付属資料B
質問状及びその回答

ここに収めた資料は以下のものである。

1．調査団からニカラグァ側への質問状（日本語版）

2．ニカラグァ側からのスペイン語による回答の英語訳（本文のみ）

※スペイン語版の質問状およびこれに対するスペイン語による回答は別途参照のこと。

1993.09.16

ニカラグア国政府への質問票（その１）

マナグア市の廃棄物処理に関連して以下の質問への回答と資料の提供をお願いしたい。資料はできれば英文のものが望ましい。

１．マナグア市廃棄物処理の現状

1）廃棄物処理に関する国の政策と開発計画
2）廃棄物処理に関する国の組織と人員
3）廃棄物処理に関する国の財政（92年度実績、93年度予算）
4）マナグア市の組織と人員
5）マナグア市の財政（92年度実績、93年度予算）
6）廃棄物処理に関する国の法令
7）廃棄物処理に関する市の条例、規則等

２．廃棄物の排出・貯留及び収集

1）収集人口
2）収集地域
3）収集方法
（a）混合収集
（b）分別収集
4）ごみ排出量
Kg／人・日，　　t／日
5）ごみ組成
6）ごみ性状
7）収集容器
（a）袋
（b）コンテナ
8）収集頻度と収集時間
回／週
9）収集料金
有料
無料
10）産業廃棄物の処理・処分
11）道路清掃ごみの量と清掃面積又は距離
12）同上作業従事職員数
13）医療関連ごみの処理・処分

14) 収集体制

(a) 直営

(b) 委託

15) 中継地の有無

16) 収集車往復回数

収集区域 ⇆ 最終処分場　　回／日

17) 収集車輌

(a) 保有車輌台数

収　集　車：　　台

トラクター：　　台

コンパクター：　　台

計　：　　台

(b) 車輌整備工場

規模：

能力：

18) 未収集ごみの有無

19) 不法投棄ごみ（処分地外）の有無

3．廃棄物の運搬・処理・処分

1) 最終処分場

(a) 位置

i 市中心部からの距離：　　km

ii 周辺環境（地形）：

(b) 面積：　　km^2

(c) 残存寿命：　　年，　　m^3

(d) 現在までの使用年数

(e) 埋立方式

i 衛生埋立

ii オープンダンピング

(f) 覆土の方法

(g) 遮水工の有無

(h) 埋立地の土質

(i) 浸出水処理の有無

(j) 浸出水による土壌、水域への影響

(k) 最終処分地管理体制と費用

(l) 跡地利用計画

4．その他

1）マナグア市から見た廃棄物処理行政上の問題点と対策

2）既存の関連調査の有無

3）リサイクルシステムの有無

4）最終処分場スキャベンジャーの有無

5）最終処分前の中間処理に対する市の考え方

6）紙・鉄、アルミ缶等有価物回収の有無と価格

7）廃棄物、環境関連業務調査委託可能なローカルコンサルタント及び分析機関の有無

1993.09.16

ニカラグア国政府への質問票（その２）

環境配慮

当プロジェクトの環境配慮に関連して以下の質問への回答と資料の提供をお願いしたい。資料はできれば英文のものが望ましい。

１．環境関連の法令とその実施体制

１）環境アセスメントに関連した法令等はあるのか？ あれば一部頂きたい。

２）環境アセスメントの所管官庁と具体的な手続は決められているか？ これを明記した文書があれば一部頂きたい。

３）次のような環境基準はあるか？ 具体的な数値等を明記した文書があれば一部頂きたい。

ａ．排水の水質基準

ｂ．土壌汚染に関する基準

ｃ．地下水汚染に関する基準

ｄ．飲料水に関する基準

ｅ．大気汚染物質の排出基準

ｆ．悪臭に関する基準

ｇ．騒音や振動に関する規制基準

ｈ．地盤沈下／地下水くみ上げに関する規制基準

ｉ．その他の環境に関する基準

４）環境基準に抵触した場合の罰則規定はあるか？ あれば一部頂きたい。

５）「環境白書」のようなニカラグァの環境の現状と環境保全に関する取組の現状をまとめた本があるか？ あれば一部頂きたい。

２．二国間、多国間の国際条約加盟状況

自然保護、環境保護に関する条約に加盟しているか？ 加盟していれば条約名と加盟年をリストアップして頂きたい。

３．プロジェクト対象地域について

１）都市全体の整備計画はあるか？ あればその大要を明記した文書を一部頂きたい。

２）アカウアリンカ以外の最終処分場候補地があるのか？ あればその地名と位置を明示した図を一部頂きたい。

３．１　社会環境

１）人口の分布はどうなっているか。人口分布を示す図があれば一部頂きたい。
２）工場の分布とその大略の生産物の種類と量はどうなっているかを示す図と資料があれば一部頂きたい。
３）半導体やその他の精密機械工場及びドライクリーニング工場の分布とそこで使用されている溶材の種類と年間使用量はどの程度か？ これらを示す図と表などの資料があれば一部頂きたい。
４）農場の分布とそこで用いられている肥料と農薬の種類と量を示す図と資料があれば一部頂きたい。
５）移転計画はあるか？
　ａ．当プロジェクトに伴う移転対象住民の数はどの程度を見込んでいるのか？
　ｂ．移転に伴う補償制度はあるか？ あればこれを明記したものがあれば一部頂きたい。
　ｃ．これまでに住民移転の経験はあるか？ あればその経験と結果を示す文書を一部頂きたい。
６）学校、病院、宗教施設の数と分布は？ これらの名前と関係者数のリスト、位置図があればこれらを一部頂きたい。
７）過去にこの地域において、疫病の発生はあったか？ あればその年代と大要を示す資料を一部頂きたい。
８）上水道、下水道の整備状況はどうなっているか？ 管路図と使用量を示した資料があれば一部頂きたい。

３．２　自然環境

１）地形及び地質の概要はどうなっているか？ 以下の資料があれば一部頂きたい。
　ａ．地形及び地質の概要説明書。
　ｂ．地　形　図（1:100,000及び1:10,000程度のもの、アカウアリンカ最終処分場及び新規の候補地周辺については1:1,000程度のもの）
　ｃ．地　質　図（1:250,000及び1:25,000程度のもの）
　ｄ．地質断面図（1:250,000及び1:25,000程度のもの）
　ｅ．航 空 写 真（1:10,000程度のもの）
　ｆ．ボーリングデータ他
２）気象データはあるか？ あれば以下の資料を一部頂きたい。
　ａ．気象の概要説明書。
　ｂ．乾期と雨期の代表的な日の気温、湿度、風向、風速の日変化
　ｃ．代表的な年の１年分の日降水量のデータ
　ｄ．最大降水日の時間毎の降水量

e．月毎の卓越風の風向と風速

3）水理地質データはあるか？ あれば以下の図と資料を一部頂きたい。

a．水理地質の概要説明書。

b．水理地質図（地表の水系と地下水位の等高線を示してあるものが望ましい）

c．水理地質断面図（滞水層、各滞水層の水位などが明示されていることが望ましい）

d．代表的な地点での地下水位の経年変化及び最近の経月変化のデータ

e．代表的な地点での水質のデータ

4）地下水の利用状況はどうなっているか？ あれば以下の図と資料を一部頂きたい。

a．井戸の分布図

b．上記の井戸の諸元（上記の図に対応する井戸の番号、名称、井戸の深さ、孔径、ストレーナの深度、月当り揚水量等）

5）河川や湖沼、特にマナグア湖とアカウアリンカ湖の水位と水質などは近年変動しているか？ 経年変化を示すデータがあればその資料を一部頂きたい。

6）湿地帯など、脆弱な自然は存在するか？ あればその図とリストを一部頂きたい。

7）自然公園、国立公園など特別な指定をうけている地域はあるか？ あればそのリストと地域境界を示す図を一部頂きたい。

7）地域内に、貴重な動物、或いは植物は存在するか？ あればそのリストと分布図を一部頂きたい。

9）観光利用や宗教的に重要と思われている景観は存在するか？ あればそのリストと位置図及び写真を一部頂きたい。

3.3 公害

1）現在のアカウアリンカ最終処分場からの排水は問題になっているか？ 問題になっており、それを報告する文書があれば一部頂きたい。

2）現在のアカウアリンカ最終処分場からの排水の水質データがあるか？ あればそのその資料を一部頂きたい。

3）土壌汚染の現況はどうか？ 現況を報告する文書があれば一部頂きたい。

4）地下水汚染の現況はどうか？ 現況を報告する文書があれば一部頂きたい。

5）大気汚染の現況はどうか？ 現況を報告する文書があれば一部頂きたい。

6）悪臭の現況はどうか？ 現況を報告する文書があれば一部頂きたい。

7）騒音や振動の現況はどうか？ 現況を報告する文書があれば一部頂きたい。

8）地盤沈下の問題が生じているか？ 生じており、その現況を報告する文書があれば一部頂きたい。

Answers to the Questionnaire 1

SOLID WASTE TREATMENT
IN
THE CITY OF MANAGUA

THE OFFICE OF PUBLIC CLEANING
THE GENERAL OFFICE OF THE MUNICIPAL
WORKS AND SERVICES
THE MUNICIPALITY OF MANAGUA

MANAGUA, OCTOBER 1 9 9 3

1. ACTUAL SITUATION OF SOLID WASTE IN MANAGUA

1. Policy and Development Plan for the treatment of the country's solid waste disposal.

2. Personnel and Administration for the treatment of the country's solid waste disposal.

3. Finance Administration for the treatment of the country's solid waste disposal. (1992 results, 1993 budget).

The answer to the above items can be taken from the 1991-1996 Health Master Plan. Due to the extension of the answers, a book is annex.

4. ¿ORGANIZATION AND PERSONNEL OF THE CITY OF MANAGUA?

Answer= The mayorship of Managua, through the Office of Public Cleaning, appointed to the General Office of the Municipal Works and Services, is in charge of the collection, transportation, disposition and treatment of solid waste generated by the population of Managua, organized by the following way:

a) Office (Specific) of Public Cleaning, and Administrative Department (Delegate), and two supporting Departments of Collection and Cleaning and Sanitary Feeling.

We are attaching the Chart of the General Office and of the Public Cleaning Office.

The Public Cleaning Office counts with experience personnel on the field, break down on the following way:

Office: 5, Administrative Department: 25, Collection and Cleaning Department: 235, and Sanitary Feeling Department: 16.

5. FINANCE ADMINISTRATION OF THE CITY OF MANAGUA.
(1992 Result, 1993 Budget).

A= 1992 and 1993 Budget attached.

6. LAWS REGARDING TREATMENT OF SOLID WAST IN THE COUNTRY?

A= See Environmental report

7. RULES AND NORMS OF THE SOLID WASTE TREATMENT IN THE CITY?

A= See, Municipal Bylaw about Hygiene, Ornament and Public Cleaning.

II. EVACUATION, STORAGE AND COLLECTION OF SOLID WASTE?

A= 1) Collection population: The population of the city of Managua is about 1,500,000 inhabitants, of which 80% corresponding to 1,200,000 inhabitants receives service.

2) COLLECTION AREA: 204 Km2 aproximately.

3) COLLECTION METHOD: The method of collection use in the city of Managua is separated: Hospitals, Industry and Commerce, Market and Micro rubbish dumps. (Routes Plans enclosed*).

4) EVACUATION VOLUME OF WASTE: A volume percapita and per day of 0.5 kg/person/day is estimated, and a daily production of 600 tons a day.

5) GARBAGE COMPOSITION: A sampling made in three different areas of the city of Managua, resulted with the following composition:

COMPONENT:	%
Foodwaste	50.6
Garden Waste	17.6
Plastic	6.7
Paper and cardboard	6.4
Glass	2.2
Textiles	1.6
Metals	1.4
Rubber	0.9
Wood and Leather	1.2
Soil	11.4

This corresponds to housing waste

6) GARBAGE CHARACTERISTIC:

The characteristic of the housing waste is of 77.4% of organic origin and 22.6% of inorganic origin.

7) CONTAINER FOR COLLECTION:
A= The population uses different types of containers like:

Plastic and paper bags, metalic and plastic container, and containers supplied by the City of Managua for different capacities. This containers are of .83 and 15 M3 respectively.

8) COLLECTION FRECUENCY (TIMES/WEEK, AND COLLECTION SCHEDULE):
A= The collection frecuency is three times a week, done in a 6 hour journal daily, from 07:00 to 13:00, though there is extra time, depending on the volume of waste found in the area; and in the market, hospitals, and health centers the collection is daily. (SEE DOCUMENT * 1 *).

9) COLLECTION RATE: (There are different types of rates).
A= Rate according to the urban type. See attached table.
(* TABLE "A")

10) TREATMENT AND DISPOSITION OF WASTE:
A= See item *3*

11) QUANTITY OF WASTE WHEN CLEANING THE STREETS:
A= District: 210,000 meters/day

12) NUMBER OF EMPLOYEES FOR THE ABOVEMENTIONED WORK:
District: 168 workers

13) TREATMENT AND DISPOSITION OF WASTE RELATED WITH HOSPITALS:
A= They receive the service of regular collection (food and cleaning waste, etc.) The hospitals take care of their pathological waste.

14) COLLECTION SYSTEM:
The collection system is under the direct administration of the municipality, these, being one of its most important area.
Please see information in item No. 4 of Personnel and Organization of the City of Managua.

15) IS THERE OR IS THERE NOT A TRANSFERENCE SYSTEM?
A= In our collection system a transferance station does not exist, we do have however, a roll-on and roll-off system, with containers of 15 M3, located in several places of the city and in some markets and industries.

If we were able to get two land feelings in both extremes of the city on intermediate station would not be necessary although it would be an alternative.

16) ROUND TRIPS OF THE COLLECTIVE VEHICLES?
A= Generally two trips per vehicle, nevertheless on Mondays and Tuesdays up to three round trips

17) RECOLLECTING VEHICLES:
a) Number of vehicles (See statistic 11).
b) Maintenance shop (See document B).

SHOP CAPACITY:
Number of operative equipment = 318

Installation capacity to work under reasonable technical conditions (Mini crane, compressed air, roof, pit)
Quantity = 18 equipments

18) IS THERE OR IS THERE NOT WASTE NOT COLLECTED?
With the collection system that we have we succeed to reach the goal of 80% of collected waste, aproximately 600 tons daily, remaining 20% without collection, about 150 tons of waste; the places without collection are waste land and other places where the collecting trucks can not enter.

19) IS THERE OR IS THERE NOT WASTE ILLEGALLY DISPOSE?
Yes, all over Managua, we call them illegal garbage and this is the result of the lack of education of the population, sometimes they throw the garbage regardless of collection day or terrain topografy. There are aproximately 297 places where people illegally throw trash.
Note: Enclosed in document C: Action Plan on the elimination of illegally thrown trash.

3) TRANSPORTATION, TREATMENT AND DISPOSITION OF THE SOLID WASTE?

