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DEVELOPMENT OF A SHORT-TERM PLAN FOR SOLID WASTE MANAGEMENT IN GREATER BEIRUT

WASH FIELD REPORT NO. 79

March 1980

Prepared For:
USAID Mission to the Republic of Lebanon
Order of Technical Direction No. 134

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ment Station.

March 29, 1983

Mr. Malcolm Butler
Mission Director
USAID Mission
Beirut, Lebanon

Attention: Mr. David H. Mandel, Projects Officer

Dear Mr. Butler:

On behalf of the WASH Project I am pleased to provide you with 10 (ten) copies of a report on Development of a Short-term Plan for Solid Waste Management in Greater Beirut.

This is the final report by Max S. Clark and is based on his trip to Lebanon from February 16 to March 2, 1983.

This assistance is the result of a request by the Mission on January 28, 1983. The work was undertaken by the WASH Project on February 10, 1983 by means of Order of Technical Direction No. 134, authorized by the USAID Office of Health in Washington.

If you have any questions or comments regarding the findings or recommendations contained in this report we will be happy to discuss them.

Sincerely,

Dennis B. Warner, Ph.D., P.E.
Director
WASH Project

cc. Mr. Victor W.R. Wehman, Jr.
S&T/H/WS

DBW:cdej

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LEBANON

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IN GREATER BEIRUT

Prepared for the USAID Mission
to the Republic of Lebanon
under Order of Technical Direction No. 134

Prepared by:

Max S. Clark III, P.E.

March 1983

Water and Sanitation for Health Project
Contract No. AID/DSPE-C-0080, Project No. 931-1176
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EXECUTIVE SUMMARY

The WASH Project provided an environmental planning specialist who spent approximately two weeks in Lebanon in February, 1983 to assist the USAID Mission in defining an environmental plan for improvements in solid-waste management in Greater Beirut. This is the report on his mission.

The 30 communities in the Greater Beirut area contain about 1.6 million inhabitants, who generate about 1,400 Tonnes/day of solid wastes.* Solid wastes are collected and disposed of by individual municipalities and two Unions of Municipalities, for the North Metn and South Beirut suburbs, respectively. The Ministry of Interior provides collection vehicles and operating funds to the municipalities.

Eight major dump sites and one processing facility, the Quarantina compost plant in East Beirut, serve the region. At two shore dumps, the Normandie site in West Beirut and the Dawra site in Bourj Hammoud, trash escapes into the sea and litters the beaches along the northern coast of Lebanon, and is carried by sea currents to the shores of Turkey and Cyprus. At five inland sites serving south Beirut suburbs, open burning of trash and substandard operation pollute the urban and riverine environment. Indiscriminate littering and disposal of solid wastes, as well as current disposal practices at municipal sites, detract from the natural beauty and other touristic attractions of the Greater Beirut region.

This report has been prepared to assist USAID and Government of Lebanon (GOL) officials in reaching an agreement on an environmental plan to improve existing solid-wastes conditions during the next one to two years. The environmental plan is stipulated as a condition precedent to a USAID Grant to Lebanon for potable water and environmental sanitation (A.I.D. Project Number 268-0330; a portion of the draft Project Grant Agreement of 20 January 1983 is included in Appendix D). The WASH mission also included on-site technical advice on various aspects of the Grant Agreement, which covers provision of solid-waste collection vehicles and assistance in rehabilitation and restoration of potable water and sewage systems in Greater Beirut.

A basic short-term plan is developed in this report, and preliminary cost estimates are given to assist in defining responsibilities of the public and private organizations charged with implementation of the plan. Under the plan the Normandie and Dawra shore dumps would be closed off from the sea by construction of dikes or sea walls. All wastes from Beirut Municipality would be processed at Quarantina, while North Metn and other existing users of the Dawra site would be served by a conventional sanitary landfill established at the existing site. The remaining suburbs in South Beirut would be served by a regional sanitary landfill in the Ghadir Valley, at the existing dump site near Baabda. Cost allowances have been made for closure of the remaining four existing dump sites in South Beirut.

The essential requirements of the plan are to limit solid-waste pollution of the Mediterranean and to upgrade the operation of disposal sites. Open burning of trash and garbage must cease, and the existing dump sites must either be closed or be converted to controlled sanitary landfills. Wastes

*One Tonne = one metric ton or 2200lbs.

entering a site should be compacted in-place and covered daily with suitable cover material. The dump sites near the Airport and in Hazmiyeh should be closed and the land rehabilitated. The Baabda site appears advantageous as a regional landfill site: it is near the center of waste generation, at an existing site (which should limit land costs) and near an industrial zone remote from residential areas. However, other sites could prove more acceptable upon further investigation and if selected would be considered to be in compliance with the basic objectives of the plan. Similarly, there is no strict requirement for disposal of all south Beirut wastes at a single regional landfill.

It would also be acceptable for Beirut municipality to continue using the Normandie site provided that it is closed off from the sea and operated as a controlled sanitary landfill. This alternative appears attractive in light of the high costs for processing at Quarantina and the desirability of creating additional land for a public park at Normandie.

A public awareness program should be undertaken involving both government and private or voluntary agencies in order to discourage littering and the indiscriminate dumping and open burning of trash. Volunteer programs for clean-up of beaches, river banks, empty lots and roadsides should be encouraged.

Other possible alternatives would be difficult to implement within the next one to two years. These include previous plans to build an incinerator/compost plant at Fourn Ech Chebbak and an incinerator at Chouaifate. Based on the results of the National Waste Management Plan, incineration and composting do not appear economical, compared to sanitary landfills. A previous proposal to take all wastes to a shore landfill, as an integral part of an 8-km long coastal land-reclamation project in North Metn, appears very attractive as a long-term possibility, but requires detailed study and appears politically infeasible in the near term.

If it appears difficult for agencies and municipalities to agree on a short-term plan, there are several urgent improvements that might be considered. Installation of floating booms at Normandie and Dawra is not workable as a long-term solution, but would retain some of the floating solids during the summer when the sea is relatively quiet. Secondly, all the existing dump sites could remain in operation during an interim period, provided that they were upgraded and operated as controlled sanitary landfills.

In order to define the most suitable long-term solutions, a solid-wastes management feasibility study for Greater Beirut should be carried out within the next two years.

Preliminary estimates of capital and operating costs for the elements of the environmental plan are summarized in the following Table.

<u>Plan Element</u>	<u>Capital Cost (LL)</u>	<u>Annual Operating Cost (LL)</u>
A. <u>SHORT-TERM MEASURES</u>		
Urgent Improvements	500,000	3,700,000
Feasibility Study	5,800,000	---
	<u>6,300,000</u>	<u>3,700,000</u>
B. <u>PLAN EXECUTION</u>		
Closure of Dump Sites	8,800,000	---
Operation of Quarantina	---	4,100,000*
Operation of Landfills	---	2,200,000
Additional Haul Distances	---	---
- To Quarantina Plant	---	2,500,000
- To Baabda Landfill	---	2,500,000
	<u>8,800,000</u>	<u>11,300,000</u>

*Incremental cost, excluding current annual cost of 5,500,000 LL.

In addition to the 30 municipalities in Greater Beirut, 15 public and private organizations have been identified that could play a role in implementation of the solid-wastes management plan. However, it is believed that primary responsibility would be placed with the public agencies listed below:

<u>Agency</u>	<u>Primary Areas of Responsibility</u>
Council for Development and Reconstruction	Coordination; foreign-exchange equipment and services
Directorate-General of Urban Affairs	Planning, technical studies
Ministry of Interior	Municipal operating budgets, financing of construction
Municipalities, Unions of Municipalities	Operation of collection equipment and disposal sites

Under present conditions in Lebanon, establishing a strict time-phased implementation schedule is not practical. Rather, it is suggested that delivery of the collection vehicles by A.I.D. be paced or keyed to the suggested urgent improvements, following an "agreement in principle" with GOL on the actions and objectives to be accomplished in solid-wastes management.

An economic and financial assessment of the basic plan indicates the annual per capita cost for the improvements would be about 8 LL/capita/year, which appears affordable to users (about 0.2 percent to 0.5 percent of per capital income) and justifiable in terms of benefits received (from tourism, recreation, and possible public parks). The major impediment to improved solid-wastes management is the very low level of municipal revenues, amounting to only 50 LL/capita/year before the civil war and as low as 16 LL/capita/year in recent years. In the long term, the need for additional sources of municipal revenue is apparent. At the national level it has been necessary to borrow funds for current expenditures in recent years. In order to finance the broad programs required for rehabilitation and reconstruction, additional funds must be borrowed. It is suggested that improvements in solid-wastes management be included among the vital services to be nurtured during a difficult period in Lebanon's history.

PREFACE

This report was prepared by M.S. Clark III of Camp Dresser & McKee Inc. (CDM). Logistic support was provided by the A.I.D./Lebanon Mission. Specialist technical inputs and graphics assistance were provided by staff of the CDM headquarters office in Boston, Massachusetts and the regional office in Slough, England.

Grateful acknowledgement is made of the assistance of the persons interviewed during this study. They are listed in an appendix to this report.

During February, 1983, the exchange rate for the Lebanese Pound (LL) was approximately LL 3.90 = U.S. \$1.00.

Solid-waste quantities in this report are expressed in metric Tonnes, where 1 Tonne = 1000 kg = 2200 lbs.

References in the text to the WASH report are to WASH Field Report No. 66, December, 1982, prepared under CTD 124, entitled "Water and Waste Needs of Metropolitan Beirut and Surrounding Areas"; prepared by a three man CDM team in November, 1982.

The abbreviation NWMP refers to the National Waste Management Plan, a two-year project sponsored by the Council for Development and Reconstruction, the World Health Organization, and UNDP; prepared by CDM and completed in February, 1982.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Because of civil war conditions that have prevailed in Lebanon since 1975, and the 1982 Israeli invasion, serious deficiencies in solid-wastes collection and disposal have accumulated in Lebanon.

In October, 1982, the U.S. Agency for International Development (USAID) issued an Order of Technical Direction (OTD) No. 124 to utilize the services of the project Water and Sanitation for Health (WASH). A three-man mission spent three weeks in Lebanon in November, 1982 defining opportunities for foreign-aid assistance to Lebanon in the sectors of water supply, drainage, sewage and solid wastes management. The WASH team examined conditions in Greater Beirut and war-damaged accessible regions of southern Lebanon. Eleven high-priority projects costing \$17,300,000 were identified, as well as seven other lower-priority projects costing \$18,900,000.

In the Greater Beirut region, the WASH team received from public agencies several itemized lists of solid-wastes collection and landfill-operation equipment that had been destroyed during the war or that was urgently needed to provide a minimum acceptable level of service.

Greater Beirut, for purposes of this report, consists of three geographic areas: (1) the Municipality of Beirut; (2) the North Metn region which stretches about 8 km along the coast from the Beirut River to the Kelb River to the East and North of Beirut; and (3) the South Beirut region, consisting of the coastal plain extending 8 km southward from the border of Beirut to Chouaifate near the southern end of the Beirut International Airport.

The solid-wastes needs identified by Greater Beirut municipalities are summarized below:

<u>Region</u>	<u>Population</u>	<u>Solid-Wastes Equipment Needed⁽¹⁾</u>			
		<u>Compactor Trucks</u>	<u>Front-end Loaders</u>	<u>Street Cleaners</u>	<u>Other Vehicles⁽²⁾</u>
Beirut	600,000	51	1	7	35
North Metn	400,000	11	2	1	20
South Beirut	520,000	<u>52</u>	<u>3</u>	<u>11</u>	<u>4</u>
		114	6	19	59

Notes: (1) From Tables E-3, E-4 and E-5 of the December, 1982 WASH report.

(2) Includes open trucks, pick-up trucks, tank trucks for street washing, street sweepers, bulldozers, cars, and jeeps.

At the time of writing of this report, USAID was negotiating with the Lebanese national Council for Development and Reconstruction (CDR) on the terms of a Grant Agreement to provide \$2,000,000 for the supply of about 40 compactor trucks to Greater Beirut. The Grant also covers assistance in the form of technical studies related to a future Grant for rehabilitation of sewers and water mains.

On February 10, 1983, WASH OTD No. 134 was issued by USAID to cover the work described herein. The OTD and initial scope of work are given in Appendix A. The 20 January 1983 draft of the initial Grant Agreement stipulates that GOL will implement an environmental plan to improve solid-waste management practices and to mitigate marine pollution by solid wastes. Basically the scope of work for this report is to define the elements of an environmental plan.

Relevant portions of the 20 January 1983 draft Grant Agreement (US AID Project No. 268-0330) are contained in Appendix D.

1.2 Methodology

The WASH consultant and Dr. Stephen F. Lintner, Environmental Coordinator, Bureau for Near East, US AID in Washington, formed a two-man team to assist the USAID Lebanon Mission in formulating the environmental plan. Mr. Clark arrived in Beirut on February 16 and departed on March 2, 1983.

In coordination with the Lebanon Mission, the public agencies and municipalities that might or should participate in formulation and execution of the environmental plan were identified. Interviews were conducted with representatives of many of the concerned agencies; persons interviewed are listed in Appendix C.

In addition, visits of inspection were made to relevant facilities and operations as necessary to confirm the continuance of conditions seen previously in November, 1982. Technical advice was provided by CDM headquarters in Boston, Massachusetts and the regional office in Slough, England. A preliminary draft of this report was reviewed with the USAID Mission, discussed and amended in minor respects before final production by the WASH office in Arlington, Virginia.

1.3 Purpose of this Report

The draft Project Grant Agreement for the Potable Water and Environmental Sanitation Project (January 20, 1983, A.I.D. Project No. 268-0330) stipulates in Section 5.2:

"Environmental Quality. The Grantee agrees to plan and implement a program to minimize and/or eliminate any environmental pollution of the Mediterranean Sea from dump sites throughout Lebanon."

In addition, Article 4: Conditions Precedent to Disbursement, stipulates under Section 4.2 (b) that the Grantee will furnish to A.I.D. the following:

"A plan for the environmentally sound utilization of such equipment."

The purpose of this report is to provide background information and a document for discussion related to the following:

- Objectives that might be incorporated into the environmental plan and the Grant disbursement for sewer cleaning and water mains repair.
- The Lebanese agencies and private groups that could play a role in developing and implementing an environmental plan of action.
- A list of possible elements that could be incorporated in the environmental plan.

1.4 Objectives of the Grant

- To foster cooperation between communities in the Greater Beirut area, and assist in "healing the wounds" of separation imposed by the civil war. This applies primarily to solid-wastes planning, but also to the program for repair of sewers and water mains.
- To provide improved water supply and sanitation services to the economically-deprived and over-crowded areas of the region, particularly the South Beirut suburbs. Often Lebanese agencies have focussed on meeting the needs of municipal Beirut, perhaps because of the large government tax revenues derived from Beirut, and because Beirut is the most politically powerful entity in Lebanon. Less attention is paid to the South Beirut suburbs, where many displaced persons presently reside as a result of migrations during the civil war.
- To improve the effectiveness and credibility of government, following a long period of anarchy and division.
- To improve the urban and marine environment.

A large number of projects were identified in the WASH report, but funds under the initial Grant are limited; future funding cannot be assured. The strategic situation now facing USAID is to use the "carrot" provided by the initial grant, plus the likelihood of additional funds in the future, to achieve the stated objectives.

1.5 Existing Conditions

Damage to buildings, roads and other infrastructure elements in Lebanon has been very extensive. Some of the damage, such as the total devastation of the central business district in Beirut, dates

from the civil war which began in 1975. In other places, such as the coastal portion of west Beirut, the main damage was done during April 1981 and the summer of 1982.

By November, 1982, major clean-up operations were already well in hand, especially in Beirut. The work of removing refuse and debris from public and private property has continued. Day by day, more people could be seen moving back into usable parts of damaged buildings, and more buildings were undergoing repair. Food vending and other commercial operations were taking place even in badly damaged areas. Sidewalks and other areas formerly covered with squatter shanties and open stores have now been completely cleared.

Operational responsibility for solid waste collection and disposal lies with the local municipalities and communities of Lebanon. Of the 1,800 communities in Lebanon, 625 are legally defined as municipalities, although of these 211 are classified as "inactive" municipalities. The Ministry of Interior provides administrators, solid-waste equipment, project funds, and general revenues for local government. The Municipal Affairs section of the Ministry is the primary channel for funds for the municipalities. Rural areas and unincorporated communities are served from the mohafaza and caza levels of government by a separate section of the Ministry. In general, the level of funding to rural areas is minimal.

