

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

NO. 22

THE GOVERNMENT OF THE FEDERAL DISTRICT
THE UNITED MEXICAN STATES

社会開発調査部報告書

**THE STUDY
ON
SOLID WASTE MANAGEMENT
FOR
MEXICO CITY
IN
THE UNITED MEXICAN STATES**

**FINAL REPORT
VOLUME II**

MAIN REPORT

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MAY 1999

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PREFACE

In response to a request from the Government of the United Mexican States, the Government of Japan decided to conduct a development Study on Solid Waste Management for Mexico City in the United Mexican States and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Hiroshi Kato, Kokusai Kogyo CO., LTD. to Mexico, three times between June 1998 to May 1999. In addition, JICA set up an advisory committee headed by Dr. Kunitoshi Sakurai, International Environmental Planning Institute between June 1998 to May 1999.

The team held discussions with the officials concerned of the Government of Mexico, and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Mexico for their close cooperation extended to the Team.

May 1999



Kimio Fujita

President

Japan International Cooperation Agency

May 1999

Mr. Kimio Fujita
President
Japan International Cooperation Agency

Letter of Transmittal

Dear Mr. Fujita,

We are pleased to submit the report on the Study on Solid Waste Management for Mexico City in the United Mexican States.

This report consists of three components: a study on the present practices of waste management in Mexico City; the formulation of the solid waste management master plan until the year 2010; and a feasibility study on the priority projects drawn from the master plan.

In the study on the present practices, six types of field investigations were conducted and existing data and information of various sources were collected and examined. By doing so, the current status of solid waste management in Mexico City was thoroughly understood and the issues to be considered were identified.

The master plan was formulated aiming to overcome these issues, with ultimate goals of the promotion of citizens' welfare, implementation of sustainable solid waste management, and contribution to environmental conservation. In the master plan, we proposed a planning framework which shows stepwise implementation and strategies towards the goals. We also suggested technical and institutional improvement plans, a public education program, and financing options.

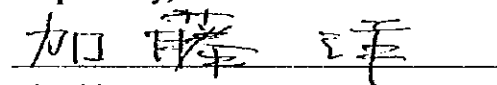
The feasibility study was carried out on three priority projects which should be commenced during the years from 1999 to 2001: introduction of a new composting plant, vertical expansion of an existing final disposal site, and construction of a new final disposal site. From the technical, financial, economical, institutional, social and environmental assessment of these projects, we concluded that they would be viable and sound in every aspect.

During the study, we held two seminars on technology transfer with as much as 200 participants in each. The seminars were reported on newspapers and attracted much attention from the general public.

We would like to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs and the Ministry of Health and Welfare of Japan. We would also like to extend our deep appreciation to the Government of the Federal District, the Embassy of Japan and the JICA office in Mexico for their vital cooperation during the implementation of our study in the United Mexican States.

Last but not least, we hope that the output of our study presented here will contribute to the improvement of solid waste management and citizens' welfare in Mexico City.

Respectfully,



Hiroshi Kato

Team Leader

The Study on Solid Waste Management for
Mexico City in the United Mexican States

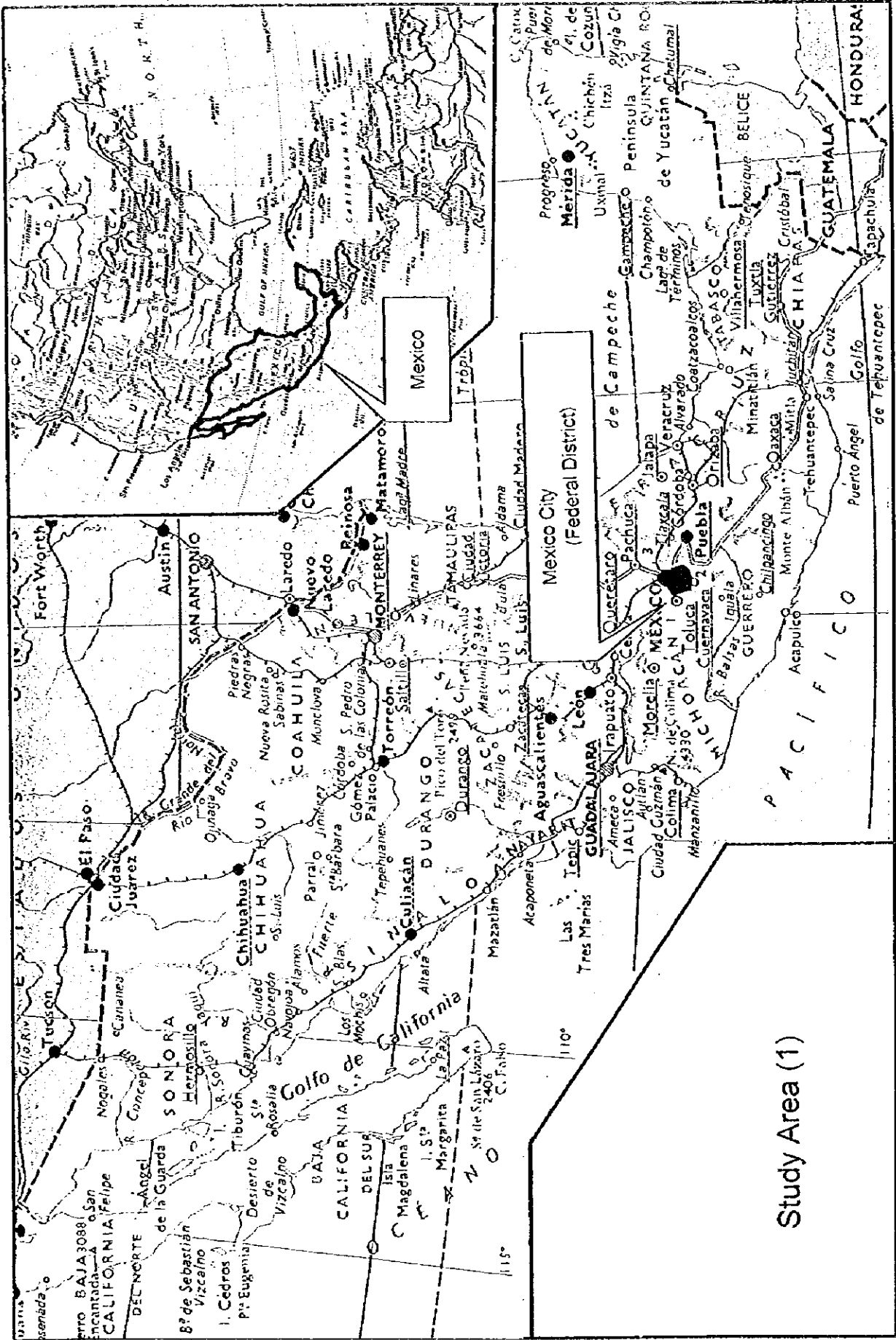
The Study on Solid Waste Management for Mexico City in the United Mexican States