1) FINAL DISPOSITION:
The collected and evacuated waste receives a treatment, consisting in compact and cover with a layer of vegetal soil or selected material.

a) LOCATION:
The place of waste of the city of Managua is located on the north-occidental side of the city, about 4 kms. from the ruins of the Cathedral between the Lagoon of Acahualinca and Lake Xolotlán.
Enclosed plan of the city and the location of the rubbish dump.

1) DISTANCE FROM THE DOWNTOWN OF THE CITY?
A= 10 km. from downtown of the city

2) ENVIRONMENT OF THE SORROUNDINGS (TOPOGRAFY)?

Around the feelings, there are cultivated areas, body of water, some houses, and scavengers.

b) SURFACE:
It has a surface of aproximately 39.77 hectares.

c) SUBSISTING LIFE?
About 2 years, for a volume of waste of aproximately 1,347,940 M3.

d) YEARS USED UP TO DATE?
From 10 to 12 years.

e) GAINING LAND SYSTEM?
A bank of selected material exist near the feeling, which is used to cover. This type of surface not suitable for construction can be used for recreational grounds.

f) FEELING METHOD?:
The method of terrace with some differences is used, in some cases the method of the areas.

g) IS THERE OR IS THERE NOT A WATERPROOFING WORK?
No, there is not.

h) QUALITY OF THE SOIL IN THE PLACE WHERE LAND WAS GAIN?:
Not suitable for construction (due to more than 10 meters of height of layers of waste).

i) IS THERE OR IS THERE NOT A TREATMENT OF WATER FILTERING?:
Due to the lack of compression for several years and the lack of material coverage, like: vegetal soil, selected material, etc. Part of rainfalls filter on the waste and combined with the leach drain in a high percentage into the lake.

On the last years the disposition of waste is done in a way that the slope is done against the lake.

k) SYSTEM OF CONTROL ON THE FINAL DISPOSITION?:
Due to the lack of equipment like the Frontal Loader, is not possible to give a total cover daily.

l) USAGE PLAN OF THE NEGLECTED SITE?:
If there is one, it is projected to build parks and sport grounds.

4) OTHERS:

1) PROBLEMS AND MEASUREMENTS IN THE PRESENT ADMINISTRATION ON THE TREATMENT OF SOLID WASTE IN THE CITY OF MANAGUA.
It is the responsibility of the municipal government to look after the improvement of the environment, and therefore one of its main task is the relocation of the existing sanitary feeling and also improve the collection system.

2) IS THERE OR IS THERE NOT RELATED INVESTIGATION?:
Yes, there is (See information about Environment)

3) IS THERE OR IS THERE NOT A RECYCABLE SYSTEM?:
There is, but it is on a private level and like a craftmanship done by "Churequeros".

4) IS THERE OR IS THERE NOT SCABENGERS ON THE FINAL DISPOSITION?
Yes, there are about 200 people.

5) CITY'S OPINION ABOUT AN INTERMEDIATE TREATMENT BEFORE THE FINAL DISPOSITION?:
None.

6) IS THERE OR IS THERE NOT RECOVERY OF VALUABLE SUBSTANCES LIKE PAPER, IRON AND ALUMINIUM CAN?:
Yes, there is but as we explain before it is done in a craftman way.

7) LOCAL CONSULTANT WHO CAN BE SUBCONTRACTED INVESTIGATIVE WORK RELATED WITH THE SOLID WASTE, ENVIRONMENT AND IF IS THERE OR IS THERE NOT AN ANALYSIS OF ORGANIZATION?:
There is information about Engineer Carlos Morales, Consultant of OPS/OMS. Complejo "Concepción Palacios", Tel. 94200-97088, Fax 97324

I N D E X

※ 2) ～15) の添付資料は別途参照されたい。

MAYORALTY OF MANAGUA

GENERAL DIRECTORATE FOR ENVIRONMENTAL PROTECTION

CARE OF THE ENVIRONMENT

QUESTIONNAIRE NO. 2

FOR THE STUDY ABOUT IMPROVEMENTS TO THE SYSTEM OF SOLID WASTE MANAGEMENT FOR THE CITY OF MANAGUA

AGREED TO BY

THE CITY OF MANAGUA

AND

THE JAPANESE INTERNATIONAL COOPERATION AGENCY

MANAGUA, OCTOBER 1993

FOREWORD

The Mayoralty of Managua, through the General Directorate for Environmental Protection, hereby presents to the distinguished members of the Japanese International Cooperation Agency the data, information, maps, and plans requested in Questionnaire No. 2, Care of the Environment, regarding the study about improvements to the system of solid waste management for the City of Managua.

It was possible to obtain the data contained here thanks to the cooperation of institutions such as INAA, IRENA, MINSA, and INETER*, the Foreign Ministry, and the efforts of the workers in the General Directorate for Environmental Protection.

Some of the data requested in the Questionnaire do not exist according to the results of consultations made with the above-mentioned institutions. However, we hope that the information provided is useful for the study and for the implementation of projects beneficial to the citizens of Managua.

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* INAA - Nicaraguan Institute for Drinking Water Supply and Sewage Systems
IRENA - Nicaraguan Institute of Natural Resources and the Environment
INETER - Nicaraguan Institute of Territorial Studies
MINSA - Ministry of Health

QUESTIONNAIRE NO. 2

Care of the Environment

Please provide us with a copy of the following information about Care of the Environment for the Project in question.

We would like each copy to be in English.

1. **Regarding the laws related to the environment and the system for implementing them.**

   1) Laws related to evaluation of the environment.

   See the book from the Environmental and Health Program for the Central American Isthmus (MASICA), WHO-PAHO, Managua, 1992.

   2) Organization(s) responsible for evaluation of the environment and its/their procedures.

   See the book from the Environmental and Health Program for the Central American Isthmus (MASICA), WHO-PAHO, Managua, 1992.

   See the pamphlet with the Draft General Law for the Environment and Natural Resources. Produced by the Nicaraguan Environmental Movement (MAN).

   3) Environmental Standards
   Please give us written or printed information with concrete values.

All environmental standards currently applied are from the Pan-American Health Organization (PAHO) and the World Health Organization (WHO). Others have been being developed for the regulation and control of the environment in Nicaragua.

a. Waste Water Standards

SEWAGE QUALITY

The quality of waste waters discharged into the sewage system should not exceed the limits indicated below:

PARAMETERS	LIMIT (mg/l)
Solids	
Total	500
Volatile	350
Fixed	150
Suspended	300
Volatile	250
Fixed	50
Dissolved	200
Volatile	100
Fixed	100
Sedimentable (ml/l)	8
DBO at 5 days and 20°	200
Oxygen consumed	75
Nitrogen	
Total	50
Organic	20
Ammoniacal	30
Nitrites (NO_2-)	0.05
Nitrates (NO_3-)	0.20
Chlorides	100
Alkalinity (as $CaCO_3$)	200
Fats	20
Temperature	27°C
pH (Units)	6.5 - 7.5

b. Standards for Soil Contamination

To date, no information has been found regarding this.

c. Standards for Groundwater Pollution

To date, no information has been found regarding this.

d. Drinking Water Standards

PHYSICAL QUALITY	MAX. ACCEPTABLE CONCENTRATIONS	MAX. TOLERABLE CONCENTRATIONS
Color	5 units	50 units
Turbidity	5 units	25 units
Taste	Not rejected	---
Odor	Not rejected	---

CHEMICAL QUALITY	MAX. ACCEPTABLE CONCENTRATIONS	MAX. TOLERABLE CONCENTRATIONS
Iron	0.3 mg/l	1.0 mg/l
Magnesium	50.0 mg/l	150.0 mg/l
Sulphates	200.0 mg/l	100.0 mg/l
Chlorides	200.0 mg/l	600.0 mg/l
pH	7.0 - 8.5	<6.5 or >9.5

DANGER TO HEALTH	MAX. TOLERABLE CONCENTRATIONS
Nitrate	15.0 mg/l
Flourine	1.5 mg/l
Nitrite	<1.0 mg/l
Hardness	500 mg/l

CHEMICAL INDICATORS OF POLLUTION	MINIMUM LIMIT FOR POLLUTION
Chemical Oxygen Demand	10 mg/l
Biochemical Oxygen Demand	6 mg/l

BACTERIOLOGICAL QUALITY	MINIMUM LIMIT FOR POLLUTION
Fecal coliforms	2.2 in 100 ml

SOURCE: NICARAGUAN HEALTH MINISTRY (MINSA)

APPLICABLE STANDARDS FOR DRINKING WATER
W.H.O.

Toxic Substances

SUBSTANCE	LIMIT (mg/l)
Lead	0.10
Arsenic	0.05
Selenium	0.01
Chromium in Cr hexavalent	0.05
Cynanide	0.05
Barium	0.01
Nitrate (in NO_3)	45

Substances and Chemical Properties which influence the drinkability of water

SUBSTANCE	MAX. ACCEPTABLE CONCENTRATION	MAX. ALLOWABLE CONCENTRATION
Total solids	500 mg/l	1500 mg/l
Color	5 units *	50 units
Turbidity	5 units **	25 units
Taste	Subjective limit of acceptability	---
Odor	Subjective limit of acceptability	---
Iron (Fe)	0.3 mg/l	1.0 mg/l
Manganese (Mn)	0.1 mg/l	0.5 mg/l
Copper (Cu)	1.0 mg/l	1.5 mg/l
Zinc (Zn)	5.0 mg/l	15.0 mg/l
Calcium (Ca)	75.0 mg/l	200.0 mg/l
Magnesium (Mg)	50.0 mg/l	150.0 mg/l
Sulphates (SO)	200.0 mg/l	400.0 mg/l
Chlorides (Cl)	200.0 mg/l	600.0 mg/l
pH	7.0 - 8.5	6.5 - 9.2
Magnesic sulphate + Sodium sulphate	500.0 mg/l	1000.0 mg/l
Phenolic compounds (in phenol)	0.001 mg/l	0.002 mg/l
Cholorophormic extracts over carbon (ECC: organic contaminants	0.2 mg/l	0.5 mg/l
Alkibenzosulphonates ABS: tensioactive agents	0.5 mg/l	1.0 mg/l

* Colormetric scale to platinum-cobalt
** Turbidimetric units

e. Standards for Emissions of Atmospheric Pollutants

This information is lacking.

f. Standards for Bad Odors

This information is lacking.

g. Standards for Regulating Noise and Vibration

No information exists regarding this.

h. Standards for Regulating the Settling of Land and Pumping of Groundwater

This information is lacking.

i. Other Environmental Standards

See pamphlet on Hygienic Standards and Procedures, Health Ministry of Nicaragua.

4) Criminal Regulations in the event that environmental standards are contravened.

No information exists regarding this.

5) Books, such as the "White Paper on the Environment" about the current situation of the environment in Nicaragua and the reality about efforts to maintain the environment.

No information exists regarding this.

2. About the situation of being signatories of Bilateral and Multilateral International Treaties

If Nicaragua is a signatory of treaties for the protection of nature and the environment, please give us a list of the treaties and the year of signing.

LIST OF BILATERAL AND MULTILATERAL INTERNATIONAL TREATIES TO WHICH NICARAGUA IS A SIGNATORY

1. United Nations Conference on the Environment and Development (UNCED - 1992)

   Rio de Janeiro, Brazil, June 1-12, 1992.
   See pamphlet.

2. XII Central American Presidential Summit Meeting

   June 4-5, 1992, Managua, Nicaragua.
   See pamphlet: Declaration from Managua

3. **About target areas of the project:**

   1) Summary of Plan for Complete Zoning of the City

At present, the Mayoralty of Managua, through the General Directorate for Urbanization, is carrying out a study into the Complete Zoning of the City of Managua. This information will be provided at a later date.

   2) Names and locations of possible sites other than Acahualinca, if there are any, for final disposal.

SELECTION OF SANITARY LANDFILL SITES

1. CIUDAD SANDINO

Located in the western sector of the city, about 12 km. from the center of gravity, in a drainage channel close to the Selecta Industry and a thermo-electric plant.

In one place, there is an abundance of material for backfilling. There is no risk of polluting groundwaters. It is State-owned property and nearby there are water, electricity, and telephone services.

The capacity is not great and it is necessary to divert the waters which run in the drainage channel. It is close to human settlements.

2. CUAJACHILLO

Located to the west of the city, 13.5 km. from the center of gravity, in a pit created by the extraction of sand. This operation continues at present at this site.

The site is State-owned, there is backfill material, and there is no risk of polluting the surface water or groundwater. There is access directly to the site. It is necessary to extend the water, electricity, and telephone services to the site.

3. EL MIRADOR

Located 7.5 km. from the center of the capital in the Altos de Santo Domingo, close to a residential area where a number of embassies are located. It has a capacity of between 3 and 3 (sic) million cubic meters. It is a valley with very gentle slopes. The vegetation is tangled and parts of the site are cultivated.

A rivulet forms in the rainy season, but in any case, it leaves no trail on the soil.

The lands are State-owned. The water table is at 90 meters of depth and no wells have been observed in the immediate surroundings.

4. SANTA ANA

This site is close to the Managua-León route, about 18 km. from the city center. It is a valley with significant slopes. The vegetation is thick and has a number of trees.

The capacity is great and it is estimated that it could receive around 15 million cubic meters of solid waste.

The lands are privately owned and are being used for raising livestock.

The water table is estimated to be at a depth of 100 meters.

No surface flow of water has been noted. It appears that the vegetation is abundant enough to absorb the rainfall which occurs.

5. SAN FRANCISCO

This site is 13.5 k. southeast of Managua and there are no nearby dwellings. It is a windy plain with uncultivated land. The land is State-owned and some 70 hectares are being considered for the development of a sanitary landfill. This could have a lifespan of more than 15 years.

The water table is more than 60 meters deep and there is no evidence of surface waters produced by rains.

Access is along the Managua-Masaya route which is very busy. Therefore, it is necessary to find alternative routes.

6. SAN ISIDRO

Located 5 km. south of the capital. It is a long drainage channel with very steep slopes and abundant vegetation, including some trees.

It has an estimated capacity of 8 million cubic meters. The lands are privately owned and used for extensive livestock raising.

At the bottom of the valley is a small stream which flows in times of heavy rains, so it would be necessary to make investments to divert this runoff.

There are dwellings nearby and it is necessary to upgrade approximately 4 km. of road so that it can withstand heavy vehicles.

7. VILLA FONTANA

Located about 9 km. south of Managua. It is necessary to build about 1.5 km. of road. It has a capacity of approximately 2.8 million cubic meters. A major temporary stream runs through the site and there is even a small spillway which undoubtedly is for protecting the end of the valley from frequent flooding.

There are 20 hectares of land, 6 of which are privately owned with the rest belonging to the State.

8. VILLA VENEZUELA

Located in the eastern sector of the city to the south of the Villa Venezuela neighborhood. The land is slightly rolling with few breaks.

