PAN AMERICAN CENTER FOR SANITARY ENGINEERING
AND ENVIRONMENTAL SCIENCES (CEPIS)

PROCEEDINGS

I MEETING OF THE TECHNICAL NUCLEUS
IN HAZARDOUS WASTE MANAGEMENT

Lima, 5-9 November 1990

Ing. Livia Benavides
Ing. Maria Rincones

World Health Organization
Pan American Health Organization
Environmental Health Program

Under the auspices of: Deutsche Gesellschaft für
Zusammenarbeit (GTZ) GmbH

June 1991
1. INTRODUCTION

Industrialization in the Region, as well as exploitation of natural resources during the last decades, have brought about improvement in technological development and the quality of life; however, it has also implied a gradual damage to the environment due to the dumping of hazardous wastes into the surface waters, soil and atmosphere.

In order to face this problem, the Pan American Health Organization (PAHO), through the Pan American Center for Sanitary Engineering (CEPIS) has established the Regional Program for Hazardous Waste Management through the German Agency for Technical Cooperation, GTZ. The goals and strategies for this program have been reviewed and adapted to the Latin American setting by a Technical Nucleus, composed of experts from industrialized countries and from countries in the Region. The objective of the Regional Program is to strengthen existing programs and develop them, in those countries where they do not exist, in order to securely control industrial wastes, allowing, of course, for industrial development in harmony with the environment. This Regional Program is a complement of other programs at CEPIS, such as the Evaluation and Control of Toxic Substances in Surface Waters and the Prevention of Groundwater Pollution. This document presents the Proceedings of the I Meeting of the Technical Nucleus.

2. PARTICIPANTS

Representatives from the following countries participated in the I Meeting of the Technical
Nucleus in Hazardous Waste Management: Argentina, Brazil, Colombia, France (OECD), Mexico, Peru, Puerto Rico, United States and Venezuela. There were 19 participants, 12 internationals (funded by the CEPIS/GTZ Cooperative Project and the PAHO Representations in a number of countries), 2 Peruvians and 5 CEPIS Staff Members. The list of participants is included as Annex 1.

3. PROGRAM OF THE MEETING

The program of the I Meeting of the Technical Nucleus is presented in Annex II. During the first two and a half days, the country representatives presented their experiences in the hazardous waste area. Lectures were divided according to broad theme areas, that is, analysis of the present situation; minimization and recycling as the common and principal strategy for action; transport, treatment and disposal and legislation on hazardous wastes. During the remaining two and a half days there were work sessions, in which the priority areas in hazardous waste management were analyzed. As a result of the working sessions the conclusions and recommendations were written, as well as the future work plan.

The list of lecturers and documents compiled during the meeting can be found in Annex III. The summary of the lectures is given below.

3.1 Environmental risks

Following the presentation from the Director of CEPIS, Mr. Alberto Flórez Muñoz, on the philosophy and modus operandi of the Technical Nucleus, Dr. Daniel Watts of the New Jersey Institute of Technology (NJIT) gave a presentation on risk analysis. During his lecture, Dr. Watts, among other observations, cited the list of ten recommendations of an expert group from the US-EPA.
Among these, the following were noteworthy:

- Planning and the budgetary process must reflect priorities based on risk analysis.

- The efforts in environmental protection must be directed towards the greatest possible risk reduction.

- Pollution prevention must be emphasized as the risk reduction option.

3.2 Analysis of the present situation

In this part of the program, the representatives from Puerto Rico, Pedro Antonio Maldonado of the Environmental Quality Board (JCA); México, Efraín Rosales of the Urban Development and Ecology Department (SEDUE); and Brasil, Marcia Drolshagen of the Rio de Janeiro State Foundation for Environmental Engineering (FEEMA), presented summaries on hazardous waste management in their jurisdiction.

The representatives described the legal framework under which their hazardous waste management programs are run. In the case of Puerto Rico, the same law is applied as in the United States, that is, the Resource Conservation and Recovery Act (RCRA). This legislation is applied directly by the JCA in Puerto Rico. In addition, the Board has prepared a law promoting hazardous waste minimization and recycling on the island.

