note is provided in Attachment 2.

III. MISSION FINDINGS

Review of Existing Studies on Waste Management in Lebanon

4. A list of existing studies, legislation and other documents reviewed for the strategy note, has been enclosed as Attachment 3. A full review of this documentation will be

included as an annex to the strategy note. The documents provide a clear overview of existing and proposed legislation, industrial activities, types of industrial and hazardous wastes and institutional tasks, and responsibilities, but unclear in regard to institutional practices, mechanisms and implementation programs. To some extent the documentation give an insight into planned studies, activities and policies related to the subject. However, better understanding was gained by the mission during discussions with various stakeholders.

5. In general, the documents present quantification of industrial and hazardous waste arisings based on generic estimates, e.g. waste loads generated per employee, rather than based on waste inventories or production specific estimates. The Decision Support System for Integrated Pollution Control (DSSIPC), see para 9 will result in more specific estimates and calculations of waste generated in Lebanon.

Waste Classification

6. A clear definition of waste is required and needs to be part of the decree on waste management and a classification of waste has to be included in the decree. It is recommended to base this classification on the classification used in the Convention on transboundary movements of waste: the Basel convention.

7. It is also recommended that the MoE includes in the decree the possibility to classify special waste streams for which a specific collection, recycling, treatment or final disposal method can be prescribed.

8. For final disposal a classification based on properties of the waste is recommended. Since the potential hazard of waste in a landfill is predominantly based on the leachate from the waste, the quality of the leachate determines the protection measures that need to be taken at the landfill.

Waste Generation

9. The Dutch consultant company Tebodin is currently executing, for the Ministry of Environment, a project to implement the DSSIPC (emissions to air and water and the generation of special waste) in Lebanon to assess and prioritize industrial pollution problems. The project includes the environmental assessment of the total industrial activities in Lebanon, collecting data from 200 questionnaires from the larger industries of Lebanon and 30 audit visits to the largest industries and representatives of the most important industrial sectors. The resulting waste inventory and calculated quantities will be used as a basis for the waste strategy note, which will become available during the month of July this year. A preliminary list of waste arisings has been enclosed as Attachment 4.

Need of Treatment Facilities

10. Currently, there are no facilities available in Lebanon ready to receive waste from industrial entities. The lack of such facilities is resulting in that industries, which currently have waste water treatment plants in operation, have no place to direct the generated waste, as well as the solid and liquid waste generated by different production processes. Establishment of such facilities is crucial in order to both solve the existing problem for the industrial sector, but also to facilitate the separation of hazardous material on the household level and provide an opportunity to stop currently co-disposal of industrial hazardous waste with municipal solid waste.

11. Discussion with NGOs. The mission met with different NGOs, which all emphasized that handling of waste management issues related to industrial hazardous waste has been carried out on an ad-hoc basis. They, furthermore, expressed the importance of establishing reception facilities for hazardous waste generated on the household level. The NGOs declared a clear willingness to participate on different levels in the preparation of the strategy note, and the mission agreed to consider that offer during the preparation of the strategy note, even if at this stage the specific tasks cannot be defined.

12. Use of Existing Opportunities. Of the waste currently generated less than 5000 ton/year may require incineration. The amount is too low to justify the investment of a special incinerator, and therefore other options have to be considered. In Lebanon there are three major cement factories, which could be involved processing the industrial hazardous waste such as waste oil, solvents, plastics, organic residues, outdated pesticides, etc.. The cement kilns capacity is regarded to be sufficient to cover also the future need for destruction of organic hazardous waste generated in Lebanon. The cement kilns could furthermore, also be a suitable user of all waste tires, even if these tires cannot be regarded as hazardous waste.

13. At least one cement industry seems to be very suitable for participating in a scheme for hazardous waste management, having a management with substantial experience in the subject, and does not foresee any technical problem.

14. New Installations. The need for new installations will most likely focus on treatment of inorganic solid waste, inorganic liquid waste, and hospital toxic waste. The treatment of industrial hazardous waste is totally different from the hospital waste and will be handled by a separate installation including storage tanks for different acids and alkaline solutions, treatment facilities for liquid waste, filter press for dewatering of sludge, and a safe disposal area for the solid waste including dewatered sludge.