The lands are State-owned. There is easy access nearby and its useful life is estimated at more than 20 years.

There are no drainage problems and there is material for backfill.

There are dwellings less than 500 meters away and this land could be considered as suitable for agriculture.

9. ZONA FRANCA

Located 1200 meters to the south of the Zona Franca along the road to Sabana Grande.

It is a place from which select material was extracted, but has since been abandoned. It is used as an open-air garbage dump. It is practically a hole with depressions of up to 3 meters below the level of the road.

There is plenty of good quality backfill material. There is no risk of polluting the surface waters and groundwater. There is good access and there are no dwellings nearby. The land is State-owned.

One inconvenience that could be mentioned is its proximity to the airport.

It has a small capacity and there are no water, electricity, or telephone services. It is far from the city center, although it may be a solution for the city's eastern sector.

3.1 Social Environment

1. Population Distribution Map

See population distribution map.

2. Map and information about distribution of factories and the types and quantities of the main products of these factories.

See main plans, sources of solid waste.

3. Information such as map and table about the distribution of semi-conductor factories, other precision equipment factories and dry cleaning plants, and the types and amounts of materials used on these sites.

See main plans, sources of solid waste and list of factories.

4. Map and information about the distribution of farms and the types and amounts of fertilizers and pesticides used on these farms.

Information regarding this is subject to a later study by the Ministry of Agriculture (MAG).

5. If a transfer plan exists.

There is no specific transfer plan regarding this project and no previous experiences.

a. Estimated number of inhabitants who are moved due to this project.

b. System of compensation for moving.

c. Previous experiences and results of moving inhabitants.

6. Number and distribution of schools, hospitals, and religious installations, with their names, lists of persons related to them, and a map showing their location.

See List of Schools, Hospitals, and Religious Installations of the City of Managua.
(See Tourist Map).

See main plan, sources of solid waste.

7. Information about past epidemics in this zone giving years and a summary.

The information provided by MINSA refers to the whole municipality and contains information about transmissible diseases which are very common here.

See List of Cases of Transmissible Diseases (1992 - 1993)

8. Situation of maintenance of the water supply system mains and the sewage system and a map of network and its volume of use.

SITUATION OF THE WATER SUPPLY SYSTEM

Regarding the situation of the water mains, the new INAA administration began in 1990 to make an evaluation of the situation of the water supply system in the City of Managua. After in-the-field inspections and office work, it arrived at the following conclusions:

1. The physical infrastructure of the drinking water supply system (wells, pumps, pipes, storage tanks, electrical controls, etc.) shows a high degree of deterioration. This is fundamentally due to deficient maintenance and

the lack of an ongoing equipment replacement program in the last eight years.

2. This physical deterioration of the system (especially leakage), combined with more than 30,000 damaged household water meters and between 30,000 to 45,000 users illegally or secretly connected who do not pay for the water they use, produces a little more than 50% of the economic loss for INAA by way of water not accounted for (water not accounted for = to the total production in (3) less the total billing (m^3).

3. As well at this time, the city of Managua has a demand for water in the order of 93 million gallons/day. With a supply of 65 million gallons/day, this means a deficit of 27 million gallons/day. This makes it necessary to cut the service twice a week in the different sectors of the city.

SITUATION OF THE SEWAGE SYSTEM

Regarding the situation of maintenance of the sewage system, in mid-June 1991, a series of programs was worked out to respond to the problems with Managua's sewage system. Among these are:

Operation and Maintenance Program

Maintenance:

Maintenance of the sewage network is divided into three sub-units:

a. Emergency Maintenance:

This consists of giving immediate attention to obstructions in the sewage network caused by sand, mud, garbage, stones, glass, plastic, rags, metal wastes, and others. These cause spillages of waste water through the inspection wells, resulting in pollution of the environment and destruction of the streets.

To attend to these emergencies, the necessary squads are formed and provided with the instruments, accessories, transportation, and appropriate tools (snakes, rotary snakes, spoons, boots, gloves, etc.).

The working hours for the emergency squad are set at 13 hours straight, from 8:00 a.m. to 9:00 p.m..

With the formation of the Emergency Maintenance Unit which follows the idea that we are public servants with a duty to the community, and with the new working hours,

it has been possible to control the emergencies and be up to date. This means that all blockages and spillages reported are attended to the same day, and sometimes the squad is waiting for an emergency to be reported in order to attend to it immediately.

b. Corrective Maintenance

This consists in repairs to the damaged infrastructure, inspection wells, and pipes.

In order to do corrective maintenance, a unit was formed and provided with repair equipment. It has been possible to specialize in this area of repairs. They are carried out with the network operating and so the staff working in the unit have some contact with waste water.

Due to the large amount of damaged infrastructure, the repairs made are selective, with the rest of the damaged structures having to be repaired under special programs.

c. Preventative Maintenance

This consists in cleaning sewage pipes and inspection wells detected in the network with an accumulation of compacted or semi-compacted solid residues which undoubtedly will cause an obstruction, clogging, or blockage of the drainage network if not attended to before damage occurs.

It was estimated in 1990 that there were about 100 km. of pipes which could potentially clog up. Accumulations of different sediments were detected in internal networks, sub-collectors, and collectors. As well, some 1000 inspection wells were also found to have an accumulation of garbage and other wastes.

A Program of Preventative Clean-up has been established in order to carry out preventative maintenance. This must be done each year throughout the whole sanitary network.

This program began to function in August 1991, but it was not until mid-1992 when the appropriate equipment was obtained that it was possible to carry out a good program of preventative maintenance.

The utilization of spoon machines (called "Malacates") and a truck with a combined system of suction and forcing water under high pressure has resulted in a substantial improvement in the attention to the public and to the network in general.

EQUIPMENT FOR CLEANING THE SANITARY SEWAGE NETWORK

CHARACTERISTICS

A. COMBINED CLEANING TRUCK

By means of a suction system, this piece of equipment cleans manholes which are flooded or spilling over. This Combined Suction System pumps a high pressure stream of water, breaking up obstacles in the pipes and it then cleans them, extracting the sediments, fats, threads, and obstructions blocking the flow of waste waters.

It has a 10 cubic yard tank for storing the extracted sediments and a 1000 gallon tank for the clean water used to break up the obstacles.

It can extract sediments to a depth of 6.0 meters along up to 30 meters of pipe.

Output: It can clean up to 500 meters of 8 inch pipe a day.
It can wash out up to one kilometer of 8 inch pipe.

B. CLEANING EQUIPMENT WITH SPOON OR BUCKET: "MALACATE"

This equipment is used when the pipes are extremly full of sediments. It is very effective for extracting mud, sand, stones, garbage, and obstacles of a certain size. All material impossible to extract with the suction-pumping truck (VACTOR) is handled with the Malacates.

The output is lower, and so the Installation System of the equipment requires a certain amount of effort, but the results obtained are very effective.

C. EQUIPMENT FOR DETECTING ILLICIT CONNECTIONS SMOKE PUMPS

This is used to detect cross connections to the rainwater drain network from the waste water network.

The technique of testing with smoke was developed in 1961 as a low-cost way to locate and identify faults in the drainage system. It has proven to be an extremely efficient method for detecting the source of inflow, other problems in the line, and in new systems.

The procedure consists of blowing large amounts of air and smoke through the sewer line. The smoke follows the path of

the water introduced backwards in relation to the surface pattern, revealing the origin of the problem in seconds.

STRUCTURE OF THE SANITARY SEWER NETWORK

The system is, with few exceptions, separated (sanitary drains and rainfall sewers in separate tubes). It is made of concrete pipes with small sections of ductile iron where it crosses over drainage channels. The system consists of an extensive network of services with 32 main collectors and 2 interceptors.

Of the 32 collectors, 23 discharge directly into the lake and the other 12 into 2 interceptor pipes which come together in order to discharge into the lake through a common 30 inch pipe. At present, only 18 discharge into the lake.

Some of the pipes end before they reach the lake. In these cases, the waste waters are directed to the lake in ditches. They also spread out over the surrounding lands, causing threats to health and esthetical problems.

The sewage system covers approximately 86% of the urbanized area and serves a large part of the population (estimated at 992,020). The total length of the system is estimated at 860 km., and is made of concrete pipes from 8 to 30 inches in diameter.

The basic elements of the sanitary sewage system are:

1. Collection networks
2. Transmission
3. Treatment
4. Site for final disposal

The users of the system are:

1. Domestic
2. Commercial
3. Industrial
4. Governmental

The domestic and commercial users represent 96% of the total number of connections.

PRODUCTION OF WASTE WATERS

Since about 1922, the sewers have been discharging waste waters along the shores of Lake Managua, and this process has been going on and increasing since that date with no treatment whatsoever. This has caused fecal pollution of the

lake. In 1922, the population with waste water services was 32,000.

The sanitary drain system serves a large part of Managua's population, but not all. The percentage served has been increasing due to the increase in the population and the extension of the urban area. In 1956, 43.5% of the population had this service, in 1968 it was 56%, and in 1976, 60% of the population was served and the amount handled was 80,000 m^3/day.

In 1982-1984, the collection network covered approximately 86.5% of the urbanized area, serving a population of 479,226. The amount of waste water handled at that time was 36 MGD (million gallons per day).

On the basis of previous information, it is estimated that for the years 1991 and 2000, the flow of waste water being discharged into the lake will increase to 48.8 MGD and 81.3 MGD respectively.

See Sanitary Sewage Plans of Managua (Districts 2-6)

3.2 Natural Environment

1. General Topographic and Geologic Information

a. Book explaining general information about the topography and geology.

The area of the Municipality of Managua is located within the Nicaraguan Depression, specifically on the southwest edge of this. It covers an area of 58,892.3 hectares.

The minimum elevation is 36.5 meters above sea level on the shores of Lake Xolotlan and the maximum is 940 meters above sea level at El Crucero.

Geomorphologically, it can be divided into three zones: plains with gentle to moderate slopes located in the central-north sector and northeast; craters and volcanic cones in the northeast, south, and southeast (Ticomo-Nejapa-Apoyeque-Masaya Caldera alignment); mountainous zones (Mateare and Managua ranges) with moderate to abrupt escarpments with slopes ranging from 30° to 80°. The latter are found in the east and southeast of the Managua area.

The geology of the area has a predominantly volcanic character and pertains to the geological province of the Nicaragua Depression or Graben. The area of interest is located on the southwest flank. A common characteristic of

most volcanic eruptions is that after each event, soil is formed which then becomes a fossil or palosoil once it is covered by the eruptions.

See the Annexes:

Geological Document of the Managua Area.

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b. Topographic map (1:100,000 and 1:10,000 more or less, in terms of the final disposal at Acahualinca and the surroundings of the potential sites, 1:10,000 more or less.

See topographic maps. Scale 1:100,000 y 1:10,000.

c. Geological map (1:250,000 and 1:25,000 more or less).

See geological map ND-16-15; NC-16-3
1:250,000

d. Geological section map (1:250,000 and 1:25,000 more or less).

See regional geological profile.

Hydrogeologic profile A-B-C; D-E-F-G; H-I-J;
K-L-M

e. Air photography (1:10,000 more or less).

To be provided later.

f. Data on perforations and others.

See hydrogeologic characteristics of the wells located in the City of Managua.

2. Meteorological Data

The climate of Managua is varied, presenting different data for climatic variables, for example the data for the low-lying areas near Lake Xolotlan with an annual average for 1992 of 747 mm. (A.C. Sandino station).

In the highest part of Managua (Southern Watershed) at El Crucero, the average annual temperature is 22°C and total rainfall was 894.7 mm. (Casa Colorado Station) in 1992 (IRENA).

The meteorological data obtained were provided by the Nicaraguan Institute for Territorial Studies (INETER). The main climatic variables were only obtained from the A.C. Sandino meteorological station, located at Km. 12 of the North Highway (A.C.S. Airport), 56 meters above sea level. The data are for the period from 1958 to 1990-92 (34 years), but some variables have figures for shorter periods and the measurements of evaporation and atmospheric pressure have been discontinued.

In the statistical tables, there are data for each month of the 30-year period. As well, there are mean, maximum, and minimum figures for each month of the period and by year. (See Table: Basic Hydrometeorological Systems of the A.C. Sandino Station, 1958-1992).

Data were gathered for 1990 which include daily measurements of climate, temperature, relative humidity, evaporation, etc. from the A.C. Sandino Station (Table: Monthly Meteorological Summary).

a. Book explaining general meteorological information.

Beginning in 1989-1990, the Department of Data and Statistics of the INETER Meteorological Directorate elaborated a Meteorological Yearbook on the national level. The data presented in the document are part of the technical archives of the Meteorological Directorate which for years have been growing by means of the observations made at the meteorological stations located throughout the country.

The Yearbook is divided into two sections or parts described below:

Part I : Contains synoptic summaries for each month, a description of the main variables which determine the climate.

Part II : Presents daily and mean values for the different climatic variables, such as temperature,

precipitation, relative humidity, etc., from each of the meteorological stations in the country.

In 1984, a document was written for Region III-Managua (titled Climatic Study of Region III-Managua) by the Climatology Department of the Hydrometeorological Service of Nicaragua (SHMN) of INETER. In this study, values are given for the behavior of the climatic factors of the City of Managua. Historical data are taken from the meteorological stations which have existed in the area.

A description is made of the general physical-geographic characteristics of the area, as well as of the main climatic-meteorological characteristics.

A description is given of the methodological aspects which were used for the first time in the country and afterwards applied and extended to other regions.

b. Daily changes in temperature, humidity, wind direction, and wind speed for representative days of the dry season and the rainy season.

Daily data were obtained for temperature, humidity, wind direction, and wind speed for 1990 from the A.C. Sandino Meteorological Station. In these tables there are daily figures for each month of 1990. (See Table of Annual Meteorological Summary)

As well, monthly data were gathered in INETER from the A.C. Sandino Meteorological Station for the period from 1958 to 1992. The meteorological parameters obtained were the following: (See Tables from the National Hydrometeorological Data System)

1. Precipitation: Data: sum total by month for the period (34 years) and total precipitation by year and for the period, as well as the average or mean.

   Mean, maximum, and minimum rainfall and monthly total.

   Measured in cubic centimeters (Table #1).

2. Maximum Temperature: With maximum absolute, mean, maximum, and minimum temperature, by month for the period from 1957-1989.

   Absolute maximum temperature by year, measured in degrees centigrade.

3. Mean Minimum Temperature: Period from 1957-1989, with the same data as the above.

4. Mean Maximum Temperature: Period from 1957-1989, with the same data as the above.

5. Average Temperature: Period from 1957-1992 with data for the average temperature of each year and data for the mean, maximum, and minimum temperature for each month of the period.

