

**EX-POST EVALUATION STUDY ON THE
NATIONAL CENTER FOR ENVIRONMENTAL
RESEARCH AND TRAINING
(PHASE II) PROJECT**

Prepared for:
Japan International Cooperation Agency
(JICA)

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(UAM-I)

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事後評価調査結果要約表

評価実施部署：メキシコ事務所

1. 案件の概要	
国名：メキシコ合衆国	案件名：国立環境研究研修センタープロジェクト フェーズ2
分野：環境管理	協力形態：プロジェクト方式技術協力（現：技術協力プロジェクト）
所轄部署：社会開発協力部 社会開発協力第二課	協力金額：約 12.2 億円
協力期間	(R/D) 1997年7月1日～2000年6月30日
	(F/U) 2000年7月1日～2002年6月30日
先方関係機関： 環境庁（INE）	
日本側協力機関： 環境省（環境庁）、経済産業省（通産省）、厚生労働省（厚生省）	
他の関連協力： 国立環境研究研修センタープロジェクト（1995年7月1日～1997年6月30日）	
1-1 協力の背景と概要	
<p>1993年、メキシコ政府は日本政府に対し、国立環境研究研修センター（CENICA）設立に関する協力を正式に要請した。日本政府は、この要請を受け、国際協力事業団（当時）－JICAを通じ、1995年7月から2年間にわたり CENICA を物理的・制度的に創設することを目的としたメキシコ環境庁（INE）との共同プロジェクトを実施した。この協力を基礎に、CENICA の組織力及び大気汚染と有害廃棄物分野における技術力をさらに開発することを目的として、1997年から国立環境研究研修センタープロジェクト・フェーズ2が実施された。このプロジェクト・フェーズ2は、プロジェクトの目的を完全に達成するために2002年まで2年間延長された。</p>	
1-2 協力内容	
(1) 上位目標	
メキシコ合衆国の環境汚染防止行政能力が向上する。	
(2) プロジェクト目標	
国立環境研究研修センター（CENICA）の組織・活動が強化される。	
(3) アウトプット（成果）	
a. CENICA の運営管理能力が向上する。	
b. 研究・研修に必要な施設・機材が有効に使用できるようになる。	
c. 環境基準の策定等に関する技術的情報が関係行政機関に提供される。	
d. 政府機関及び産業界の環境担当者の環境問題に対する意識・環境対策技術が向上する。	
e. CENICA の環境関連情報（特に大気汚染と有害廃棄物）収集、分析、発信の機能が強化される。	
(4) 投入（プロジェクト終了時）	
日本側：	
長期専門家派遣	13 名 機材供与
短期専門家派遣	32 名 ローカルコスト負担
研修員受入	22 名
総額 約 12.2 億円	
相手国側：	
カウンターパート配置	最大 54 名
土地・施設提供	ローカルコスト負担 約 1.2 億円
2. 評価調査団の概要	

調査者	(担当分野：氏名、所属先) 総括: Dr. Julio Goicoechea メトロポリタン自治大学 環境: Ms. Alejandra Quintanar メトロポリタン自治大学
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調査期間	2005年12月20日～2006年3月15日	評価種類	事後評価
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3. 評価結果の概要

3-1 評価結果の要約

(1) 効果

プロジェクトは様々な主としてプラスの効果もたらした。プロジェクトの上位目標は達成されたと考えられるが、それは環境の質の改善につながるまでに至らない範囲に留まる。プロジェクトは CENICA の組織強化を通じて上位目標の達成に貢献した。プロジェクトによるプラスの効果のうち、プロジェクトの枠組の中で計画されていなかったもので主たるものは、1)CENICA が環境庁のひとつの局として格上げされたこと、及び 2)CENICA が大気汚染抑制と廃棄物管理分野における技術的アドバイスと支援を提供するラテン・アメリカの地域センターとなったことである。予期せぬマイナスの効果は特にみられなかった。

(2) 自立発展性

プロジェクトの自立発展性は確かであると考えられる。CENICA は、人員の数と予算の規模の面では、プロジェクト終了後拡大していないものの、組織的な発展を遂げた。それを裏付ける事実のひとつは、CENICA が連邦政府においてより大きな責任を果たすようになり、様々な国際環境会議・交渉において連邦政府をしばしば代表するようになったことである。CENICA はまた、プロジェクトの成果を基礎として技術的にも発展した。それは CENICA が独自に様々な研究・研修活動を実施してきたことに見て取れる。この組織的・技術的な自立発展のプロセスは、CENICA が持つ人材育成と施設（特に機材）整備への投資に関する適正な方針を考慮すると、将来にわたって継続する可能性が高いと考えられる。

3-2 プロジェクトの促進要因

(1) 効果発現を促進した要因

環境管理の改善に向けた政府の意志、及び近年の好調なメキシコ経済が、プロジェクトの効果発現を促進したと考えられる。

(2) 自立発展性強化を促進した要因

政策環境は、CENICA の提供するサービスへの強い需要を生むことにより CENICA の継続的な発展にとって良好な要因であり続けた。

3-3 プロジェクトの阻害要因

(1) 効果発現を阻害した要因

阻害要因は、特に見られなかった。

(2) 自立発展性強化を阻害した要因

阻害要因は、特に見られなかった。

3-4 結論

概して、効果及び自立発展性のいずれの観点からも成功であったと判断される。CENICA のサービスに対する現在の強い需要を考慮すると、CENICA はメキシコの環境管理に大きなプラスの効果をもたらし、持続的発展を続けると考えられる。

3-5 提言（当該プロジェクトに関する具体的な措置、提案、助言）

メキシコ連邦政府への提言

他の多くの国の場合と同様、環境行政の政府機関は比較的新しく、十分な水準にまで人員を増加させるだけの時間がなかった。その一方で、環境行政への社会的要求は日増

しに大きく、かつ複雑になっている。従って、メキシコ連邦政府が進める公務員削減政策は健全ではあるものの、環境行政部門にこれを適用するにあたっては注意が必要である。

CENICA への提言

メキシコでは、州及び郡の政府当局が、十分なリソースと能力を有さないまま、大気汚染と廃棄物の管理に関する多大な責任を与えられている。従って、CENICA は、州及び郡の政府当局のための研修、研究、助言指導サービスを拡張すべきである。それこそが、環境の質の改善に向けて CENICA が最も直接的に貢献できる道である。

研究活動に刺激を与えるため、ワーキング・ペーパーをウェブ・サイトで公開することは、検討する価値があると考えられる。

持続的な組織の発展を確かなものにするために、スタッフ間で経験・知識を共有するシステムと組織文化を形成することが重要である。人員の交替は時として避けがたく起こるものであり、組織を去る人員が新しく来る人員や残っている人員に経験・知識を移転することが、それら経験・知識の喪失を防ぐために決定的に重要である。そのようなシステムと文化なくしては、組織として経験と知識を蓄積していくことが不可能である。

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3-6 教訓

CENICA の持つ重要な利点のひとつは、研究と研修（コンサルティングや助言指導も含む）の機能を併せ持っていることである。なぜなら、この2つの機能は互いに良い効果を及ぼし合うからである。ここで得られる教訓は、政府が環境に関する研究または研修の機関を創設しようとするならば、両方の機能を持たせることが有効であるということである。

CENICA のもうひとつの利点は、メトロポリタン自治大学内に位置しており、大学の図書館へのアクセスを持っていることである。政府が研究機関を設立しようとする際には、参考文献を自前で揃える費用を節約する観点から、大学内につくるのが有効な選択肢である。

3-7 フォローアップ状況

JICA は、本件プロジェクト終了後、CENICA との協力プロジェクトを幾つか形成してきた。それらのうち、あるものはメキシコにおける環境管理能力の強化を図るプロジェクトであり、別のものはラテン・アメリカの他の国々に対する支援のためのプロジェクトである。

Summary

Evaluation conducted by: JICA Mexico Office

1. Outline of the Project	
Country : United Mexican States	Project title : National Center for Environmental Research and Training (Phase II) Project
Issue/Sector : Environmental Management	Cooperation scheme : Technical Cooperation Project
Division in charge : Social Development Cooperation Dept. Social Development Cooperation Division II	Total cost : <u>Approx. 1.22 billion yen</u>
Period of Cooperation	R/D: 1 July, 1997 ~ 30 June, 2000
	Follow-up: 1 July, 2000 ~ 30 June, 2002
	Partner Country's Implementing Organization : National Institute of Ecology
	Supporting Organization in Japan : Environment Agency Ministry of Trade and Industry Ministry of Health
Related Cooperation	National Center for Environmental Research and Training Project (1 July, 1995 ~ 30 June, 1997)
<p>1-1. Background of the Project</p> <p>In 1993, the Government of Mexico submitted an official request to the Government of Japan for cooperation in the development of the National Center for Environmental Research and Training (CENICA). Accepting this request, the Government of Japan, through Japan International Cooperation Agency (JICA), implemented a joint project with the National Institute of Ecology (INE) for two years from July 1995 to build the physical and institutional foundation of CENICA. Building on this foundation, the National Center for Environmental Research and Training (Phase II) Project was initiated in July 1997 by INE and JICA for the purpose of the further institutional development of CENICA as well as its technical capacity development in the areas of air-pollution and hazardous waste. This Phase II Project was extended for two years until June 2002 in order to fully achieve the objectives of the project.</p> <p>1-2. Project Overview</p> <p>(1) Overall Goal To improve the ability of environmental protection in the United Mexican States</p> <p>(2) Project Purpose Structures and activities of the National Center for Environmental Research and Training</p> <p>(3) Outputs</p> <p>a. The management of CENICA is improved.</p> <p>b. Facilities and equipment necessary for environmental research and training are effectively used by counterpart personnel.</p> <p>c. Technical information related to the establishment of the environmental protection standards is provided to relevant Mexican authorities.</p> <p>d. Knowledge and techniques of federal government officials, local authorities and industry</p>	

personnel on environmental protection are improved.

e. The role of CENICA in data collection and publications related to environmental matters (particularly air pollution and hazardous waste) is improved.

(4) **Inputs** (as of the Project's termination)

Japanese side :

Long-term Expert	<u>13</u>	Equipment	Approx. 510 million Yen
Short-term Expert	<u>32</u>	Local cost	Approx. 50 million Yen
Trainees received	<u>22</u>		

Mexican Side :

Counterpart	<u>max. 54</u>		
Land and Facilities		Local Cost	Approx. 120 million Yen

2. Evaluation Team

Members of Evaluation Team	Leader: Dr. Julio Goicoechea, Metropolitan Autonomous University Environment: Ms. Alejandra Quintanar, Metropolitan Autonomous University	
Period of Evaluation	Day/ month/ Year - Day/ month/ Year 20/12/2005 - 15/03/2006	Type of Evaluation : Ex-post

3. Results of Evaluation

3-1. Summary of Evaluation Results

(1) Impact

The Project had various impacts that were principally positive. The Overall Goal of the project was considered to be achieved but only to the extent that such improvements have not resulted in the actual improvements in the quality of environment. The project contributed to the achievement of the Overall Goal through the capacity development of CENICA. The principal positive impacts of the Project but not intended in the project framework were that; 1) CENICA was promoted to be a General Direction of the National Institute of Ecology; and 2) CENICA became a regional center to provide technical advisory and assistance in Latin America in the field of air pollution control and waste management. No particular unintended negative impact was observed.

(2) Sustainability

Sustainability of the Project is considered to be firm. Although CENICA has not grown in terms of its number of personnel and its budget scale since the end of the Project, it has developed institutionally, which was supported by the fact that CENICA has taken greater responsibilities in the Federal Government and often represented the Federal Government in various international environmental meetings and negotiations. CENICA has also developed technically based on the foundation of the Project, which was demonstrated by the fact that CENICA has undertaken plentiful research and training activities independently. This self-reliant technical and institutional development process is quite likely to continue in the future considering its sound policies of the human resources development and the investments in its infrastructure, i.e. the equipment in particular.

3-2. Factors that have promoted project

(1) Impact

The determination of the government towards a better environmental protection as well as a good economic performance of the nation in recent years was considered to be positive factors for the Project.

(2) Sustainability

The policy environment has been favorable for sustainable development of CENICA by having generated strong demands for the services of CENICA.

3-3. Factors that have inhibited project

(1) Impact

No particular impeding factor was observed.

(2) Sustainability

No particular impeding factor was observed.

3-4. Conclusions

Overall, the Project is considered to be successful in terms of both its Impact and Sustainability. Considering the current strong demands for the services of CENICA, it has significant positive impacts on the environmental management in the country, and will continue to develop sustainability.

3-5. Recommendations

For the Mexican federal government

Like many other countries, the government organizations for the environmental administration are relatively new and have not had time to increase their personnel more than a sufficient level. On the other hand, the social demand for the environmental administration is growing and becoming more complex. Therefore, although the current federal government policy of reducing the number of officials is sound, it requires cautions to apply the policy to the branch for the environmental administration.

For CENICA

In Mexico, state and municipal authorities are given heavy responsibilities of the management of air pollution and wastes, without having sufficient resources and capabilities. Hence, CENICA shall expand its training, research and advisory services intended for state and municipal authorities. This will be the most direct way of contribution for CENICA toward the improvement of the environmental quality.

It is worth considering publishing working papers on its web-site in order to stimulate the research activities.

It is important to construct a system and nurture an organizational culture of sharing the experience and knowledge among its staff for the purpose of securing the sustainable institutional development. Since the replacement of staff inevitably occurs from time to time, transfer of experience and knowledge from the outgoing staff members to remaining and new staff members is vital in order to prevent their loss. Without such a system and a culture, there will be no accumulation of experience and knowledge as an institution.

3-6. Lessons Learned

It was observed that one of the significant advantages of CENICA was that it has both functions of research and training (including consultancy and advisory) because they give

beneficial effects to each other. A lesson learned here is that when considering establishing an institute for environmental research or training, it would be beneficial to assign it to the both.

Another advantage of CENICA is that it is located in the Metropolitan Autonomous University and has access to the university libraries. It is a good option to establish a government research institute inside an university in order to save the cost for purchasing reference materials.

3-7. Follow-up Situation

JICA has been developing several projects with CENICA since the Project ended. Those include projects for the capacity development of environmental management in Mexico as well as for the assistance to other countries in Latin America.

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1. Scope of the ex-post evaluation study

In 1993, the Government of Mexico submitted an official request to the Government of Japan for cooperation in the development of the National Center for Environmental Research and Training (CENICA). Accepting this request, the Government of Japan, through Japan International Cooperation Agency (JICA), implemented a joint project with the National Institute of Ecology (INE) for two years from July 1995 to build the physical and institutional foundation of CENICA. Building on this foundation, the National Center for Environmental Research and Training (Phase II) Project was initiated in July 1997 by INE and JICA for the purpose of the further institutional development of CENICA as well as its technical capacity development in the areas of air-pollution and hazardous waste. This Phase II Project was extended for two years until June 2002 in order to fully achieve the objectives of the project.

As three years have passed since the completion of the cooperation, JICA has decided to undertake an ex-post evaluation of the National Center for Environmental Research and Training (Phase II) Project including its two-year extension period (hereinafter referred to as “the Project”). The scope of this ex-post evaluation study consists of (1) measuring the impact (effects) of the Project, (2) assessing the sustainability of the Project, and (3) extracting lessons for the future.

2. Project overview

The project framework for the first three years of the Project was as follows.

(1) Overall Goal

To improve the ability of environmental protection in the United Mexican States

(2) Project Purpose

Structures and activities of the National Center for Environmental Research and Training (CENICA) are strengthened.

(3) Outputs

- a. The management of CENICA is improved.
- b. Facilities and equipment necessary for environmental research and training are effectively used by counterpart personnel.
- c. Technical information related to the establishment of the environmental protection standards is provided to relevant Mexican authorities.
- d. Knowledge and techniques of federal government officials, local authorities and industry personnel on environmental protection are improved.
- e. The role of CENICA in data collection and publications related to environmental matters (particularly air pollution and hazardous waste) is improved.

During the two-year extension period of the Project, i.e. from July 2000 to June 2002, there was a slight modification to the project framework, that is, the “Output b” was replaced by the term, “Operation and management of the monitoring stations and the laboratory are strengthened”. There was no change to the “Overall Goal” and the “Project Purpose”.

The terminal evaluation study for the Project undertaken in December 2001 reached the conclusion that the Project Purpose had generally been attained.

3. Evaluation methods

The ex-post evaluation was implemented in accordance with the JICA’s Ex-post Evaluation Guideline. In the beginning of the evaluation, the following six main evaluation questions were set according to the scope of the evaluation study described in the first section of this report. The first three main evaluation questions are related to the impact and the other three are related to the sustainability of the Project, respectively.

- (1) To what extent, has the Project’s Overall Goal been achieved?
- (2) What positive and negative impacts has the Project made apart from those that were originally intended, and why and how have they occurred?
- (3) Were there any external factors that influenced the achievement of the Overall Goal?
- (4) Has the recipient institution (CENICA) continued to develop its technical and institutional capacity building upon the achievements of the Project?
- (5) How likely will this self-reliant development process continue for the future?
- (6) What will be the possible factors that may contribute or inhibit the sustainable development process?

The evaluation study was designed in a way that it would be able to give answers to those 6 questions in the end. For this purpose, the Evaluation Grid was developed (Annex 7), which included sub-questions for each main evaluation question, specific study methods and data collection methods. Necessary information was collected mainly by document review and interviews with CENICA staff. The collected information was analyzed to produce the evaluation results that are described below.

4. Results of the evaluation

4.1. Impact of the Project

4.1.1. Degree of achievement of the Project’s Overall Goal

The Overall Goal of the Project was “to improve the ability of environmental protection in the United Mexican States” and this section looks at the degree of achievement of it, which is a principal aspect to assess the impact of the Project. During the first three years of the Project, no indicator was set to measure the degree of achievement of the Overall Goal, whereas, during the last two years of the extension period, the indicator was set as

“Several regulations, guidelines and official standards are reviewed according to the General Law for Ecological Equilibrium and Environmental Protection”.

As to the environmental laws and regulations, there was some legislative development. The General Law of Sustainable Forestry Development, the General Law for Prevention and Integral Management of Wastes, and the Law of Bio-security of Genetically Modified Organisms were newly published in February 2003, October 2003, and March 2005, respectively. Furthermore, there was a major reform of the Law of National Waters in April 2004, and a decree to modify the General Law for Ecological Equilibrium and Environmental Protection was published in February 2005.

Within the cooperation period of the Project, i.e. from July 1997 to June 2002, Secretariat of Environment and Natural Resources (SEMARNAT) and its subordinate organizations promulgated, either independently or jointly with other secretariats, 32 Mexican Official Norms (NOMs) and 32 Mexican Norms (NMX) related to the environment and natural resources through the Official Diary of the Federal Government. Likewise, after the termination of the Project, i.e. from July 2002 to March 2006, SEMARNAT promulgated 25 NOMs while no NMX were established by SEMARNAT during this period. Regarding the modifications to the norms administered by SEMARNAT, 4 NOMs were modified between July 1997 and March 2006. Many of these NOMs and NMXs were dealing with air pollution and hazardous waste, that is, the themes directly related to the Project. It should be noted that these figures do not include the NOMs and MMXs administered by other secretariats although some of them are relevant to environmental protection and management, such as the NOMs administered by the Secretariat of Health regarding the acceptable concentration of contaminants (e.g. ozone, carbon monoxide, sulfur dioxide) in the air. This is because of the fact that it is very difficult to differentiate such norms that have at least some relevance with environment from the others that have no relation with environment. Therefore, the Mexican Government has made a far greater effort on the normalization to protect environment than is illustrated by the figures above.

Apart from the legislative and regulatory aspects, there were various technical and institutional developments with regard to the environmental protection and management. Only the two most relevant cases for the Project, one for air pollution and the other for hazardous wastes, are introduced below.