In the case of Mexico, the hazardous waste legislation is managed on a country-wide level by SEDUE. In this country, the concern for adequate hazardous waste management arises not only due to those generated by the national industry, but also by the "maquiladoras". These are American industries located in Northern Mexico, close to the border, which assemble and/or package products to
be returned to the USA. This industry generates large quantities of wastes which require a special control program.

On the other hand, in Rio de Janeiro, the law is specific to the state, making its management easier. Still, problems have arisen, especially since nearby states have different control laws or have none at all, while at the federal level, there is no legislation on this subject.

In all cases, economic and human resources limitations, as well as cleaning of abandoned sites, were cited as the main problems.

Dr. Yakowitz, of the Organization for Economic Cooperation and Development (OECD) provided a summary on hazardous waste management in industrialized countries. He emphasized that, depending on the hazardous waste classification method, the quantity to be controlled will vary. For example, the volumes reported by the United States are very large because some liquid effluents are included in their classification system, but are not considered as hazardous wastes in others.

3.3 Hazardous waste classification and rapid assessment

As to hazardous waste classification, Dr. Yakowitz described the different systems used in industrialized countries. Among these, he emphasized the German system, since the code describes the waste and the recommended disposal method. He recommended that this system be applied on a national level in those countries with no classification system. On the international level he suggested that the International Waste Identification Code (IWIC) be adopted.
As to rapid assessment methods, Livia Benavides (CEPIS) presented the INVENT model (developed by Dagh Watson SpA for the World Bank) which estimates the quantities of solid and liquid wastes generated by industry based on employment statistics. The main problems identified with this method are the description of wastes and the use of employment statistics to carry out the estimates. Both of these may distort results somewhat.

3.4 Hazardous waste minimization

Dr. Daniel Watts presented the philosophy of waste minimization. He explained the reasons that motivate minimization, as well as, the different existing technologies such as: process modification, hazardous substances substitution with other less dangerous and material recuperation and reuse.

As examples of this strategy, some case studies were presented. María Rincones of the Universidad Central de Venezuela (UCV) and Max Zárate (CEPIS), then presented the case study on minimization in a tannery of goat and sheep hides. Although this project is still going on, initial data show that the reuse of de-hairing and tanning liquors is feasible.

Carlos Alberto Gomez of the National Institute for Water Science and Technology (INCYTH) presented a parallel case in the reuse of the chromium liquor in a bovine tannery in Argentina. This reuse has shown to be highly beneficial and has been implemented in many tanneries in the Great Buenos Aires area.

In this tannery, the reuse of the dehairing liquor was also evaluated. Although results showed that the reuse was possible, this technology was not implemented because it did not show a clear economic benefit.
Mr. Gómez also presented a case study in a metal finishing plant where fantasy jewelry is produced. In this case, minimization measures were implemented in order to save water and reduce losses of liquors, such as: adequate drag-out of the pieces, counter-current rinsing and mixing of the rinse waters. Chemical products recovery techniques were also applied on spent baths through the use of ion exchange.

Industrial waste recycling outside the plant was presented by María de Lourdes Maffey from the Mexican Health Department (SSA), who talked about the industrial waste exchange in Mexico. The objective of this exchange is to promote the use of industrial wastes and installation or recycling plants. Although, the exchange has had a positive impact, she stressed that it should be more active.

3.5 Transport, treatment and disposal of hazardous wastes

Pedro Penteado de Castro Neto of the Corporation for Technology on Environmental Sanitation (CETESB) presented a paper on the hazardous wastes control system in the State of São Paulo, Brazil. This system was designed based on that from the United States. CETESB is responsible for the control of hazardous wastes, which is made effective through the following subsystems: closure or standardization of existing treatment and disposal sites, control of generators, control of transporters and new treatment and final disposal sites. The main limitation that CETESB must face is the lack of resources to control a large industrial park as is the State of São Paulo.