List of Volumes

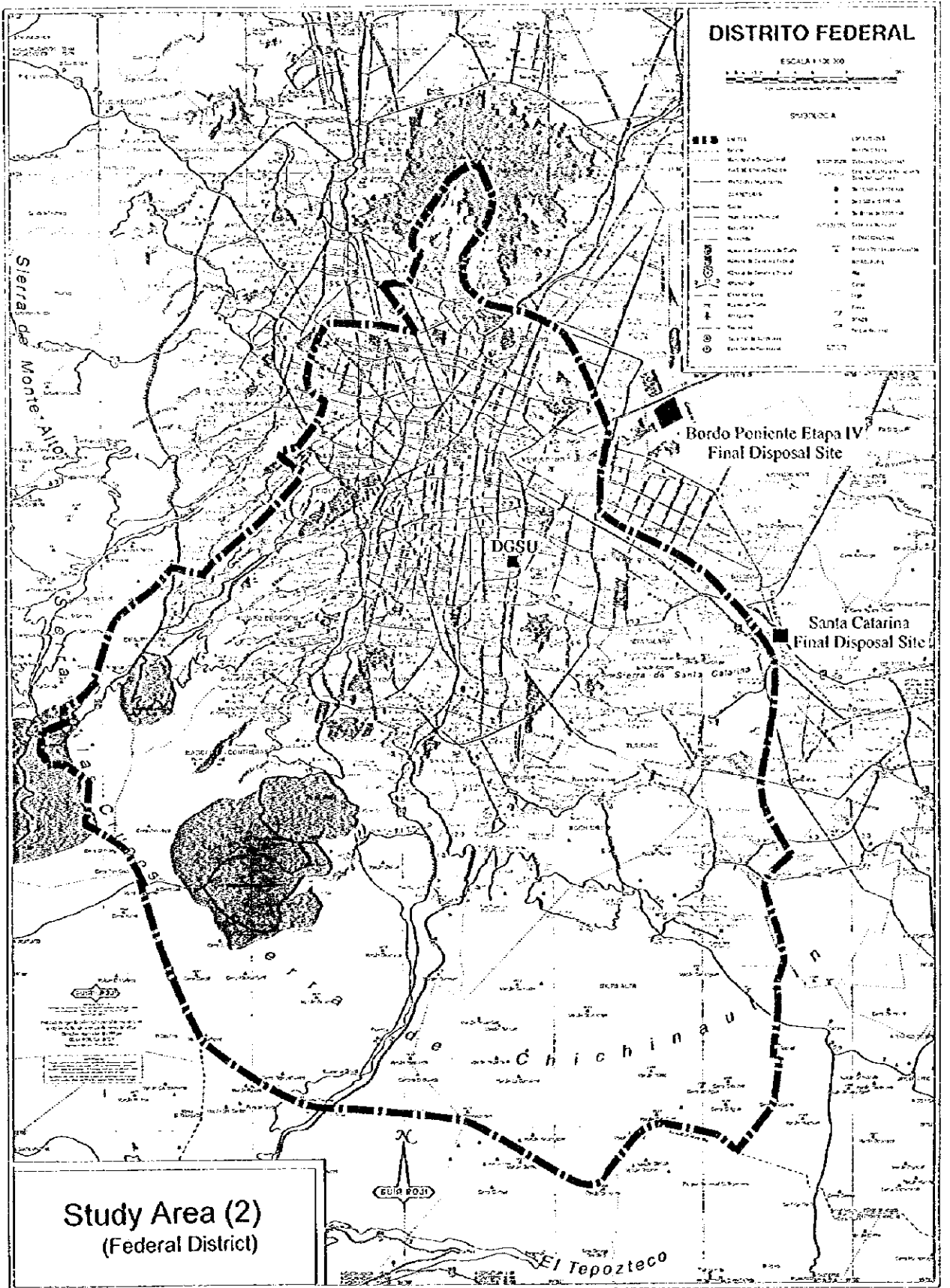
Volume I	Executive Summary
Volume I(S)	Executive Summary (Spanish Version)
Volume II	Main Report
Volume II(S)	Main Report (Spanish Version)
Volume III	Annex
Volume III(S)	Annex (Spanish Version)
Volume IV	Data Book
Volume IV(S)	Data Book (Spanish Version)
Volume V	EIA Report
Volume V(S)	EIA Report (Spanish Version)

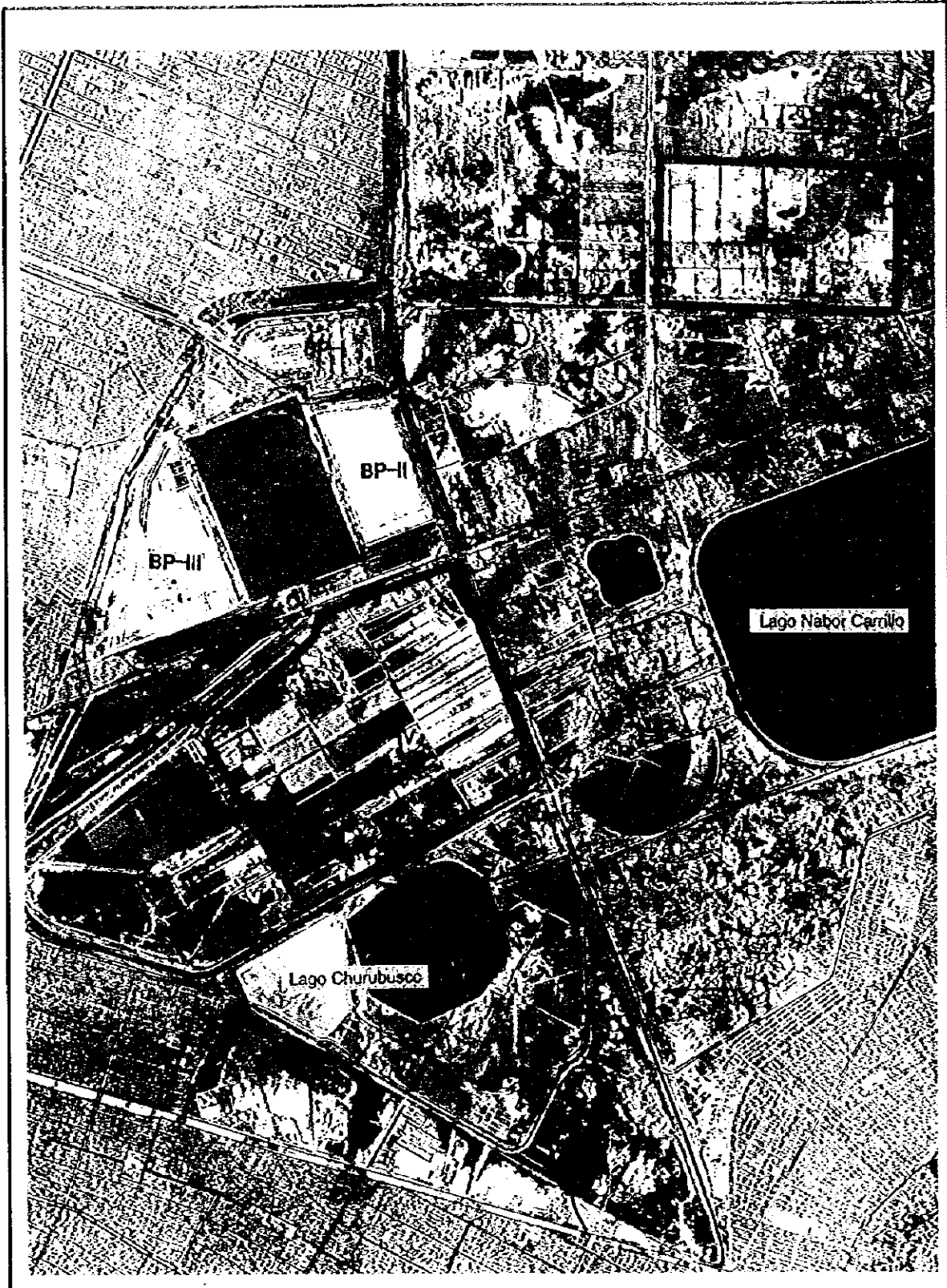
This is the Main Report.

