フィリピン国有害産業廃棄物対策予備調査
報告書

目次

第Ⅱ部　予備調査の結果

第１章　調査概要

１　背景

フィリピン国では、近年の工業化に伴って産業廃棄物の発生量が増加してきており、適切な産業廃棄物の管理体制確立が急務となっている。しかし、行政機関による法規執行能力が不足し、また産業廃棄物の処理・リサイクルを担う事業者の育成の施策が十分に取られていない等の問題があり、体制づくりは十分進んでいない。今後、適切な管理体制が確立されなければ、深刻な環境問題の発生のみならず、近年の輸出企業はISO14001の取得が重要となってきていることから、産業廃棄物の処理処分について十分整備されていないフ国への海外からの投資が敬遠される可能性があり、同国の健全な発展を阻害しかねない。

また、産業廃棄物の内、特に廃油、廃酸・アルカリ、重金属を含むスラッジ等の有害産業廃棄物については適切に処理できる業者がほぼ存在していないため、多数の企業で工場内に保管されているのが現状であり、早急な対策が必要である。

かかる状況の下、平成１２年２月にフィリピン国政府から本件開発調査の正式要請書が日本側に提出された。

事業団は、平成１２年１月２３日から３月１０日にかけて、有害産業廃棄物対策の開発調査についてプロ形調査を実施し、開発調査の実施意義を確認するとともに、調査概要について「フ」国側が作成した要請書案を基に協議を行った。その結果、有害産業廃棄物対策のM/P作成を行う「フェーズ１」と有害産業廃棄物の処理・リサイクル事業のF/S調査を行う「フェーズ２」とにフェーズ分けして実施すること等、「フ」国側と合意を得られた。

本件のフェーズ１の実施細則（I/A）については、当初、JICAフィリピン事務所がフィリピン国側と協議し、署名・交換する方針であった。しかしながら、同事務所及び鉱調部が再度検討した結果、フィリピン国側の調査実施体制の構築を促進させ、I/A署名を早期に実現するには調査団の派遣が必要と判断されたため、本予備調査団を派遣することとなった。

２　調査の目的

（１）フィリピン国側と本格調査（フェーズ１）の実施細則（I/A）について協議を行い、合意に到ればI/A及びM/Mの署名を行う。

（２）本格調査におけるフィリピン国側の実施体制、具体的な調査実施方法について確認し、円滑な本格調査の実施を確保する。

3　団員構成

（1）団長・総括	渡辺泰介	JICA鉱工業開発調査部工業開発調査課 課長代理
（2）技術協力行政	田村修司	通商産業省技術協力課技術協力専門職
（3）調査企画	鈴木昭彦	JICA鉱工業開発調査部工業開発調査課

4　派遣期間

平成１２年5月１５日（月）～平成１２年5月１９日（金）

5　日程

5月	１５日（月）	東京発(9:45)(JL741)→マニラ着(13:25) 日本大使館表敬、JICA事務所にて打ち合わせ、
	１６日（火）	EMBにて打ち合わせ、BOI訪問、PEZA訪問
	１７日（水）	UNDP訪問、ステアリングコミッティ参加、JETRO訪問
	１８日（木）	坂本専門家との打合せ、EMBにて打ち合わせ（I/A署名）、 富岡専門家訪問、JICA事務所報告、日本大使館報告
	１９日（金）	日本人商工会議所訪問、BOI坂本専門家訪問、 マニラ発(14:45)(JL742)→(19:40)東京着

第２章　調査結果

1　実施細則（I/A）の合意

調査団と環境天然資源省(DENR)環境管理局(EMB)との間で I/A について協議を実施した双方合意に至り、I/A を協議議事録（M/M）とともに署名、交換した（別添参照)。

I/A に記載された本格調査の概要は以下の通り。

フィリピン国有害産業廃棄物対策調査（フェーズ１）の概要

１．調査の目的

フィリピン国への投資環境を整備し、健全な工業の発展を支援するための産業廃棄物対策として、フィリピン国の.有害産業廃棄物管理の現状を踏まえた上、適切な行政体制の構築方法や処理事業を担う民間セクターの振興策、短期アクションプラン等を含む、２０１０年までの有害産業廃棄物の管理に係るM／Pを策定する。

２．調査の概要

（1）調査地域

フィリピン国全体

（ただし、工場訪問調査等、詳細な調査は、マニラ首都圏及び CALABARZON 地区を対象とする。）

（次ページに続く）

（2） 調査項目

ア．有害産業廃棄物に関わる現状調査

（ア） フィリピンの社会経済開発戦略に照らした環境保護政策及びその行政組織体制

（イ） 産業廃棄物の発生の観点から見た工業セクターの発展状況

（ウ） 海外ドナーによる関連分野のプロジェクト

イ．有害産業廃棄物管理の現状分析

（ア）法規制体制

（イ）現在及び将来の有害産業廃棄物の発生量

（ウ） 発生源である企業による有害産業廃棄物の管理状況

（エ） 民間処理業者による処理・リサイクルの状況

（オ） 既存の有害産業廃棄物管理システム（他国の事例、既存技術）

ウ．有害産業廃棄物管理マスタープランの策定

（ア）有害産業廃棄物対策における基本戦略

（イ）有害産業廃棄物管理における適切な行政体制

（ウ）有害産業廃棄物の管理基準及びガイドライン

（エ）有害産業廃棄物管理への民間セクター振興策

（オ）有害産業廃棄物処理・リサイクル事業の具体案

（カ）アクションプラン

※フェーズ２について

有害産業廃棄物処理・リサイクルのモデル事業のＦ／Ｓ調査を行うフェーズ２は、フェーズ１で提案された具体案に基づき、フィリピン国側が事業主体を確保し、資金源の確保の方法を明確にできた場合に実施する。

なお、今回の協議において出されたフィリピン国側からの要望事項を踏まえ、当初調査団が作成していた I/A 案から変更した点は以下の通り。

（１）有害産業廃棄物処理・リサイクル施設のサイトの技術的な評価の実施

I/A の Scope of the Study に「有害産業廃棄物処理・リサイクル施設を設置するサイトのガイドライン作成、及び、ガイドラインに基づく候補サイトの技術的評価」を追加した。

当初調査団は、フェーズ２で F/S 対象となる有害産業廃棄物の処理・リサイクル施設（以後、“処理施設”）のサイトの選定については「フ」側が実施するべきものであり、フェーズ１調査と並行して「フ」国側が候補サイトを挙げ、評価、選定することを想定していた。しかし、EMB は、本格調査の調査項目として、処理施設を設置するサイトのガイドラインを作成の上、同ガイドラインに基づいて候補サイトを調査し、技術的な評価を行うよう、強く要望した。調査団は、最終的なサイトの選定は実施できないが、政治的考慮を伴わない技術的な評価であれば実施可能と判断し、最終的に EU 調査で挙げられた１０の候補サイト[i]、及びフィリピン側から本格調査の第２次現地調査までに提示される候補サイトについて、技術的な評価を実施することとした。

（２）「Undertakings of GOJ」の変更について

「Undertakings of GOJ」の“2. to pursue technology transfer to Philippine counterpart personnel in the course of the Study.”を“２．to help build capacity of the Philippine counterpart ～”と変更した。

ステアリングコミッティとの協議の際、EMB から、Undertakings of GOJ について以下の指摘があった。

ア．フィリピン国側の Undertakings の項目に対して、日本側の項目が少なすぎる。

イ．技術移転として表記されている“technology transfer”という用語は、フィリピンではテクニカルな面だけを意味してしまうので、“capacity building”という用語にし、さらに具体的な技術移転の内容を列挙した記述を追加すべきである。

調査団は、Undertakings の変更は困難である上、EMB が要望している内容は M/M にも十分記載されている等の理由で Undertakings の変更は必要ないと主張した。しかし、EMB は、重要事項は M/M ではなく I/A に記載すべきであると Undertakings の変更に固執し、さらに協議を行った結果、“technology transfer”の “capacity building”への変更のみに焦点が絞られた。調査団は、この変更は元々の Undertakings の文意から外れるものでもないとも判断し、外務省本省から了解を取り付けた上、Undertakings の変更を行った。

[i] EU の資金により、英国のコンサルタント（Entec）が実施した“TOXIC AND HAZARDOUS WASTE MANAGEMENT STUDIES”（95-97）において、有害産業廃棄物処理施設の建設候補地として、10 地点が挙げられている。

2　本格調査のフィリピン国側実施体制の確認

ステアリングコミッティが EMB による調整の下で開催され、本格調査の円滑な実施に必要な「フ」国側の実施体制が整えられた。

ステアリングコミッティには、スケジュールの都合で参加できなかった LLDA を除く、全てのメンバーが出席した[ii]。調査団から開発調査の仕組みや本格調査の内容について説明した後、EMB を議長として質疑応答が行われ、各メンバーの本調査に対する理解を深めるとともに、円滑な調査実施のために必要な各メンバーの協力が確保されることが確認できた。

また、産業界からの協力を確保するために調査への参加が必要な BOI、PEZA については、調査団は個別に訪問も行い、それぞれが調査へ積極的に協力することを確認している。

なお、現地の日本側関係者から、マニラ首都圏庁（MMDA）や地方自治体の代表者をステアリングコミッティに参加させる必要性について指摘された。これに対し、調査団は検討の結果、MMDA、地方自治体の代表については、調査の冒頭から処理施設の候補サイトの議論になってしまう恐れがあることから、ある程度技術的な調査を進めた上でコミッティへの参加について検討を行い、必要であればコミッティへの参加を呼びかけることとした。

3　その他確認事項

（1）Clean Air Actについて

昨年5月に採択された“ Clean Air Act”では、第20条にて「有害な煙」を発生する有害廃棄物の焼却を禁じている。現在施行細則が、EMBやBOIを含む関係諸機関により構成されるIRR（Implementing Rule and Regulation）により検討されており、７月には完成する見込みである。第２０条の施行細則については、EMBが作成した案の段階ではあるが、有害な煙が発生しない条件下での有害廃棄物の焼却が可能となるように規定されている。

[ii]ステアリングコミッティのメンバー
- 環境天然資源省(DENR)環境管理局(EMB)
- 貿易工業省(DTI)投資委員会(BOI)
- エネルギー省(DOE)環境保護モニタリング課(EMPD)
- 経済加工区庁(PEZA)
- DENRラグナ湖開発公社(LLDA)
- DTI国際貿易関係局(BITR)

本格調査は施行細則の内容を十分に検討、留意して実施するが、必要に応じて実施細則の規定内容について提言することとする[iii]。

なお、施行細則は、完成後JICA事務所に提出するよう、調査団はEMBに依頼した。

（２）処理施設の事業主体について

フェーズ２のF/S対象となる処理施設の事業主体については、フェーズ１の中で調査団が案を複数作成、提言し、フィリピン国側が調査団のサポートを得ながら実際に探して確保することとなっている。

今回予備調査団は、情報収集として、各訪問先で事業主体に係る見解を聴取した。要点は以下の通り。

ア．EMB/DENR

事業主体、資金ソースとして、まず第一に民間セクターを想定している。民間セクターにビジネスとして興味を持っている者がいると考えているが、民間セクターが不可能であれば、日本政府を始めとしたドナーのloanに期待しており、DENR傘下のNRDC(National Resource Development Corporation)を受け皿とするアイデアがある。

イ．BOI/DTI

民間セクターに処理施設への投資について、外資でテキサス・インストルメンツ、インテル、オーストラリア企業１００％出資のパシフィック・レア・メタルが関心を示している。また、DTI 傘下の NDC（National Development Company）を事業主体にする方法もある。

ウ．日本人商工会議所環境委員会

日系企業が、事業主体となりえるかは分からない。環境委員会では、処理施設についてはフィリピン国政府が中心に取り組むべきと考えている。日系企業が事業主体になるとしても第３セクターにより実施する必要があり、日系企業だけで事業を実施するのは困難。

また、処理対象廃棄物を選んだり、分別の問題から日系企業だけを産廃の引き受け対象としたりして、事業内容を絞り込む方が現実的である。ただし、この場合、フィリピン国政府から反対される可能性がある。

[iii] 例えば、「処理施設の建設許可を、フィリピン国側が有害の基準値に基づき審査しようとしても、実際に基準値を満たすか否かの判断能力はないため、炉の種類等の設備のスペックで審査する方法が望ましい」（ジェトロ、飛騨氏）

エ．ジェトロ

民間セクターによる民間企業のキャパシティを越えたコスト、リスクであり、政府が出資したり、政府が事業主体となることが必要と考えている。

オ．山田専門家（EMB）

GTZのセブ島のプロジェクトでは、セブ電気メッキ協会とセブ商工会議所が協同処理施設会社を設立して共同廃水処理施設を建設し、運営している事例があり、本件においても参考とすべき。

（３）有害産業廃棄物の情報管理システム改善

本格調査では、EMBの有害産業廃棄物の管理に必要な情報管理システムの改善を実施し、対処方針どおり、２人月の作業量の範囲で作業を行うことで合意した。

ただし、日本側が用意するパソコンの台数については当初１台程度を想定していたものの、多量なデータ入力等の実際の作業に不十分であることが指摘された。従って、本格調査において適切な情報管理システムを検討の上、必要な台数（最大５台まで）を調査団が用意する。

（４）技術移転について

EMBは本格調査での技術移転に期待が高いが、具体的な技術移転の活動内容として以下の３項目を挙げた。

ア．セミナー／ワークショップの実施

イ．研修コース（OJT）

ウ．地方自治体の責任者の日本派遣（有害産廃関連の施設視察）

調査団は、「ア.」、「イ.」は本格調査において実施可能であるが、「ウ.」については実施不可能と回答し、EMBは了解している。

（５）UNDPとの本格調査における連携について

調査団はUNDPを訪問し、本調査の概要を説明するとともに、UNDPが計画している有害産業廃棄物に係るプロジェクト[iv]について聴取した。本格調査との連携については、以前UNDPからJICA事務所に提案のあったセミナーでの協力に関し、UNDPは講師派遣の用意があるところ、具体的な実施方法を本格調査団と相談して検討することとした。また、UNDPのプロジェクトでも実施を計画している有害産業廃棄物の情報システムの改善については、本調査の結果を受けて対応することを確認した。

[iv] Harmonized Regulatory Systems and Capability Building for Toxic Chemicals and Hazardous Waste Management

（６）口上書の交換について

本件調査の口上書については、５月１２日付でフィリピン国政府と現地日本大使館との間で交換されている。

４　今後の予定

第１次現地調査の８月下旬からの開始を目指し、本格調査のコンサルタント選定作業を開始する。

今年度末にDF/Rの説明を目的とする第３次現地調査を実施する計画であるが、併せて同現地調査にてフェーズ２の実施可否を検討し、実施可能と判断されれば早期に予備調査団を派遣して、フェーズ２のI/Aについてフィリピン国側と協議を行う。

第II部　添付資料

1　I/A（写）、M/M（写）
2　主要面会者一覧
3　Recyclers/treaters of Hazardous Waste
4　4th HAZWASTE CONGRESS IN THE PHILIPPINES資料
5　共和国法律6969
6　ﾌｨﾘﾋﾟﾝ環境事情
7　PROJECTO DOCUMENT (UNDP)

＊ 3～6はJETROマニラより入手

IMPLEMENTING ARRANGEMENT ON THE TECHNICAL COOPERATION FOR THE STUDY ON INDUSTRIAL HAZARDOUS WASTE MANAGEMENT IN THE REPUBLIC OF THE PHILIPPINES (PHASE 1) AGREED UPON BETWEEN DEPARTMENT OF ENVIRONMNTAL AND NATURAL RESOURCES AND JAPAN INTERNATIONAL COOPERATION AGENCY

Manila, May 18, 2000

Mr. Peter Anthony A. Abaya
Director,
Environmental Management Bureau (EMB),
Department of Environment and Natural Resources (DENR)

Mr. Taisuke Watanabe
Leader,
Preliminary Study Team,
Japan International Cooperation Agency (JICA)

I INTRODUCTION

In response to the request of the Government of the Republic of the Philippines (hereinafter referred to as "GOP"), the Government of Japan (hereinafter referred to as "GOJ") has decided to conduct the study on industrial hazardous waste management in the Republic of the Philippines (Phase 1) (hereinafter referred to as "the Study"), and exchanged the Notes Verbales with GOP concerning the implementation of the Study.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programmes of GOJ, will undertake the Study in accordance with the relevant laws and regulations enforced in Japan.

On the part of GOP, the Environmental Management Bureau, the Department of Environmental and Natural Resources (hereinafter referred to as "EMB/DENR") shall act as the counterpart agency to the Japanese study team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

The present document constitutes the implementing arrangement between JICA and EMB/DENR under the above-mentioned Notes Verbales exchanged between two governments.

II. OBJECTIVES OF THE STUDY

To contribute toward promotion of investment and development of industry in harmony with environment in the Philippines,

1. Review the present status of industrial hazardous waste (hereinafter referred to as "hazardous waste") management
2. Formulate a long-term master plan for proper hazardous waste management until year 2010 including capacity building for regulation and private contractor development, and an immediate plan of action to implement the master plan in the short term

III. THE STUDY AREA

The Study covers nationwide, however detailed survey and facility options focus on the CALABARZON and Metro Manila area.

IV. SCOPE OF THE STUDY

1. Review of the status of hazardous waste
   (1) Policy and institutional framework for environment protection vis-à-vis national socio-economic development strategies

(2) Development of industrial sub-sectors from the viewpoint of generation of industrial waste.
(3) Relevant projects by donors

2. Assessment of present hazardous management

(1) Regulatory system
- The government's capabilities in monitoring, regulation and law enforcement and administrative disposition or character
- Present institutional arrangements
- Issuance of Environmental Compliance Certificates (ECC) and other related environmental permits for treatment, recycling and/or disposal facility proposals
- Incentives for investments in treatment, recycling or disposal facilities

(2) Current and future volume of hazardous waste
- Current volume estimation by category through survey of actual waste generators with special focus on CALABARZON and Metro Manila area.
- Projection of hazardous waste generation by category in 2010 through survey of actual hazardous waste generators.

(3) Hazardous waste management by generator
- Current status, problems concerning hazardous waste management
- Willingness to pay for hazardous waste recycling and treatment
- On-site facilities, including cost

(4) Capabilities of private contractors

(5) Reference systems
- Existing technologies
- Management systems in other countries (ex. Malaysia, Thailand, Japan)

3. Formulation of a hazardous waste management master plan

(1) Planning framework and strategies
- Basic principles of waste minimization

(2) Regulatory framework and institutional development
- Institutional or organizational setup including clarification and delineation of the responsibilities of concerned agencies, the government and the private sector.

- Capacity building, such as human resources development, laboratory and monitoring equipment requirements, administrative procedures
- Development of standards or guidelines on hazardous waste management, such as treatment, storage and disposal facility standards and siting
- Improvement of the information system on waste generation, waste generators, and private contractors (transporters and treaters)
- Improvement of the monitoring system on waste generation and management, such as quarterly reporting of waste generators, manifest system on the transport and treatment, inspection of generators

(3) Private sector participation in hazardous waste management
- Options for private sector participation
- Development scenario for contractors
- Identification of incentives, such as tax holidays, loans, exclusive rights

(4) Options for introducing hazardous industrial waste treatment & recycling facilities
- Size, technology and cost (capital and O&M)
- Assessment of candidate sites

(5) Plan of action for the short term

V. STUDY SCHEDULE

The tentative schedule of the Study is attached as the Annex.

VI. REPORT

JICA shall prepare and submit the following reports in English to GOP.

Twenty (20) copies of the Inception Report in English
Twenty (20) copies of the Interim Report in English
Thirty (30) copies of the Draft Final Report in English
Thirty (50) copies of the Final Report in English

VII. UNDERTAKING OF GOP

In accordance with the Note Verbales exchanged between GOJ and GOP, GOP shall accord privileges, immunities and other assistance to the Japanese study team (hereinafter referred to as "the Team") in

connection with the performance of their duties for the Study and, through the authorities concerned, take necessary measures to facilitate the smooth conduct of the Study.

1. GOP shall be responsible for dealing with claims which may be brought by third parties against the members of the Team and shall hold them harmless in receipt of claims and liabilities arising in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims or liabilities arise from gross negligence or willful misconduct of the above-mentioned members.

2. EMB/DENR shall, at its own expense, provide the Team with the followings, in cooperation with other agencies concerned:

   (1) Available data and information related to the Study,
   (2) Counterpart personnel and support staff necessary for the Study
   (3) Suitable office space with necessary equipment and furniture in Metro Manila,
   (4) Credentials or identification cards to the members of the Team.

3. To facilitate smooth conduct of the Study, EMB/DENR shall make necessary arrangements with other governmental and non-governmental organizations concerned for the following:

   (1) to secure the safety of the Team,
   (2) to permit the members of the Team to enter, leave and sojourn in the Philippines for the duration of their assignment therein,
   (3) to exempt the members of the Team from taxes, duties fees and other charges on equipment, machinery and other materials brought into the Philippines for the conduct of the Study,
   (4) to exempt the members of the Team from income taxes 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 the necessary facilities to the Team for remittance as well as utilization of the funds introduced into the Philippines from Japan in connection with the implementation of the Study,
   (6) to secure permission for entry into private properties or restricted areas for the conduct of the Study,
   (7) to secure permission for the Team to take all data and documents (including map and photographs) related to the Study out of the Philippines to Japan by the Team, and
   (8) to provide medical services as needed. Their expenses will be chargeable to the members of the Team,

VIII. UNDERTAKING OF GOJ

In accordance with the Note Verbales exchanged between GOJ and GOP, GOJ, through JICA, shall take the following measures for the implementation of the Study:

1. to dispatch, at its own expense, the Team to the Philippines,
2. to help build capacity of the Philippine counterpart personnel in the course of the Study.

IX. CONSULTATION

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

Tentative Schedule

Annex

	Schedule of the Study											
Month	1	2	3	4	5	6	7	8	9	10	11	12
Field Survey		■	■		■	■		■				
Work in Japan	□		□				□			□		
Submission of Report	△ IC/R		△ IT/R									
Submission of Draft Final Report and presentation							△ DF/R					
Submission of Final Report										△ F/R		

IC/R : INCEPTION REPORT
IT/R : INTERIM REPORT
DF/R : DRAFT FINAL REPORT
F/R :FINAL REPORT

MINUTES OF MEETING
FOR
IMPLEMENTING ARRANGEMENT
ON
THE TECHNICAL COOPERATION
FOR
THE STUDY
ON
INDUSTRIAL HAZARDOUS WASTE MANAGEMENT
IN
THE REPUBLIC OF THE PHILIPPINES
(PHASE 1)
AGREED UPON BETWEEN
DEPARTMENT OF ENVIRONMNTAL AND NATURAL RESOURCES
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Manila, May 18, 2000

Mr. Peter Anthony A. Abaya
Director,
Environmental Management Bureau (EMB),
Department of Environment and Natural Resources (DENR)

Mr. Taisuke Watanabe
Leader,
Preliminary Study Team,
Japan International Cooperation Agency (JICA)

This minutes of meeting has been prepared to confirm the points agreed on between the authorities concerned of the Government of the Republic of the Philippines (" the Philippine side ") and the team organized by the Japan International Cooperation Agency ("the Team"), concerning the implementing framework of the study on industrial hazardous waste management in the Republic of the Philippines (Phase 1) ("the Study"). Hence this minutes of meeting should be read in conjunction with the " Implementing Agreement " signed in Manila on May18, 2000 ("I /A").

A list of those who participated in the discussions is attached herewith (See Annex 1).

1. Industrial hazardous waste covered by the Study

The Philippine side and the Team (collectively referred to as "both sides") agreed that the Study will cover industrial hazardous waste (hereinafter referred to as "hazardous waste") defined in SECTION 25, DENR Administrative Order No.29 under Republic Act 6969, excluding pathogenic or infectious wastes.

2. Improvement of the information system on waste generation, waste generators and private contractors (transporters and treaters)

With regard to article IV. 3. (2) of the I/A, the both sides agreed that the JICA study team will provide database application by customizing popular application software, with a computer prepared for the Study, to manage the data of the Registration Forms of waste generators and private contractors (transporters and treaters), and the data of quarterly report of waste generators.

The Team proposed that the total amount of manpower of the JICA study team for the database application should be within about 2 man/months. The Philippine side agreed.

3. Organizational Setup for Implementation of the Study

Concerning institutional setup for implementation of the Study, the both sides agreed on the followings;

(1) Steering Committee

The steering committee, of which a secretariat would be established within the Department of Environment and Natural Resources (DENR), would be organized for ensuring smooth implementation of the Study.

The committee members will be composed of, but not limited to, representatives of the following organizations:

- Environment Management Bureau (EMB), DENR
- Board of Investment (BOI), the Department of Trade and Industry (DTI)
- Environmental Protection and Monitoring Division (EPMD), the Department of Energy (DOE)
- Bureau of International Trade Relation (BITR), DTI
- Laguna Lake Development Authority (LLDA), DENR
- Philippine Economic Zone Authority (PEZA)

The responsibilities of each steering committee member are as follows:

a. EMB/DENR, as the leading counterpart, will engage in overall coordination for the Study. Director of EMB/DENR shall chair the steering committee.
b. Other members, as collaborating counterparts, will provide necessary advice and support for the smooth and effective implementation of the Study.

(2) Working Group

The Philippine side will assign appropriate counterpart personnel who will form a working group to help the Japanese consultants carry out the Study.

(3) Arrangements for organizing the Steering Committee

EMB/DENR will make necessary arrangements to organize the Steering Committee.

4. Technology transfer in the Study

(1) The both sides agreed that several workshops/seminars for dissemination of information on the techniques and technologies on proper hazardous waste management would be held in the Study.

(2) Furthermore, the Philippine side recommended that training for personnel concerning hazardous waste management, including the information system, should be conducted in order to enhance the technical capability of Philippine staff and to ensure the effective and efficient transfer of technology(ies).
The Team replied that the techniques and technologies on proper hazardous waste management would be transferred to Philippine staff through joint work by the Japanese consultants and Philippine staff.

5. Assessment of candidate sites for hazardous industrial waste treatment & recycling facilities

With regard to article IV. 3. (4) of the I/A, both sides agreed that JICA study team shall assess, from technical point of view, 10 promising sites in the final report of "TOXIC AND HAZARDOUS WASTE MANAGEMENT STUDIES" by Entec. If the Philippine side proposes a few additional potential sites with their information before 2nd field survey, the JICA study team may assess these sites also.