Dr. Raúl Arias, of the Cauca Autonomous Regional Corporation (CVC) explained that industrial effluents are being controlled in the Cauca river basin in Colombia. However, there is still no hazardous waste control program.
Even when hazardous waste control systems exist, siting of a treatment and/or disposal plant can be very difficult, especially due to the opposition from the nearby community. This is called the NIMBY (Not In My Back-Yard) syndrome. As Dr. Watts stated, this is due to the risk perception by the community which can be easily distorted. Obviously, it is necessary to take into account and involve the community throughout the whole of the siting process.

Finally, Dr. Harvey Yakowitz described the Basel Convention on the Control of the Transboundary Movements of Hazardous Wastes and their Disposal. Dr. Yakowitz recommended its ratification by the countries in the Region, since the Convention is a legal tool at the international level which can support effectively the application of national laws.

3.6 Hazardous wastes legislation

A panel was carried out on this subject, where initially Pedro Maldonado, Marcia Drolshagen and Efraín Rosales described the legislation on hazardous wastes in their state or countries. Following this, there was a discussion on the different control systems existing in the countries represented in the meeting. It was concluded that legislation should not be directly adopted from an industrialized country. Rather, it is recommendable to apply laws gradually in such a way that its enforcement is feasible.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Hazardous wastes management. General scheme for its implementation

Since the subject is very extensive, and, in order to consolidate recommendations, it was considered convenient to prepare a general scheme that could serve as guideline for the implementation of a hazardous waste control program.
4.1.1 Hazardous Wastes Classification and Quantification

It is necessary to start with the definition of hazardous wastes and how it is evaluated. Such definition must be uniform, simple and must be based on the five factors common to those countries which have a particular definition of hazardous wastes, that is, corrosivity, reactivity, explosivity, toxicity and flammability.

Countries must adopt a national hazardous waste classification system which should be clear and brief.

Countries lacking hazardous waste classification systems must adopt one, preferably the German system, before preparing an inventory on hazardous wastes generation. It is the duty of the countries to carry out this inventory, to the extent allowed by available resources, so that it will have the greatest possible precision. The inventory will quantify the amount of wastes generated, allowing for decision making and establishment of control priorities.

Those countries which agree with their present classification system or which cannot modify it (due to political opposition, slow legislative processes, bureaucratic inertia, etc.), can keep such a system and can apply it internally within their territory, but could also adopt a different classification system to be applied in the international exchange of their own or other hazardous wastes.

In order to facilitate the exchange of information and technology, as well as to provide an adequate mechanism for a potential international movement of hazardous wastes, it is necessary to adopt an international classification system of hazardous wastes. This system should be simple,
uniform and easy to translate to the national classification system and vice versa. Those countries which do not have classification systems, must adopt those which will allow a rapid conversion to the international system.

The international classification system, known as IWIC (International Waste Identification code), is highly recommendable since it complies with the criteria mentioned above.

It is also necessary to take into account that in the case of transportation of hazardous wastes, the United Nations International Classification for Hazardous Materials must be adopted by the countries.

Finally, the countries must participate or be alert on activities related to the Basel Convention, since it will establish international agreements on the most practical hazardous waste classification and evaluation codes for international exchange.

4.1.2 Legislation

Implementation of a hazardous waste control system depends on the creation of coherent and effective legislation at all levels as follows:

a. Constitution

- Adapt the countries' Constitution in order to promote the basis for environmental and health protection.

b. Specific legislation

- Must be general and broad.
- Must create the institution.
- Must establish penalties and responsibilities to hazardous waste generators.
- Must provide environmental protection policies and specific legislation must be given in relation to transfrontier movements of hazardous wastes.
- Legislation must be given to promote and guarantee community participation.

c. Regulations
- Define responsibilities and scope.
- Criteria for hazardous waste characterization, handling, transport, storage, treatment and disposal. Also, for field inspections, monitoring, post-closure and hazardous waste analysis.

d. Standards and procedures
- Specific procedures for hazardous waste characterization and analysis.
- Procedures for physical, biological and chemical treatment and incineration, as well as transport, storage, recycling and final disposal of hazardous wastes.
- Manifests for generators, transporters and final disposal facilities. The mechanism to obtain the return of the document must be included.