Although municipalities are authorized to collect certain types of local taxes, in actual practice only about a dozen communities receive significant revenues from local industries or other sources. Although the Ministry is thus the major source of municipal revenue, the amounts received are very low by U.S. standards, averaging only \$12/capita/year before the war.

The larger communities in each mohafaza perform some solid wastes collection and disposal. The smaller ones in many cases have formed formal or informal unions for this purpose. In Greater Beirut there are two unions of municipalities, for North Metn and the south Beirut suburbs. These have been formed in part to provide regional solid waste services.

In Beirut Municipality, which has the status of a mohafaza, the responsibility for solid wastes collection has been delegated to two divisions as follows:

- Sanitation Division: operation of collection and transportation services.
- Engineering Division: supervision of turnkey operation of the Quarantina compost plant; maintenance of collection vehicles.

A direct result of the shelling, strafing and bombing of Beirut, particularly west Beirut, was the creation of enormous quantities of building rubble and debris. The Lebanese construction contractor OGER Liban, under funding from the Government of Saudi Arabia, took over the removal of rubble (and, as necessary, garbage) on a

temporary basis from September 6, 1982, acting under the general direction of the Governor of the Mohafaza. It was understood that the company was to give up this work at the end of November, but OGER Liban has continued their work through February, 1983.

As the start of its work, OGER Liban tried to use the existing municipal sanitation labor force of 1600 men, but found their attendance and effectiveness to be so poor that they replaced them with 700 directly hired personnel. (By the first week of November, this force had been reduced to 150.) It is understood that, even for semi-skilled positions such as drivers and mechanical maintenance personnel, the problem is not lack of competent people but salary and administrative conditions in the municipality.

The World Health Organization (WHO), as executing agency for the United Nations Development Programme (UNDP), sponsored the preparation of a National Waste Management Plan. This was to have been paralleled and followed by preliminary engineering and feasibility (PE/F) studies for solid waste management, sewerage and drainage for four priority areas: Tripoli, Jounieh, Zahle and Saida. These latter studies were in fact not able to be performed.

1.6 Solid Waste Conditions and Needs in Greater Beirut

Prior to the Israeli invasion east and west Beirut had effectively been separated by the civil war. Solid wastes from east Beirut were conveyed to the Quarantina compost/incineration plant by trucks maintained in private garages in east Beirut after destruction of the former maintenance facility at Quarantina. Waste from west Beirut was carried to a shore dump at Normandie in trucks maintained in an open yard near the Arab University. (Refer to Figure 1 for locations of solid waste facilities in Beirut.)

The Quarantina plant was provided and is operated by a French company under contract to the municipality. It has a design capacity of 600 T/day. It was intended to serve the whole of the municipality. Because of hostilities, it was closed from mid-1975 through 1978, and it has been operated at reduced capacity since then. The plant was damaged slightly after the invasion by a bomb which had been picked up with refuse. The damage was repaired within two weeks, and the plant is currently treating 80 to 100 T/day of refuse. There is a marketing problem in disposing of the finished compost, which is accumulating on-site. Non-compostible material is incinerated, and the residue is disposed of on-site. Ferrous metal is recovered and baled.

Before the invasion, the Ministry of the Interior had in 1981 purchased 77 compactor trucks, ranging in capacity from 6 to 16 cyd for municipalities throughout Lebanon. Beirut Municipality had a prewar total of 80 compactors and 40 open trucks and received 29 replacement compactors from the Ministry in 1981 (14 of 14 cyd capacity and 15 of 16 cyd capacity).

The Lebanese contracting firm OGER Liban lent Beirut Municipality 10 compactor trucks and 20 open trucks. (These vehicles are understood to have been brought from Saudi Arabia. It has been indicated but not confirmed that the 10 compactors are to be donated to Saida.) In addition, the municipality rented 25 open trucks. That is to say, there have been 75 trucks available in Beirut for municipal waste disposal purposes since the invasion, of which number 30 were compactor vehicles.

The Beirut Municipality has decided that it intends to use 1.5-cyd bins for the pre-collection storage of solid wastes taken from buildings along streets and alleys that are too narrow for 16-cyd packer vehicles. It is understood that OGER Liban will provide initially 450 and ultimately up to 900, as needed, of these bins. The use of bins will require that packer vehicles be equipped with hydraulic lifters matched to the bins.

The municipality's estimate of the number of compactor trucks needed is 100 of 16-cyd capacity plus 20 dump trucks. The municipality also needs pick-up trucks, front-end loaders, tank trucks, street sweepers, sedan cars and a bulldozer.

As a check on the above estimate for packer vehicles, one would expect that the approximately 600,000 population of Beirut would, at the estimated rate of 0.8 kg/day per person of refuse, generate about 480 T/day. This is in accordance with the municipality's estimate of 400 - 500 T/day but is very low by U.S. standards. On the basis of 4-hour shifts actually worked by municipal personnel, with an average of 1.5 trips per shift, allowing for 20 percent of vehicles down for repair, the required number of 16-cyd packer vehicles needed would be 120. The number of such new vehicles needed, disregarding the 9 vehicles currently undergoing major repair, would then be 100. However, there appears to be no reason why each vehicle should not be used for two shifts each day, in which case the effective number of trips per vehicle would be doubled, reducing the required number of new vehicles to 40. (It is understood that security conditions are such that night work is not feasible.)

The Normandie dump has been enlarged greatly since the invasion because building rubble as well as refuse is being dumped there. The dump was flattened and regraded by OGER Liban and has been given a good soil cover. Refuse burning, which was previously a problem, has now been controlled (although occasional fires still occur). There is some dust and odor, and floatable materials are carried away from the dump faces by the sea. A floating boom has been provided along part of the west side (facing the St. Georges Hotel) to contain floatable materials. Heavy seas attending a major storm in February, 1983, washed away large portions along the periphery of the regraded dump site.

Except for the swimming pool at the St. Georges Hotel and the landfill operation, there is no current residential or commercial use of the land in the vicinity. Nearby buildings have been heavily damaged and are not usable at present. This will of course change in the future.

The North Metn suburbs of Beirut, lying to the east of the Beirut River and extending northward along the coast to the Kelb River, have been using the Dawra dump site in Borj Hammoud (see Fig. 1) for the past 25 years. The Dawra site is operated by the municipality of Borj Hammoud using supplementary funds from the user communities. In addition to the member communities of the Union of North Metn Municipalities, Jounieh and the south Beirut suburbs of Chiyah and Fourn Ech Chebbak use the Dawra site.

The total population served by the site is about 450,000, and the quantity of solid wastes is reported to be 240 T/day. Within the large service area of Dawra, there are also many small open dumps in wadis and along roadsides.

The Dawra dump is recognized by local officials as a major environmental blight. Open fires contribute to air pollution and mats of floating material are carried out to sea and deposited on shores northward from Dawra (as well as on the shores of Turkey and Cyprus). Limited amounts of cover material are used to bury the trash and ashes, and the access road is barely navigable by passenger cars.

Informal discussions with local officials indicated that the Quarantina compost plant has remained closed to collection vehicles from west Beirut, primarily because of political pressure on Beirut to allow the wastes now going to Dawra to be taken to Quarantina. However, the capacity of Quarantina is insufficient to handle wastes from east and west Beirut plus the communities served by Dawra.

The Dawra site is within the limits of a coastal land reclamation development planned by Dar Al Handasah (Shair and Partners) for the Union of North Metn Municipalities. A number of political, legal and administrative hurdles remain before this scheme can proceed, and those involved believe 5 to 10 years may pass before it is implemented. A perimeter sea wall at the 5m to 7m depth contour, lying 300m to 500m offshore, would be built and then sand and sediment from St. George's Bay would be dredged to create the reclaimed land. Under this scheme, the Dawra site is within a planned industrial zone, on land allocated to a secondary sewage treatment plant for northern Beirut and North Metn (in the event that pre-treatment is insufficient for marine disposal to St. George's Bay).

To permit future construction of industrial or sewage-treatment facilities at the Dawra site, it is important to dispose of building rubble at restricted portions of the site. Rubble will not provide a stable structural foundation for buildings, and driving piles through it would be difficult and expensive.

The South Beirut suburbs use five dump sites in addition to the Dawra site. The locations are shown on Figure 1. These sites serve the following members of the Syndicate of South Beirut coastal municipalities:

<u>Dump Site</u>	<u>Communities Served</u>
Dawra	Chiyah, Fourn Ech Chebbak
Hazmiyeh	Hazmiyeh
Baabda	Baabda, Hadath, Louaize, Wadi Chahrour
Airport	Ghbaire, Bourj El Barajne, Haret Hraik, Mraijer
Kfarchima	Kfarchima
Chouaifate	Chouaifate

In November, 1982, the Hazmiyeh site was an open burning dump on the flood plain on the west bank of the Beirut River. Trash, burned residues, and minimal soil cover accumulated to a height of 15m encroaching on the river. Oils and litter are carried into the river. Odors from burning garbage permeated the air over a densely inhabited area. A major highway along the west bank of the river has permitted dumping of trash at random locations along the bank downstream from the Hazmiyeh dump.

During the civil war, a considerable amount of trash and sediment accumulated in the Beirut River flood channel, a concrete structure 200m wide and about 2km long built to provide flood protection for portions of Beirut, Senn el Fil and Borj Hammoud. Recently, the Ministry of Hydraulic and Electric Resources undertook a channel cleaning operation which has proceeded downstream to within 200m of the river mouth.

The Baabda dump site was visited in November and similar environmental degradation noted. The smoke, odor, and accumulation of debris at the site despoils the forested mountain-side environment, visible from the urban area below.

An incinerator/compost plant at Fourn Ech Chebbak was under construction at the outbreak of the civil war, as a turnkey construct/operate contract to the same French firm involved in the Quarantina compost plan. Much of the structural work was completed, and equipment had been delivered but not installed. Officials of the South Beirut suburbs indicated that it may cost LL 7 million to replace unusable original equipment and finish the construction. Reservations on the adequacy of the scheme were expressed by several local officials, with respect to plant capacity, the 25/75 split between incineration/compost, the intended service area and the likelihood of air pollution in a densely-inhabited area where smog forms and becomes trapped against the mountain slope.

An attempt was also made to build an incinerator at Chouaifete, to serve portions of Beirut, south Beirut, and possibly North Metn. Demonstrations and protests by local inhabitants prevented any progress beyond fencing in of a proposed site, and several officials made reference to an "impending" decision on a new site. Grants from the French government were provided several years ago for equipment for this and other sites in Lebanon, but none of the planned incinerators have been built.

This brief review of solid wastes conditions in Greater Beirut provides an indication of the high priority given by local officials to finding appropriate solutions to the solid waste problems of Greater Beirut.

The 30 municipalities in Greater Beirut have an urgent need for a rational regional solid-wastes management plan. Although solving solid-waste problems is recognized by local officials as a high-priority need, very little has been accomplished to date for several reasons. Municipalities have responsibility for collecting solid wastes, but must develop their own ad hoc agreements on the location and operation of disposal sites. The Ministry of Interior provides garbage trucks and operating funds to municipalities, but without technical input regarding the appropriate allocation, type and number of vehicles, and without stipulating appropriate locations and practices for landfill disposal. There is also evidence of politically-powerful communities bringing their influence to bear to solve their own solid wastes problems at the expense of other cities in the region.

A coordinated approach to seeking appropriate technical solutions, and identifying the required steps in organization, staffing, finance and operation, is a badly needed contribution toward restoration of both satisfactory environmental conditions and government effectiveness.

CHAPTER 2

POTENTIAL PARTICIPANTS IN THE ENVIRONMENTAL PLAN

Table 1 is a list of governmental and private organizations which could play a role in developing this environmental plan. A brief assessment of their possible roles is given below.

2.1 Council for Development and Reconstruction (CDR)

CDR will accept responsibility on behalf of the GOL that the environmental plan will be developed and implemented. CDR can help in coordination and advice on the political situation. However, it is unlikely that CDR can formulate the plan or force decisions and financial commitments onto the municipalities and government agencies.

2.2 Municipality of Beirut

The Lebanese Army is now in East Beirut, and soon the municipality will be able to close the Normmandie site and take West Beirut waste to the Quarantina plant. In November, it seemed clear that the Philangists were unwilling to have West Beirut garbage trucks pass near their headquarters building adjacent to Quarantina. Also, the North Metn municipalities (also called the East Beirut suburbs) wanted their wastes treated at Quarantina rather than wastes from West Beirut. However, it is not clear whether Beirut municipality has the will and resources to build a sea wall or bund at Normandie. Nor is it clear that Beirut can find politically-acceptable disposal sites outside the municipal boundary.

2.3 Ministry of Hydraulic and Electric Resources

They should have a limited role in the solid-waste plan, but are eager to take over sewage projects on a national scale. They have good technical people in the water supply sector, but in the past have been too political.

2.4 Ministry of Interior

Sami Shaib controls municipal budgets, and has the power and money to impose an environmental plan. He was very cooperative in assisting the WASH team in November, 1982. Unfortunately he has a limited technical staff, and it is uncertain how he will react to the concept and financial commitments of the environmental plan.

2.5 Grand Projects of Beirut

This agency should be given only a limited role, since their past work is primarily in design and construction of sewers, street lights, and drainage.

2.6 North Metn Union of Municipalities

They operate the Dawra dump site in Bourj Hammoud, which also serves Jounieh and several South Beirut suburbs. Since North Metn will not be receiving any benefit from the initial grant, only Sami Shaib of Interior could assure funds for closing off the site. The site is in an industrial zone, well off the main highway, and should be kept in operation until a Greater Beirut solid-wastes management plan is adopted. Perhaps an inexpensive floating boom at Dawra is the only short-term improvement possible.

2.7 Syndicate of South Beirut Municipalities

Lack of funds and small political influence have led to a proliferation of noisome inland dumps within the South Beirut region. The Hazmiyeh dump site is more of a blight on the urban landscape than Dawra. Mr. Helou, President of the Syndicate and Mayor of Baabda, is a relative of the former President of Lebanon, and has been very cooperative in the past. However, Baabda is a rich Christian community, and there is no assurance that Mr. Helou is a true spokesman for the poorer Moslem communities. Few of the communities have municipal engineers or technically competent representatives (to the writer's knowledge). The mayor of Bourj El Barajne indicated a private consulting engineer works part-time for his municipality.

2.8 Beirut Water Office (OEB)

A French firm, BCOEM, is studying the distribution system under an IBRD loan for the area north of Bir Hassan Street, and generally West of Chiyah (based on a verbal description by Mr. Zarife). For this project OEB is acting as the coordinator with Ain Ed Delbe Water Authority, which serves the South Beirut suburbs. OEB could also act as coordinator for USAID water main repairs in South Beirut, but Ain Ed Delbe should join in any "working committee" dealing with this subject.

2.9 Lebanese Federation for Protection of the Environment

This organization of private citizens has a number of technically-competent environmentally-aware individuals, and could give an indication of the strength of the public will to improve the environment.

2.10 Ministry of State for the Environment

This position perhaps no longer exists, but was formerly held by Ceasar Nasr as a "Minister without Portfolio" in Prime Minister Wazzan's Cabinet, prior to Amin Gemayel's election as President.

2.11 ACE and BCOEM

These two private consulting firms, Lebanese and French respectively, should be brought in during the actual performance of the sewer cleaning and water mains repair. However, their detailed technical

knowledge of local conditions is not required in developing the environmental plan for solid wastes. One possibility which warrants further investigation concerns coordination between the proposed sea closure of the Dawra dump site, and construction of the North Metn sewage treatment plant and sea outfall designed by ACE. The sewage plant is to be built on fill at the Dawra site. CDR and Grand Projects of Beirut have received bids on the construction contract, but it may be possible to amend or extend the contract so that the filled area encloses the dump site. However, CDR funding of the project is uncertain, and there are serious technical questions about the outfall project.

2.12 OGER Liban

Mr. Harriri's firm continues to funnel Saudi funds into rubble clearance and reconstruction of Beirut's infrastructure (street lights, repavement, electrical cables, trash collection). They regraded the Normandie dump site, but failed to place stone riprap on the seaward faces; recently stormy seas have overtopped and washed away the portion that had been regraded. Although extremely energetic and resourceful, OGER Liban is developing a reputation for precipitous action with little time given to proper engineering planning and design. They should be contacted in the event that short-term measures at Normandie are found to be beyond the will or financial resources of Beirut municipality. As a minimum, they should deposit rubble around the perimeter of the Normandie site to prevent erosion by wave action.