Firstly, there was a substantial development in the air quality monitoring networks. In 1997, there were air monitoring networks covering 38 cities and metropolitan areas, of which eight had some sort of automatic equipment. By 2005, the networks had been extended to 52 cities and metropolitan areas. Among those, 5 networks were

automatically operated, while 22 were operated by a mixture of automatic and manual monitoring. The remaining 25 relied on manual devices. In 2002, the National Institute of Ecology (INE) started operation of the National System of Air Quality Information (SINAICA) for integrating the air quality information generated by those air quality monitoring networks and publishing it to the public through internet. The SINAICA has integrated 18 monitoring networks to date and its coverage is expanding. In parallel with this initiative, INE had been making a particular effort to standardize the data quality as well as the measurement methodologies of different air quality monitoring networks in the nation.

Secondly, according to the reports of the Federal Attorney for Environmental Protection (PROFEPA), the installed capacity of hazardous waste treatment infrastructure was increased from 5.2 million tons in 1999 to 11.0 million tons in 2005. In the meantime, PROFEPA has been developing the national registry of hazardous waste generation, which constitutes the foundation of the proper management of hazardous wastes.

All the facts presented above indicate that the Mexican Government has strengthened its capacity of environmental protection and management. However, various statistics on environmental quality in Mexico imply that such increase in capacity has not yet reached the point that could result in visible improvements in the quality of environment.

4.1.2. Contributions of the Project to achieving the Overall Goal

The principal purpose of the Project, i.e. the Project Purpose, was, in short, the institutional development of CENICA. Therefore, the proposition of assessing the contributions of the Project to achieving the Overall Goal could be translated into another proposition of assessing the contributions of CENICA to increasing the ability of environmental protection in Mexico. This section examines the latter proposition.

CENICA has been an active participant in the processes of the establishment and the modification of environmental laws, regulations, and norms throughout the project cooperation period and after. As to the NOMs, CENICA has been involved in the drafting proposals for the purpose of the establishment or the modification of 46 NOMs (Mexican Official Norms) and 22 NMXs (Mexican Norms) between 1999 and 2005. Among these, 21 were related to air quality and the remaining 47 were related to wastes. Having been monitoring PM_{2.5} since 1999 and being the forefront of the investigation of this contaminant, CENICA played a particularly important role in the modification of the NOM to newly integrate PM_{2.5} as a contaminant regulated. CENICA was also deeply involved in the creation of the General Law for Prevention and Integral Management of Wastes published in October 2003. CENICA's involvement in the legislative development is not

restricted to the federal level processes but is expanded to local level processes. One of the examples is that, in 2005, CENICA played an advisory roll in the revision by the Government of the Federal District, the Mexican capital city, of the regulations regarding air quality control and waste management.

Apart form the legislative and political interventions described in the previous paragraph, CENICA contributed to the improvement of the ability of environmental protection in Mexico through providing various training courses, workshops, seminars and conferences. The list of those capacity development activities by CENICA is found in Annex 3.

In addition, CENICA played a principal role in the development and the operation of the National System of Air Quality Information (SINAICA) that is mentioned in the previous section. In this respect, therefore, CENICA contributed significantly to strengthening and standardization of the air quality monitoring of the nation.

4.1.3. Positive and negative impacts of the Project not planned in the Project Design Matrix

The most significant positive impact of the Project was that CENICA was promoted to become a General Direction of the National Institute of Ecology (INE) in 2001 whereas it was a branch of the General Direction of Environmental Management and Information of INE at the beginning of the Project. The Project undoubtedly contributed to this promotion in the administrative status of CENICA by strengthening its technical and institutional capacity. This change made favorable effects on the linkage between the Project and its Overall Goal because CENICA increased its responsibilities, its budget, and its personnel, and hence influenced more strongly to the improvement of the environmental protection in Mexico. One of the examples that demonstrate the increasingly important roles of CENICA in the Mexican Government is that nowadays CENICA staff members participate in various international environmental meetings and negotiations as representatives of the government.

Another positive impact is that CENICA has begun to provide technical assistance and advisory to the countries in Latin America with regard to the issues of air pollution control and waste management. CENICA provides training courses for the participants from those countries as well as send its staff to give *in situ* technical assistance and advisory. CENICA is now an important partner of the south-south cooperation for JICA.

No particular negative impacts were observed during this ex-post evaluation study.

4.1.4. External factors that influenced the achievement of the Overall Goal

There must have been countless factors except for the existence of the Project that influenced the achievement of the Overall Goal. It is impossible to examine those factors one by one here. The most fundamental factor, however, that positively influenced the achievement of the Overall Goal should be, albeit an abstract way of putting it, the determination of the Mexican Government and the Mexican citizens toward the improvement of the quality of the environment. Without it, nothing could have improved the ability of environmental protection. Another important positive factor would have been a relatively good economic performance of the country in recent years. It allowed the Mexican economy to have a reserve that could be invested in the middle-term issues like environmental protection, which would not have been possible if most available resources in the economy have had to be spent on short-term necessities for survival.

4.2. Sustainability of the Project

4.2.1. Continuation of technical and institutional development of CENICA since the end of the Project

This section examines the technical and the institutional development of CENICA achieved since the end of the Project, i.e. June, 2002.

Change in the number of staff

With respect to the total staff number, the payroll was composed of 94 staff members in 2002, of which 45 were officers/researchers and 49 were technicians (refer to Annex 1.1). In March 2006, the number of staff diminished to 82. This reduction is a result of the Voluntary Retirement Program for civil servants. It affected basically the number of technicians. The decrease in the number of staff did not affect significantly the performance of CENICA, as the responsibilities of the out-going staff were distributed among the rest of the staff while efforts were made to streamline the duties of the personnel as well as to better organize the work of each staff to enhance the efficiency and the effectiveness of the functions of the center.

Budget changes

The total budget of CENICA in 2002 was 25,280 thousand Mexican pesos at prices of 2004 (refer to Annex 1.2). To date, the budget has generally been stable at that level although there was insignificant fluctuation. The CENICA's share among the total budget of the Mexican Federal Government has also been invariant, being around 0.0020% between 2002 and 2005 (refer to Annex 1.3).

Change in organizational structure

Since 2002, CENICA has undertaken the organizational restructuring (refer to the organizational charts shown in Annex 2.1, 2.2 and 2.3). Despite this reorganization of its structure, there was no major change in the functions of CENICA as a whole although a few tasks were newly integrated such as the analysis of genetically modified organisms, which was initiated in 2004.

Research output

In terms of scientific articles, CENICA staff published 24 articles between the year 2000 and 2005 (refer to Annex 1.4). Among those, 19 articles were published in foreign journals, and the other 5 were published in domestic journals. The research personnel of CENICA participated in various academic/scientific congresses, and produced 58 papers and proceedings from 2002 to 2005 (refer to Annex 1.4). CENICA published 72 publications from 2002 to 2005 (refer to Annex 1.4). In addition, 6 books were published through the National Institute of Ecology (INE) from 2003 to 2005.

Provision of training courses

The number of courses offered every year by CENICA varies. In 2002 it provided 15 courses, followed by 9 in 2003 and 11 in 2004. During the year 2005 the number of courses offered was 9. The courses were provided either at the premises of CENICA, or in other locations within Mexico. The themes of the courses were not restricted to the specialty areas of CENICA, i.e. air quality monitoring, air pollution control, waste management and soil contamination, but also included relevant practical skills such as statistical packages for environmental data interpretation.

The data presented above suggest that although institutional “growth” (increase in size) did not take place during the post-project period, i.e. from 2002 to 2005, signs of institutional “development” (improvement in quality) could be observed, considering the growing importance of the roles of CENICA among the Mexican Government as described in the section 4.1.3. On the other hand, the data of the research outputs and the provision of training courses prove that CENICA has independently undertaken various research and training activities since the end of the Project, which indicates that CENICA has technically been developed in this period by the experience, knowledge and skills acquired through the research.

4.2.2. Prospects of the future development of CENICA

This section tries to foresee the future development of CENICA by examining the present investments (time, money, efforts) in the human resource development as well as the infrastructure development in CENICA.

Staff training programs

As a rule, every member, regardless of being a researcher/officer or a technician, is entitled and bound to take at least one training course or seminar every year, funded by CENICA. Therefore, there is equal training opportunity for each person. One training course per year, however, is not the limit of training opportunity because each staff member is obliged to fulfill the requirements for his/her own post, and it may be necessary to take more training to achieve this. The training courses organized by CENICA itself are open to all the CENICA personnel. It was estimated that an average of three weeks per person per year were devoted for participating in workshops, seminars, congresses, and training courses (both internal and external). As to the budget allocation for staff training, it was not possible to estimate the expenses used for staff training because they were integrated into the budget for general expenses that was spent on many other uses as well. However, the budget for the staff training was generally perceived to be sufficient by CENICA staff.

The methods of updating technical knowledge and skills

Primarily, the staff members of CENICA update their technical knowledge and skills through their respective research activities and analysis, including participation in academic/scientific congresses as well as the preparation of articles and publications. A great advantage of CENICA in this respect is that it is located inside the Metropolitan Autonomous University and, therefore, CENICA personnel has an access to the university libraries, which provides them with opportunities to acquire state-of-the-art technical knowledge.

Needless to say, the participation CENICA personnel in training courses and workshops as trainees should contribute significantly to updating technical knowledge and skills. However, the participation in such courses and workshops as instructors or lecturers should equally or sometimes more beneficial for that purpose because "teaching is learning". CENICA staff is abundantly endowed with such learning opportunities since CENICA organizes many training courses, workshops and seminars inviting its own staff as lecturers and instructors.

Investments in the acquisition and maintenance of equipment

The most variable component of the budget of CENICA is for the acquisition of equipment (See Annex 1.2). In 2002, it was 317 thousand Mexican pesos, doubling to 756 thousand in the following year. While it decreased to 326 thousand in 2003, it reached 1,500 thousand and 3,796 thousand in 2004 and 2005, respectively. The percentage of this budget within the total budget increased from 1.2% in 2003, to 14.8% in 2005.

The budget for the maintenance of equipment is classified into the budget for materials and supply items. This budget is used for purchases of all physical inputs, except equipment, required for the operation of the center. Therefore, the amount allocated to this budget is not precisely representing but at least indicative of the resource available for the maintenance of equipment. The fluctuated between 2,072 and 2,320 thousand Mexican pesos, with the exception of 2003, when it was reduced to 1,695 thousand Mexican pesos. This budget item accounted for between 6.5% and 17.7% of the total budget of CENICA.

Judging from the information presented above, CENICA has a strong investment policy in terms of the acquisition of equipment, which is favorable in terms of the prospect of future institutional development of the center. One explanation of this investment policy is that CENICA had to introduce more sophisticated machinery in order to respond to its expanding responsibilities. Although the trend of the budget scale for the staff training was not traceable, CENICA has a good staff-training policy and strong determination for human resource development. It is, therefore, considered that CENICA will sustain its institutional development in the future unless some uncontrollable external forces make it impossible.

4.2.3. Possible factors that might contribute or inhibit the development of CENICA

Possible influence of the presidential election in 2006 on CENICA

It is unlikely that the new federal administration to take office from December 1, 2006, would curtail its environmental policies, including those of air quality control and waste management. For one thing, it is because the quality of environment attracts ever greater attentions from the public, local governments, the Congress, and the Senate in recent years. What is more, Mexico is a party to many multilateral environmental agreements, and is also bound by environmental provisions of bilateral and regional agreements, particularly the North American Free Trade Agreement (NAFTA). The new administrations will have to further improve its environmental protection and management to respond to the domestic demands as well as to comply with those international commitments. This means that the demand for CENICA's services shall be, at least, sustained or more likely to expand. In this respect, therefore, the change in administration will not result in the organizational discontinuation of CENICA.

On the other hand, the change of administration may lead to replacement of some personnel of CENICA. It will certainly influence the development of CENICA but the influence is unforeseeable.

Government policies, laws and programs that might influence a further development of CENICA

The Federal Government's implicit policy of cutting down the number of government officials may well result in impacts (possibly negative ones) on the future development of CENICA.

The General Law of Ecological Balance and Environmental Protection provides that state and municipal authorities are responsible, within their own jurisdiction, of the prevention of atmospheric pollution as well as the management of non-hazardous solid and industrial wastes, including the prevention and control of the effects of the wastes on environment. These provisions will influence positively to the development of CENICA because the demand for the capacity development of state and municipal authorities with respect to the prevention of air pollution and waste management is enormous considering the sheer number of those authorities and the frequency of the changes in administration (in case of municipalities, the administration changes every three years). There shall be effectively endless demand for the services of CENICA, which in turn will lead to the development of CENICA.

4.2.4. Compliance with recommendations made by the final evaluation study team

The final evaluation study for the Project was undertaken in December, 2001 and the evaluation study team made the following recommendations. The degree of compliance with those recommendations is an indicator of the sustainability of the Project.

- (1) Promotion of information sharing and equal opportunity for training among CENICA's personnel
- (2) Increase of number of staff, budget and space
- (3) Smoother provision of the budget by the Mexican Government to CENICA

Information sharing and equal opportunity for training

In terms of information sharing among CENICA personnel, there seems to be no major problem at present. However, there seems to be relatively less information flows between Iztapalapa-based staff and Tecamachalco-based staff due mainly to their physical distance. According to the General Director of CENICA, there is an intension of integrating all CENICA personnel into the same premises in the future. If it occurs, it will facilitate the information sharing among the staff.

As to the equal opportunity for receiving training, CENICA has already developed a policy for it, as already mentioned in the section 4.2.2.

Increase of number of staff, budget and space

As already mentioned in the section 4.2.1., the staff and the budget have not effectively increased since the end of the Project. The space has not increased, too. Although CENICA Tecamachalco was created in 2004, it was the result of closing down two other stations previously located apart. This is principally due to the administrative and fiscal policies of the Federal Government and is not attributed to CENICA's efforts.

Smoother provision of the budget by the Mexican Government to CENICA

No major issue in this aspect has been raised during this ex-post evaluation study.

5. Conclusions

To conclude, evaluation results of the Impact and Sustainability are presented below in reference to the main evaluation questions.

Impact

The Project had various impacts that were principally positive. The Overall Goal of the project was achieved, that is, the ability of environmental protection in Mexico was improved, but only to the extent that such improvements have not resulted in the actual improvements in the quality of environment. CENICA, as a consequence of the Project, contributed to the achievement of the Overall Goal. The principal positive impacts of the Project but not intended in the project framework were; 1) CENICA was promoted to be a General Direction of the National Institute of Ecology; and 2) CENICA became a regional center to provide technical advisory and assistance in Latin America in the field of air pollution control and waste management. Both impacts were considered to have resulted from the technical and institutional development of CENICA as a consequence of the Project. No unintended negative impact was observed, on the other hand. Apart from the Project, some important factors that must have influenced positively the achievement of the Overall Goal were considered to be the strong determination of the country toward environmental protection as well as the good economic performance of the nation in recent years.

Sustainability

Sustainability of the Project is considered to be firm. Although CENICA has not grown in terms of its number of personnel and its budget scale since the end of the Project, it has developed institutionally, which was supported by the fact that CENICA has taken greater responsibilities in the Federal Government and often represented the Federal Government in various international environmental meetings and negotiations. CENICA has also developed technically based on the foundation of the Project, which was demonstrated by the fact that CENICA has undertaken plentiful research and training activities

independently. This self-reliant technical and institutional development process is quite likely to continue in the future considering its sound policies of the human resources development and the investments in its infrastructure, i.e. the equipment in particular. External factors, notably the policy environment, will generally be favorable for further development of CENICA by generating vigorous demands for the services of CENICA.

6. Recommendations

A recommendation to the Mexican Federal Government

The Mexican Federal Government has made extraordinary efforts to cut down the number of government officials. Although it is a sound policy from economic and fiscal perspectives, the uniform reduction of personnel throughout the entire government sector is not always reasonable. Just like the cases of other countries, the creation of the administrative bodies for environmental protection and management is relatively recent in comparison to those of other traditional sectors such as finance, transport, health, education, agriculture, industry, etc. Therefore, the administrative bodies in the environment sector have not had enough time to fully evolved and grown, including the numerical size of their personnel. On the other hand, the public demand for the government services with regard to environmental protection and management is apparently growing. Therefore, the reduction in the staff number and the budget of the environmental sector requires an extreme caution before implementing them.

Recommendations to CENICA

Mexico has relatively well developed legislative and political framework of environmental protection and management. The key to actual improvements in environmental quality is, therefore, the enforcement of policies and provisions of the legislation. As for the prevention of air pollution and waste management, state and municipal authorities are responsible for the enforcement within their respective jurisdiction but they are often given such responsibility without being given sufficient resources and capability. Hence, CENICA shall expand its training and advisory services intended for state and municipal authorities. This will be the most direct way of contribution for CENICA toward the improvement of the environmental quality.

In connection with the point referred to in the previous paragraph, CENICA shall place its research priority on those themes that are closely related to the improvement of the capacity of environmental protection and management at the state and municipal level.

One of the effective ways of stimulating research activities of CENICA personnel is to publish working papers on its own web-site. Although working papers are not usually peer-reviewed, publishing them is an effective way of promptly providing the public with

the research results for use, and getting the feedback from wider range of people than in the case of usual scientific articles. Furthermore, it will stimulate internal competitions among research personnel and will be an incentive for them to make more efforts. In short, it will be beneficial to raise the technical level of research activities of CENICA and, therefore, worth considering.

Finally, it is important to construct a system and nurture an organizational culture of sharing hard-won experience and knowledge among its staff for the purpose of securing the sustainable development of CENICA. Since the replacement of staff inevitably occurs from time to time, transfer of experience and knowledge from the outgoing staff members to remaining and new staff members is vital in order to prevent their loss. Without such a system, there will be no accumulation of experience and knowledge, and no progress can be made as an institution.

7. Lessons learned

Complementary nature of research and training functions

One of the significant advantages of CENICA is that it has both functions of research and training (including consultancy and advisory) because they give beneficial effects to each other.

On one hand, research is the source of firsthand knowledge that can be transmitted to others through training. Moreover, in the process of research activities, one has to extensively collect relevant information from the classic to the latest, which will also enrich the contents of training. Without research activities, it will be difficult and laborious to continuously collect the up-to-date information in the relevant field, and the contents of the training, consultancy and advisory may easily become obsolete.

On the other hand, training, consultancy and advisory activities always remind the researchers of the real-world situations as well as of the exact research topics most needed in the field. Being a government research institution, CENICA is supposed to undertake applied research instead of basic one but, without the training, advisory, and consulting activities, it would be difficult to keep track of the kind of research that is genuinely useful in the field for the purpose of improving the capacity of environmental protection and management. What is more, it is often said that “teaching is learning”. One would often acquire new knowledge and new understanding in the preparation process for the teaching as well as in the teaching itself through the interactions with participants and getting their feedback.

The lesson learned here is that when a government in a developing country considers establishing an institute for environmental research or training, it would be beneficial to assign the both functions.

Locating a government research institute in a university

Another advantage of CENICA is that, as mentioned in the section 4.2.2., it is located in the Metropolitan Autonomous University and has access to the university libraries. Collecting and updating scientific/technical books and journals is extremely costly, and it would be difficult for a government research institute to do it for itself.

The lesson learned here is that when a government considers establishing a research institute, building it in a university is a wise option. If it is not possible, the government should try to locate it at least near a university, and arrange an agreement with the university to gain access to its libraries. Such agreement shall also be beneficial for the university if the research institute could provide its students with the infrastructure and the guidance for their research and learning activities.