6. Implementation of Phase 2 and its preconditions

Concerning Phase 2, of which principal work is a feasibility study on hazardous waste treatment & recycling facility, both sides agreed as follows;

(1) The Study will proceed to Phase 2, if, after reviewing the output of Phase 1, the Philippine side clarify sources of funds and secures undertaking bodies for construction and operation of the facility until the end of Phase 1.

(2) After the Japanese side has confirmed that the precondition mentioned in (1) has been satisfied, the implementing framework of Phase 2 will be discussed and stipulated by the I/A of Phase 2.

Annex 1

List of Members

The Philippine side

Environmental Management Bureau (EMB), Department of Environment and Natural Resources (DENR)

Mr. Peter Anthony A. Abaya	Director
Ms. Angelita T. Brabante	Officer in-charge, Environmental Quality Division, Chief, Chemicals Management Section
Mr. Geri Geronimo R. Sañez	Section Chief, Hazardous Waste Management Section, Environmental Quality Division
Mr. Solon C. Rativo	Senior Environmental Management Specialist
Ms. Leah Aurea U. Texon	Science Research Specialist II
Ms. Elizabeth L. Cariño	Science Research Specialist II
Mr. YAMADA, Taizo	JICA Expert (Environmental Planning and Management Advisor)

Japanese Side

JICA Project Formulation Study Team

Mr.WATANABE, Taisuke	Deputy Director of Industrial Development Study Division, Mining and Industrial Development Study Department, JICA
Mr. TAMURA, Shuji	Technical Cooperation Specialist,

	Technical Cooperation Division, International Trade and Policy Bureau, Ministry of International Trade and Industry
Mr. SUZUKI, Akihiko	Industrial Development Study Division, Mining and Industrial Development Study Department, JICA

JICA Philippines Office

Ms. BAMBA, Noriko	Assistant Resident Representative
Ms. Osel Enriquez	Project Liaison Officer

主要面会者一覧

（1）Environmental Management Bureau (EMB), Department of Environment and Natural Resources (DENR)

・Mr. Peter Anthony A. Abaya	Director
・Mr. Fernandino Y. Concepcion	Assistant Director
・Ms. Angelita T. Brabante	Officer in-charge, Environmental Quality Division, Chief, Chemicals Management Section
・Mr. Geri Geronimo R. Sañez	Section Chief, Hazardous Waste Management Section, Environmental Quality Division
・Ms. Leah Aurea U. Texon	Science Research Specialist II
・山田泰蔵	JICA Expert (Environmental Planning and Management Advisor)

（2）Board of Investments (BOI), Department of Trade and Industry (DTI)

・Mr. Marco R. Carlos	Investment Specialist, Engineering Industries Dept. /Environmental Unit
・坂本弘樹	JICA Expert (Advisor for Policy Making)

（3）Support Service Department, Philippine Economic Zone Authority (PEZA)

・Engr. Emmauel D. Pineda	Manager

（4）在フィリピン日本大使館

・堺井　啓公	２等書記官

（5）ジェトロマニラセンター

・飛騨俊秀	Director

（6）Metropolitan Manila Development Authority (MMDA)

・冨岡征四郎	JICA Expert (Solid Waste Management)

（7）日本人商工会議所　環境委員会

・橋本顕一	環境委員長（NEC Computer Storage Philippines, Inc.）
・徳野博之	環境委員(住友商事（株）マニラ支局)

・**山田光良**　　**事務局長**

（8）JICAフィリピン事務所

・**小野　英男**　　**所長**
・**小原　基文**　　**次長**
・**番場　紀子**　　**所員**
・Ms. Osel Enriquez　　ローカルスタッフ

RECYCLERS/TREATERS OF HAZARDOUS WASTE

List of establishments with issued Interim Permits and will recycle/treat hazardous wastes:

COMPANY	ADDRESS/TEL.NO.	CONTACT PERSON	TYPE OF WASTE
1 Bensan Industries, Inc.	353 EDSA, Caloocan City	Mr. Benjamin Santos Ms. Yvette Santos	Waste oil
2 Oil Tech Resources, Inc.	Bo. Makiling, Calamba, Laguna Tel: (049) 545 61 90		Waste oil
3. Petroleum Technology & Research Corp. (PTRC)	8613 Old Panaderos St., Sta. Ana, Manila	Mr. Enrique Kp. Tan	Waste oil
4. Philsin Marine Services, Inc.	Brgy. St. Francis, Limay, Bataan CDC Bldg., 1195 Maria Orosa St., Ermita, Manila Tel. No.: 521-2015 / 521-2019 / 524-3489	Mr. Mariano Barcenas	Bunker oil sludge
5. Tidewater Association, Inc.	Brgy. San Roque, San Rafael, Bulacan		Waste oil
6. International Chemicals Industries (INCHEM)	Km. 32, Mac Arthur Highway, Guiguinto, Bulacan Tel. No.: 444-0051	Mr. Jose Malawaran	Metal Bearing Sludge
7. Pacific Rare Metal Industries, Inc.	Plant: Subic SEPZ, Subic, Zambales Tel: (047) 232 32 17 to 22 Head Office: Ground Floor, Toledo Bldg. II, 79 Sct. Limbaga cor T, Morato, Quezon City Tel: 412 52 11 / 372 35 80 to 84	Mr. Daniel T. Hisshion	Metal Bearing Sludge
8. C.M. Manufacturing Philippines, Inc.	Phase III, Block 15-A Lot 1 Philippine Economic Zone Authority, Rosario, Cavite Tel. No.: (046) 437-232- to 22	Mr. Kodo Takamura	Inorganic Chemical Waste (Lead Compound) [e.g. Solder Dross]

9. Philippine Recyclers, Inc.	Plant: No. 2 Bo. Patubig, Marilao, Bulacan Tel: (044) 711 2220 / 711 22 62 / 711 22 36 Main Office: Sct Santiago cor Marathon St. Diliman, Quezon City Tel: 922 23 05	Engr. Irving Guerrero	Lead Acid batteries
10. Ampchem Industries	6 Baco St., Nagkaisang Nayon, Bo. Capri, Novaliches, Quezon City Tel: (0912) 833 95 48 Pager: (141) 217605	Engr. Edgardo A. Villasor	Spent Solvents
11. Bayer Philippines, Inc.	3F EBC Bldg., Ortigas Ave. cor Roosevelt Street, San Juan Tel: 721 60 11 / 721 57 31	Mr. Cesar S. Igual Ms. Rosalia A. Gonzalo	Pharmaceutical wastes (Incineration)
12. Bacnotan Cement Corporation	Brgy. Quirino, Bacnotan, La Union	Julius B. Yballe	Mould runners
13. Integrated Waste Management Inc.	Brgy. Puting Lupa, Calamba, Laguna Tel: (0918) 876 11 56 Head Office: No. 25 President Ave., Teoville Subd., Sucat, Parañaque Tel: 825 33 21 / 31; 826 5753; 820 95 60	Engr. Winnifred G. Solis	Biomedical Wastes (Hospital & Pharmaceutical wastes which include pathological and infectious wastes, sharps and pharmaceutical wastes) (Incineration)
14. Metaforms Trading	No. 23 J. Sotto St., Chrysanthemum Village, San Pedro, Laguna Tel: 846 24 31 / 808 25 70	Mr. Pablito Valente	Industrial Sludge
15. Enviro-Means Industry	No. 4-D Elias St., Acacia, Malabon	Mr. Fernando M. Dabu	Used solvent, used coolants, used oil/sludge
16. Solchem Phils. Inc.	Km 18 Impex Cpd. Pamplona, Las Piñas	Ms. Nellie Villaraiz Tel No: 541 30 45	Used solvent
17. Ortho Consolidated	# 20 Grey St., San Juan	Ms. Nellie Villaraiz Tel No: 541 30 45	Used solvent

as of 01 Feb 1999
MAAV@MAAV.HWLISTS doc

LIST OF TRANSPORTERS

List of establishments with issued Interim Permits to Transport Hazardous Wastes:

COMPANY	ADDRESS/TEL.NO.	CONTACT PERSON	TYPE OF WASTE
1. International Chemicals Industries (INCHEM)	Km. 32, Mac Arthur Highway, Guiguinto, Bulacan Tel. No.: 444-0051	Ms. Honorata De Leon	Metal Bearing Sludge
2. Philsin Marine Services, Inc.	CDC Bldg., 1195 Maria Orosa St., Ermita, Manila Tel. No.: 521-2015 / 521-2019 / 524-3489	Mr. Mariano Barcenas	Bunker oil sludge
3. O.M. Manufacturing Philippines, Inc.	Phase III, Block 15-A Lot 1 Philippine Economic Zone Authority, Rosario, Cavite Tel. No.: (046) 437-232- to 22	Mr. Kodo Takamura	Inorganic Chemical Waste (Lead Compound) [e.g. Solder Dross]
4. Chem-Kalz Exchange Corporation	Unit 253, 2F, The Sycamore Bldg., Alabang-Zapote Road, Alabang, Muntinlupa	Mr. Genaro Manuel M. Garcia	Pharmaceutical wastes
5. Alejandro G. Pangan Trucking	1767 Evangelista St., Bangkal, Makati City Tel. No.: 844-8972	Mr. Alejando G. Pangan	
6. E. Mangaron Trading	1030 Lorex St., Tañada Subd., Gen. T. de Leon, Valenzuela Tel. No. 2932085/4325285	Mr. Ruel Mangaron	Waste Oil
7. E. Camaligan Trading	Mauban, Quezon	Mrs. Eden Camaligan	Waste Oil
8. Ecology Specialist	Ground Floor, Bldg. F, Phoenix Sun Business Park, E. Rodriguez, Libis, Quezon City Tel: 912 72 41 / 912 72 36		Waste oil
9. RMF Trucking	Mangatarem, Pangasinan		various used oil
10. White Gold Marine Services, Inc.	1422 S. Herrera St., Sta. Cruz Fax No.: 2541169		used oil (barges/tankers)
11. Mundo Commodities & General Services	1 JRB Bldg., Doña Manuela Ave., Manuela Subd., Las Piñas Tel. No. 8065380	Angelito C. Mundo	
12. A.D. Garganta Trading	6290 St. Anthony St., Magnusville, Pallocan West, Batangas City	Mrs. Alicia D. Garganta Hauler/Proprietor	used oil/bunker sludge oil
13. Talosig Trucking Services	35 22nd St., West Bajac Bajac, Olongapo City, Zambales	Mr. Bobby Baylon (Tel. No.: 3727632)	spent solvents & used oil

14. PNOC-Energy Dev't. Corporation Negros Oriental	PNOC Bldg., Fort Bonifacio, Makati	Mr. Jesus M. Quevenco Jr. (Residence Manager)	Cooling Tower Sludge
15. GlobeCare	No.1 Sheridan St., Mandaluyong City, M.M. Telefax (632) 747 74 70 / 747 74 69	Mr. Francis How	PCB contaminated wastes, solvents, waste transformer oil
16. SafeCo Environmental Services, Inc.	24 A. San Francisco St., Bo. Capitolyo, Pasig City Telefax (632) 637 87 01/ 02 637 27 39	Ms. Marilyn G. Hoese	Chemicals & Industrial wastes, PCB contaminated wastes, solvents, hydraulic oil & transformer oil
17. Banjo's Merchandise	Pinamucan, Batangas City Tel: 440 47 70	Mr. Allen Berberabe	Used oil/bunker fuel sludge
18. Enviro-Means Industry	No. 4-D Elias St. Bo Capitolyo, Pasig City Tel: 288 77 75	Mr. Fernando M. Dabu	Used solvent
19. Alegria-Industrial Sales Marketing	Veraville Alegria, Paraiso Drive, Talon 4, Las Piñas	Ms. Josephine D. Angeles	Spent Solvents
20. Jades Concrete Products	Tiwala St., Malanday, Valenzuela	Mr. Antonio A. Herrera	Lead acid batteries
22. Metaforms Trading	No. 23 J. Sotto St., Chrysanthemum Village, San Pedro, Laguna Tel: 846 24 31 / 808 25 70	Mr. Pablito Valente	Industrial Sludge
23. Integrated Waste Management Inc.	Brgy. Puting Lupa, Calamba, Laguna;Tel: (0918) 876 11 56 Head Office: No. 25 President Ave., Teoville Subd., Sucat, Parañaque Tel: 825 33 21 / 31; 826 5753	Engr. Winnifred G. Solis	Biomedical Wastes (Hospital & Pharmaceutical wastes which include pathological and infectious wastes, sharps and pharmaceutical wastes) (Incineration)
24. Bayer Philippines, Inc. (Crop Protection Plant)	Crop Protection Division, Canlubang Plant 3F EBC Bldg., Ortigas Ave. cor Roosevelt Street, San Juan Tel: 721 60 11 / 721 57 31	Ms. Tess Cayton	Pharmaceutical wastes (Incineration)
25. Hideya Trading	No. 21 Road 4 St., Proj. 6, Quezon City Tel No.: 525 17 25 / 453 30 42	Ms. Dulce David	Used oil
26. Fritz Logistics Phils Inc.	Oyster Industrial Complex, Ninoy Aquino Ave., Pque.	Mr. Jerry H. Steihmeier – Managing Director	Used oil

4TH HAZWASTE CONGRESS IN THE PHILIPPINES
Dusit Hotel Nikko
February 8-9, 2000

Overview of the Toxic and Hardous Waste Management Situation and the Initiative to Address the THW in the Philippines
Speaker: Mr. Peter Anthony Abaya - Director
Environmental Management Bureau

Major points that the speaker mentioned:
Hazardous waste is new in the Philippine setting, not because our country does have it but we are not concern about it.

There's are a lot of reports coming out, about hazwaste generated in the Philippines. There are studies indicating a 500,000 metric tons hazwaste produce every year and recently he read 4 Million metric tons/year, while a Japanese firm study resulted to 230,000 metric ton/yr. But this is not accurate for all of these are just a study. As recorded in the EMB's database about 34M metric ton of hazwaste generated nationwide by 829 firms registered in EMB from 1996~1998. About 11M metric tons of hazwaste were generated per year base on EMB registered generator. But according to BOI database there are about 15,000 registered firm which are potential hazwaste generators. Last, January 15, 2000 is the deadline for firm to registered at EMB if your company generate hazwaste, for those firm not yet registered they will be given notification, and subject to fine and penalties.

Given as example was in Leyte where PASAR mining and PHILPHOS where located. When they visited PASAR, (which generate 100,000 tons of mercury) some trees around the area turn to green totally green even the trucks. While in Philphos (which generate 1.5 Million tons dimpsum waste) river there turned to yellow. Even creeks and wells between these two firms turned to red or yellow, this is how serious hazwaste in the Philippines is.

This coming April he mentioned that leaded gasoline will be face-out. Lead according to studies makes the people dull, it lowers the I.Q. of the people who often inhale it. And taking consideration the growing percentage of deseases like cancer in the country and sad to say that the younger the age even the baby on the womb absorbed greater amount of pollutant in the environment.

He also compared the situation of the hazwaste generated in Singapore which is merely 300 metric tons/year. Other countries would spent $200/tons of hazwaste while in the Philippines only $8/tons where spent by few concerned industries.

He also mentioned the limited number of waste transporters, that there are only 26 transporter currently recognized by EMB. Business on waste transport is also encouraged to the possible investors.

R.A. 8749 Clean Air Act (CAA) is very complicated because of the ban on incinerator. The clean air act define incinerator as "burning", therefore if the company use different kind of technology which is non-burning its free, but a new type of hazwaste is generated. That is why the EMB together with its inter-agency coordinating body are working together to enforce this policies and guidelines to avoid illegal traffic of hazwaste just like the Japanese waste brought to the Philippines and that of in Clark and Subic.

According to him EMB have the efficient people, but need bigger budget. C.A.A. was passed by the congress without a single cent of budget, and they need people to help them out.

Question & Answer

1. Lead is also use by semi-conductors company in the Phils. Is there a schedule for banning for the use of lead in semi-conductors in the future?

   "They are not aware in the case of semi-conductors, so far none they are only informed about the lead in the gasoline."

2. One of the delegates commented that the EMB should consider also the banning of lead in all industries who use it.

   "According to them they will consider that but this is not part of the face-out plan of EMB and they are open for preposition in this matter."

3. How EMB handle the face-out of lead in the gasoline?

   "Actually they may allow importation of leaded gasoline provided that this will undergone process of reducing its lead content or on the other hand they are allowing its importation if the lead content is same or below the required lead content in the gasoline."

4. Is there are plan for cleaning up the waste in Clark & Subic.

   "They are still waiting for the budget and support for those responsible for the chemical spill"

5. There is a 15 M budget release to EMB by the Presidential Task Force donated by international organization for cleaning up toxic waste in Clark, why don't you use this to clean the area?

   "15 Million is not enough for cleaning the area, they are still looking for more funds"

6. Does it mean that we will just wait and see until people who live there die because of that toxic waste?

   "We believe that it is sealed in good place. And we cannot just move it and when the budget is spent, we'll stop, it will just worsen the situation. Well we may agree that the 15 million be spent for Public Information safety and

awareness. Recent assured that if the enough funding is here, we have already plans and option to do to solve this problem."

7. What if a company buys another company and found later that the site has a dump hazwaste who will be responsible for that?

   "The buyer will then be responsible for the proper disposal of that waste, considering that they buy already that site."

8. Is it possible in the future to acquire one ECC for one industrial site instead of each company located in that place to acquire ECC?

   "We are open for that preposition, so if PEZA will be coordinating with us then we can consider that possibility. It will also ease the monitoring task of EMB."

REVISION ON THE IMPLEMENTING RULES AND REGULATIONS (IRR) of R.A. 6969

Speaker: Engr. Geri Sanez

According to Engr. Sanex R.A. 6969 is the least appreciated law since 1990. We hope with this revision we may be able to monitor hazwaste in the country and even the dumping of hazwaste from other countries. And they proud to say that they successfully brought back the waste coming from Japan. The Philippines has been the dumping site for so many years, and now we won't allow this to happened again.

R.A. 6969 doesn't ban exportation or importation of chemicals and substances we just gives license or permit its trading. As a matter of fact we still allow import/export of used oil provided it does have PVC while, OECG cannot be exported without local counterparts.

January 15, 2000 was given by the EMB to registered companies generating hazwaste. Since the said date was already lapse the EMB will issue notice of violation, and will conduct surprise visit to non-registered companies. They will be then liable for administrative violation and subject for fines and penalty.

Questions & Answer

1. Since the deadline which is January 15, was already past, is there any incentives for a company who will voluntarily registered inspite of the deadline compare to the company who just registered because they have already inspected?

   "There is no difference because deadline is deadline they are all equally subject for administrative offense. So there is no special discount or any kind of incentives entitled for them. The fine of 50,000 maximum is fix to all."

Q: So therefore we'll just wait and see for EMB people for inspection, which normally took sometimes for them to do so. And so for that period of time companies will continue producing hazwaste.

"We should understand that if the policy of the government is quite poor be a resposible citizen to do what is due and proper on your part. Remember that you people working in this kind of environment will be affected first and then the rest of the nation. Be considerate to the next generation, I know that ruing the environment is free, let them breath the air we used breath then."

2. Is it the same thing if the company will get DENR ID number to your regional office?

   "Yes, it is the same."

   Q: Why is it that we already apply to you regional office in Visayas and yet we haven't receive our ID number."

   "They admit that their database is poor, the system is not yet network nationwide. In that case if the regional office failed, just contact their central office. The process is that when you apply to the regional office, that is the only time they will send your application to us, then to be put in our database. We admit the inefficiency, as a matter of fact they sometimes open their database and the information supplied in the screen was replaced by different symbols. That is how obsolete, the EMB system is aside for more manpower that is needed to accomplished our goals."

3. We understand that you have a requirements for licensing for solid waste transporters. Why is it that you ask for a certain papers specifically the LTO certification and LTO registration requirements and yet when we asked them they don't know about it?

   "So far we haven't strenghten yet the close contact at DOTC/LTO with regards to that matter. We are still enhancing the process and our inter-agency connection with other concern government agencies and department."

Comments about R.A. 6969

Mr. Cecil Corloncito
Environment Consultant
Carmelray Industrial Corporation

1. Hazardous waste need transport permit when transferring from one site to another. While hazardous chemicals does not need transport permit of any movement.
2. There is a problem of distinction between hazardous and non-hazardous. It is not clearly defined it seems that all waste are hazardous.
3. No minimum quantity classification of what constitute hazardous waste.

4. The EMB sole jurisdiction.

GLOBAL TRENDS
By David Nelson - President & CEO
EnviroSearch International
He is a evironmental advisor to many Asian governments. According to him global awareness of the danger of improper hazwaste management is virtually becoming a major problem in every country. The Basel convention recently strenghten the enthusiasm of each country to address environmental problem. Health problems effects severely on many countries especially in Asia & Eastern Europe.

The problem in Asian countries like Philippines are the following
1. Coastal, groundwater, air pollution is increasing.
2. Lack of environmental infrastructure treatment facilities.
3. Not enough emphasis to pollution prevention.
4. Inadequate enforcement of regulations
5. Lack of availability of standardize sampling analysis.

According to him we have to revise ways to protect the environment if your waste is a pollutant production is a defect.

Overview of the Toxic and Hazardous Waste Management Situation and the Initiative to Address the THW in the Philippines

Presented by

Peter Anthony Abaya
Director
ENVIRONMENTAL MANAGEMENT BUREAU

during

4th HAZWASTE PHILIPPINES
CONFERENCE & EXHIBITION
(Former Philippine International Toxic and Hazardous Waste Congress)
8 & 9 February 2000, Dusit Hotel Nikko, Makati City, Philippines

KEYNOTE ADDRESS

Overview of the Toxic and Hazardous Waste Management Situtation and the Initiative to Address the THW in the Philippines

PETER ANTHONY A. ABAYA
Director, Environmental Management Bureau

Introduction

My opening talk for today will focus mainly on the present situation of the Philippine Environment in relation to hazardous waste management. Let me share that the politically correct and internationally accepted term is hazardous waste not toxic waste since toxicity is just one of the characteristics of a waste material or substance to be exhibited to become hazardous. I will also discuss our initiatives, the DENR-EMB, being undertaken to address issues and concerns on hazardous waste management.

I hope that at the end of the day, we would come out here enlightened on the real situation that we are all facing now. It is time that we also focus not only on municipal waste but also on industrial waste. Of the total waste generated nationwide, 40% of it is industrial waste and portions of which is hazardous. A big amount not to be taken for granted.

I. SITUTATION, ISSUES AND CONCERNS

A. Huge amount of industrial hazardous wastes

The EMB Hazardous Waste Tracking System (database) has listed about thirty four (34) million MT of hazardous waste generated nationwide by 700 facilities for the period 1996-1998. This amount is just the tip of the iceberg as there are, at present, 829 firms registered with EMB. But based on the registry of the Board of Investment, there are about 15,000

industries registered and these are all considered potential hazardous waste generators.

B. *Limited number of treatment, storage and disposal (TSD) facilities*

There are only 15 recognized SMEs that recycle, recover and treat hazardous wastes and most are located in Metro Manila and vicinity. Some small quantities are still being exported by MNCs, who has the financial resources, for recovery, treatment and final disposal. This area of hazardous waste management is our priority to assist the regulated community in managing their waste and prevent the potential risks and hazards posed by uncontrolled and illegal dumping of hazardous waste. Investments in this area are highly encouraged because of its potential and the present demand.

C. *Limited number of Waste transporters*

There are 26 transporters currently recognized by EMB and regularly secure permit to transport hazardous wastes for recovery and treatment. Again, definitely not sufficient considering the amount of hazardous waste generated. Business on waste transport is also encouraged to fill in the gap or address the present insufficiency.

D. *Passage of the Republic Act 8749: The Clean Air Act*

This Act has major impact on hazardous waste management because of the Ban on incinerators. There are limited technologies available and expensive, and as a new product, consumer or industrial, that is introduced into the market, a new type of hazardous waste is generated. New treatment technologies for this new type of waste should be studied and researched which entails millions of either dollar or billions of pesos.

E. *Inter-agency Coordination*

There is a need to strengthen coordination with other government agencies like the Bureau of Customs, Department of Trade and Industry – Board of Investment and Bureau of International Trade Relations, Department of Energy in enforcement, monitoring, inspection and harmonization of its policies and guidelines. Harmonization of the Customs and Hazardous Wastes codes and numbers must be done to prevent illegal traffic of hazardous waste.

F. Limited financial and manpower resources in the part of the Government

The Republic Act 6969 was passed without any budget or allocation for more personnel, therefore, full enforcement of the law is not really possible. The EMB can not be blamed if its actions may not be sufficient at times. However, upon further review of the Act, there is a specific provision on the establishment of a Special Fund for monitoring and research. EMB has drafted the necessary guidelines and coordinated with the Department of Budget and Management on how the Special Fund could be included as one of the Budget Items in the Annual General Appropriations Act. Establishment of this Fund is given priority and expected to be in operation within year 2000. With the Fund, compliance monitoring and inspection of the regulated community nationwide will be swiftly and efficiently conducted.

G. Apparent lack of awareness of the common Filipino about the emerging concerns on industrial hazardous waste and its risks to Environment and human health

The sad fact in our country today is that a majority of the population is not aware and conscious of how industrial hazardous waste affects their everyday lives. The term "Industrial Waste" might not seem to have anything to do with them. Ordinary person would only be conscious of

household waste but not much of that entails industrial waste in the manufacturing establishments.

II. INITIATIVES

A. *Promotion of Partnership with the private sector*

We encourage private sector or what we call the "regulated community" to do self-monitoring and regulation. We are currently implementing programs and projects that would support both of us, "Regulator and Regulated Community", in the efficient and effective implementation of RA 6969. Among which are, the Industrial Initiative for Sustainable Environment (IISE) [USAID] and the Private Sector Participation in Managing the Environment (PRIME) [UNDP]. These projects promote the principles and concepts of the Environmental Management System (EMS-ISO 14000 series), Industrial Ecology Centers (closed-loop system), eco-labelling, cleaner production, cleaner technologies, and waste minimization techniques. We encourage you to actively participate and join these projects because we believe that the success of its implementation is through the regulated community's full cooperation. (*ask private sector to look at establishing facility centers as a viable business they may want to invest; talk about the great opportunities. Maybe some form of "Public-Private Partnership" IEMP has initiated and now being continued to be promoted. Cite experience in Malaysia and Thailand).* If Public-Private Partnership is successful in Malaysia and Thailand, it's a big challenge for us to replicate it .