In this report, the project cost is estimated by using the September 1998 price and an exchange rate of 1 US\$ = 135.00 Japanese Yen = 9.10 Pesos.

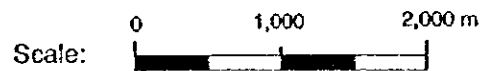


Study Area (1)

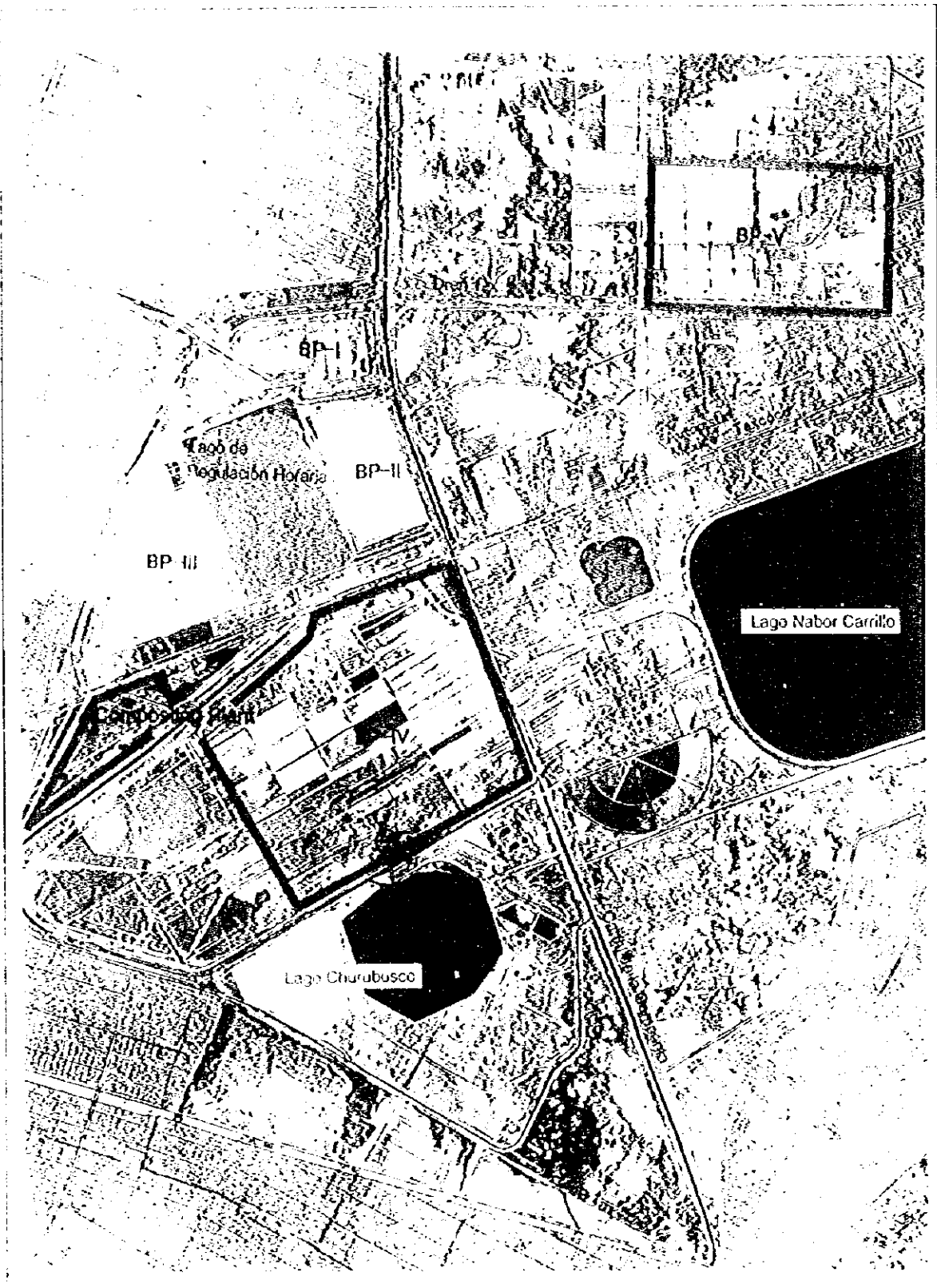




Location of Priority Projects



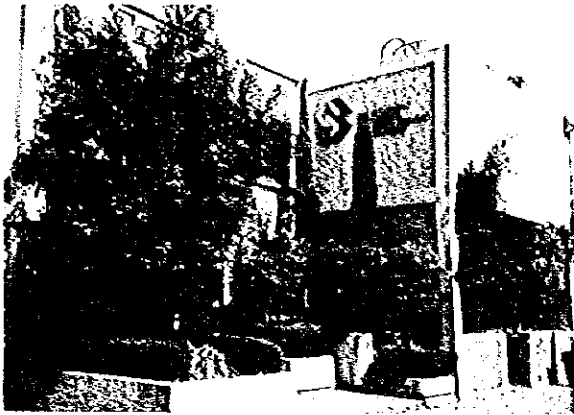
KOKUSAI KOGYO Co., Ltd.