Annex-1: Synthesis data

Annex-1.1: CENICA Personnel (Officers/Researchers and Technicians) 1997-2005

(Unit: Persons)

	Air Quality			Waste			Training			Administration			TOTAL		
	Officers/ Researcher s	Technicians	Subtotal	Officers/ Researcher s	Technicians	Subtotal	Officers/ Researcher s	Technicians	Subtotal	Officers/ Researcher s	Technicians	Subtotal	Officers/ Researcher s	Technicians	Total
1997	2	0	2	2	0	2	0	0	0	4	0	4	8	0	8
1998	2	0	2	2	0	2	0	0	0	4	0	4	8	0	8
1999	8	0	8	4	0	4	4	0	4	5	0	5	21	0	21
2000	8	0	8	4	0	4	4	0	4	4	0	4	20	0	20
2001	23	46	69	8	1	9	4	0	4	10	2	12	45	49	94
2002	23	46	69	8	1	9	4	0	4	10	2	12	45	49	94
2003	23	46	69	8	1	9	4	0	4	10	5	15	45	52	97
2004	23	46	69	8	1	9	4	0	4	9	5	14	44	52	96
2005	22	31	53	9	1	10	4	0	4	9	6	15	44	38	82
2006	21	32	53	9	1	10	4	0	4	9	6	15	43	39	82

Annex-1.2: CENICA budget between 1997 and 2005 at prices of 2004

(Unit: Thousand Mexican Pesos)

Year	Total Budget	Personnel Expenses		Non Personnel Expenses							
				Materials and Supplies		General Services		Equipment		Subtotal	
1997	3,759	2,148	57.1%	n.a.		n.a.		n.a.		1,611	42.9%
1998	5,506	2,570	46.7%	n.a.		n.a.		n.a.		2,937	53.3%
1999	8,144	6,074	74.6%	n.a.		n.a.		n.a.		2,069	25.4%
2000	9,922	7,728	77.9%	n.a.		n.a.		n.a.		2,195	22.1%
2001	11,814	8,176	69.2%	2,088	17.7%	1,234	10.4%	317	2.7%	3,638	30.8%
2002	25,280	16,880	66.8%	2,320	9.2%	5,323	21.1%	756	3.0%	8,399	33.2%
2003	26,151	20,418	78.1%	1,695	6.5%	3,712	14.2%	326	1.2%	5,733	21.9%
2004	24,938	18,058	72.4%	2,072	8.3%	3,308	13.3%	1,500	6.0%	6,880	27.6%
2005	25,600	16,881	65.9%	2,222	8.7%	2,701	10.6%	3,796	14.8%	8,719	34.1%

Source: INEGI and Ministry of Finance

Figures expressed as percentages indicate proportions in the total budget

n.a.: data not available

Annex-1.3: CENICA budget within the Mexican Federal Government budget between 1997 and 2005 at prices of 2004

(Unit: Million Mexican Pesos)

Year	CENICA Budget	Federal Government Budget	Proportion of CENICA Budget within the Federal Budget
	(1)	(2)	(3) = (1)/(2)
1997	3.8	1,016,386	0.0004%
1998	5.5	997,774	0.0006%
1999	8.1	1,032,096	0.0008%
2000	9.9	1,113,556	0.0009%
2001	11.8	1,154,105	0.0010%
2002	25.3	1,247,781	0.0020%
2003	26.2	1,324,882	0.0020%
2004	24.9	1,326,952	0.0019%
2005	25.6	1,272,971	0.0020%

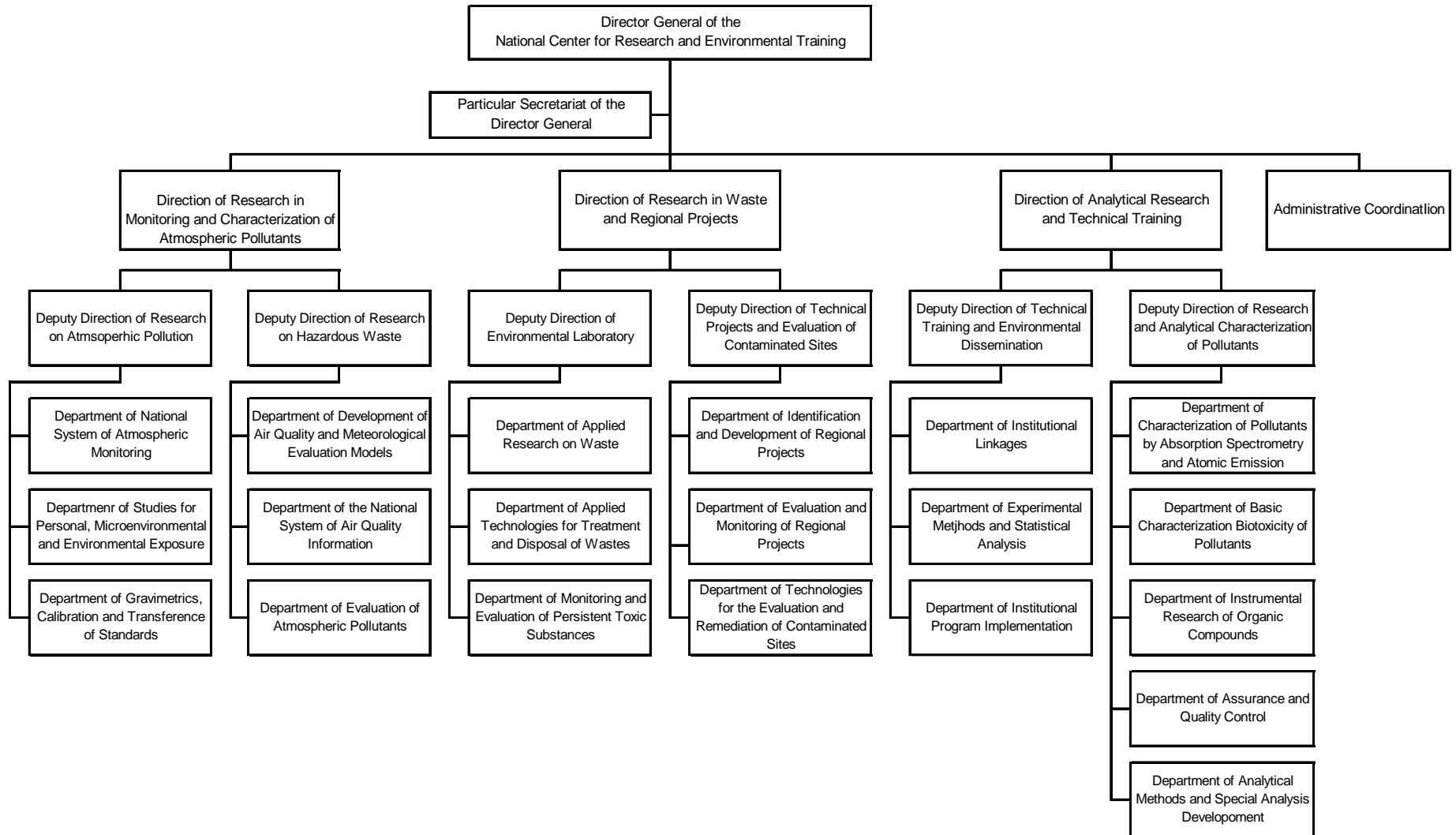
Source: INEGI and Ministry of Finance

Annex-1.4: CENICA's Research and Training Activities between 2002 and 2005

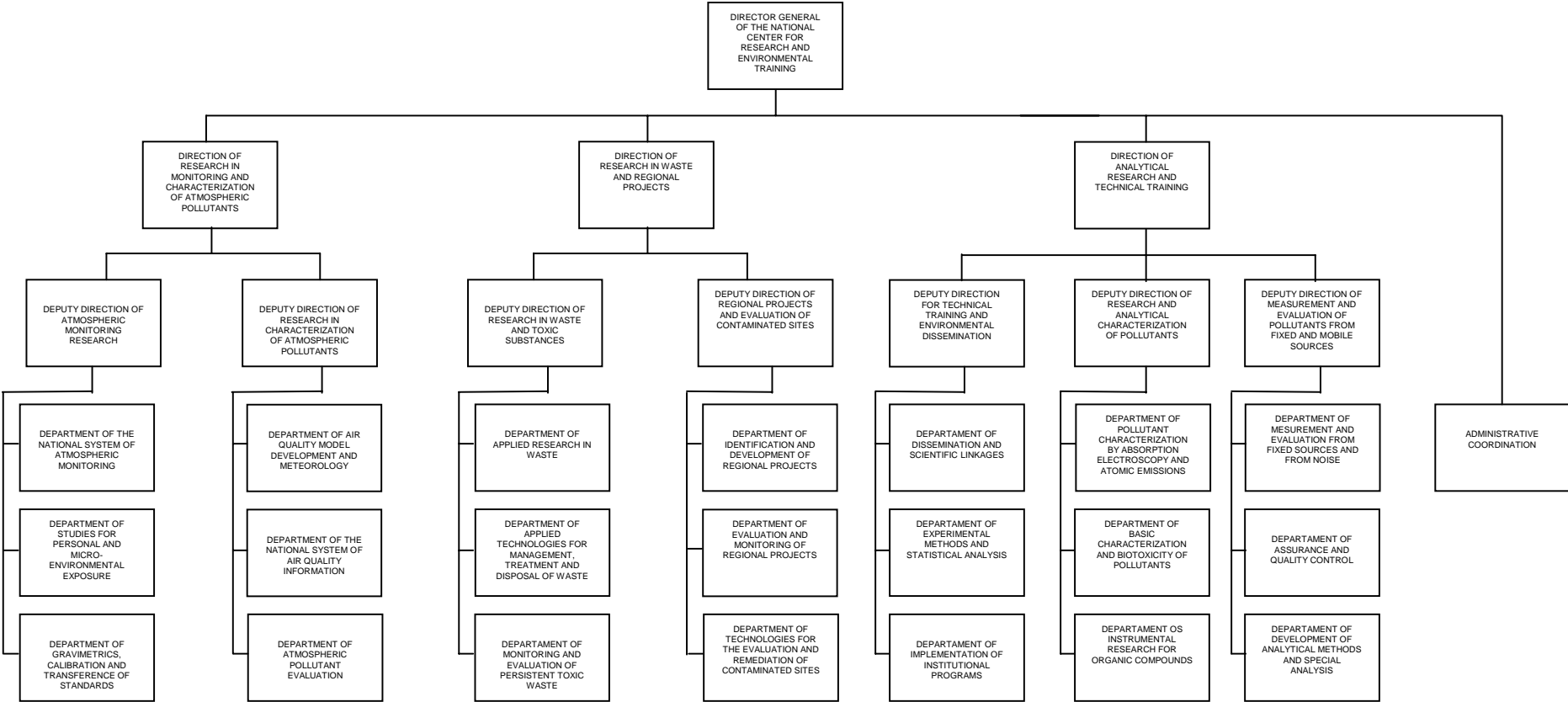
Year	No. of research articles published			No. of papers and proceedings produced for scientific congresses, conferences, etc.			No. of technical reports produced	No. of training courses provided
	Domestic journals	International journals	Total	in Mexico	Overseas	Total		
2002	1	2	3	4	0	4	12	15
2003	4	3	7	15	10	25	19	9
2004	-	5	5	4	13	17	21	11
2005	-	9	9	11	1	12	20	9
Sum	5	19	24	34	24	58	72	44

Annex-2: Structure and organization

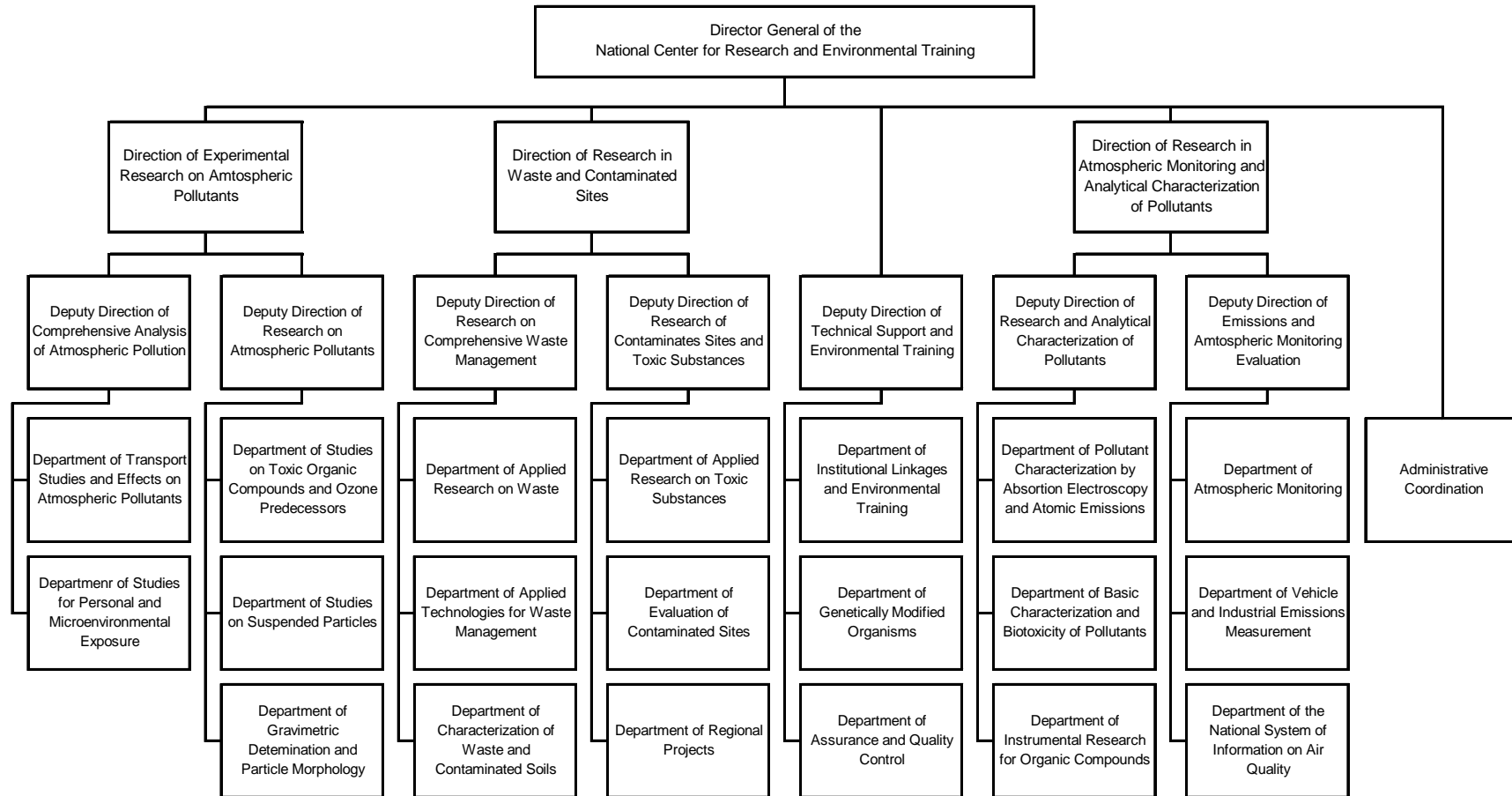
Annex-2.1: CENICA Organizational Chart. 2001-2003



Annex-2.2: CENICA Organizational Chart 2004



Annex-2.3: CENICA Organizational Chart. 2005-2006



Annex-3: Training

Seminars, courses and workshops organized by CENICA

Year 2002

1. Seminar. *Monitoring and Evaluation of Atmospheric Particles*. Organized by CENICA and JICA. Mexico City, April 17, 2002
2. Seminar. *Analytical Techniques for Pollutants in Biological Matrices*. Organized by CENICA and JICA. Mexico City, April 22, 2002
3. International Seminar. *Contaminated Soil Remediation*. Organized by CENICA and JICA. Mexico City, April 24, 2002
4. Seminar. *Contaminated Soil Remediation*. Organized by CENICA. Mexico City, April 24, 2002
5. Meeting. *PLANAME*. Organized by CENICA. Mexico City, April 29, 2002
6. Regional Workshop. *Waste management of COP's*. organized by CENICA. Mexico City, April 30 to May 3, 2002
7. Seminar. *Comprehensive Management of Solid Waste*. Organized by CENICA with AMCRESPAC. Mexico City, May 23, 2002
8. Seminar. *Vertical Profiles of Contamination and Meteorological Parameters*¹⁰. Organized by CENICA and JICA. Mexico City, June 7, 2002
9. *Binational Seminar on Atmospheric Modelling*. Organized by CENICA. Mexico City, June 11, 2002
10. *International Seminar on Waste*. Organized by CENICA and the Ministry of the Environment, Spain. Mexico City, June 17 to 21, 2002
11. Course-Workshop. *Assurance and Quality Control in Test Laboratories*. Organized by CENICA. Mexico City, August 19 to 23, 2002
12. Course. *Introduction and Application of Air Quality Evaluation*. Organized by CENICA and Sub-Secretary of Ecology of the State Government of Aguascalientes. Aguascalientes, Aguascalientes, November 11 to 13, 2002
13. Course. *Remediation of Contaminated Soils*. Organized by CENICA, CECADESU and the Regional Center for Sustainable Development. Patzcuaro, Michoacan. November 21 to 22, 2002
14. Course. *Introduction to Atmospheric Pollution*. Organized by CENICA and CECADESU. Mexico City, November 27 to 29, 2002

15. Course. *Introduction to Atmospheric Pollutants Measurement*. Organized by CENICA. Mexico City, December 17 and 18, 2002

Year 2003

1. *First Course on Adequate Management of Solid and Hazardous Waste*. 2003. organized by CENICA. Mexico City, January 20 to February 14, 2003

2. Course. *Atmospheric Monitoring and Data Management*. Organized by the Institute of Ecology of the Government of the State of Guanajuato and CENICA. Salamanca, Guanajuato, June 10 to 13, 2003

3. Course. *Introduction to Atmospheric Monitoring*. Organized by CENICA, DGICURG and DICTA-CENICA. Salamanca, Guanajuato, June 11 to 13, 2003

4. Course. *Atmospheric Monitoring*. Organized by the State Branch of SEMARNAT, the State of Sonora and CENICA. Hermosillo, Sonora, June 18 to 20, 2003

5. Course. *Remediation of Contaminated Soils*. Organized by CENICA and CECADESU and the Regional Center for Sustainable Development. Mazatlan, Sinaloa, September 4 and 5, 2003

6. Course. *Adequate Management of Municipal Solid Waste*. Organized by CENICA, CECADESU and Regional Center for Sustainable Development. la Paz, Baja California Sur, October 16 and 17, 2003

7. Course. *Adequate Management of Municipal Solid Waste*. Organized by CENICA, CECADESU and Regional Center for Education and Sustainable Development. Playa del Carmen, Quintana Roo, October 23 and 24, 2003

8. Second Course. *Regional Management of Solid and Hazardous Waste*. Organized by CENICA, Mexico City, November 3 to 28, 2003

9. Course. *Atmospheric Monitoring*. Organized by the State Branch of SEMARNAT in the State of Durango, Mexico and CENICA. Durango, November 12 to 14, 2003

Year 2004

1. Course. *Analysis of Transgenics*. Organized by CENICA. Mexico City, February 2 to 9, 2004

2. Course-Workshop *Breeding, Support and Evaluation Methods of Acute Toxicity with Daphnia Magna Straus*. Organized by CENICA. Mexico City, June 30 to July 2, 2004 .