2.13 Green Plan

This semi-autonomous agency, nominally under the wing of the Ministry of Agriculture, has programs for reforestation, control of soil erosion, and assistance to farmers in terracing of steep hillsides and building farm ponds. They have talked in the past about improving the marketing and distribution of compost from Quarantina. They could be assigned responsibility for accepting all Quarantina compost.

The compost could either be sold, donated to farmers, or spread as a soil conditioner for vegetation on the barren eroded mountain-sides so commonly seen in Lebanon.

2.14 Governor of Mount Lebanon

He would be instrumental in calling together the mayors of South Beirut suburbs, and in identifying a technically-competent environmentally-aware spokesman for this region.

2.15 Director-General of Urbanism

Mr. Fawaz could assist in assuring the compatibility of any proposed solid-wastes plan with other physical planning and projects within Greater Beirut. Although he claims to have a staff of 70 engineers (or had this staff before the civil war), his agency is viewed by

municipalities as concerned primarily with land-use planning and zoning. The Directorate was involved in planning a landfill for Saida, and based on a verbal description by Mr. Fawaz, the Directorate was doing a credible job (taking into account environmental, archeological and surface-geological conditions, and planning for a 50-year landfill life.) It would be desirable to assist the Directorate in strengthening its capability to carry out solid-wastes planning and engineering for municipalities having no technical staff.

CHAPTER 3

AN ENVIRONMENTAL ACTION PLAN FOR SOLID WASTES MANAGEMENT IN GREATER BEIRUT

3.1 Scope of the Plan

The environmental action plan must define the following:

- Required physical improvements at dump sites and processing facilities.
- Required improvements in operation of disposal sites.
- Programs to improve public awareness and public participation.
- Assignment of responsibility for the financial, administrative, organizational, and operational aspects of the plan.
- Agreement among participating agencies on a time-phased schedule for implementing the environmental plan.

The topics are addressed below.

3.2 Physical and Operational Improvements at Disposal Sites

There are eight major municipal dump sites within Greater Beirut and one processing facility at Quarantina; see Figure 1.

Estimates of the population served and the solid-waste quantity (Tonnes/day) disposed of at each site are given in Table 2. In total, the eight sites serve 30 communities containing about 1.6 million inhabitants, who generate about 1400 Tonnes/day of solid wastes.

There is at present no agreed plan for solid-wastes management in Greater Beirut. It is recognized that selection of landfill sites, processing facilities and their associated service areas will ultimately be made by the affected Lebanese governmental agencies and municipalities. However, it is considered useful to outline a "basic" regional plan for solid-wastes management for several reasons:

- (1) To define a plan against which other alternative plans can be compared. In particular, the basic plan should be compared with proposals to build an incinerator/compost plant at Fourn Ech Chebbak to serve South Beirut, an incinerator at Chouaifate to serve West Beirut, and a planned 8 km long coastal land reclamation scheme for North Metn which could (at an extreme) utilize all the urban solid-wastes generated in Lebanon for 20 years to create filled land.

- (2) To establish "order-of-magnitude" costs of construction and operation, so that public agencies are aware of their commitments when they assume responsibility for aspects of the plan.
- (3) To itemize the components of the plan, for subsequent use in defining an implementation schedule.

It is suggested that a "basic" plan for improved solid-wastes management in Greater Beirut would entail the following:

Normandie Site. Dumping at Normandie must stop, and wastes from West Beirut be carried to Quarantina. The Normandie site must be closed off by a dike or sea wall to prevent trash being carried into the sea. A possible method of closure is shown in Figure 2. As an interim measure only, a floating boom should be installed to limit the escape of floating solids to the open sea. If the municipality cannot afford to process all municipal wastes at Quarantina, then the operation of Normandie should be upgraded to that of a sanitary landfill. A conceptual design for the Normandie site (in the Minet El Hosn section of the Beirut) is shown in Figure 3 (excerpted from the NWMP).

Dawra Site. A dike or sea wall must be built to prevent movement of floating trash into the sea. Open burning of trash must cease, and operation of the site improved by compacting and covering the solid wastes daily with suitable cover material; i.e., operation as a conventional sanitary landfill. Ideally only inert wastes (non-putrescible, inorganic) should be placed below sea level, with the usual "cells" of solid wastes and cover material placed above the layer of inert material. The conceptual design for the Normandie site shown on Figure 3 could be adapted to the Dawra site. Rubble from current reconstruction could be used to rebuild and elevate the access road, and in conjunction with geotechnical fabric be used to seal off the seaward faces of the dump site.

Quarantina site. The compost plant is owned by the Municipality of Beirut, and operated under a turnkey contract to a French firm. Due to the high costs of composting, it is proposed that the plant serve only the Municipality. The site is small and was the dump site for Beirut for many years before the compost plant was built. Reject material (the portion of the solid wastes that cannot be composted, such as glass, rubble, and street sweepings) is piled on-site, on top of the former dump. Ultimately Quarantina is to be abandoned to permit expansion of the Port of Beirut. It is proposed that the reject material be hauled to the Dawra site for disposal, and it is assumed that the associated costs would be paid by the plant operator. The plant handled over 500 Tonnes/day for brief periods in the past, and is believed capable of handling all of Beirut's wastes. However, careful attention must be given to marketing and disposal of the compost, presumably by the Green Plan, before Quarantina is placed in full operation.

Hazmiyeh Site. Open burning and dumping at this site, located on the flood plain of the Beirut River and within a heavily urbanized area, must cease. The site should be re-graded, with the dump face excavated back so as to prevent encroachment on the flood plain. As a "basic" alternative, it is proposed that the wastes from Hazmiyeh be hauled to a proposed regional landfill for South Beirut near Baabda (See below).

As of February, 1983 the Hazmiyeh dump site was no longer in use and Hazmiyeh municipality reportedly was using the Dawra site; however, the mayor of Fourn Ech Chebbak indicated that his town has posted a night watchman to limit dumping of Hazmiyeh wastes along the western bank of the Beirut River. The mayor also indicated the Hazmiyeh dump was closed, and a considerable amount of additional fill material carried on-site, in order to provide access from a nearby highway and create a storage yard for vehicles imported through the Port of Beirut.

A potentially serious flood hazard has been created by the former Hazmiyeh dump site and the new embankment placed between November, 1982 and February 1983. The unconsolidated trash and fine-grained fill material could be swept into the Beirut River by flood waters and could block the flow passage under the bridge immediately downstream (see photographs in Appendix E.) In 1954 a large flood destroyed the historic Pasha Bridge (near the present bridge). Subsequently the Beirut Flood Channel was built downstream, with a hydraulic capacity of 800 m³/sec. The 100-year flood was estimated at 1500 m³/sec, but a lower value was used in design because it was assumed that flood-plain storage would reduce the peak flow during a flood. The dump site and new embankment have reduced the flow area of the river considerably below that of the flood channel, in addition to eliminating a portion of the flood plain.

Baabda Site. Open burning at this site must cease, and the site instead should be operated as a sanitary landfill. The Baabda site is adopted herein as the preferred site for a South Beirut regional landfill, for the following reasons:

- Since it is already in use, public or political objections should be limited to the impact of additional truck traffic on access roads to the site. Additional land costs for site expansion should be relatively low. If necessary, a new access road from the valley below the site could be built to overcome objections to truck traffic.
- The site is near the center of generation for South Beirut, but is not itself in a heavily-developed area. Operation as a sanitary land fill (rather than an open burning dump) would not be noticeable from the heavily-industrialized Ghadir valley below the site.
- Development and operation of a sanitary landfill is more economical than other alternatives considered in the past; namely, an incinerator/ compost plant at Fourn Ech Chebbak, and an incinerator at Chouaifate.

- There are no apparent streams or springs near the site, and site drainage can be controlled to limit the effect of the site on water quality. There are no residential areas (and hence private wells) between the site and the Ghadir River (which is already polluted by industrial wastewater).
- It is believed adequate amounts of cover material are available near and within the site.

Airport site. The area to the West and North of the airport contains several active dump sites, as well as the dump site used for three years by West Beirut during the hostilities. Since this area provides the first view of Lebanon for any tourists arriving at the airport, priority should be given to closing the active dump sites and to landscaping the strip of land on either side of the exit highway from the airport. Similarly, the former dump site bordering the coastal highway next to the airport should be landscaped and improved. Compost from Quarantina could be used to promote vegetation at these sites.

Kfarchima and Chouaifate sites. These sites are small and perhaps less objectionable than the others. They have not been visited or evaluated by the writer. For purposes of identifying a "basic" plan, it is assumed these sites would be closed and the wastes from their service areas carried to the regional site near Baabda.

3.3 Estimated Costs for Plan Implementation

In accordance with the "basic plan outlined above, the solid wastes generated in Greater Beirut can be assigned to the Quarantina, Dawra and Baabda sites in the estimated quantities shown in Table 3.

The estimated costs of the plan include two types of costs: (1) capital or once-only costs for closure of dumpsites; and (2) recurring annual costs for operation of collection vehicles and disposal sites.

Table 4 contains preliminary cost estimates for closing six dump sites. An amount of LL 6 million is allocated to building sea walls at Normandie and Dawra; this is higher than the LL 4.8 million estimate in the WASH report, but less than the LL 14 million that can be estimated using procedures outlined in the NWMP. More detailed mapping, borings, hydrographic surveys and engineering studies are needed to refine cost estimates, establish site boundaries, and carry out detailed design. Costs of closure at these sites will depend strongly on timing; a proposed highway extension of the Corniche Ain El Mraisse across the Normandie site could minimize the cost of closure. Similarly, construction of the North Metn outfall and sewage treatment plant would provide at least partial closure of the Dawra site against wave action.

The incremental cost of operation at the Quarantina compost plant is estimated in Table 5. If the solid wastes from the entire Municipality are sent to Quarantina, the additional annual cost will be about LL 4.1 million. Noteworthy are the very high unit costs of

168 LL/Tonne at present, 49 LL/Tonne if West Beirut wastes are added, and 25 LL/Tonne marginal cost for each additional Tonne taken to the plant. These high unit costs illustrate the importance of finding a commercial market for the compost (although it should be pointed out that no compost plant in the U.S.A. has ever proven to be economical). The assumption herein is that the compost can be given away free, for the cost of hauling incurred by the user.

The annual costs of operation at existing dump sites are unknown, and are assumed to be minimal. The annual costs for operation of conventional sanitary landfills at Baabda, Dawra, and a "typical small landfill" for 100 Tonnes/day are shown in Table 6. The estimated unit cost of about 7 LL/Tonne at Baabda and Dawra is significantly smaller than the 49 LL/Tonne projected for the Quarantina plant. The somewhat higher unit cost of 10 LL/Tonne for a small 100 Tonne/day landfill indicates the economy of scale obtained in operation of large landfill sites.

Ideally, a regional landfill site would be selected after comparing haul costs and landfill costs for many alternative sites. Furthermore, the possibility of using transfer stations (where local collection vehicles transfer wastes to large vans for transport to the landfill) would be examined. However, in the present case, it is assumed that the Baabda site is the only environmentally and technically acceptable location for a landfill.

Table 7 contains a conservative estimate of the additional haul costs for the "basic" plan, in which the existing dump sites are taken as the origin of the solid wastes. The incremental haul cost can then be estimated using the quantity of waste to be hauled, and the road distance from the existing dump site to the new proposed disposal site. In actuality, re-routing of collection vehicles would involve smaller increments in haul distance than those shown in Table 7. Turn-around times at Landfill sites are assumed to be the same as at existing dumps: i.e., no incremental cost is incurred. The total costs for the basic plan are summarized in Table 8.

In order to provide an optimized long-term plan for solid-wastes management in Greater Beirut, the WASH report recommends that a feasibility study be conducted. The estimated costs are LL 3.0 million for expatriate consulting services and LL 2.8 million for local consulting and support services.

In the event that long delays are expected in implementing a "basic" plan or other agreed plan of action, interim emergency measures should be taken. These would include:

- placing a floating boom around the Normandie and Dawra sites.
- discontinuing the open burning of solid wastes at existing dump sites.
- upgrading the operation of dump sites to that of acceptable sanitary landfills.

The cost of a floating boom is estimated at LL 500,000. Improved operation at existing landfill sites would have an annual cost of about LL 3,700,000, in excess of the LL 2,200,000 estimated for the basic plan because of the reduced economy of scale at landfills and use of Quarantina only for East Beirut. Approximate costs of improved landfill operation for each site are given in Table 9, based on the adjusted curve from the NWMP shown on Figure 4.

3.4 Public Awareness Program

Private citizens have contributed equipment (such as pre-collection storage containers) and participated in clean-up campaigns in the past. However, any general improvement in urban solid-wastes conditions will require additional discipline and public spirit on the part of the citizenry. These should be fostered and strengthened by a government-organized campaign (in coordination with environmental groups, advertizers, broadcasters, publishers, suppliers of trash bags, etc.) that might entail the following:

- an anti-littering campaign.
- additional litter baskets on streets.
- promoting the use of garbage bags at pre-collection storage points.
- distribution and use of the pre-collection bins supplied by OGER Liban (contingent on availability of USAID trucks with hoisting mechanisms).
- volunteer programs for clean-up of beaches, river banks, empty lots and roadsides.
- discouragement of indiscriminate dumping along roadsides and wadis.
- discouragement of open burning of trash in urban areas.

3.5 Agencies Responsible for Plan Execution and Operation

The components and associated costs of the suggested solid waste improvement plan are listed in Table 10, with a designation of the agencies that could assume responsibility for sponsorship, execution, or operation of each plan component.

Essentially all of the costs must be paid by GOL agencies and municipalities. Only the Greater Beirut solid-wastes feasibility study contains any significant foreign-exchange cost component, but to the writer's knowledge funding of this study has not been given a high priority by any international lending or donor agency. Donor agencies consider the time required for a study (9 to 12 months) as too long to contribute meaningfully to a crash program in redevelopment and reconstruction of Lebanon.

Thus, the agencies involved would assume the following responsibilities:

<u>Function</u>	<u>Agency</u>
Planning	Directorate-General of Urbanism
Foreign-exchange equipment and services	Council for Development and Reconstruction
Municipal operating budgets, financing of construction	Ministry of Interior
Extension of contracts for highway and outfall construction	Grand Projects of Beirut
Operation of equipment and facilities	Municipalities or Unions of Municipalities

3.6 Time Schedule for Implementation

Under present circumstances (in February, 1983) the GOL faces many basic and pressing problems with respect to security, sovereignty, finance, organization and provision of public services. Furthermore, there are few precedents in Lebanon for the type of conditions included in the initial water and sanitation Grant. In the past, equipment (such as garbage trucks) has been given as a direct gift from a donor (such as Saudi Arabia) to a municipality (such as Saida or Tripoli). Involvement by the central government in allocation of such gifts has been minimal and after-the-fact, and without obligations or responsibilities imposed on the receiver.

Under current conditions the GOL may not accept a strict time schedule for implementing a solid-wastes environmental plan. At the same time, finding acceptable solutions to solid-waste management problems has a high priority with governmental and municipal officials. The desire and good will to carry out the suggested (or other) environmental plan should not be doubted; it is only the basic opportunity and the financial resources that are missing.

A possible solution to assuring compliance with a time schedule is to set "contingent conditions" that start the clock moving to accomplish each particular action. The "contingent conditions" would then be followed by a "period of implementation" to be mutually agreed by USAID and GOL. For example, opening Quarantina to wastes from West Beirut could have an associated contingent condition: Beirut municipality must be able to collect local taxes in excess of some agreed threshold. When this occurs, the municipality would agree to pay the additional haul costs and operating costs at Quarantina.

There are other contingent conditions which govern implementation of all environmental-protection actions--for example, the national government's ability to collect taxes or find additional sources of revenue, and the relative priority to be assigned to solid wastes in setting the government's budget. It is believed that such larger global contingencies do, in fact, control the government's ability to act.

A suggested approach for reaching agreement with the GOL is to adopt a four-step procedure:

- have the GOL "agree in principle" with the actions and objectives to be carried out to improve solid-waste management in Greater Beirut. At this point the packer trucks locally available would be purchased and supplied by USAID.
- have the GOL agree that, "conditions permitting", certain Urgent Improvements would be made within, say, a three-month period. The Urgent Improvements might include the installation of floating booms at Normandie and Dawra, the cessation of open burning at selected dump sites (Normandie, Dawra, Hazmiyeh, Baabda, and the Airport, for example), and improved operation of selected sites as sanitary landfills. Upon reaching agreement, the garbage trucks to be shipped from the U.S.A. would be ordered and delivered to Beirut, but would not be turned over to the GOL.
- Upon agreement that the Urgent Improvements have been accomplished and that landfill operations have improved, deliver the trucks to GOL.
- For the duration of the USAID-assisted rehabilitation program in Lebanon, have the GOL agree to an A.I.D. monitoring program to assess general progress in solid-wastes management.