15. Location of New Installations. The generation of solid waste to be securely disposed is estimated to not exceed 10000 ton/year in a long-term perspective, given the fact that it is currently estimated at less than 5000 to/year. Therefore, there is no justification to calculate with more than one site. The size of such a site would not require more than 20

hectare, and therefore also regarded as possible to locate within one of the industrial zones. The final size will be calculated much more in detail in the strategy note.

Legislative Framework

16. Existing. The existing frame work is not sufficient to handle waste management issues, as it only deals with controlling nuisance. Currently, a new environmental frame work law is under review and discussion, which included provisions to draft decrees related to waste management issues.

17. Necessary Additional Laws and Regulations. To enable an efficient control of the waste generation and the future treatment of the waste there is a necessity that additional regulations are issued providing the Government the tools to direct the waste streams to established facilities, and force the industries and other waste generators to adopt cleaner production technology and waste reduction measures. In reality these issues should be regulated in an environmental permit based on an environmental impact assessment. Furthermore, standards and guidelines for waste management routines within the industrial facilities need to be developed.

Support Program

18. The fund for the environment, as mentioned in the Environment Act, should be activated as soon as possible. The fund can be used to support investment in recycling and treatment technologies. The fund will receive capital from fees, fines and other financial instruments for waste management. A well defined (tasks, project identification, conditions, management, openness) fund can attract grants and loans from international donors.

19. Training will be required for the government employees (including customs officials) involved in monitoring and enforcement of waste management activities. Training on specific issues such as planning and policy development will be considered. Furthermore, a special training program for industry environmental managers will be considered.

Financing

20. The mission found that there was a clear willingness from the industries to pay the cost related to transport and treatment of the hazardous waste. However, it was also expected that they should not be directly involved in the financing of the actual treatment facilities, which anyhow will be covered by the delivery fee.

21. Financing of the needed facilities is expected to be done by the private sector, under the scenario that there is a law in place requiring the industries to use the built facilities. In the initial phase part of the investment capital can be provided through a loan from one of the international financing institutions as the World Bank.

IV. NEXT STEPS

22. Based on the mission's findings the following actions have been agreed:

- (a) The Government will through IDAL provide the Bank information about industrial zones suitable for location of a treatment facility based on requirements for site selection provided by Tebodin;
- (b) MOE will provide Tebodin with the draft EIA decree being prepared;
- (c) Tebodin will provide MOE, MOI, CDR, IDAL, and the Industrial and Businessmen Associations a condensed discussion paper by Mid-August for comments latest September 1, 1998.
- (d) the Draft Report of the Strategy Note will be presented to the Government and the Bank on September 15, 1998; and
- (e) the Final Report will be presented on October 15, 1998.

PEOPLE MET

Ministry of Environment

Akram Chehayeb	Minister
Zahi Abou Mansour	Advisor of the Minister
Hanna Bou Habib	Environment Inspector
Adel Yacoub	Agriculture Engineer
Samih Wehbe	Oil pollution Specialist

Ministry of Industry

Nadim Salem	Minister
Nayla Abi Karam	Advisor of the Minister

Ministry of Petroleum

Tripoli Oil Installation
Zahrani Oil Installation

Avedis Guidanian	Advisor of the Minister
Albert Rashkidi	Head of Accident Prevention Dept.
Khalil Ambriss	Assistant General Manager

CDR

Programs Division

Muzen Sleiman

Investment Development Authority of
Lebanon (IDAL)

Research & Information Dept.
ACE (Consultant to IDAL)

Imad El Moghrabi
Ghassan Tannous
Joseph Naufal

Director General Manager

Governorate of Mount Lebanon

Subeill Yamout
Maher Tamim

Governor

Association of Lebanese Industrialists

Jacques Sarraf
Hisham Abou Jaoude
Lawrence Chidiac

President
Secr Environment Committee
Industrial Representative

Lebanese Businessman Association
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Fadi Assaf
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Kamal Shehadi
F. Gemayel
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Vice President
Director General
Economic Consultant
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Sukkar Group Services

Maysara Sukkar
Malek Sukkar
Ayman Jaafar
Eric Shrewsbury

President
Vice President, Group Services
Vice President, Operations
Director, Engineering
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Solidere

Reclamation of Normandy Landfill

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Ireland State Agencies Development Co-
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Niall Mc Dermott
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Associate, Water Science Eng.