3. Course. *Monitoring and Characterization of Atmospheric Particles*. Organized by CENICA, Mexico City, September 8 to 10, 2004

4. Course. *Quality in Test Laboratories: Selected Topics.I*. Organized by CENICA, Mexico City, September 20 to 24, 2004
5. Course-Workshop. *Criteria Standarization for Manual and Automatic Monitoring Network Operation*. Organized by the Institute of Technology of the State of Guanajuato and CENICA. Salamanca, Guanajuato, September 26 and 27, 2004
6. Course-Workshop. *Breeding, Support and Evaluation Method of Acute Toxicity with Daphnia Magna Straus*. Organized by CENICA, Mexico City, October 13 to 15, 2004
7. Course. *Monitoring Network Design of Suspended Particles*. Organized by CENICA with the Agency for Environmental Protection of the State of Nuevo Leon and the State Office of SEMARNAT in the State of Nuevo Leon. Monterrey, Nuevo Leon, October 26 and 27, 2004
8. Course-Workshop. *General Law for the Prevention and Comprehensive Management of Waste*. Organized by CENICA and the General Legal Coordination of SEMARNAT, the Office of State of Guanajuato, the Institute of Ecology of the State of Guanajuato and the Technological University of Leon. Leon, Guanajuato, October 26 and 27, 2004
9. Advanced Course. *Remediation of Contaminated Soils*. Organized by CENICA and the General Direction of Comprehensive Management of Materials and Hazardous Activities of SEMARNAT. National Autonomous University of Mexico, State Office of the State of Sonora and University of Sonora. Hermosillo, Sonora, October 28 and 29, 2004
10. Course. *Management and Monitoring of Air Quality*. Organized by CENICA and the General Direction of Air Quality Management and Emmissions Record and Pollutants Transfer of SEMARNAT. Mexico City, November 30 to December 2, 2004
11. Course. *Environmental Risk*. Organized by CENICA and the General Direction of Materials and Hazardous Activities of SEMARNAT. Mexico City, November 30 to December 1, 2004

Year 2005

1. *Third Regional Course on Adequate Management of Solid and Hazardous Waste*. Organized by CENICA. Mexico City, January 24 to February 18, 2005
2. Course. *Identification and Characterization of Emmission Sources of PM₁₀ and PM_{2.5} based on Analytical Data of PM in the Environmental Air*. Organized by CENICA. Mexico City, January 31 to February 1, 2005
3. Course. *Waste Incineration*. Organized by CENICA. Mexico City, February 10 and 11, 2005

4. Course. *Introduction to Management and Monitoring of Air Quality*. Organized by CENICA. Mexico City, May 16 and 17, 2005
5. Course-Workshop. *Monitoring and Characterization of Particles*. Organized by CENICA. Mexico City, June 30, 2005
6. Course. *Graphical and Statistical Analysis of Environmental Data with "R" Statistical Programme*. Organized by CENICA. Mexico City, June 27 and 28, 2005
7. Course. *Atmospheric Monitoring in Villahermosa City*. Organized by CENICA. Tabasco, October 27 and 28, 2005
8. Course. *Introduction to Protocol Evaluation for Incineration and Similar Processes Emissions Test*. Organized by CENICA. Mexico City, November 14 to 18, 2005
9. Course. *Remediation of Contaminated Soils in Tuxtla Gutierrez*. Organized by CENICA. Chiapas, November 28 and 29, 2005

Annex-4: Research

4.1: Publications

4.1.1 Research articles

Year 2002

1. Bravo, H., R. Sosa, P. Sánchez, E. Bueno and L. González. 2002. Concentrations of benzene and toluene in the atmosphere of the southwestern area at the Mexico City Metropolitan Zone. **Atmospheric Environment** 36:3843-3849
2. Velasco-Saldaña, E., (in print). Estimates for biogenic non-methane hydrocarbons and nitric oxide emissions in the Valley of Mexico. **Atmospheric Environment** 1-13.
3. Volke-Sepúlveda, T. 2002. Bioremediación de suelos contaminados (*Biological remediation of contaminated soils*). **Bio Tecnología** 7 (1):24-39

Year 2003

1. Velasco, E. 2003. Estimates for biogenic non-methane hydrocarbons and nitric oxide emissions in the Valley of Mexico. **Atmospheric Environment** 37: 625-637.
2. Gómez-Perales, J.E., R.N. Colvile, M.J. Nieuwenhuijsen, A. Fernández-Bremauntz, V.J. Gutiérrez-Avedoy, V.H. Páramo-Figueroa, S. Blanco-Jiménez, E. Bueno-López, F. Mandujano, R. Bernabé-Cabanillas and E. Ortiz-Segovia. (in print). Commuter's Exposure to PM2.5, CO and benzene in Public Transport in the Metropolitan Area of México City. **Atmospheric Environment**
3. Cerón, R.M., H. Padilla., A. Báez., R. Belmont., J.G. Cerón., and M. Muriel. (in print). Influence of Sea Salt Aerosol on Precipitation Chemistry in Coastal Marine Sites in Mexico **Environmental Pollution**
4. Solórzano Ochoa, G. 2003. Aportación de gases de efecto invernadero por el manejo de residuos sólidos en México: el caso del metano (Contribution of greenhouse gases due to solid waste management) **Gaceta Ecológica**, 66: 7-15.
5. Rosas, A.; A. Peña; G. Ramos; Ch. Izumikawa; G. Aguilar; J.A. Velasco; S. Flores; A. Díaz; L. Magdaleno; L. García and P. Salgado. 2003. La evaluación de la incineración de residuos peligrosos (*Evaluation of hazardous waste incineration*) **Gaceta Ecológica** 66: 27-40.
6. Velasco, J. A. and T. Volke. 2003. El composteo: una alternativa tecnológica para la bioremediación de suelos en México (*Composting: A technological alternative for biological remediation of soils in Mexico*) **Gaceta Ecológica** 66: 41-53.
7. G. Encarnación Aguilar and G. Fernández. 2003. Tecnologías de tratamiento de medicamentos caducos para su disposición segura (*Treatment technologies for expired drugs regarding its safe disposal*) **Calidad Ambiental** VIII (4): 14 – 16

Year 2004

1. Alcántara, S., A. Velasco and S. Revah. 2004. Sulphur Formation by steady-state continuous cultures of a sulfoxidizing consortium and *Thiobacillus thioparus* ATCC-23645. **Environmental Technology** 25: 1151-1157
2. de la Rosa, D.A., T. Volke-Sepúlveda and G. Solórzano. 2004. Release of total gaseous mercury from municipal solid waste disposal sites nearby Mexico City **RMZ- Materials and Geoenvironment: Periodical for Mining, Metallurgy and Geology** 51(1): 67-71
3. de la Rosa, D.A., T. Volke-Sepúlveda, G. Solórzano, C. Green, R. Tordon, and S. Beauchamp. 2004. Survey of atmospheric total gaseous mercury in Mexico. **Atmospheric Environment** 38: 4839-4846
4. Ergas, S., and B. Cárdenas-González. 2004. Biofiltration: Past, present and future directions. **Biocycle** 45: 35-39
5. Gómez-Perales, J.E., R.N. Colvile, M.J. Nieuwenhuijsen, A. Fernández-Bremauntz, V.J. Gutiérrez-Avedoy, V.H. Páramo-Figueroa, S. Blanco-Jiménez, E. Bueno-López, F. Mandujano, R. Bernabé-Cabanillas, and E. Ortiz-Segovia. 2004. Commuter's Exposure to PM_{2.5}, CO and benzene in Public Transport in the Metropolitan Area of México City. **Atmospheric Environment** 38, pp 1219-1229

Year 2005

1. Cortez-Lugo, M., H. Moreno-Macías, F. Holguin Molina, J.C. Chow, J.G. Watson, V. Gutiérrez-Avedoy, F. Mandujano, M. Hernández-Ávila and I. Romieu. 2005. Relationship between indoor, outdoor and personal fine particle concentrations for individuals with COPD and predictors of indoor-outdoor ratio in Mexico City. **Journal of Exposure and Environmental Epidemiology** (in print)
2. Hernández, S., D.A. de la Rosa, C. Márquez and G. Solórzano. 2005. Ambient air measurements of total gaseous mercury in Mexico. **Abstracts. Papers of The American Chemical Society** 229: U833-U833 042-ENVR Part 1
3. Márquez C., Castro T., Muhlia A., Moya M., Martínez-Arroyo A., and Báez A. 2005. Measurement of aerosol particles, gases and flux radiation in the Pico de Orizaba National Park, and its relationship to air pollution transport. **Atmospheric Environment** 39 (21): 3877-3890
4. Márquez C. Castro T. & Martínez-Arroyo A. 2005. Reply to "The regional influence of volcanic emissions from Popocatepetl, Mexico" from Pyle & Mather **Atmospheric Environment** 39 (34): 6479-6480

5. Molina-Barahona, L., L. Vega-Loyo, M. Guerrero, S. Ramírez, I. Romero, C. Vega-Jarquín and A. Albores. 2005. Ecotoxicological Evaluation of diesel contaminated soil before and after a bioremediation process. **Environ Toxicol** 20:100-109
6. Naohide, S., A. Fernández-Bremauntz, S. Blanco, and Y. Yanagisawa. 2005. The commuters' exposure to volatile chemicals and carcinogenic risk in Mexico City. **Atmospheric Environment** 39 (19): 3481-3489
7. Ortiz, I., J.A. Velasco and S. Revah. 2005. Effect of toluene as gaseous cosubstrate in bioremediation of hydrocarbon-polluted soil. **Journal of Hazardous Materials** (in print). Available in internet.
8. Velasco, J.A., D.A. de la Rosa, A. Rosas, G. Solórzano and T. Volke. 2005. Gaseous mercury and volatile organic compounds measurements from five municipal solid waste disposal sites surrounding the Mexico City Metropolitan. **Atmospheric Environment** (FI 2.338). (accepted)
9. Volke-Sepúlveda, T., M. Gutiérrez-Rojas and E. Fabela-Torres. 2005. Biodegradation of high concentrations of hexadecane by *Aspergillus niger* in a solid-state system: kinetic analysis **Bioresource Technology** (in print)

4.1.2. Papers and proceedings

Year 2002

1. Rosas-Domínguez, A., A. Peña, G. Ramos, C. Izumikawa, A. Díaz and A. Magdaleno. 2002. Evaluación de la eficiencia de incineración de los residuos peligrosos en México. In: Tratamiento de residuos peligrosos (*Evaluation of the incineration efficiency of hazardous waste in Mexico*) **XIII Congreso Nacional de FEMISCA** April 17-20, Guanajuato, Guanajuato, pp. 467-470
2. Solórzano-Ochoa, G. 2002. Aportación de gases de invernadero por el manejo de residuos sólidos en México: el caso del metano (*Evaluation of hazardous waste incineration in Mexico: The case of methane*). **Proceedings. XXVIII Congreso Interamericano de Ingeniería Sanitaria y Ambiental** October 27 to November 1, Cancún, Quintana Roo México. CD versión
3. Velasco, E., E. Segovia, M. Hidalgo, S. Ramírez, F. Ángeles, A. Retama, A. Campos and J. Montaña. 2002. Lluvia ácida en los bosques del poniente del Valle de México (*Acid rain in the west forests of the Valley of Mexico*). **XXVIII Congreso Interamericano de Ingeniería Sanitaria y Ambiental, October 27 to November 1°, Cancún, Quintana.Roo.** CD version
4. Velasco-Saldaña, H.E., E. Bueno, O. Fentanes, C.A. Sánchez-Soto, A. Kamiya, M. Saito, V. Gutiérrez-Avedoy, B. Cárdenas and S. Wakamatsu. 2002. Measurements of the vertical profile of meteorological parameters and ozone concentration in Mexico City **Proceedings. 95th Annual Conference of Air and Waste Management Association.** Paper No. 42663

Year 2003

1. Solórzano, G. 2003. Manejo de residuos sólidos (*Solid waste management*). **X Congreso Nacional de Comisiones Legislativas de Salud** August 18, Mazatlan, Mexico
2. Ortiz, I., J. A. Velasco, D. Cabanillas and S. Revah. 2003. Biodegradación de hidrocarburos en suelo mediante la inyección continua de tolueno como cosustrato (*Hydrocabide biodegradation in soils through a continuous injection of toluen as co-substrate*). **X Congreso Nacional de Biotecnología y Bioingeniería** September 8-12, Puerto Vallarta, Mexico.
3. Bravo, A. L., T. Volke y M. Gutiérrez. 2003. Degradación de altas concentraciones de benzo(a)pireno por hongos filamentosos en cultivo sólido. (*Degradation of high degree concentrations of benzo(a)piren by filamentous fungi in solid nurture*) **X Congreso Nacional de Biotecnología y Bioingeniería,** September 8-12, Puerto Vallarta, Mexico.

4. Solórzano, G. and T. Volke. 2003. Mining operations and soil pollution in Mexico. An overview on inorganic contaminates **6th Meeting of the Ad Hoc International Working Group on Contaminated Land** March 17-18, Montreal, Canada
5. Meza, J. C.; S. Revah; J.A. Velasco and R. Auria. 2003. Enhanced biodegradation of hydrocarbons by addition of gaseous co-substrates. ***In situ and on site Bioremediation. The 7th International Symposium*** June 2 – 5, Florida, USA
6. Yamamoto T., G. Solórzano, R. Cuellar and C. Guzmán. 2003. Landfill management improvement in Mexico City: ground subsidence monitoring and leachate management. **9^o Congreso de Manejo y Disposición final de Residuos Sólidos**. October 6-10, Sardinia, Italy
7. Gómez-Perales, J.E., R.N. Colvile, M.J. Nieuwenhuijsen, A.A. Fernández Bremauntz, V. Gutiérrez Avedoy, V.H. Páramo Figueroa, S. Blanco Jiménez, F. Mandujano, R. Bernabe, E. Bueno López and M. Hidalgo-Navarro. 2003. Commuters' exposure to PM_{2.5}, CO and Benzene inside the public transport in Mexico City. **13th Annual Conference of International Society of Exposure Analysis**, September 21-25, 2003, Stresa Piemonte, Italy
8. Gómez-Perales, J.E., A. Grossinho, R.N. Colvile, M.J. Nieuwenhuijsen, A.A. Fernández-Bremauntz, V. Gutiérrez Avedoy, V.H. Páramo Figueroa, S. Blanco Jiménez and R. Ramos-Villegas. 2003. Exposure Assessment of CO levels for public transport users and residents in Mexico City using GIS **13th Annual Conference of International Society of Exposure Analysis** September 21-25, 2003, Stresa Piemonte, Italy.
9. Sepúlveda, J.D., S. Blanco and B. Cárdenas. Estudio comparativo de las concentraciones de partículas antropogénicas entre las regiones centro, norte, sur, oriente y poniente de la ZMVM mediante Microscopía Electrónica de Barrido y Microanálisis Elemental por Espectrometría de Rayos X. (*Comparative study of anthropogenic particle concentration in the central, northern, south and eastern regions of the Metropolitan Area of Mexico City by means of Sweep Electronic Microscopy and Elementary Microanalysis by X Ray Spectrometry*) **Proceedings. III Congreso Iberoamericano de Física y Química Ambiental** Octubre 6-10, 2003, Atlahuetzia, Tlaxcala, Mexico.
10. Ángeles, F., S. Blanco, R.M. Bernabé, O. Rivera, A. Retama and B. Cárdenas. Diseño de la red de monitoreo para PM_{2.5} de la ZMVM: Identificación de sitios de monitoreo en las regiones de Ecatepec, Tlalnepantla, Cuauhtémoc y Nezahualcóyotl. (*Design of the monitoring network for PM_{2.5} for the Metropolitan Area of Mexico City: Identification of Monitoring Sites in the regions of Ecatepec, Tlalnepantla, Cuauhtemoc*

and Nezahualcoyotl) **Proceedings. III Congreso Iberoamericano de Física y Química Ambiental** 6-10 de Octubre de 2003, Atlihuetzía, Tlaxcala, Mexico.

11. Bueno, E., P. López, V. Gutiérrez, B. Cárdenas, A. Kamiya and S. Wakamatsu. Seasonal Trends of total and specific VOC's at the Southeast of the Mexico City. **Proceedings. ASAAQ** February 2003, Tsukuba, Japón

12. Bueno, E., O. Fentanes, A. Sánchez, S. Blanco, B. Cárdenas, V. Gutiérrez, V. Rentería, E. Velasco, A. Kamiya, M. Saito, and S. Wakamatsu. Determination of the vertical profiles for meteorological parameters, ozone and VOC concentrations in the Mexico City Metropolitan Area. **Proceedings. ASAAQ** February 2003, Tsukuba, Japón

13. Velasco, E., B. Cárdenas, B. Lamb, and A. Kamiya. 2003. Observations of vertical ozone and meteorological parameters in the first 1 km of height in Mexico City. **Proceedings. ASAAQ** February 2003, Tsukuba, Japón

14. Segovia, E., E. Velasco, M. Hidalgo, A. Campos, A. Wellens, A. García, A.M. Maldonado, S. Ramírez, and I. Romero. Acid rain in the forests of the Valley of Mexico City **Proceedings. ASAAQ** February 2003, Tsukuba, Japan

15. Wakamatsu, S., M. Saito, S. Kamiya, V. J. Gutiérrez, J. R. Varela, J. Granados, M. Castillejos, and R. Sosa. Analysis of wind field in México City **Proceedings. ASAAQ** February 2003, Tsukuba, Japan. P8.15

16. Sánchez, A., S. Blanco., F. Ángeles, O. Fentanes and B. Cárdenas. Correlación entre el muestreo manual y el monitoreo continuo de partículas suspendidas PM_{10} y $PM_{2.5}$ en el sureste de la Ciudad de México. (*Correlation between manual sampling and continuous monitoring of PM_{10} and $PM_{2.5}$ suspended particles in the southeast of Mexico City*) **Proceedings. III Congreso Iberoamericano de Física y Química Ambiental** October 6-10, 2003, Atlihuetzia, Tlaxcala, Mexico.

17. Ramírez, J., V.J. Gutiérrez, B. Cárdenas, S. Blanco, V.H. Páramo, F. Angeles, R. Ramos, A. Retama, A. Soler and L. Valdés. Determinación de Ozono en Zonas Agrícolas del Valle de México (*Ozone Determination in Agricultural Areas of the Valley of Mexico*) **Proceedings. III Congreso Iberoamericano de Física y Química Ambiental** 6-10 de October, 2003, Atlihuetzia, Tlaxcala, Mexico.

18. Mendoza, J., J. Chanona, S. Flores, A. Hernández, J. Montoya, J. Sepúlveda, S. Revah, V. Gutiérrez and B. Cárdenas Estudio de la actividad biocatalítica en diferentes soportes con aplicación en biofiltración y su relación con la microestructura (*Study of the biocatalitic activity in different supports with biofiltration application and its relation to the microstructure*) **Proceedings. X Congreso Nacional de Biotecnología y Bioingeniería** September 8-12, Puerto Vallarta, Jalisco, Mexico.

19. Cárdenas, B., J. Munguía, D. Martínez, L. Herrera, S. Hernández and S. Revah. Operación de un sistema de biofiltración para el control de una mezcla de compuestos orgánicos volátiles por largos periodos (*Operation of a biofiltration system for controlling the blend of volatile organic compounds during large periods*) **Proceedings. X Congreso Nacional de Biotecnología y Bioingeniería** September 8-12, Puerto Vallarta, Jalisco, Mexico
20. Cercado, B., B. Cárdenas, R. Auria and S. Revah. 2003. Secado y humectación de una biopelícula sobre soporte sintético (*Drying and humidifying a biolayer over a synthetic container*) **Proceedings. X Congreso Nacional de Biotecnología y Bioingeniería** September 8-12, Puerto Vallarta, Jalisco, Mexico
21. CENICA 2003. Primer Curso Regional sobre Manejo Adecuado de Residuos Sólidos y Peligrosos. (*First Regional course on Adequate management of Solid and Hazardous Waste*) February. **Proceedings** in CD version
22. CENICA 2003. Segundo Foro del Día Interamericano de la Calidad del Aire (Second Forum for the Interamerican Day for Air Quality) August. **Proceedings** in CD version
23. CENICA 2003. Segundo Encuentro Iberoamericano de Medio Ambiente Calidad del Aire México España (Second Iberoamerican Meeting on the Environment Mexico-Spain on Air Quality). November. **Proceedings** in CD version
24. CENICA 2003. Taller sobre la Importancia del Monitoreo Atmosférico en el Contexto de la Gestión de la Calidad del Aire en México (*Workshop on the Relevante of Atmospheric Monitoring within the Framework of Air Quality Management in Mexico*) November, **Proceedings** in CD version
25. CENICA 2003. Segundo Curso regional sobre Manejo Adecuado de Residuos (Second Regional Course on Adequate Waste Management) November. **Proceedings** in CD version

Year 2004

1. Bernabé, R., S. Blanco, J. Cerón, B. Cárdenas and F. Ángeles. 2004. Variación espacial y temporal de las PM_{2.5} en cinco sitios del área metropolitana de la Ciudad de México (Spatial and Chronological Variation of PM_{2.5} in five sites of the Metropolitan Area of Mexico City. In: **XIV Congreso Nacional de FEMISCA 2004**, May 12-14, Mazatlan, Sinaloa. CD version, 11 pp.
2. Bueno, E., V. Gutiérrez, H. Bravo and R. Sosa, 2004. Simultaneous Measurements of Diurnal Concentrations of Volatile Organic Compounds in the Southeast and Southwest of Mexico City. En: **97th Annual Conference of The Air & Waste**

Management Association (AWMA), June 22-25, Indianapolis, Indiana. No. 333 , CD version, 9 pp

3. Bueno, E., H. Wöhrnschimmel, A. Velasco, V. Gutiérrez, B. Cárdenas and Sh. Wakamatsu. 2004. Continuous VOCs monitoring at the CENICA supersite during April 2000-2004: A comparison with the CAM-MIT 2003 campaign. In: **American Geophysical Union Fall Meeting**, December 13-17, San Francisco, California. CD. 1 pp

4. de la Rosa, D.A., T. Volke-Sepúlveda and G. Solórzano. 2004. Release of total gaseous mercury from municipal solid waste disposal sites nearby Mexico City. In: **Abstracts of the 7th International Conference on Mercury as a Global Pollutant**. June, Ljubljana, Slovenia. CD version, 4 pp.