B. *Seek assistance from international funding agencies.*

A JICA Team of Expert is presently in town conducting facility visits and meetings with the stakeholders in relation to our proposed "Industrial Hazardous Waste Management Study" for their consideration. The expected output of the project are [a] National Framework /Master Plan on

Hazardous Waste Management and [b] Establishment (construction and operation) of a Pilot Integrated Treatment, Storage, Recycling/Recovery, and Disposal Facility in the CALABARZON area. Other efforts are existing but still at the exploratory stage like the UNDP Program/Project on the Harmonization of the Regulatory Systems with Special Focus on Hazardous Waste Management.

C. *Improve coordination efforts with different agencies of the Government*

The recent issue of waste dumping or illegal traffic of hazardous wastes from Japan was a good sign of coordination between EMB and the Bureau of Customs. There still yet a need to further strengthen this working relation since Customs has and will be a big help in enforcing RA 6969 especially on the guidelines and procedures to be complied with as the Philippine Commitment to the Basel Convention. Further, we are closely coordinating with the Department of Trade and Industry-Board of Investment and the Bureau of International Trade Relation to ensure that what we are importing are recyclable materials containing hazardous substances and not pure hazardous waste for disposal.

On the other hand, coordination with the Department of Foreign Affairs on other hazardous waste issues that entails diplomatic processes and procedures is regularly and smoothly done. (*Cite that we EMB chair the Technical Working Group of the Philippine Task Force on Hazardous Waste in former US Military Installations [EO 202 signed in 18 January 2000 and member of the Presidential Commission on VFA Implementation [EO 199 signed in 17 January 2000)*

D. *Efforts to hasten the approval of budget of the EMB as a Line Bureau*

In cognizance to the issue in enforcement of RA 6969 both hazardous wastes and toxic substances management that entails more budget and personnel, we (The EMB) has prepared and submitted to DBM the

Comprehensive EMB Organizational Structure that cascades up to the congressional districts. Details on the manpower and financial resources requirements are provided in the submitted document.

E. *Massive Information campaign*

We, the DENR-EMB through the cooperation of other groups, will embark on a campaign to raise the consciousness of the ordinary Filipino citizen. This campaign will encourage waste minimization, recycling and reuse at the consumer level. This campaign will require your cooperation by implementing programs and projects promoting the concept of extended manufacturer's responsibility to address the indiscriminate dumping and disposal of used products considered hazardous i.e. used lead-acid batteries, used oil, used cellular phone batteries, etc.

Finally, we would like to express and extend our appreciation to the organizers or initiators of this 4th Hazwaste Philippines for taking time and putting efforts in convening this with a common goal and objective of protecting the environment through effective implementation of environmentally sound technologies and programs on hazardous waste management. We look forward to a fruitful discussion in this gathering.

Thank you and good day

Revisions on the Implementing Rules and Regulations (IRR) of Reepublic Act 6969

Presented by

Geri Geronimo Sañez
Chief of Hazardous Unit
ENVIRONMENTAL MANAGEMENT BUREAU

during

4th HAZWASTE PHILIPPINES
CONFERENCE & EXHIBITION
(Former Philippine International Toxic and Hazardous Waste Congress)
8 & 9 February 2000, Dusit Hotel Nikko, Makati City, Philippines

REVISIONS ON THE IMPLEMENTING RULES AND REGULATIONS OF REPUBLIC ACT 6969

- Schedule of Fees, Fines and Penalties
- Guidelines and Procedures on the Registration/Licensing of Waste Transporters
- Guidelines for TSD Permitting Procedure
- RA 6969 Special Fund
- Memo Circular or Administrative Order Adopting Annex III of Title III Orientation Manual

Schedule of Fees, Fines and Penalties

- Application and Processing Fee
  - ✓ Registration of Hazardous Waste Generator- DENR Identification Number
  - ✓ Registration/Licensing of Waste Transporters
  - ✓ Registration of Importers of Recyclable Materials
  - ✓ Issuance of Permit to Transport
  - ✓ Issuance of Export Clearance
  - ✓ Issuance of Importation Clearance
- Rates of Fines and Penalties
  - ✓ Administrative Violations
  - ✓ Criminal Violations

Guidelines and Procedures on the Registration/Licensing of Waste Transporters

- Standard specifications of Conveyance
  - ✓ number of units
  - ✓ LTO registration requirements
  - ✓ LTO certification of road worthiness
- Capitalization
- Standard specification of support equipment
- Standard on provision of a Garage
- Required experience in HW handling
- Training ie, emergency/contingency planning
- Insurance requirement
- Accountability Statement

Guidelines for TSD Permitting Procedure

- Environmental Impact Assessment
  - ECC Issuance
- Permitting Requirements
  - PD 984 (Air and Water Quality)
  - RA6969
- Standard Specifications on Design and Construction
- Abandonment Plan

RA 6969 Special Fund

- Processing Fee
- Fines and Penalties
- Inclusion to the General Appropriations Act to become regular budget line item
- Monitoring and research

Memo Circular or Administrative Order Adopting Annex III of Title III Orientation Manual

- Complete listing and characterization of hazardous wastes under DAO 29
  - exception on the quantity of used oil generated
  - official adoption of the standard levels of leachable metals based on TCLP test

Financing In-house and Centralized Toxic and Hazardous Waste Facilities and Equipment

Presented by

Jurgen Orlich
Senior Advise
FILIPINO-GERMAN FINANCIAL CO-OPERATION

during

4th HAZWASTE PHILIPPINES
CONFERENCE & EXHIBITION
(Former Philippine International Toxic and Hazardous Waste Congress)
8 & 9 February 2000, Dusit Hotel Nikko, Makati City, Philippines

Financing of In-house and Centralized Hazardous Waste Treatment Facilities

1. Introduction

In many industrial manufacturing processes hazardous waste also is generated. Treatment and disposal of hazardous waste is very expensive. The damage to the environment and to human health is well known if the waste is simply dumped.

Quite often people think that all problems with hazardous waste would be solved if the industry would only introduce and use "clean technologies". This is of course a fiction. First of all, there is no "clean technology". There are only "cleaner technologies". Secondly, for many processes these cleaner technologies are still not available. Hazardous waste will be generated by the industry also in future. The more a country is industrialized the more it needs a functioning hazardous waste management.

To avoid any misunderstanding, I am promoting cleaner technologies and waste minimization. I only want to point out that in addition and first of all a state of the art final disposal facility is necessary.

For almost all solutions of the hazardous waste complex, money is needed. My paper has the intention to show some options how facilities in the Philippines can be financed.

2. Organization of HW Management

What are the core issues of a reasonable Hazardous Waste Management?

First of all there must be a clear and comprehensive legislation giving answers on:

- What is regarded to be waste and hazardous waste? (Definitions)
- Who is responsible? (Distribution of Responsibilities)
- Where has hazardous waste to be disposed of? (Facilities)
- How has hazardous waste to be handled? (Organizational and technical aspects)

Let's start with the definitions:

What is to be regarded as waste?

a) Subjective definition of Solid Waste:

Solid Waste means any movable articles or material for which their owner wishes to relinquish responsibility by disposal.

Projekt-Consult GmbH
Germany

Center for Environmental Studies
and Management, Philippines

What is to be regarded as waste?

b) Objective definition of Solid Waste:

Solid waste means any movable articles or material which must be removed from their holding place as waste in order to safeguard the common welfare and to protect the environment generally.

Projekt-Consult GmbH
Germany

Center for Environmental Studies
and Management, Philippines

General definition of Hazardous Waste

Hazardous Waste means any waste arising from commercial, industrial, agricultural and other activities which, due to its nature, composition, quantity, or for any other reason is:

- hazardous or potentially hazardous
  - to human health,
  - to plants or animals,
  - to air, soil or water;
- which is explosive, radio-active or flammable;
- which may cause diseases;
- or which my be harmful in any way whatsoever within the overall context of this definition.

projekt consult
Projekt-Consult GmbH
Germany

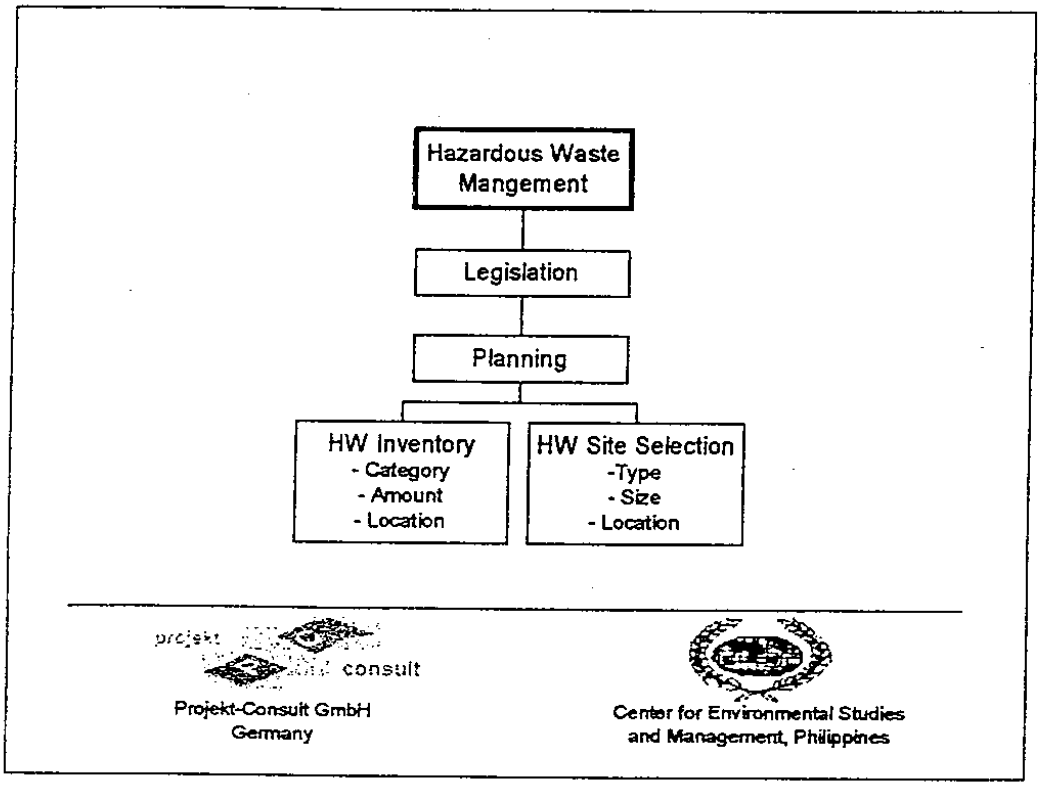
Center for Environmental Studies and Management, Philippines

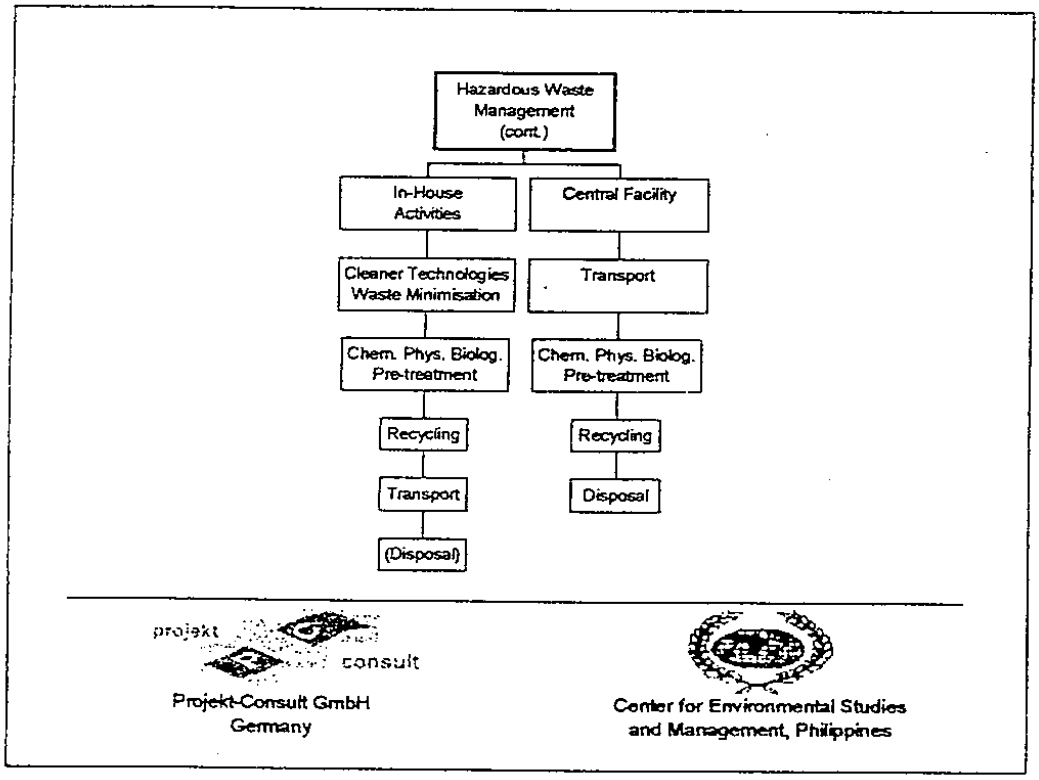
Special definition of Hazardous Waste?

Hazardous Waste means all wastes especially, but not exclusively, falling within the categories listed in the relevant Order issued by the Minister (Secretary) of Environment and which might be amended from time to time when necessary.

projekt consult
Projekt-Consult GmbH
Germany

Center for Environmental Studies and Management, Philippines


Hazardous Waste Mangement
Legislation
Planning
HW Inventory
- Category
- Amount
- Location
HW Site Selection
-Type
- Size
- Location
consult
Projekt-Consult GmbH
Germany
Center for Environmental Studies
and Management, Philippines


Hazardous Waste
Management
(cont.)
In-House
Activities
Central Facility
Cleaner Technologies
Waste Minimisation
Transport
Chem. Phys. Biolog.
Pre-treatment
Chem. Phys. Biolog.
Pre-treatment
Recycling
Recycling
Transport
Disposal
(Disposal)
consult
Projekt-Consult GmbH
Germany
Center for Environmental Studies
and Management, Philippines

3. Financing of Hazardous Waste Treatment Facilities

Considering the scarcity of local resources the easiest way to get funds for hazardous waste facilities, especially for large plants, seems to be through the bilateral and international Donor Institutions. They all have environmental protection, including hazardous waste treatment, as priority field in their programs and there is a shortage of good project proposals.

Unfortunately, when it comes to a project proposal most of the donors see several problems and their decision will depend on several factors.

Some of these factors are:

- insufficient central and local administrative infrastructure,
- insufficient medium and long term planning,
- insufficient solutions for recovering operation and maintenance costs. Most Donors insist that the companies have to pay for the services (polluter pays principle) in order to safeguard sustainability of the investment.

Funds can be made available either from the Donor Institutions directly or indirectly through the Governmental Banks like the Land Bank and the Development Bank of the Philippines. Both Banks have environmental programs. In addition, there are private investors that are willing to construct and to operate hazardous waste treatment and disposals.

I will concentrate on the environmental program of the Development Bank of the Philippines (DBP), because I am working there as advisor. With the program of the Land Bank I am not so familiar.

DBP has an entire program with several environmental projects. The program is policy based.

Development Bank of the Philippines

DBP has an environmental program including the following projects:

- Environmental Management Program (EMP, Sweden)
- Environmental Self-monitoring Program (Sweden)
- Water supply (World Bank)
- Water Supply (Nordic)
- Environmental Infrastructure (EISCP, Japan)
- Industrial Pollution Control (IPCLP, Germany)
- Domestic Shipping Modernization Program (Japan)

Development Bank of the Philippines

The elements of the lending policy of DBP in environmental protection

- Loans with low interest rates
- eligibility criteria for projects
- obligation of the borrower to comply with environmental standards
- willingness of the borrower to implement Environment Management System (EMS)
- obligation of the borrower to report about his environmental performance
- granting technical advisory assistance of experts

The objective of DBP is to improve the entire environmental performance of a borrower company through instruments like introduction of Environmental Management Systems and environmental self-monitoring, over and beyond simply financing acquisition of environmental equipment and facilities. Changing the environmental behavior of an enterprise, its management and its employees is just as important consideration in these policy-based lending facilities.

Development Bank of the Philippines

Eligible projects:

- Water supply
- Municipal waste water treatment
- Municipal solid waste disposal
- Hospital waste treatment
- Industrial waste water treatment
- Industrial air pollution
- Hazardous waste treatment
- Common effluent treatment
- Cleaner technologies (modernization)
- Occupational health and safety

Development Bank of the Philippines

Eligible projects of Hazardous Waste Management:

- Cleaner Technologies (modernization)
- Recycling technologies
- Chemical, physical, biological pre-treatment technologies
- Hazardous waste landfill sites
- Hospital waste treatment
- Industrial waste water treatment
- Common effluent treatment
- Cleaner technologies (modernization)
- Occupational health and safety

Development Bank of the Philippines

Terms and Conditions

Low interest rates

Grace period

Repayment up to 15 years

Technical Assistance

Philippine Company

Integrated Program on Clean Technology

Presented by

Engr. Reynaldo Esguerra
Supervising Specialist
DEPARTMENT OF SCIENCE AND TECHNOLOGY

during

4th HAZWASTE PHILIPPINES
CONFERENCE & EXHIBITION
(Former Philippine International Toxic and Hazardous Waste Congress)
8 & 9 February 2000, Dusit Hotel Nikko, Makati City, Philippines

Department of Science and Technology

A competent and competitive S&T community with a social conscience

Accelerate the development of the country's scientific and technogical capability, and that this will eventually spur productivity of Philippine industries and the marketability of their products

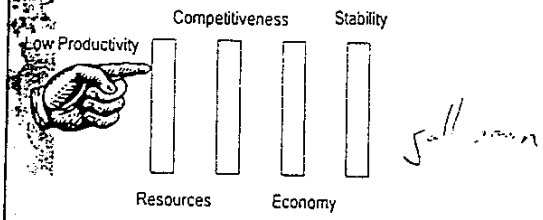
Flagship Programs

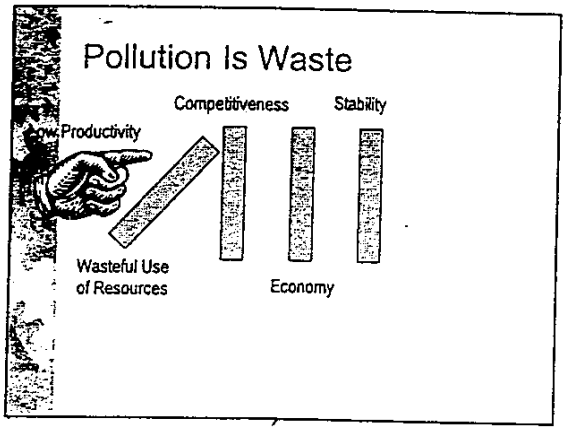
- S&T Program for Mindanao
- Intervention for the Poor, Vulnerable and Disadvantaged
- Expansion of Metrology Centers
- Packaging Research and Development Center
- Virtual Centers for Technology Innovation
- Integrated Program on Clean Technologies

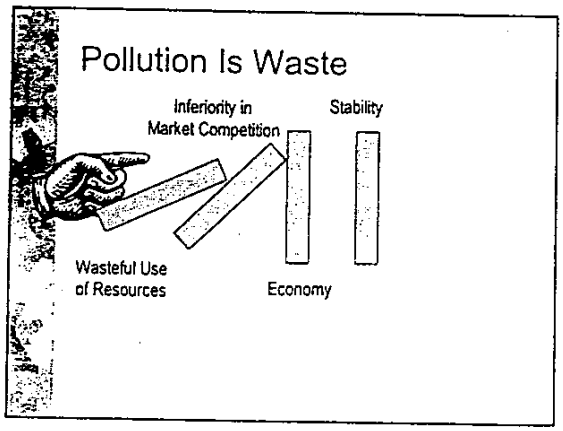
Integrated Program on Clean Technologies

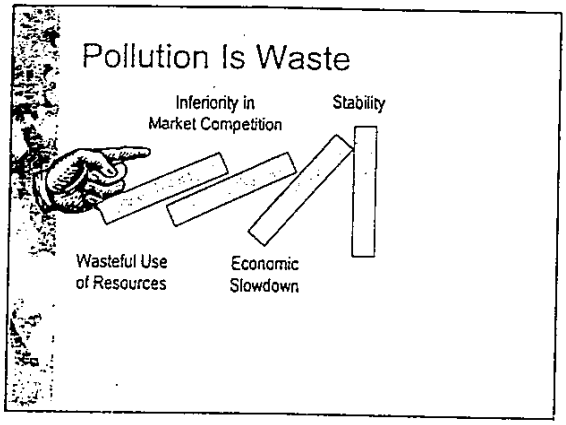
Promote sustainable development and strengthen the competitiveness of Philippine industries through the adoption of clean technologies

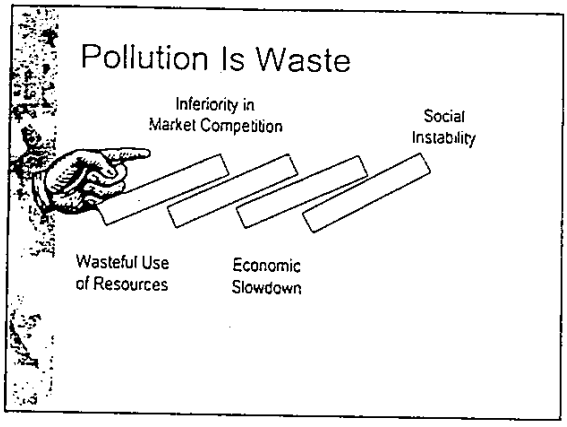
Pollution Is Waste




Pollution Is Waste
Competitiveness
Stability
Low Productivity
Wasteful Use
of Resources
Economy


Pollution Is Waste
Inferiority in
Market Competition
Stability
Wasteful Use
of Resources
Economy


Pollution Is Waste
Inferiority in
Market Competition
Stability
Wasteful Use
of Resources
Economic
Slowdown


Pollution Is Waste
Inferiority in
Market Competition
Social
Instability
Wasteful Use
of Resources
Economic
Slowdown

Business Definition of Waste

Anything other than the minimum amount of equipment, materials, parts, space, and workers' time which are absolutely essential to add value to the product

Cleaner Production Leads to Productivity

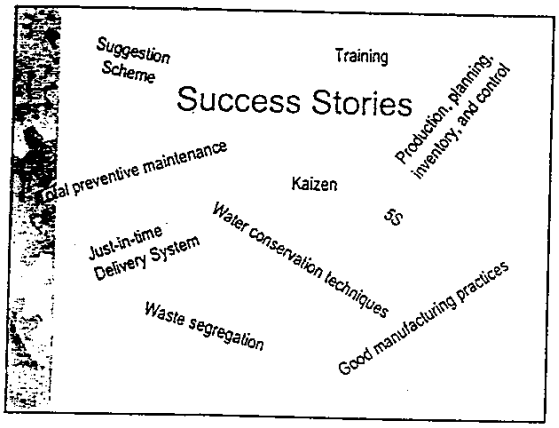
Definition of Cleaner Production

Applying an integrated preventive environmental strategy to processes, products, and services to increase efficiency and reduce risks to humans and the environment

United Nations Environment Programme

Philippine Success Stories

- IEMP = Business for water conservation
- MEIP
- PRIME
- PRRD
- IWED
- GPP



Clean Technology Can Further Increase Productivity and Reduce Wastes

Clean Technology

"any technology or process that uses fewer raw materials and/or less energy, and/or generates less waste than an existing technology or process"

Gerard Keily

Focusing on Clean Technology

& their Evaluation

Provide central direction, leadership, and coordination of scientific and technological efforts and ensure that the results therefrom are geared and utilized in areas of maximum economic and social benefits for the people

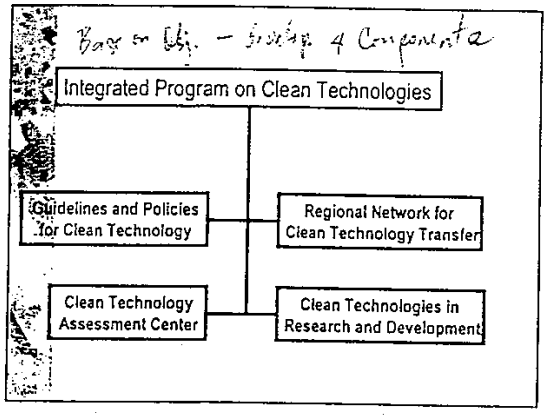
EO 128

Objectives

- Develop guidelines and policies to systematize the promotion of clean technologies in research, development and technology transfer
- Establish support mechanisms primarily for the industrial sector, particularly SMEs, for the identification, evaluation, selection and acquisition of cost-effective technologies for cleaner production

Objectives

- Provide industrial extension services to regional SMEs
- Coordinate and implement research and development on clean technologies
- Assess environmental and economic impacts of adopting clean technologies



Guidelines and Policies for Clean Technologies

- Environmental performance indicators
- CP/EMS in SMEs
- Integrating CP in R&D
- Protocols for environmental technology verification
- Industry and Technology Needs Prioritization

5

Clean Technology Assessment Center

- Clean technology assessment
- Info center of verified technologies
- Training
- Technical Support
- Business plan

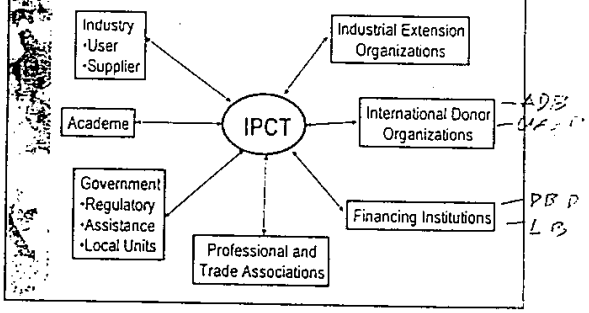
Regional Network for Clean Technology Transfer

- Clean technology promotion
- Cleaner production assessment
- Feasibility analysis preparation
- Training
- Documentation of environmental requirements

Clean Technologies in Research and Development

- Resource recovery
- Clean process
- Material substitution
- Reverse engineering
- EPI MONITORING