Location of Priority Projects

Scale 1:50,000

KOKUSAI KOGYO Co., Ltd.



General Direction of Urban Services (DGSU), in which the study team set up its office.



A meeting on the Inception Report in July, 1998.



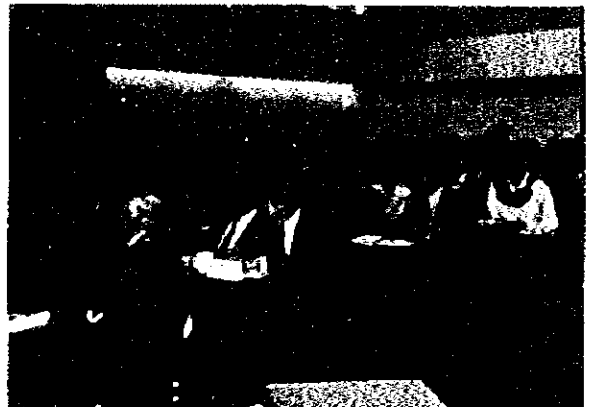
A workshop was held in September, 1998.

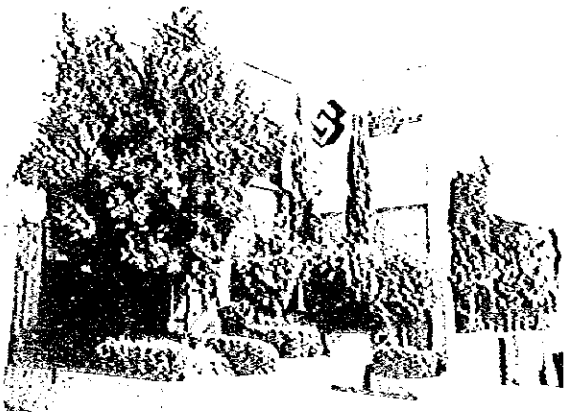


Signing the Minutes of Meetings on the Progress Report(1) in October, 1998.

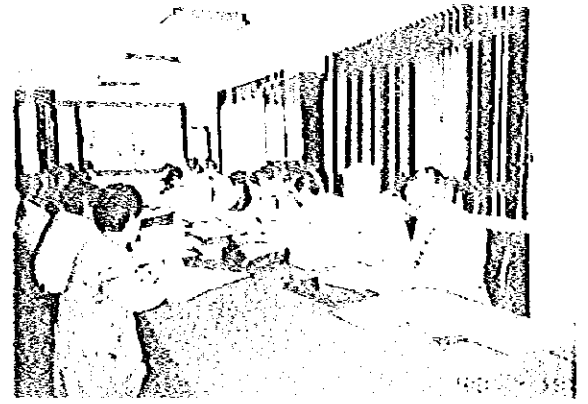


A seminar regarding the Interim Report was held in November, 1998.





Exterior view of the building.



Meeting around the long table.



Meeting in progress.



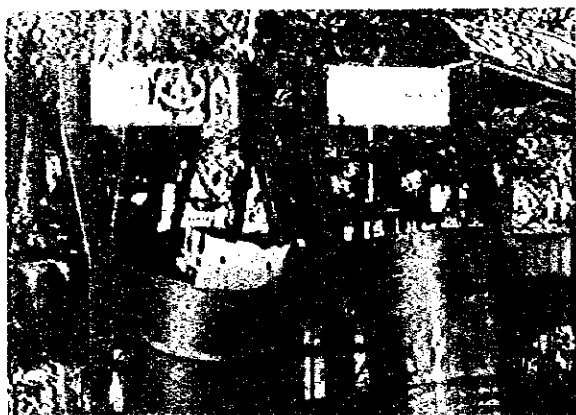
People looking at documents.



Panel discussion with a speaker.



Large group of people at a reception.



Oil drums are utilized for refuse containers



Oil drums are also utilized for handcarts



Recyclable materials (which are kept in plastic bags in the picture) are separately collected from non-recyclable waste.



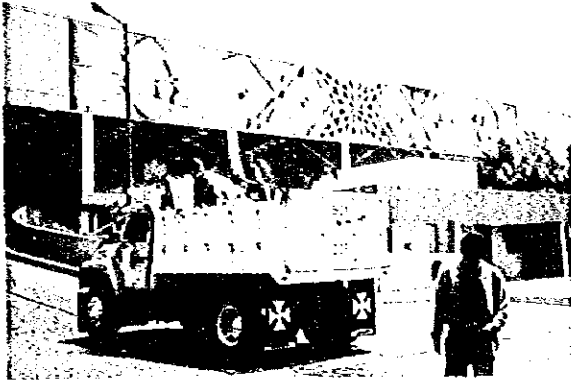
Waste collected by handcarts is transferred to collection vehicle.



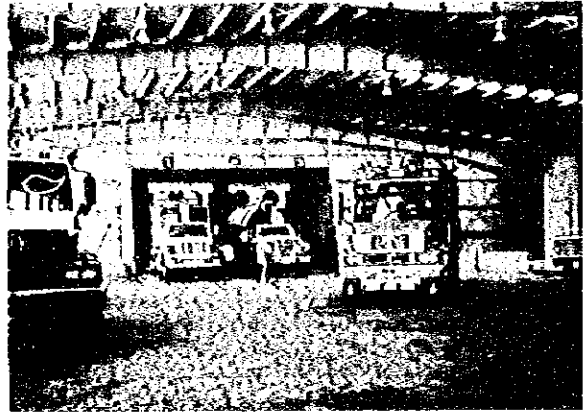
The collection vehicle receives both recyclable and non-recyclable materials from the handcart.



A collection vehicle running in the city



A collection vehicle coming into a transfer station



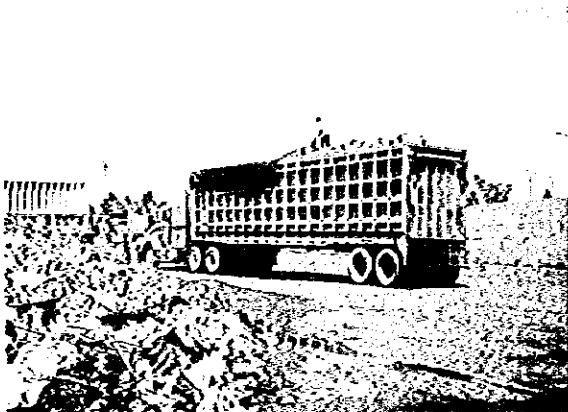
*Refuse inlet of the transfer station.
Waste will be transferred from collection vehicles to large-size trailers*



Waste moved to a large-size trailer



A large-size trailer and a charge chute



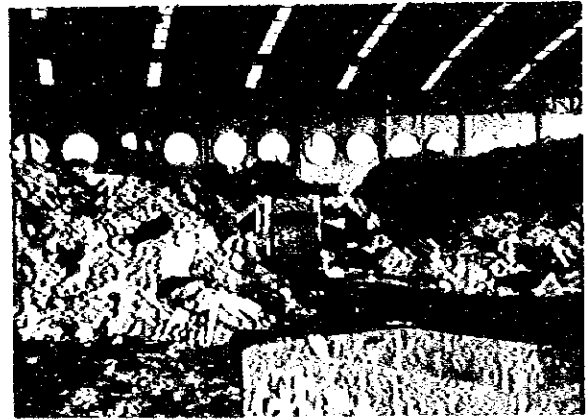
The top of a trailer has to be covered to prevent refuse from scattering.