5. Dzepina, K., D. Salcedo, Q. Zhang, M. Dunn, P. De Carlo, A. Huffman, J. Jimenez, T. Onasch, P. Mortimer, J. Jayne, M. Canagaratna, D. Worsnop, J. Gaffney, N. Marley, R. Volkamer, B. de Foy, S. Frey, K. Johnson, B. Zuberi, L. T. Molina, M. J. Molina, R. Bernabe, C. Márquez, S. Blanco, F. Angeles, B. Cardenas, T. Shirley, R. Leshner, W. Brune and J. Smith. 2004. Size, Time, and Composition-Resolved Aerosol Measurements in Mexico City During the MCMA-2003 Field Campaign: The Organic Component. In: **American Geophysical Union Fall Meeting**, December 13-17, San Francisco, California. CD version, 1 pp

6. Flores, S., G. Encarnación, M. Ibarra, T. Yamamoto, A. Rosas and G. Solórzano. 2004. Determinación del poder calorífico de residuos sólidos municipales en la Cd. de México. In: **Proceedings XIV Congreso Nacional de la Federación Mexicana de Ingeniería Sanitaria y Ambiental**, May, Mazatlan, Sinaloa. CD version, 7 pp.

7. Gómez, J., N. Colvile, M. Nieuwenhuijsen, S. Blanco, R. Bernabé, E. Bueno and B. Cárdenas. 2004. Evaluación de partículas finas PM_{2.5}, monóxido de carbono y benceno al interior de diferentes medios de transporte de la Ciudad de México (*Evaluation of PM_{2.5} particles, carbon monoxide and benzen within various means of transport in Mexico City*) In: **XIV Congreso Nacional de FEMISCA** May 12-14, Mazatlan, Sinaloa. CD version, 15 pp.

8. Hernández, S., D.A. de La Rosa, C. Marquez, G. Solórzano and A. Martinez. 2004. Exploratory Investigation of Concentrations of Total Gaseous Mercury in the Mexico City Metropolitan Area. In: **American Geophysical Union Fall Meeting**, December 13-17, San Francisco, California. CD version, 1pp.

9. Jiménez, J.L., K. Dzepina, Q. Zhang, M. Dunn, P. De Carlo, J. Huffman, D. Salcedo, T. Onasch, D. R. Worsnop, C. E. Kolb, P. Mortimer, J. T. Jayne, M. R. Canagaratna, R. Volkamer, K. Johnson, B. Zuberi, B. de Foy, S. Frey, M. Molina, L. T. Molina, L. Marr,

- J. Arey, B. Cardenas, W.H. Brune, J. Smith, P. Mc Murry, J. Gaffney, N. Marley, A. Laskin, J. Cowin, R. Bernabe, S. Blanco, C. Márquez and F. Angeles. 2004. Overview of Measurements of Particle Emissions and Ambient Concentrations in Mexico City during the MCMA-2003 Field Campaign. In: **American Geophysical Union Fall Meeting**, December 13-17, San Francisco, California. CD version, 1pp
10. Lamb, B.K., E. Velasco, E. Allwine, S. Pressley, H. Westberg, B. Knighton, T. Rogers, E. Grimsrud, T. Jobson, M. Alexander, P. Prazeller, R. Volkamer, B. de Foy, L. Molina, M. Molina, M. Grutter, E. Bueno, S. Blanco, H. WohnerSchimmel, B. Cardenas, J. L. Arriaga, M. T. Limon, S. Escalona, G. S. Iglesias, P. Doskey and J. Gaffney. 2004. Ambient VOC Concentration and Emission Measurements during the MCMA 2002 and 2003 Field Campaigns. In: **American Geophysical Union Fall Meeting**, December 13-17, San Francisco, California. CD version 1pp
11. Márquez, C., A. de la Rosa, S. Hernández, A. Martínez, T. Volke-Sepúlveda, G. Solórzano and B. Cárdenas. 2004. Total gaseous mercury measurements at four sites of the Mexico City Metropolitan Area during a short period. In: **97th Annual Conference of The Air & Waste Management Association (AWMA)**, June 22-25, Indianapolis, Indiana. N° 226. CD version 11 pp.
12. Molina, L.Y., B. de Foy, M. J. Molina, E. Caetano, V. Magana, A. Zitacuaro, R. Ramos, A. Retama, B. Cardenas, A. Martinez, R. Reyes and G. Sosa. 2004. Photochemical and Meteorological Conditions during the MCMA-2003 Field Measurement Campaign. In: **American Geophysical Union Fall Meeting**, December 13-17, San Francisco, California. CD version, 1pp.
13. Ramírez, J., J. Cerón, A. Retama, S. Blanco, R. Ramos, V. Gutiérrez and B. Cárdenas. 2004. *Variación de las concentraciones de Ozono en Zonas Agrícolas del Valle de México (Ozone concentration variation in Agricultural Zones of the Valley of Mexico)*. In: **XXIX Congreso Interamericano de Ingeniería Sanitaria y Ambiental**, August 22 - 27, San Juan, Puerto Rico. CD version, 8 pp.
14. Salcedo, D., K. Dzepina, A. Huffman, P. De Carlo, T. B. Onasch, P. Mortimer, J. T. Jayne, M. Canagaratna, D. R. Worsnop, L. Marr, L.T. Molina, M. J. Molina, B. Cardenas, R. M. Bernabe, C. Marquez, J. S. Gaffney, N. Marley, R. Volkamer, B. Zuberi, W. Brune, R. Leshner, T. Shirley and J. L. Jimenez. 2004. Characterization of Ambient Aerosols in Mexico City during the MCMA-2003 Campaign using an Aerosol Mass Spectrometer: Overall Trends and the Inorganic Component. In: **American Geophysical Union Fall Meeting**, December 13-17, 2004, San Francisco, California. CD version, 1pp
15. Sosa, G., J. Arriaga, E. Vega, V. Magaña, E. Caetano, B. de Foy, L. T. Molina, M. J. Molina, R. Ramos, A. Retama, J. Zaragoza, A. Martinez, C. Márquez, B. Cárdenas,

B. Lamb, E. Velasco, E. Allwine, S. Pressley, H. Westberg and R. Reyes. 2004. Air Quality and Meteorological Boundary Conditions during the MCMA-2003 Field Campaign. In: **American Geophysical Union Fall Meeting**, December 13-17, San Francisco, California. CD. 1pp

16. Velasco, J.A., A. Rosas, A. De la Rosa, T. Volke and G. Solórzano. 2004. Caracterización de peligrosidad en lixiviados y biogás generados en un relleno sanitario de residuos sólidos municipales (*Risk characterization of lixiviates and biogas originated in a sanitary landfill of municipal solid waste*). In: **Proceedings. XIV Congreso Nacional de la Federación Mexicana de Ingeniería Sanitaria y Ambiental** May 2004, Mazatlan, Sinaloa. CD version, 8 pp.

17. Wöhrnschimmel, H., V. Mugica, B. Cárdenas, C. Márquez and J. Stahlein. 2004. Ozone, and VOC vertical profiles over the Southeast of Mexico City. In: **10th International Symposium "Transport and Air Pollution"** September 17-19, Boulder, Colorado, pp. 24-31

Year 2005

1. Bernabé R., C. Márquez, T. Castro, D. Salcedo, S. Blanco, F. Angeles and B. Cárdenas. 2005. Composición química de las partículas suspendidas en la atmósfera en los sitios CENICA y Santa Ana, durante la campaña CAM-MIT 2003 (*Chemical composition of suspended particles in the atmosphere in the CENICA and Santa Ana Fields, during the CAM-MIT Campaign*) In: **Libro de Resúmenes del V Simposio de Contaminación Atmosférica** July 19-21, Mexico City, pp. 258-262

2. Bueno, E., H. Wöhrnschimmel, A. Velasco, S. Blanco, V. Gutiérrez, S. Wakamatsu and B. Cárdenas. 2005. Monitoreo continuo de compuestos orgánicos volátiles en el supersitio durante abril del 2000-2004: una comparación con las mediciones de la campaña CAM-MIT 2003 (*Continuous Monitoring of Volatile Organic Compounds in the supersite during April 2000-2004: a comparison with the measurements of CAM-MIT 2003*). In: **Libro de Resúmenes del V Simposio de Contaminación Atmosférica** July 19-21. Mexico City, pp. 253-257.

3. Cárdenas, B., E. Bueno, H. Wöhrnschimmel, S. Blanco, B. Lamb, E. Velasco, E. Allwine, S. Pressley, H. Westberg, B. Knighton, T. Rogers, E. Grimsrud, T. Jobson, M. Alexander, P. Prazallor, R. Volkamer, B. de Foy, L. T. Molina, M. J. Molina, M. Grutter, P. Doskey, J. Gaffney, J. L. Arriaga, M. T. Limón, and S. Escalona. Concentraciones ambientales y mediciones de emisiones durante las campañas de medición MCMA 2002 y 2003 (*Environmental Concentrations and emission measurement during measurement campaigns MCMA 2002 and 2003*). In: **Libro de Resúmenes del V Simposio de Contaminación Atmosférica** July 19-21, Mexico City, pp. 4-5.

4. De la Rosa, D.A., G. Solórzano and T. Volke. 2005. Emisiones de mercurio gaseoso total en sitios de disposición final de residuos sólidos municipales en la Zona Metropolitana de la Ciudad de México (*Total gaseous mercury emissions in final disposal sites of solid municipal waste in the Metropolitan Area of Mexico City*). In: **1er Congreso Interamericano de Residuos Sólidos DIRSA-AIDIS** May 5-7, Merida, Yucatan
5. Martínez, A.P., C. Banic and R. Artz, 2005. Current status of the CEC North American Regional Action Plan for Environmental Monitoring and Assessment In: **American Chemical Society 229th National Meeting & Exposition** San Diego, CA. March 13-17, 2005. 4 pp
6. Salcedo, D., J. L. Jimenez, K. Dzepina, Q. Zhang, M. Dunn, Peter DeCarlo, y Alex Huffman, T. Onasch, D. R. Worsnop, Ch. E. Kolb, P. Mortimer, J. T. Jayne, M. R. Canagaratna, R. Volkamer, L. Marr, K. Johnson, B. Zuberi, S. Frey, B. de Foy, M. J. Molina, L. T. Molina, J. Arey, R. Bernabé, C. Marquez, F. Ángeles, S. Blanco, B. Cárdenas, W. Brune, J. Smith, P. McMurry, J. S. Gaffney, N. A. Marley, A. Laskin and J. Cojín. Resumen de mediciones de emisiones y concentraciones atmosféricas de partículas en la Ciudad de México durante la campaña MCMA-2003 (*Summary of emission measurement and atmospheric concentration of particles in Mexico City during the 2003 MCMA Campaign*). In: **Libro de Resúmenes del V Simposio de Contaminación Atmosférica** 19-21, July 2005, México City, pp. 6-7.
7. Salcedo, D., K. Dzepina, T. B. Onasch, A. J. Huffman, P. F. Decarlo, J. T. Jayne, P. Mortimer, M. R. Canagaratna, D. R. Worsnop, K. S. Johnson, B. Zuberi, R. Volkamer, L. C. Marr, L. T. Molina, M. J. Molina, B. Cardenas, R. M. Bernabé, C. Márquez, J. Gaffney, N. A. Marle, W. Brune, R. Leshner, T. Shirley, V. Shutthanandan, Y. Xie and J. L. Jiménez. 2005. Caracterización de aerosoles atmosféricos en la Ciudad de México durante la campaña MCMA-2003 (*Characterization of atmospheric aerosols in Mexico City during the 2003 MCMA Campaign*). In: **Libro de Resúmenes del V Simposio de Contaminación Atmosférica** July 19-21, Mexico City, pp. 23-29.
8. Sosa, R., H. Bravo, P. Sánchez, J. Santacruz and E. Bueno. 2005. Volatile compound air quality over the Gulf of Mexico. **Air and Waste Management Association** Paper N° 1306.
9. Velasco, N., I. González, T. Volke and M. Gutiérrez. 2005. Evaluación del uso de agrolita como soporte inerte para el crecimiento y degradación de hexadecano por *Aspergillus niger* en cultivo sólido (*Use evaluation of agrolite as inert support for growth and degradation of hexadecan for Aspergillus niger in solid culture*). In: **XI Congreso Nacional de Biotecnología y Bioingeniería** September 18-23, Merida, Yucatan.

10. Velasco, J.A., D.A. de la Rosa and T. Volke. 2005. Precipitación de altas concentraciones de plomo por bacterias sulfato reductoras en un reactor a régimen continuo (*Precipitation in high lead concentrations by sulphate reduction bacteria in a continuous regime reactor*). In: **XI Congreso Nacional de Biotecnología y Bioingeniería** September 18-23. Merida, Yucatan.
11. Wöhrnschimmel, H. Zuk, M., Bretón, J., Rojas, L. and B. Cárdenas. 2005. Exposición personal a benceno y partículas en pasajeros del transporte público (*Personal Exposure to benzen and particles in passangers in public transport*). In: **Libro de Resúmenes del V Simposio de Contaminación Atmosférica** July 19-21, Mexico City, pp. 243-247.
12. Zuk, M., S. Blanco, L. Rojas, J. Cruz, C. Armendáriz, P. Serrano, J. Sepúlveda, A. Martínez, F. Angeles and O. Masera. 2005. Evaluación de concentraciones microambientales de partículas suspendidas (*Evaluation of microenvironmental concentrations of suspended particles*). In: **Libro de Resúmenes del V Simposio de Contaminación Atmosférica** July 19-21. México City, pp 263-267

4.1.3. Books

Year 2003

1. Cárdenas, B., S. Revah., S. Hernández, V.J. Gutiérrez and A. Martínez. 2003. **Tratamiento biológico de compuestos orgánicos volátiles de fuentes fijas** (*Biological treatment by volatile organic compounds from fixed sources*) Instituto Nacional de Ecología-SEMARNAT, Mexico. 70 pp
2. Volke Sepúlveda, T. and J. A. Velasco. 2002. **Tecnologías de remediación para suelos contaminados** (*Remedial technologies for polluted soils*). Instituto Nacional de Ecología-SEMARNAT. ISBN 968-817-557-9. Mexico. 64 pp
3. De Icaza del Río, G., 2003. **Formation and transformation mechanisms of particulate matter under ten micrometers (PM₁₀) and ozone (O₃) in the Mexico City Metropolitan Area and Greater Manchester Area** Instituto Nacional de Ecología-SEMARNAT, Mexico. 226 pp

Year 2004

1. SEMARNAT, INE y PNUMA (comps.). 2004. **GEO MÉXICO. Perspectivas del Medio Ambiente en México** Instituto Nacional de Ecología, México. 329 pp
2. Velasco, E. and R.M., Bernabé. 2004. **Emisiones Biogénicas. Emisiones de compuestos orgánicos volátiles no metano de la vegetación y óxido nítrico del suelo** INE. México. 100 pp

Year 2005

1. Volke, T., J.A. Velasco and D.A. de la Rosa. 2005. **Suelos contaminados por metales y metaloides: muestreo y alternativas para su remediación** (*Contaminated soils by metals and metalloids: sampling and alternatives for its remediation*). Instituto Nacional de Ecología – Secretaría de Medio Ambiente y Recursos Naturales. ISBN: 968-817-492-0. Mexico City, 141 pp.

4.1.4. Technical Reports

Year 2002

1. Blanco-Jiménez, S. and F. Ángeles-García. 2002 **Diseño, adquisición e instalación de una red para el monitoreo de partículas menores a 2.5 micrómetros (PM_{2.5}) en las regiones de Ecatepec, Tlalnepantla, Cuauhtémoc y Nezahualcoyotl** (*Design, acquisition and installation of a monitoring network for particles smaller than 2.5 micrometers (PM_{2.5}) in the regions of Ecatepec, Tlalnepantla, Cuauhtémoc and Nexahualcoyotl*). First report submitted to the Secretary of the Environment of the Government of the Federal District Mexico City, August, 2002. 86 pp.
2. Blanco-Jiménez, S. and H. E. Velasco-Saldaña. 2002 **Perfil vertical de ozono y parámetros meteorológicos en la ZMVM** (*Vertical profile of ozone and meteorological parameters in the Metropolitan Area of Mexico City*). Mexico City, September, 55 pp.
3. CENICA-INE. 2002 **Informe del proyecto de desarrollo del Sistema Nacional de Información de la Calidad del Aire** (*Project Report of the development of the National System of Information of Air Quality*). Mexico City, October, 15 pp.
4. CENICA-INE, 2002. **Reporte del muestreo corto para determinar la presencia de metales en zonas aledañas a la empresa MET-MEX PEÑOLES, S.A. de C.V. en Torreón, Coahuila en diciembre de 2001** (*Report of a short sampling to determine the presence of metals in the areas surrounding the Factory MET-MEX PEÑOLES, Ltd.*). Report submitted to the Coordination of Advisors of SEMARNAT, Mexico City, February, 51 pp
5. Gutiérrez, V., A. and A. Gutiérrez. 2002 **Informe de la situación y los conocimientos actuales sobre las principales fuentes y emisiones de dioxinas en México** (*Report of the state and current knowledge about the principal sources and emissions of dioxins in Mexico*). Report submitted to the Cooperation Commission of North America (CCA), Mexico City, January, (Segundo Reporte. Revisión 1), 165 pp.
6. Ortuño, T., P. Salgado, M. C. Gutiérrez, A. Magdaleno, A. Díaz, H. García and J.A. Velasco. 2002. **Determinación de la presencia de metales en suelos y sedimentos de Hermosillo, Sonora y sus inmediaciones** (*Determination of metal presence in soils and sediments of Hermosillo, Sonora and its surroundings*). Mexico City, November, 21 pp.