As outlined above, it is estimated that Urgent Improvements could be carried out within three months after signing of the Grant Agreement.

Implementation of the basic plan could be carried out within one year after the various contingent conditions have come to pass (political agreement to proceed, financial arrangements to fund construction and operating costs, etc.). Within this one-year implementation period, approximately 3 to 6 months would be required for technical studies for closure of dump sites. Technical studies and services would include: ground surveys, bathymetric surveys, borings, agreement on end use of sites to be closed, projection of solid-waste quantities at regional sites, investigation of suitable construction materials for sea walls (including rubble from reconstruction of the Beirut Commercial District), design, preparation of construction documents, and cost estimation. During the remainder of the implementation period, technical assistance would be required in evaluation of bids, supervision of construction, and advisory services on organization, staffing, solid wastes collection and operation of landfill sites.

3.7 Environmental, Economic and Financial Assessment

Agreement with GOL on the technical features of the solid-waste management plan, such as selection of locations and types of disposal facilities, is recognized as a condition precedent to plan implementation. However, for purposes of discussion between USAID and GOL officials, it is considered desirable to assess the probable environmental, economic, and financial impacts of the suggested "basic" plan.

Environmental Impacts

The effects of implementing the basic plan could be categorized in several ways: positive and negative; long-term and short-term; and by degree of certainty for probability of occurrence. In the present case, the most practical approach is to enumerate the more likely positive and negative environmental impacts over the near term (say, 5 to 10 years), as follows.

Positive environmental impacts would include:

- improved conditions of the marine and coastal environment, by closure of the Normandie and Dawra sites.
- improved air quality in the urban environment by cessation of open burning at dump sites, particularly the Hazmiyeh site.
- improved environmental health conditions by limiting marine and air pollution.
- reduced risk of flooding by closure and regrading of the Hazmiyeh site.
- aesthetic enhancement of the urban environment by closure of the airport site and other South Beirut dump sites.
- the opportunity for possible additions to the presently-limited system of public parks and playgrounds in Beirut and the southern suburbs, particularly if the Normandie and Airport dump sites are closed and converted to public parks.

Negative environmental impacts might include:

- in building the sea walls at Normandie and Dawra, soft unconsolidated marine sediments will be disturbed and may cause submarine mud slides into St. Georges Bay or at a minimum a localized muddying of the waters during construction (although this effect will be small compared to that of the Beirut River).
- various possible end uses of the land at disposal sites will be expensive to do or rendered impractical; for example, buildings constructed on top of former landfills must be carefully designed to limit differential settlement, and driving piles through concrete rubble for building foundations may prove impossible.

- improper design and/or operation of the landfills at Dawra and Baabda could lead to environmental problems or pollution such as the following: (1) anaerobic decomposition and sulfide generation from wastes deposited below sea level or groundwater level (only inert wastes should be placed below sea level at Dawra); (2) methane production, a natural byproduct of organic decomposition at sanitary landfills, must be taken into account by providing proper ventilation in landscaping and development of end uses for the land; (3) spontaneous combustion of decomposing garbage and trash is a normal hazard of landfill operation, but can be minimized by prompt compaction into thin layers and application of suitable amounts of cover material; (4) liquid toxic wastes and landfill leachates may migrate downstream or into the sea. At Dawra this may require segregation, containerization or even prohibition of toxic waste disposal, and certainly will require placement of a clay or geotechnical fabric against the interior of the sea wall.
- environmental risks specific to the Baabda site would include (1) possible leachate contamination of the coastal aquifer in the Ghadir valley, although this region is heavily settled and industrialized and wells at present are degraded by salinity intrusion and wastewater; (2) possible soil erosion or landslides associated with landfill operation on a relatively steep mountainside; and (3) removal of portions of a relatively mature pine forest, which must be replanted as the landfill operation progresses across the site.

From examination of these impacts, it is concluded that the positive environmental benefits greatly exceed the possible negative effects, since the negative effects can be controlled or minimized by following sound practices in planning, design, construction, and operation of the proposed facilities. Carrying out the improvements would also assist Lebanon in meeting the environmental objectives of the Med Pol program* to which Lebanon is a signatory nation.

Economic Assessment

Economic justification for implementing the basic plan requires consideration of two basic questions:

- Are the costs affordable to the populations served, and do the people receive benefits commensurate with the costs?
- Do the benefits to the national economy exceed the costs incurred?

*Med Pol: The Convention for the Protection of the Mediterranean Sea against Pollution

Table 11 shows an estimate of the per-capita annual costs for the three service areas associated with the Quarantina, Dawra, and Baabda sites, respectively. For the Greater Beirut the average cost is about 8 LL/capita/year.

In 1981 the minimum wage level was 800 LL/month. Assuming one wage-earner per household of six persons, the minimum per-capita income would be about 1600 LL/capita/year. If costs were shared equally by persons of all income levels, the poorest people would pay about 0.5 percent of their annual income for the proposed plan.

Good statistics on average per-capita incomes in Lebanon are lacking. An AUB* survey in 1978 indicated an average household income of about LL 25,000 in 1978, for 489 families in Greater Beirut. For a household of five persons, a payment of 40 LL/year for improved solid-wastes services would amount to only 0.2 percent of household income.

Inhabitants of Beirut would pay about 11.50 LL/capita/year, and in return the attractiveness of Beirut as a tourist center would be improved. Before the civil war and the recent destruction of the Israeli invasion, tourism accounted for one-fourth of the Gross National Product and Beirut contained 6000 hotel rooms. Assuming reconstruction of the same hotel space, an occupancy rate of 50 percent, and an average daily tourist expenditure of 300 LL, the additional income to the Beirut area would be about LL 330 million. Thus Beirut could pay all the costs for solid-wastes improvements by transfer of only 2 percent of the gross expenditures by tourists. Recreational benefits would accrue to the residents from trash-free waters, which would permit swimming along the Beirut shoreline.

North Metn residents would pay about 3.50 LL/capita/year and in return would receive cleaner beaches, primarily in Jounieh Bay where much of the trash from Normandie and Dawra comes ashore. On Sundays during the summer about 100,000 local residents typically go to these beaches. Assuming an annual attendance of 1.8 million visitor-days at beaches, the cost of solid-wastes improvements would equate to a daily charge of one LL per visitor. This is much less than what inhabitants are willing to spend on food and transportation for a typical day at the beach. In addition, cleaner beaches would enhance the attractiveness of the Casino and other tourist hotels in the region.

In return for their 8.70 LL/capita/year, inhabitants of South Beirut would share in the increased employment opportunities in the tourism industry, and would free themselves from the pungent odor of burning garbage. If former dump sites are converted into public parks, residents would gain the opportunity for occasional respite from the poor over-crowded conditions found there. The inhabitants would also be paying their share toward cleaning up the popular beaches lying between Rauche and the Summerland resort complex; these beaches are used by many of the local residents during the summer months.

In the longer term, the Lebanese economy will depend upon tourism, banking, commerce, and industry. Each of these sectors depends in part upon re-establishing Beirut as the "Paris of the Middle East" and a place that is attractive to Westerners and Arabs alike. Reconstruction programs

*The American University of Beirut

currently underway -- expansion of the airport, rebuilding the Beirut Commercial District, expanding the Port of Beirut, and improving the international highways -- are major investments of billions of Lebanese Pounds that have been committed, in part, with this objective in mind. Clearly the costs of solid-waste improvements for Greater Beirut are negligible compared to these other investments and should not be omitted from any serious program to invigorate the Lebanese economy.

From the considerations outlined above, it is concluded that the "basic" plan is economically justifiable.

Financial Considerations

Although current data on municipal budgets and revenue are not available, it is known that municipalities have limited financial resources. Revenues are obtained from two sources: so-called "private funds" from direct taxation by the municipality; and "public funds" from the central government derived from a common tax and national taxes on fuel, electricity, water, telephone and tobacco. Informal estimates by various officials indicate that most municipalities rely almost entirely on public funds, and only about ten "rich" communities derive any substantial revenue from private funds. The so-called rich communities are primarily small towns which contain relatively substantial industries.

The private funds from direct taxation by municipalities apparently are not reported to, or tabulated by, any central ministry; requests for such information must be made directly to the individual municipalities. Private funds are obtained from taxes on the following: rents, advertising, gasoline stations, certain types of commercial and industrial enterprises, construction of buildings, use of municipal slaughterhouses, bicycles, motorcycles, street vendor licenses, store signs, engines, sewer and sidewalk taxes, beverages, taxes on theatres and other public gathering places, notarization fees, and taxes on explosive materials. For Baabda, considered to be one of the better-organized communities in Lebanon, 1979 revenues from local taxation amounted to only about LL40 per-capita.

The Ministry of the Interior disburses the public funds to municipalities derived from the common tax and fuel tax. Published data indicate total funds from these sources increased from LL 70 million in 1969 to LL 119 million in 1972. This is equivalent to about LL 30 to LL 35 per capita per year.

The outbreak of fighting reduced tax receipts to LL 16 million in 1976, and this trend continued through 1980. In 1980 an emergency one-time subsidy was paid to municipalities to make up for the loss in revenue over the previous years. In the case of Baabda, the subsidy resulted in total 1980 revenues from the national government of about LL 100 per capita, an amount which would not compensate for any significant amount of municipal expenditures during the previous six years of hostilities.

Certainly the primary conclusion to be reached is that municipal budgets are far too low to incorporate any meaningful program in solid wastes management. Municipal expenditures are devoted primarily to salaries, consumable supplies, and minimal maintenance of physical plant. Funds are

not available for capital expenditures for acquisition of sanitation equipment. An example of the effect of large capital expenditures is provided by the financing for the south Beirut sewer system: paying off the fifty-percent municipal share of the cost required an allocation of 25 percent of each municipality's budget over a five-year period.

Beirut municipality employs 1600 persons for garbage collection and rents three bulldozers to operate the Normandie site. From these and other figures, it can be estimated that current solid-waste expenditures amount to about LL 30 million in labor costs, LL 1 million for Normandie operation, LL 5.5 million for Quarantina operation, and about LL 1 million for vehicle operating costs. The incremental annual cost of about LL 7 million for the suggested solid waste improvements would increase current expenditures on solid-waste management by about 20 percent.

This sizable increase of about 20 percent may, on the surface, appear objectionable. A further grounds for objection is that the municipality in February is borrowing money to pay current salaries, and has temporarily halted work by engineering consultants on a number of current projects.

A further constraint on municipal expenditures is the large staff of politically-appointed garbage collectors, many of whom were hired after the last municipal elections in 1963. Appointment to such positions was considered in many instances to be an ad-hoc social-welfare or public make-work employment scheme at a time when Beirut was relatively prosperous. Attempts since 1963 to reduce the Beirut work force have been unsuccessful and led in at least one instance to the dissolution of the national Cabinet; the fragility of political alliances in Lebanon is indicated by the 55 changes in Cabinets over the 40 years since independence was obtained in 1943. Thus, it is considered politically and socially untenable to suggest that 20 percent of the garbage collectors be let go to allow improvement in solid-wastes management, although clearly many of them are not working productively.

It is concluded that present municipal income levels are not sufficient to support improvements in solid-wastes management. In the near term, such funds must come from the central government. It is recognized that the central government has been borrowing money to finance current expenditures. However, the GOL also recognizes that it must soon prove the effectiveness of central government to counteract the many divisive forces at play. One can only hope that improvements in solid-wastes management are seen as one of the vital services to be nurtured at a difficult point in Lebanon's history.

TABLE 1

Possible Participants in Development of a
Solid-Wastes Environmental Plan of Action

<u>Agency</u>	<u>Contact</u>	<u>Responsibility*</u>				
		<u>SW</u>	<u>WW</u>	<u>WS</u>	<u>DN</u>	<u>OP</u>
Council for Development and Reconstruction (220000)	Dr. Mohamed Attallah, Chairman Antoine Rabbat, Waste Mgt. (274275)	X	X	-	X	-
Municipality of Beirut	Mitri Namar, Governor Issam Ali Hassan, SW Collection Mounir Bekdash, SW Engineer (305972, Hm 310531) Wahid Boukhari, SW. Eng. (220405) Osama Hourri, WW Eng. (308060) Pierre Michenaud, Qarantina (222066)	X	X	-	X	X
Ministry of Hydraulic and	Bahaeddine Bsar, Minister Rida Dheyne, General Director (274275, 270256) Bassam Jaber, Technical Studies Samir Corbane, Major Works	-	-	X	X	-
Ministry of Interior (371371)	Samih Solh, Director-General Sami Shaib, Municipal Affairs	X	-	-	-	X
Grand Projects of Beirut (365017)	Assem Sinnu, Director-General	-	X	-	X	-
North Metn Union of Municipalities	Habib Hakim, President (892000) Jean Zaidan, Mayor, Engineer	X	X	-	-	X
Syndicate of South Beirut Municipalities	Elias Helou, President (420573)	X	X	-	-	X
Beirut Water Office (386550/1)	Lucien Moubayed, Director-General Gabriel Zarife, Chief Engineer	-	-	X	X	X
Lebanese Federation for Protection of the Environment	Dr. K. Medawar, President					

*SW = Solid Wastes, WW = Waste-Water, WS = Water-Supply;
DN = Design, execution; OP = Operation, mun. finance

TABLE 1 (Continued)

<u>Agency</u>	<u>Contact</u>	<u>Responsibility*</u>				
		<u>SW</u>	<u>WW</u>	<u>WS</u>	<u>DN</u>	<u>OP</u>
Ministry of State for the Environment (1981-82)	Ceasar Nasr					
UNICEF (368490, 368720, 366270)	Raymond Naimy, Chief Eng. John Gulmar Andersson, Chief	-	-	X	X	-
Associated Consulting Engineers (ACE)	Gilbert Michalani	-	X	X	X	-
BCOEM		-	-	X	X	-
OGER Liban (806085/803805)	Fadi Chalak, Project Manager Omar Daouk, Engineer	X	-	-	-	-
Green Plan	Dr. Malek Basbous, President Aref Berjawi, Vice President Abu Jawdeh	X	-	-	-	-
Governor of Mount Lebanon	Fadel Hamouiyieh (demoted subsequently)					
Director-General of Urbanism	Muhamed Fawaz					

TABLE 2 Estimated Quantities of Solid Wastes for Greater Beirut Dump Sites

<u>Dump Site</u>	Communities <u>Served</u>	Population <u>(1)</u>	Solid Wastes <u>Tonnes/day</u>
Normandie	West Beirut	500,000	450
Dawra	Jounieh	70,000	
	Borj Hammouud	140,000	
	Senn El Fil	80,000	
	Jdaide, Dekouane	125,000	
	Dbaye, Zalqa		
	Antelias - Naccache	20,000	
	Remaining No. Metn (2)	34,000	
	Chiyah	40,000	
	Fourn Ech Chebbak	25,000	
		<u>534,000</u>	480
Quarantina	East Beirut	100,000	90
Hazimiyeh	Hazmiyeh	50,000	45
Baabda	Baabda	24,000	
	Hadath	100,000	
	Louaize	1,000	
	Wadi Chahrour	5,000	
		<u>13,000</u>	105
Airport	Ghbaire	45,000	
	Bourj El Barajne	120,000	
	Haret Hraik	70,000	
	Mraije	2,000	
		<u>237,000</u>	210
Kfarchima	Kfarchima	6,000	5
<u>Chouaifate</u>	<u>Chouaifate</u>	<u>30,000</u>	<u>25</u>
Totals: 8 sites	30 communities	1,587,000	1,410

Notes: (1) Estimated 1980 populations from NWMP.