Large-size trailer (70 m³) hauling waste



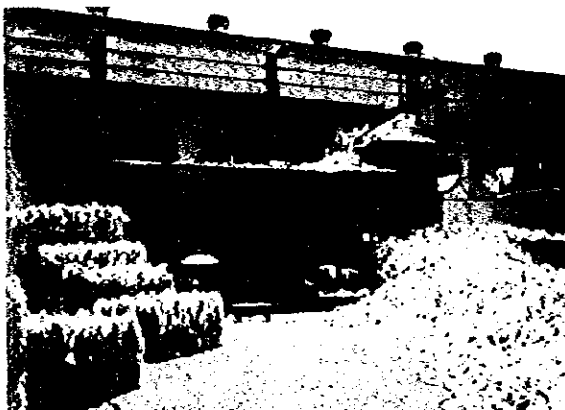
Bordo Poniente Selection Plant



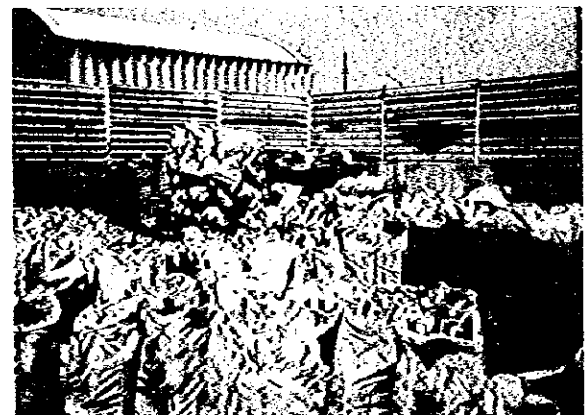
Platform of the Selection Plant



Picking belt conveyor (capacity: 500 ton/day x 3 lines)



Compression packing equipment for P.E.T. bottle



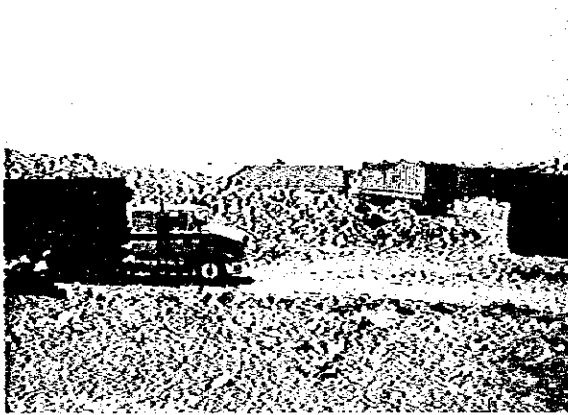
Collected glass bottles are stored with being classified into each type.



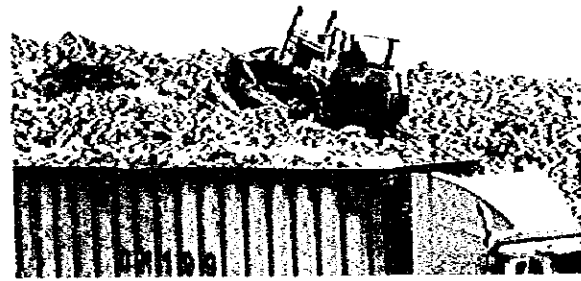
Weighbridge at the entrance of Bordo Poniente Etapa IV Landfill



Trailers waiting to unload waste



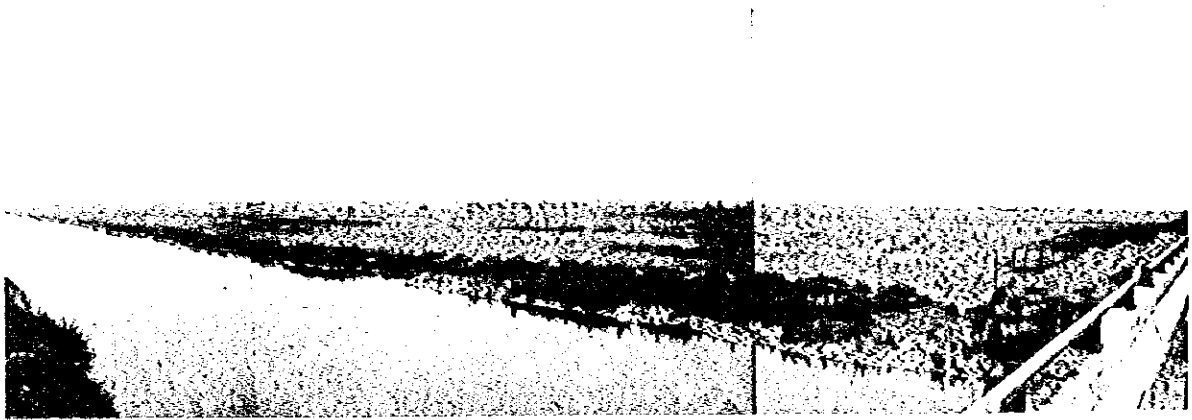
A waste unloading area at Bordo Poniente Landfill