NGOs

Greenpeace

Protection de l'Environnement
(Nabativeh)

Liban Vert

Global 500 Forum, UNEP

Fouad Hamdan
Majed Baalbaki

Chairman

Wilson Rizk
Pierre Malychef

INDUSTRIES

SIDEM Aluminium

Societe des Ciments Libanais

Kamal Yammine
Marc Wurtz

Director of Production
Director of Operations

Waste Management Strategy Note
Draft Outline

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7 Financing of waste management

7.1 Waste treatment and disposal costs

7.2 Waste disposal charges

8 Import and export

9 Implementation and Action Plan

9.1 Legislative program

9.2 Permit implementation program

9.3 Staffing requirements and training program

9.4 Investment programs for waste treatment

9.5 Locating waste treatment facilities

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1 Introduction

The present project aims at developing a Strategy Note on Industrial waste management. In the Strategy Note the all important issues will be identified and preliminary proposals will be drafted for priority issues. The final waste management strategy that will be developed based upon this strategy note will widen and deepen these proposals and all issues concerning industrial waste, medical waste, municipal solid waste will be integrated.

The Strategy Note focuses on technical as well as institutional issues that need to be addressed in detail in the strategy. Some of these issues will be detailed in the Strategy Note, partly depending on the availability of data. This paper presents the outline for the Strategy Note and identifies the issues that will be considered and developed in the Strategy Note.

Effort has been made to develop a strategy that starts from the present situation regarding waste management practices and that points the direction to sustainable waste management, taking in to account cost effectiveness and environmental protection on an equal level. The development of the government sector and the private sector are considered of equal importance as well.

1.1 Definition of waste

For the definition of waste the definition used in the Environmental act is used.

The processes utilised to process this waste are also subject to the regulations of on waste

The term "waste management" includes generation, collection, sorting, transport, reuse and recycling, treatment and final disposal. Treatment is considered any operation that renders waste less harmful, less bulky or any other change in characteristics of the waste that makes the disposal process less costly or less technically complicated. Disposal is considered any operation that stores the waste for an undefined or indefinite period of time.

1.2 Responsibilities for waste management

The generator of waste is responsible for the waste until save disposal. This includes the responsibility to ensure save transport, recycling and treatment. The responsibility can not be transferred within this chain without a sufficient guarantee from the accepting company or organisation for save treatment and disposal. All costs incurred by waste management operations are to be borne by the generator of waste.

The Government is responsible for developing legislation, guidelines and requirements for waste management. for permitting, monitoring and enforcement and to develop support programs for industry to become involved in waste management operations.

2 Present waste generation and treatment practices

The classification of industrial waste and hazardous waste is based on the classification used in the Basel Convention. Data from the OSS system and other sources will be included

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2.1 Environmental impact

2.2 Treatment and disposal costs

3 Legislation

3.1 Classifications of waste

A clear definition of waste is required to clarify to all actors involved and to the generators of waste what the waste management requirements are and to set guidelines for monitoring and enforcement of waste management.

The environment act includes provisions for the development of decrees concerning waste management issues. A waste definition and classification must be drafted. It is recommended to base this classification on the classification used in the Convention on transboundary movements of waste: the Basel convention. This classification is used internationally and provides a clear framework based on types of waste and with respect to processes that produce waste.

Additionally it can be effective to specify waste streams based on the required treatment and final disposal. It is therefore also recommended that the MoE includes in a decree the possibility to classify special waste streams for which a specific collection, recycling, treatment or final disposal method can be prescribed. Advantage is that with such a secondary classification MoE can direct the recycling, treatment or final disposal more directly, based on specific circumstances in Lebanon.