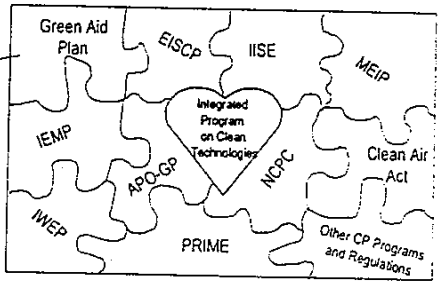
Participation of Stakeholders



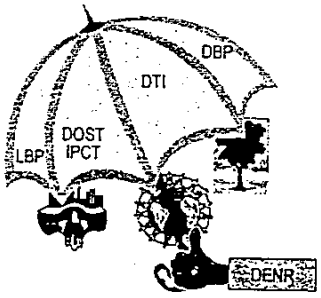
6

Partnership with DBP

Complementing Past, Present and Future Programs/Projects



Promote and Enable Voluntary Industry Initiatives



共和国法律６９６９

－毒性物質及び有害・核廃棄物管理法－

（有害廃棄物関係のみ抜粋）

第２条　政策の表明

健康又は環境に対して不当なリスク及び／又は危害を呈する化学物質及び混合物の輸入、製造、加工、販売、流通、使用及び廃棄を規制、制限又は禁止すること；いかなる目的のためであっても、フィリピンの領土内への有害・核廃棄物の通過を含む搬入、及び同領土内でのそれらの廃棄を禁止すること；また毒性化学品に関する研究及び調査を促進しかつ円滑化することが、この国の政策である。

第３条　範囲

本法律は、いかなる目的のためにも国内への有害・核廃棄物の通過を含む搬入、保管もしくは貯蔵及び廃棄を含めて、フィリピンにおいて規制されていない全ての化学物質及び混合物の輸入、製造、加工、取扱い、貯蔵、輸送、販売、流通、使用及び廃棄に適用するものとする。

第４条　目的

本法律の目的は次の通りである：

（ａ）、（ｂ）、（Ｃ）　＝略＝

（ｄ）いかなる目的であっても、この国への有害・核廃棄物の通過を含む搬入、並びに保管もしくは貯蔵及び廃棄を防止すること。

第５条　定義

本法律で使用されるものとして：

（ａ）、（ｂ）、（Ｃ）、（ｄ）、（ｅ）、（ｆ）　＝略＝

（ｈ）「有害廃棄物」とは、この法律では、何らの安全な商業的、工業的、農業的又は経済的な利用法もなく、そして投棄又は処分のために発生国からフィリピンの領土のいずれかの場所に、または一時的にフィリピンの領土のいずれかの場所を経由して、出荷され、輸送され又は持ち込まれる物質、として定義される。

「有害廃棄物」とはまた、副産物、副生物、プロセス残渣、使用済みの反応媒体、汚染されたプラントもしくは機器又は製造行程から出るその他の物質、並びに最終製品の消費者廃棄物をいうものとする。

第６条環境・天然資源省の任務、権限及び責任

環境・天然資源省は次の任務、権限及び責任を課された施行機関であるものとする：

（ａ）（ｂ）（Ｃ）（ｄ）（ｅ）（ｆ）（ｇ）　＝略＝

（ｈ）国内への有害・核廃棄物の通過も含む搬入、並びに同国内へのぞれらの廃棄物の処分を監視及び防止すること；

（ｉ）（ｊ）　＝略＝

（ｋ）健康と環境に対する化学物質、混合物及び廃棄物の影響に関して、情報を普及させ、かつ教育的な認識向上活動を実施すること

第１３条　禁止される行為

次の行為及び不作為は違法とみなされるものとする：

（ａ）（ｂ）（Ｃ）　＝略＝

（ｄ）何らかの量の有害・核廃棄物を陸上輸送、航空輸送、海上輸送により、あるいはフィリピンのいずれかの場所に貯蔵することにより、海上経済水域を含むフィリピン領土へ通過を含めて貯蔵、輸入又は搬入することを直接又は間接的に引き起こし、援助し又は容易にすること。

第１４条　刑事犯罪及び処罰

（ａ）　＝略＝

（ｂ）(i) 本法律の第１３条（ｄ）項に違反する者には、１２年と１日から２０年までの禁固の刑が課されるものとする。犯罪者が外国人であれば、その者はその者の刑に服した後、国外追放され、そしてその後のフィリピンへの入国を禁じられるものとする；

(ii) 株式会社又は他の共同団体の場合には、少なくとも５００，０００ペソの懲罰的損害賠償に加えて、その経営組合員、社長又は最高幹部経営者に上記の処罰が課されみものとする。それが外国企業であれば、フィリピンで事業を行うことの許可の取消しに加えて、このような企業の経営者と全役員はフィリピンへの入国を禁じられるものとする；

(iii) 犯罪着が政府の官吏又は公務員である場合には、その者は、上記の処罰に加えて、自動的に免職され、かつ選挙又は指名によるいかなる役職に就く資格をも永久に失ったとみなされるものとする。

（ｃ）　＝略＝

（ｄ）有害・核廃棄物のこの国への搬入又は輸入について責任のある者又はそれに関係のある者又は企業は、それらの禁止されている廃棄物を輸送又は返送することを義務付けられるものとする。

何らかの顕著な量の有害廃棄物又は核廃棄物のフィリピンへの輸送又はフィリピンでの貯蔵のために使用された可能性のある全ての施設及び付属物含む全ての輸送手段は、政府の選択に基づいて没収されるものとする。

第１５条　行政罰金

本法律の第１６条（規則及び規制の公布：略）に従って正式に公布及び公表された施行規則及び規制の違反を含む、本法律の違反の全ての場合に、環境・天然資源長官は、これにより、その違反の罪があると認定された者又は事業体に１０，０００ペソ以上５０，０００ペソ以下の罰金を課する権限を与えられる。環境・天然資源省により課され、徴収された行政罰金は、もっぱら、毒性物質及び混合物に関連のあるプロジェクトと研

究活動のために同省により運営される特別基金に繰り入れられるものとする。

上院法案 N0.２５５と下院法案 No.２５１９４を統合したものである本法律は、１９９０年９月６日に上下両院により最終的に可決され、同年１０月２６日フィリピン共和国大統領 C.C. AQUINO によって署名された。

共和国法律６９６９の施行規則及び規制

ＴＩＴＬＥ　Ｉ．　一般規定と行政手続き

ＣＨＡＰＴＥＲ　Ｉ．　一般規定

第２条　政策の表明

健康又は環境に対して不当なリスク及び／又は危害を呈する化学物質及び混合物の輸入、製造、加工、販売、流通、使用及び廃棄を規制、制限又は禁止すること；いかなる目的のためであっても、フィリピンの領土内への有害・核廃棄物の通過を含む搬入、及び同領土内でのそれらの廃棄を禁止すること；また毒性化学品に関する研究及び調査を促進しかつ円滑化することが、この国の政策である。

第３条　範囲

これらの規則及び規制は、いかなる目的のためにも国内への有害・核廃棄物の通過を含む搬入、保管もしくは貯蔵及び廃棄を含めて、フィリピンにおいて規制されていない全ての化学物質及び混合物の輸入、製造、加工、取扱い、貯蔵、輸送、販売、流通、使用及び廃棄に適用するものとする。

第４条　解釈

これらの規則及び規制は、健康又は環境に対して不当なリスク及び／又は危害を呈する化学物質及び混合物の輸入、製造、加工、販売、流通、使用及び廃棄を規制、制限又は禁止すること；いかなる目的のためであっても、フィリピンの領土内への有害・核廃棄物の通過を含む搬入、及び同領土内でのそれらの廃棄を禁止すること；また毒性化学品に関する研究及び調査を促進しかつ円滑化するという国の政策を実施するために自由に解釈される。

第６条　定義

次の語句は、これらの規則及び規制において使用されるとき、前後の関係により明らかに他の意味を示唆するのでない限り、次の意味を持つものとする：

１．、２．、３．、４．、５．、６．、　＝略＝

７．「有害廃棄物」とは、この法律では、何らの安全な商業的、工業的、農業的又は経済的な利用法もなく、そして投棄又は処分のために発生国からフィリピンの領土のいずれかの場所に、または一時的にフィリピンの領土のいずれかの場所を経由して、出荷され、輸送され又は持ち込まれる物質、として定義される。

「有害廃棄物」とはまた、副産物、副生物、プロセス残渣、使用済みの反応媒体、汚染されたプラントもしくは機器又は製造行程から出るその他の物質、並びに最終製品の消費者廃棄物をいうものとする。

８．　＝略＝

９．「不活性廃棄物」とは、埋立場に置かれたときに、汚染又は公衆の健康及び安全に対する危険有害性を引き起こす程の物一理的、化学的及び／又は生物的変化を受けないことが正当に予期される何らかの廃棄物をいう。

１０．、１１．、１２．　＝略＝

１３．「占有者」とは、有害廃棄物を受領、生産、発生、貯蔵、処理、再生利用、再加工、加工、製造又は廃棄するための免許を持たなければならない者である。

１４．「許可」とは、次の活動のいずれかまたはすべてに従事し、又は実施するための法的な承認をいう：

ａ．　＝略＝

ｂ．有害廃棄物…貯蔵、処理、輸送、輸出、加工、再加工、再生利用及び廃棄

ｃ．　＝略＝

１５．　＝略＝

１６．「汚染」とは、フィリピンの何らかの水、大気及び／又は土地資源の物理的、化学的、生物的性質の何らかの変化、またはそれらの資源への何らかの液状、気体状もしくは固体状廃棄物の何らかの排出、または不必要な騒音の何らかの発生、または不快な臭気の何らかの放出をいい、それは、公衆の健康、安全もしくは福祉に対して有害な水、大気及び／又は土地資源を作り出すか、またはそれらに対して有害なものにするような、またはその可能性が大きいようなものであり、あるいは家庭用、工業用、農業用、娯楽用もしくはその他の正当な諸目的のためのそれらの利用に悪影響を与えるものである。

１７．、１８．、１９．、２０．　＝略＝

２１．「廃棄物発生者」とは、何らかの商業、工業又は貿易活動を介して有害廃棄物を発生又は生産する者をいう。

２２．「廃棄物輸送業者」とは、有害廃棄物を輸送することを免許されている者をいう。

２３．「廃棄物処理業者」とは、有害廃棄物を処理、再生利用又は処分することを免許されている者をいう。

２４．　＝略＝

ＣＨＡＰＴＥＲ　ＩＩ．　行政規定

第７条　環境・天然資源省の権限と任務

環境・天然資源省は下記の任務、権限及び責任を課させるものとする：

ａ)、ｂ)、ｃ)、ｄ)、ｅ)、ｆ)、ｇ)　＝略＝

ｈ）フィリピンへの、有害・核廃棄物の通過を含む搬入及びその処分を監視及び防止すること；

ｉ)、ｊ)　＝略＝

ｋ）健康と環境に対する化学物質、混合物及び廃棄物の影響に関して、情報を普及させ、かつ教育的な認識向上活動を実施すること；及び

ｌ)　＝略＝

第８条　長官の権限と任務の委任

１．　＝略＝

２．長官は次のことを行うための権限を委任することができる：

ａ．　＝略＝

ｂ．有害廃棄物が発生、貯蔵、加工、再加工、再生利用、処理及び／又は廃棄されている施設の査察を実施し、かつ関係のある適切な当局に勧告を行うこと；

ｃ．化学物質ならびに有害・核廃棄物の輸送のために使用さていると考えられる、又は使用される可能性が大きいと考えられる乗物又は船舶を、本規則及び規制の関係する諸規定に従って、停止、拘留、査察、検査又は査察及び検査のために適当な場所に移動させること；

ｄ．フィリピンへの、有害・核廃棄物の通過を含む搬入及びその処分を監視及び防止すること；

ｅ．　＝略＝

３．　＝略＝

第９条　環境保護管の義務と責任

環境保護官は、次の義務と責任があるものとする：

ａ．　＝略＝

ｂ．化学物質又は有害廃棄物が使用、製造、貯蔵、加工、再加工、発生、処理又は廃棄されていると正当に考えられる施設に立ち入り、次のことを行なうことができる。

ｉ．本規則及び規制の関係のある諸規定の適用を受ける調査及び試験用化学物質の資料を環境保護管に提出させるため、支払いなしに受け取ること又は占有者もしくは施設の管理者か化学物質の所有者に要求すること；

ii.、iii.　＝略＝

ｃ．省の必要な許可なしに、化学物質及び有害廃棄物輸送のために使用されている又は使用されているらしいと考える、いかなる乗物又は船舶を停止、拘束、査察、調査及び調査のために適当な場所に移動すること。

ｄ.、ｅ．　＝略＝

ＣＨＡＰＴＥＲ　ＩＩＩ．　省庁間技術諮問会議　＝略＝

ＴＩＴＬＥ　ＩＩ　有害化学物質　＝略＝

ＣＨＡＰＴＥＲ　ＩＶ．　化学物質リスト
ＣＨＡＰＴＥＲ　Ｖ．　試験規定
ＣＨＡＰＴＥＲ　ＶＩ．　免除

ＴＩＴＬＥ　ＩＩＩ．　有害・核廃棄物

ＣＨＡＰＴＥＲ　ＶＩＩ．　有害廃棄物

第２４条　政策

１．いかなる目的であっても、フィリピンの領土内への有害廃棄物の通過を含む搬入及び処分を禁止することが本省の政策であるものとする。

２．本省は、次の優先順位で推進することにより、国内で発生する有害廃棄物の適正な管理を促進する：

ａ）．有害廃棄物の発生の最少化；

ｂ）．有害廃棄物の再生利用及び再利用；

ｃ）．有害廃棄物を無害にするための処理；

ｄ）．不活性の有害廃棄物残渣の埋立処分

３．有害廃棄物を次のことを引き起こさない、又は潜在的に引き起こさないような方法で管理するものとする：

ａ）．汚染；

ｂ）．公衆の健康、福祉及び安全に対し危険を呈する状態；

ｃ）．動物、鳥、野生生物、魚又はその他の水生生物に対する危害；

ｄ）．植物及び植生に対する危害；又は

ｅ）．環境の一部分の有益な利用に対する制限。

４．廃棄物発生者は有害廃棄物の適正な管理及び処分について責任があるものとする。

５．廃棄物発生者はその者の有害廃棄物の適切な貯蔵、処理及び処分のための費用を負担するものとする。

第２５条　有害廃棄物の分類

１．表１にリストされる廃棄物のクラス及びサブカテコリーは、本規則及び規制の目的のために有害廃棄物として規定されるものとする。

２．表２にリストされる種類の廃棄物は、本規則及び規制の諸規定から免除されるものとする。

３．表１と表２のリストは包括的なものではなく、そして定期的な見直しの対象になるものとする。

TABLE 1. PRESCRIBED HAZARDOUS WASTES

Class	Sub-category	Waste Number
Plating Wastes	Discarded plating solutions and salts with a cyanide concentration of less than 200 ppm.	A101
	Discarded heat treatment solutions and salts with a cyanide concentration of less than 200 ppm.	A102
	Plating solutions and salts containing cyanides at a concentration exceeding 200 ppm.	A103
	Heat treatment solutions and salts containing cyanides at a concentration exceeding 200 ppm.	A104
	Complexed cyanide solutions and salts	A105
	Other cyanide wastes arising from the plating and heat treatment industries	A199
Acid Wastes	Sulfuric Acid	B201
	Hydrochloric Acid	B202
	Nitric Acid	B203
	Phosphoric Acid	B204
	Hydrofluoric Acid	B205
	Mixture of Sulfuric and Hydrochloric Acid	B206
	Other inorganic acids	B207
	Organic acids	B208
	Other mixed acids	B299
Alkali Wastes	Caustic soda	C301
	Potash	C302
	Alkaline cleaners	C303
	Ammonium Hydroxide	C304
	Lime slurries	C305
	Lime-neutralized metal sludges	C306
	Other alkaline materials	C399
Inorganic Chemical Wastes	Non-toxic salts	D401
	Arsenic and its compound	D402
	Boron compounds	D403
	Cadmium and its compounds	D404
	Chromium compounds	D405
	Lead compounds	D406
	Mercury and mercuric compounds	D407
	Other salts and complexes	D499
Reactive Chemical Wastes	Oxidizing agents	D501
	Reducing agents	D502
	Explosive and unstable chemicals	D503
	Highly reactive chemicals	D599
Paints/ Resins/ Latices/inks/ Dyes/Adhesives/ Organic Sludges	Aqueous-based	E601
	Solvent-based	E602
	Other mixed	E699

Organic Solvents	Flash point>61°C	F701
	Flash point<61°C	F702
	Chlorinated solvents and Residues	F703
Putrescible/ Organic Wastes	Animal/abattoir wastes	G801
	Grease trap wastes from industrial or commercial premises	G802
	Others	G899
Textile	Tannery wastes	H901
	Other textile wastes	H999
Oil	Waste oils	I101
	Interceptor sludges	I102
	Vegetable oils	I103
	Waste tallow	I104
	Oil/water miixtures	I105
Containers	Portable containers previously containing toxic chemical substances	J201
Immobilized Wastes	Solidified and polymerized wastes	K301
	Chemically fixed wastes	K302
	Encapsulated Wastes	K303
Organic Chemicals	Aliphatics	L401
	Aromatics and phenolics	L402
	Highly odorous	L403
	Surfactants and detergents	L404
	Halogenated solvents	L405
	Polychlorinated biphenyls and related materials	L406
	Other organic chemicals	L499
Miscellaneous Wastes	Pathogenic or infectious wastes	M501
	Asbestos Wastes	M502
	Pharmaceutical wastes and drugs	M503
	Pesticides	M504

TABLE 2. EXEMPTED WASTES

DESCRIPTION
Garbage from domestic premises and households
Industrial and commercial wastewaters which are disposed of on-site through the sewage system
Industrial and commercial solid wastes which do not contain prescribed hazardous wastes as identified in Table 1.
Materials from building demolition except asbestos
Septic tank effluents and associated sullage wastewaters.
Untreated spoils from mining, quarrying and excavation works but not materials in the nature of tailings, commercially treated materials and mine facility consumables.

第２６条　廃棄物発生者

１．全ての廃棄物発生者は次のことを行うものとする。

ａ）発生した廃棄物の種類と量を、本省により承認され様式方法に従って本省に、規定料金の支払いを伴って届け出る：

ｂ）．発生、生産又は外部に輸送した有害性廃棄物の種類と量を含む情報、および必要であるようなその他の情報を、年４回、本省に提出する。

２．廃棄物発生者は、施設内で発生又は生産した有害廃棄物が、既に処理、再生利用、再加工又は処分されたものとして廃棄物処理業者により証明されるまでは、有害性廃棄物を所有し続け、かつ責任があるものとする。

３．廃棄物発生者は、化学物質及び／又は有害廃棄物が関係する漏出及び事故を軽減しまたそれらと戦うための包括的な偶発緊急事故対応計画を策定し、本省に提出するものとする。これらの計画は本省により発行されたガイドラインの内容に従うものとする。

４．廃棄物発生者は次に関しその者の要員及びスタッフを教育訓練する責任があるものとする：

ａ）．第２６条３項に基づき要求される計画の実施；

ｂ）．化学物質及びその容器の不適正な取扱い、貯蔵、輸送及び使用により呈される有害性。

第２７条 廃棄物輸送業者

１．有害廃棄物の輸送は、本省からの事前許可が得られない限り、許されないものとする。

２．有害廃棄物を輸送するための許可の発行又は修正のための申請は、本省により承認された様式と方法に従って行われ、かつ規定料金の支払いを伴うものとする。

３．本省は廃棄物輸送業者の登録簿を維持するものとする。

４．廃棄物発生者は有害廃棄物を輸送するために、本省により正式に承認された廃棄物輸送業者のみを使用するものとする。

第２８条　廃棄物輸送記録

１．廃棄物輸送記録は、本省によって定められた様式であるものとし、次の細目を記載するものとする：

ａ）．廃棄物発生者の名称と所在地；

ｂ）．有害廃棄物の積荷を輸送するために使用された廃棄物輸送業者の名称；

ｃ）．廃棄物輸送車の登録番号；

ｄ）．廃棄物輸送業者の廃棄物処理免許；

ｅ）．表１に記載されたクラスとサブカテコリーを含む、有害廃棄物の輸送業者の記述；ｆ）．輸送された有害廃棄物の量；

ｇ）．輸送中に使用された容器の種類；

ｈ）．有害廃棄物の通過中継場所及び最終的仕向先の名称と所在地；及び

ｉ）．仕向先における、有害廃棄物の処理、貯蔵、再生利用、加工、再加工又は処分のための意図する方法。

２．有害廃棄物の輸送前に、廃棄物発生者は定められた様式に廃棄物発生者に関する部分

を２通記入し、規定料金の支払いを伴って、本省に提出するものとする。

３．廃棄物発生者は、廃棄物輸送記録のコピーを、本省が受領した日から２４カ月の期間、保存し、保管するものとする。

４．有害廃棄物の輸送前に、廃棄物輸送業者は、定められた様式における廃棄物輸送業者に関する部分を２通、記入するものとする。

５．廃棄物輸送業者は、廃棄物輸送記録のコピーを廃棄物輸送車の運転室に備えるものとする。

６．廃棄物処理、貯蔵、再生利用、再加工、加工又は処分施設への到着の際に、廃棄物輸送業者は、廃棄物輸送記録のコピーを廃棄物処理業者に引き渡すものとする。

７．廃棄物輸送記録を受領したとき、廃棄物処理業者は次のことを行うものとする。

ａ）．有害廃棄物の廃棄物記述の正確性を確認する；

ｂ）．廃棄物輸送記録における廃棄物処理業者についての部分を記入する；

ｃ）．完成した廃棄物輸送記録を有害廃棄物の受領後２４ヵ月の期間、保存し保持する。

８．有害廃棄物のデータが不正確である場合には、廃棄物処理業者は直ちに、正当な期間内にこのような不正確性について廃棄物発生者に通知するものとする。廃棄物処理業者は、このような有害廃棄物の受入れがその者の施設の操業において何らかの危険又は害を引き起こすおそれがある場合には、このような受入れを拒否する権利を持つものとする。

９．有害廃棄物が処理、貯蔵、輸出、再生利用、再加工、加工又は廃棄のために廃棄物処理業者によって受け入れられる場合には、廃棄物処理業者は廃棄物発生者に対しその有害廃棄物の受入れを書面により保証するものとする。

10．廃棄物処理業者は、第２８条９項に基づき要求される保証書を５日以内に本省に送付し、そのコピーを廃棄物発生者に与えるものとする。

１１．有害廃棄物の輸送が、環境へのその有害廃棄物の漏出又は放出をもたらす事故に関連する限り、廃棄物崎送業者は直ちにその漏出を封じ込め、かつ本省に届け出るものとする。

第２９条　有害廃棄物の貯蔵および表示

１．有害廃棄物の貯蔵のための容器、コンテナー及びタンクは明瞭に表示され、かつ、この表示は次の明細を含むものとする：

ａ）．表１に示されるような、有害廃棄物のクラス；

ｂ）．表１に示されるような、有害廃棄物のサブカテゴリー；

ｃ）．表１に示されるような廃棄物番号；

ｄ）．廃棄物発生者の名称と所在地；

ｅ）．最大容量又は最大容積。

２．第２９条１項に定められる容器、コンテナー及びタンクの表示は、ペンキ、転写印刷又はその他の永久的なマーク形式により目立つようにマークされるものとする。

第３０条　廃棄物の処理及び処分施設

１．表３に規定されるような施設内で行われかつ本省により許可されない限り、いかなる

廃棄物処理業者も、有害廃棄物を受け入れ、貯蔵、処理、再生利用、再加工又は処分をしないものとする。

TABLE 3. PRESCRIBED WASTE TREATMENT PREMISES

Category	Description
A	Premises that conduct on-site disposal of hazardous wastes generated or produced at the premises through industrial or commercial processes and activities other than disposal via sewer.
B	Commercial or industrial hazardous waste incinerators.
C	Landfills, dumps or tips that accept hazardous waste for disposal
D	Premises that recycle or reprocess hazardous waste which were not generated or produced at that premise
E	Premises that immobilize, encapsulate, polymerize or treat hazardous wastes which were not generated or produced at that premise
F	Premises that store hazardous wastes, which were not generated or produced at that premise for periods exceeding 30 days.