(2) Eight towns each smaller than 10,000; Broummana, Mar Moussa, Saqiet El Misk, Douar, Aayroun, fanar, Byaqout, Bolonya-Mrouj

TABLE 3 Allocation of Solid Wastes under the "Basic" Plan

<u>Site</u>	<u>Communities Served</u>	<u>Population</u>	<u>Solid Wastes (Tonnes/day)</u>
Quarantina	Beirut Municipality	500,000	540
Dawra	Existing users(1)	534,000	480
Baabda	Existing users(?)	130,000	105
	Hazmieh	50,000	45
	Airport users(3)	237,000	210
	Kfarchima	6,000	5
	Chouaifate	30,000	25
	Subtotal, Baabda site:	<u>453,000</u>	<u>390</u>
Totals: 3 Sites	30 communities	1,587,000	1,410

Notes:

- (1) Jounieh, Bourj Hammoud, Senn El Fil, Jdaide, Dekouane, Dbaye, Zalqa, Antelias-Naccache, eight small North Metn towns listed in Table 2, Fourn Ech Chebbak, Chiyah.
- (2) Baabda, Hadath, Louaize, Wadi Chahrour.
- (3) Ghbaire, Bourj El Barajne, Haret Hraik, Mraije.

TABLE 4 Estimated Costs for Closure of Dump Sites

<u>Site</u>	<u>Estimated Cost</u>
Normandie	2,000,000 LL
Dawra (1)	4,000,000
Hazmiyeh	1,500,000
Airport	1,000,000
Kfarchima	200,000
Chouaifate	100,000
	<u>8,800,000 LL</u>

Note:

(1) Sea wall or dike only; this site would remain in operation, while all other sites would be closed to disposal.

TABLE 5

Incremental Annual Cost (1000 LL/year)
for Operation of Quarantina Compost Plant

Service—Area	<u>Solid Wastes (Tonnes/day)</u>	<u>Fixed Cost</u> (1)	<u>Variable Cost</u> (2)	<u>Total Cost</u>	<u>Unit Cost (LL/Tonne)</u>
Beirut Municipality	540	4,706	4,962	9,688	49
East Beirut	90	4,706	827	5,533	168
Increments:	450	0	4,135	4,135	25

Notes:

- (1) The contract between the Municipality and the turnkey operator of Quarantina stipulates a fixed annual cost of 941,284 LL times a cost index "K". The value of K in 1983 is reported to be 5; in 1980 K was in the range 2.77 to 2.83, and in the first quarter of 1981 it was 2.39.
- (2) 5.035 LL/Tonne Times "K". K=5 assumed.

TABLE 6 Incremental Annual Costs for Sanitary Landfills

<u>Site</u>	<u>Solid Wastes</u> <u>(Tonnes/day)</u>	<u>Annual</u> <u>Cost (LL)</u> <u>(1)</u>	<u>Unit Cost</u> <u>(LL/Tonne)</u>
Baabda	390	980,000	6.90
Dawra	480	1,200,000	6.85
Typical Small	100	365,000	10.00

Note:

(1) Based on unit costs from 1982 NWMP, under "poor" conditions, plus 20 percent for inflation.

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TABLE 7 Incremental Annual Costs of Haul to Disposal Sites

<u>From Existing Site</u>	<u>To Proposed Site</u>	Haul Distance <u>(km)</u>	Wastes Hauled <u>(Tonnes/day)</u>	Annual Haul Cost <u>(LL)</u> (1)	Unit Cost <u>(LL/Tonne)</u>
Normandie	Quarantina	3	450	2,500,000	15
Hazmiyeh	Baabda	4	45	330,000	20
Airport	Baabda	5	210	1,910,000	25
Kfarchima	Baabda	3	5	30,000	15
Chouaifate	Baabda	5	<u>25</u>	<u>230,000</u>	25
Subtotal, Baabda			285	2,500,000	
Total				5,000,000	

Note:

- (1) Based on a round-trip cost of 7 LL/km/Tonne, for a 16 cyd packer carrying 3 Tonnes, a vehicle cost of 2.5 LL/km, a labor cost of 40 LL/hour and vehicle speed of 10 km/hour.

TABLE 8 Summary of Estimated Costs

CAPITAL COSTS (LL)

Closure of dump sites	8,800,000
-----------------------	-----------

INCREMENTAL ANNUAL COSTS (LL/year)

Operation of Quarantina Compost Plant	4,100,000
Operation of sanitary landfills	2,200,000
Additional haul distances	
- To Quarantina Plant	2,500,000
- To Baabda landfill	2,500,000
	<u>11,300,000</u>

TABLE 9 Costs for Upgraded Operation at Existing sites

<u>Site</u>	<u>Solid Wastes</u> <u>(Tonnes/day)</u>	<u>Estimated Annual</u> <u>Operating Cost (LL)</u>
<u>Beirut</u>		
Normandie	450	1,100,000
<u>Beirut Suburbs</u>		
Dawra	480	1,200,000
Hazmiyeh	45	200,000
Baabda	105	400,000
Airport	210	630,000
Kfarchima	5	40,000
Chouaifate	<u>25</u>	<u>130,000</u>
	870	2,600,000
	===	=====
Subtotal, suburbs		
Totals	1,320	3,700,000

TABLE 10 Agency Responsibilities for Plan Implementation

<u>Plan Component</u>	<u>Estimated Cost (1)</u>		<u>Possible Sponsoring or Executing Agencies (2)</u>
1. Emergency measures			
(a) Floating booms at shore dumps	50,000	C	Beirut, Bourj Hammoud, Interior, Urbanism
(b) Improved landfill operation at existing sites	3,700,000	OP	Seven municipalities (3), Interior, Unions of Municipalities
2. Greater Beirut Solid-Wastes Feasibility Study	5,800,000	C	Unions of Municipalities, Interior, CDR, Urbanism
3. Closure of Dump Sites			
(a) Normandie	2,000,000	C	Beirut, Grand Projects, CDR
(b) Dawra	4,000,000	C	North Metn Union, Bourj Hammoud, Interior, Grand Projects, CDR
(c) Hazmiyeh, Airport Kfarchima, Chouaifate	2,800,000	C	Municipalities, South Beirut Union, Interior, CDR
4. Expanded operation of Quarantina	4,100,000	OP	Beirut
5. Improved operation of regional landfills			
(a) Dawra Site	1,200,000	OP	North Metn Union, Bourj Hammoud, Jounieh, Interior
(b) Baabda site	1,000,000	OP	South Beirut Union, Baabda, Interior
6. Additional Haul Distances			
(a) Normandie to Quarantina	2,500,000	OP	Beirut
(b) South Beirut to Baabda	2,500,000	OP	South Beirut Union, Interior

Notes:

(1) C = Capital costs in LL,
OP = Annual operating costs in LL/year

(2) Abbreviations for Agencies:

CDR	= Council for Development & Reconstruction
Interior	= Ministry of Interior, Municipal Affairs Section
Urbanism	= Ministry of Public Works, Directorate-General of Urbanism
North Metn Union	= Union of Municipalities of North Meth
South Beirut Union	= Syndicate of Municipalities for the South Coast of Beirut

(3) Municipalities where existing dump sites are located.

TABLE 11 Estimated Per-Capita Annual Costs

<u>Item</u>	<u>Service Area for Regional Disposal Facility</u>			
	<u>Municipality of Beirut</u>	<u>North Metn</u>	<u>South Beirut</u>	<u>Total, Greater Beirut</u>
1. Population Served	600,000	534,000	453,000	1,587,000
2. Disposal Site	Quarantina	Dawra	Baabda	
3. Incremental Annual Costs (LL)				
- Haul costs	2,500,000	0	2,500,000	5,000,000
- Disposal costs	4,100,000	1,200,000	980,000	6,280,000
	<u>6,600,000</u>	<u>1,200,000</u>	<u>3,480,000</u>	<u>11,280,000</u>
4. Present-worth Value of Costs (LL)				
- Annual costs ⁽¹⁾	40,554,000	7,374,000	21,384,000	69,312,000
- Capital costs ⁽²⁾	2,000,000	4,000,000	2,800,000	8,800,000
	<u>42,554,000</u>	<u>11,374,000</u>	<u>24,183,000</u>	<u>78,112,000</u>
5. Present-worth Per-Capita Cost				
(LL per capita)	70.92	21.30	53.38	49.22
6. Equivalent Annual Cost				
(LL)	6,925,000	1,851,000	3,936,000	12,712,000
7. Per-Capita Annual Cost ⁽³⁾				
(LL/capita/year)	11.54	3.47	8.69	8.01

Notes:

(1) Present-worth of 10 years operation, 10% discount rate (net after inflation) present worth factor of PWF=6.1446. Applied to present-day costs (no inflation), with no growth in per-capita solid-waste generation rates (kg/cap/day) over the 10 years. Base year is initial year of operation, coinciding with year in which capital costs incurred.

(2) For sea walls at Normandie and Dawra, and closure of So. Beirut dumps.

(3) Present-worth per-capita cost divided by PWF= 6.1446.

APPENDIX A

ORDER OF TECHNICAL DIRECTION
AND
SCOPE OF WORK

Rec'd 2/17/83

February 14, 1983

T-134

Mr. Max Clark
Camp, Dresser & McKee
One Center Plaza
Boston, MA 02108

Dear Mr. Clark:

WASH has been requested by USAID/Lebanon and NE/PD to assist them in developing an environmentally sound "Plan-of-Action" to stop the continuing pollution of the Mediterranean Sea which is emanating from improper dumping of solid wastes at various points along the coast of Lebanon. (See attached OTD for details).

To assist WASH in developing this Plan, you are authorized to expend the following time and resources:

- International/domestic per diem days - not to exceed twenty two (22) days.
- International trips (Boston/Washington/Lebanon/Washington/Boston) not to exceed one (1).
- Local travel in Lebanon - NTE \$1600. (May hire a car).
- Secretarial, graphics, reproduction and/or local professional services - NTE \$2800.

You are to start the Mission on or about 14 February by reporting to the Mission in Beirut where you will be joined by Mr. Steven Lintner on/about 18 February. He will serve as the team leader of this two person mission. The team will work with the Government of Lebanon and AID/Lebanon to develop the Plan-of-Action described in the attached OTD.

You are authorized to work seven days a week if needed, but, you can not exceed the authorized days. This time includes time for developing your final report which is due in WASH within 15 days of your return to the U.S.

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The resources listed above (time, trips and expenses) may be expended up to the limits indicated without prior written approval of the WASH Project Director. But, you should establish contracts and/or obtain receipts for all expenditures.

The Task Manager for this effort will be Mr. David Donaldson [REDACTED]
[REDACTED] You should contact him concerning any questions regarding this work.

Thank you for your effort. I remain,

Sincerely,

Dennis B. Warner
Project Director

DBW:DD:mh

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WATER AND SANITATION FOR HEALTH (WASH) PROJECT
ORDER OF TECHNICAL DIRECTION (OTD) NUMBER 134
10 February 1983

TC: Dr. Dennis Warner, P.E.
WASH Contract Project Director

FROM: Mr. Victor W. R. Wehman Jr., P.E., R.S. JWW
AID WASH Project Manager
AID/S&T/H/WS

SUBJECT: Provision of Technical Assistance Under WASH Project
Scope of Work for USAID/Lebanon and NE/PD

REFERENCE: A) Memo Freundlich/Wehman dated 8 February 1983
B) Beirut 1069, dated 28 Jan 1983

1. WASH contractor requested to provide technical assistance to USAID/Lebanon and NE/PD as per Ref A and Ref B para 2-3. Contractor's consultant will work under the direct supervision of NE/PD officer Mr. Steven Lintner during this activity. Mr. Lintner will work with WASH consultant in Lebanon on this activity.
2. WASH contractor/subcontractor/consultants authorized to expend up to 26 person days of effort over a three (3) month period to accomplish this technical assistance.
3. Contractor authorized to expend up to 22 person days of international/domestic per diem to accomplish this effort.
4. Contractor to coordinate with NE/PD (Steven Freundlich and Steven Lintner), NE/TECH/HNP (Barbara Turner), NE Bureau Lebanon Desk Officer, NE/PD/ENGR (James Habron) and should provide copies of this OTD along with periodic progress reports as requested by NE Bureau and/or S&T/H/WS staff.
5. Contractor authorized to provide up to one (1) international round trip from consultants home base to Washington D.C. (for briefing) to Lebanon and return to consultants home base through Washington D.C. (for debriefing and possible planning meetings).
6. Contractor authorized local travel within Lebanon as necessary and appropriate to accomplish technical assistance effort NTE \$1600 without the prior written approval of the AID WASH Project Manager.
7. Contractor authorized to obtain necessary secretarial, graphics, reproduction and/or local professional services as necessary and appropriate to accomplish this scope of work NTE \$2800 without the prior written approval of the AID WASH Project Manager.

(2)

8. Contractor authorized to provide for local car or vehicle rental or hire as necessary and appropriate to accomplish this technical assistance effort. USAID/Beirut is encouraged to support consultant and team if vehicles available and appropriate.
9. WASH contractor will adhere to normal established administrative and financial controls as established for WASH mechanism in WASH contract.
10. WASH contractor should definitely be prepared to administratively or technically backstop field consultants and subcontractors.
11. New Procedures relating to Subcontractor cost estimates and contractor justification for use of consultants remains in effect.
12. Contractor to provide field draft coordinated report to USAID/Lebanon before consultant returns to U.S. Final report due to USAID/Lebanon, NE/PD and S&T/H/WS within 30 days of return of consultant to the U.S.
13. Mission and NE/PD staff should be contacted immediately and technical assistance initiated before 14 February 1983.
14. Appreciate your prompt attention to this matter. Good luck.

WASH
Proj. DIR.
Donaldson

MEMORANDUM

Date: February 8, 1983

To: S&T/HEA: Victor Wehman

From: NE/PD/MENA: Steven J. Freundlich

Subject: Request for the services of Max Clark under the WASH Project

Per our phone conversation of February 7, 1983 the following "Terms of Reference" apply to the proposed TDI services of Mr. Max Clark under the WASH Project.

McJunkie
Austin
WJ WEHMAN
WITTEN

The AID/Lebanon mission has requested the services of Mr. Clark as part of a two person team that will be in Beirut, Lebanon for up to three weeks. The other member of the team will be the Near East Bureau Environmental Coordinator, Mr. Stephen Lintner. The Team will work with the Government of Lebanon and AID/Lebanon on the development of an environmentally sound "Plan of Action" to stop the continuing pollution of the the Mediterranean Sea which is emanating from improper dumping of solid wastes at various points along the coast of Lebanon. This Plan is required, by AID, as a Condition Precedent to the disbursement of funds under the recently authorized Potable Water and Environmental Sanitation Sector Project #268-0330.

It is envisioned that such a Plan will include a program to;

- a) close the Normandie dump site,
- b) provide enclosures for the Dawra and other relevent dump sites throughout Lebanon, based on the National Waste Management Plan,
- c) reassign the dumping locations for various municipalities in order to maximize the use of environmentally safe disposal areas such as the Qarantina Plant, and
- d) develop a overall plan for the collection and handling of solid waste in Beirut.

The Plan will also incorporate a description of the steps to be taken, identification of the organizations responsible for each step, identification of the sources of funding for the implementation of each step of the Program, and a proposed time table for the implementation of the program.

The Mission has requested that Mr. Clark arrive in Beirut on February 14, 1983 in order to begin work on this urgently needed Plan as soon as possible. Mr. Lintner plans on arriving in Beirut on/about February 18, 1983. The Mission envisions that the Team's work will require a minimum of two weeks and a maximum of three weeks. The mission will provide the Team with the necessary logistical support during its time in Lebanon.

Attachment:
Beirut 01069

RECEIVED ST/H/WJ (WEHMAN) 2-9-83
PASSED TO WASH 2-9-83

Clearances:
NE/PD: S. Lintner (draft)
NE/PD/MENA: D. McCall (draft)
NE/PD/ENGR: F. Montanari (draft)

Drafter: NE/PD/MENA: S. Freundlich/sjf

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Department of State

INCOMING TELEGRAM

WASH ACTION COPY
Page DIR

BEIRUT 010.9 01 OF 02 231533Z 8611 048613 A 0760

ACTION OFFICE NEPD-31
INFO NEPD-01 NETC-04 PPTC-01 POPR-01 PPPB-03 GC-01 GCPL-01
GCNE-01 C-01 CMGT-02 CHE-02 JMD-01 ENJR-01 NEME-03
STEN-01 RELO-01 TELE-01 CAEN-01 MAST-01 LTF-01
/835 14 028

INFO OCT-08 02-10 NEA-07 AM-0-01 /853 W
-----J56155 231533Z /33

O 231516Z JAN 83
FM AMEMBASSY BEIRUT
TO SECSTATE WASHDC IMMEDIATE 1352
AMEMBASSY AMMAN IMMEDIATE

UNCLAS SECTION 21 OF 02 BEIRUT 01269

AIDAC

AMMAN FOR RLA

E.O. 12355: N/A
SUBJECT: POTABLE WATER AND ENVIRONMENTAL SECTOR
PROJECT (251-0330)

REF: STATE J25708

1. SCHEDULE BELOW IS MISSION'S BEST ESTIMATE OF STEPS AND TIME REQUIRED TO EXECUTE GRANT AND INITIATE PROJECT IMPLEMENTATION:

A. 1/28 - BEIRUT GARBAGE TRUCK SPECS CABLED TO AID/W FOR REVIEW.

B. 2/1 - DRAFT GRANT AGREEMENT FORMALLY TRANSMITTED TO CDR.

C. 2/2 - MISSION AND CDR BEGIN DISCUSSIONS ON DRAFT AGREEMENT AND TECHNICAL GROUP COMPOSITION

D. 2/4 - TECHNICAL GROUP CONVENED TO DISCUSS DRAFT GRANT AGREEMENT, ENVIRONMENTAL PLAN PREPARATION AND SCOPE OF WORK FOR CDM.