Examples of such waste streams are:

- construction and demolition waste;
- end of life vehicles;
- waste oils and lubricants;
- car batteries, car tyres;

In general these wastes are of a high volume and can be recycled, treated or disposed of with relative ease if kept separate from other wastes and the generators of waste are clearly defined. Recycling, treatment and final disposal requirements for several of types of these waste will be clarified in the section on technologies.

For final disposal a classification based on properties of the waste is recommended. Since the potential hazard of waste in a landfill is predominantly based on the leachate from the waste, the quality of the leachate determines the protection measures that need to be taken at the landfill. Relative simple leachate tests can be used to predict the behaviour of waste in a landfill.

3.2 Standards on air emissions, waste water and waste

Treatment of waste water and air emissions results in increased waste generation (waste water treatment sludge and separated dust). To control these discharges and to effectively estimate the effects on waste generation, standards on waste water and air emissions are required as well.

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3.3 Industrial waste management plans

Generation of waste in companies needs to be controlled in the permit requirements. It will be considered to include the draft of an industrial waste management program in the permit requirements. In such a program the company concerned will be asked to develop initiatives to reduce waste generation, to promote recycling of waste, to ensure safe transport and final disposal out of the company or to develop a safe disposal site on the territory of the company. Such a program must include a time schedule and a allocated budget for implementation. On a regular basis the company will submit a report to the permitting authority on the execution of the program, including achieved results.

It is noted that such a program is one of the requirements of environmental management systems such as ISO 14001.

3.4 Industrial environmental manager

As part of the requirements of the permit it is recommended that in each company one person is appointed to handle and control all environmental aspects. The final responsibility for operating according to the legal requirements is on the plant director.

3.5 Waste transport

The generator of waste will be responsible for the waste management of his own waste and therefore the generator of waste must ensure himself that the waste is disposed of in an environmental sound way. For the acceptance (by treatment and recycling companies or by organisations operating landfills) and transport of waste a special procedure will be developed to ensure that the generator of waste disposes of his waste in a proper way and that enable the government to control the disposal and to trace any violations. It will be considered to include certification procedures for transport and treatment companies to increase efficiency.

3.6 Waste treatment

Waste treatment, including recycling, is considered a normal industrial activity. The permit requirements for these companies will therefore be the same. Two important deviations will be considered.

It will be considered in the Strategy Note to include provisions to limit the number of permits that will be issued for these activities. Competition between companies can result in lower costs for the waste generators but competition can also result in a situation where costs can not be recovered by the companies or where quantities of waste become too small to process effectively, resulting in no treatment at all. Limiting the number is considered to ensure the stability and cost effectiveness of the treatment.

Included in the permit for waste management activities will be an acceptance duty. The receiving industry will have the obligation to accept certain wastes to ensure treatment and to ensure that the industry does not take the economic most attractive wastes only.

Treatment operations should be developed for those waste for which a recycling or treatment operation is presently available or which can be introduced with relative ease. The secondary classification proposed will guide these waste treatment operations. Presently operations are available or can be made available without significant effort for car batteries, metal scrap, production waste from glass,

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plastics and paper production.

Studies are ongoing on waste motor oil and car tyres. Other waste that can be specified as such are slaughterhouse waste, out of life vehicles, spent solvents, construction and demolition waste etc. (to be complemented by from DSS).

For some of these wastes potential treatment operations, legal and permit requirements and organisational aspects will be developed in the Strategy Note. It will also be considered to develop guidelines for the management of these waste by decree of the council of ministers. A detailed environmental permit will not be required but management should be executed according to the guidelines.

3.7 Landfill operations

Landfills need to be developed for hazardous and for industrial waste that can not be treated otherwise. Also treatment processes such as incineration generate hazardous waste for which landfill area will be required. It is in general not recommended to dispose industrial waste indiscriminately on landfills for municipal solid waste. Noted is that waste from canteens or offices in industries can be comparable to MSW, but disposal in MSW landfills can only be allowed if sufficient guarantees for separation at source and collection are made.

The waste that is generated in domestic industry such as small bakeries can be collected along with the household collection and disposed of combined. For waste management of industries that generate only organic waste recycling options are available such as animal food production and composting. Required is only sufficient separation at source. These activities need to be promoted as waste management options.