7. Rosas-Domínguez, A. 2002 **Evaluación de la eficiencia de incineración de los residuos peligrosos en México** (*Evaluation of the efficiency of hazardous waste incineration in Mexico*). México City, March, 64 pp.
8. Sepúlveda, J. 2002 **Estudio comparativo de las concentraciones de partículas antropogénicas entre las regiones centro, norte, sur, oriente y poniente de la Zona Metropolitana del Valle de México, mediante microscopía electrónica de barrido y microanálisis elemental por espectrometría de Rayos X** (*Comparative Study of the concentration of anthropogenic particles in the central, north, south, east and west of the Metropolitan Area of Mexico City, by means of electronic microscopy of sweeping and elementary microanalysis by X ray spectrometry*). Preliminary report, December 2002, 53 pp.
9. Solórzano-Ochoa, G. 2002 **Revisión y análisis de las experiencias de Argentina, Brasil, Colombia, Ecuador y México respecto de los cinco elementos claves para el manejo ambiental de pilas y baterías** (*Revision and analysis of the experiences in Argentina, Brazil, Colombia, Ecuador and Mexico regarding five key elements for the environmental management of batteries*). Report submitted to Dra. Sonia Valdivia, Coordinator of the Project "Red Panamericana de Manejo Ambiental de Residuos" (REPAMAR) of the German Cooperation Agency (GTZ) and Pan American Health Organization (PAHO). Lima, Peru and México City, 152 pp.
10. Solórzano, G., A. De la Rosa, S. Hernández, A. Rosas-Domínguez, H. García, G. Solórzano, P. Salgado and T. Volke. 2002. **Monitoreo de mercurio en diversas matrices** (*Mercury monitoring in different matrices*). México City, November, 17 pp.
11. Volke-Sepúlveda, T. and J.A. Velasco-Trejo. 2002 **Biotratibilidad de suelos contaminados con hidrocarburos a nivel laboratorio: primera etapa** (*Biotreatment of polluted soils with hydrocarbons at laboratory level: first stage*), Mexico City, November, 20 pp.
12. Volke, T., A. Rosas-Domínguez., C. Izumikawa, G. Solórzano, G. Encarnación and S. Flores. 2002 **Remediación de sitios contaminados por la actividad minera en los Distritos de El Triunfo-San Antonio y Santa Rosalía, Baja California Sur** (*Remediation of soils contaminated by mining activity in the El Triunfo-San Antonio and Santa Rosalía Districts, Baja California Sur*), México City, November, 26 pp.

Year 2003

1. Volke, T., G. Solórzano, A. Rosas, Ch. Izumikawa, G. Encarnación, J. A. Velasco and S. Flores. 2003 **Remediación de sitios contaminados por metales provenientes de yales mineros en los distritos de El Triunfo-San Antonio y Santa Rosalía, Baja California Sur** (*Remediation of contaminated sites by metals originated*

in mining posts in the districts of El Triunfo-San Antonio and Santa Rosalia, Baja California Sur), Final Report, 37 pp.

2. Volke Sepúlveda, T. and J. A. Velasco Trejo. 2003 **Biodegradación de hidrocarburos del petróleo en suelos intemperizados mediante composteo** (*Biodegradation of hydrocarbons from petroleum in air and weather exposure through compost*) Final Report 33 pp.

3. Encarnación, G; S. Flores, M. Ibarra, T. Yamamoto and A. Rosas. 2003 **Poder calorífico de residuos sólidos municipales** (*Calorific power of solid municipal waste*). Final report 35 pp.

4. Flores, S.; G. Encarnación, A. Rosas, A.L. Magdaleno and P. Salgado. 2003 **Estabilización de cenizas provenientes de la incineración de residuos peligrosos** (*Ash stabilization originated in hazardous waste incineration*) Final report 32 pp.

5. Ustarán, J., V. Gutiérrez and G. Solórzano. 2003 **Pilot Program for the Measurement of Environmental Dioxinas & Furans in Mexico and Selection of 6 Initial Sites** North American Commission for Environmental Cooperation (NACEC) Final report 68 pp.

6. Alvarado, V. and V. Gutiérrez. 2003 **Análisis comparativo de la cuantificación de liberaciones de dioxinas y furanos en México** Final report 75 pp.

7. Jiménez-Morales, R. 2003 **Desarrollo de la capacidad técnica y científica para la detección de organismos genéticamente modificados (OGMs) y sus productos mediante técnicas moleculares, Etapa 1** (*Technical and scientific capacity development for detection of genetically modified organisms (GMOs) and their products thorough mollecular techniques, Stage 1*) Final report 62 pp.

8. Balaam M., 2003. Integración del sistema de medición del laboratorio de emisiones vehiculares (*Integration of the measurement system of the vehicular emissions laboratory*), **Ambientalis** Mexico City, 5 pp.

9. Balaam M., 2003. Ciclos de manejo y medición de emisiones en vehículos ligeros para el laboratorio de emisiones vehiculares del CENICA (*Management and measurement cycles of light vehicle emissions for the laboratory of vehicular emissions at CENICA*) **Ambientalis** México City

10. Ángeles, F., S. Blanco, R. Bernabé, E. Bueno, C. Márquez and A. Sánchez. 2003 **Participación del CENICA durante la campaña de muestreo CAM-MIT 2003** (*CENICA participation in the CAM-MIT 2003 sampling campaign*). Technical Report. CENICA-INE-SEMARNAT

11. Sánchez, A., S. Blanco and B. Cárdenas. 2003 **Proyecto de desarrollo del Sistema Nacional de Información de la Calidad del Aire** (*Project for the development of the National System of Information for Air Quality*). Technical Report. CENICA-INE-SEMARNAT
12. Márquez, C., S. Blanco, A. Sánchez and E. Bueno. 2003. **Perfil vertical de los contaminantes atmosféricos** (*Vertical profile of atmospheric pollutants*). Technical Report CENICA-INE-SEMARNAT
13. Sepúlveda, J.D. 2003 **Caracterización morfológica y química elemental de partículas PM_{2.5} en los municipios del Estado de México: Ecatepec, Tlalnepantla y Nezahualcóyotl, y de las delegaciones Cuauhtémoc y Benito Juárez del Distrito Federal mediante microscopía electrónica y microanálisis elemental por espectrometría de rayos X** (*Morphological and chemical elementary characterization of PM_{2.5} particles in the municipalities of the state of Mexico: Ecatepec, Tlalnepantla and Nexahualcoyotl, and the political delegations of Cuauhtemoc and Benito Juarez in the Federal District by means of electronic microscopy and elementary microanálisis by X ray spectometry*). Technical Report CENICA-INE-SEMARNAT
14. Sepúlveda, J.D. 2003 **Elaboración de una base de datos sobre partículas colectadas en muestreos de PST, PM₁₀ y PM_{2.5} analizados en el CENICA en los años 2000, 2001 y 2002** (*Data base built up on particles collected of PST, PM₁₀ and PM_{2.5} analyzed by CENICA during 2000, 2001 and 2002*). Technical Report. CENICA-INE- SEMARNAT.
15. Hernández, S. and S. Revah. 2003 **Proyecto operación y optimización de un sistema de biofiltración a escala piloto para el tratamiento de solventes tipo thinner** (*Project for operation and optimization of a biofiltration filter at a pilot scale for the treatment of thinner type solvents*), Technical Report CENICA-INE- SEMARNAT.
16. Ramírez, J., J. Cerón, S. Blanco, B. Cárdenas and V.J. Gutiérrez. 2003 **Variaciones de las concentraciones del ozono en áreas agrícolas cercanas a la zona Metropolitana del Valle de México vinculados con algunos fenómenos meteorológicos de escala sinóptica** (*Variations in the ozone concentration in agricultural areas nerby the Metropolitan Area of Mexico City linked with some meteorological phenomenon of sinoptic scale*) Technical Report CENICA-INE-SEMARNAT.
17. Instituto Nacional de Ecología y Programa de las Naciones Unidas para el Medio Ambiente, 2003 **Informe perspectivas del medio ambiente en México 2004: GEOMÉXICO** (*Report on perspectivas of the environemnt in Mexico 2004: GEO MEXICO*) Informe Preliminar

18. Energía, mejora continua y capacitación, EMC, 2003 **Implantación de la metodología para la especiación de hidrocarburos en gasolinas por cromatografía de gases-FID acoplado al software PIONA para su aplicación a la evaluación de calidad de la gasolina** (*Implementation of the methodology for speciation of hydrocarbons of gasolines by gas chromatography-FID coupled to PIONA software for its application to evaluate the quality of the gasoline*). Technical Report CENICA-INE-SEMARNAT

19. Martínez, J., 2003 **Sistematización y análisis de la información de algunas de las redes de monitoreo del país** (*Sistemization and analysis of the information of some monitoring networks in the country*). Technical Report. CENICA-INE-SEMARNAT.

Year 2004

1. Angeles, F., J. Cerón and S. Blanco. 2004. **Preparación y realización de campaña piloto y 1er campaña de muestreo para determinar exposición personal a monóxido de carbono y partículas suspendidas por quema de biomasa en Comachuen, Michoacán** (*Preparation and realization of a pilot campaign and 1st sampling campaign to determine personal exposure to carbon monoxide and suspended particles for biomass burning in Comachuen, Michoacan*), Partial report submitted to the DG-ICURG as part of the collaboration with DG-CENICA in the project "Personal exposure to wood fumes". Mexico City, December, 18 pp

2. Angeles, F., T. Ortuño, H. Barrera, R. Bernabé, F. Mandujano, P. Dominguez, M. Hernández, B. Cárdenas and V. Gutiérrez. 2004 **Final report del Muestreo y Análisis para la determinación de concentraciones de contaminantes atmosféricos** (*Final report of sampling and analysis for the determination of concentrations of atmospheric pollutants*). Report submitted to the Federal Comisión for the Protection of Sanitary Risks as part of the Specific Agreement of collaboration between the Government of the Federal District (Secretary of the Environment) and Universidad Autónoma Metropolitana. Mexico City, October, 31 pp

3. Bernabé, R.M., F. Mandujano, F. Angeles and J. Cerón. 2004 **Monitoreo y caracterización de partículas durante 2004** (*Monitoring and characterization of particles during 2004*). Informe de la DG-CENICA. Mexico City, December, 16 pp

4. Bernabé, R., C. Márquez, J. Cerón, F. Ángeles, S. Blanco, A. Sánchez, T. Ortuño, A. Téllez and B. Cárdenas. 2004 **Análisis de la fracción orgánica, metales, distribución de tamaño y propiedades ópticas de partículas suspendidas en la atmósfera de la ZMCM** (*Analysis of the organic fraction, metals, distribution of size and optical properties of suspended particles in the atmosphere of the Metropolitan Area of Mexico City*) Report submitted to the Mexican Petroleum Institute as part of

the collaboration of the DG-CENICA in the project SEMARNAT-2002-CO1-0296. Mexico City, June, 35 pp

5. Blanco, S., C. Márquez and B. Cárdenas. 2004 **Extensión de la Cobertura del Sistema Nacional de Información de la Calidad del Aire, etapa 2** (*Coverage extent of the National System of Information of the Air Quality, stage 2*). Report of the DG-CENICA, Mexico City, December, 120 pp

6. Bueno, E, J. Cerón and B. Cárdenas. 2004 **Monitoreo y caracterización de compuestos orgánicos volátiles (COVs) en la atmósfera** (*Monitoring and characterization of volatile organic compounds (COVs) in the atmosphere*). Report of the DG-CENICA, Mexico City, December, 30 pp

7. Encarnación, G., S. Flores, G. Solórzano, Ch. Izumikawa, G. Ramos and A. Rosas. 2004 **Análisis de ciclo de vida de envases de bebidas** (*Analysis of the life cycle of beverage containers*), Report of the DG-CENICA. Mexico City, November, 40 pp.

8. Fentanes O., J. Zaragoza and A. Martínez. 2004 **Situación Actual del Monitoreo Atmosférico en México** (*Current Situation of Atmospheric Monitoring in Mexico*). Report of the DG-CENICA. Mexico City, November, 38 pp

9. Gutiérrez, M., E. Favela, M. Gallegos, M.T. Oropeza, T.L. Volke and M.L. Franco. 2004. **Estudios de tratabilidad para la remediación de suelos intemperizados contaminados con hidrocarburos** (*Studies for treating exposed soils to air and weather polluted with hydrocarbons*). Report of the activities pertaining to the Multidisciplinary Research Program, submitted to the Rectorship of the Universidad Autónoma Metropolitana-Unidad Iztapalapa. Mexico City, April, 56 pp

10. Gutiérrez, M., T. Ortuño, G. Encarnación, A. Téllez and P. Salgado. **Muestreo y Análisis de lixiviados y residuos en pozos de observación venteo en el confinamiento de residuos peligrosos en Guadalcázar, S.L.P.** (*Sampling and analysis of lixiviated wastes and wastes in observation wells exposed to the wind in hazardous waste confinement in Guadalcázar. S.L.P.*) Report submitted to the General Direction of Comprehensive Management of Materials and Riskful Activities in December 2004. Mexico City, December, 60 pp

11. Gutiérrez, M., T. Ortuño, S. Flores, M. Reyes, A. Maldonado and P. Salgado. 2004 **Muestreo y análisis de residuos peligrosos y sólidos urbanos en el predio de la empresa "Metales y Derivados, S.A." en Tijuana, B.C.** (*Sampling and analysis of hazardous and urban solid waste on the grounds of the firm "Metales y Derivados, S.A." in Tijuana, B.C.*) Report submitted to the General Direction of Comprehensive Management of Materials and Riskful Activities in June 2004. Mexico City, June, 30 pp

12. Márquez, C., J. Ceron, F. Ángeles, F. Mandujano, T. Ortuño, S. Paola and B. Cárdenas. 2004 **Niveles de cromo total, cromo trivalente y cromo hexavalente en partículas PM_{2.5} y PM₁₀ durante un periodo corto de muestreo en los alrededores de la empresa Cromatos de México** (*Levels of total chromium, trivalent chromium and hexavalent chromium in PM_{2.5} and PM₁₀ particles during short time sampling period in the surroundings of the firm Cromatos de Mexico*). Report submitted to the Federal Attorney of the Environment, Mexico City, December, 35 pp
13. Martínez A.P., T. Ortuño, O. Fentanes and P. Salgado. 2004 **Estudio de comparación de procedimientos de muestreo de alto volumen para la determinación de plomo en aire ambiente en la Ciudad de Torreón, Coah.** (*Study of procedure comparison of high volume sampling for the determination of lead in the environmental air in the City of Torreon, Coahuila*). Report submitted to the Federal Attorney of the Environment, Mexico City, April, 71 pp
14. Rosas, A., S. Flores, J. A. Velasco and G. Solórzano. 2004 **Caracterización de lixiviados y biogás generados en sitios de disposición de residuos sólidos municipales de México** (*Characterization of lixivated and biogas generated in solid municipal waste in Mexico*). Report of DG-CENICA. México City, November, 30 pp
15. Sánchez, A. and S. Blanco. 2004. **Operación, mantenimiento y calibración de la estación de monitoreo CENICA-1** (*Operation, maintenance and calibration of the monitoring station CENICA-1*). Report of DG-CENICA, Mexico City, December 30 pp
16. Sepúlveda, J.D. 2004 **Perfil morfológico y químico elemental de partículas respirables en fuentes de emisión puntual y muestreos ambientales** (*Morphological and elementary chemical profile of breathable particles in point of source emissions*). Informe de la DG-CENICA. Mexico City, December, 80 pp
17. Solórzano, G. T.L. Volke, A. Rosas, M.T. Ortuño and A. Téllez. 2004 **Programa de muestreo y análisis de residuos, lixiviados y gases provenientes del proceso de tratamiento mecánico-biológico de la planta de tratamiento de residuos sólidos a través del sistema Faber-Ambra®** (*Program for sampling and analysis of waste, lixivated and gases originated by the process of biological-mechanical treatment of the treatment plant of solid waste through the Faber-Ambra®*). Report prepared by DG-CENICA in coordination with Universidad Autónoma Metropolitana-Unidad Iztapalapa for the German Technical Cooperation Agency (GTZ) and the Secretary of Ecology of the Government of the State of Mexico, Mexico City, June, 36 pp
18. Tovar, C., 2004 **Informe para la implementación del sistema de gestión de calidad basado en ISO-9001-2000 en el área de capacitación ambiental del Centro Nacional de Investigación y Capacitación Ambiental** (*Report for the implementation of the system of quality management based in ISO-9001-2000 in the area of*

environmental capacity of the National Center for Environmental Research and Training). Report of the DG-CENICA, Mexico City, September, 93 pp

19. Velasco, J.A., D.A. de la Rosa, G. Solórzano and T. Volke. 2004 **Evaluación de tecnologías de remediación para suelos contaminados con metales** (*Evaluation of remedial technologies for metal polluted soils*) Report of the DG-CENICA. Mexico City, November, 37 pp

20. Volke, T., M. Gutiérrez, V. Alvarado, P. Salgado y T. Ortuño. 2004 **Muestreo y análisis de agua, suelo y jales mineros en Nacozari, Son.** (*Sampling and analysis of water, soil and mining sites in Nacozari, Sonora*) Report submitted to the French Agency of Mineral Resources (BRGM) and the SEMARNAT Delegation in Sonora, Mexico City, December, 25 pp

21. Zaragoza, J. and A. Martínez. 2004 **Evaluación del impacto de las emisiones de la termoeléctrica de Tuxpan, Ver., en la calidad del aire** (*Evaluation of the impact of the emissions of the thermoelectric plant in Tuxpan, Veracruz in air quality*) In collaboration with the Direction General of Urban, Regional and Global Pollution Research. Report submitted to DG -ICURG in May, 2004. Mexico City, May, 4 pp

Year 2005

1. Alarcón, G. 2005. **Análisis y revisión de las políticas públicas en la gestión ambiental de los residuos en México** (*Analysis and revision of public policies in the environmental management of waste in Mexico*). Final report submitted to DG-CENICA, Mexico City, 69 pp

2. Bernabé, R. S. Blanco, F. Angeles, H. Wohrnschimmel, F. Mandujano and B. Cárdenas. 2005 **Monitoreo y Caracterización de Partículas Suspendidas. Etapa II** (*Monitoring and characterization of suspended particles. Stage II*) Report of DGCENICA. Mexico City, December, 13 pp

3. Bueno, E., S. Blanco, B. Cárdenas and H. Wohrnschimmel. 2005 **Monitoreo y caracterización de compuestos orgánicos Volátiles (COVs). Etapa II** (*Monitoring and characterization of volatile organic compounds (COVs). Stage II*). Report of DGCENICA. Mexico City, December, 15 pp

4. Castillejos, J. 2005 **Georeferenciación de la información de las estaciones automáticas de monitoreo atmosférico del país** (*Georeferentiation of the information of automatic stations of atmospheric monitoring in the country*), Final report submitted to DG-CENICA, Mexico City, 50pp

5. Encarnación, G., S. Flores, G. García, G. Kiss and G. Solórzano. 2005 **Caracterización de lixiviados y biogás generados en sitios de disposición final de residuos sólidos municipales en México** sobre los muestreos y análisis

efectuados en tres sitios de la Zona Metropolitana del Valle de México (*Characterization of lixivated substances and biogas generated in solid waste final disposal sites*). Mexico City, December, 40 pp

6. Encarnación, G., S. Flores, G. Ramos and G. Kiss. 2005 **Análisis de ciclo de vida de envases de bebidas: vidrio y cartón multicapas** (*Analysis of life cycle of containers of beverages, glass and multilayer cardboard*). Final report submitted to DGCENICA. Mexico City, December, 55 pp

7. Flores, S., G. Kiss and G. Solórzano. 2005. **Asesoramiento técnico en materia del manejo integral de los residuos sólidos municipales y localización de sitios adecuados para la construcción de un relleno sanitario, en apoyo a las autoridades municipales en la Eco-región de La Chinantla, Oaxaca** (*Technical advice on integral solid waste management and location of adequate sites for the construction of a sanitary landfill, in support of the municipal authorities of the Eco-region La Chinantla, Oaxaca*). Reporte Técnico elaborado para la Oficina del Proyecto PNUD "Manejo Integrado de Ecosistemas en la Eco-región de La Chinantla". Mexico City, September, 16 pp

8. Jiménez, A. 2005 **Análisis del marco jurídico en materia de residuos en México** (*Analysis of the legal framework in Mexico*). Final report submitted to DG-CENICA. Mexico City, 90 pp

9. Hernández-Ávila, M., F. Meneses-González, M. Cortez, T. Alejandre and V. Gutiérrez-Avedoy. 2005. **Evaluación del medio ambiente aéreo con base en un monitoreo de partículas suspendidas, La Paz, Baja California** (*Evaluation of the aerial environment based on the monitoring of suspended particles, La Paz, Baja California*). Instituto Nacional de Salud Pública. Mexico City, 29 pp

10. Márquez, C., S. Blanco, and H. Wohrnschimmel. 2005 **Reporte anual de la estación de monitoreo automático UAM-I de la DGCENICA** (*Annual report of the automatic monitoring station UAM-I*). Mexico City, December 13 pp