E. 2/5 - TOY OFFICER(S) ARRIVE TO ASSIST WITH ENVIRONMENTAL PLAN.

F. /7 - MISSION AND CDR REVOKLNUF OUVPO ON GRANT AGREEMENT; TECHNICA. GROUP COMPLETES REVIEW OF SCOPE OF WORK FOR CDM; TOY OFFICER BEGIN WORK WITH TECHNICAL GROUP ON ENVIRONMENTAL PLAN; SER/CM REQUESTS PROFORMA INVOICES FOR GARBAGE TRUCKS.

G. 2/9 - CONTRACT NEGOTIATIONS WITH CDM BEGIN.

H. 2/14 - GRANT AGREEMENT EXECUTED; TECHNICAL GROUP COMPLETES FINAL DRAFT OF ENVIRONMENTAL PLAN; MISSION BEGINS NEGOTIATIONS FOR LOCALLY AVAILABLE GARBAGE TRUCKS; CONTRACT EXECUTED WITH CDM.

I. 2/18 - ENVIRONMENTAL PLAN AND OTHER CP DOCUMENTS APPROVED BY AID; MISSION CONTRACTS FOR LOCALLY AVAILABLE TRUCKS.

J. 2/21 - AID/W COMPLETES CONTRACTING FOR ADDITIONAL GARBAGE TRUCKS.

K. MISSION IS REQUESTING CDR TO CONVEY TECHNICAL GROUP CONSISTING OF A REPRESENTATIVE FROM EACH IMPLEMENT-

BEIRUT 010.9 01 OF 02 231533Z 8611 048613 A 0760
ING ORGANIZATION E.G. CDR. OFFICE DES EALK DE BEIRUT
(CEB). MUNICIPALITY OF BEIRUT OTHER MUNICIPALITIES,
MINISTRY OF INTERIOR, MINISTRY FOR HIGH-JULIC AND
ELECTRIC RESOURCES.) THIS GROUP SHOULD PROVIDE TECHNICAL
FOR QUICK REVIEW AND APPROVAL OF GRANT AGREEMENT GROUP
WILL BE ESPECIALLY IMPORTANT IN PREPARING SOLID WASTE
DISPOSAL PLAN AND WILL BE USED TO REVIEW SCOPE OF WORK
FOR CDM AND SUBSEQUENT CONTRACTS.

3. TO SATISFY C.P. 4.3 A), WE WILL ASK CDR FOR PLAN OF ACTION TO STOP POLLUTION OF THE OCEAN FROM IMPROPER DUMPING OF SOLID WASTES INCLUDING: THE CLOSING OF NORMANIDE DUMP SITE; THE ENCLOSURE OF THE DALRA AND OTHER DUMP SITES; AND THE REASSIGNMENT OF DUMP LOCATIONS FOR VARIOUS MUNICIPALITIES TO MAXIMIZE THE USE OF ENVIRONMENTALLY SAFE DISPOSAL AREAS SUCH AS THE SARANTINA PLANT. SUCH A PLAN WOULD INCLUDE: A DESCRIPTION OF THE STEPS TO BE TAKEN; IDENTIFICATION OF THE ORGANIZATIONS RESPONSIBLE FOR EACH STEP; IDENTIFICATION OF FUNDING SOURCES FOR THE MEASURES; AND A TIME TABLE. WE WILL NEED ONE TO TWO WEEKS OF TOY HELP TO ASSIST GOL IMPLEMENTING ORGANIZATIONS AND ASSURE THAT THE END PRODUCT IS ACCEPTABLE TO A.I.D. BECAUSE PLAN ENTAILS EXTENSIVE CIVIL WORKS TO SECURE DUMPS, CIVIL ENGINEERING EXPERTISE MAY BE REQUIRED IN ADDITION TO ENVIRONMENTAL COORDINATOR STEVE LINTNER. WE WILL RELY ON AID/W JUDGEMENT IN THIS MATTER. SEE PARA ONE FOR TIMING OF TOY.

4. PLEASE ADVISE STATUS OF PREPARATION CDM SCOPE OF WORK. WE WOULD LIKE TO PRESENT SCOPE TO TECHNICAL GROUP

FOR REVIEW. HOPEFULLY, NEGOTIATIONS WITH CDM CAN BE COMPLETED IN TIME TO PERMIT EXECUTION OF CONTRACT IMMEDIATELY AFTER PROJECTED EXECUTION OF GRANT FEB. 14.

5. SEPTEL TRANSMITTED SPECS FOR MUNICIPALITY OF BEIRUT GARBAGE TRUCKS. SER/CM SHOULD SEEK PROFORMA

RECEIVED ST/H/WS (WETTMAN) 2-9-83
PASSED TO WASH 2-9-83

ACTION TAKEN
V.A.N.
RECEIVED
Cable [Signature] 2/2
DATE INITIALS DATE
TAKES:
Friedrich 2/2/83

McJunkin
Austin
Witten
Wetman
Jew

NE JPD/MENA
1/31/83

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ACTION AID-00

ACTION OFFICE NEPD-04

INFO NEDP-03 NETC-04 PPCE-01 PDPR-01 PPPB-03 GC-01 GCFL-01
GCNE-01 C-01 CMGT-02 CNE-02 STMD-01 ENGR-01 NEME-03
STEN-01 RELO-01 TELE-01 DAEN-01 MAST-01 LTF-01
/035 A4 823

INFO OCT-00 COPY-01 SS-10 NEA-07 AMAD-01 /054 W
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FM AMEMBASSY BEIRUT
TO SECSTATE WASHDC IMMEDIATE 1353
AMEMBASSY AMMAN IMMEDIATE

UNCLAS SECTION 02 OF 02 BEIRUT 01069

INVOICES FOR PROCUREMENT OF TRUCKS ONLY FROM FIRMS
HAVING SERVICE CAPACITY IN LEBANON. LIKELY DATE FOR
PLACING FIRM ORDER SHOWN IN SCHEDULE. LOCAL
PROCUREMENT OF AVAILABLE VEHICLES SHOULD OCCUR AROUND
SAME TIME. PLEASE PROCESS ADHOC CONTRACTING DELEGATION
FOR MISSION DIRECTOR. WE WILL HAVE TO IDENTIFY TRUCK
SIZES, QUANTITIES AND SPECS FOR TRUCKS NEEDED OUTSIDE
OF BEIRUT WITH TECHNICAL GROUP. WILL ADVISE SOONEST.
DILLON

UNCLASSIFIED

A-8

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Scope of Work

To assist the GOL in the development of an environmental plan for solid waste disposal to include:

- determination of the end-use and final shape of the filled area^s of Normandie and Dawra;
- design for extensions of the outfall sewers on either side of the Normandie site;
- design for impervious and durable slopes against the sea at both dumps;
- agreement on emergency interim measures to contain floatables;
- an agreement on the redistribution of solid waste disposal from the Normandie and Dawra dump sites to the under-utilized disposal plant of Quarantina and others in Beirut.
- a time-phased implementation plan for the above activities which assigns responsibility to various ministries and implementing agencies, both national and provincial.

Environmental Plan

At the end of the 2-week TDY, Lintner and Clark should have completed or caused to have completed an environmental plan which will fulfil the CP of this grant. (See attached telex for Fuller Scope).

Drafted by: P. Pearson:fab - Feb. 15, 1983

APPENDIX B

Study Team Itinerary

Bangkok/Athens (by air)		Feb. 14, 1983
Athens (to obtain visa)		Feb. 15, 1983
Athens/ Beirut		Feb. 16, 1983
Meetings:	OEB, water mains	Feb. 18, 1983
	Beirut, solid wastes	Feb. 21, 1983
	Urbanism, planning	Feb. 23, 1983
	Beirut, solid wastes	Feb. 23, 1983
	South Beirut Municipalities	Feb. 24, 1983
	Beirut, waste water	Feb. 24, 1983
	Interior, solid wastes	Feb. 25, 1983
	South Beirut, solid wastes	Feb. 26, 1983
	Interior/OEB/CDR/Hyd. & Elec.	Feb. 28, 1983
	Urbanism, planning	March 1, 1983
	South Beirut, solid wastes	March 1, 1983
Beirut/London/Boston		March 2/3, 1983

APPENDIX C

Persons Interviewed

- Ministry of Interior
Sami Shaib, Director, Municipal Affairs
- Ministry of Hydraulic and Electrical Resources
Bassam A. Jaber, Director, Technical Studies
Antoine Rabbat, Engineer
- Ministry of Public Works, Directorate-General of Urban Affairs
Muhamed Fawaz, Director-General
- Governorate of Mount Lebanon
Fadel Hamouiyieh, Governor (former)
- Syndicate of Municipalities for South Coast of Beirut
Maroun Maroun, Chief of Chiyah Municipality
Chiefs or representatives of 10 municipalities
- Municipality of Beirut
George Riashi, Chief Engineer
Mounir Bekdache, solid wastes engineer
Wahib Boukhari, solid wastes engineer
Osama Houry, sewerage and drainage engineer.
- Beirut Water Officer (OEB)
Gabriel Zarife, Chief Engineer
- Municipality of Fourn Ech Chebbak
Roukoz Kassis, President
- Municipality of Bourj el Barajne
(Abou Tallib) Hussain Ali Nasser, President
- U.S. Agency for International Development Mission to Lebanon
Malcolm H. Butler, Mission Director
David H. Mandel, Mission Projects Officer
Robert W. Pearson, Assistant Mission Projects Officer
Dr. Stephen F. Litner, Environmental Coordinator,
Bureau for Near East

APPENDIX D

DRAFT GRANT AGREEMENT *
(20 January 1983, P.N. 268-0330)

* Annex 2 "Project Grant Standard Provisions Annex"
not included.

PROJECT
GRANT AGREEMENT

THE REPUBLIC OF LEBANON
AND THE
UNITED STATES OF AMERICA

FOR
THE POTABLE WATER AND ENVIRONMENTAL
SANITATION PROJECT

JANUARY 20, 1983

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Project Grant Agreement

Dated:

Between

The Republic of Lebanon ("Grantee")

And

The United States of America, acting through the
Agency for International Development ("A.I.D.")

Article 1: The Agreement

The purpose of this Agreement is to set out the understandings of the parties named above ("Parties") with respect to the undertaking by the Grantee of the Project described below, and with respect to the financing of the Project by the Parties.

Article 2: The Project

SECTION 2.1. Definition of Project. The Project, which is further described in Annex 1, will consist of assistance in rehabilitation and restoration of the potable water, sewage, and waste collection and disposal systems in Beirut and other selected localities within Lebanon. Within the limits of the above definition of the Project, elements of the amplified description stated in Annex 1 may be changed by written agreement of the authorized representatives of the Parties named in Section 8.3, without formal amendment of this Agreement.

Article 3: Financing

SECTION 3.1. The Grant. To assist the Grantee to meet the costs of carrying out the Project, A.I.D., pursuant to the Foreign Assistance Act of 1961, as amended, agrees to grant the Grantee under the terms of this Agreement not to exceed Two Million Seven Hundred and Fifty Thousand United States ("U.S.") Dollars (\$2,750,000) ("Grant").

The Grant may be used to finance foreign exchange costs, as defined in Section 6.1, and local currency costs, as defined in Section 6.2, of goods and services required for the Project.

SECTION 3.2. Grantee Resources for the Project.

(a) The Grantee agrees to provide or cause to be provided for the Project all funds, in addition to the Grant, and all other resources required to carry out the Project effectively and in a timely manner.

SECTION 3.3. Project Assistance Completion Date.

(a) The "Project Assistance Completion Date" (PACD), which is January 31, 1985, or such other date as the Parties may agree to in writing, is the date by which the Parties estimate that all services financed under the Grant will have been furnished for the Project as contemplated in this Agreement.

(b) Except as A.I.D. may otherwise agree in writing, A.I.D. will not issue or approve documentation which would authorize disbursement of the Grant for services performed subsequent to the PACD or for goods furnished for the project, as contemplated in this Agreement, subsequent to the PACD.

(c) Requests for disbursement, accompanied by necessary supporting documentation prescribed in Project Implementation Letters are to be received by A.I.D. or any bank described in Section 7.1 no later than nine (9) months following the PACD, or such other period as A.I.D. agrees to in writing. After such period, A.I.D., giving notice in writing to the Grantee, may at any time or times reduce the amount of the Grant by all or any part thereof for which requests for disbursement, accompanied by necessary supporting documentation prescribed in Project Implementation Letters, were not received before the expiration of said period.

Article 4: Conditions Precedent to Disbursement.

SECTION 4.1. First Disbursement. Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(a) An opinion of the Minister of Justice or of other counsel acceptable to A.I.D. that this Agreement has been duly authorized and/or ratified by, and executed on behalf of, the Grantee in accordance with all of its terms;

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(b) A statement of the name of the person holding or acting in the office of the Grantee specified in Section 8.3., and of any additional representative, together with a specimen signature of each person specified in such statement; and

(c) Evidence that the Grantee will budget and have available such local financing as is necessary for the successful implementation of the Project.

SECTION 4.2. Additional Disbursement. Prior to any disbursement under the Grant, or to issuance by A.I.D. of documentation pursuant to which disbursement will be made, for the procurement of waste collection and packing equipment or other related equipment, the Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(a) A plan for the distribution of equipment procured under the Project;

(b) A plan for the environmentally sound utilization of such equipment; and

(c) Evidence that implementing agencies and municipalities agree to provide the maintenance, and storage facilities necessary for the operation and protection of such equipment and related spare parts.

SECTION 4.3. Notification. When A.I.D. has determined that the conditions precedent specified in Section 4.1 and 4.2 have been met, it will promptly notify the Grantee.

SECTION 4.4. Terminal Dates for Conditions Precedent.

(a) If all of the conditions specified in Section 4.1 have not been met within 60 days from the date of this Agreement, or such later date as A.I.D. may agree to in writing, A.I.D., at its option, may terminate this Agreement by written notice to Grantee.

(b) If all of the conditions specified in Section 4.2 have not been met within 120 days from the date of this Agreement, or such later date as A.I.D. may agree to in writing, A.I.D., at its option, may cancel the then undisbursed balance of the Grant, to the extent not irrevocably committed to third parties, and may terminate this Agreement by written notice to the Grantee.

Article 5: Special Covenants

SECTION 5.1. Project Evaluation. The Parties agree to establish an evaluation program as part of the Project. Except as the Parties otherwise agree in writing, the program will include, during the implementation of the Project and at one or more points thereafter:

- (a) evaluation of progress toward attainment of the objectives of the Project;
- (b) identification and evaluation of problem areas of constraints which may inhibit such attainment;
- (c) assessment of how such information may be used to help overcome such problems; and
- (d) evaluation, to the degree feasible, of the overall development impact of the Project.

SECTION 5.2. Environmental Quality The Grantee agrees to plan and implement a program to minimize and/or eliminate any environmental pollution of the Mediterranean Sea from dump sites throughout Lebanon.

SECTION 5.3. Counterpart Personnel The Grantee agrees to ensure that implementing agencies and municipalities which receive equipment under the grant will assign appropriate numbers of qualified personnel as counterparts to be trained by the suppliers in the correct operation and maintenance of the equipment.

Article 6: Procurement Source

SECTION 6.1. Foreign Exchange Costs. Disbursements pursuant to Section 7.1 will be used exclusively to finance the costs of goods and services required for the Project having, with respect to goods, their source and origin, and with respect to services their nationality in the United States (Code 000 of the A.I.D. Geographic Code Book as in effect at the time orders are placed or contracts entered into for such goods or services) ("Foreign Exchange Costs"), except as A.I.D. may otherwise agree in writing, and except as provided in the Project Grant Standard Provisions Annex, Section C.1(b) with respect to marine insurance. Ocean transportation costs will be financed under the grant only on vessels under flag registry of the United States, except as A.I.D. may otherwise agree in writing.