3.8 Product legislation

3.9 Permit implementation program

Presently not all industries have an operational (environmental) permit. It will be considered to develop a special permit program to address those industries that do not have a permit presently. Such a program will include priorities for which industries will have to apply for a permit. An example of such priorities is:

- industries producing hazardous waste require a permit before 1-1-1999
- industries processing hazardous waste require a permit before 1-1-1999
- industries producing large quantities of non hazardous waste require a permit before 1-1-2000
- industries processing non hazardous waste require a permit before 1-1-2000
- industries processing industrial waste require a permit before 1-1-2001
- industries producing low quantities of industrial waste comparable to municipal solid waste do not require a permit but general operating regulations will be drafted to which these industries will need to comply

The dates mentioned are only examples and will be further differentiated based on the final results of the overview of industrial waste generation.

All requirements noted in the previous paragraphs will be included in the permits

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Along with a permit program the monitoring and enforcement of waste management activities will be developed. The same timeschedules can be used.

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4 Treatment and disposal options

4.1 Centralised landfill for hazardous waste

based on leachate characteristics

4.2 Treatment and disposal of medical waste

4.3 Landfills for industrial waste

4.4 Storage on site

for single generators

4.5 Landfills for construction and demolition waste

4.6 Treatment processes for specific types of waste

- waste oil
- end of life vehicles
- waste tyres, car batteries and other (hazardous) waste from cars
- spent solvents
- paint residues
- etc.

4.7 Export

5 Support program for waste management

5.1 Fund for environmental protection

The fund for the environment, as mentioned in the Environment Act, should be activated as soon as possible. The fund can be used to support investment in recycling and treatment technologies. The fund will receive capital from fees, fines and other financial instruments for waste management. A well defined (tasks, project identification, conditions, management, openness) fund can attract co-financing grants and loans from international donors.

5.2 Training for government staff

Training will be required for the government employees (including customs officials) involved in monitoring and enforcement of waste management activities. Training on specific issues such as planning and policy development will be considered.

5.3 Training program for industrial environmental managers

A special training program for industry environmental managers will be considered. Such a program

should focus on wastewater and waste issues and be further developed in a training program for ISO 14001. Providing training is considered a task for the industries since the revenues that can be achieved (maintained export potential, cost reduction through improved process operation and environmental management, reduced liability) from trained staff is for the industry.

5.4 Cleaner production and Waste minimisation

The industry will be involved, preferably initiate, cleaner production programs directed at small and medium sized industries and recycling activities. Experience in many countries with a developing industry has shown that substantial reductions in air emissions, waste water discharges and waste generation can be achieved without substantial investment and that such programs can define the most cost effective investment programs. Cleaner production programs aim at increasing the production efficiency and thereby increase the revenues and decrease the costs. Therefore strong involvement of the industry in initiating such program is required. A contribution in the costs of developing such programs can be considered.

5.5 Waste Exchange and Recycling Information Centre

Recycling and reuse contribute to the reduction of waste that needs to be landfilled. Landfill area is considered scarce in Lebanon and therefore recycling initiatives have to be promoted. Recycling can generate revenues for the generator or for the company involved in recycling. The Strategy Note will develop proposals for promoting recycling, which may include legislative demands as well as (financial) support for investments in the recycling industry.

The establishment of a waste exchange to promote the recycling of industrial waste and the establishment of a Recycling information centre will be considered. The Waste Exchange is to link generators and potential users of waste. The recycling information centre is to provide easy access to information on recycling companies, in Lebanon and abroad.

6 Organisation of waste management

The present organisation of environmental management needs further clarification. Unclear is what the status is of the proposals and ideas discussed during this mission.