11. Meneses-González, F., M. Téllez-Rojo, V. Gutiérrez-Avedoy, S. Blanco, C. Torres and M. Hernández-Ávila. 2005 **Respiratory health effects in children exposure to a thermoelectric plant in México** Mexico City

12. Ortuño, T., A. Gutiérrez and A. Téllez. 2005 **Muestreo y Análisis de lixiviados y suelo en pozos en el confinamiento de residuos peligrosos en Guadalcázar, S.L.P.** (*Sampling and analysis of lixivated substances and soils in wells in the confinement of hazardous waste in Guadalcázar, San Luis Potosí*). Report submitted to the Direction General of Comprehensive Management of Materials and Riskful Activities in June, 2005. Mexico City, June, 31 pp

13. Ortuño, T., A. Gutiérrez and A. Téllez. 2005 **Análisis de suelos procedentes del predio de la empresa “Metales y Derivados S.A.” en Tijuana, B.C.** (*Analysis of Soils originated on the grounds of the firm “Metales y Derivados S.A.” in Tijuana, Baja California*). Report submitted to the General Direction of Materials and Riskful Activities in December, 2005. Mexico City, December, 15 pp
14. Ortuño, T., M Reyes and A. Gutiérrez 2005 **Niveles de cromo total, y cromo hexavalente en suelo, asfalto y concreto de la empresa Cromatos de México** (*Levels of total chromium and hexavalent chromium in soils, asphalt and concrete in the firm Cromatos de Mexico*). Report submitted to Rietzler, Mexico City, December, 35 pp
15. Ramos, G. 2005. **Inventario de ciclo de vida del envase de aluminio para bebidas** (*Inventory of the life cycle of the aluminium container for beverages*). Final report submitted to DG-CENICA . Mexico City, November, 60 pp
16. Rocha, M.G. and A.D., Nava. 2005 **Análisis comparativo de muestras de granos de maíz con técnicas moleculares para la detección de Organismos Genéticamente Modificados: OGMs** (*Comparative analysis of seeds of corn with molecular techniques for detecting Genetically Modified Organisms: GMOs*). Report of DG-CENICA, December, Mexico City, 20pp
17. Sánchez, J. 2005 **Análisis de la gestión integral de residuos, aspectos relativos al desarrollo institucional** (*Analysis of the integral management of waste, relative aspects of institutional development*). Final report submitted to DG-CENICA. Mexico City, December, 24 pp
18. Sepúlveda, J.D. 2005 **Determinación de la contribución de partículas suspendidas de algunas fuentes fijas a partir de sus perfiles morfológicos y químico elementales** (*Determination of the contribution of the suspended particles from fixed sources from its morphological and elementary chemical profiles*). Report of DG-CENICA. Mexico City, December, 200 pp
19. Velasco, J.A., D.A. de la Rosa, T. Volke, M.E. Ramírez and G. Solórzano. 2005. **Evaluación de tecnologías de remediación para suelos contaminados con metales** (*Evaluation of technologies for remediation for metal polluted soils*). Report of DGCENICA. Mexico City, November, 35 pp
20. Wohnschimmel H., C. and Márquez, C. 2005. **Estudio sobre transporte e impacto de los contaminantes atmosféricos: Etapa I** (*Study of the transport and impact of atmospheric pollutants: Stage I*) Report of DG-CENICA. Mexico City, December, 11 pp

4.2. Thesis supervision

Year 2002

1. Hernández-Flores, A.L. 2002. **Control de vapores de gasolina por biofiltración** (*Gasoline vapour control by biofiltration*). Master's Degree. Biotechnology, Universidad Autónoma Metropolitana, Mexico City, 201 pp.

Year 2003

1. Camacho Rea, Irene. 2003. **Análisis costo-beneficio ambiental de la incineración de residuos sólidos municipales en la Ciudad de México** (*Environmental cost-benefit analysis of the incineration of solid municipal waste in Mexico City*). Master's Degree. Environmental Engineering. Universidad Nacional Autónoma de México. Mexico City, July 11, 2003

2. Velasco Álvarez, Nancy. 2003. **Efecto de pretratamientos fisicoquímicos en la degradación por composteo de hidrocarburos del petróleo presentes en un suelo intemperizado** (*Physicochemical pre-treatment effect in the degradation by compost of hydrocarbons of petroleum existing in a soil open to air and weather*). Thesis. Specialization in Biotechnology. Universidad Autónoma Metropolitana - Iztapalapa. Mexico City, July 29, 2003

Year 2004

1. Velázquez G. María Angélica. 2004 **Diagnóstico sobre la generación de residuos tipo CRETI en un hospital de tercer nivel** (*Diagnosis on CRETI type waste generation in a third level hospital*). Tesis de Maestría en Ingeniería Ambiental. Universidad Nacional Autónoma de México. Mexico City. Defense submitted on October 28, 2004. Adviser: Gustavo Solórzano Ochoa

2. Wohnrschimmel, H. 2004 **Interpretation of Vertical profiles of volatile organic compounds and ozone over the southeast of Mexico City** Diploma Thesis, Swiss Federal Institute of Technology, Zurich. Adviser: Beatriz Cárdenas González (co-director)

Year 2005

1. Maya, M. 2005 **Efecto del tolueno en la biodegradación de hidrocarburos en un suelo contaminado con petróleo** (*Toluen effect in the biodegradation of hydrocarbons in a soil contaminated with petroleum*). Master's Degree Thesis. Biotechnology. September 1998-March 2005. Universidad Autónoma Metropolitana-Iztapalapa, 80 pp. Adviser: Tania Volke Sepúlveda

2. González, S. 2005 **Manual de operación de los equipos manuales de monitoreo de partículas (HiVol): Totales y PM₁₀** (*Operation manual for manual monitoring equipments of particles (HiVol): Total and PM₁₀*). Dissertation to obtain the degree of “Técnico Superior Universitario en Tecnología Ambiental”, Universidad Tecnológica de Nezahualcóyotl, Division of Environmental Technology, 78 pp. Advisers: Ing. Octavio Rosas Arias and José Juan Felipe Ángeles García (Technician)
3. García, D., 2005 **Operación, limpieza, mantenimiento y calibración de un equipo de alto volumen PM_{2.5} marca Andersen** (*Operation, cleanness, maintenance and calibration of a high volume PM_{2.5}, Andersen trade mark*) Dissertation to obtain the degree of “Técnico Superior Universitario en Tecnología Ambiental”, Universidad Tecnológica de Nezahualcóyotl, División of Environmental Technology, 85 pp. Advisers: Ing. Isabel Arellano Angulo and José Juan Felipe Ángeles García (Technician)
4. Hernández, J., 2005. **Operación de la estación de monitoreo de contaminantes atmosféricos y meteorología**. Dissertation to obtain the degree of “Técnico Superior Universitario en Tecnología Ambiental”, Universidad Tecnológica de Nezahualcóyotl, Division of Environmental Technology, 78pp. Advisers: Ing. Isabel Arellano Angulo and M. in I. Claudia Márquez Estrada
5. León, E., 2005 **Comparación de equipos manual y automático de monitoreo de partículas suspendidas**. Dissertation to obtain the degree of “Técnico Superior Universitario en Tecnología Ambiental”, Universidad Tecnológica de Nezahualcóyotl, Division of Environmental Technology, 94 pp. Advisers: Ing. Isabel Arellano Angulo and M. en I. Claudia Márquez Estrada

4.3. Acceptance of Interns

Year 2004

1. Research internship. Michael Dausan. **Validación de equipo de exposición personal a monóxido de carbono y partículas fracción fina** (*Validation of equipment for personal exposure to carbon monoxide and fine fraction particles*). Premises of DGCENICA, August 14-29
2. Research internship. Elena Andrey. **Structure analysis and spatial distribution study of ozone tropospheric data: case application to Mexico City**. Practical internship to be awarded the Diploma, Polytechnical Institute of Laussane, Switzerland. DGCENICA Laboratories, November 15 to December 17, 2004.
3. Academic internship. Dr. Jesús Ramírez Almogoea, Director of the Multidisciplinary Ozone Group of the Meteorological Institute of Cuba. del Grupo Multidisciplinario de Ozono del Instituto de Meteorología de Cuba. April 19 to May 14 for the preparation of the following article: Ramírez, J., J. Cerón, S. Blanco, V. Gutiérrez y B. Cárdenas. 2004. **Ozone measurements in agricultural areas of Mexico City**, to be published in Atmospheric Pollution (under revision).

Annex-5: Participation of CENICA in the establishment and the modification of environmental norms

N°	Field	Type	
Year: 1999			
NOM (Mexican official norm)			
1	air	new	*PROY-NOM-098-ECOL-2000. Emission limits for hazardous waste incinerators (revised in 2002)
2	waste	update	*PROY-NOM-052-ECOL-2000. An enumeration of hazardous waste, its characterization and identification (revised in 2000 and 2002)
Year 2000			
NOM (Mexican official norm)			
3	air	update	NOM-021-SSA1-1993 Criteria for evaluating the environmental quality
4	air	update	NOM-044-ECOL-1996 Emission limits for diesel vehicles
5	air	update	NOM-045-ECOL-1996 Emission limits for diesel vehicles (revised in 2002 and 2005)
6	air	update	NOM-050-ECOL-1993 Emission limits for vehicles
7	air	update	NOM-080-ECOL-1994 Limits for noise emission from motor cars, motorcycles, and motor tricycles (revised in 2002)
8	waste	new	*PROY-NOM-087-ECOL-2000 Management and clasification of biological-infectious waste
9	waste	new	*PROY-NOM-XX Criteria and methodologies for polluted soil remediation (revised in 2002)
10	waste	new	NOM-XX Emergency standard establisihing maximum allowed limits on hydrocarbon leakages
NMX (Mexican norm)			
11	waste	new	*PROY-NMX-AA-001-SCFI-2001 Liquid waste and/or aqueous solutions.- corrosiveness to carbon steel (proposal prepared by CENICA; revised in 2006, subject to public consultation)
12	waste	new	*PROY-NMX-AA-013-SCFI-2001. Solid waste.- pH determination (proposal prepared by CENICA; revised in 2006)
13	waste	new	*PROY-NMX- AA-020-SCFI-2001. Waste.- semivolatile organic compounds in products from the toxic compounds extraction test (proposal prepared by CENICA; revised in 2006)
14	waste	new	*PROY-NMX-AA-103-SCFI-2001. Waste.- volatile organic compounds in products from the toxic compounds extraction test (proposal prepared by CENICA, revised in 2006)
15	waste	new	*PROY-NMX-AA-027-SCFI-2001 Liquid waste.- pH determination (proposal prepared by CENICA; revised in 2006)
16	waste	new	*PROY-NMX-AA-037-SCFI-2001. Liquid waste.- ignitability in closed-cup (proposal prepared by CENICA, revised in 2006)
17	waste	new	*PROY-NMX-AA-041-SCFI-2001. Solid waste.- ignitability (proposal prepared by CENICA; revised in 2006)
18	waste	new	*PROY NMX AA043 SCFI 2001. Waste.- reactivity determination (proposal prepared by CENICA; revised in 2006, subject to public consultation)

N°	Field	Type	
19	waste	new	*PROY-NMX- AA-048-SCFI-2001 Waste.- metals by atomic absorption sepctrophotometry in products from the toxic compounds extraction test (proposal prepared by CENICA; revised in 2006)
Year 2001			
NOM (Mexican official norm)			
20	waste	new	*PROY-NOM-004-ECOL-2001. Pollutant content limits in sludge for final disposal
21	waste	new	*PROY-NOM-133-ECOL-1999. Specifications for polychlorinated byphenils (PCBs) management
Year 2002			
NOM (Mexican official norm)			
22	air	update	NOM-040-ECOL-2001. Environmental protection. Production of hydraulic cement. Maximum allowance of emission levels to the atmosphere
23	air	update	NOM-025-SSAI-1993 Environmental Health. Criteria to evaluate the environmental air quality regarding particulate matter (PST, PM ₁₀ and PM _{2.5} , for human health protection)
24	waste	new	NOM-EM-138-ECOL-2002. Maximum allowed levels of pollutants in soils subject to hydrocarbon leakages, site characterization and restoration routines (revised in 2003, 2004 and 2005)
NMX (Mexican norm)			
25	waste	new	NMX. Waste. Extraction test for toxic compounds (norm prepared by CENICA; revised in 2005)
26	waste	new	NMX. Waste. Procedure for securing and managing representative samples for determining risks levels of industrial waste (norm prepared by CENICA)
27	waste	new	NMX. Solid waste. Water content determination by Karl Fihser's method (revised in 2004 and later cancelled due to absence of aplicability); (norm prepared by CENICA)
28	waste	new	NMX. Waste. Anion determination by ionic cromathography (revised in 2004 and later cancelled due to absence of aplicability); (norm prepared by CENICA)
29	waste	new	NMX. Waste. Determination of total organic carbon (revised in 2004 and later cancelled due to absence of aplicability); (norm prepared by CENICA)
Year 2003			
NOM (Mexican official norm)			
30	waste	new	Draft proposal. NOM (number pending). Routine for determining cleansing levels in soil remediation polluted by metals and metalloids
31	waste	new	Draft proposal NOM (number pending) . Clasification of waste, components and procedures for elaborating a waste management plan
32	air	update	NOM-085-ECOL-1994. Atmospheric pollution. Fixed sources using using solid, liquid or gaseous fossil fuels or its combination
33	air	update	Draft proposal NOM-086-ECOL-1994. Environmental protection specifications to be fulfilled by fluid and gaseous fossil fuels when used in fixed and mobile sources

N°	Field	Type	
NMX (Mexican norm)			
34	waste	new	Draft proposal NMX-XXX. Residuos. Total sulphur determination (draft prepared by CENICA; revised and 2004 and later cancelled)
35	waste	new	Draft proposal NMX-XXX. Waste. Total organic matter determination (draft prepared by CENICA; revised and 2004 and later cancelled)
36	waste	new	Draft proposal NMX-XXX. Waste. Total metal determination in waste, soils and sediments (draft prepared by CENICA; revised in 2004)
37	waste	new	Draft proposal NMX-XXX. Waste. Total volatile organic compounds in waste, soils and sediments (draft prepared by CENICA; revised in 2004)
38	waste	new	Draft proposal NMX-XXX. Waste. Total semivolatile organic compounds in waste, soils and sediments (draft prepared by CENICA; revised in 2004)
39	waste	new	Draft proposal NMX-XXX. Soils. Determination of total hydrocarbons of oil through spectrophotometry using infrared method (draft prepared by CENICA)
40	waste	new	Draft proposal NMX-AA-XXX-2003. Selection of an adequate site for conduit and transverse points sampling (revised in 2004); (draft prepared by CENICA)
41	air	update	Draft proposal NMX-AA-009-2003. Determination of average speed and volumetric fluid of a gas running through a conduit (Pilot Tube Method); (revised in 2004 and 2005)
42	waste	update	Draft proposal NMX-XXX. Waste. Determination of total nitrogen (cancelled)
43	air	update	Draft proposal NMX-XXXX-2004. Method of analysis for metal determination by fixed emission sources by atomic absorption spectrophotometry
44	air	update	Draft proposal NMX-AA-XXXX-2004. Humidity content. Integral extractive method
45	air	update	Draft proposal NMX-AA-XXXX-2004. Sampling method for metal determination in fixed sources
46	air	update	Draft proposal NMX-AA-XXXX-2004. Method to determine polychlorinated dibenzyl-d-dioxynes (PCDD's) and polychlorinated dibenzylfuranes (PCDF's) in fixed source emissions by high and low resolution gas chromatography
Year 2004			
NOM (Mexican official norm)			
47	waste	new	*PROY-NOM-147-SEMARNAT/SSA-2004. Criteria for polluted soil remediation determining contents of arsenic, beryllium, cadmium, hexavalent chromium, mercury, nickel, lead, selenium, thallium and vanadium (revised in 2005)
48	air	update	NOM-085-ECOL-1994 Atmospheric pollution. Fixed sources using solid, liquid or gaseous fuels, or its combinations, establishing maximum allowed levels of smoke, total suspended particles, sulphur dioxide and nitrogen oxides, and requirements and conditions for indirect heating equipment, as well as maximum allowed emissions of sulphur dioxide in direct heating equipments
NMX (Mexican norm)			
49	waste	new	Draft proposal NMX-XXX. Solid waste. Water contents by the method of Karl Fisher (draft prepared by CENICA)

N°	Field	Type	
50	air	update	Draft proposal NMX-AA-035-2004. Determination of carbon dioxide (CO ₂), oxigen (O ₂) and/or carbon monoxide (CO) for average molecular weight of a gas on a dry basis and excess air in combustion process. Method of humid selective absorption (Orsat); (revised in 2005)
51	air	update	Draft proposal NMX-AA-054-2004. Determination of humidity content of gases flowing through a conduit. Gravimetric, dry bulb and dry bulb temperature methods (revised in 2005)
Year 2005			
NOM (Mexican official norm)			
52	air	update	NOM-041-ECOL-1999. Maximum allowed levels of pollutant gases arising from exhausts of gasoline automobiles
NMX (Mexican norm)			
53	waste	new	Draft proposal NMX-XXX. Waste. Determination of hydrocarbons (medium fraction) in polluted soils
54	waste	new	Draft proposal. NMX-XXX. Waste. Determination of hydrocarbons (light fraction) in polluted soils
55	waste	new	Draft proposal NMX-XXX. Waste. Determination of BTEX in polluted soils with polycyclical aromatic hydrocarbons
56	waste	new	Draft proposal NMX-XXX. Soils. Determination of polycyclical aromatic hydrocarbons in polluted soils
57	waste	update	*PROY-NMX-XXX SEMARNAT. Determination of hydrocarbons (heavy fraction) in polluted soils
58	waste	update	*PROY-NMX-XXX-SEMARNAT/Waste. Obtaining representative samples; management, conservation and transport
59	air	new	*PROY-NADF-004-AMBT-2004. Mesurement and maximum allowed limits for mechanic vibrations to be fulfilled by emission sources in Mexico City

Asterisk (*) indicates that those were drafts subject to public consultation.

Annex-6: Certification and acknowledgements

6.1. Certification

Year 2002

On November 6, 2002, the *Entidad Mexicana de Acreditación, A.C.*, i.e. a Mexican accreditation entity, gave credit 10 laboratory tests of CENICA.

Year 2003

On November 5, 2003, the *Entidad Mexicana de Acreditación, A.C.* granted the extension of accreditation to nine laboratory tests for waste, soils, sediments and air, having attained a total of 27 accredited tests.

6.2. Acknowledgements

Year 2002

FEMISCA Prize for Atmospheric Pollution, at the XXVIII Interamerican Congress of Sanitary and Environmental Engineering.

Year 2003

1st Place in the Poster Classification, with the work by Volke, T.; E. Favela y M. Gutiérrez. 2003. Degradation of high concentration of hexadecan by *Aspergillus niger* in solid culture. Effect in a low C/N relation. X National Congress of Biotechnology and Bioengineering. September 8-12. Puerto Vallarta, México.

Year 2004

1. Granted by AIDIS MEXICO to the best exposition at the XIV National Congress of Sanitary Engineering and Environmental Sciences. Mazatlán, Sinaloa, Mexico, 2004. Subject: Evaluation of PM2.5 fine particles, carbon monoxide and benzen at the interior of different means of transportation in Mexico City. Authors: Autores Gómez J, Colville N, Nieuwenhuijsen M, Blanco S, Bernabé R, Bueno E. y Cárdenas B.

2. To the fulfillment of quality requirements by the National Institute of Public Health Of Québec, Canada, having approved the tri-national (Mexico, United States and Canada) of inter-calibration of metals in the bloodstream within the Project for a POPs/Metals Biomonitoring Study to Identify Population Risk and Environmental Hotspots in North America. Two previous events of Round Robin in four metals for verifying analytical methods of reliability and sensibility with a total of 48 tests in 33 samples had already taken place.