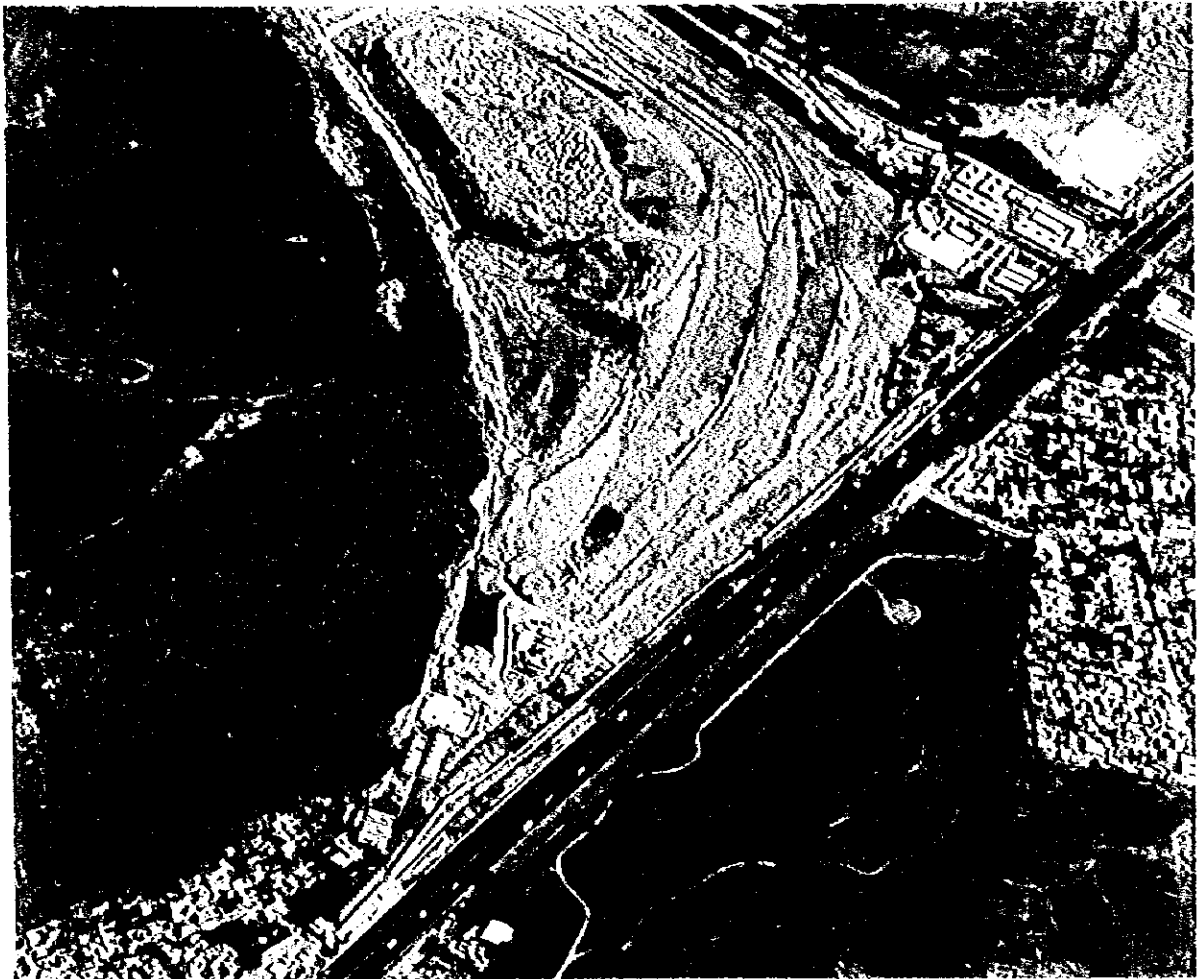
Spreading and compacting waste by a bulldozer



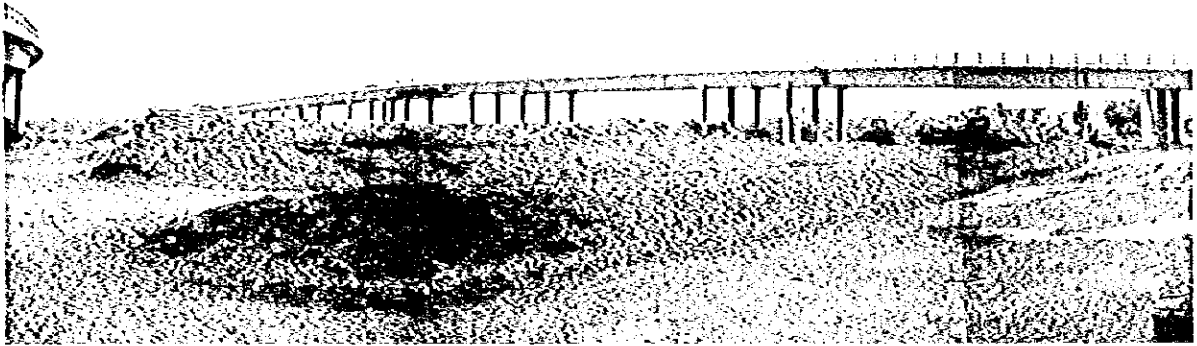
*Bordo Poniente Etapa IV Landfill.
The foreground shows a future cell being under construction of impermeable liner.
The distant view presents a cell being currently filled.*



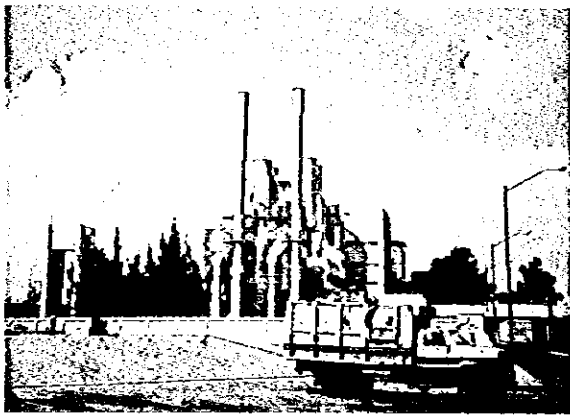
Canal de la Campaña flowing along the Bordo Poniente (Etapa IV) Landfill Site



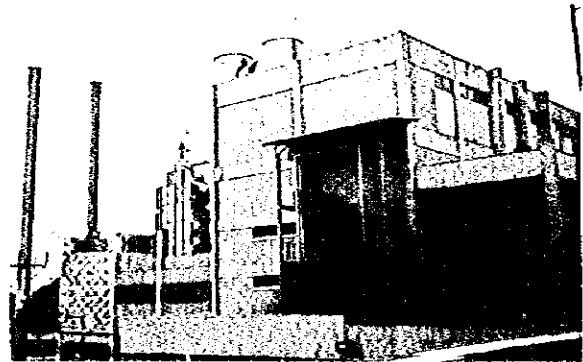
Santa Catarina Landfill



Yard trimmings composting facility



Experiment incineration plant for municipal solid waste (capacity: 50 ton/day x 2 units) which are currently not operated.