6.1 Tasks and role of the Ministry of Environment

National planning, developing legislation, decrees, standards and guidelines on WM (and other environmental issues), monitoring of large industrial activities, recommendation/permit evaluation for large industrial activities, inspection of all level permits and activities. Monitoring and data-acquisition

6.2 Tasks and role of the Ministry of Municipalities and Rural affairs

enforcement of large industrial complexes assist in planning and program development, assist in monitoring, recommendations for MoE on sector issues

6.3 Tasks and role of the Ministry of Industry

permitting of large industrial complexes assist in planning and program development, assist in monitoring, recommendations for MoE on sector issues, get industries involved in wm activities

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6.4 Tasks and role of other ministries

assist in planning and program development, assist in monitoring, recommendations for MoE on sector issues

6.5 Tasks and role of the Governates and the municipalities

regional and municipal planning, permitting and enforcement of small and medium sized industries

6.6 Tasks and role of the Industry and industry associations

waste reduction, transport, etc, get involved in wm activities as industrial activities, training for members information for members, represent industry to government.

6.7 Public participation

6.8 Monitoring and enforcement

A special paragraph needs to address this issue and a complete structure, related to permitting needs to be considered.

7 Financing of waste management

7.1 Waste treatment and disposal costs

The costs for waste treatment will be covered by the individual generator. A direct link between treatment/disposal costs and the generator is the most efficient way to recover the costs and to promote initiation of the reduction and minimisation activities by the waste generator.

7.2 Waste disposal charges

The introduction of waste disposal charges on mass distributed waste will be considered. The revenues from such disposal charges can be used to finance investment and operation of waste management for this waste. A waste disposal charge is charged on the purchase of the product. The charge can be levied by the government or by the industry itself, providing that the industry takes responsibility for waste management.

8 Import and export

The convention on transboundary movements of waste provides a clear enough framework to control import and export of waste, if properly enforced. Apart from training, no further activities will be considered.

Export of hazardous waste to treatment and disposal facilities will be considered an option for Lebanon. The costs for this export will have to be borne by the generator.

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- 9 Implementation and Action Plan
 - 9.1 Legislative program
 - 9.2 Permit implementation program
 - 9.3 Staffing requirements and training program
 - 9.4 Investment programs for waste treatment
 - 9.5 Locating waste treatment facilities
industrial zones

DOCUMENTS ON WASTE

GENERAL

Assessment of the State of the Environment (ERM, 1996)
Main Report
Policy Options
Regional Environmental Assessment Report on the Coastal Zone of Lebanon (Ecodit, 1997)
Statistical Yearbook (Data on Import/Export)
First National Inventory of Greenhouse Gases, April 1998
Loi sur la Protection de l'Environnement, DRAFT, 1997
ELA Decree, DRAFT 1998

MUNICIPAL SOLID WASTE

Solid Waste/Environmental Management (World Bank)
Staff Appraisal Report 1995
Aide Memoire 1998
Long Term Strategy for Solid Waste Management (LibanConsult, 95)
Volume I Final Report
Volume II Annex
Bourj Hammoud Closure-Project Execution Plan- SIUC3 (MOE, 1997)
Compost Marketing Study (WB, ongoing)

INDUSTRIAL WASTE

Industrial Census (MoEP, 1994)
National Industrial Waste Management Plan (Dar Al Handasah, 1998)
Survey/ Report
Decision Support System (Tebodin, ongoing)
Classification of Industries and Industrial Areas (Fugro, 1996)

HOSPITAL WASTE

Feasibility Study for Collection and Treatment of Hospital Waste, (ERM, Ongoing)
Phase I
Phase II Draft

WASTE OIL

Options for Vehicle Waste Oil Management in Lebanon (SIU3, 1997)
Plan Directeur de la Gestion et de la Collecte des Huiles Usagees (ETEC, 98)
Volume I
Volume II (Annex in Arabic)

TIRES

Discarded Rubber Tire Disposal Options for Lebanon (MEEA, 1996)
Rubber Tires Treatment Policy (MOE, 1997)

AGRICULTURE WASTE

Production and Use of Chemical Fertilizers and the Environment (Zurayk, Baalbaki, Talhouk AUB, 1995)
Yearly Report on the Flow of Imported Pesticides in Lebanon, 1996 & 1997

QUARRIES

A Nation-wide study of Quarries (Dar Al Handasah, 1996)
Stage I Report: Data collection Volume I
Stage II Report: Policies and courses of action

CONSTRUCTION WASTE

SLAUGHTER HOUSE WASTE

Proposed Animal Remnants Treatments Plant (NAPA, MOE, 1998)