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SECTION 6.2. Local Currency Costs. Disbursements pursuant to Section 7.2. will be used exclusively to finance the costs of goods and services required for the Project having their origin in the Republic of Lebanon ("Local Currency Costs").

Article 7: Disbursement

SECTION 7.1. Disbursement for Foreign Exchange Costs.

(a) After satisfaction of conditions precedent, the Grantee may obtain disbursements of funds under the Grant for the Foreign Exchange Costs of goods or services required for the Project in accordance with the terms of this Agreement, by such of the following methods as may be mutually agreed upon:

(1) by submitting to A.I.D., with necessary supporting documentation as prescribed in Project Implementation Letters, (A) requests for reimbursement for such goods or services, or, (B) requests for A.I.D. to procure commodities or services in Grantee's behalf for the Project; or,

(2) by requesting A.I.D. to issue Letters of Commitment for specified amounts (A) to one or more U.S. banks, satisfactory to A.I.D., committing A.I.D. to reimburse such bank or banks for payments made by them to contractors or suppliers, under Letters of Credit or otherwise, for such goods or services, or (B) directly to one or more contractors or suppliers, committing A.I.D. to pay such contractors or suppliers for such goods or services.

(b) Banking charges incurred by Grantee in connection with Letters of Commitment and Letters of Credit will be financed under the Grant unless Grantee instructs A.I.D. to the contrary. Such other charges as the Parties may agree to may also be financed under the Grant.

SECTION 7.2. Disbursement for Local Currency Costs.

(a) After satisfaction of conditions precedent, the Grantee may obtain disbursements of funds under the Grant for Local Currency Costs required for the Project in accordance with the terms of this Agreement, by submitting to A.I.D., with necessary supporting documentation as prescribed in Project Implementation Letters, requests to finance such costs.

(b) The local currency needed for such disbursements may be obtained:

(1) by acquisition by A.I.D. with U.S. Dollars by purchase or from local currency already owned by the U.S. Government; or

(2) by A.I.D. (A) requesting the Grantee to make available the local currency for such costs, and (B) thereafter making available to the Grantee, through the opening or amendment by A.I.D. of Special Letters of Credit in favor of the Grantee or its designee, an amount of U.S. Dollars equivalent to the amount of local currency made available by the Grantee, which dollars will be utilized for procurement from the United States under appropriate procedures described in Project Implementation Letters.

The U.S. dollar equivalent of the local currency made available hereunder will be, in the case of subsection (b)(1) above, the amount of U.S. dollars required by A.I.D. to obtain the local currency, and in the case of subsection (b)(2) above, an amount calculated at the rate of exchange specified in the applicable Special Letter of Credit Implementation Memorandum hereunder as of the date of the opening or amendment of the applicable Special Letter of Credit.

SECTION 7.3. Other Forms of Disbursement. Disbursements of the Grant may also be made through such other means as the Parties may agree to in writing.

SECTION 7.4. Rate of Exchange. Except as may be more specifically provided under Section 7.2, if funds provided under the Grant are introduced into the Republic of Lebanon by A.I.D. or any public or private agency for purposes of carrying out obligations of A.I.D. hereunder, the Grantee will make such arrangements as may be necessary so that such funds may be converted into currency of the Republic of Lebanon at the highest rate of exchange which, at the time the conversion is made, is not unlawful in the Republic of Lebanon.

Article 8: Miscellaneous

SECTION 8.1. Investment Guaranty Project Approval. Construction work to be financed under this Agreement is agreed to be a project approved by the Republic of Lebanon pursuant to the Agreement between it and the United States of America on the subject of investment guaranties, and no further approval the Republic of Lebanon will be required to permit the United States to issue investment guaranties under that agreement covering a contractor's investment in that project.

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SECTION 8.2. Communications. Any notice, request, document, or other communication submitted by either Party to the other under this Agreement will be in writing or by telegram or cable, and will be deemed duly given or sent when delivered to such party at the following addresses:

To the Grantee:

Mail Address:

Republic of Lebanon
Council for Reconstruction and Development
Beirut, Lebanon

Alternate address for cables:

To A.I.D.:

Mail Address:

USAID
c/o American Embassy
Beirut, Lebanon

Alternate address for cables:

USAID/AMEMB
Beirut, Lebanon

All such communications will be in English, unless the Parties otherwise agree in writing. Other addresses may be substituted for the above upon the giving of notice. The Grantee, in addition, will provide the USAID Mission with a copy of each communication sent to A.I.D.

SECTION 8.3. Representatives. For all purposes relevant to this Agreement, the Grantee will be represented by the individual holding or acting in the office of Chairman, Council for Reconstruction and Development and A.I.D. will be represented by the individual holding or acting in the office of Director, USAID Lebanon, each of whom, by written notice, may designate additional representatives for all purposes other than exercising the power under Section 2.1 to revise elements of the amplified description in Annex 1. The names of the representatives of the Grantee, with specimen signatures, will be provided to A.I.D., which may accept as duly authorized any instrument signed by such representatives in implementation of this Agreement, until receipt of written notice of revocation of their authority.

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SECTION 8.4. Standard Provisions Annex. A "Project Grant Standard Provisions Annex" (Annex 2) is attached to and forms part of this Agreement.

SECTION 8.5. Language of Agreement. This Agreement is prepared in both English and Arabic. In the event of ambiguity or conflict between the two versions, the English Language version will control.

IN WITNESS WHEREOF, the Grantee and the United States of America, each acting through its duly authorized representative, have caused this Agreement to be signed in their names and delivered as of the day and year first above written.

THE REPUBLIC OF LEBANON

By: _____

Title: _____

UNITED STATES OF AMERICA

By: _____

Title: _____

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ANNEX 1

AMPLIFIED PROJECT DESCRIPTION

Elements of this Amplified Project Description may be changed by written agreement of the authorized representatives of the parties named in the Grant Agreement without formal amendment of the Agreement, provide that such changes are within the general scope of the Project as set forth in the text of the Agreement.

The purpose of this Project is to assist the Government of Lebanon's effort to meet the immediate need for restoring to a reasonable level, essential water, sewerage, waste collection and disposal services in Beirut and other accessible areas in Lebanon. The Project will also focus on assisting various concerned GOL agencies to initiate a rational long-term planning process aimed at modernization and expansion of these essential systems throughout Lebanon.

The overall sector objectives of the Project include:

- A. To improve the quality of environmental safety by increasing the efficiency and effectiveness of solid waste collection and treatment in Beirut;
- B. To improve the quantity and quality of potable water available to the people of Beirut and other accessible areas;
- C. To improve environmental conditions by inspecting, mapping, repairing and cleaning as much as possible of the existing sewage and drainage systems of Beirut; and
- D. To provide the GOL with the technical assistance required to rationalize and strengthen the organizational capability to plan, construct, operate and infrastructure systems of Lebanon.

The activities to be financed by the Project include;

- A. The procurement, for the city of Beirut, of essential waste collection and packing equipment, spare parts for the equipment and appropriate short-term equipment servicing agreements.

Subject to the availability of funds, AID anticipates financing similar equipment for other surrounding municipalities under a subsequent agreement of the Parties.

- B. The procurement of the Architect and Engineering services of Camp Dresser and McKee Inc. to develop the scopes of work, and the equipment procurement plans for the following short-term repair and reconstruction contracts,
 - 1. a contract for the inspection, mapping, cleaning and reconstruction of as much of the Beirut sewer system as possible within the funds available for this activity. The contractor will also be responsible for the procurement

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and importation of required equipment and for training GOL personnel to carry on the work after the completion of the contract.

2. a contract for the repair of major water-lines in the city of Beirut, which will utilize the funds available for this activity, to provide materials, equipment, and personnel to locate, repair and reconstruct as many as possible of the most significant leaks in the system and to provide for the installation of an appropriate number of protected stand-pipes at strategic locations throughout the city of Beirut.

The two aforementioned contracts are not themselves included in this Project, however it is anticipated that they will be financed under a subsequent agreement of the Parties.

C. The procurement of essential small-value equipment and/or technical services and studies directly concerned with planning future A.I.D. water and sanitation related projects in Lebanon.

III. Illustrative Financial Plan:

The initial estimates of the costs for each of the activities to be financed under the Project are as follows:

A. The procurement of equipment for the city of Beirut.....	\$2,000,000
B. A contract for the A & E services which are required to develop the necessary scopes of work, supervise, manage and implement the short-term programs of repair and reconstruction of the Beirut sewer system and water supply system	\$400,000
D. Studies concerned with planning future A.I.D. water and sanitation related projects in Lebanon and the procurement of essential small-value equipment and/or technical services which are urgently required by the GOL.....	\$350,000
	Total.....
	\$2,750,000

IV. Financing Method:

The most appropriate method of financing each of the individual activities contained in the Project will be developed and agreed to in the separate Project Implementation Letters that will be signed with the Grantee agencies responsible for the implementation of these activities.

V. Evaluation:

The Grantee Country and the A.I.D. evaluation responsibilities and requirements for each of the individual activities and for the Project as a whole will be developed during the initial implementation stages of the Project and will be described in separate Project Implementation Letters with each of the appropriate GOL agencies.

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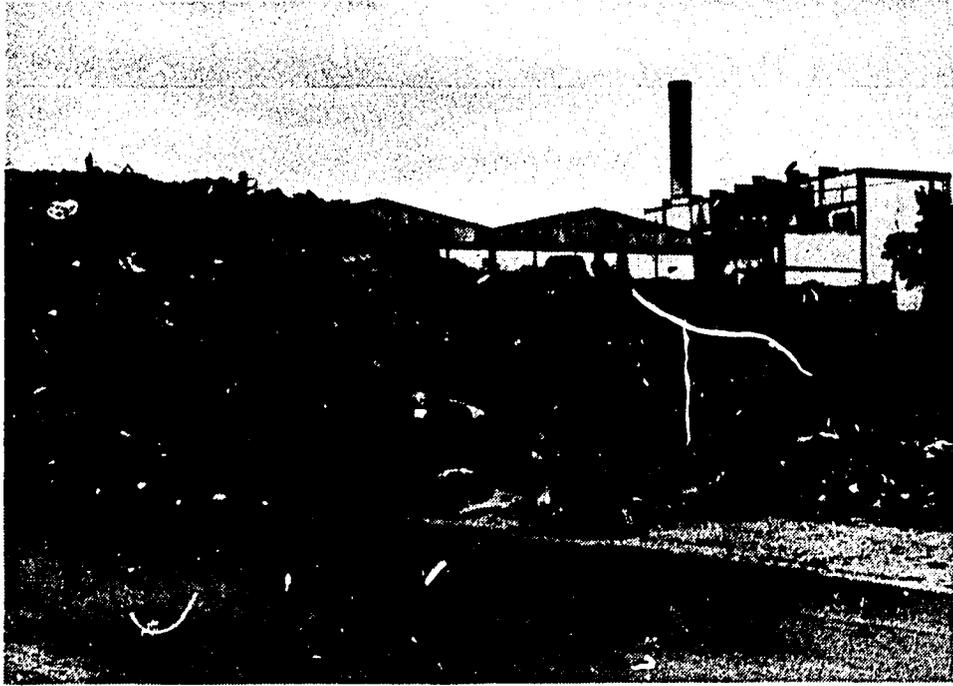
APPENDIX E
ILLUSTRATIONS



Normandie Dump Site in West Beirut
Regraded by OGER Liban. Erosion by
sewage discharge along eastern edge.



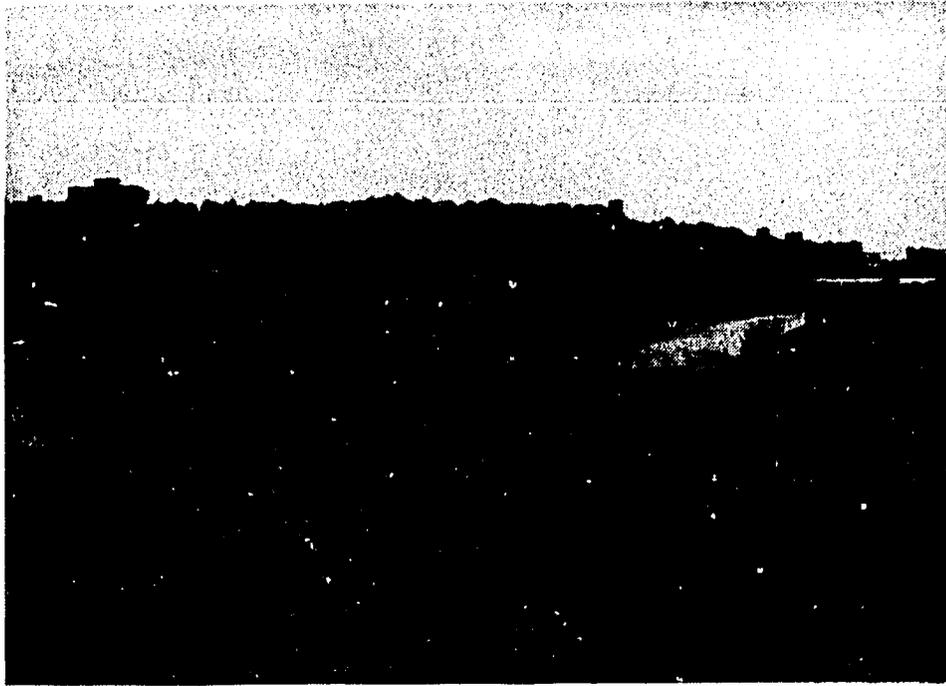
Normandie Dump Site. Erosion of
regraded portion by heavy seas.



Quarantina Compost Plant in Background;
former Beirut dump site in foreground as
seen from the Port highway.



Quarantina Compost Plant. Incinerator
residue and non-compostable material
placed on top of former dump.



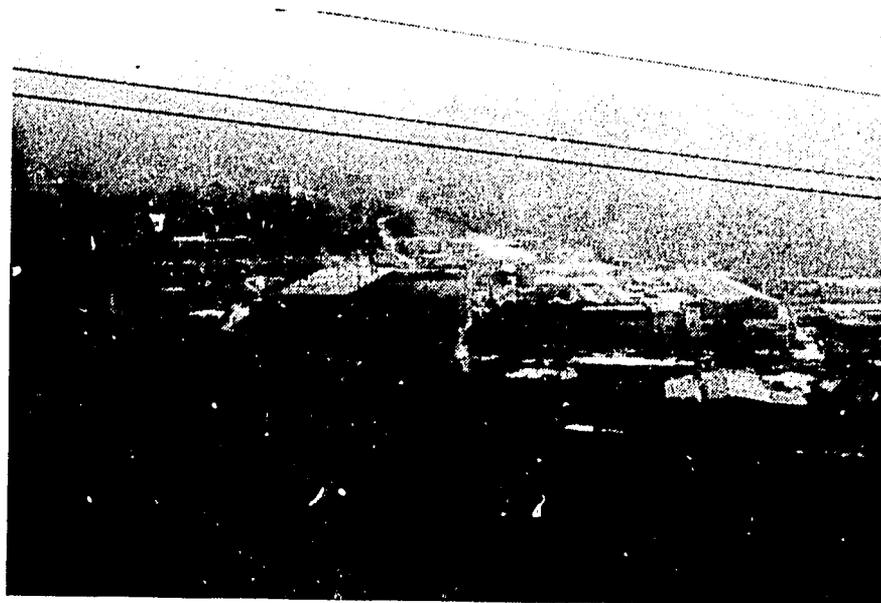
Material Dumped Along West Bank of Beirut River; view to northward and downstream from bridge at Hazmiyeh dump site. Beirut flood channel is farther downstream.



Composite Photo of Hazmiyeh Dump Site and New Embankment; view southward and upstream from heavily-travelled highway bridge.



Open Burning of Trash at Baabda Dump Site (suggested location for south Beirut regional sanitary landfill).



View Southward from Baabda Dump Site of Industrial Zone in the Ghadir River Valley.