Close-up of the experiment incineration plant



Current condition of waste discharge in the central market



Loading waste discharged from the Central Market



Start of the survey



Mixing of sample waste



Reduction of sample waste



Classification of sample waste



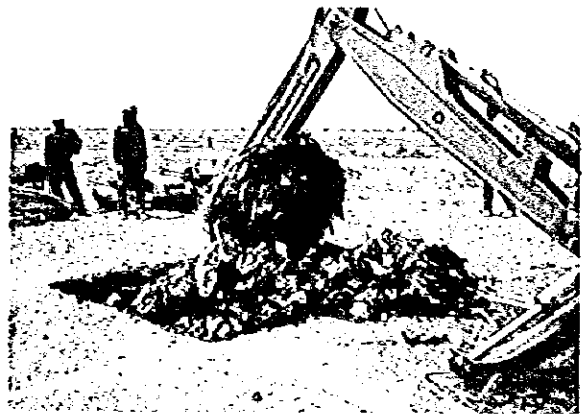
Classified samples



Weighing samples



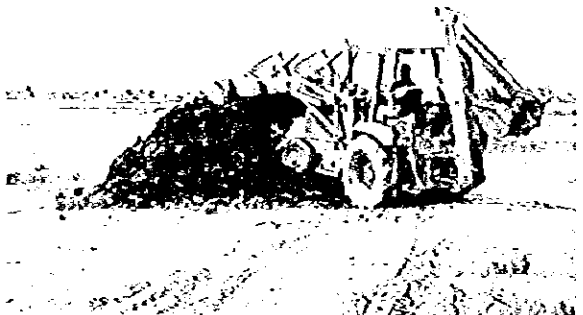
Removal of the final cover (20 to 30 cm thickness)



Sampling



Sampling



Sampling



The waste sampled was weighed by the weighbridge of Bordo Poniente Etapa IV Landfill.



Waste Reduction Method was employed for the physical composition analysis



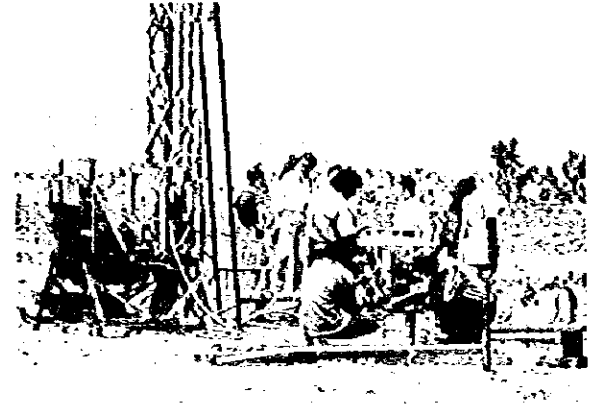
Public opinion survey (POS) (1)



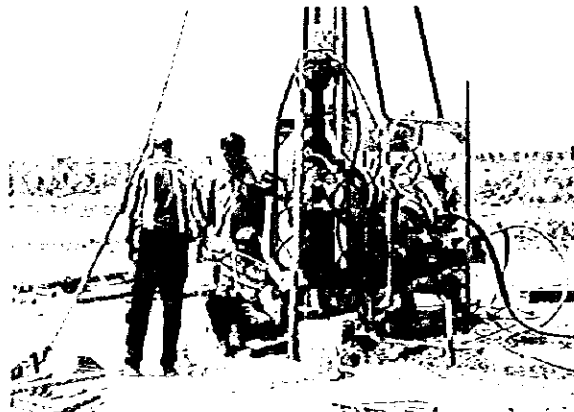
POS (2)



POS (3)



Environment survey (1) :
Boring survey on Bordo Poniente III landfill



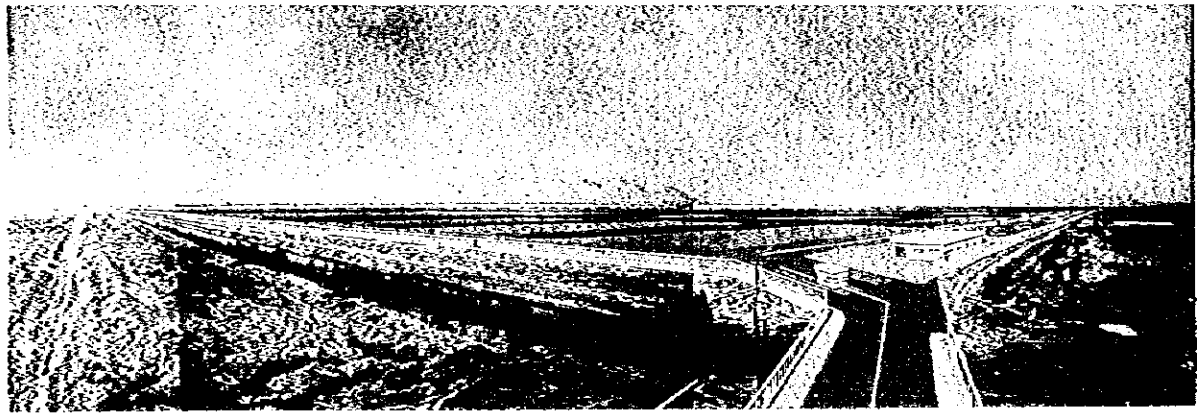
Environment Survey (2) :
Boring survey on Bordo Poniente (Etapa III)



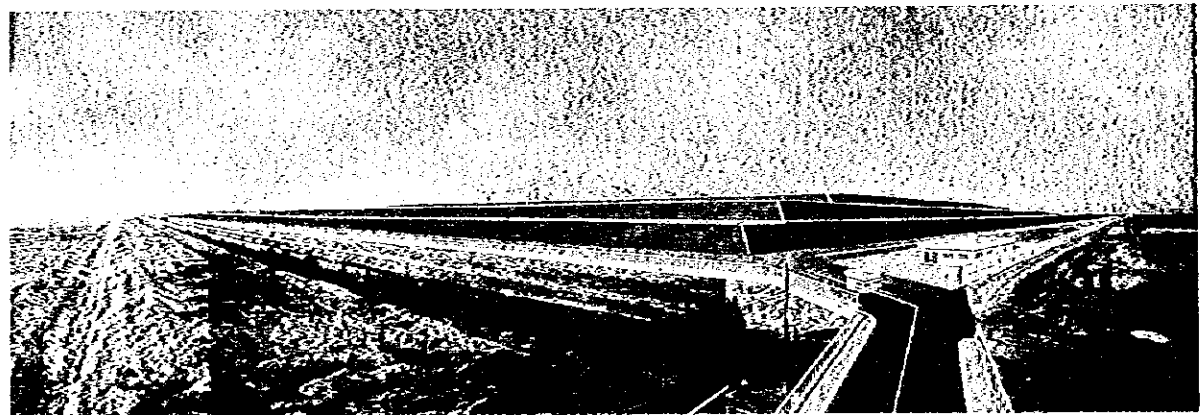
Environment Survey (3) :
Investigation of samples