   Measured in degrees centigrade. (See Table #6)

6. Minimum Absolute Temperature: Measured in degrees centigrade for the 1957-1992 period.

   Minimum temperature data by year and mean, maximum, and minimum temperature figures for each month of the period. (See Table #7)

7. Solar Radiation: Measured in cal/cm^2 x day.

   From 1959 to 1990 (53 years). Mean data for radiation by year and mean, maximum, and minimum data for each month of the period. (See Table #7)

8. Insolation: Measured in tenths of an hour.

   From 1958 to 1989 (31 years). Data for mean insolation for each year of the period. Data for mean, maximum, and minimum insolation for each month of the years in the period. (See Table #8)

9. Average Wind Speed: Measurement (meters/second) h = 8 m.

   From 1957-1992. Average wind speed velocity for each year and for all months of the period. Data for mean, maximum, and minimum wind speed for each month of the period. (See Table #9)

10. Prevailing Wind Direction: Measurement - course.

    From 1957-1992. Data for prevailing wind direction for each month of the period.

    Prevailing direction by year for all the months of the year for 35 years. (See Table #10)

11. Maximum Wind Gusts: Measurement (meters/second).

    From 1970 to 1989.

    Data: Maximum wind gusts for each month of the period.

    Maximum wind gusts by year.

    Maximum wind gusts: mean, maximum, and minimum for

each month of the period (19 years).

12. Evaporation: Measured in millimeters. From 1969 to 1989. No recent data obtained because this measurement has been discontinued.

    Evaporation data for each month of the period. Total evaporation by year and the sum total of all the years in the period. Total, mean, maximum, and minimum evaporation for each month of the 20 year period. (See Table #12)

13. Vapor Tension: Measured in millimeters.

    From 1968 to 1989. There are no recent data because this measurement was discontinued.

    Data for mean vapor tension for the months of the years of the 19 year period. Mean, maximum, and minimum vapor tension by month, as well as a summary of the data for the period. (See Table #13)

14. Atmospheric Pressure: Measured in mmhg.

    From 1958 to 1989.

    Atmospheric pressure data by month and mean for each year of the period. Mean, maximum, and minimum pressure for each month, as well as the means, maximums, and minimums for the total number of years considered. (See Table #14)

c. Daily precipitation data by year for a representative year.

From the data provided by INETER from the A.C. Sandino Meteorological Station with respect to precipitation for the 34 year period taken into account (1968-1992), it was determined that 1987 was the representative year. The data for that year are as follows:

Total Precipitation	1102.0 mm annual
Annual Mean Precipitation	91.8 mm
Maximum Recorded Precipitation	311.0 mm (July)
Minimum Recorded Precipitation	0.0 mm (Feb.-Apr.)

See Table: National Basic Hydrometeorological System.

d. Hourly precipitation on the day of maximum precipitation.

No hourly precipitation data from the day of maximum precipitation were obtained, only daily rainfall by month for 1990 from the A.C. Sandino Station. (See Annual Meteorological Summary Tables)

e. Prevailing wind direction and wind speed by month.

See Tables 9, 10, and 11 of the National Basic Hydrometeorological System from the A.C. Sandino Station for the period from 1958 to 1992. Contain monthly and annual wind speed and prevailing wind direction data and maximum wind gusts. Data exist for the latter two parameters for the whole period.

See Monthly Meteorological Summary table for 1990 from the A.C. Sandino Station which contains wind speed data, minimums and means by day for each month and prevailing wind direction by day and month for 1990.

Monthly precipitation data were also obtained for 1991-1992 from the San Judas Station (location 069136-120632), the Santa Rosa Station (location 069143), the Casa Colorado Station (location 069647), the San Isidro de la Cruz Verde Station (location 069-0078) and the Asososca Station (location 069050).

See the National Meteorological Services Tables (INETER). 10 tables.

3. Hydrogeological Information

a. Book of general hydrogeologic information.

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See hydrogeologic conditions pamphlet.

b. Hydrogeological map (preferably with surface water system and groundwater levels).

See hydrogeological map.

See geohydrological map.

c. Hydrogeological sectional map (preferably with standing water level and levels of each stratum of standing water).

See Hydrogeological map.

See map of elevation of the ceiling of the impermeable hydrogeologic layer underlying the Sierras Group.

See map of the groundwater flow mechanism.

See hydrogeological profile A-B-C; D-E-F-G; H-I-J; J-L-M.

d. Data for annual and monthly changes in groundwater level in a representative site.

Records were obtained from the Cristina Pèrez, Masaya, and Sabana Grande stations with the daily level of the water represented in the figures for groundwater levels.

The Cristina Pèrez station is located in the center of the City of Managua, and the water level is almost 44-45 meters below the ground surface. This level drops continuously, even in the months of the rainy season such as June and July. During the last days of the month of July, there is a slight rise in the level.

The Masaya station is located in the southwest part of the Masaya Lagoon and the water level is almost 15.5 meters below the surface of the ground. The lowest water level ocurred in March and this increased until the end of July. The level dropped in September and rose rapidly in October due to the 200 mm. per day of precipitation observed at the La Concepción Station on October 3.

The Sabana Grande Station is located to the south of the airport and the water level is 22 meters below ground level. This level varies with rainfall.

For more information:
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e. Water quality data in a representative site.

See samples of water quality from drinking water sources for the City of Managua.

4. Use of Groundwater

a. Map of distribution of wells.

See map of well sites and ionic concentrations of groundwater and surface water.

b. Factors for the wells mentioned above. (number, name, depth, diameter, depth of sieve, volume of pumping for 1 month).

See results of well inventory.

5. Have there been changes in the water level and water quality in the lakes and rivers, espec. Lake Managua and the Acahualinca Lagoon? Please provide data indicating yearly changes.

Yes, there have been changes in the water level.

TABLE #1

YEAR	ELEVATIONS OF WATER LEVEL	
	ASOSOSCA LAGOON	LAKE MANAGUA
1960	40.57	---
1961	40.40	---
1962	40.11	---
1963	40.17	38.31
1964	39.98	---
1965	39.30	37.45
1966	38.78	37.87
1967	38.00	36.92
1968	37.21	37.62
1969	37.08	39.20
1970	37.03	39.60
1971	36.63	39.42
1972	35.57	38.05
1973	36.62	39.16
1974	36.12	38.98
1975	35.38	39.31
1976	35.93	38.37
1977	35.83	37.21

TABLE #3

DATE	WATER LEVEL NEJAPA LAGOON	WELL PPA-3A	WELL PPA-M3	WELL PPA-70.
	ELEVATION IN METERS			
FEB. 1	---	---	42.32	---
FEB. 3	41.96	---	---	---
FEB. 23	---	---	41.92	---
MAY 1	---	---	41.48	---
MAY 5	---	---	---	40.38
MAY 8	41.33	---	---	---
MAY 18	41.38	41.51	41.50	---
JUNE 1	41.52	---	41.47	---
JUNE 6	41.57	---	41.44	---
JULY 3	41.52	---	41.39	---

See Table of Changes in Water Levels

6. Are there fragile natural systems like swamps? Please provide a map and a list.

The Municipality of Managua is located at 86° west longitude and 12° north latitude, to the south of the Lake Managua watershed.

It has a varied terrain with steep slopes in the areas near the Managua Sierra (Cuajachillo, Las Nubes, El Crucero) and with a slight declination (plain) near Lake Managua. Elevations range from 39 meters (lake basin) to 340 meters (mountains) above sea level.

The climate, according to the Köppen classification is Tropical Savanna. (Source: IRENA)

The municipality has an area of 588.9 km² (urban and rural). No fragile areas are present which could be called swamps, but it can be said that the coastal areas of the lake are subject to flooding during the rainy season (between May and October) and swampy areas are created over an area of approximately 15 km².

These areas are also zones of liquefaction since some are terraplain areas or have alluvial soils, which because of their composition or due to their greater percentage of groundwater, could result in major destruction if there is seismic activity.

Special Fault Areas

These are areas which could be considered fragile. There are 13 main seismic faults in Managua with a density of active faults of approximately one for every 0.73 km². This is a high density of seismic faults.

Besides being in the graben, it is on top of a thin horizon of residual materials and soil, which in turn lies on top of piroclastic holocene volcanic material which in general is poorly compacted.

List of Seismic Faults

1. Airport Fault
2. Tiscapa Fault
3. Ciudad Jardin or Chico Pelón Fault
4. Centroamérica Fault
5. Stadium Fault
6. Los Bancos Fault
7. Unidad de Propósito-Mayoreo Fault
8. Villa Panama Fault
9. Sierra Maestra-San Judas Fault
10. Rubenia Fault
11. Batahola Fault
12. Pancasan Fault
13. Asososca Fault

Flood Zones

These are low-lying areas or areas near the lake or near drainage channels which are in danger of flooding during heavy rains. Among the main ones are:

1. Eastern Zone of the city
2. Airport area
3. Green areas in the ruins
4. Sabana Grande
5. Tiscapa Lagoon
6. Plaza de Sol - Pancasan
7. Lake shore
8. Southern Watershed (Half Moon)
9. Pista de la Resistencia
10. Km. 7, South Highway
11. Santa Rosa
12. Nicarao
13. Rubenia
14. Acahualinca
15. San Cristobal
16. San Isidro drainage channel
17. Jocote Dulce drainage channel
18. Los Duartes drainage channel

See plan of critical points for flooding and sedimentation in Managua. Source: Planning-ALMA.

7. Are there areas specially designated as natural or national parks? Please provide a list and a map indicating the boundaries.

The City of Managua has a number of sites with the ecological (landscape) characteristics which lend themselves to tourism, such as its lagoons, lakes, hills, and other sites. It also has a number of other sites of cultural interest, such as historical sites, detailed below:

LIST OF PLACES OF INTEREST FOR TOURISM IN THE MUNICIPALITY OF MANAGUA

PLACE OF INTEREST	TOURISM VALUE	DISTRICT
Asososca Lagoon	Viewpoint	#2
Las Nubes (El Crucero)	Viewpoint	#7
Motastepe Hill	Viewpoint	#2
Gruta Xavier	Viewpoint. Center for Catholic activities	#1
Tiscapa Lagoon	Possible recovery. Recreation center. Viewpoint	#4
Lake Managua	Possible recovery. Historical, cultural patrimony of the city. Possible navigation.	#2 and #4
El Malecón Park	Center for family recreation.	#2

PLACES OF CULTURAL INTEREST

Historical city center of Managua. Includes the following:

PLACE OF INTEREST	TOURISM VALUE	DISTRICT
Ruins of the Cathedral	Possible cultural center. Relic of neo-classical constructions in Nicaragua	#4
Central Park	Recreation and cultural center	#4
Julio Cortazar Museum	Contemporary art exhibitions	#2
National Theatre	Artistic presentations	#4
Monument to the Victims of the Earthquake Park	Recreation	#2
San Pedro Cemetery	Historical interest Possible recovery	#2
Olof Palme Convention Center	Center for international conventions	#4
Ruins of the Gran Hotel	Cultural center	#4
Acahualinca Footprints Museum	Historical and cultural patrimony of our ancestors.	#2

According to Decree No. 42-91 of October 31, 1991, the President of the Republic, in use of the faculties conferred on her by law, decreed that a number of hills, massifs, volcanoes, and lagoons in the country are Natrual Reserve Areas and Protected Areas. The following are located within the Municipality of Managua:

NAME OF AREA	AREA	MANAGEMENT CATEGORY
Lake Managua (Xolotlan)	1016 km²	Natural Reserve
Asososca Lagoon	140 ha.	Natural Reserve
Tiscapa Lagoon	40 ha.	Natural Reserve
Nejapa Lagoon	220 ha.	Natural Reserve
Acahualinca Lagoon		Natural Reserve

Xiloá Lagoon (outside of the Managua Municipality area)

According to the Managua Regulator Plan of 1992, the following hills were declared as Natural Reserve Zones (RN-1) in the Regulations for Zoning and Land Use:

a. San Carlos Hill (deforested)
b. Miraflores Hill
c. Motastepe Hill (extraction of select material)
d. Hormigón Hill
e. Valle Dorado Hill
f. Rises of Motastepe

These same Regulations include the Asososca, Nejapa, and Acahualinca Lagoons. (See Zoning and Land Use Plan)

Natural Reserve Zone of the Lake Shore (RN-2)

Length of the shore within the municipality (15 kilometers).

Natural Reserve Zone of Urban Parks (RN-4)

Tiscapa Lagoon (besides being a Natural Reserve, it is also considered as an Urban Park).

There is problem of pollution of its waters and deforestation of its slopes.

The most important urban parks in the capital are:

* National Stadium
* Sandino Memorial Park
* Managua Central Park
* Rubèn Dario Park
* Las Piedrecitas Park
* Luis Alfonso Velazquez Flores Park
* El Malecón Park-Plaza (south shore of the lake)
* Las Madres Park

These parks represent alternatives for recreation and relaxation for the population. With the parameters for selection are:

* Dimensions
* Age
* Importance
* Location
* Existing vegetation

See zoning and land use map of the urban area of the City of Managua.

8. Are there any valuable animals or plants in the area? Please provide a list and map of their distribution.

Within the urban area of the Municipality of Managua, there are still tree species which are valuable from the point of view of multiple use, such as: fuel, lumber, soil protection, and ornamental. The following are the main ones:

COMMON NAME	SCIENTIFIC NAME
1. Cortez	Tabebuia chrysantha
2. Guanacaste Blanco	Albizzia caribeae
3. Guanacaste de Oreja	Enterolobium cyclocarpum
4. Madroño (national tree)	Calycophyllum candidissimun
5. Sacuanjoche (national flower)	Plumeria rubra
6. Espino Negro	Posonia aculeata
7. Genizaro	Pithecollobium saman
8. Madero Negro*	Cadrela odorata
9. Roble	Gliricidia sepium
10. Guayabón	Terminalia oblonga

These forest species predominate in the rural areas of the municipality where there are still some wooded zones. These are located in the following areas:

* El Crucero
* Filos de Cuajachillo
* Las Nubes
* Berlin

This zone could be declared a Protected Natural Reserve.

9. Are there landscapes considered to be important for tourism or religion? Please provide a list, a map with their locations, and photographs.

Tourism

a. Shores of Lake Managua (presently polluted).
b. Tiscapa Lagoon (problems of pollution and deforestation).
c. Xiloa Tourism Center (10 km. outside the limits of the municipality.
d. El Crucero area (agreeable temperature).
e. Filas de Cuajachillo (agreeable temperature, panoramic view of the city).

---

* Very valuable species (precious wood)

Religion

a. Former Cathedral (historical monument, presently in abandon).
b. The Immaculate Conception of Mary Cathedral (in the final phase of construction).
c. Santo Domingo Church (festivities for the patron saint of Managua).

Parks

a. Malecòn
b. Luis Alfonso Velazquez
c. Central Park

See tourist map of Managua.

3.3 Pollution

1. **Are there problems of runoff from the final disposal at the existing Acahualinca site? Please provide information about this problem.**

Yes there are because this garbage dump does not the have the characteristics of a real sanitary landfill site. However, it is assumed that due to the slope of the land, the natural runoff goes towards the lake, although this has not been measured (flow in gallons/minute).