4.1.3 Global planning for hazardous management

Global planning is necessary before a hazardous waste management system is implemented. This strategy implies the following activities:

a. Evaluation of types, quantities and location of generated wastes through inventories.

b. Establishment of the needs as to number, size, type and location of hazardous waste treatment and/or disposal plants.
c. Determination of the technical and financial contribution required in the different governmental and private sectors for implementation of these facilities.

d. Setting-up of priorities, in terms of industrial sectors and, as a consequence of hazardous wastes on which control should focus.

4.1.4 Hazardous waste control infrastructure

a. The government must establish the control system on hazardous wastes. This role can be given at all levels within political organizations in a country.

b. Countries having a federal political organization, or which have several political sub-divisions must control through a strong legislation at the federal or central level.

c. Nevertheless, good communication channels with municipalities or local regional governments must be established so that they may aid in monitoring and surveillance of the federal legislation.

d. The regulatory responsibility can be placed either within a pre-established structure or on a new organization. Still, this governmental organization must be of the highest level and must include conservation of natural resources and environmental pollution prevention and control. It must not be dispersed in multiple governmental institutions.

e. Guidelines for hazardous waste control should be developed within the CEPIS/GTZ program, starting at the definition of
hazardous waste, through minimization processes, recycling, transport, treatment and final disposal, legislation and control, up to clean-up of contaminated sites. These must be incorporated in a basic document.

f. So that a country may implement an efficient management system the following resources are necessary:

Financial resources:
- Through governmental assignment.
- Via charges through permits and licensing systems for hazardous waste facilities.
- Via charges to hazardous waste generators for expenses in research, monitoring and fines.
- Funds thus obtained should be channelled to the regulatory institution and not be lost in the general treasury.
- Allocation of external funds from national and international institutions.

Human resources
- A good administrative team with well defined and differentiated roles must be established.

Equipment
- Computer equipment for the follow-up and systematization of information, telephones, fax (legal authorization to receive official information), vehicles, videotapes, video and photographic cameras, portable atmospheric emission detectors (sniffers) and sampling systems.
4.1.5 Others

a. Clean-up of contaminated sites
   - Identification of hazardous waste contaminated sites.
   - Identification of responsible parties.
   - Evaluation procedures.
   - Land use.
   - Clean-up levels.
   - Clean-up procedures.
   - Notification to pertinent health authorities.

b. Make available to interested parties the following:
   - Information and access to technology.
   - Financial resources.
   - Human resources development.

c. Have a marketing program, together with the dissemination of information in order to gain public and political support.

4.1.6 CEPIS/GTZ must:

a. Promote that their consultants, together with experts from Latin American countries, evaluate the literature in this area, so that guidelines be prepared in Spanish, on classification systems, both at the national and international levels. These guidelines must be compiled in a basic document to be widely disseminated.

b. International working groups can be created to discuss and periodically follow up the work mentioned above.

c. Promote the dissemination of case studies.
d. Organize information and its dissemination, so that it be continuous and regular, facilitating the exchange of information on latest advances in hazardous waste classification and evaluation.

4.2 Minimization

4.2.1 Minimization is defined as any process modification or recycling activity leading towards waste reduction.

Emissions control and economics has led industry towards the need for minimization. In Latin America, a public policy has not been agreed on for minimization, although there are individual initiatives.

There are two sectors that are perfectly identified in industry. On one hand, there are large enterprises, including those with multinational characteristics, which have direct access to technological innovations. On the other hand, there are the small and medium-size industries, many of which have low-technology processes with little access to more complex ones. Actions must be directed towards technical assistance for the latter.

It is important to identify the minimization potential in Latin America, as well as the specific initiatives which have been developed with the objective to disseminate them on a regional level and use these experiences to apply them in similar situations.

Strategies and mechanisms for the development of minimization programs are a priority. It is vital to guarantee participation of all sectors involved: the
productive sector, control authorities and generators of innovative technologies.

This integration must guarantee:

- Development of minimization programs by the productive sector through control activities.
- Allocation of resources in sufficient quality and quantity for the development of minimization programs.
- Dissemination of technologies developed in minimization programs.