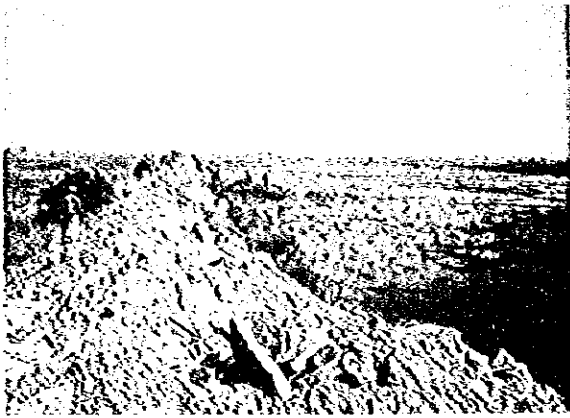
New Landfill (Etapa V) present landscape



New landfill (Etapa V) landscape expected in 2002



New landfill (Etapa V) landscape after closure



*Present condition (1) :
An entrance is planned to be constructed here*



*Present condition (2) :
Middle of the site*



A view of the site from the west



A view of the site from the east

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List of Abbreviations

ALDF	DF Legislative Assembly (<i>Asamblea Legislativa del DF</i>)
AMCRESPAC	Mexican Association for Solid and Hazardous Wastes Control (<i>Asociación Mexicana para el control de residuos sólidos y peligrosos</i>)
AURIS	Urban Action and Social Integration Institute (<i>Instituto de Acción Urbana e Integración Social</i>)
BANOBRAS	National Development Bank for Public Works and Services
BOD	Biochemical Oxygen Demand
BP	Bordo Poniente
C/N	Carbon/Nitrogen
CAM	Metropolitan Environmental Commission (<i>Comisión Ambiental Metropolitana</i>)
CNA	National Water Commission (<i>Comisión Nacional del Agua</i>)
COD	Chemical Oxygen Demand
CORETT	Commission for the Regulation of Land Tenure (<i>Comision par la Regulacion de la Tenencia de la Tierra</i>)
CP	Counterpart
CP	Composting Plant
DDF	Department of the DF
DF	Federal District (<i>Distrito Federal</i>)
DF/R	Draft Final Report
DGMA	General Direction of Environment (<i>Dirección General del Medio Ambiente</i>)
DGSU	General Direction of Urban Services (<i>Dirección General de Servicios Urbanos</i>)
DSR	Debt Service Ratio
EF	External Fund
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
FDS	Final Disposal Site
F/S	Feasibility Study
FIRR	Financial Internal Rate of Return
FIVIDESU	Housing, Social and Urban Development Trust (<i>Fideicomiso de Vivienda, Desarrollo Social y Urbano</i>)
GATT	General Agreement on Tariffs and Trade

GC	Gathering Center (<i>Centro de Acopio</i>)
GDF	Government of the Federal District (<i>Gobierno del Distrito Federal</i>)
GPS	Global Positioning System
GRP	Gross Regional Product
HDPE	High-Density-Polyethylene
IC/R	Inception Report
IEE	Initial Environmental Examination
IMSS	Mexican Social Security Institute (<i>Instituto Mexicano del Seguro Social</i>)
INARE	National Institute of Recyclers (<i>Instituto Nacional de Recicladores</i>)
INDECO	National Institute for the Development of Rural Community and Popular Housing (<i>Instituto Nacional par el Desarrollo de la Comunidad Rural y de la Vivienda Popular</i>)
INE	National Institute of Ecology (<i>Instituto Nacional de Ecología</i>)
INEGI	National Institute of Statistics, Geography and Informatics (<i>Instituto Nacional de Estadística, Geografía e Informática</i>)
INFONAVIT	National Institute for the Workers Housing Promotion. (<i>Instituto Nacional de Fomento a la Vivienda del Trabajador</i>)
ISSSTE	Institute of Security and Social Service for State Workers (<i>Instituto de Seguridad y Servicios Sociales para los Trabajadores del Estado</i>)
IT/R	Interim Report
JICA	Japan International Cooperation Agency
L/C	Letter of Credit
LGEEPA	Ecological Balance and Environmental Protection Law (<i>Ley General de Equilibrio Ecológico y Protección al Ambiente</i>)
M/M	Minutes of Meeting
M/P	Master Plan
MIA	Environmental Impact Assessment Report (<i>Manifestaciones de Impacto Ambiental</i>)
NAFTA	North American Free-Trade Agreement
NIT	New Intermediate Treatment
NOM	Mexican Official Norm (<i>Norma Oficial Mexicana</i>)
OCR	Ordinary Capital Resource
OF	Own Fund

O&M	Operation and Maintenance (<i>Operación y Mantenimiento</i>)
OECD	Organization for Economic Cooperation and Development
OW	Organization of Workers
P/R	Progress Report
PAHO	Pan-American Health Organization
PEMEX	Petróleos Mexicanos
PET	Polyethylene terephthalate
POS	Public Opinion Survey
PP	Processing Plant
PROFEPA	Office of the Federal Attorney for Environmental Protection
RIMEX	Mexican Industrial Recycles
S/P	Selection Plant
SC	Santa Catarina
SCT	Secretariat of Communication and Transport (<i>Secretaría de Comunicaciones y Transportes</i>)
SDN	Secretariat of National Defense (<i>Secretaría de la Defensa Nacional</i>)
SECOFI	Secretariat of Trade and Industrial Development (<i>Secretaría de Comercio y Fomento Industrial</i>)
SEMARNAP	Secretariat of Environment, Natural Resources and Fishing (<i>Secretaría del Medio Ambiente, Recursos Naturales y Pesca</i>)
SERVIMET	Servicios Metropolitanos, SA
SHCP	Secretary of Finance and Public Credit (<i>Secretaría de Hacienda y Crédito Público</i>)
SJA	San Juan de Aragón
SL	Sanitary Landfill (<i>Relleño Sanitario, RS</i>)
SM	Secretariat of Navy (<i>Secretaría de Marina</i>)
SMA	Secretariat of Environmental of the GDF (<i>Secretaría del Medio Ambiente</i>)
SOS	Secretariat of Works and Services (<i>Secretaría de Obras y Servicios</i>)
SSA	Secretariat of Health and Assistance (<i>Secretaría de Salud</i>)
SWM	Solid Waste Management
T/S	Transfer Station
TDS	Total Dissolved Solids
TGs	Task Groups

UNAM	National Autonomous University of Mexico (<i>Universidad Nacional Autonoma de Mexico</i>)
WACS	Waste Amount and Composition Survey
WB	World Bank
WTP	Willingness to Pay
ZMVM	Mexico Valley Metropolitan Area (<i>Zona Metropolitana del Valle de México</i>)

Glossary

1. Botes: 10-30 liters capacity containers.
2. Cabos: Operation supervisor.
3. Chácharas: Mechanic apparatus, furniture and other articles thrown away as waste Artifacts, menages and other goods thrown away.
4. Finca: Fees paid by large and medium waste generators.
5. Láminas: Ferrous metal sheets and tin plate.
6. Pepenador: Waste-picker.
7. Propina: Tip paid by minor waste generators.
8. Tambos: 200 liters drum container.