Regarding the production of gases (methane CH_4, CO_2, and others), there are no quantitative data.

2. **Water quality data from the final disposal at the existing Acahualinca site.**

The following are water quality data from the Acahualinca Lagoon, to be used as a reference for the site.

DIAGNOSTIC AND MONITORING OF EPICONTINENTAL WATERS

ACAHUALINCA LAGOON, 1993

BACTERIOLOGICAL ANALYSIS

SAMPLING POINT CENTER UFC/ML				
DATE	TOTAL COLIFORMS	FECAL COLIFORMS	STREP. COLIFORMS	SAPROLITA (BACT) ml
12/03/93	90000	90000	---	61000
05/05/93	24000	34000	500	33000

SAMPLING POINT NORTH UFC/ML				
DATE	TOTAL COLIFORMS	FECAL COLIFORMS	STREP. COLIFORMS	SAPROLITA (BACT) ml
12/03/93	140000	140000	---	57000
05/05/93	500000	170000	1600	10000

SAMPLING POINT SOUTH UFC/ML				
DATE	TOTAL COLIFORMS	FECAL COLIFORMS	STREP. COLIFORMS	SAPROLITA (BACT) ml
12/03/93	11000	11000	---	4300
05/05/93	24000	24000	240	4900

BIOLOGICAL ANALYSIS

TYPES	SPECIES
Algae	Cyanoplucae Chococcos Oscillatoria Merismupedia
Diatoms	Bacilloriaphyceae Cyclotella Nelasira Nitzochia
Chlorophytes	Chosterium Osciptis Pediastrum Scenedemus
	ABUNDANT Oscillatoria Scenedesmus Pediastrum

3. **Data on the situation of soil contamination.**

To date, there is no information regarding this.

4. **Data on the situation of groundwater pollution.**

According to an analysis of pesticides in groundwater in the East of Managua (August 1993).

From April 1992 to June 25, 1993, a study was made of the sub-area in the east defined in the Project for Water Supply in Managua and the investigation was carried out by the Japanese International Cooperation Agency and INAA.

In the study, samples were taken from 17 perforated wells and measurements were made of the organochloride and organophosphate pesticides in the water samples. 253 measurements were made of 15 types of organophosphate pesticides commonly used in Nicaragua.

The samples are only representative of the groundwater since the presence of pesticides in the soil was not investigated. Samples were taken from the wells belonging to INAA for supplying water to the City of Managua, Sabana Grande, Cofradia, and Ticuantepe.

In the analysis, all the pesticides were under the detection limits with the exception of toxaphene which was found in concentrations of 5.23 mg/l, a value close to the allowable limit in the 1991 Water Quality Standards of the United States of America which sets a value of 5 mg/l.

In one of the wells sampled (Well #2: See location drawings - Data on Groundwater Pollution), the chlorates dieldrin, p^1, p^1-DDE, p^1, p^1-DDD, and toxaphene were detected. The latter was more than 56 times over the allowable limits for water quality.

Organophosphorate pesticides detected were Disistón, Diazinón, DEF, Ediphenes, and Terbufos. These samples were also over the European standards.

In Wells Nos. 3, 4, and 5, Heptadoro and Heptadoro Epoxide were detected with measurements slightly over the standards.

In the wells directly supplying water to the City of Managua (Wells Nos. 7 and 16), no pesticides were detected. In the area nearby Well #17, a warehouse where agro-chemicals were stored was destroyed, and the wastes were buried in the warehouse yard. It was assumed that Well #17, located 480 meters southeast of the site would be contaminated. No type of pesticide was detected in the analysis.

In general, it is felt that the groundwater of the study area is free from contamination by pesticides, since even though Well #2 was sampled a number of times, only once were pesticides detected. This is presumed to be because the well is uncovered and the contamination entered through the air.

But it should be noted that the wastes from the agro-chemical warehouse destroyed in 1984 are a threat to groundwater quality. However, nine years have passed since the fire, and no evidence of contamination has been found in the closest well to the site (480 meters away), the cone of which probably reaches the area of the warehouse.

RESULTS OF PESTICIDE TESTING OF GROUNDWATER (in mg/l)

REF #	NAME OF WELL	DATE	TYPE OF ANALYSIS	
			ORGANOCHLOR.	ORGANOPHOS.
1	Sabana Grande	21/04/92	Toxaphene:5.23 Others :nd	nd
2	San Cristobal	13/08/92	Dieldrin: 14 p'p'-DDE: 26 p'p'-DDD: 14 Toxaphene:280 Others : nd	Tebufos :92 Disiston:48 Diazinon:13 DEF :11 Endiphen:41 Others :nd
		25/06/93	nd	nd
3	Pueblo Sabana Grande, INNA 2.	07/10/92	Heptacloro: 2 Others : nd	nd
		25/06/93		nd
4	Hacienda Santa Ana	07/09/92	Heptacloro: 6 Heptalepox: 8 Others : nd	
5	El Verbo Coop.	07/09/92	Heptacloro: 2 Others : nd	
6	Exper. Porcino	07/09/92		NALED:<L.D. Others: nd
7	INAA Ticuantepe	12/05/93	nd	nd
8	Valle Gothel INAA No. 71	12/05/93	nd	nd
9	El Pique Coop.	12/05/93	nd	nd
10	Sabana Grande N.5 (N.31)	12/05/93	nd	nd
11	Carlos Fonseca N.16 (N.79)	12/05/93	nd	nd
12	El Tempisque	12/05/93	nd	nd
13	Cofradia INAA 2	12/05/93	nd	nd
14	Campuzano	12/05/93	nd	nd
15	Guancastillo	12/05/93	nd	nd
16	San Martin chicken farm	12/05/93	nd	nd
17	Villa Fraternidad	12/05/93	nd	nd

nd = not detected <L.D. = Under detection limit

SOURCE: Pesticide Analysis of Groundwater in the East of Managua. INNA. August 1993.

Apart from the data found by INAA this year (1993), there are no other approximate studies about the contamination of groundwater and there is only the hypothesis that the amounts of chemical substances that fall in the channels and water bodies which receive liquid industrial wastes may penetrate the sub-soil. To date, it has been difficult to determine the degree of contamination, but it is obvious that the groundwater has been contaminated to an undetermined extent, even in the Managua Aquifer, or at least in the zones closest to the heavy chemical industry.

According to studies done by an international atomic energy agency (Plata Bedmar Antonio, Vienna, Austria, October 1985), the contamination of the aquifer in the industrial sector affects Wells PP-25, PP-25A, and PE-50. This takes the form of high concentrations of Cl^- and Ca^{++} ions. In Well PP-21, an abnormally high concentration of Mn (0.825 ppm) was detected, while in the uncontaminated wells, the level was not even 0.1 ppm. In that same well, concentrations of 1.31 and 2.10 ppb (*) of DDD have been measured. In Well PP-25, concentrations of 5.27 ppb of hexachlorocyclolexane and 1.50 ppb of chlorophene have been recorded.

The existing correlation between the level of ionic contamination and the pH shows that it has to do with contamination which is acidic in character. This contrasts with the contamination reaching Lake Managua by way of the drainage channels which, as seen before, has a basic character. This fact together with the geographic distribution of the contamination and with the changes in chemical composition derived from the same, raises the suspicion that that contamination is produced by the discharging of residual products done periodically by the ELPESA-HERCASA industrial complex into the atmosphere. The products emitted contain chlorine and different kinds of chlorate compounds, and they form a kind of cloud which is detected organoleptically at ground level. The disposal of these products and the later transport of them by rainwater must produce the contamination of the groundwater. The CLH content produces the dissolution of the calcium carbonate fraction of the soil and is the cause of the increase in the concentration of the Cl^- and Ca^{++} ions, as well as other cations.

Nonetheless, this hypothesis must be tested in a more detailed investigation. According to this same study, an analysis was made in the Asososca Lagoon and it was determined that the existing contamination of the aquifer in the industrial sector is not affecting --at least not in a significant fashion-- the Asososca Lagoon. This is probably due to the intensive pumping of water done continually in this sector. The underground flow should circulate from the lagoon to the industrial sector and not the other way. It is

possible that an eventual cessation of pumping in the industrial sector would bring about the intrusion of contaminated water into the Asososca Lagoon.

The report "Alternative Sources for Water Supply to the HERCAS-ELPESA Industrial Complex, 1988", reports on the conditions of the groundwater level in the industrial area (HERCASA-ELPESA), located 1.5 km. north of the Asososca Lagoon. In this study, physical, chemical, bacteriological, and isotopic analyses were performed on the water of the wells perforated in those areas. According to this report, in the sub-soil of these areas, there are two aquifer zones, one above with highly mineralized water and another below in confrontative conditions with less mineralized water.

The area of the Acahualinca Lagoon is considered to be a source of contamination of the wells located around it.

ANALYSIS OF THE HYDROGEOCHEMICAL CHARACTERISTICS OF THE ACAHUALINCA LAGOON

Even with the absence of sufficient chemical analyses and the corresponding systematic monitoring of a hydrogeologic character, a study has been implemented of the vulnerability of the soil (1992) in the zone of Acahualinca with its characteristics of discharge and with good conditions of hydraulic connection between the surface and subsurface waters. A stiff diagram was drawn up, calculations were made of the index of base exchange, and a general assessment of bacterial contamination was done for all the types of hydrologic characteristics (PP, PE, AS). This was done with the object of giving an approximation in the interpretation of the hydrogeochemical characteristics (see figures for Acahualinca). It can be seen that the macro-components of the water, their concentrations are given in meq/l in order to better appreciate the degree of participation and evolution of each element in the total composition of the dissolved solids in the water, from which the following can be observed: [sic ?]

1. That the chloride content at the lakeshore and the west sector is high with respect to the east sector because of the influence of the pollution from the industrial zone.

2. The negative icb values, as a relation of the imbalance between chlorides and alkalines (Na^+, K^+), might indicate a leaching of the soil under present conditions and an increase in the cationic exchange because of the presence of the mineral Zeolite in volcanic and clayey rocks (cationic exchange towards softening).

3. Due to the relative influence of the topographic elevation, there is a certain hegemony in the

distribution of the concentrations of anions (HCO_3, Cl^-), and cations (Na^+, Ca^{2+}). This in turn determines the genetic type of water, sodium calcium bicarbonate in the west sector and sodium bicarbonate in the east. From this it can be deduced that the latter are older.

4. Given the bacteriological contamination from excrement in the study zone, a low and insignificant sulphate ion content is observed because of the effect of the process of catalyzed reduction by the bacteria itself. (In Well PE-47, 2400 fecal coliforms were detected by the NPM/100 ml standard. Lab. UNAN)

5. Besides the natural conditions which ensure the predominance of the bicarbonate anion, there is another factor which makes this so. The leachings from the garbage dump, on producing methane gas in interaction with water molecules, can free up bicarbonate ions: $CH_4 + 3H_2) \dashrightarrow HCO_3 + 9H^+ 8\grave{e}$, or else the process of ionic change (softening of the water), in which calcium is fixed and sodium is freed, in which the water becomes more aggressive, the HCO_3 ion increases at the expense of the hydrolysis of the CO_3^{-2} put into solution.

5. Data on the current situation of air pollution.

According to data from the Nicaraguan Institute of Territorial Studies (INETER) with its National Hydrometeorological Service, seven publications have been issued about air pollution.

In the first work, sulphur dioxide in the air was monitored in possible areas affected by the gas turbine before it began operating.

The first publication is a bulletin about Air Pollution by Concentrations of SO_2 and Cl from June to August 1989. It also contains a reference to the terminology used in the analysis.

The analysis of the behavior of SO_2 and Cl concentrations from October to December 1989 is presented in a second bulletin.

From January to March 1990, a third bulletin was published with an analysis of the behavior of SO_2, O_3, and Cl_2 concentrations.

In the fourth bulletin, an analysis is made of the behavior of the chlorine and sulphur dioxide concentrations in the period from April to June, 1990.

The fifth bulletin contains a monitoring of the gases emitted during the eruption of the Cerro Negro volcano (April 1992). It is not reported in this summary because it is outside the scope of the area of study.

See Bulletins Nos. 1, 2, 3, and 4 about air pollution. INETER

6. Data on the present situation of bad odors.

There is no monitoring of bad odors, but there are analytical studies about the environmental problem represented by the Acahualinca garbage dump because of bad odors, smoke, esthetic deterioration, proliferation of disease-carrying animals and insects (flies, rats, mosquitoes, vultures, cockroaches, etc.). According to a survey of more than 70 households and health centers, it was found that there is a high incidence of respiratory ailments characteristic of these kinds of activities related to the final disposal of solid wastes. (See Figure: Most common ailments in the northeast sector of Acahualinca, indicating the kinds and percentages of ailments among the population.)

7. Data on the present situation of noise and vibration.

To date, no studies have been made which reflect the present situation of this problem.

8. Data on the problem of settling of the land, if this happens.

In the study area, no cases of land settling have presented themselves.

付属資料C
Scope of Work

SCOPE OF WORK
FOR
THE STUDY
ON
THE IMPROVEMENT
OF
THE SOLID WASTE MANAGEMENT SYSTEM
FOR
THE CITY OF MANAGUA
IN
THE REPUBLIC OF NICARAGUA

AGREED UPON BETWEEN
MUNICIPALITY OF MANAGUA
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

OCTOBER 25, 1993
MANAGUA, NICARAGUA

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I. INTRODUCTION

In response to the request of the Government of the Republic of Nicaragua (hereinafter referred to as " the government of Nicaragua"), the Government of Japan has decided to conduct a Study on the Improvement of the Solid Waste Management System for the City of Managua in the Republic of Nicaragua (hereinafter referred to as "the Study") in accordance with the laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for implementation of the technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with authorities concerned of Nicaragua.

The present document sets forth the Scope of Work for the Study.

II. OBJECTIVES OF THE STUDY

The objectives of the Study are:

1. to formulate a master plan for the improvement of the solid waste management (hereinafter referred to as "SWM") of the city of Managua.
2. to conduct a feasibility study for priority project(s) to be selected from the master plan.

III. STUDY AREA

The study area shall cover whole area under the administration of the Municipality of Managua.