2．本条に基づく許可の発行又は修正のための申請は、本省により承認された様式及び方法に従って行われ、かつ規定料金の支払いを伴い、また、本省により要求されることがある計画書、明細書とその他の情報、及びそれらの要約を添付するものとする。
3．本省は廃棄物処理業者の登録簿を維持するものとする。

第３１条　有害物質の輸入及び輸出

1．有害物質をフリピンへ輸入、又は輸出しようとする者は、本省からの書面による事前承認を申請し、取得しなければならない。
2．第３１条１項に基づいて行われる申請は、本省により承認された様式及び方法によって行われ、かつ規定料金の支払いを伴うものとする。
3．本省は、承認された許可に適合しない輸入された有害物質を差し押え、有害物質をその発生地点へ返送し、かつ破った費用を回収するための手続を開始するものとする。

ＣＨＡＰＴＥＲ　ＶＩＩＩ．　核廃棄物　＝略＝

ＴＩＴＬＥ　ＩＶ．　一般条項　＝略＝

ＣＨＡＰＴＥＲ　ＸＩ．　許可規制

第３８条　有害・核廃棄物に対する規定料金

１．本省は次に関する妥当な料金を定めを：。

ａ）．廃棄物発生者の登録；

ｂ）．廃棄物輸送業者の許可；

ｃ）．廃棄物処理業者の許可；

ｄ）．有害物質の輸出入の承認；

ｅ）．廃棄物輸送記録

２．本省は料金基準及び料金基準の改訂を官報又は一般に配布している新聞に公表するものとし、それは公表１５日後に発効すみものとする。

ＣＨＡＰＴＥＲ　Ｘ．記録、報告書及び届出書の公衆にこよる閲覧、ならびに情報の秘密保持　＝略＝

ＴＩＴＬＥ　Ｖ．　禁止行為と罰則　＝略＝

ＣＨＡＰＴＥＲ　ＸＩ．　禁止行為

ＣＨＡＰＴＥＲ　ＸＩＩ．　罰則

ＴＩＴＬＥ　ＶＩ．　最終条項　＝略＝

別添 6

Jetro

フィリピン環境事情

２０００年５月１７日
ジェトロマニラセンター
飛騨　俊秀

１．フィリピンの環境政策

(1)法制度

フィリピンにおいては、１９７７年にＰＤ(Presidential Decree,大統領令) １１５１号とＰＤ１１５２号の二つの環境法が制定されている。

ＰＤ１１５１号は「フィリピン環境政策」で、環境政策の理念、政府の責任等について規定しており、その第４条で**環境影響評価制度**（後述）を制定している。

ＰＤ１１５２号は「フィリピン環境法典」で、ＰＤ１１５１号を受けて、**大気、水質、土地利用、天然資源、廃棄物**の５分野についての管理制度を規定している。

これらの大統領令は、マルコス大統領時代の旧憲法下で制定されたものであるが、アキノ大統領がその後１９８７年に制定した新憲法（注１）下でもそのまま引き継がれている。

（注１）「フィリピン共和国憲法」（８７年２月１１日発効）

第２条第１６節において「自然と調和した望ましい生態環境に対する国民の権利は保障される」と規定されており、いわゆる「環境権」が明確化されている。

この他第１２条第３節の国土利用、第１３条第４節の農地改革においても環境問題に留意する旨の規定がある。

その他、環境保護に関連する主な法律等として以下のものが挙げられる。

・１９７６年ＰＤ９８４号「国家公害規制命令」

規制の全分野に関して公害防止の一般的な枠組みを規定。

国家公害規制委員会（ＮＰＣＣ；National Pollution Control Commission）の設置を規定しているほか、産業廃棄物を含む廃棄物の処理と廃棄についても規定している。

・ＰＤ１０６７号「水質保全法」

水資源の利用、開発及び保護に関する法律をまとめたもの。

・ＰＤ９７９号「海洋汚染防止法」

海の汚染防止に関する事項を規定。

・ＰＤ８２５号「ごみ処理法」

ごみの不適切な処理及びその他の不潔な行為に関する罰則を規定。

・１９９０年ＲＡ（Republic Act, 共和国法）６９６９号「有害物質及び有害・核廃棄物規制法」

有害化学物質の利用、輸入及び処理、有害廃棄物・核廃棄物の処理等に関する法律。

・ＰＤ１５８６号「環境影響評価システム法」
　環境上安全なプロジェクトの承認手続きを規定。
・ＲＡ７５８６号「国家総合保護地域システム」
　自然保護地域設定を規定。
・ＲＡ８７４９「１９９９年フィリピン大気浄化法」
　大気汚染の防止を目的に、固定排出源（焼却炉を含む）、自動車、燃料等について規制。

(2) 行政組織

フィリピンにおける環境行政に関しては、１９８７年に設立された**環境天然資源省**（ＤＥＮＲ；Department of Environment and Natural Resources）が中心的役割を担っている。また、その内部機関である**環境管理局**（ＥＭＢ；Environmental Management Bureau）が環境規制の中心的役割を果たし、さらに環境影響評価制度等の実施機関となっている。

ＥＭＢとならぶ重要な組織として、**ラグナ湖開発公社**（ＬＬＤＡ；Laguna Lake Development Authority）が存在する。ＬＬＤＡは、ラグナ湖地域（注２）の天然資源確保、環境保護のための総合調査、開発計画立案等を実施する機関として設置された機関であり、本地域内の土地及び水に関する強大な権限を有している。ＬＬＤＡは、当初は国家経済開発庁の下部機関として設立されたが、現在ではＤＥＮＲの一組織となっている。

（注２）ラグナ・ド・ベイ地域
　ラグナ湖に流入する河川の集水域全域でその広さは約４，８００ｋｍ２に及ぶ。
　具体的には、リサール州、ラグナ州、サン・パブロ市、パサイ市、カルーカン市、ケソン市、マニラ市、タガイタイ市、バタンガス州のタナウアン町、同セントトーマス町、同マルバー町、キャビテ州のシラング町、同カーモナ町、ケソン州のルクバン町、メトロマニラのマリキナ町、同パシグ町、同タグイグ町、同ムンティルンパ町、同パテロス町を指す。

なお、各規制の具体的な所管及び担当者は、以下のとおりである。ただし、実際の規制当局は、通常、ＬＬＤＡ管轄地域はＬＬＤＡ、その他地域ではＤＥＮＲ地方事務所や地方自治体である。

①水質汚濁

Engr. Nicanor Mendoza
Chief, Water Quality Management Section, EMB
tel (63 2) 426-4332　fax (63 2) 426-4335

②大気汚染

Engr. Casar Siador
Chief, Air Quality Management Section, EMB
tel (63 2) 426-4332　fax (63 2) 426-4335

③廃棄物処理

・都市ごみ（Municipal solid waste）

Mr. Albert A. Magalang

Project Management Office, Presidential Task Force on Waste Management, EMB

tel（63 2）426-2534　fax（63 2）924-7540

・産業廃棄物（一般）

Engr. Erliada Gonzales

Chief, Environmental Quality Division, EMB

tel（63 2）426-4332　fax（63 2）426-4335

・有害廃棄物

Ms. Angelita Brabante

Chemicals and Waste Management section, EMB

tel（63 2）928-3773　fax（63 2）928-3675

又は

Mr. Geri Geronimo R. Sanez

Chief, Hazardous Waste Mnagement Section, EMB

tel（63 2）436-0614　fax（63 2）928-3675

(3) 環境影響評価書制度

環境影響評価書（ＥＩＳ；Environment Impact Statement）制度は、上述のＰＤ１１５１「フィリピン環境政策」第４条によって規定された制度であり、その詳細はＰＤ１５８６号「環境影響評価書制度法」及びＤＥＮＲ　ＡＯ９６－３７「環境影響評価書制度施行令」で規定されている。

本制度は、公社を含む全ての政府機関、民間団体、企業に対し、環境に影響を与える一定の活動、プロジェクト、事業を実施するにあたって、事前に**環境適合証**（ＥＣＣ；Environmental Compliance Certificate）の取得を義務付けるものであり、事業者はＥＣＣを取得できない場合には、当該事業を実施に移せないことになっている。

ＥＣＣ取得のための申請方法には以下の３種類がある。

①環境に対する影響が軽微なもので、事業規模が従業員２０人以下、資本金５０万ペソ以下のもの。州政府が認可できる。

②環境的に重要な地域（ＥＣＡ；Environmentally Critical Area）でのプロジェクト

国立公園、マングローブの育成地域、水源地等の指定された１２の地域における事業で、事業者は**初期環境調査**（ＩＥＥ；Initial Environmental Examination）を添付してＤＥＮＲの管轄各地方事務所に申請する必要がある。

本件については、ＤＥＮＲの各地方事務所が認可権限を持っているが、場合によってはこのＩＥＥに代えてＥＩＳ（後述）の作成を指示される場合もある。

なお、本ＩＥＥは１９９６年から提出が義務付けられており、それ以前は事業説明書（ＰＤ；Project Description）を提出することとなっていた。

③環境的に重要なプロジェクト（ＥＣＰ；Environmentally Critical Project）

事業が周辺環境へ重大な影響を与えると想定される事業（注３）に適用されるもので、事業者は環境影響評価書案（Draft ＥＩＳ）を作成し、ＤＥＮＲのＥＭＢに提出しなくてはならない。

ＥＭＢは、提出された Draft ＥＩＳについて所定の審査を行い、ＥＩＳとして完成させるとともに、適当である場合には申請者に対してＥＣＣを発行する。

一般にＥＩＳは大気、水質、水循環、動植物から地域の社会、経済、文化へ及ぼす影響まで評価した詳細な報告書となる。このため、事業者は Draft ＥＩＳ提出の前に、ＤＥＮＲ及びその他の関係者との間で「検討範囲の限定」を行う。

なお、１９９６年には本制度を強化するためのＥＯ（Executive Order,政令）２９１が制定され、関連する全省庁が環境ユニット（ＥＵ；Environmental Unit）を組織し、ＥＩＳの作成支援等を行うこととなった。

また、従来ＥＣＣを取得するには大変時間がかかっていたが、１９９６年のＤＥＮＲＡＯ(Administrative Order,行政命令)３７号によって、処理日数は一年から１２０日間（ＥＣＰの場合）又は７５日間（それ以外のプロジェクト）に短縮された。

（注３）対象事業

重工業（非鉄金属産業、製鉄業、石油及び石油化学産業、精錬業）
資源採掘産業（鉱業、採石業、森林伐採、漁業）
インフラ整備事業（主要なダム、発電所、干拓、道路及び橋梁）
ゴルフ場開発

(4) 公害管理者

公害管理者（ＰＣＯ；Pollution Control Officer）はＤＥＮＲ ＡＯ２６－９２号で規定された制度である。これによると、実際に又は潜在的にその活動が水質、大気及び土地汚染の原因となるあらゆる商工業企業及び民間団体はＰＣＯを指名しなくてはならず、またＰＣＯは企業内において環境法令の遵守状況を監視し、法令違反について責任を負うこととなっている。

さらに、ＰＣＯは四半期毎にＤＥＮＲの地方事務所に報告書を提出することが義務付けられている。

２．フィリピンの環境基準等

フィリピンにおける環境基準は、基本的にはＰＤ９８４号「国家公害規制命令」及びそれを受けて１９７８年の官報に掲載された「国家公害規制委員会（ＮＰＣＣ）規則」に定められている。その後規制内容は関連法案によって改正されてきており、例えば水質、大気については以下に掲げる改訂法等によって規定されている。

なお、組織としてのＮＰＣＣ自体は１９８７年のＤＥＮＲ設立時にＥＭＢに統合されている。

(1) 水質基準

水質基準については、ＤＥＮＲ ＡＯ３５号「排水に関する１９９０年改訂法」（８２年規制の改定）と、これを補足しているＤＥＮＲ ＡＯ３４号「水の利用と分類／水質基準」（７８年規制の改定）で規定されている。

ＤＥＮＲ ＡＯ３４号は、淡水の水質をＡＡ～Ｄの５クラス（注４）、海水ではＳＡ～ＳＤの４クラスに分類するとともに、それぞれの分類毎の水質基準、分析方法を設定している。

一方ＤＥＮＲ ＡＯ３５号は、上記の各クラスに分類された水域への排水基準を設定している。（ただし、ＡＡクラスの水域には排水できない。）

（注４）淡水の分類概要

AA ｸﾗｽ　公共供給水Ｉｸﾗｽ。分水界に囲まれた流域を保有し、認可された殺菌法のみでﾌｨﾘﾋﾟﾝの飲料水国家水質基準(NSDW)を満たす水。

A ｸﾗｽ　公共供給水 II ｸﾗｽ。完全な処理（凝集沈澱、濾過および殺菌）によってNSDWを満たす公共水源。

B ｸﾗｽ　ﾚｸﾚｰｼｮﾝ水質Ｉｸﾗｽ。原則的に、入浴、水泳、ｽｷﾝﾀﾞｲﾋﾞﾝｸﾞといった、水が皮膚に接触するようなﾚｸﾚｰｼｮﾝ（特に観光目的）に用いられる。

C ｸﾗｽ　１）魚類や他の水棲資源の増殖および飼育に用いられる漁業用水。
２）ﾚｸﾚｰｼｮﾝ水質 II（船遊用他）。
３）産業用供給水Ｉｸﾗｽ（処理後、製造業で用いられる）。

D ｸﾗｽ　１）農業用、潅漑用、畜産撒水用他。
２）産業用供給水 II ｸﾗｽ（ｸﾘｰﾆﾝｸﾞ用他）。
３）他の陸水で、その水質によって本ｸﾗｽに分類されたもの。

(2) 大気基準

大気基準については、ＤＥＮＲ ＡＯ１４号「１９９３年大気汚染規制に関する大気基準及び規制・取締規則」（７８年規制の改定）で規定されている。

一方、１９９９年６月２３日エストラーダ大統領がＲＡ８７４９「１９９９年フィリピン大気浄化法」に署名し、現在フレームワークとアクションプランの策定作業が進められている。本法律施行後は、大気汚染防止に関しては本法律に基づき規制されること

となるが、基準値はＡＯ１４と全くであり、両規制がそのまま併存することとなる(Engr. Erliada Gonzales, Chief, Environmental Quality Division, EMB（上述）の見解)。

フィリピン大気浄化法では、工場における排出規制から自動車の排ガス規制まで幅広い分野がカバーされてており、広範囲な人々に影響を与えるものと予想されている。中でも本法律の下では、有害な煤煙を発生させる焼却炉の建設、使用が禁止されることから（第２０条)、今後都市ごみや産業廃棄物の焼却処分について新たな取り組みが必要となりゴミ問題が深刻化することが危惧されている。ただし、有害な煤煙（例えばダイオキシン）を発生させない焼却炉については建設が認められる（Engr. Erliada Gonzales の見解）ことから、建設可能な焼却炉の基準が明らかになれば、従来以上に焼却炉の建設が容易になる可能性も残されている。なお、この基準はＷＨＯ等の国際的な基準を基に検討されると言われている。

また、本大気浄化法では、大気汚染防止機器の導入等を行う企業に対する税額控除、加速減価償却といった税制上の優遇措置も認められることになっている。（第１３条）

(3) 廃棄物

フィリピンにおいては、廃棄物はいわゆるごみと有害廃棄物に分けて管理されている。すなわち、一般産業廃棄物を特別に管理する法律等は存在しない。

ごみ（固形廃棄物）は主にＰＤ８２５号「ごみ処理法」、ＰＤ９８４号「国家公害規制命令」及びＤＥＮＲ ＡＯ９８５０「ランドフィルのためのクライテリア」で規定されており、有害廃棄物はとＲＡ６９６９号「有害物質及び有害・核廃棄物規制法」で規定されている。

それぞれの廃棄物を処理するためには、専門の業者に処分を依頼する必要があるが、処理業者となるためには、ごみの場合はＥＭＢの Presidential Task Force on Waste Management の承認とＥＣＣを取得する必要があり、有害廃棄物の場合はＲＡ６９６９に基づくＥＭＢの許可とＥＣＣを取得する必要がある。ＥＭＢによると、現在１７の中小企業が有害廃棄物の処理（recycle, recover and treat）業者として、また２６の業者が有害廃棄物の輸送業者して認定されている。

なお、ＲＡ６９６９によると有害廃棄物を発生させている者もＥＭＢに届け出る必要があり、ＤＥＮＲによれば既に約７００の設備が発生者として登録されており、１９９６年から１９９８年の間に３，４００万トンの有害廃棄物が発生したとされている。

３．フィリピンの環境問題

(1)水質汚濁

メトロマニラや他の主要都市の水質汚濁は、主に一般公衆によって引き起こされていると言われている。事実、ＤＥＮＲのレポート（注５）によると汚染の約５２％はドメスティックな下水（家庭の下水汚物やゴミ、一般の市場や屠殺場から出る廃棄物）であり、残り４８％を占める産業排水を上回っている。

産業排水の主な汚染源となっている業種としては、フィリピン全体では食品加工、飲料、養豚・屠畜、繊維・染料、紙・パルプが挙げられ、この５業種で全汚染の９０％を占めると言われている。

なお、メトロマニラの下水道普及率は約１０％と言われているが、し尿処理に関しては浄化槽（septic tank）の設置が義務付けられており、これを含めると水洗化率は約９０％になると言われている。（１９９３年時点でのメトロマニラにおける同タンクの設置数は約１４０万個。）いずれにしても、し尿以外の生活雑排水はほとんど処理されていない。

メトロマニラを流れるパシグ川は既に生物学的に死んでいると言われており、この川が大統領官邸のマラカニアンの真横を流れていることもあって、前ラモス大統領夫人が「パシグ川リハビリテーションプロジェクト」を強力に推進していたことは有名である。ＤＥＮＲのモニタリング結果によると１９９０年から９５年にかけてのパシグ川のＢＯＤ（生物化学的酸素要求量）年間平均は１０．４ mg/l から１９．３ mg/l の範囲にあり、リハビリテーション事業の効果が現れているとしている（この期間のＢＯＤの最高値はSanchez 地区の 51.6mg/l(1990 年)）。しかしながら、パシグ川の水質データは、上述水質基準における淡水分類Ｃランク（魚が飼育できる水質）の基準をいまだ１００～５，４００倍上回っていると言われており、パシグ川は依然として死の川と言える。

なお、メトロマニラにはパシグ川水系の他に４つの水系（注６）があるが、いずれも同様の状況にある。

メトロマニラの水源となっているのが東南アジアで第２の大きさを持つラグナ湖である。ラグナ湖の面積は約９００ km2 (琵琶湖の約１．３倍)、湖岸の延長は約２２０ km、水量は約３２億 m3、平均水深は２．８ｍである。ラグナ湖には２１の河川が流入しており、湖水は延長２４ km のパシグ川によってマニラ湾に注がれている。

ラグナ湖には約１，５００工場からの排水（うち、排水処理施設を有しているのは約７００社)、農作業による肥料や農薬、家庭からのゴミや下水が流入しており、さらに湖内での過度の養殖も加わって、環境汚染は相当に進行している。ＤＥＮＲのレポートによると、汚染原因の比率はドメスティックな下水と産業排水がそれぞれ３０％ずつで、残り４０％は農畜産業によるとされている。ラグナ湖の水質は上述水質基準のＣランクにほぼ匹敵すると言われているが、ＤＯ、ｐＨなどはこの基準値を上回っている。

ラグナ湖で特に深刻な問題はこれら様々な排水等に起因する富栄養化であり、５～８月には緑藻類が１０，０００個/ml にも達している。

また、ラグナ湖では上記の排水汚泥等の流入に加え、周辺の森林伐採、支流河川の河岸浸食等による汚泥堆積が進んでおり、水深が年々減少していることも重大な問題となっている。現在では、平均水深２．８ｍに対し、汚泥の厚さは平均３．５ｍとも言われている。

なお、現在フィリピンでは、４，２００万人が水道による飲み水の供給を受けているが、残りの３，０００万人は井戸水、雨水等の飲料水としての適正に疑問がある水源を利用している。

メトロマニラから排出される水の最終的な行き場がマニラ湾である。当然ながらマニラ湾の汚染も非常に進んでいる。このため、赤潮も頻繁に起きており、１９９２年には２６９回もの赤潮を記録している。

（注５）Philippine Environmental Quality Report 1990-1995, EMB, DENR

（注６）パシグ川水系以外の４水系
パラニヤーケーサポテ水系、サン・ファン水系、ナボタスーマラボンーツラハンーテネヘロス水系、マリキナ水系

(2) 大気汚染

メトロマニラは世界で最も大気汚染の著しい都市の一つとされている。主な汚染源は自動車と工場であるが、前述のＤＥＮＲのレポートによるとそれぞれの汚染源率はＣＯの９９％、ＴＯＧ（全有機ガス）の９４％、ＮＯｘの８３％が自動車由来であり、ＳＯｘの８８％が工場由来でさらにその８７％が発電所由来となっている（1990 年ﾃﾞｰﾀ）。したがって、大気汚染の第一原因が自動車であり、その次が発電所となっている。

なお、メトロマニラにおけるＴＯＣ全排出量は約１１万トン、同ＣＯは約５８万トン、同ＮＯｘは約８万トン、ＳＯｘは約９万トンである（ﾃﾞｰﾀはいずれも 1990 年）。

大半が発電所由来とされるＳＯ２に関して言えば、８０年代と比べると急激に減少しており大幅に改善の方向にあるとされている。メトロマニラ内に設置された９カ所の観測地点でのモニタリング結果によれば、ＳＯ２の濃度は０．００６～０．０２２ ppm の範囲であり（1993 年ﾃﾞｰﾀ）、既に基準値０．０３ ppm（一年平均）を下回っている。

大気汚染の第一原因である自動車に関しては、路上の自動車数が増加するにつれ排気ガス量も単純に増加の一途を辿るわけであるが、自動車数増加に伴う交通渋滞と断続運転がさらに大気汚染を加速しているとも言える。特に全車両数の約３０％を占めるディーゼル車は発進時に黒煙を大量に排出することから、これらディーゼル車の小刻みな発進・停止の繰り返し運転によってメトロマニラの路上は常にもやがかかったような状態となっている。例えば、１９９７年中旬のメトロマニラの総浮遊粉塵（ＴＳＰ）の最高値は基準値を２．５倍も上回っており、１９９３年の最高値の５倍にもなっている。

また、フィリピンでは有鉛ガソリンが依然使用されており、同地区での自動車からの鉛排出量は年間４００トン（1990 年）にも達している。さらに、近年日本ではガソリンの低ベンゼン化が重要な課題となっているが、同地区での自動車に起因するベンゼン排出量は約４．４千トンに達している。

なお、１９９７年９月の大統領令によって、メトロマニラでは２０００年に、それ以外では２００１年に有鉛ガソリンの使用は禁止されることとなっていたが、前述の「１９９９年フィリピン大気浄化法」によって、有鉛ガソリンは本法律施行後１８ヶ月以内に禁止されることとなり、ベンゼンについては段階的に含有量が削減され、最終的には２００３年までに２％以下にまで押さえられることとなっている。

(3) 廃棄物

フィリピンにおける産業廃棄物の現状については、ほとんど把握されていない。処理業者に委託するのが一般的のようであるが、実情は分かっていない。

ＤＥＮＲによるとメトロマニラでは一日６，５００トンの固形廃棄物が発生しており、回収率は８５％程度で、残りの未回収分は燃やされたか川に捨てられたと見積もられている。また、全ゴミ発生量の内、４０％が有害廃棄物を含む産業廃棄物であると推定されている。

一方、ＪＩＣＡチームが１９９７年に調査した結果によると、メトロマニラでは一日平均５，３４５トンのごみ（産業廃棄物を含む）が発生しており、このうち家庭内や事業者により自己処理されているのが全体の６％に当たる３４１トン、さらに４％の２００トンがリサイクル品として回収されていた。

このため、残りの９０％の４，８０４トンがいわゆる排出ごみとなっており、これらのうち収集されているのが３，４９６トン（発生量全体の６５％）で、不法投棄されているのが１，３０８トン（同２５％）であった。

収集されたごみは、５４トン（同１％）がリサイクルされるほかは、首都圏の４カ所の処分場に埋め立てられていた。

なお、同チームでは１９９７年末の有害廃棄物を除く固形の一般産業廃棄物は一日平均４６０トン発生しており、２０１０年には８６０トンに達すると見積もっている。

４．環境利用料の導入

上述のとおり、フィリピンの環境の汚染が著しく進行しており、一向に改善の兆しが見られていない。改善が見られない理由の一つとして、排水処理施設のような環境関連施設は非常に高価でありまた運転維持費が高くつくことから、これらの設備を導入する又は導入した装置を稼働させるよりは罰金で（あるいはその罰金を払わないための”袖の下”で）済ませようという風潮が企業にあったことが挙げられる。

一方、ＬＬＤＡでは環境関連設備の導入を促進するため、従来の罰金・罰則に加え、環境利用料(Environmental Users Fee)制度を１９９７年１月に導入した。本制度の下では、廃水を出す全ての企業が排水量とＢＯＤの濃度と総量に応じて料金を払う（注７）ことが義務づけられており、この支払額がかなり高額になることから、企業にとっては環境関連施設を導入し稼働させる方が安上がりという考え方も生まれてきている。

本制度は現在のところ、ＬＬＤＡ管轄の企業だけが対象であるが、ＥＭＢが全国の企業を対象に同様の制度を開始することを検討している。ただし、ＬＬＤＡはＤＥＮＲの中にあって特別な組織であり、環境利用料等の収入を国庫に入れずに自ら使用することが出来る（人件費にも流用できる）こともあって、本利用料の徴収に積極的であるが、ＥＭＢは仮に実施してもその収入を国庫に入れなくてはならないため、本制度の実施にはそれほど積極的ではないと思われる。実際９８年度中に実施する予定であったが、未だに実施されていない。

（注７）環境利用料の算定方法

この利用料は固定部分と変動部分からなっており、後者は排水中のＢＯＤの濃度と総排出量に応じて決まる。料金の徴収は４半期毎に行われる。

年間合計利用料　＝　固定料金　＋　変動料金（単価×年間合計ＢＯＤ(kg)）

①固定料金

排水量(m3/日)	料金
・　１５０＜	Ｐ１５，０００
・３０～１５０	Ｐ１０，０００
・　＜３０	Ｐ　５，０００

②変動料金の単価

・ＢＯＤ濃度５０ mg/l 以下　　５ペソ／ｋｇ（ＢＯＤ）

・ＢＯＤ濃度５０ mg/l 超過　３０ペソ／ｋｇ（ＢＯＤ）

③年間合計ＢＯＤ

年間合計ＢＯＤ(kg)　＝　ＣＢＯＤｍ×Ｑｍ×３００×１０

ＣＢＯＤｍ：ＢＯＤ平均濃度(mg/l)

Ｑｍ　　：一日当たりの排水量(m3/日)

３００　　：年間稼働日数

１０　　：換算計数(m3/l/kg/mg)

ＤＥＮＲによると、本環境利用料の導入により、ラグナ湖の年間ＢＯＤ負荷量は７８％、総量に換算して２千トン削減されている。

（補足）大気浄化法に基づく通常排出負担金制度

環境利用料と同様の考え方を大気汚染防止に取り入れたのが、通常排出負担金（Regular Emission Fees）制度（Enission Charge System）である。これは、上述の「１９９９年フィリピン大気浄化法」第１３条に定められた制度で、負担金額は汚染物質の排出量及び有毒性に基づいて定められることとなっている。なお、産業活動に伴う排出の場合はＤＥＮＲが、自動車による排出については運輸通信省が本負担金を徴収することになっている。

なお、環境規制法の中に、費用負担の制度を取り入れていく考え方は今後も続いていくものと思われる。例えば上述のＲＡ６９６９号「有害物質及び有害・核廃棄物規制法」はその実施が不完全であることをＤＥＮＲ自身も認めており、その理由の一つにＲＡ６９６９が何らの予算措置も人員の手当も行われないままに法案通過したことを挙げているためである。

５．フィリピンアジェンダ２１

１９９２年にブラジルのリオデジャネイロで国連開発会議（ＵＮＣＥＤ）が開催され、経済的、社会的及び生態的に継続的発展を遂げていくための行動計画を示した「アジェンダ２１」が採択された。このアジェンダ２１は全世界共通のアジェンダであるが、ＵＮＣＥＤでは同時に各国が独自のアジェンダを制定することを求めた。

これを受けフィリピンにおいても前ラモス大統領の指示(Memorandum Oder No.288)の下、９５年６月に政府、民間、ＮＧＯ、労働者等各界の代表からなる「継続的発展のためのフィリピン委員会」が設置され、「フィリピンアジェンダ２１（ＰＡ２１）」の制定作業が進められてきた。

本ＰＡ２１は、森林、海水、淡水等をエコシステムとしてとらえ、これらエコシステムの管理、保守、維持、リハビリを行いつつ開発を進めることを提言しており、９７年９月ラモス大統領が署名し、９７年の国連環境特別総会に提出された。本ＰＡ２１の策定によって、あるいはその過程において、多くの関係者の環境問題に対する意識は急激に高まってきたと言えよう。

ＰＡ２１の実現に向けた具体的な政策は発表されていないが、フィリピン貿易工業省の投資委員会（ＢＯＩ）が従来から毎年策定している投資優先計画（ＩＰＰ）の一環として環境案件に対してもインセンティブ付与（税制上の優遇）がなされることとなった。

UNITED NATIONS DEVELOPMENT PROGRAMME

Project of the Government of the Republic of the Philippines

(Revised Draft as of Feb. 1999)

PROJECT DOCUMENT

Title:	**Harmonized Regulatory Systems and Capacity Building for Toxic Chemicals and Hazardous Waste Management**
UNDP Sector:	**Sustainable Development**
Government Sector/Subsector:	**Environment and Natural Resources/ Environment**
Government Implementing Agencies:	**Environmental Management Bureau of the Department of Environment and Natural Resources**
Estimated Starting Date:	**May 1999**
Estimated Duration:	**Three (3) years**

UNDP and Cost Sharing Financing:	
UNDP TRAC:	**US $ 1,313,353**
Government (in-kind cost sharing):	**US $ 218,858**
T O T A L:	**US $ 1,532,211**

Brief Description

Economic growth and industrial development in the Philippines has resulted in the increased use of toxic chemicals and generation of hazardous waste from industrial processes. These chemicals and wastes pose health (human and ecological) risks unless properly managed. The Government of the Philippines has enacted Republic Act 6969 or the Toxic Substances and Hazardous and Nuclear Wastes

A. EXECUTIVE SUMMARY

1. Project Background

The use of toxic chemicals and the generation of hazardous wastes have increased dramatically in the last ten years and continue to increase in parallel with economic growth and industrial development in the Philippines. These chemicals and wastes pose risks to human health and the environment unless properly managed.