The main sources of funding must come from the private sector, as the main beneficiary from the activities in said programs. Experiences from other countries show that industry must establish their priorities within the minimization activities. This aspect must be agreed on by the involved parties.

Confidentiality is a very important factor for industry. In many cases, this sector tends to consider technologies and modifications as their own; thus, an agreement with specific industrial associations should be a strategy to be promoted.

The promotion of minimization activities can be carried out through more stringent quality standards on effluents or through economic incentives. Experiences in other countries have shown that the latter is most effective.

It is essential to consider minimization programs within legislation. Source reduction must be provided through public policy which takes into consideration economic incentives. One viable strategy is
to impose greater costs in hazardous waste management and disposal so that industry will feel the need to minimize.

Recycling technologies, as well as waste exchanges, can be good strategies to promote waste minimization.

4.2.2 CEPIS/GTZ must:

a. Promote and stimulate the application of this minimization strategy in countries in the Region.

b. Stimulate and develop minimization research programs (case studies).

c. Prepare a document on minimization providing guidelines for these programs, including steps in the development of environmental audits.

d. Promote and carry out training activities for technical personnel. The following activities are considered valuable: workshops, courses, seminars, professional exchanges and expert consultancies.

e. Organize and select information generated in minimization programs and disseminate them through information systems (REPIDISCA) and direct mechanisms to assure that technologies reach users.

f. The execution of this program at the national level must be included within the PAHO Country Engineer's responsibility.

4.3 Professional training

In order to guarantee training in this area, the following items should be taken into consideration:
4.3.1 Professional training must be directed towards the following groups:

- Universities, in order to improve the level of professors at the undergraduate and graduate levels.
- Industry, to improve professionals in the production and management areas, as well as other employees and workers.
- Primary and secondary schools, as the first steps in the development of activities at community level.
- The community.
- The responsible authorities.

Compilation and dissemination of case studies related to hazardous waste classification and inventories, as well as legislation and minimization technologies, will allow the development and strengthening of professionals in charge of control and within industry.

It is important also, to undertake courses, seminars, workshops and professional exchanges, short-term training in research institutions and in industry to attain this objective.

It is extremely important to carry out courses and prepare manuals for industrial employees and workers. Course material must be prepared for specific industrial areas.

The use of advisory brochures to educate the community is an efficient mechanism to identify and solve hazard situations caused by inadequate waste management. This mechanism can be used also as a political tool in problem solving.
Technical materials and audiovisuals are necessary and efficient tools to accomplish the above activities.

4.3.2 CEPIS/GTZ must:

- Promote training programs at different user levels.
- Identify experienced professionals in this area who will aid training programs.
- Allocate resources for the identification and organization of documents and other support tools (videos, brochures and others), which will allow the desired multiplying effect.
- Coordinate technical assistance from experienced members of the Technical Nucleus in countries in the Region. This technical assistance must include training of a group of professionals at the national level, which will act as the focal point for the dissemination of knowledge in hazardous waste management.

4.4 Analytical capacity

4.4.1 In order to undertake hazardous waste management, it is essential to have well equipped laboratories for rapid waste identification and quantification.

Analytical requirements must be determined and the following must be defined:

a. Procedure standards, including sampling, sample preparation, analysis and data interpretation.
b. Analytical quality control and reference laboratories, at country level, thus establishing a specialized laboratory network at regional level.

It is recommended that each country carry out an inventory of laboratories and trained personnel.

4.4.2 CEPIS/GTZ must:

a. Coordinate and organize existing information in the countries, to cover immediate needs, laboratory and personnel-wise. That is, CEPIS/GTZ must act as a clearing house of technical information related to analytical activities.

b. CEPIS/GTZ must have a catalytic effect in the development of environmental laboratories. Reference laboratories must be decentralized and must benefit from already existing laboratories in the Region.

c. The following reference laboratories, with their location, are proposed:

- México : To support Central America and the Caribbean.
- Argentina : To support Paraguay, Uruguay and Chile.
- CEPIS : To support Andean countries.
- Brazil : To support Brazil.