IV. SCOPE OF THE STUDY

In order to achieve the above objectives, the study will cover the followings:

Phase 1: Formulation of a master plan

1. Collection and review of existing data and information of Managua City on:

   a) physical conditions such as climate, topography, geology, etc.
   b) social and economic conditions and statistics
   c) urban development plan and land use
   d) road traffic system and conditions

e) national and municipal policies and development plans related to SWM
f) legislation and institutional aspects on SWM
g) financial condition of the Municipality of Managua
h) Present condition of SWM
i) on-going projects related to SWM
j) Social and environmental aspects of the SWM

2 Field survey

a. Amount of solid waste and its composition
b. Geology, water quality, land use on existing dumping area and future landfill sites
c. Public consciousness on SWM
d. Environmental survey

3. Analysis of collected data and information and identification of problems

4. Forecast of future amount and composition of solid waste

5. Formulation of a master plan of SWM

(1) Confirmation of planning framework
a. Target year
b. Planning area
c. Service level
d. System components

(2) Setting goals and strategies for the improvement of SWM toward the target year

(3) Comparison of alternatives for system components

(4) Selection of the best alternative

(5) Conduct of initial environmental examination

(6) Facility plan

(7) Organization and management plan

(8) Operation and maintenance plan

(9) Planning for sanitary education

(10) Cost estimation

(11) Evaluation of the master plan

a) socio-economic aspects
b) financial aspects
c) environmental aspects

(12) Implementation plan

(13) Selection of priority project(s)

Phase II Feasibility Study

1. Feasibility study on the priority project(s)

(1) Confirmation of planning frame work

a. Target year
b. Planning area
c. Service level
d. Components of the project(s)

(2) Supplemental study

(3) Environmental impact assessment

(4) Planning of the outline of facilities

(5) Preliminary design of facilities and equipment

(6) Planning for institutional and organizational development

(7) Operation and maintenance plan

(8) Cost estimation

(9) Project evaluation
a.socio-economic evaluation
b.financial evaluation
c.environmental evaluation

(10) Implementation plan

V. STUDY SCHEDULE

The Study will be carried out in accordance with the tentative schedule attached in Appendix 1.

VI. REPORTS

JICA will prepare and submit the following reports in English to the Government of Nicaragua.

1. Inception Report:

   Twenty (20) copies at the commencement of the first work in Nicaragua.

2. Progress Report (1)

   Twenty (20) copies at the end of the first work in Nicaragua.

3. Interim Report

   Twenty (20) copies at the beginning of the second work in Nicaragua

4. Progress Report (2)

   Twenty (20) copies at the end of the third work in Nicaragua.

5. Draft Final Report:

   Twenty (20) copies at the beginning of the forth work in Nicaragua. The Government of Nicaragua will submit its comments to JICA within thirty (30) days after receipt of the Draft Final Report.

6. Final Report:

   Forty (40) copies within thirty (30) days, after JICA's receipt of comments on the Draft Final Report.

VII. UNDERTAKINGS OF THE GOVERNMENT OF NICARAGUA

1. To facilitate smooth conduct of the Study, the Government of Nicaragua shall take the following necessary measures:

(1) to inform the members of the Japanese Study Team (hereinafter referred to as "the Team") any existing risk in the Study area and to take any measures deemed necessary to secure the safety of the Team,

(2) to permit the members of the Team to enter, leave and sojourn in Nicaragua for the duration of their assignment therein, and exempt them from foreign registration requirements and consular fees,

(3) to exempt the members of the Team from taxes, duties and any other charges on equipment, machinery and other materials brought into Nicaragua for the conduct of the Study,

(4) to exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Team for their services in connection with the implementation of the Study

(5) to provide necessary facilities to the Team for remittances as well as utilization of the funds introduced into Nicaragua from Japan in connection with the implementation of the Study,

(6) to secure permission for entry into private properties or restricted areas for the implementation of the Study,

(7) to secure permission for the Team to take all data and documents (including photographs and maps) related to the Study out of Nicaragua to Japan, and

(8) to provide medical services as needed. Its expenses will be chargeable on members of the Team.

2. The Government of Nicaragua shall bear claims, if any arises, against the members of the Team resulting from, occurring in the course of, or otherwise connected with,discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.

3. The Municipality of Managua shall act as a counterpart agency to the Team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

4. The Municipality of Managua shall, at its own expense, provide the Team with the following, in cooperation with other organizations concerned:
   (1) available data and information related to the Study,

   (2) counterpart personnel,

   (3) suitable office space with necessary equipment in Managua City,

   (4) credentials or identification cards.

VIII. UNDERTAKINGS OF JICA

For the implementation of the Study, JICA shall take the following measures:

1. to dispatch, at its own expense, study teams to Nicaragua,

2. to pursue technology transfer to the Nicaraguan counterpart personnel in the course of the Study.

IX. CONSULTATION

JICA and the Municipality of Managua shall consult with each other in respect of any matter that may arise from or in connection with the Study.

X. OTHERS

The Scope of work is prepared in both English and Spanish and the both versions are signed by the both parties. In case any doubt arises in interpretation, the English text shall prevail.

ANNEX I

TENTATIVE STUDY SCHEDULE

MONTH / DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Phase I: Master plan								Phase II: Feasibility study							
WORK IN NICARAGUA		First work						Second work		Third work			Forth work			
WORK IN JAPAN																
REPORT PRESENTATION		IC/R				P/R(1)		IT/R				P/R(2)	DF/R			F/R

IC/R: Inception Report

P/R: Progress Report

IT/R: Interim Report

DF/R: Draft Final Report

F/R: Final Report

ALCANCE DE TRABAJO

PARA

EL ESTUDIO

SOBRE

EL MEJORAMIENTO

EN

EL SISTEMA DE MANEJO DE

LOS DESECHOS SOLIDOS

PARA

LA CIUDAD DE MANAGUA

EN

LA REPUBLICA DE NICARAGUA

ACORDADO ENTRE

LA ALCALDIA DE MANAGUA

Y

LA AGENCIA DE COOPERACION INTERNACIONAL

DEL JAPON

25 DE OCTUBRE, 1993

MANAGUA, NICARAGUA

ING. ROBERTO CEDENO BORGEN
ALCALDE a,i
ALCALDIA DE MANAGUA

YUDIHISA SAKURADA
JEFE DEL EQUIPO DE ESTUDIO
PREPARATORIO
AGENCIA DE COOPERACION
INTERNACIONAL DEL JAPON

ARQ. MARIANO ARGUELLO H.
SECRETARIO GENERAL
MINISTERIO DE COOPERACION EXTERNA

I. INTRODUCCION

En respuesta a la solicitud del Gobierno de Nicaragua, el Gobierno del Japón ha decidido llevar a cabo el Estudio sobre el Mejoramiento en el Sistema del Manejo de los Desechos Sólidos para la Ciudad de Managua en la República de Nicaragua (en adelante denominado "El Estudio") de conformidad con las leyes y regulaciones en vigor en Japón.

En consecuencia, la Agencia de Cooperación Internacional del Japón (en adelante denominada "JICA"), agencia oficial responsable para la implementación de los programas de cooperación técnica del Gobierno del Japón llevará a cabo el Estudio en cooperación estrecha con las autoridades concernientes de Nicaragua.

El presente documento fija el Alcance de Trabajo para el Estudio.

II. OBJETIVOS DEL ESTUDIO

Los objetivos del Estudio son:

1. Formular un Plan Maestro para el mejoramiento del manejo de los desechos sólidos (en adelante denominado "SWM") de la ciudad de Managua.

2. Llevar a cabo un estudio de factibilidad para proyecto(s) prioritario(s) seleccionado(s) en el Estudio del Plan Maestro.

III. AREA DEL ESTUDIO

El área de estudio cubre el área total bajo la administración del Municipio de Managua.

IV ALCANCE DEL ESTUDIO

Para realizar los objetivos arriba mencionados, el estudio cubrirá los siguientes puntos:

Fase 1: Formulación de un plan maestro.

(1) Colección y revisión de dato e información existentes de la Ciudad de Managua sobre:

a) Condición física tales como clima, topografía, geología, etc.
b) Condición y estadisticas sociales y económicas
c) Plan de desarrollo urbano y uso de tierra
d) Sistema de tráfico de carreteras y condiciones
e) Políticas nacionales y planes de desarrollo relacionados con SWN
f) Legislación y aspectos institucionales sobre SWM.
g) Condición financiera del Municipio de Managua
h) Condición actual de SWN.
i) Revisión de proyectos en curso relacionados con SWN
j) Aspectos social y ambiental de SWN

2. Reconocimiento del campo.

a) Cantidad de desecho sólido y su composición
b) Geología, calidad de agua, uso de tierra en área existente de descarga y futuros sitios para relleno.

c) Conciencia pública sobre SWN.
d) Reconocimiento ambiental

3. Analisis de datos coleccionados e información e identificación de problemas.

4. Pronóstico de futura cantidad y composición de desechos sólidos.

5. Formulación del Plan Maestro sobre SWN.

(1) Confirmación del marco planeado

a. Año meta
b. Area planeada
c. Nivel de servicio
d. Componentes del sistema

(2) Metas establecidas y estrategias para mejoramiento de SWN hacia el año meta.

(3) Comparación de alternativas para componentes del sistema.

(4) Selección de mejor alternativa

(5) Conducta del examen inicial de medio ambiente

(6) Plan de facilidad

(7) Plan de organización y manejo

(8) Plan de operación y mantenimiento

(9) Planeación para educación sanitaria

(10) Estimación de costo

(11) Evaluación del Plan Maestro

a) Aspectos socio-económicos
b) Aspectos financieros
c) Aspectos ambientales

(12) Plan de implementación

(13) Selección de proyecto(s) prioritario(s)

Fase II Estudio de Factibilidad

1. Estudio de factibilidad de proyecto(s) prioritario(s).

(1) Confirmación del marco planeado

a. Año meta.
b. Area planeada
c. Nivel de servicio
d. Componentes de Proyecto(s)

(2) Estudio adicional

(3) Evaluación de impacto ambiental

(4) Planificación del esquema de facilidades

(5) Diseño preliminar de facilidades y equipamiento

(6) Planificación para desarrollo institucional y organizacional

(7) Operación y plan de mantenimiento

(8) Estimación del costo

(9) Evaluación del proyecto

a. Evaluación socio-económica
b. Evaluación financiera
c. Evaluación ambiental

(10) Plan de implementación

V. PROGRAMA DEL ESTUDIO

El Estudio se llevará a cabo de acuerdo con el programa tentativo anexado en Apendice 1.

VI. INFORMES

JICA preparará y presentará los siguientes informes en Inglés al Gobierno de Nicaragua.

1. Informe inicial:

   Veinte (20) copias al inicio del estudio en Nicaragua.

2. Informe de progreso (I)

   Veinte (20) copias al final del primer estudio en Nicaragua.

3. Informe intermedio

   Veinte (20) copias al inicio del segundo estudio en Nicaragua.

4. Informe de progreso (II)

Veinte (20) copias al final del segundo estudio en Nicaragua.

5. Borrador del Informe Final:

Veinte (20) copias al inicio del cuarto estudio en Nicaragua. El Gobierno de Nicaragua presentará sus comentarios a JICA dentro de treinta (30) días luego de recibido el Borrador del Informe Final.

6.- Informe Final:

Cuarenta (40) copias dentro de treinta (30) días, después de que JICA reciba comentarios sobre el borrador del Informe Final.

VII. COMPROMISOS POR PARTE DEL GOBIERNO DE NICARAGUA

1. Para facilitar un adecuado desarrollo del Estudio, el Gobierno de Nicaragua tomará los siguientes recaudos:

(1) Informar a los miembros de la Misión de Estudio del Japón (en adelante denominada como "La Misión") cualquier peligro existente en el área del Estudio y tomar todas las medidas necesarias para garantizar la seguridad de la Misión.

(2) Permitir a los miembros de la Misión el ingreso partida y permanencia en Nicaragua a lo largo de su estadía en el país, y eximirlos de los requerimientos de registros de extranjeros y derechos consulares.

(3) Eximir a los miembros de la Misión de impuestos, obligaciones y demás cargos en equipamiento maquinaria y demás materiales traidos a Nicaragua para la ejecución del Estudio.

(4) Eximir a los miembros de la Misión de impuestos sobre rentas y cargos de otro tipo que puedan imponerse en relación a emolumentos o concesiones abonadas a los miembros de la misión por sus servicios relacionados a la implementación del Estudio.

(5) Proveer a la Misión de las facilidades necesarias tanto para la remisión como para el uso de los fondos introducidos en Nicaragua desde el Japón en relación a la implementación del Estudio.

(6) Garantizar, para la implementación del Estudio, el permiso de ingreso a propiedades privadas o áreas restringidas.

(7) Garantizar el permiso para la Misión para obtener todo tipo de datos, documentación (incluyendo fotografías y mapas) relacionados con el Estudio fuera de Nicaragua al Japón.

(8) Proveer de atención médica en caso de ser necesario. Los gastos serán cubiertos por los miembros de la Misión.

2. El Gobierno de Nicaragua se hará cargo de las demandas, si surge alguna, contra los miembros de la Misión, como resultado del cumplimiento de sus tareas durante la implementación del Estudio, excepto cuando dichas demandas surjan de graves negligencias o conductas inadecuadas por parte de los miembros de la Misión.

3. La Alcaldía de Managua (ALMA) actuará como la Agencia Contraparte de la Misión y también como el Cuerpo Coordinador en relación con otras organizaciones gubernamentales y no-gubernamentales para la implementación adecuada del Estudio.

4. La Alcaldía de Managua proveerá a la Misión, bajo su propio costo, y en cooperación con otras organizaciones concernientes, lo siguiente:

(1) Datos e información disponible relacionados con el Estudio.

(2) Personal contraparte.

(3) Oficina adecuada con el equipamiento necesario en la ciudad de Managua.

(4) Credenciales o tarjetas de identificación.