Toxic chemicals use and hazardous wastes generation, storage, treatment and disposal are governed by a number of legislations, namely: Republic Act 6969 or the Toxic and Hazardous and Nuclear Wastes Control Act of 1990, Presidential Decree No. 1586 or the Environmental Impact Assessment Law and Presidential Decree No. 984 or the Pollution Control Law. To date, however, implementation of controls on toxic chemicals and hazardous wastes has only been partial because of lack of budget, resources, expertise and operational systems and procedures. Moreover, the oftentimes duplicating or redundant requirements of the three (3) systems result in confusion and undue delays in chemical importation and hazardous waste disposal approvals. Harmonizing these related permitting systems will provide a sound basis for industrial investments and establishment of treatment and disposal facilities in the near future. The Philippines, likewise, as signatory to a number of international agreements on this subject, such as the Basel Convention and as Party to the negotiations for new agreements such as the one on POPs, needs to capacitate itself to meet its obligations under these Conventions.

Pursuant to the government's goal of improvement of the quality of life of the Filipinos, as enunciated in the 1993-1998 Medium Term Development Plan, the United Nations Development Programme has agreed to assist in the development and harmonization of the various regulatory systems and procedures governing toxic chemicals importation, use, transport and storage and hazardous waste transport, treatment and disposal and required under RA 6969, P.D. 1586 and P.D. 984, as well as, establish capacity on toxic chemicals and hazardous wastes management. This assistance will likewise include capacitation for meeting the country's commitments under the various agreements to which it is or will be a signatory. This is in line with its Country Cooperation Framework for the Philippines which recognizes the need for effective environmental management to ensure sustainable development.

2. Description of the Project

The project aims to contribute to the country's development goal of improvement of the quality of life of its people and has been designed to develop capacity to manage risks from toxic chemicals use and hazardous wastes generation, transport and disposal. It will also attempt to harmonize all the regulatory systems mandated under RA 6969, P.D. 1586 and P.D. 984.

Component 2 - Database and Management Information Systems Development/ Improvement

This will develop databases on the PCL, CCOs, hazardous wastes and generators, transporters, treaters, disposers, hazardous waste recyclables, EIA compliance and P.D. 984 compliance. All of these plus existing ones will be consolidated into one integrated system.

Component 3- Training

This will train government, industry and the academe on specific areas like toxicology, industrial emergency planning and response, hazardous wastes characterization and testing, contaminated site assessment and remediation, EIA compliance monitoring and audit, environmental quality standards setting and environmental monitoring techniques and methods.

Component 4 - Information, Education and Communication

This will formulate a Communications Plan for the Project concerns and will involve implementation of some of the proposed IEC activities.

Component 5 - Support Facilities

This will entail establishment of an Advisory Response Center for Industrial Emergencies and a Reference Laboratory for Hazardous Wastes.

3. Inputs

UNDP Inputs

The UNDP shall provide inputs for consultancy services, training, conduct of studies, consultative meetings and workshops and field visits.

Government Inputs

The Government, through the Environmental Management Bureau of the DENR shall provide the counterpart personnel, office space and equipment and part of the maintenance and operating costs. It shall likewise provide technical information in its possession needed by the Project.

4. Financial Data

The total budgetary allocation for the project is $1,532,211.00 broken down as follows:

UNDP TRAC Resources	US$ 1,313,353.00
Government in-kind	PhP 8,754,324.00 ($218,858.00)

A Review of the Options for Restructuring the Secondary Lead Acid Battery Industry, in Particular the Smaller Battery Recyclers and Secondary Lead Smelters and the Informal Sector, with a View to Enhancing Their Environmental Performance and Improving Health Standards.

Background and objective of the study

The ban on the export of used lead-acid batteries (ULAB) from Annex VII (OECD, EC, Liechtenstein) to non-Annex VII countries pursuant to decision III/1 of the Basel Convention will reduce the availability of imported scrap feedstock for battery recycling in the Philippines. As ULAB supply from other developing countries will become scarcer and scarcer, the ban is likely to encourage and enhance collection and recuperation of domestically generated scrap batteries. This leads to a situation within which, the limits of justifiable collection and transport costs, the principal secondary lead smelter in the country, Philippine Recyclers Inc.(PRI), siphons off domestically generated ULAB from the smaller battery recyclers and secondary lead smelters, and unlicensed battery reconditioners/melters in the informal sector of the Philippine economy. Although this development is desirable from an environmental and health point of view, it might generate adverse social problems and hardship.

From a short-term perspective, this study explores the technological and managerial opportunities for improving the environmental and occupational health performance of the smaller battery recyclers and secondary smelters and unregulated reconditioning and melting activities in the informal part of the economy. The analysis has been conducted on the basis of site visits of typical production units, a brief survey questionnaire completed by the site managers and assessment of regional availability of scrap feedstock and lead demand (in the form of reconditioned batteries and refined lead for non-battery uses).

From a medium- and long-term point of view, the study investigates the pros and cons of restructuring the informal ULABs collection and recycling sector in the Philippines. The objective has been to make the smaller battery recyclers and secondary smelters, battery reconditioners and inefficient recyclers in the informal sector part of an effective and efficient collection infrastructure supporting an environmentally sound secondary lead sector for the recycling of battery scrap. This approach gradually phases out uncontrolled, inefficient and environmentally unacceptable methods of partial lead recovery, and in particular practices employed outside the formal sector by an unknown, but somewhat significant number of people. It would also spare Government agencies the eventual need to address this problem at a financial and social cost, most likely out of proportion to the amount of lead recovered during any decontamination procedure or through the provision of a (publicly managed or subsidized) scrap battery collection system.

In this regard, due attention has been paid to the logistic peculiarities of an archipelago, in particular the regional spread of collection infrastructure, collection and shipment costs as well as the assurance of environmentally safe transport. It is not unlikely that the Government might have to provide some support and assistance in making parts of the remote collection and transport system viable.

Scope of the study

- Brief characterization of the size, employed technology, feedstock material and output of (i) battery reconditioners; (ii) cottage melters; and (iii) the smaller battery recyclers and secondary smelters (Asia Pacific, Silver King, Guevarra/Magsuet, Celica Batteries, Tower Lead, Honest Parts, and any others that are identified and located). Furthermore, the inter-relationship between these three different commercial groups regarding the supply of feedstock and demand for recovered lead are briefly reviewed.

- Short characterization of the main environmental and occupational health problems of the three groups: battery reconditioners; cottage melters; and smaller battery recyclers and secondary smelters

- Assessment of options for short-term upgrading of environmental and occupational health performance in the three groups. The options are practical, feasible and affordable.

- Analysis of the long-term restructuring options of the three target groups with a view to

  (i) increasing collection of domestically generated ULAB for the unregulated battery recyclers which meet acceptable environmental standards;

  (ii) gradually reducing uncontrolled, partial lead recovery in the country in a socially tolerable way.

Section 1. Characterization of the size, technology, feedstock material, output and inter-relationship between these groups: Battery Reconditioners, Cottage Melters, Smaller battery recyclers and secondary lead smelters.

Section 1.1 Battery Reconditioners

Throughout the major cities of the Philippines, and in particular the capital Manila, there are hundreds, possibly thousands of small battery reconditioners. The typical battery reconditioner occupies small shop premises located along main city roadways with street access and is usually found amongst other shops selling a variety of provisions, fast foods, and domestic and consumer goods.

Each battery reconditioner seems to employ about 4 other Filipinos engaged in a number of manual tasks associated with dismantling and re-assembling batteries. One person in each of the premises is responsible for the commercial transactions, that is, the purchase or acquisition of "spent" batteries and the sale of reconditioned batteries and surplus battery parts, i.e. rubber and polypropylene cases, and battery plates.

Some of the reconditioners also rented or leased commercial batteries for daily, weekly and monthly periods to self employed truck, "Jeepneys" and taxi drivers.

It is likely from observations made during a field trip to the Philippines in June of 1998 that as many as 6,000 Filipinos could be employed in the battery reconditioning industry.

Battery reconditioners test "spent" batteries delivered to their premise to ascertain whether the battery can be reconditioned by just recharging the cells or whether one or more of the batteries cells requires replacing due the build up of sulfates on the surface of the active materials. If the battery merely requires recharging, it is quickly resold after a quick "boost" overnight charge and the electrolyte topped up with either distilled or de-ionized water.

Batteries with defective cells require those cells to be replaced or the sulfate layers on the active surfaces of the lead acid battery to be removed. There are chemicals that certain reconditioners will add to the battery electrolyte to remove the lead sulfate layer from the active surface on the battery plates. In some cases removal of the inactive sulfate layer will allow the battery to be recharged and effectively reconditioned. When chemicals are ineffective, recyclers will usually break open the battery by cutting through the rubber or polypropylene weld at the top of the battery case and removing the top complete with the positive and negative terminal connections. Using simple measuring and observation techniques the battery cell or cells that are "spent" are identified and replaced by cannibalizing another battery with some "good" cells. The positive plates are often reused up to three times. The top will then be replaced, glued to the base section and the battery recharged prior to resale.

The expected battery life from these reconditioning methods will vary tremendously as some or all of the cells will fail shortly after resale. Experience has shown that some reconditioned batteries will fail after about three months, although many will last for five or six months, but useful life is very short compared to the expected two years life of a new battery in the hot climate of the Philippines.

Those cells that are "spent" and batteries that are beyond "reconditioning" will be broken open and the acid "dumped" by washing down the street drain or allowed to percolate into the soil at the rear of the premises. No evidence was observed for the safe collection and neutralization of battery acid in the reconditioning shops. The battery electrolyte is disposed of because it has no value. The rubber or polypropylene cases are sold to either a plastic recycling plant or directly to a battery manufacturer for reuse. The battery plates will be set aside, usually at the rear of the premises and allowed to dry. The dried plates will then be placed in large clear heavy duty plastic bags and sold by weight to one or more of the dozen or so smaller secondary smelters or backyard melters in the Philippines. Philippine Recyclers Inc. secondary plant at Bulacan does not purchase battery plates for smelting.

Section 1.2 Cottage Melters

The small Cottage Melters typically work from the backyard of domestic premises or on a larger scale from abandoned industrial premises. None of these cottage businesses are licensed lead recyclers and it is also probable that lead melting is not the only metal recovery activity. Very often lead melters primary source of income will be derived from lead metal recovery from the collection of industrial and automotive battery scrap, because they can obtain a better price for the separated metallic lead content than the whole scrap battery or the plates if sold separately.

Cottage Melters break open the scrap batteries with an axe or a circular saw. The dilute sulfuric acid is disposed of by either tipping it into drains or rivers, or allowing it to percolate through the soil into the surrounding groundwater. The rubber and polypropylene cases are sold to plastic recyclers for eventual resale to the battery manufacturers. The lead battery plates, complete with the lead oxide and sulfate pastes still embedded in the battery plate grids are melted in large open kilns or cast iron "pots" of various sizes. The metallic lead grids melt easily and the metal is tapped from the kilns or pots and cast in moulds to produce unrefined lead ingots. It is most unlikely that any backyard melter will have a furnace capable of recovering the lead from the paste. The most likely scenario is that once the metallic lead in the battery grids has melted and been cast into metallic ingots the melting pot or kettle will be emptied ready for the next batch.

The waste paste tipped from the pot will be in the form of a heavy slag or residue with a lead content of over 90%. The most profitable method for disposal of this lead rich slag would be to sell it to a small or large smelter, but the most likely fate for this waste material is either the river, the rear of the melter's dwelling housing or some remote part of the countryside. There was no evidence at any of the small scale smelters that were inspected that these residues are sold for further processing. Backyard recovery rates are therefore, at best, 40% of the available lead in a scrap battery, including lugs and bridges, and consequently there will always be a serious pollution problem caused by the lead rich slag disposal.

The number of backyard melters in the Philippines has proven impossible to estimate, as the melting operations tend to be spasmodic rendering the task of tracking down these clandestine activities extremely difficult. The author of this paper did not find and witness any small scale melting operations in Manila, despite many hours of searching.

Section 1.3 Smaller Battery Recyclers and Secondary Lead Smelters

A Smaller Battery Recycler or Secondary Smelter can be described as a lead recycler producing less than 5,000 tonnes of lead ingots per annum.

There are 9 known Smaller Battery Recyclers and Secondary Lead Smelters in the Philippines, six on the main island located close to Manila, and three on the smaller islands. The owners and managers of four of the smaller smelters cooperated with the Author in the preparation of this study[1], in return for anonymity in the final report.

The smaller battery recyclers and secondary lead smelters produce between them approximately 12,000 tonnes of secondary unrefined lead ingots per annum. The raw materials are mainly acid drained and dry battery plates. Only one secondary plant was breaking and processing a small quantity of whole case batteries.

An estimated 150 Filipinos are directly employed in the small lead smelting plants.

All the smaller battery recyclers and secondary lead smelting plants employ "short" 1 to 3 tonne reverberatory furnaces using diesel or waste oil fired burners as the main lead smelting furnace.

Reverberatory furnaces average approximately 2.4 meters wide X 10m long at the slag line, but the reverberatory furnaces favored by the small recyclers in the Philippines are approximately one third of this size. Two burners normally fire the furnaces, although the small furnaces used in the Philippines have only one air enriched diesel/waste oil burner.

[1] Appendix IV, UNCTAD / ILMC Philippine Project, Field Study Report, Small Battery Recycling Plants, Environmental and Occupational Health Assessment, August 1998.

The standard furnace construction uses magnesite brick below the slag line, chrome magnesite brick at the slag line, and high alumina brick on the upper walls. The suspended arch roof is constructed using basic brick in areas where slag may splash and high alumina brick elsewhere.

The floor arch is heavy-duty fireclay brick. It was not possible to determine or confirm which refractories have been installed in the small Filipino reverberatory furnaces. Carbon is usually added to the charge material as a reducing agent in the form of coke breeze, but in one Filipino plant waste coconut shells are used, in an amount up to about 5% by weight of the total charge. (About the same as coke breeze)

The mixed dry charges are fed manually to the small furnaces and pushed into the reaction area using a variety of hand-make tools. Radiation and convection from the hot furnace gases and walls heat the charge. The lead alloy grids melt, and the carbon reacts with the lead oxides and sulfates reducing these compounds to metallic lead and a variety of gaseous and solid oxides and sulfides. Most of the reactions take place in the first half of the furnace. The remaining portion of the furnace is mainly a settling area for separation of the slag from the metal, although some smelting is done in this zone.

The slag consists of a thin, fluid layer floating on top of the heavier molten lead layer. Both the molten slag and metal are tapped at the end of each smelt from the furnace into cast steel pots.

During the smelting of battery plates, the furnace produces low (0.2- 0.7%) antimony bullion (soft lead) and a furnace slag containing 80% lead and antimonial oxides.

The furnace slag is stored and reprocessed in the reverberatory furnace in a separate slag campaign. The campaigned slag charge is blended with up to 5% reducing agent and is fed back to the furnace in the same manner as the battery plate material. Normally this slag smelt will recover about 50% of the lead contained in the slag as a low (.8-2.5%) antimony bullion. The residual slag from the slag charge is typically rich in antimonial oxides and low in lead oxides and ideally should be processed further in an oxygen blast furnace. As none of the smaller battery recyclers and secondary lead smelters own a blast furnace the lead recovery rate during the slag campaigns is not optimized and some of the residual lead in the slag is not recovered.

Reverberatory furnace smelting, at approximately 1400 to 1500 degrees centigrade, reduces the lead compounds to metallic lead bullion, and at the same time oxides the alloying elements in the battery grids, posts, straps, and connectors to produce a slag containing virtually all the alloying elements.

The following reverberatory furnace reactions are typically the most common:

1. $PbS0_4 + C \rightarrow Pb + CO_2 + SO_2$
2. $2PbO + C \rightarrow 2Pb + CO_2$
3. $4Sb(m) + 3PbSO_4 \rightarrow 3Pb + 3SO_2 + 2Sb_2O_3$
4. $2Sb(m) + 3PbO \rightarrow 3Pb + Sb_2O_3$
5. $Sn(m) + PbSO_4 \rightarrow Pb + SO_2 + SnO_2$
6. $Sn(m) + 2PbO \rightarrow 2Pb + SnO_2$
7. $3As(m) + 3\ PbSO_4 \rightarrow 3Pb + 3SO_2 + 2As_2O_3$
8. $2As(m) + 3PbO \rightarrow 3Pb + As_2O_3$

Carbon and/or carbon monoxide reduces some of the lead sulfate to metallic lead evolving carbon dioxide and sulfur dioxide as shown in reaction #1. To reduce the sulfur dioxide emissions metallic iron is added to the furnace charge to combine with the free sulfur to form iron sulfides as shown in equation # 9.

9. $PbS + Fe \rightarrow Pb + FeS$

Most of the lead sulfate is reduced by the molten grid metallic according to equation # 9. In this reaction one mole of lead sulfate reacts with 4 moles of molten lead to produce 4 moles of lead oxide and one mole of lead sulfide, which enter the slag. Antimony and any arsenic and tin contained in the grid metal are also oxidized in a similar manner. Reaction # 10 is responsible for the lead sulfide, most of which is oxidized in the highly oxidizing slag by the lead oxide to produce molten lead and sulfur dioxide as shown in # 11. Any residual lead sulfide remains in the slag. The remaining two moles of lead oxide are reduced to lead by carbon in reaction # 12.

10. $PbSO4 + 4Pb \rightarrow 4PbO + PbS$
11. $2PbO + PbS \rightarrow 3Pb + SO_2$
12. $2PbO + C \rightarrow 2Pb + CO_2$

The lead sulfate and the lead oxide generated in the furnace reactions produce conditions that are reducing to lead, but oxidizing to all other battery grid alloying elements and impurities. Thus the furnace bullion contains very low levels of antimony and almost no arsenic or tin. The free flowing lead oxide or litharge slag contains virtually all the alloying elements as oxides.

At the four sites inspected internally the operators were adding scrap steel to the furnace charges. The iron in the steel reduces the lead sulfate to lead oxide during the smelting process and the iron is oxidized to iron sulfide. The lead oxide is then further reduced to metallic lead by the action of the carbon in the coke, producing carbon dioxide as the eventual by-product.

The iron, by reducing the lead sulfate to the oxide, effectively de-sulfurizes the charge, but this desulfurization process is futile unless the slag is eventually removed from the process circuit.

All but one of the small smelters continuously returns the slag to the reverberatory furnace, thereby saturating the molten slag in the furnace bath with iron sulfides. At saturation point any further desulfurization is only achieved with the liberation of the sulfur from the melt and the emission of sulfur dioxide gas into the atmosphere.

One of the secondary plants also utilized a small 2 to 3 tonne Rotary furnace with a deisel oil fired burner for campaigned smelting of drosses and by-products. The rotary kiln is a 3 metre steel cylinder probably lined with chrome magnesite refractory bricks (79% MgO and 9% Cr_2O_3), as most rotary furnaces are. Heat is transferred from the burner flame to both the charge and the refractory lining by radiation.

These batch kilns are rotated during four hours of smelting thereby mixing the charge, exposing fresh material and increasing the rate of heat transfer as the hot refractories transfer heat to the material by conduction as the drum constantly rotates the refractories under the charge. The smelting temperature is approximately 1000 degrees celcius with conditions and reagent requirements usually based on the ternary phase oxide system of silica, iron and sodium. The reagents used in the Filipino rotary normally consists of 5% scrap iron (scrap construction rods) for sulfur removal and 5% sodium carbonate; the reducing agents are usually 5% coal fines and sand is added as required for the silica content in order to maintain fluidity in the tertiary slag phase.

The Filipino rotary had an diesel oil fired air enriched burner located in a refractory lined door at one end of the furnace. At the opposite end the furnace wall was tapered to an exhaust flue of about 400 millimetres in diameter. The furnace is charged through the open door housing the burner and tapped from a plugged hole in the located center of the rotary drum. There is no afterburner installed in the Filipino rotary system, but in the absence of combustibles, is acceptable.

This manually charged Filipino rotary furnace smelts product drosses, that is, lead oxides and complex metallic salts where lead is combined with other impurities. The chemical reactions occurring in the rotary furnace will depend on the composition of the drosses. Essentially, however, oxides and other compounds in the drosses are reduced to remove any sulfur and other non-metallics, disposing of the waste material in the form of a slag that melts at a relatively low temperature. The basic lead compounds react as follows:

1. $PbO_2 + C \rightarrow Pb + CO_2$
2. $PbO + C \rightarrow Pb + CO$
3. $2PbO + PbS \rightarrow 3Pb + SO_2$
4. $PbS + Fe \rightarrow Pb + FeS$

The carbon reduces the lead oxides to metallic lead and carbon dioxide and monoxide as described in 1 and 2. Redox reactions with lead oxide and the active iron liberate metallic lead, sulfur dioxide and iron sulfide.

The dust collected in the filter bags is removed by manually shaking the bags after each furnace charge. The dust dislodged from the inside of the bags, falls to the bottom of the bag housing and is collected via a rotary valve (sealed non-return valve to prevent leaks to atmosphere) and returned to the furnace.

Two of the small smelters visited ventilated furnace gases and the fume generated in the furnace tapping areas to baghouses with polyester bag filters. One of the smelters passes furnace exhaust gasses and the ventilation from the tapping area through an aerosol mist in a small water-cooling tower. The fume dust adheres to the water droplets in the aerosol, and forms a wet sludge that collects in a reservoir at the base of the tower. The sludge is manually removed each week, dried and the fume returned to the process.

The feed for the aerosol is water circulated by a water pump in a closed unfiltered loop. The efficiency of the aerosol will be adversely affected as fine colloidal fume particles collected by the fine aerosol are re-circulated and block up the small holes in the aerosol nozzles. Furthermore, the water will gradually become acidic as some of the sulfur dioxide produced in the smelting process dissolves in the water. This innovative dust and fume collection system would be greatly improved if:

(i) water re-circulated to the pump was filtered to remove nozzle blocking particles

(ii) the re-circulating liquid was alkaline

An alkaline aerosol would remove more of the sulfur dioxide gas to form a neutral salt that could be returned to the furnace. Under relatively easily controlled conditions during smelting the sulfur in the salt can be removed by iron addition to the charge material and tapped from the furnace a slag that would need to be discarded.

One of the plants visited appeared to vent the furnace fumes to the atmosphere. Three other plants visited without gaining access to the process areas did not appear to have ventilation plants on the premises and "white smoke" typical of unfiltered lead fume was clearly visible from the furnace stacks.

Section 1.4 The Inter-relationship between the different Lead Recyclers

Lead acid batteries that the reconditioners cannot resell are opened and the battery acid disposed of. There is considerable speculation about the methods for disposing of the acid electrolyte and regrettably the author could not ascertain precisely the most common methods of disposal. In the absence of any acid neutralization ponds, it is most likely to be disposed of by either tipping it down the local storm drain or sewer, or into a nearby stream or river or allowing it to percolate into the water table through the soil around the reconditioners premises. The lead containing plates with the metallic grids and the lead paste are separated, air dried, packed into heavy duty plastic bags, sealed and sold to the small secondary lead plants. Philippine Recyclers Inc. (PRI), the largest secondary smelter in the Philippines have a policy of purchasing and recycling only whole case batteries and the company does not purchase battery plates.

The small recyclers compete with each other for scrap battery plates in a market driven supply/demand situation. There was no evidence of any collusion between the small smelters to depress scrap prices, but there was ample evidence to suggest that there was a chronic shortage of scrap materials and all the small smelters visited during the field trip appeared to be vying with each other for supplies and operating their plants under capacity.

The small recyclers smelt the plates and probably recover at least 90% of the available lead in the grids and the paste. The unrefined lead ingots produced by the small recyclers are for the most part sold to PRI. PRI add the unrefined ingots to their own furnace metal during the lead refining process for the removal of impurities.

A minority of the small recycling plants ship their unrefined lead to producers of other small lead products such as wheel weights, lead solder or fishing sinkers.

The policy of PRI to purchase whole case batteries only serves to secure the small recyclers with an unrestricted supply of battery plates from the reconditioners. While the reconditioners have a ready market for the battery plates, they will continue to dispose of the acid in "environmentally unfriendly" ways. The market for battery plates and oxide is being sustained because PRI purchase most of the unrefined lead from the small recyclers. Acid disposal into the environment will only cease when all the recyclers, large and small, decide to recycle only whole case batteries and neutralize the acid electrolyte in the recycling process. Such a policy has, however, other implications, which are discussed later.

Section 2. Environmental and Occupational Health problems.