Said laboratories would be responsible in helping countries develop their analytical capacity, identifying hazardous wastes according to their level of corrosivity, flammability, toxicity, reactivity and explosivity.
5. **FUTURE WORK PLAN**

The following activities were agreed on during the I Meeting of the Technical Nucleus in Hazardous Waste Management:

5.1 **Case studies in waste minimization**

The following case studies should be carried out:

a. Minimization program in the tannery industry, to be carried out by CEPIS.

b. Minimization program in the electro-plating industry, to be undertaken by and coordinated through INCYTH.

c. Minimization program in the textile industry to be carried out by CEPIS.

5.2 **Technical documents**

The following technical documents must be prepared:

a. Guideline on Hazardous Waste Definition and Classification, according to the German and International (IWIC) systems (CEPIS).


c. Guidelines on Hazardous Waste Minimization, which will include stages in the development of environmental audits, according to existing documents. (UCV, Venezuela).


CEPIS will coordinate the preparation and dissemination of these documents. CEPIS will have the support from the Members of the Technical Nucleus and local experts, as well as the advise from the international experts who participated in the Meeting and German consultants through the CEPIS/PAHO/GTZ Agreement.

Technical documents should be concluded by the end of 1991 and will then be disseminated to pertinent groups, among others, the public and private industry, control authorities and universities.

5.3 Technical Nucleus

The second meeting of the Technical Nucleus will be scheduled during 1992, with the objective of evaluating past activities and establishing future ones.

5.4 Others

Other activities to be considered in the future work plan are:

5.4.1 Testing of the INVENT program to the German hazardous waste classification system, with production factors from this country should be included in order to estimate hazardous waste generation. This program will be evaluated in Peru, Colombia and Costa Rica.
5.4.2 Compile and disseminate to countries in the Region information on hazardous waste management, especially experiences from Mexico, Puerto Rico and Brazil. The experience in Puerto Rico on the development of legislation should be included, as well as emphasis on classification systems.

5.4.3 A course, sponsored by GTZ and coordinated by CEPIS, on the transport of hazardous wastes will be given. A German expert has been invited to this event.

5.4.4 It was agreed that Venezuela's case on hazardous waste management should be followed, particularly the contract with a private enterprise should be reviewed and analyzed. The classification system and monitoring capacity in this country should also be evaluated. In this case, it is possible to have Mexico's support, consultancy and experience.

6. ACKNOWLEDGEMENTS

We would like to thank the consultants and their institutions, Dr. Harvey Yakowitz (OECD) and Dr. Daniel Watts (New Jersey Institute of Technology) who, through their experience and knowledge, provided excellent information, clarification, insight and advice.

The undivided and active dedication of the participants, which contributed to the overall success of this event is also appreciated.

Thanks is also given to the GTZ, which provided partial support to the Meeting.
This meeting would have not been possible without the support and advise of Alberto Flórez Muñoz, Director, and Henry Salas, Water Pollution Advisor. The assistance of Mrs. Lucía Figari, Mrs. Ruth Moro and Mrs. Inés Delgado in providing logistics and secretarial support is gratefully acknowledged.
ANNEX 1

LIST OF PARTICIPANTS
LIST OF PARTICIPANTS
I MEETING OF THE TECHNICAL NUCLEUS IN
HAZARDOUS WASTE MANAGEMENT
(5-9 November 1990)

<table>
<thead>
<tr>
<th>CEPIS</th>
<th>Phone</th>
<th>Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng. Alberto Flórez Muñoz</td>
<td>35-4135</td>
<td>37-8289</td>
</tr>
<tr>
<td>Director</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apartado Postal 4337</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lima 100, Perú</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eng. Henry Salas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Pollution Adviser</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eng. Lívía Benavides</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous Wastes Officer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ing. Max Zarate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young Resident Professional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ing. Gerardo Méndez</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young Resident Professional</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ARGENTINA

Eng. Carlos Alberto Gómez 70-4145 (0541) 6209162 Centro de Tecnología del Uso del Agua (CTUA) Instituto Nacional de Ciencia y Tecnología Hídrica (INCYTH) 3 de Febrero 3641- 7o. D (1429) Buenos Aires, Argentina
- A.I.2 -