VIII COMPROMISOS DE JICA

Para la implementación del Estudio, JICA deberá tomar las siguientes medidas:

1. Enviar, bajo su propio costo, equipo de estudio a Nicaragua.

2. Efectuar la transferencia de tecnología al personal contraparte nicaraguense durante el desarrollo del Estudio.

IX CONSULTA

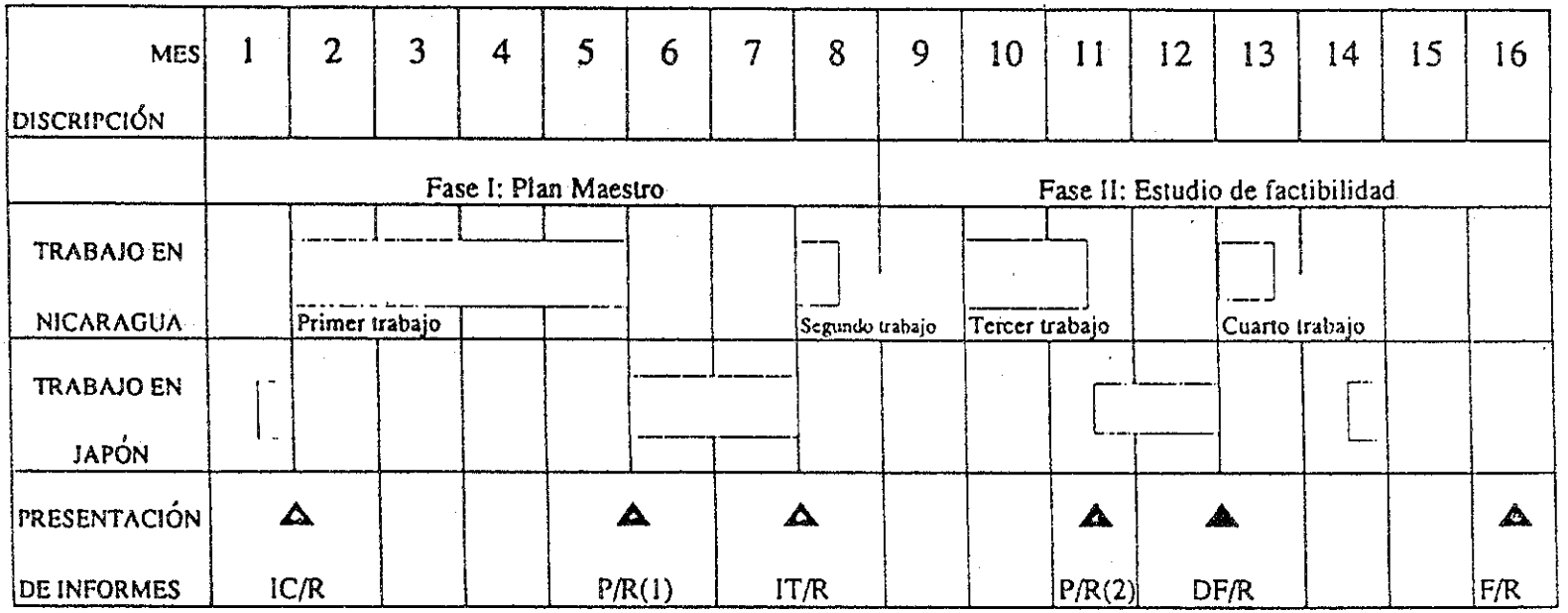
JICA y la Alcaldía de Managua (ALMA) se deberán consultar entre sí en relación con cualquier asunto que pueda surgir del o relacionado con el Estudio.

X OTROS

El alcance de trabajo es preparado en Inglés y en Español y las dos versiones son firmadas por las dos partes. En caso de que surja(n) duda(s) en la interpretación, el texto en Inglés deberá predominar.

ANEXO I

PROGRAMA TENTATIVO DE ESTUDIO



IC/R: Informe Inicial

P/R: Informe de Advance

IT/R: Informe Intermedio

DF/R: Informe Final de Borrador

F/R: Informe Final

付属資料D

Minutes of Meeting

MINUTES OF MEETING
FOR
THE STUDY
ON
THE IMPROVEMENT
OF
THE SOLID WASTE MANAGEMENT SYSTEM
FOR
THE CITY OF MANAGUA
IN
THE REPUBLIC OF NICARAGUA

MANAGUA, OCTOBER 25, 1993

ROBERTO CEDEÑO BORGEN
Mayer a.i.
The Municipality of Managua

YUKIHISA SAKURADA
Leader, Preparatory Study Team
Japan International Cooperation Agency

MARIANO ARGUELLO H
Secretary General Ministry of
External Cooperation

In response to the request of the Government of the Republic of Nicaragua (hereinafter referred to as "the Government of Nicaragua") the Japanese Preparatory Study Team (hereinafter referred to as "the Team") was sent by the Japan International Cooperation Agency (hereinafter referred to as "JICA") to discuss, with the Municipality of Managua, the Scope of Work for the Study on the Improvement of the Solid Waste Management System for the City of Managua in the Republic of Nicaragua (hereinafter referred to as "the Study").

The Team headed by Mr.Yukihisa SAKURADA stayed in Nicaragua from the 17th of October to the 26th of October, 1993, and four of its members stayed for four more days. During their stay in Nicaragua the Team carried out field reconnaissance in the Study Area, received available information and held a series of interviews with officials and local technicians.

The Team also had discussions with the Municipality of Managua on the Scope of Work to be undertaken by both the Municipality of Managua and JICA for the successful execution of the above-mentioned Study. A list of those who attended these discussion meetings is shown in the Annex 1.

The main items which were discussed by the Team and the Municipality of Managua are as follows:

1. The Team proposed a Draft Scope of Work, which was discussed in detail and agreed between the Team and the Municipality of Managua.

2. The Study Area consist of the whole area under the jurisdiction of the Municipality of Managua.

3. The type of solid waste to be studied is limited to the municipal solid wastes. However, non-hazardous industrial solid waste can be included for the Study. The municipal solid wastes are defined as the waste which the Municipality of Managua is responsible to manage. They include household waste, market waste, non-hazardous hospital waste and street sweeping waste.

4. The study shall cover the whole process of the Solid Waste Management including collection, transportation, intermediate treatment, final disposal and operational management etc.

5. The target year of the Master Plan is set for the year 2010 and that of the Feasibility Study is 2000.

6. The identification of future sanitary landfill site shall be completed by the Municipality of Managua taking consideration on the result of the first work in Nicaragua stated in Tentative Study Schedule of the Scope of Work by the time of submission of the Progress Report (I).

7. The Japanese Study Team shall assess the environmental impact to be caused by waste management facilities in compliance with the policy and legislations set by the Government of Nicaragua.

8. The Japanese Study Team shall prepare main reports of the Draft Final Report and Final Report in Spanish as a reference according to the request of the Municipality of Managua. In addition, the Japanese Study Team shall prepare a brief summary in Spanish for each of all other reports to facilitate the discussion between the Japanese Study Team and the Municipality of Managua.

9. To guarantee the smooth conduct of the Study and promote technology transfer through on-the-job training, the Municipality of Managua shall designate the appropriate number of counterpart personnel such as:

(1) Leader of the counterparts (full time)
(2) Four officers (full time)
(3) Secretary/ typist/ office clerk (full time)
(4) Driver(s) (full time) in case JICA provides vehicle(s)

10. For the smooth conduct of the Study, appropriate truck scale shall be installed at the entrance of the existing final disposal site, before commencement of the first work in Nicaragua stated in the Tentative Study Schedule of the Scope of Work. And the temporary site office with a telephone, electricity and water supply also should be provided to operate the truck scale.

11. To pursue technology transfer, the Municipality of Managua requested JICA to hold a seminar in conjunction with the submission of the Draft Final Report.
The Municipality of Managua also requested JICA to train some Nicaraguan counterpart personnel in Japan under the Japanese Technical Cooperation Scheme.

12. The Municipality of Managua requested JICA to supply the following equipments in conjunction with the Study:

(1) Photocopy Machine able to take minimum A3-size and 20 sheets per minute
(2) Two four wheel drive (4WD) vehicles
(3) One personal computer

The Team clarified that the request would be studied by JICA based on the strict evaluation of the necessity of these equipments for the conduct of the Study.

13. The Municipality of Managua also requested JICA to conduct the following surveys in conjunction with the study:

(1) Solid waste quantity and quality survey
(2) Topographic survey
(3) Geotechnical site investigation
(4) Sampling and testing of ground water and surface water
(5) Fauna and flora survey around the sites

The Team clarified that the request would be studied by JICA based on the strict evaluation of the necessity of these surveys for the conduct of the Study.

14. Spanish versions of both the Scope of Work and these Minutes of Meeting are prepared and signed as a reference according to the request of the Municipality of Managua.

15. The Municipality of Managua shall provide appropriate office space (approximately 80㎡) for Japanese experts and Nicaraguan counterpart personnel with office furnitures, a telephone, lighting and electricity supply.

16. The Final Report will be opened to the public whenever it is requested.

17. JICA will examine the possibility to prepare the Spanish Version of the Inception Report and the main report of Interim Report. This petition was made by the Municipality of Managua . This action will expand somewhat the period of the implementation of the Study.

ANNEX 1

LIST OF THE ATTENDANTS

Ministry of External Cooperation

Miss Martha Avilés	In charge a.i. of Asia, Africa and Oceania.
Mr. Michiyuki Shimoda	Advisor of Economic Cooperation
Miss Yuko Shiraishi	Japan Overseas Cooperation Volunteer

Municipality of Managua

Mr. René Quesada (Team leader)	Advisor to the Vice-Mayor
Mr. Carlos Morice	General Director for Public Works
Mr. Adolfo Torres	General Director for Environment Protection.
Mr. Jorge Cisne	Director for Solid Waste Management
Mr. Marvin Sánchez	Deputy Director for Solid Waste Management
Miss Brenda Medal	Director for Water, Air, and Deforestation.
Miss Sandra Rivas	Environmental Inspector

JICA Preparatory Study Team

Mr. Yukihisa Sakurada (Team leader)	Director, Planning Division, Social Development Study Department, JICA
Mr. Shigeru Ando	Technical Supervisor, Japan Waste Research Foundation
Mr. Yoshikatsu Nari	Staff, Second Development Study Division, Social Development Study Department, JICA.
Dr. Syouichi Haryu	Chief Engineer, Japan Overseas Consultants Co. Ltd.
Mr.Yukifusa Nakashima	Manager, Environmental Geology Division, P.E., Kiso-Jiban Consultants Co., Ltd.
Mr. Kenichi Tabiki	Coordinador, Japan International Cooperation Center.

MINUTAS DE LA REUNION PARA
EL ESTUDIO DEL PROYECTO DE
MEJORAMIENTO DEL SISTEMA DE MANEJO,
RECOLECCION, TRATAMIENTO Y DISPOSICION
DE LOS DESECHOS SOLIDOS DE LA
CIUDAD DE MANAGUA
REPUBLICA DE NICARAGUA

Managua, 25 de Octubre de 1993

ING. ROBERTO CEDEÑO BORGEN
ALCALDE a.i
ALCALDIA DE MANAGUA

YUKIHISA SAKURADA
JEFE DEL EQUIPO DE ESTUDIO
PREPARATORIO
AGENCIA DE COOPERACION
INTERNACIONAL DEL JAPON

ARQ. MARIANO ARQUELLO H.
SECRETARIO GENERAL
MINISTERIO DE COOPERACION EXTERNA

En respuesta a la solicitud del Gobierno de la República de Nicaragua (de aquí en adelante "El Gobierno de Nicaragua") el Equipo de Estudio Preparatorio Japonés (de aquí en adelante "El Equipo") fué enviado por la Agencia de Cooperación Internacional del Japón (de aquí en adelante "JICA"), para discutir, con la Municipalidad de Managua, los alcances de trabajo para el Estudio sobre el Mejoramiento del Sistema de Manejo, Recolección, Tratamiento y Disposición de los Desechos Sólidos de la Ciudad de Managua.

El Equipo encabezado por el Señor Yukihisa Sakurada permaneció en Nicaragua del 17 al 26 de Octubre de 1993, y cuatro de sus miembros permanecieron por cuatro días más. Durante su estadía en Nicaragua el Equipo llevó a cabo viajes al campo en el Area de Estudio, recibió información disponible y mantuvo una serie de entrevistas con profesionales y técnicos locales.

El equipo japonés tuvo discusiones con la Alcaldía de Managua sobre el alcance del trabajo a ser realizado por ambas partes para la satisfactoria ejecución del Estudio. Una lista de los participantes en dichas discusiones se muestra en el Anexo 1.

Los temas más importantes que fueron discutidos por el Equipo y la Alcaldía de Managua, son los siguientes:

1. El Equipo propuso un Borrador del Alcance del Trabajo, que fué discutido en detalle y acordado entre el Equipo y la Municipalidad de Managua.

2. El Area de Estudio consiste en toda el área bajo la jurisdicción de la Municipalidad de Managua.

3. El tipo de desechos sólidos a ser estudiado es limitado a los desechos sólidos de la municipalidad. Sin embargo, desechos sólidos industriales que no son peligrosos pueden ser incluidos en el Estudio. Los Desechos Sólidos de la Municipalidad son definidos como los desechos que la Municipalidad de Managua es responsable de manejar. Esto incluye, desechos domésticos, desechos de mercados, desechos de hospitales, no peligrosos, y desechos de las calles.

4. El Estudio deberá cubrir todo el proceso del Manejo de los Desechos Sólidos, incluyendo recolección, transporte, tratamiento intermedio, disposición final de la basura y manejo operacional.

5. El año meta del Plan Maestro está fijado para el año 2010 y para el Estudio de Factibilidad el año 2000.

6. La identificación de futuros sitios para rellenos sanitarios deberán ser completados por la Alcaldía de Managua tomando en consideración los resultados del primer trabajo en Nicaragua establecido en el estudio tentativo del calendario del alcance del trabajo, durante la presentación del Reporte de Progreso (I).

7. El Equipo de Estudio japonés deberá valorar el impacto ambiental producido por las instalaciones de manejo de desechos, en cumplimiento con las políticas y legislaciones establecidas por el Gobierno de Nicaragua.

8. El Equipo de Estudio japonés deberá preparar reportes del Borrador Final y del Reporte Final en el idioma español de acuerdo a la solicitud de la Municipalidad de Managua. Asimismo, el Equipo de Estudio japonés

deberá preparar un sumario breve en el idioma español para cada uno de los reportes para facilitar la discusión entre el Equipo de Estudio y la Municipalidad de Managua.

9. Para garantizar la buena conducción del Estudio y promover la transferencia de tecnología a través del entrenamiento in-situ, la Municipalidad de Managua designará, como contraparte, un número apropiado de personal, como sigue:

   (1) Jefe de la Contraparte Nacional (tiempo completo)

   (2) Cuatro profesionales (tiempo completo)

   (3) Secretaria/mecanógrafa/oficinista (tiempo completo)

   (4) Conductores (tiempo completo) en caso de que JICA suministre los vehículo(s)

10. Para garantizar la buena conducción del Estudio, deberá ser instalada en la entrada del sitio de disposición final de la basura, una balanza apropiada para camiones.

11. Para implementar la transferencia de tecnología la Alcaldía de Managua solicitó a JICA realizar un seminario conjuntamente con la entrega del Borrador del Reporte Final.

    La Alcaldia de Managua también solicita a JICA entrenar en Japón algún personal de la contraparte nicaragüense dentro del esquema de cooperación técnica.

12. La Alcaldía de Managua solicitó a JICA el suministro de los equipos siguientes conjuntamente con el Estudio:

(1) Máquina Fotocopiadora capaz de realizar 20 copias por minuto del tamaño A-3.

(2) Dos vehículos de doble tracción (4WD)

(3) Una Microcomputadora

El Equipo aclaró que JICA estudiaría ésa solicitud basados en una evaluación estricta de la necesidad de dichos equipos para la conducción del Estudio.

13. La Municipalidad de Managua también solicitó a JICA llevar a cabo las siguientes encuestas conjuntamente con el Estudio:

(1) Estudio de la calidad y cantidad de los desechos sólidos

(2) Medición Topográfica

(3) Investigaciones Geotécnicas del sitio

(4) Muestreo y pruebas de aguas subterráneas y aguas superficiales.

(5) Estudio de la Fauna y la Flora alrededor de los sitios.

El Equipo aclaró que la solicitud sería estudiada por JICA basados en la evaluación estricta de la necesidad de estos estudios para la conducción del Estudio Total.