SLUDGE

CAR BATTERIES

WASTE WATER

Wastewater Management Plan for Lebanon (Camp Dresser McKee, Khatib & Alami, 1982)
Update Lebanon's Staged Wastewater Program (Khatib Alami, 1994)
Volume I Pre-feasibility report
Volume II Annexes
Water Quality, Howard Humphry

Sheet 1

Sector Code	Industrial activity	Number of industries	Type of waste (not classified)	Waste production (tonne/a)	Waste in stock (tonne)	Comments
1	agriculture and hunting	2	pesticides		0	N/A
			putrescent waste	not relevant		
14	mining and quarrying	240	inorganic non hazardous waste	N/A	N/A	all large activities produce granite, marble, rocks, limestone and ground products, no specific hazardous waste anticipated
			alkaline waste	N/A	N/A	
15/15	food products and beverages and tobacco products	4542	putrescent waste	not relevant		most putrescent waste can be used in agriculture, minor quantities of chemical wastes (H ₂ PO ₄ , denaturing agents, laboratory chemicals)
17	textiles	610	dye stuff		1	0
			potential dry sludge		60	0
			textile cuttings	not relevant		
13	clothing	3044	textile cuttings	not relevant		
13	leather and leather products	858	putrescent scrap products		125	100
			chromium containing scrap		250	150
			potential dry sludge		25	0
			leather product cuttings	N/A	N/A	
20	wood and wood products	144	paint, resin and adhesive waste		30	0
21	pulp and paper products	217	potential dry sludge containing heavy metals		400	0
			low hazardous waste (paper recycling)		500	100
22	printing and publishing	432	low hazardous waste		180	0
			solvents		120	0
			ink residues		124	0
			heavy metal waste		1	0
23	coke and petroleum products	19	mineral oil sludge		150	N/A
24	chemical products and fibres	209				
	# paint		paint sludge (5% heavy metals)		50	25

Sheet1

Sector Code	Industrial activity	Number of industries	Type of waste (not classified)	Waste production (tonne/a)	Waste in stock (tonne)	Comments
	# pesticides		pesticide containing waste	20	5	
	# pharmaceuticals		pharmaceutical waste	30	5	
	# fertilizers		1 catalyst	0	30	
			gypsum	300000	0	
	# detergents		detergent containing residues	30	5	
25	rubber and plastic products	408	plastic and resin waste	100	20	
25	non metallic mineral products	1673				
	# cement pipe manufacturing		1 asbestos (10 %) cement pipe cuttings	150	30	private landfill
			inert waste powder (10 % asbestos)	60	10	
			sludge	2400	N/A	
27, 28, 29, 34	basic metal industry	242	oil emulsions	25	5	
			heavy metal containing waste (various oxides and sludge)	3000	0	
	# aluminium products		potential scrubber sludge	25	0	
			potential sludge from waste water	100	0	
	# galvanizing industry		potential galvanizing sludge	10	0	
	# lead from batteries		slag (heavy metal containing)	500	50	
	# car breaks		7 asbestos containing waste	2	0	
	recyclable industrial packaging waste		paper/cardboard, glass, plastics			
	equipment/car maintenance	domestic and industrial	mineral oils from industries and workshops	less than 4	10000	
	boiler water make up	20	inorganic non hazardous waste	25		
	relevant non-industrial waste					

Factor Code	Industrial activity	Number of industries	Type of waste (not classified)	Waste production (tonne/a)	Waste in stock (tonne)	Comments
		1	potential municipal sewerage waste	300000		2.5 million inhabitants connected to sewer
		2	hospital risk waste	4600		
		3	domestic special waste: spent batteries, medications, mineral oils, paint residues etc., car wrecks (scrap, batteries, oils, tyres)	-		
		4	recyclable (packaging) waste (paper/cardboard, plastics, glass)	-		
Most waste production data are preliminary estimates derived from the OSS/IPC model						
All data refers to the present situation, future ansings will follow later						
Many waste streams can and will be reduced when waste disposal will have a cost.						
this has not yet been taken into account						