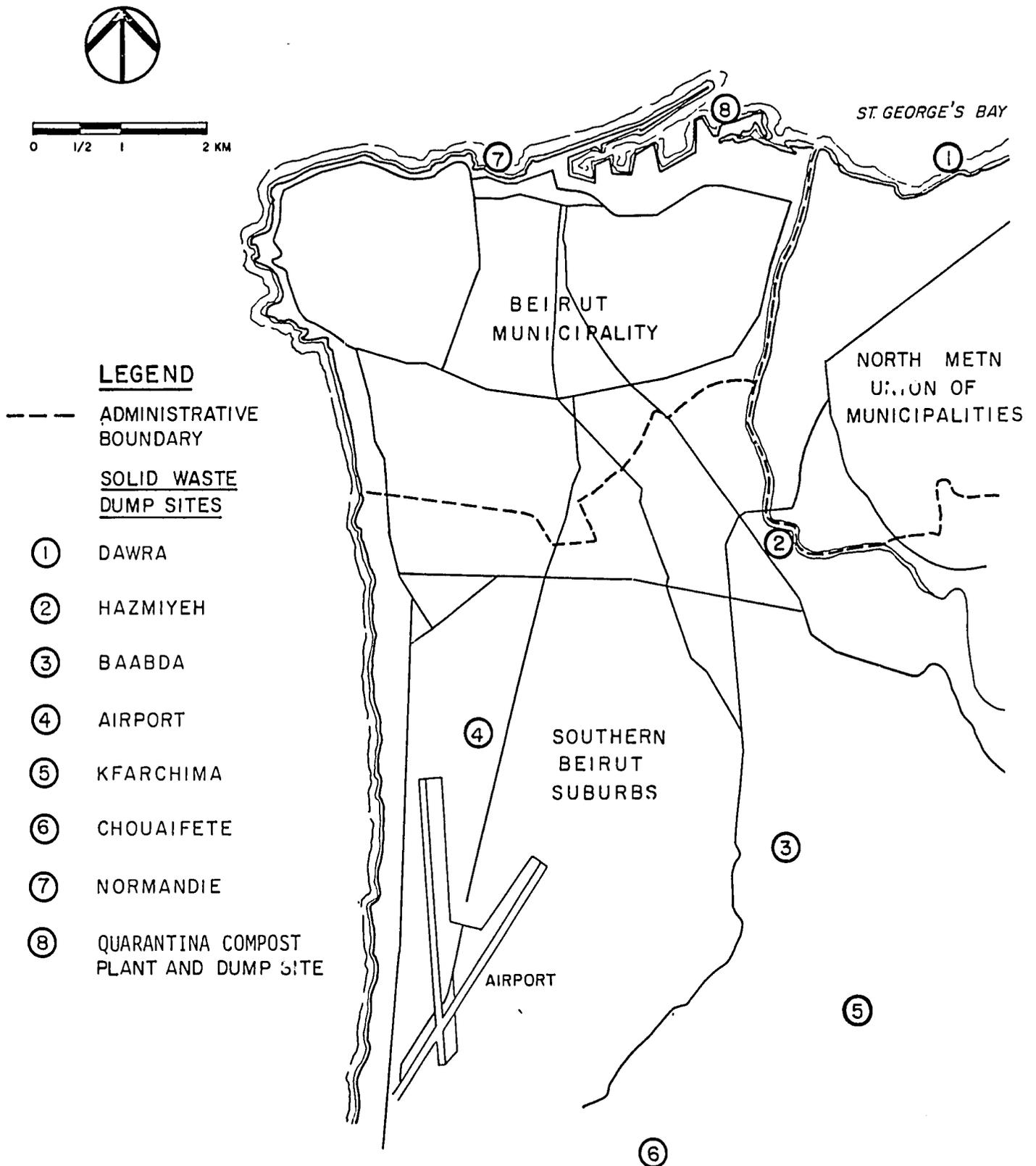
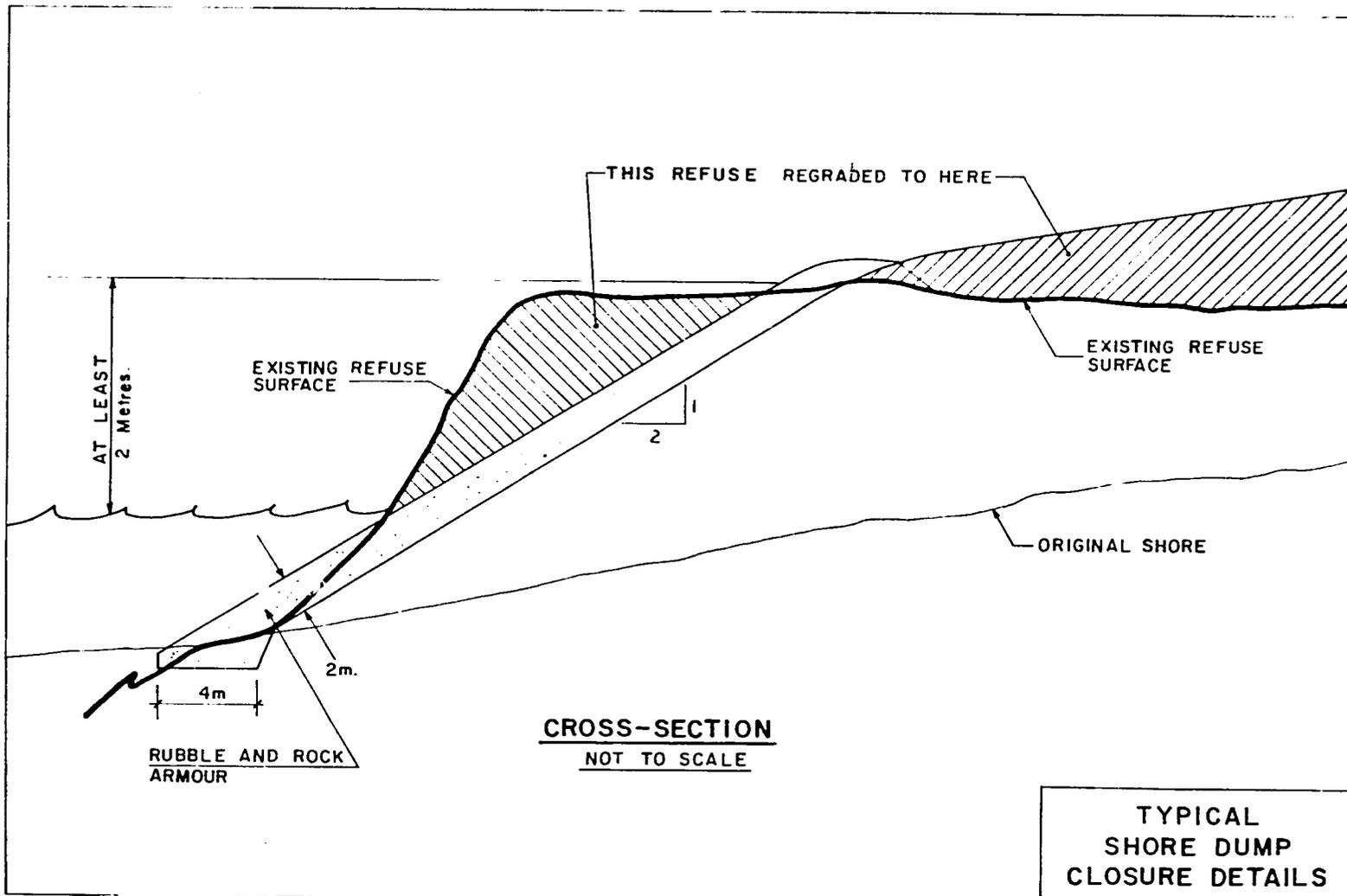
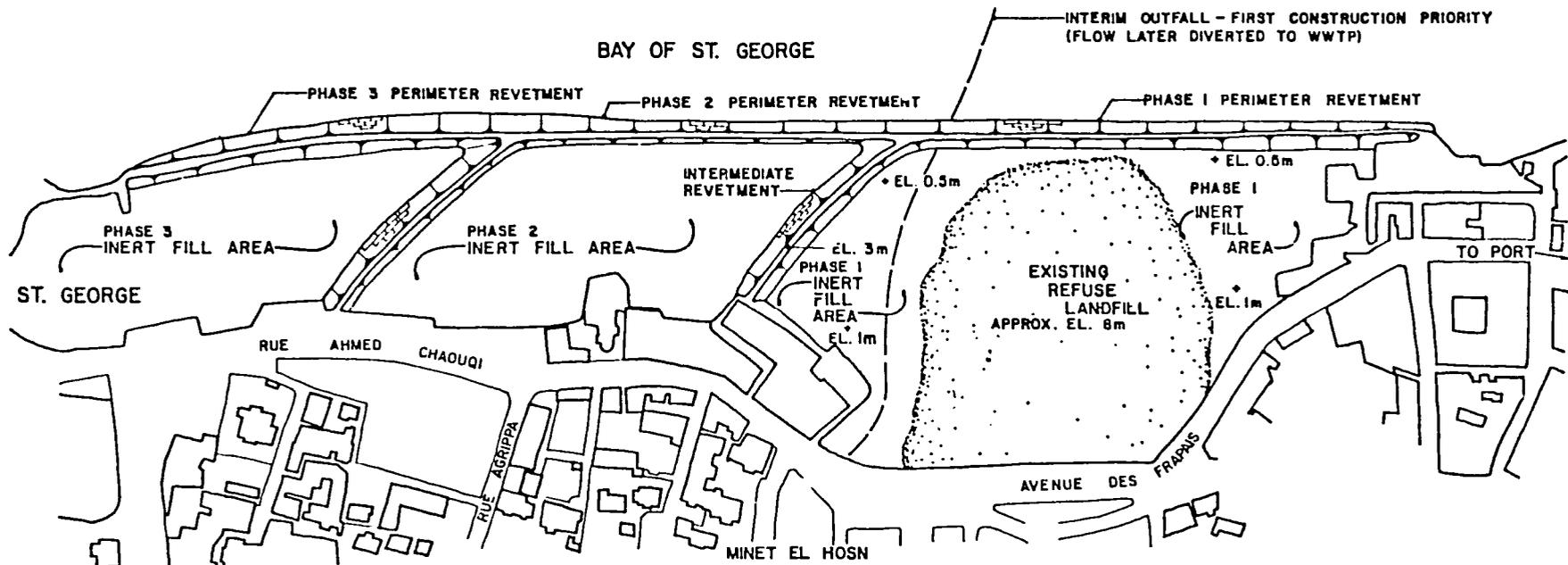


FIG. 1 BEIRUT SOLID WASTE FACILITIES

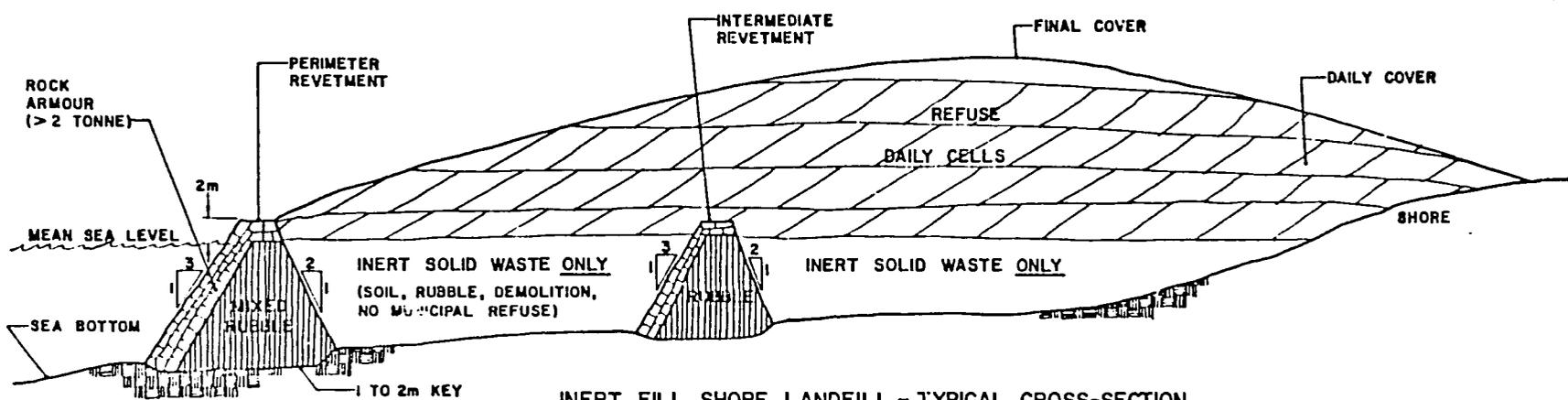


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F-3



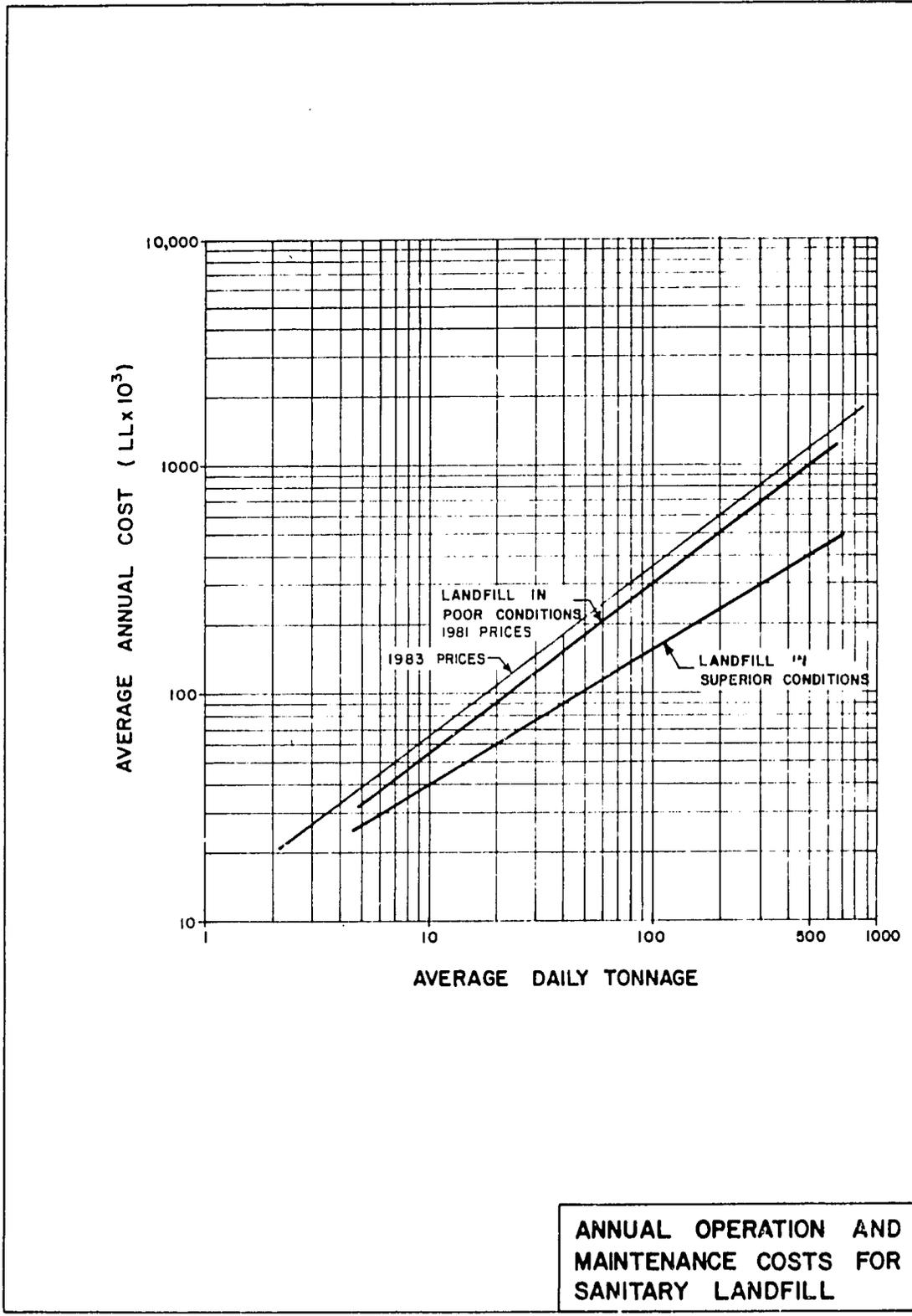
INERT FILL SHORE LANDFILL - TYPICAL
SCALE: 1:200



INERT FILL SHORE LANDFILL - TYPICAL CROSS-SECTION
N.T.S.

**NORMANDIE PROTOTYPE
SHORE LANDFILL
INERT FILL CONCEPT**

FIGURE 3



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