**BRAZIL**

Eng. Marcia Drolshagen  
Fundacao Estadual de  
Engenharia do Meio Ambiente  
(FEEMA)  
Rua Fonseca Teles 121,  
15 Andar  
Sao Cristovao,  
Rio de Janeiro, Brasil

Eng. Pedro Penteado de  
Castro Neto  
Companhia de Tecnologia  
de Saneamento Ambiental  
(CETESB)  
Av. Prof. Frederico Hermann  
Jr. No. 345  
Sao Paulo, Brasil

**COLOMBIA**

Eng. Raúl Arias Uribe  
Corporación Autónoma  
Regional del Cauca (CVC)  
Apartado Aéreo 2366  
Cali, Colombia

Chemist María Leonor  
Cárdenas Cruz  
Empresa de Acueducto y  
Alcantarillado de Bogotá  
(EAAB)  
Dep. Laboratorio de  
Aguas Negras  
Calle 22C, No. 40-99  
Bogotá, Colombia
- A.I.3 -

Eng. Luis Ignacio Sánchez 6110358
Country Engineer
PAHO/WHO Representative
Carrera 11-9348
Bogotá, Colombia

FRANCE

Dr. Harvey Yakowitz (331) (331)
Organization for Economic
Cooperation and Development
OECD (Annex Maillot)
2, Rue André Pascal
75775 Paris, Cedex 16, France

MEXICO

Chemist María de Lourdes 5846529
Maffey García
Secretaría de Salud (SSA)
San Luis Potosí 192, 4to. piso
Colonia Roma, México D. F.

Eng. Efraín Rosales 5531235 2867971
Secretaría de Desarrollo
Urbano y Ecología (SEDUE)
Río Elba No. 20, Col. Cuauhtémoc
C.P. 06508
México, D. F.
- A.I.4 -

PERU

Chemist Ada Barrenechea de Stein
Universidad Nacional de Ingeniería (UNI)
Av. Túpac Amaru s/n
Lima

Eng. Carmen del Pilar Tello
Dirección General de Salud Ambiental (DITESA)
Av. Las Artes 1239
Urb. San Borja

PUERTO RICO

Lic. Pedro Antonio Maldonado Ojeda
Junta de Calidad Ambiental (JCA)
Apartado 11488
Santurce
Puerto Rico 00910

(809) 767-8057  (809) 766-2483

UNITED STATES

Dr. Daniel Watts
New Jersey Institute of Technology (NJIT)
323 M. L. King Blvd.
Newark, New Jersey

(201) 596-3465
- A.I.5 -

**VENEZUELA**

<table>
<thead>
<tr>
<th>Phone</th>
<th>Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td>6621911</td>
<td></td>
</tr>
</tbody>
</table>

Ing. María E. Rincones Celis
Universidad Central de Venezuela (UCV)
Apartado Postal 47008
Los Chaguaramos 1041-A
Caracas, Venezuela
ANNEX 2

PROGRAM OF ACTIVITIES
I MEETING OF THE TECHNICAL
NUCLEUS IN HAZARDOUS WASTE MANAGEMENT
(Lima, Perú – 5-9 November 1990)

Monday, November 5

08:30 - 09:00  Registration

09:00 - 09:30  Opening
Alberto Flórez Muñoz
Carlos Cúneo
David Tejada Pardo

09:30 - 10:00  Coffee Break

10:00 - 10:45  Philosophy and Modus Operandi of the Technical Nucleus
Alberto Flórez Muñoz

10:45 - 11:45  Environmental risk implications in hazardous waste management
Daniel Watts

PRESENT SITUATION ANALYSIS

11:45 - 12:30  Hazardous Waste Management in Puerto Rico
Pedro A. Maldonado

12:30 - 14:00  Lunch

14:00 - 14:45  Hazardous Waste Legislation and Control in Mexico
Efraín Rosales

14:45 - 15:30  Hazardous Waste Management in Rio de Janeiro
Marcia Drolshagen

15:30 - 15:45  Coffee Break

15:45 - 16:30  Hazardous Waste Management: Experience in Industrialized Countries
Harvey Yakowitz