14. Versiones en español, tanto del Alcance del Trabajo como de las Minutas de la Reunión son preparadas y firmadas como referencia, de acuerdo a la solicitud de la Alcaldía de Managua.

15. La Alcaldía de Managua suministrará el espacio de oficina apropiado (aproximadamente 80 M2) para los expertos japoneses y la contraparte nicaraguense que cuente con mobiliario, teléfono, electricidad y suministro de agua.

16. El Informe Final será proporcionado al público si así lo solicitase éste.

17. En cuanto al Informe Inicial y reporte principal del Informe Intermedio, la misión discutirá en Japón para ver si es posible entregar en español estos informes a solicitud de la Alcaldía de Managua. Esto alargará un poquito el plazo de ejecución del Estudio.

ANEXO 1

LISTA DE PARTICIPANTES

Ministerio de Cooperación Externa

Lic. Martha Avilés	Responsable a.i. Departamento de Asia, Africa y Oseanía.
Sr. Michiyuki Shimoda	Asesor de Cooperación Económica Financiera
Sra. Yuko Shirasishi	Voluntaria de Cooperación en Ultramar del Japón.

Alcaldía de Managua

Ing. René Quesada (Jefe de equipo)	Asesor del Vice-Alcalde
Ing. Carlos Morice	Director General de Obras y Servicios Municipales
Ing. Adolfo Torres R.	Director General de Protección del Medio Ambiente
Ing. Jorge Cisne	Director de Sanamiento y Ornato
Ing. Marvin Sánchez	Subdirector de Saneamiento
Sra. Brenda Medal	Directora Departamento Aire, Agua y Deforestación.
Sra. Sandra Rivas	Inspectora Ambiental

EQUIPO DE JICA PARA ESTUDIO PREPARATORIO

Sr. Yukihisa Sakurada	Director, División de Planificación, Departamento de Estudio de Desarrollo Social, Agencia de Cooperación Internacional del Japón
Sr. Shigeru Ando	Supervisor técnico, Fundación para Estudio de los Desechos de Japón
Sr. Yoshikatsu Nari	Segunda División de Estudio de Desarrollo, Departamento de Estudio de Desarrollo Social, Agencia de Cooperación Internacional del Japón
Sr. Shouichi Haryu	Consultor en el Ultramar del Japón S.A.
Sr. Yukifusa Nakashima	Consultor Kiso-Jiban S.A.
Sr. Ken-ichi Tabiki	Centro de Cooperación Internacional del Japón.

付属資料E

主要面談者リスト

付属資料－E　主要面談者リスト

日　本　大　使　館　：	
・一等書記官	渡辺　直人
・経済・財務協力顧問	Lic. Francisco Bosco Fonseca
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収集資料リスト

収集資料リスト

番号	資料の名称	形態	版型	ページ数	部数	収集先名称又は発行機関
1	Respuestas a Cuestionario マナグア市街の固形廃棄物処理に関する質問状1に対する解答	報告書	レター	11	1	ALMA
2	Organigrama de la Direccion General de Obras y Servicios Municipales マナグア市公共事業総局組織図	図	ﾌﾙｽｹｯﾌﾟ	1	1	ALMA
3	Organigrama de la Direccion de Limpieza Publica マナグア市公共清掃局組織図	図	ﾌﾙｽｹｯﾌﾟ	1	1	ALMA
4	Documento " Presupuesto ano 1993 マナグア市公共清掃局1993年度予算	表	A4	1	1	ALMA
5	Documento " Presupuesto ano 1992 マナグア市公共事業総局1992年度決算	表	A4	1	1	ALMA
6	Ordenanza Municipal Higiene Ornato y Limpieza Publica el Concejo Municipal de Managua マナグア市の美化衛生と公共清掃に関する条例	文書	ﾌﾙｽｹｯﾌﾟ	1	1	ALMA
7	Plano de Rutas de Hospitales, Centros de Salud e Industrias 医療施設及び工場ごみ収集ルート図	地図	A2変形	1	1	ALMA
8	Plano de Ruta de Mercados y Supermercados 市場及びスーパーマーケットごみ収集ルート図	地図	A2変形	1	1	ALMA
9	Plano de Adreas Cubiertas por Rutas en la Ciudad 居住区ごみ収集区域ルート図	地図	A2変形	1	1	ALMA
10	Documento " 1 " a)−Codigo de Rutas b)−Sectores y Barrios atendidos c)−Dias de Atencion d)−Tipo de Equipo e)−Nomber del Operador 収集ルート番号，収集区分と収集区域，収集日，機材，オペレータのリスト	リスト	レター	18	1	ALMA
11	Cuadro " A " Ingreso Mensual Domiciliar 居住区からのごみ収集料金と徴収状況	表	レター	1	1	ALMA
12	Cuadro " II " Estado de los Equipos 廃棄物収集・処理機材の状況	表	レター	1	1	ALMA
13	Documento " B " Taller de Mantenimiento 整備工場の機材と人容	リスト	レター	1	1	ALMA
14	Documento " C " Plan Mejoramiento de Rutas de Recoleccion, Evacuacion de Contenedores y Eliminacion de Botaderos 廃棄物処理業務改善計画表	表	ﾌﾙｽｹｯﾌﾟ	1	1	ALMA

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15	Documento " C " Plan Mejoramiento de Rutas de Recoleccion, Evacuacion de Contenedores y Eliminacion de Botaderos. 付属書	報告書	レター	11	1	ALMA
16	Planos Por Distrito Donde se Ubican Los Microbotaderos 地区別小規模不法投棄箇所分布図	地図	レター	6	1	ALMA
17	Direccion General de Obras y Servicios Municipales Clasificacion de Cargos de Acuerdo a Estructura Organizacional Propuesta Presupuesto, 1994 マナグア市公共事業総局の部署別人容, 1994	表	レター	2	1	ALMA
18	Alcaldia de Managua, 1992 マナグア市役所全体組織図, 1992	図	A4	1	1	ALMA
19	Organigrama Funcional Direccion General de Proteccion Medio Ambiente マナグア市環境保全総局組織図	図	ﾌﾙｽｹｯﾌﾟ	1	1	ALMA
20	La Gaceta, 17 de Agosto de 1988. No.155 1988年8月17日付官報 No.155	文書	レター	8	1	ALMA
21	Programa de Rehabilitacion de Sistemas de Agua Potable y Alcantarillado Sanitario, 21 de Octubre de 1993 上・下水道改善計画概要, 1993年10月21日	文書	レター	7	1	INAA
22	Procedimiento de Seleccion de Firmas Consultoras Para la Actualizacion del Plan Maestro de Alcantarillado Sanitario Para la Ciudad de Managua Parte " B " マナグア市街の衛生下水道基本計画の近代化のためのコンサルタント会社選定手続	文書	A4	27	1	INAA
23	Cuido del Medio Ambiente, Cuestionario No.2 Para el Estudio Sobre el Mejoramiento en el Sistema de Manejo de los Desechos Solidos Para la Ciudad de Managua マナグア市街の固形廃棄物処理に関する質問状2：「環境配慮」に対する解答書	報告書	レター	48	1	ALMA
24	Clasificadion de la Legislacion Ambiental y Salud de Nicaragua, 1992 ニカラグアの環境と健康に関する法律の分類, 1992年	書籍	レター	189	1	MASICA
25	Anteproyecto de Ley General Del Medio Ambiente Y Los Recursos Naturales, 5 de Junio de 1993 環境及び天然資源に関する基本法の草案 1993年6月5日	報告書	レター	39	1	MAN
26	Normas y Procedemientos de Higiene 衛生に関する基準及び手続き（抜粋）	文書	レター	14	1	Ministerio de Salud
27	Conferencia de Naciones Unidas sobre Medio Ambiente y Desarrollo, 1992 環境と開発に関する国際連合会議資料, 1992	文書	レター	6	1	Nicaragua XII Cumbre

番号	資料の名称	形態	版型	ページ数	部数	収集先名称又は発行機関
28	Declaracion de Managua, 4 y 5 de junio, 1992 マナグア宣言, 1992年 4月・5日	文書	レター	11	1	ALMA
29	Agenda de Managua, 4 y 5 de junio, 1992 マナグア議定書, 1992年 4月・5日	文書	レター	10	1	ALMA
30	Listado de Fabricas 工場リスト	リスト	A3	7	1	ALMA
31	Listado de Escuelas, Hospitales e Instalaciones Religiosas 学校、病院、宗教設備リスト	リスト	レター	6	1	Hospitales y Contros de Salud
32	Listado de Casos de Enfermedades Trasmisibles (1992−1993) 伝染病の発生事例とマナグア市の人口構成に関する資料	リスト・図表	レター	13	1	ALMA
33	Geologia Del Area de Managua マナグア市街の地質（ＪＩＣＡ報告書抜粋）	報告書	レター	25	1	国際協力事業団（ＪＩＣＡ）
34	Anuario Meteorologico, 1990 （気象年報 1990）	書籍	A5	221	1	INETER
35	Caracteristicas Hidrogeologicas de Los Pozos Ubicados en la Ciudad de Managua マナグア市街の井戸の水理地質的特徴に関する資料	表	レター	13	1	INAA
36	Sistemas Basicos Hidrometeorologicos Nacional 国土の水理気象基本資料	表	レター	17	1	INETER
37	Resumen Meteorologico Anual 気象概況資料	表	レター	17	1	INETER
38	Condiciones Hidrogeologicas 水理地質概況（ＪＩＣＡ報告書抜粋）	報告書	レター	11	1	国際協力事業団（ＪＩＣＡ）
39	Muestras de Calidad de Agua en Fuentes de Agua Potable, Ciudad de Managua マナグア市街の飲料水源の水質に関する資料	主として表	レター	20	1	INAA
40	Resultados de Inventarios de Pozos 井戸の諸元リスト	リスト	A4	5	1	INAA
41	Datos de Cambio Anual y Cambio Mensual Del Nivel de Agua Subterranea en Sitio Representativo 代表的な地点での地下水位の経年変化及び経月変化データ	図	レター	5	1	ALMA
42	Cuadros Cambio de Nivel de Agua ティスカパ湖、アソソスカ湖及びマナグア湖の水位変化及びティスカパ湖の水質データ	図表	レター	4	1	ALMA
43	Boletines Sobre la Contaminacion del Aire, 1～4 大気汚染に関する公報, 1～4	報告書	レター	59	1	INETER
44	Enfermedades Comunes en el Sector N.O. Barrio Acahualinca, Managua マナグア市アカウアリンカ地区に共通な疾患	図	レター	3	1	ALMA

番号	資料の名称	形態	版型	ページ数	部数	収集先名称又は発行機関
45	Datos de Contaminacion del Agua Subterranea 地下水汚染データ	図表	レター	9	1	ALMA
46	新規の最終処分場候補地位置図 (1:100,000)	地図	A1変形	2	1	ALMA
47	Mapa Distribucion de La Poblacion (1:30,000) 人口分布図	地図	A1変形	1	1	ALMA
48	Red de Alcantarillado Sanitario (1:7,500) 衛生下水道網	地図	A0変形	7	1	ALMA
49	地形図 (Republica de Nicaragua, 1:1,000,000)	地形図	B2	1	1	INETER
50	Planos Topograficos (Nindiri, Managua, 1:50,000) 地形図	地形図	A2変形	2	1	INETER
51	Planos Topograficos(Nindiri, tipitapa, San Rafael del Sur, Managua, Mateare, 1:50,000) 地形図	地形図	A2変形	5	1	INETER
52	Mapa Geologico(Nicaragua, Costa Rica) 地質図（ニカラグァ、コスタリカ 1:250,000）	地質図	A2変形	2	1	ALMA
53	Perfil Geologico Perfil Hidrogeologico 地質・水理地質断面図	地質図	A3～ A2変形	4	1	ALMA
54	Mapa Hidrogeologico (1:100,000) 水理地質図	地質図	A2変形	4	1	ALMA
55	Mapa de Ubicacion De Pozos y Concentracion Ionicas de Aguas Subterraneas y Superficiales (1:20,000) 地下水及び地表水のイオンダイヤグラム一覧図	地図	A0変形	1	1	ALMA
56	Puntos Criticos de Inundacions y Sedimentaciones (1:40,000) 洪水及び堆積危険地点図	地図	A3変形	1	1	ALMA
57	Zonificacion y Uso de Suelos Area Urbana de Managua, ABRIL 1982 (1:20,000) マナグア市街地域のゾーニングと土地の用途, 1982年4月	地図	A0変形	1	1	ALMA
58	Mapa Turistico " Ciudad de Managua " マナグア市街ツーリストマップ	地図	A1変形	1	1	ALMA
59	マナグア市街地域のごみ収集地点分布総合図 (1:10,000)	地図	A0変形	1	1	ALMA
60	Plan Maestro del Area Central DIAGNOSTICO, Septimbre 1991 マナグア市中央地域基本計画, 1991年9月	報告書	レター	239	1	PMAC
61	Plan de Accion Para el Saneamiento y Recuperacion del Lago de Managua 排水とマナグア湖の回復のための行動計画	報告書	A4	171	1	IRENA

番号	資料の名称	形態	版型	ページ数	部数	収集先名称又は発行機関
62	Vieneley Para Penar a los Contaminadores, Nvevo Diano 17 de Octubre de 1993 汚染禁止法に関する1993年10月17日付Nvevo Diano紙記事	新聞記事切り抜き	ﾌﾙｽｹｯﾌﾟ	1	1	ALMA
63	Project Document Institutional Support for the National Directorate for the Environment (NDE) in IRENA –Short Term Programme 天然資源環境省内の環境に関する国家会議の設立援助計画書, 1993年11月（抜粋）	報告書	レター	18	1	IRENA
64	Terminos de Referencia Para Los Estudios de Impacto Ambiental, Agosto 20, 1993 環境影響評価書の項目　1993年8月20日	報告書	A4	3	1	IRENA
65	Investigacion Sobre Los Desechos Solidos de la Cikudad de Masaya, Nicaragua マサヤ市街の固形廃棄物に関する研究, 1990年6月	報告書	レター	54	1	UNI
66	地形図 (Republica de Nicaragua, 1:1,000,000)	地形図	B2	1	1	Institute Geografico Nacional
67	The Study on Water Supply Project in Managua Progress Report	報告書	A4	222		国際協力事業団（JICA）
68	The Study on Water Supply Project in Managua Summary Report (Draft)	報告書	A4	182	1	国際協力事業団（JICA）
69	ニカラグァ国マナグア市上水道整備計画調査事前調査報告書	報告書	A4	391		国際協力事業団（JICA）
70	ニカラグァ国マナグア市上水道整備計画調査要約	報告書	A4	128		国際協力事業団（JICA）
71	ニカラグァ共和国ニカラグァ道路整備計画調査事前調査報告書	報告書	A4	141		国際協力事業団（JICA）

付属資料G
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