A recent study of non-exposed adult women in Manila to lead[2] from dietary sources concluded that the blood lead levels of the study group was low at less than 4 mg/dl of Hemoglobin, indicating that the levels of lead exposure, including respiratory lead particulates, might be low. Data published by the Philippine Environmental Management Bureau (EMB) in 1990[3] and 1996[4] shows that lead in air values in Manila from 1987 to 1995 were not excessively high. Indeed, recorded lead in air values have fallen slightly from a geometric mean value of 0.52 □g/m^3 in 1987 to 0.45□g/m^3 in 1995.

Information detailing environmental exposure to lead in the Philippines from the EMB is not readily available.

Pre-employment blood lead levels for employees of the RAMCAR Corporation[5] (appendix III) recruited from the Metro Manila area during the last two years show, however, a very different picture. The average blood lead level from those recruited in the Metro Manila area is 16.52 mg/dl of lead in blood. The number of new employees sampled in the survey was 176 from as far south as Imus and as far north as Plaridel. The average blood lead level for employees living in the Marilao area was 21.58. The lowest result was from Meycauayan employee and the highest was from an employee recruited in Marilao.

This survey of Metro Manila residents recruited to PRI or RAMCAR demonstrates that there is population exposure in and around the whole of the Metro Manila area. It is most unlikely that any emissions from the regulated site at Bulacan would be solely responsible for such widespread pollution. It is, however, more likely that the elevated blood lead levels amongst the Manila residents is due to a number of point sources scattered around the city, including unregulated smelters and battery reconditioners.

Section 2.1 Battery Reconditioners

The most immediate problem posed by the battery reconditioners is the disposal of battery electrolyte, that is, dilute sulfuric acid. Acid tipped into the drainage and municipal sewer system will be neutralized at one of the many city water treatment plants. Such treatment is, however, an unnecessary financial penalty against a town's or city's municipal budget.

---

[2] Non-occupational exposure of adult women in Manila, the Philippines, to lead and cadmium. Z.-W. Zhang et al, January 5th 1998. The Science of the Total Environment 215 (1998) 157 – 165.
In total 45 female non –smoking clerical workers from a large medical complex were sampled to determine levels of dietary exposure.

[3] Philippine EMB, Department of Environment and Natural Resources, the Government of the Philippines. Philippine environment in the eighties, Environmental Management Bureau, 1990:6.

[4] Philippine EMB, Department of Environment and Natural Resources, the Government of the Philippines. Philippine environmental quality report 1990 - 95 in the eighties, Environmental Management Bureau 1996:9.

[5] RAMCAR Corporation 1999.

Acid that is allowed to percolate into the ground at the rear of the battery reconditioners' shop will render the surrounding soil infertile and probably contaminate the groundwater. Acid tipped into streams and rivers will, depending on the extent of the dilution, lower the pH of the water and adversely affect the local ecosystem.

Sulfuric acid will also attack and dissolve most concrete mixtures and mortar. This is important in Manila, where riverbank erosion on certain sections of the river is prevented by stone and mortar retaining walls.

Personnel observed working in the reconditioning shops were not wearing any protective clothing, gloves or safety goggles. Some of the personnel working in the shops wore only shorts, no shirts or shoes, and others who were wearing tee shirts wore only sandals on their feet. The procedure to open the "spent" batteries and either change the plates or remove certain cells rendered the person undertaking the task at risk from acid splashes, and hence burns, to the skin and face, particularly the hands feet and eyes.

Battery plates removed from "spent" batteries and individual cells are air dried prior for sale to the small smelters. There is a risk that when the dried plates are collected and packed into the heavy duty plastic bags that the lead paste on the metallic grids will be disturbed and the lead bearing dust generated disperse into the atmosphere and contaminate those in the immediate vicinity. If inhaled or ingested the lead in such fine colloidal size particles will be readily absorbed into the blood stream.

It should be noted that all of the battery reconditioners observed were located in busy streets and adjacent to other general food stores including outdoor "fast food" vendors. People were observed eating meals outdoors either adjacent to or close by battery reconditioning shops and young children were seen playing in the adjoining streets.

Section 2.1 Smaller Battery Recyclers and Secondary Lead Smelters

The four small smelting facilities visited had changing rooms and lockers for clean clothes. Only one of the proprietors issued their employees with protective footwear and none of them issued any protective clothing. One of the sites had a manual laundry for employees to wash their working clothes. At the other three sites employees were expected to launder their own work clothes at home. It was not possible to observe employees working at the smelters where access was not gained due to high perimeter walls.

Two of the smelters had showers for the operators to use at the end of their shifts and all four plants had hand washing facilities for use prior to meals and refreshment breaks. One of the proprietors had issued his employees with rubber dust respirators and the other three had paper masks available on request. Regrettably at only one of the Sites were any of the operators observed wearing respirators tapping slag and metal from the furnace. Some of the operators were seen to be wearing wet towels or scarves around the face during furnace tapping periods.

The vast majority of operators at the four sites wore shorts, light tee shirts and open toed sandals. Only a few maintenance personnel were observed wearing hard hats. Nobody was observed wearing eye protection, not even when tapping the furnaces.

Battery plates are delivered to the small recyclers in heavy-duty plastic bags and at all four sites were stored unopened until the material was charged to the furnace. Whilst a few of the plastic bags at one of the locations were torn open, this method of storage did adversely contribute to the lead in air levels.

Breaking the bags open prior to charging, however, does pose a serious problem. The bags are opened manually and the contents tipped onto the unventilated charge preparation area adjacent to the furnace. Clouds of dust are clearly visible during this activity and undoubtedly contribute to elevated lead levels.

One of the plants had just installed a new micro-pulsed cyclone assisted baghouse with an automated cleaning cycle for removing fume from the inside of the cloth bags. Unfortunately, this Taiwanese baghouse was still awaiting full commissioning and was not operational during the field trip. It did, however, appear to be a well designed and engineered unit, appropriate to the size of the smelter.

The furnace extraction systems employed at two of the sites and connected to manually maintained baghouses did appear to ventilate smelting fume. During smelting there were few fume emissions from the furnaces observed and the operators seemed to understand how to balance the burner exhaust gases and fume extraction systems. Nevertheless, hygiene extraction was poor on all of the furnaces. This was particularly apparent after firing a new charge and during the tapping phase of the end of the smelting cycle.

Baghouse fume and dust filters require frequent shaking to remove the build up of fume on the inside of the bags to maintain ventilation velocities in the flue system. Without frequent shaking, particularly during the first phase of smelting, the fume adheres to the inside of the filter bag and "blinds" the filter medium, severely limiting extraction and reducing ventilation at the furnace to virtually zero. Furthermore if there is a heavy accumulation of fume, it is subsequently more difficult to remove completely, even with vigorous shaking. Regular, automated and engineered mechanical shaking will minimize the risk of fume building up on the inside of the filter bags.

The exhaust stack from the smelter that contained fume with an aerosol in a 3.0 by 0.3 metre cooling tower was fume free during smelting. Nevertheless, hygiene extraction at the furnace was inadequate and failed to contain all the fume emissions during the tapping phases.

All the furnace stacks at the five sites inspected externally were observed to be fuming white smoke, typical of unfiltered furnace exhaust gases containing lead fume. It is unknown whether these sites have any hygiene or environmental controls. Two of these sites were in heavily populated areas, thereby exposing residents to lead fume. Three of

the four sites inspected internally are located in industrial zones and at least 400 metres from designated housing areas. One of the sites inspected internally has a private residence adjacent to the entrance to the property and appears to be located in a mixed zone, that is, industrial premises and private properties.

The hygiene and smelting flue ducting from all the furnaces converged at various points prior to entry to the baghouse. No mechanical dampers were observed in the respective ducting to optimize either hygiene or smelting extraction. The installation of simple manually controlled dampers located in the furnace and hygiene ducting would allow furnace operators to direct ventilation to maximize extraction to either the furnace during smelting or for hygiene during the slag and tapping periods.

External perimeter inspections at all nine sites did not reveal evidence of liquid effluent pollution, although it is feasible that wastewater from the laundries and the showers will pollute the municipal drainage system with lead bearing dusts. The absence of liquid effluent contamination is because the main feed material for the small smelters are dry battery plates and lead oxide paste.

Only one of the owners of the four smelters inspected admitted landfill disposal of furnace slag. The other three claimed that the slags and residues were continuously re-circulated in the furnaces. It is common and good metallurgical practice to return the slag tapped from reverberatory furnaces to the smelting process. The metallurgy of the reverberatory furnace is such that the slag tapped from the furnace will be rich in antimony, if present in the scrap feedstock, and lead oxides. Returning the slag to the furnace permits a second reduction phase to recover the lead in the slag residue.
There is a point, however, when the slag is so rich in antimony, that re-circulation via the reverberatory furnace fails to reduce the lead content of the slag tapped from the furnace.

The traditional metallurgical solution to this dichotomy is to process this high antimonial lead bearing slag through a high temperature oxygen blast furnace. This additional furnace procedure reduces the lead content in the final residues to less than 5% (and usually < 0.5%) and produces a stable inert disposable slag suitable for either landfill or sale as road hardcore or sandblast material.

Whilst all the furnaces at the sites inspected were either housed in separate buildings or under cover, the solid waste residues were sorted and stored outside and exposed to the elements. It is important to sort through the slag because it is common practice amongst experienced operators who want to ensure that all the slag is tapped from the furnace to allow the slag to flow into the collection pot until molten metal is observed flowing into the pot. This molten lead will sink to the bottom of the slag pot during the cooling phase and solidify. Sorting through the cooled and upturned slag buttons allows operators to recover the valuable metal and return it to the process for ingot casting.

It was noted during the field trip that the slags exposed to the elements for a week or so at all the sites had degraded and were breaking down into a dusty residue. The production of these degradable slags is in part due to the use of soda ash as a fluxing agent in the furnace, thereby producing soluble sodium salts in the slags. During periods of heavy rain there exists the potential for the lead bearing slags to wash away as slurry.

The small recycler with the five tonne Rotary smelter was not operating this furnace during the site inspection. This Rotary furnace is utilized to toll smelt lead-bearing industrial drosses unsuited to the reverberatory furnaces. Rotary furnaces, unless operated at high temperatures using calcium silicate based fluxes, will produce leachable lead bearing residues unsuitable for landfill or any other industrial application. Leachable rotary furnace slags require further metallurgical treatment, which may include solvent extraction of toxic metals, to render the residues inert and safe for landfill disposal.

Section 3 Short Term Upgrading of Environmental and Occupational Health Performance

Section 3.1 Battery Reconditioners

The unauthorized disposal of battery electrolyte must cease. The problem for these reconditioning shops will be where to store and how to dispose of the dilute sulfuric acid. The simple solution is not expensive, but does require education of the battery reconditioners and distribution of materials and reagents.

The Philippine Government must consider suitable legislation and monitoring to ensure that the battery reconditioners do not dispose of untreated battery electrolyte into the environment. The Government should also consider distributing to the reconditioning shops 100 litre heavy-duty plastic drums to facilitate storage of electrolyte drained from the discarded batteries.

Once the dilute sulfuric acid is contained it can either be neutralized with lime prior to discharge or collected by the municipal authorities and neutralized at a central treatment plant. Lime is a cheap neutralizing agent, but the government may have to consider free distribution of the lime to the reconditioners, otherwise the owners of the shops might consider the expense unnecessary. Lime treatment of the battery acid is not an ideal environmental solution because it does not remove any dissolved lead or lead sulfate in the discharge effluent. Of the two "environmentally unfriendly" problems and as "*a first step*", it is preferable to neutralize the acid and discharge the effluent with some dissolved lead and entrained lead sulfate than discharge untreated raw dilute sulfuric acid to the waterways and municipal drainage system. As an alternative the municipal authorities might consider entering into a contract with PRI to treat the battery electrolyte collected from the reconditioners.

The battery reconditioning shops operate on a "shoestring budget" and the provision of any form of safety equipment represents an "unwanted" overhead. The government must educate and encourage owners to follow simple safety precautions. The employees at the battery reconditioning shops should be observing a minimum level of precautions and wear rubber acid resistant gloves, a body apron, boots and goggles. In addition when battery plates are prepared for sale to the smelters the employees should be wearing facemasks, especially when the dried plates are placed in the heavy-duty plastic bags, because this activity will generate a fine lead bearing dust which is easily inhaled.

Hand and face washing facilities should be available as a safety feature to wash away any battery acid that might splash onto the skin or into the eyes. In addition the owners of the shops should be educated to insist that employees wash their hands before eating or drinking.

In a country where smoking cigarettes appears to be almost endemic amongst the working population a smoking ban is unlikely to be observed, but a smoking ban in the reconditioning shops would reduce considerably the risk of ingestion of lead from hand mouth contact.

Reconditioning shops should reinforce any education program with inexpensive signs clearly visible in the place of work. Typically examples of two such signs would read:

"WARNING – LEAD/ACID WORK AREA – NO SMOKING, EATING OR DRINKING"
"LEAD/ACID WORK AREA – WEAR GLOVES, GOGGLES, BOOTS AND APRON"

Section 3.1 Smaller Battery Recyclers and Secondary Lead Smelters

Although most of the owners of the small secondary smelters visited had respiratory and safety equipment available at the smelting sites, few operators wore any propriety personal protective equipment. A thorough education program for the secondary lead smelting workers detailing the potential dangers and hazards associated with lead recycling should be a priority. Such a program should include the simple precautions that can be taken to minimize the risks of lead exposure and furnace related accidents, namely these "*Ten Commandments*":

1. Wear respiratory protection during charging, smelting and tapping operations
2. Segregate work and home clothes
3. Only wear lead smelting clothing at work
4. Do not wear contaminated clothing at home
5. Wash and change work clothing every day or shift
6. Wash hands and face prior to eating or drinking
7. Eat and drink away from the smelting operations in a segregated area
8. Shower thoroughly at the end of the work day
9. Shower thoroughly immediately following a high level lead exposure
10. Do not smoke in the smelting areas

Following such education the owners should enforce the wearing of personal protective equipment. This is not a large additional cost to the owners as much of the basic equipment is already available. The minimum standards for personal protection should be hard hat, respirator, goggles, acid resistant rubber boots and a fire resistant apron when tapping the furnace.

Whilst eating and drinking areas were segregated at all the premises inspected during the field visit, large, but inexpensive signs would serve to reinforce personal hygiene. These signs would remind personnel to wash their hands prior to eating or drinking.

Two of the sites inspected had employee changing, laundry and shower facilities for employees. Nevertheless, there was little evidence that the laundry and showers were actually used to any extent, if at all. The employees at the two sites with showers should be given every encouragement to use the facilities and wash thoroughly at the end of their designated shift. Soap and clean towels should be made available and space provided to hang washed work clothes and any personal towels.

Secondary smelters without showers should consider installing at least one unit, which would at least provide a dousing point in the event that an employee is accidentally badly burned. Such an installation is not inexpensive, but is essential for both hygiene and safety reasons.

As stated in the previous section in a country where smoking cigarettes is almost endemic amongst the working population a smoking ban is unlikely to be observed. Nevertheless, a smoking ban in the smelting areas would virtually eliminate hand to mouth contact and considerably reduce the risk of ingestion of lead.

The introduction of simple manually operated dampers into the extraction ducting from the furnaces to the baghouses would enable the ventilation to be optimized for either smelting or tapping and considerably improve fume capture during slag and metal tapping. Fume capture during tapping would also be improved if the hooding on all the furnaces inspected was lowered closer to the slag and metal pots.

The risk of lead contamination during furnace charge preparation would be reduced if the bags containing the battery plates were cut open and the contents tipped into dust retaining skips specially designed with angle iron lids (see appendix II). These skips can be designed to be lifted by either an overhead crane or mobile or hand fork truck so that the charge can be deposited in or close to the furnace with the minimum of dust dissipated into the work areas. Alternatively the bags could be of a designated size that can be charged to the furnace unopened so that the risk of lead bearing dust emissions from the battery plates is eliminated.

Slag sorting and storage, prior to returning the slags to the process should be under cover to minimize weathering and the degradation of the slag into a dusty residue. Additional buildings are expensive and the only inexpensive solution would be for the owners to manage the undercover space available more efficiently and construct small storage and sorting bays with simple partitions.

Section 4 Long-term restructuring options which:

- **Reduce lead recovery in the informal sector**
- **Increase collection rates of domestically generated lead scrap**
- **Define a role for the small recycler**

Section 4.1 Reduce lead recovery in the informal sector

The long-term options for restructuring the recycling of used lead acid batteries (ULAB) in the Philippines will inevitably involve the country's major secondary lead producer, Philippine Recyclers Inc. The emphasis for this discussion paper is, however, the battery reconditioners and the small smelters.

Information and data collated by the International Lead Zinc Study Group (ILZSG) and the United Nations Conference on Trade and Development (UNCTAD) suggests that the number of ULAB recycled in the formal licensed sector of the secondary lead industry in the Philippines approaches one million units per annum.

This figure, however, represents only 50% of the replacement batteries sold in the Philippines each year. The remaining 50% of ULAB are either reconditioned or smelted in the informal unlicensed and unregulated sector or dumped and "lost" to the environment.

To discuss long term restructuring also requires an understanding of the reasons why the Philippines' has such a proliferation of battery reconditioners. By Filipino standards a new lead acid battery is equivalent to one weeks wages and represents a very expensive commodity. Furthermore because of the climate in the Philippines the average life of a new lead acid battery is approximately two years.

Heat is the number one "*killer*" of a battery; although it increases the performance of the battery in the short-term, life is drastically reduced over time. Heat increases the rate of evaporation, which causes a loss of water from the electrolyte. Extreme heat also increases the rate of self-discharge and promotes the corrosion of the positive plate grids. Antimonial battery alloys are resistant to grid "creep" and "deformation", but are prone to higher gassing rates during charging and the consequent loss of electrolyte. Calcium alloys are not ideally suited to use in hot climates and are subject to grid "creep" and "deformation".

The automotive batteries manufactured in most OECD countries, even those with hot climates, have much longer useful lifespan of between 5 and 10 years. This is because most battery manufacturers use either tin rich antimonial battery alloys to increase grid mechanical strength, reduce "creep" and improve corrosion resistance or special silver enriched alloys, which reduce corrosion and extend battery life up to twice as long as standard grid alloys.

It should be noted, however, that silver rich alloys are not, however, conducive to producing competitive high-grade secondary lead because silver is expensive to remove during the recycling process[6]. Recent studies by the Advanced Lead Acid Battery Consortium (ALABC)[7] have shown that the material strength and corrosion resistance of the positive grids can be improved considerably in calcium lead alloys if the calcium content is reduced to less than 0.08% and tin is added to the alloy to levels between 1.5 and 2%. In addition MetalEurope have been developing special barium lead alloys for use in high temperature applications and early indications are that these grid alloys might extend battery life.[8]

Understandably Filipinos reject paying up to a weeks salary for a battery with a limited life and will seek to purchase or lease a reconditioned unit for under half the cost of a new battery. For as long as lead acid battery life in the Philippines is so poor compared to OECD countries, there will be a market for reconditioned batteries.

The first stage of any major restructuring must be the introduction of long life batteries that provide up to 5 years useful life thereby rendering the reconditioned battery poor value for money and an uneconomic purchase. Additional research may be required to determine the optimum grid alloy composition for lead acid batteries in the Philippines. This could be undertaken in conjunction with a Philippine University, on the basis of South-South co-operation (for instance with India), or with one of the major OECD companies already supporting this area of research.

The size of the battery reconditioning industry in the Philippines will place an enormous resource demand on the EMB if these premises are to be officially inspected, monitored and regulated. If the EMB cannot acquire the necessary resources, then the presence of so many uncontrolled sources of potential lead and sulfuric acid contamination will undermine any environmental improvements made in the formal recycling sector. A change in battery grid technology that extends battery life affords the most socially acceptable way forward. In this context the Government might consider a research grant to a suitable Philippine university to explore existing technologies for battery designs and grid formulations to optimize the construction of a "long life" battery. Such a grant should be a good investment, bearing in mind the advances already made and published. It should also be possible to seek additional funding from the major recycler, PRI.

---

[6] P. Frost, ALABC conference Prague 1998
[7] D. Prengemen, ALABC conference Prague 1998
[8] L. Albert, LABC conference Prague 1998

Because the battery reconditioning industry supports the livelihoods of so many Filipinos, any legislative program by the Philippine government to displace those employed in this sector will have serious social consequences. It is unlikely, however, that regulation alone would eliminate the trade. As long as there remains a strong demand for cheap automotive batteries this unregulated trade will continue to prosper, albeit "underground" and possibly illegal.

New grid technology that dramatically increases the life of a battery reduces the number of batteries in the recycle loop and encourages the purchase of new batteries, and not reconditioned units, apart from those that just need recharging. The retail market in "long life" lead acid batteries would therefore be the driving force to displace "cannibalized" reconditioned batteries. Moreover, this would be a slow transition over a number of years, effective only as the new units become available and confidence in the new technology grows. Over say a five-year period the demand for so many reconditioning shops will reduce and the number of premises decline. The process of change should be sufficiently slow as to allow those engaged in the trade to seek new ventures and alternative employment.

During this period it is imperative that the Philippine government and the secondary lead producers extend battery collection incentives to encourage some of the reconditioners to become scrap ULAB collectors. The Government should consider legislation that requires whole scrap batteries complete with electrolyte to be collected and stored prior to delivery to a secondary smelter.

Ideally the batteries should be palletized, shrink-wrapped and delivered unbroken to the secondary recyclers. While this might be impractical in the near future, this is the standard in the best recycling regimes and at PRI, and should become general practice in the Philippines.

In return the reconditioners should be given the opportunity to retail and lease new inexpensive batteries in exchange for scrap ULAB. This opportunity will provide a further incentive to dispense with the reconditioning trade and accelerate the integration of the reconditioning sector into the mainstream recycling sector, which has an excellent record of collecting ULAB with the licensed secondary smelters.

Section 4.2 Increase collection rates of domestically generated lead scrap

The gradual decline of battery reconditioners will not necessarily increase the percentage of scrap batteries in the Philippines collected and recycled at the licensed smelters. At present, whether "spent" batteries are sent directly to the major smelter, PRI, or are exchanged for a reconditioned battery, and "spent" cells sold to the smaller smelters, virtually all the lead in both recycling circuits is recovered. A small quantity might be sold to the backyard melters, although no evidence of this activity was found in Manila during the field, but even if this is the case, the quantity will be small.

Any change in the plate grid technology that increases the working life of the lead acid battery reduces environmental contamination from the dilute sulfuric acid and lowers the risk of population exposure from lead oxide dusts. Essentially the tonnage of lead recovered from ULAB within the current recycling circuit or PRI, the small recyclers and the battery reconditioners is the same, although environmental and population lead exposure is dramatically reduced. Improvements in collection and recycling rates for ULAB in the Philippines must, and can only come from new sources of ULAB, as yet not collected and possibly dumped in the environment.

The Republic of the Philippines consists of about 7,100 islands, but fortunately for the battery smelters over 50% of vehicle registrations are in the Metro Manila area and most of the remaining registrations are on the main island Luzon and the islands of Negros, Mindanao, and Cebu. RAMCAR, the parent company of PRI and the owner of Motolite Batteries has over 800 retail outlets in the Philippines (the Map in appendix I) including the largest islands. The RAMCAR "Balik Bateria[9]" collection scheme guarantees a discount on a new Motolite battery if the ULAB is returned and traded in at the time of purchase. Thus PRI has effectively a nationwide network of 800 ULAB collection points.

Philippine new battery sales suggest that there are at least another 500 independent battery retailers. The independent retailers do not necessarily collect ULAB when a new battery is sold and even if they do, they might not sell the ULAB to PRI or any other small recycler for recovery. Furthermore it is doubtful whether it is profitable for retailers not located on the main island to economically return small quantities the ULAB to the PRI site, bearing in mind that ULAB have to be shipped to the main island of Luzon in an environmentally sound manner.

The options for battery retailers who collect ULAB and wish to arrange for them to be recycled are limited. None of the small recyclers have the necessary plant and equipment to receive and process whole case batteries in an environmentally acceptable manner. Those retailers who might be environmentally conscientious and want to ensure that the whole ULAB are recycled to the highest environmental standards can only sell the batteries to PRI, because the Bulacan plant is the only site at present with the necessary equipment to contain and neutralize the battery acid.

The price offered by PRI for such batteries is lower than the current price offered by the battery reconditioners, because transporting and shipping ULAB safely is comparatively expensive, especially if they have to be shipped to the mainland by boat. This gives the small recycler, without shipping costs, a competitive advantage and consequently they are in a position to offer higher prices for the scrap materials.

[9] Appendix 1

There was no evidence that the small recyclers are processing whole case batteries in any large numbers. Nevertheless, if the battery reconditioners are likely to decline over the next 5 years or so, the owners of these sites will be forced to consider whole ULAB as a feedstock in the absence of readily available battery plates. Under current licensing regulations none of the small recyclers are likely to obtain accreditation from the EMB to process whole ULAB unless they install facilities to contain and neutralize the battery acid.

There are virtually no small battery recyclers in OECD countries, because over the last twenty years the enormous cost of complying with environmental and occupational health standards could only be met by those companies with high capacity recycling plants. The smaller recyclers became uneconomic and ceased to operate.

New technologies developed in the last 10 years could, however, improve the prospects for small recyclers. Environmentally sound pyro-metallurgical and hydro-metallurgical battery reprocessing plants can be designed on a smaller scale to receive whole ULAB, break them, separate the components and smelt the lead bearing scrap. In line computer control systems enable processes to be controlled in real time. Process engineers do not have to rely on vast waste storage bunkers to contain effluent for retrospective treatment prior to discharge. Furnaces do not have to be large for economic batch processing, as certain modern designs facilitate continuous charging and tapping. Such designs enable the design engineers to scale the furnaces to suit the anticipated demand, large or small.

It is therefore feasible for some of the owners of the small recycling plants in the Philippines to consider upgrading their processes over the next five years to include those items of plant that would enable them to comply with the licensing requirements of the EMB. Existing reverberatory furnaces could be either integrated into the upgraded site or replaced with similar sized furnaces, but not necessarily the same technology.

To ensure a return on investment in new process equipment it is important for the owners of the small smelters to secure a supply of ULAB. As outlined above PRI will dominate the market for ULAB in the Metro Manila area and attract additional supplies from their retail outlets on the other main islands. There are, however, areas of the Philippines where PRI does not collect many batteries because it is either uneconomic or the retail outlets to collect ULAB do not exist (see appendix I, retail map of the Philippines).

It would be beneficial to both the owners of the small recyclers and the environment of the Philippines if small recyclers could be located in these areas. Indeed, some already are and would be ideal candidates for upgrading their facilities.