16:30 - 17:15  Hazardous Waste Classification Criteria
Harvey Yakowitz

17:30 - 19:00  Welcome Cocktail Party
<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00 - 09:45</td>
<td>Rapid Assessment of Hazardous Waste Generation (INVENT)</td>
<td>Livia Benavides</td>
</tr>
<tr>
<td>09:45 - 10:30</td>
<td>Minimization and Recycling of Industrial Wastes</td>
<td>Daniel Watts</td>
</tr>
<tr>
<td>10:30 - 11:00</td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td>11:00 - 11:45</td>
<td>Case Study: Tanneries</td>
<td>M. Rincones/M. Zárate</td>
</tr>
<tr>
<td>11:45 - 12:30</td>
<td>Minimization of Industrial Wastes in Argentina</td>
<td>Carlos Gómez</td>
</tr>
<tr>
<td>12:30 - 13:30</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>13:30 - 14:15</td>
<td>Transport, Treatment and Final Disposal of Hazardous Wastes</td>
<td>Luis Sánchez</td>
</tr>
<tr>
<td>14:15 - 15:00</td>
<td>Process Modification; Alcalis of Colombia</td>
<td>Lourdes Maffey</td>
</tr>
<tr>
<td>15:00 - 15:30</td>
<td>Industrial Waste Exchange in Mexico</td>
<td>Pedro Penteado</td>
</tr>
<tr>
<td>15:30 - 16:15</td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td>16:15 - 17:00</td>
<td>Transport, Treatment and Disposal of Hazardous Wastes in Sao Paulo</td>
<td>Rio Arias</td>
</tr>
</tbody>
</table>
### Wednesday, November 7

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00 - 09:45</td>
<td>Nimby syndrome and community participation</td>
<td>Daniel Watts</td>
</tr>
<tr>
<td>09:45 - 10:30</td>
<td>The Basel Convention</td>
<td>Harvey Yakowitz</td>
</tr>
<tr>
<td>10:30 - 11:00</td>
<td>Coffee Break</td>
<td></td>
</tr>
</tbody>
</table>

**HAZARDOUS WASTE LEGISLATION**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Presenters</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00 - 13:00</td>
<td>Panel: Hazardous Wastes Legislation in the Region</td>
<td>P. Maldonado, M. Drolshagen, E. Rosales</td>
</tr>
<tr>
<td>13:00 - 14:00</td>
<td>LUNCH</td>
<td></td>
</tr>
<tr>
<td>14:00 - 17:00</td>
<td>Working Session 1</td>
<td>Groups</td>
</tr>
</tbody>
</table>

### Thursday, November 8

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00 - 10:30</td>
<td>Plenary Session (discussion on work from previous day)</td>
<td></td>
</tr>
<tr>
<td>10:30 - 11:00</td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td>11:00 - 12:30</td>
<td>Working Session 2</td>
<td>Groups</td>
</tr>
<tr>
<td>12:30 - 14:00</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>14:00 - 15:15</td>
<td>Working Session 2 cont.</td>
<td>Groups</td>
</tr>
<tr>
<td>15:15 - 15:30</td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td>15:30 - 17:00</td>
<td>Plenary Session</td>
<td></td>
</tr>
</tbody>
</table>

### Friday, November 9

- **Parallel sessions:**
  - Write up of meeting proceedings and final report
  - Open conferences
- **b. Presentation of meeting proceedings**
- **c. Conclusions and recommendations**
ANNEX 3

DOCUMENTS RECEIVED BY CEPI'S OF THE PARTICIPANTS
TO THE MEETING
BIBLIOGRAPHIC REFERENCES


- HAZARDOUS SUBSTANCE MANAGEMENT RESEARCH CENTER at N.J.I.T. Brochure.


- MALDONADO OJEDA, Pedro A. Responsabilidad personal y corporativa en la legislación ambiental. Presented in: Comité Local de Respuestas a Emergencias Ambientales, bajo el título III de SARA.


- YAKOWITZ, Harvey. Possibilities and constraints in Harmonizing National Definitions of Hazardous Wastes. OECD.


- YAKOWITZ, Harvey. Waste Management Activities in Selected Industrialized Countries. OECD.