Those small smelters that are located in the heavily populated areas of Manila should either: -

- cease operating due to a lack of supply of battery plates;
- be closed by the EMB for failing to posses valid environmental compliance certificates or adequately contain battery acid or control the discharge of battery acid
- relocate outside Manila to an area with a potential supply ULAB scrap.

From an environmental perspective it would be most desirable for those smelters located in populated areas to move to either remote locations or industrial zones. Certainly those located in the populated areas of Metro Manila should be closed.

Such a strategy will undoubtedly improve overall collection rates of ULAB in the Philippines as the small recyclers relocate to other ULAB catchment areas and seek to maximize scrap feedstock.

Section 4.3 Define a role for the small recycler

In those areas of the Philippines where PRI do not have retail outlets and by previous definition a collection center for ULAB, have an obvious role. Their role and any incentive to upgrade their facilities is somewhat unclear in those areas of the Philippines close to the Bulacan smelter or where PRI have retail outlets and collection centers. As the number of battery reconditioners declines, PRI and the Smaller Battery Recyclers will be competing for the same raw materials.

It is, however, expensive for PRI to ship ULAB from the many islands in the Philippines to Luzon in compliance with the statutory environmental requirements.

Consideration should therefore be given to setting up regional secondary lead consortiums between PRI the Smaller Battery Recyclers. The basis for such an arrangement would be as follows:

- PRI would send all the ULAB collected in the outlying islands, that is apart from Luzon, under the RAMCAR "Balik Baterya[10]" collection scheme to local Small Battery Recyclers and Secondary Lead Smelters for processing under a consortium toll contract. In this way PRI would avoid the high shipping and transport cost associated with returning the ULAB to Bulacan.
- The Smaller Battery Recyclers and Secondary Lead Smelters would break and segregate all the recoverable materials in the ULAB.

[10] Appendix 1

- PRI would assist Smaller Battery Recyclers and Secondary Lead Smelters on the islands of Negros, Mindanao, and Cebu to set up neutralization plants for the treatment of the battery electrolyte.

- The polypropylene battery case material would crushed or shredded and resold to PRI at "fair" prevailing market prices to be cast into new battery cases at the RAMCAR battery manufacturing plant.

- The lead in the battery grids and the lead oxide and sulfates should be recovered, cast into ingots and sold to PRI as crude lead bullion. Transporting lead bullion does not pose any environmental hazards and considerably reduces the shipping costs per tonne of lead recovered.

The remaining question is the technology that the smaller smelters could consider and afford.

There are essentially two competing technologies that can be "tailored" to be suitable for the smaller recycler, one is based on the CSIRO/ISASMELT submersible lance furnace and the others are hyro-metallurgical processes.

Both have problems associated with operating overheads and ancillary costs.

The submersible lance technology generates high temperatures and requires expensive furnace refracortories and automated baghouse systems that are energy intensive. This type of furnace requires the minimum of reagents and produces an inert slag that can be granulated and used as hardcore for roads or landfill.

This is, nevertheless, an established technology with plants in the UK, Belgium and a new one under construction in Malaya. A Company in Melbourne, Australia, specializes in designing and delivering purpose built furnaces. The predominant product from this furnace is "soft" lead, that is antimony free, which would suit the demand of the RAMCAR battery plant.

The hydro-metallurgical processes are difficult to assess, as there are so few operating commercially. The main drawbacks seems to be the high cost of electricity associated with the electrolytic production of pure lead and the disposal of highly toxic slimes that accumulate as residues in the bottom of the electrolytic tanks.

In theory, the hydro-metallurgical processes offer a new way forward to environmentally friendly recycling. All the hydro-metallurgical processes dissolve the grid metallics and the lead oxide and sulfate paste in an acid or base solution. The process is therefore free of lead bearing fumes and emissions. The lead salts are then passed to an electrolytic cell for purification by electrolysis. Installation costs for turn-key projects would be high.

One of the proposed hydro-metallurgical processes, the PLACID process, employs a technology that could be adapted favorably to suit the circumstances in the Philippines. Such an approach is already under consideration in India and is basically as follows:

a) Dissolve the grid metallics, oxides and sulfates in a the PLACID acid/brine solution
b) Adjust the PLACID process to partially refine the lead without proceeding to the final electrolytic stage
c) Process the partially refined lead in a conventional low temperature melting furnace, such as a small Rotary furnace, at about 500-600° Celsius to produce a cast lead bullion suitable for refining at the PRI Bulacan plant.
d) Careful control of the process should result in the production of gypsum (calcium sulfate) as the only waste product. Gypsum can be sold as a useful raw material to the cement industry and plaster board manufacturers.

The PLACID process is patented and more information is available, but only with the permission of the owner of the license[11].

Such a mix of new and conventional technology should provide an environmentally friendly option that has potential as a viable alternative to either pure pyro-metallurgy or electrochemistry. Certainly the ability to utilize a low temperature melting furnace will minimize fume problems, baghouse requirements, and reduce fuel consumption.

Under the above scheme the smaller recyclers would have a role in the future growth of the secondary lead industry in the Philippines and would therefore be more receptive to change and cooperate with the Government in the implementation of this program.

Section 5. The Role of the Government of the Philippines

It is imperative throughout the period of adjustment following the introduction of both short and long term improvements that the EMB remain vigilant in their pursuit of those recyclers that do not meet the minimum standards of environmental control. The EMB should consider penalties against those recyclers that consistently fail to meet the standard required, including revoking the operating license of persistent offenders. It is also important to locate new, but unlicensed, smelters in remote and populated areas and ensure that uniform standards are applied throughout the Philippines.

This strategy should not represent an undue strain on the manpower resources of the EMB and it would certainly be more desirable to monitor 8 or 9 small smelters than a thousand or so battery reconditioners.

[11] David Andrews Projects Limited, UK.

The Government and the EMB have a key role in these strategies to ensure that every assistance is available to provide relocation incentives and facilitating technology transfer to those small recyclers receptive to environmental improvements. The benefits to the Government for adopting this strategy are fivefold:

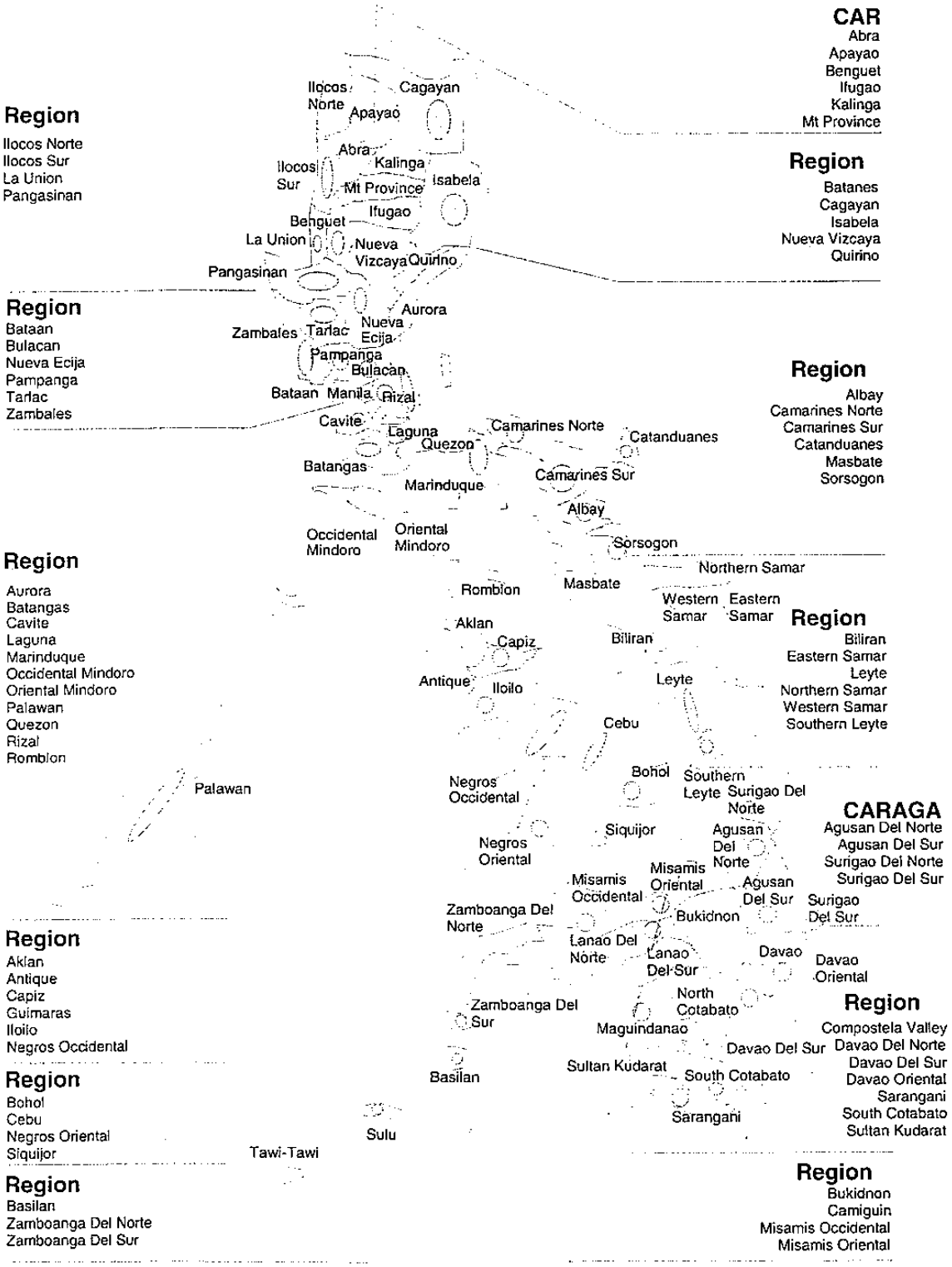
- the environment will be protected from the adverse effects of ULAB recycling
- occupational and population lead exposure will be reduced
- immediate and severe financial hardship will not be inflicted on those in the local population involved in battery recycling and who might economically and socially be adversely affected by improved environmental performance
- sound environmental performance in the secondary lead industry will considerably enhance the prospects of concluding Article 11 Agreements for the import of ULAB to meet the increasing demand for secondary lead
- the Philippine economy will be less reliant on the import of primary lead to meet the shortfall of secondary lead

The Philippines has a prosperous lead acid battery industry exporting 350,000 production units annually. This industry is an important contributor to the wealth of the nation, but unless the demand for lead for the battery industry can be met from secondary materials, the manufacturers will have no alternative but to import primary lead. There is usually little added value in manufacturing batteries from primary lead at the London Metal Exchange (LME) world prices, although in the current market the price differential is small. Nevertheless, there is still a considerable scope for adding value when lead is imported at scrap prices, recycled and resold, effectively at primary lead prices, in new batteries.

The above strategies encompass both short and long term improvements. The social disruption that might be caused by a short-term strategy that eliminates those employed in the reconditioning and informal battery recovery sectors would be so severe that it can be anticipated that the activities would be driven underground. Consequently, only the essential improvements to occupational health and the environment can be considered short term. All other strategies can be considered long term and aim to integrate all those parties involved in the recycling sector into an environmentally sound and cohesive industry in a socially acceptable manner.

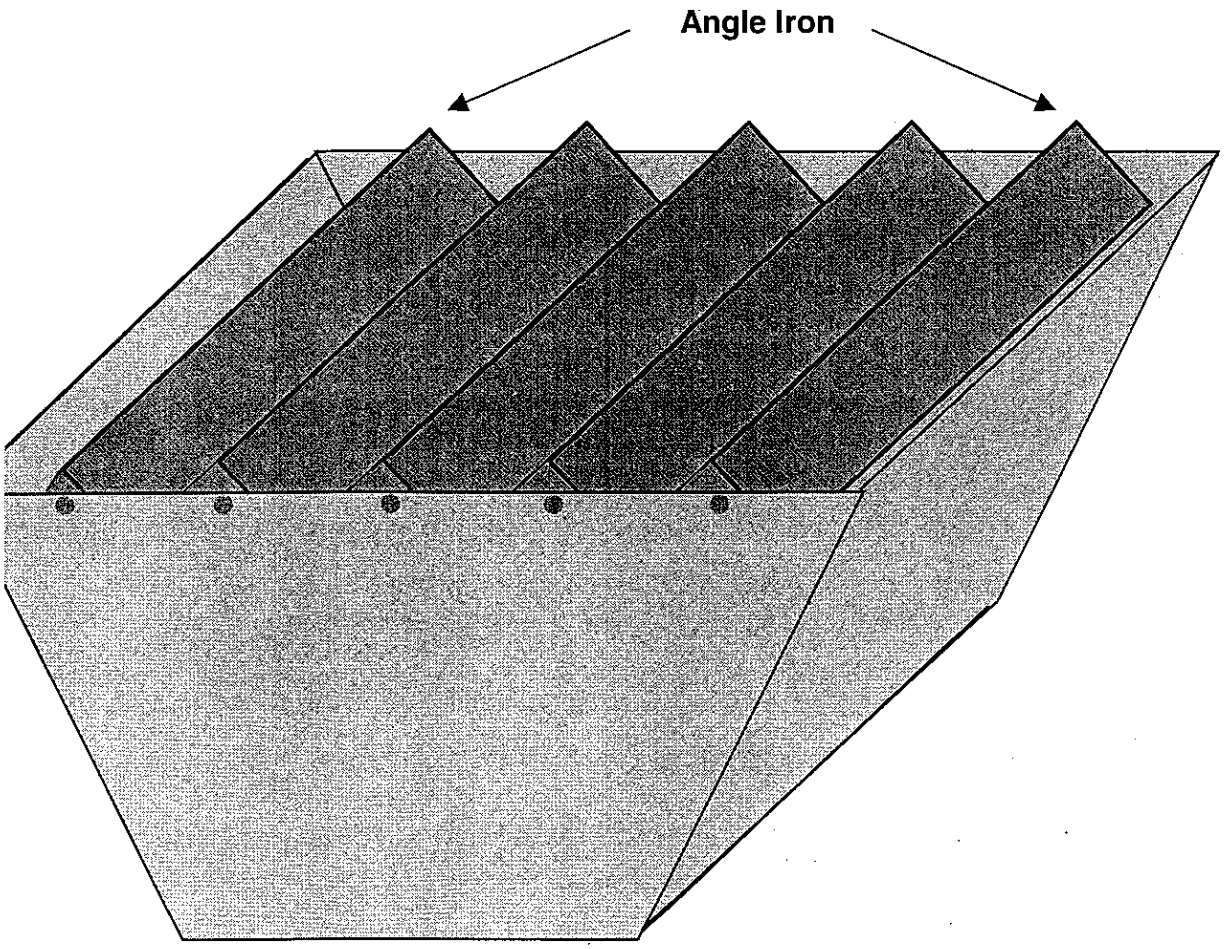
Brian Wilson
March 10, 1999

Provincial Catchment Area of Scrap Battery Collection within The Balik Baterya Program of Philippine Recyclers, Inc.

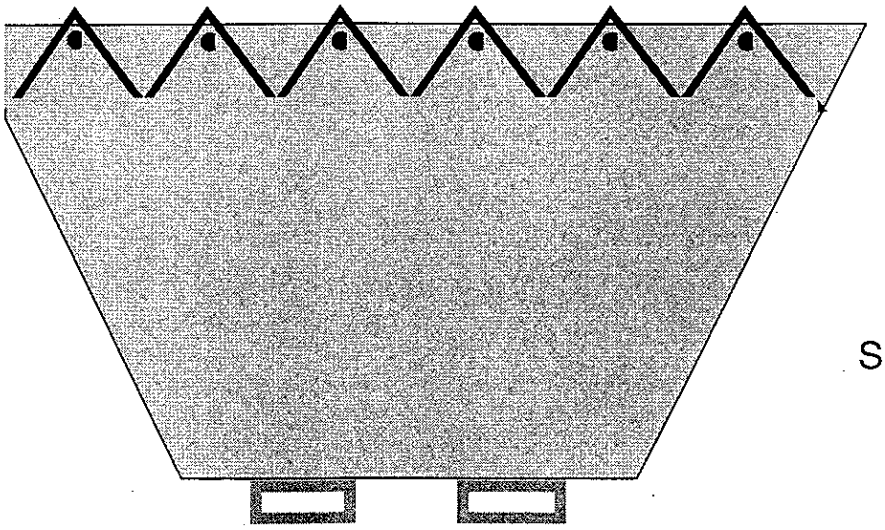


Provinces covered by the collection

Dust Reducing Skip



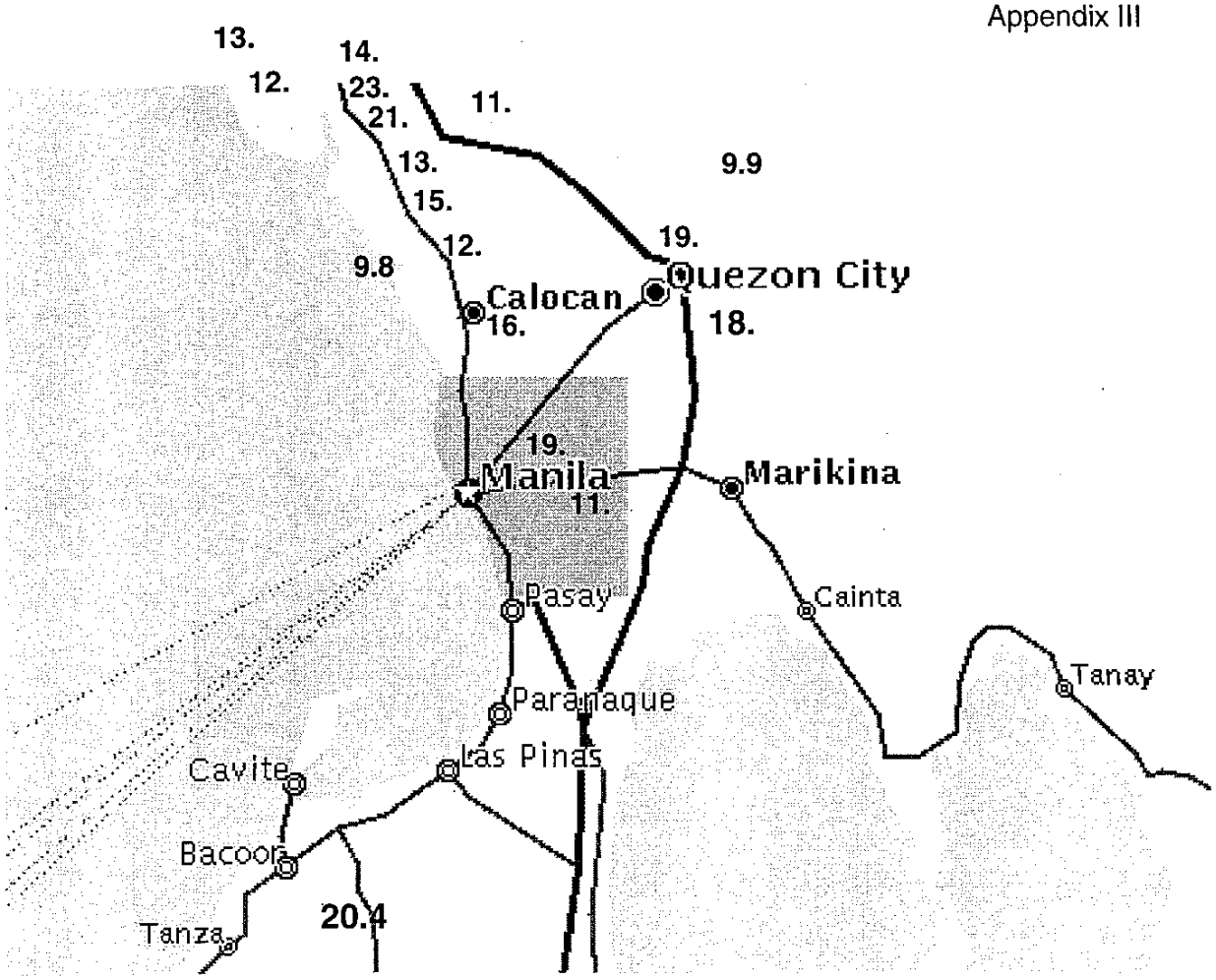
Drosses and fume "dumped" onto the skip open the swivel lids of "angle iron" to pass down into the skip. The angle iron lids swivel back into position and seal the skip.



Side elevation

PRI Employee Baseline Lead in Blood Averages

Appendix III



Metro Manila Towns	sample size	average	Metro Manila Towns	sample size	average
Sta Maria	2	11.3	San Iidefonso	1	18.21
Plaridel	4	13.49	San Jose del Monte	2	9.89
Meycauayan	45	15.94	San Miguel	1	15.1
Marilao	23	21.58	Navotas	1	9.79
Bocaue	14	23.06	Quezon City	3	18.28
Hagonoy	4	12.53	Valenzuela	34	15.32
Obando	6	14.08	Malabon	4	12.5
Baliuag	2	14.37	Caloocan	4	16.7
Calumpit	4	13.21	Novaliches	1	19.55
Pandi	5	14.05	Sta Cruz	1	17.3
Paombong	1	22.22	Guagua	1	8.9
Balagtas	4	12.04	Imus	1	20.42
Malolos	7	15.02	Mandalutong	1	11
			weighted average		16.52

UNCTAD / ILMC Philippine Project

Field Study Report

Small Battery Recycling Plants

Environmental and Occupational Health Assessment

August 1998

1. Process

LEAD RECYCLING PLANT	1	2	3	4
1. Lead bearing materials recycled	Battery Plates drosses	Battery Plates	Drained batteries & plates	Battery Plates
2. Annual tonnage of recycled materials	1,400	1,200	1,200	1,800
3. Procedures for material collection	Delivered by truck	Reconditioners deliver by truck	Purchased & collected by truck	Purchased & collected by truck
4. Facilities for the reception of materials	Concrete bay in plastic sacks	Undercover bins	Plastic sacks in the yard	Under cover concrete bay in plastic sacks
5. Procedures for sorting scrap materials	N/A	N/A	Manual	N/A
6. Mechanically or manual battery breaking	N/A	N/A	Manual	N/A
7. Battery component separation process	N/A	N/A	Manual	N/A
8. Separate component transport system	N/A	Fork truck	Fork truck	N/A
9. Scrap smelting process and furnaces	2 x reverberatory 1 x rotary	Reverberatory	Reverberatory	Reverberatory
10. Furnace charging system	Manual by shovel	Manual by shovel	Manual by shovel	Manual by shovel
11. Furnace combustion conditions	Diesel / waste oil & air	Diesel oil & air	Diesel oil & air	Diesel oil & air
12. Furnace hygiene regimes	furnace extraction hoods to 2 baghouses	Surgical face masks	Extraction to water scrubbing tower	Extraction hood to baghouse
13. Baghouse ventilation & extraction systems	2 cyclones to baghouse	None	Extraction to water scrubbing tower	Manually shaken bags
14. Furnace lead and slag tapping regimes	Metal & slag tapped to separate pots	Metal & slag tapped to separate pots	Metal & slag tapped to separate pots	Metal & slag tapped to separate pots
15. Slag treatment, storage & disposal	Weathered on open ground & recycled	Open compound	Land fill	Recycled
16. By-products treatment	Baghouse fume recycled	N/A	Baghouse fume recycled	Recycled
17. Ingot casting procedures & process	By ladle from metal pot	By ladle from metal pot	By ladle from metal pot	By ladle from metal pot

2. Environment

	1	2	3	4
1. Chemical composition of typical discard	N/K	N/K	N/K	N/K
2. Atmospheric discharge limits	N/K	N/K	Results with EMB	N/K
3. Ranges and the mean atmospheric discharge results for the smelter	N/K	N/K	Results with EMB	N/K
4. Discharge standards for liquid effluent discharge	N/A	N/K	EMB	N/K
5. Raw material storage prior to furnace charging	Storage bin	Covered bin	Plastic sacks	Storage bin
6. Process area extraction and ventilation systems	Extraction hood to a baghouse	Exhaust ventilation	Extraction hood to a baghouse	Extraction hood to a baghouse
7. Baghouse cleaning and maintenance regimes	Automatic pulsed	N/A	Manually as required	Manually shaken
8. Baghouse cleaning and maintenance procedures	Maintained when stack is smoking	N/A	Top up water and remove fume sludge	Damaged bags changed as required
9. Chemical composition of the return slag	N/K	Iron matte, Na_2SO_4, FeO, SiO_2, $FeSi_2$	N/K	N/K
10. By-product storage areas	No	No	Sealed solid concrete	No
11. Disposal method of the discard slag	Landfill	Recycled	Landfill	N/A
12. Proximity of local population to the plant	300 meters	100 meters	Adjacent	Approx. 2.5 meters
13. Person responsible for environmental performance	Plant Manager	Plant supervisor	Owner	Owner

3. Occupational Exposure

	1	2	3	4
1. Number of employees and contract personnel working at the plant	25	20	10	16
2. Age and service profiles	N/K	Average age 35 years	5 years service	Average age 35 years 1.5 years service
3. Labor turnover rates	Low	Low	Nil	Nil
4. Hours of work, shift system and working patterns	3 x 8 hours continuous rotating pattern	3 x 8 hours continuous rotating pattern	7 x 8 hour day shift 2 x 15 hour rotating night shift	2 x 12 hour rotating shifts
5. Plant changing facilities and regime prior to starting work	Changing room, lockers for personal clothing	Changing room, lockers for personal clothing	Changing room, lockers for personal clothing	Changing room, lockers for personal clothing
6. Plant changing facilities and regime at the end of the working day	Changing room, lockers for personal clothing	Changing room, lockers for personal clothing & laundry	Changing room, showers, lockers for personal clothing	Changing room, showers, lockers for personal clothing
7. Protective process clothing	none	None	Personal issue	Personal choice
8. Process clothing changing & washing regime	none	Daily clean set	Daily clean set	Plant laundry facilities
9. What is the regime to ensure that process workers wear clean clothes?	None	Inspection	Inspection	Inspection
10. Segregation of eating, drinking & process areas	Segregation	Segregation	Segregation	Segregation
11. Washing or showering facilities prior to consuming food and drink	Hand wash	Hand wash	Hand wash & shower	Hand wash & shower
12. Hygiene surveillance program	None	None	None	None
13. Respirator policy for process areas	Respirators issued	Respirators issued	Respirators issued	Respirators worn to tap & charge furnace
14. Occupational exposure training	Initial instruction	Initial instruction	Initial instruction	Induction training
15. Person responsible for hygiene & occupational health	Plant Manager	Plant supervisor	Owner	Owner