Year 2005

1. First laboratory of molecular Biology accredited by the *Entidad Mexicana de Acreditación, A.C.*, with national and internacional acknowledgement in the test "Genetically modified corn detection by the method of chain reaction in the polimerization, PCR".

2. Grant to renew and update the NMX-17015-2000 standard for 30 tests at the *Entidad Mexicana de Acreditación, A.C.* with national and internacional acknowledgmenet in the areas of waste and soils (24 tests), air (5 tests) and genetally modified organisms (GOMs) (1 test).

3. Volke, T. 2005. Proposal for arbitrage. Manuscript: "Atmospheric gaseous elemental mercury in downtown Toronto", submitted for its consideration to the Atmospheric Environment journal. April 2005

4. Acknowledgment in fulfilling quality requirements by the Centro Nacional de Metrología, for its approved participation in the test of aptitude for the Determination of Poliaromatic Hydrocarbons in soils, June, 2005
5. Acknowledgments in the Evaluating Technical Comité in the Thematic Area (Environmental Biotechnology) for the XI National Congress of Biotechnology and Bioengineering. Mexican Association of Biotechnology and Bioengineering, April 2005

Annex-7: Evaluation grid

Criteria	Evaluation Questions		Achievement Criteria/Measures	Data Needed	Data Sources	Data Collection Methods
	Main Questions	Sub-questions				
IMPACT	1. To what extent, has the Project's overall goal been achieved?	- How much and what improvement has been made since 1997 with regard to the national-level capacity of environmental/management protection in the field of air quality control?	<ul style="list-style-type: none"> - Regulations, guidelines and official standards: i) established, ii) reviewed, and iii) modified by the federal/local government regarding air quality control - Changes concerning: <ul style="list-style-type: none"> - Increase in government officials devoted to air pollution control, specifying the number, qualifications and the capacity related to this role - The scale of the budget disbursed towards this objective, specifying its proportion within the total federal budget and the federal ministries involved - Improvements in the organizational structure of the government departments and institutes responsible for air pollution control - Regarding air pollution improvement: <ul style="list-style-type: none"> - Kinds of criteria pollutants currently monitored in respective region/ metropolitan area, and the initiative to equalize them towards a full national comparison - Incorporation of additional criteria pollutants in routine monitoring, i.e. PM_{2.5} - Development or establishment of new tools and measures regarding air pollution control such as SINAICA - Newly established air quality monitoring networks and the pollutants monitored in respective network - Improvement or deterioration in the level of pollution in comparison to the standard, for instance ozone and PM₁₀ in the metropolitan areas of Mexico City and Monterrey, as well as SO₂ in Guadalajara, specifying: i) control measures taken in the medium term; ii) forecasts of the future trends of the pollution, and iii) the mid-term target of the pollution level - Actions taken and planned to improve the quality of the air monitoring data generated by monitoring networks - PROFEPA and local government actions for the compliance of standards and regulations 	<p>Comprehensive Report (White Paper) or official reports from: i) incumbent federal government agencies involved, and ii) state or municipal governments</p> <p>Manpower organizational modifications</p> <p>Size and proportion of budget disbursed</p> <p>Changes in organization structure</p> <p>Relation of criteria pollutants by area</p> <p>Relation of new pollutants being included</p> <p>Innovation in means of control and indicators regarding pollution</p> <p>Expansion of areas/regions under monitoring</p> <p>Selected criteria pollutants' time series</p> <p>Improvement in data collection (quality and quantity)</p> <p>Record of environmental actions taken by incumbent public agencies</p>	<p>CENICA, INE, SEMPARNAT, GDF, White Paper</p> <p>CENICA, INE, SEMARNAT SS</p> <p>CENICA, INE, SEMARNAT SS</p>	<p>Document literature search, interviews</p> <p>Document literature search, interviews</p> <p>Document literature search, interviews</p>

Criteria	Evaluation Questions		Achievement Criteria/Measures	Data Needed	Data Sources	Data Collection Methods
	Main Questions	Sub-questions				
IMPACT	1. To what extent, has the Project's overall goal been achieved? <i>(continues)</i>	- How much and what improvement has been made since 1997 with regard to the national-level capacity of environmental management/protection in the field of waste management?	- Regulations, guidelines and official standards: i) established, ii) reviewed, and iii) modified by the federal/local government regarding hazardous waste	Comprehensive Report (White Paper) or official reports from: i) incumbent federal government agencies involved, and ii) state or municipal governments	CENICA, INE, SEMPARNAT, GDF, White Paper	Document/literature search, interviews
			- Data regarding: - Increase in: i) government officials devoted to hazardous waste management, specifying the number, qualifications and the capacity related to this role; ii) the scale of the budget disbursed towards this objective, specifying its proportion within the: a) total federal budget, and b) federal ministries involved	Change in manpower	CENICA, INE, SEMPARNAT, GDF, White Paper	Document/literature search, interviews
			- Modifications in the organizational structure of the government departments and institutes responsible for hazardous waste management	Changes in organizational structure	SEMARNAT, INE, CENICA	
			- Progress regarding infrastructure capacity for hazardous waste to be adequately reused, recycled, treated, incinerated and confined	Increase in installed capacity specifying location and type of facility	SEMARNAT, INE, CENICA	
			- Development or establishment of new tools and measures regarding waste management, e.g. a systematic procedure to register waste disposal sites	Innovation in measures of management and indicators regarding hazardous wastes	INE, CENICA	
			- Increase in the cases of: a) detection, and b) rehabilitation of the site of illegal disposal of hazardous waste	Progress in law enforcement regarding hazardous waste	SIRREP, CICOPLAFEST	
			- Improvement in size and quality of accurate inventories of waste disposal sites	Inventory reports	PROFEPA	
			- Improvement in mechanisms to control trans-border movement of hazardous wastes such as i) maquiladora's waste to be exported; ii) waste imported for recycling in Mexico	Change in regulations and derived results	INE, BEEC	
			- Role of PROFEPA and local governments for the compliance of standards and regulations	PROFEPA reports	PROFEPA	

Criteria	Evaluation Questions		Achievement Criteria/Measures	Data Needed	Data Sources	Data Collection Methods
	Main Questions	Sub-questions				
IMPACT	1. To what extent, has the Project's overall goal been achieved? <i>(continues)</i>	- To what extent and in what way, has CENICA contributed to the above-mentioned improvement of air quality control?	<ul style="list-style-type: none"> - Scientific information and technical advisory provided by CENICA regarding: i) mechanisms of air pollution formation; ii) classification of air pollutants; iii) health effects of atmospheric pollution; iv) establishment and review of air pollution standards - CENICA's participation in the working committees for the establishment of standards and regulations with regard to air quality control - Technical advisory provided by CENICA to evaluate: i) the set of criteria pollutants monitored; ii) tools and measures used for the monitoring; iii) quality management of data collection and iv) measure to be taken by PROFEPA and local governments to assure the compliance of standards and regulations - CENICA's contribution to the capacity development of the personnel of federal/local governments responsible for air pollution control 	CENICA, INE and SEMARNAT Reports	CENICA, INE, SEMARNAT	Document/literature search, interviews
		- To what extent and in what way, has CENICA contributed to the above-mentioned improvement of waste management?	<ul style="list-style-type: none"> - Scientific information and technical advisory provided by CENICA regarding: i) establishment and review of hazardous waste standards, ii) appropriate way of hazardous waste treatment; iii) activities for REMEXMAR, the Mexican waste management network - CENICA's participation in the in the working committees for the establishment of standards and regulations with regard to waste management - Technical advisory provided by CENICA to evaluate: i) infrastructure capacity of waste treatment or disposition; ii) tools and measures of waste management in use; iii) detection and rehabilitation of the sites of illegal waste disposal; iv) making an inventory of waste disposal sites; v) the harmonization with international initiatives about hazardous waste, and v) the enforcement of standards and regulations by PROFEPA and local governments - CENICA's contribution to the strategic planning regarding hazardous waste management 	CENICA, INE and SEMARNAT Reports	CENICA, INE, SEMARNAT	Document/literature search, interviews

Criteria	Evaluation Questions		Achievement Criteria/Measures	Data Needed	Data Sources	Data Collection Methods
	Main Questions	Sub-questions				
IMPACT	2. What positive and negative impacts has the Project made apart from those that were originally intended, and why and how have they occurred?	- What are the unexpected positive and negative effects of the Project on INE, SEMARNAT, federal/state governments, and the civil society of Mexico?	<ul style="list-style-type: none"> - CENICA's contribution to the harmonization of hazardous waste data collection between Mexico and US, encompassing both countries' regulations to make HAZTRACK more efficient - CENICA's contribution to the capacity development of the personnel of federal/local governments responsible for waste management - Commitment to protect the environment (clean industry certification) by private and public suppliers of leading utilities, i.e. CFE, LFC and PEMEX), under the initiative of this last companies - Specific Initiatives by industrial chambers to abate air pollution and hazardous waste generate - Other possible effects - Goals originally set and achievements made by CENICA regarding the expansion of: i) organizational status, ii) budget scale; iii) social and political roles, and iv) services for society (both for specialists and the public) 	<p>Agreements established</p> <p>Agreements established</p> <p>Relations with INE, SEMARNAT and other public agents that led to the rapid growth of CENICA</p>	<p>SEMARNAT, INE, CENICA</p> <p>SEMARNAT, INE, CENICA</p> <p>CENICA</p>	<p>Records, reports, interviews</p> <p>Records, reports, interviews</p> <p>Reports, Interviews, documents</p>
		- How has the Project influenced on the organizational status, budget, authority and responsibility of CENICA?				

Criteria	Evaluation Questions		Achievement Criteria/Measures	Data Needed	Data Sources	Data Collection Methods
	Main Questions	Sub-questions				
IMPACT	3. Are there any external factors that influenced the achievement of the overall goal?	- Were there any changes in the government policies, laws and regulations that affected CENICA and Mexico's environmental management capacity? How has it affected them?	- Influence of policies, legislation and regulations, e.g. air quality standards (NOM) being set on hazardous waste	Specific policies, legislation and regulations affecting CENICA in particular and the national environment management capacity in general	PND, DOF Relevant regulations	Reports, Interviews, Document analyses
		- Did change in economic and social conditions of the country after the end of the Project significantly affected CENICA and Mexico's environmental management capacity? How has it affected them?	- Influence of NAFTA environmental agreements and negotiations, e.g. harmonization with Toxic Release Inventory (TRI) in the United States and National Pollutant Release Inventory (NPRI) in Canada, the Record of Emissions and Pollutant Transfers, and introduction of North American Industrial Classification System (NAICS)	Data comparisons, information sharing regarding emission records and pollution transfers in the North American region	SEMARNAT, INE, CENICA	Reports, Interviews, Data analyses
		- What events after the end of the Project have significantly influenced on CENICA and Mexico's environmental management capacity? How did that affected?	- Relationship between the establishment/expansion of the coverage of air quality monitoring with economic indicators of cities and metropolitan areas under the scheme	Contents of the monitoring programs, geographical areas covered, pollutants included and excluded	SEMARNAT, INE, CENICA	Reports, Interviews, Data analyses

Criteria	Evaluation Questions		Achievement Criteria/Measures	Data Needed	Data Sources	Data Collection Methods
	Main Questions	Sub-questions				
SUSTAINABILITY	1. Does the recipient institution (CENICA) continues to develop its technical and institutional capacity building upon the achievements of the Project?	- How has the staff number of CENICA changed since 2002?	- Job description and Curriculum Vitae of recruited personnel	Monthly payroll from 2002 to date as well as its composition in terms of personnel qualification	CENICA	Budget analysis/ Interviews, Reports Budget analysis/ Interviews, Reports
		- How many staff members resigned since 2002? Have they been replaced by new employees? How has the resignation of the staff members affected CENICA?	- Job description for turnover posts, duration of vacancies and source of replacements. Measures taken to make up for the work suspended during the presence of vacant posts	Job manual, monthly payroll, profile of staff members who resigned and recruits (promotion/outside hiring). Outstanding activities left due to vacancies	CENICA	
		- How has the budget of CENICA changed since 2002?	- Structure and the amount of annual budget, financial viability and disbursement timing	Annual accounts (balance, surplus and deficit accounts , cash flow)	CENICA	Budget analysis, Reports
		- How has the organizational structure of CENICA changed since 2002, and what are the intentions of such change?	- Organization chart. Links and collaboration among areas. Criteria for budget allocation by area: i) project goals, ii) targets and iii) evaluation of results	CENICA's short and mid term development plans	CENICA	Reports, interviews
		- What are the principal achievements of CENICA in terms of research between 2002 and the present?	- Quantitative and qualitative research activities accomplished	Research topics; contents; author(s); date; place and publisher	CENICA	Reports, Literature search, Interviews
			- Effectiveness and efficiency of information and data management	Data/information collection system .		
			- List of books and bibliographical references collected	On-line/at premises availability for specialists and the public	CENICA, Internet	Reports, Interviews
			- Frequency and scope the collection of publications, such as, scientific reports, papers and journals	List of collected publications in stock		
			- Information exchange/sharing with related institutions	Information exchange/sharing records		

Criteria	Evaluation Questions		Achievement Criteria/Measures	Data Needed	Data Sources	Data Collection Methods
	Main Questions	Sub-questions				
SUSTAINABILITY	1. Does the recipient institution (CENICA) continue to develop its technical and institutional capacity building upon the achievements of the Project? (<i>continues</i>)	- What are the principal achievements of CENICA in terms of training (for people outside CENICA) between 2002 and the present?	- Seminars and training activities individually or jointly held, in a systematic fashion	Nature of activity (i.e. domestic/international seminar, workshop, course, conference); date, duration, place, number of attendants, fee). Record of replication of events (frequency, location and subjects)	CENICA	Reports, Interviews
		- To what extent have the recommendations made by the evaluation study team been complied?	- Monitoring of ex-participants of the activities for capacity development	- Accessibility of CENICA's collection of book and references for the use of external users	Periodical survey of the past trainees at home and abroad regarding current affiliation, job performed and place of work.	CENICA
			- Progress regarding: i) information sharing and equal opportunity for training; ii) number of staff, budget and space; iii) budget constraints	Requests and inquiries for the books and references that CENICA holds	CENICA	Document/literature search, interviews

Criteria	Evaluation Questions		Achievement Criteria/Measures	Data Needed	Data Sources	Data Collection Methods
	Main Questions	Sub-questions				
SUSTAINABILITY	2. How likely does this self-reliant development process continue for the future?	- What is the CENICA's staff training program like?	- Goals vs. achievements of mid-term personnel training program	CENICA records and mid-term training program	CENICA	Reports, Interviews
		- How do the staff members of CENICA update their technical knowledge and skills to keep up the advance in science and technology in their respective field of specialty?	- Participation by CENICA's personnel in external seminars, workshops, academic congresses etc., regarding air quality control, hazardous waste management and laboratory analysis technique	Record of the participation in external seminars, workshops, academic congresses. Itemized CENICA's annual budget breakdown for the staff participation in the external events	CENICA	Reports, Interviews
		- How much time, on average, does a staff member of CENICA undergoes training every year?	- Time devoted to formal training/on the job training of personnel	Duration and kind of training provided	CENICA	Reports, Interviews
		- How much budget was allocated to the training for CENICA's staff in each year between 2000 and 2005? What was the percentage of staff training budget in the CENICA's total budget in each year between 2000 and 2005?	- Itemized breakdown of training expenses (total and relative amounts)	CENICA Budget. Price deflators	CENICA, Banco de Mexico	Budget analysis, Reports, Interviews
	- How much budget was allocated to the acquisition and maintenance of equipment of CENICA in each year between 2000 and 2005? What was the percentage of the equipment acquisition and maintenance budget in the CENICA's total budget in each year between 2000 and 2005?	- Breakdown of disbursements for purchase and maintenance of equipment (total and relative amounts)	CENICA Budget. Price deflators	CENICA, Banco de México	Budget analysis, logbooks, Data analyses	

Criteria	Evaluation Questions		Achievement Criteria/Measures	Data Needed	Data Sources	Data Collection Methods
	Main Questions	Sub-questions				
SUSTAINABILITY	3. What are the possible factors that might contribute or inhibit the sustainable development process?	- What would be the possible influence of the presidential election in 2006 on CENICA?	- Change in political priorities regarding the environment	Electoral platforms of the main contending political parties	Political Parties' Platforms	Literature search, Surveys
		- What are the government policies, laws and programs that may take effect in favour of the further development of CENICA?	- Government determination and efforts towards stringent monitoring and regulation of air pollution and contamination by wastes	Political will from regulators and law makers; lobbying from NGOs; general public awareness	CENICA, SEMARNAT/INE	Documents, Literature search
		- Are there any other events or changes that may affect CENICA?	- Possible effects of the government orientation between economic incentives vs. command and control approaches for air pollution control and hazardous waste management	Selected studies, evaluations and scenarios in the field for Mexico, based on local and foreign experience	CENICA, INE, USEPA, EC	Documents, Literature search
		- Possible personnel turnover after the change of the president of the country	- Possible event (2001) as a reference	Previous event (2001) as a reference	CENICA	Payroll
		- Change of purchasing power of allocated budget	- Change of purchasing power of allocated budget	Budget. Expected inflation, i.e. for 2006 and 2007	CENICA, Banco de Mexico	Documents, <i>ad hoc</i> estimates

Abbreviations

BEEC (Border Environmental Cooperation Commission)
 CFE (Federal Electricity Commission)
 CICOPLAFEST (Chemical Substances Managing Information System)
 DOF (Federal Official Bulletin)
 EC (Environmental Canada)
 INE (National Ecological Institute)
 LFC (Central Light and Power Company)
 PEMEX (Petróleos Mexicanos; state-owned oil company)
 PND (National Development Plan)
 PROFEPA (Federal Attorney for the Protection of the Environment)
 SEMARNAT (Ministry for the Environment and National Resources)
 SIRREP (Hazardous Waste Tracking System)
 SS (Ministry of Health)
 USEPA (United States Environmental Protection Agency)

Annex-8: Project Design Matrix (PDM) of the Project

**Annex 8-a Project Design Matrix (PDM) of the Project
(July 1997 – June 2000)**

PROJECT DESIGN MATRIX

THE NATIONAL CENTER FOR ENVIRONMENTAL RESEARCH AND TRAINING (PHASE II)

NARRATIVE SUMMARY	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
OVERALL GOAL To improve the ability of environmental protection in the United Mexican States	_____	_____	_____
PROJECT PURPOSE Structures and activities of the National Center for Environmental Research and Training (CENICA) are strengthened.	1. Activities of CENICA are started along the activity plan and give satisfactory results 2. The activity plan of CENICA is authorized by authorities concerned	1. Activity report of CENICA 2. The activity plan	* The importance of environmental protection policies does not change in the national development policy of the United Mexican States
PROJECT OUTPUTS 1. The management of CENICA is improved 2. Facilities and equipment necessary for environmental research and training are effectively used by counterpart personnel 3. Technical information related to the establishment of the environmental protection standards is provided to relevant Mexican authorities 4. Knowledge and techniques of federal government officials, local authorities and industry personnel on environmental protection are improved 5. The role of CENICA in data collection and publications related to environmental matters (particularly air pollution and hazardous waste) is improved	1. CENICA is managed and operated properly 2. Operation rate of the equipment increases 3. Results of the technical research are reported to relevant authorities 4. Training courses and seminars are implemented at least once a year 5. Information on environmental matters is published regularly	1. Activity report of CENICA 2. Equipment operation/maintenance report 3. Report to the relevant authorities 4. Reports of training courses and seminars 5. Activity report of CENICA	* Trained counterpart personnel remain in CENICA
PROJECT ACTIVITIES 1-1. To advise and guide counterpart personnel on management of CENICA 1-2. To advise and guide counterpart personnel on CENICA's effective relationship with federal government, local authorities and industry 2-1. To install a pilot monitoring station in CENICA 2-2. To plan and carry out monitoring of air pollution in the pilot monitoring station 2-3. To advise and guide counterpart personnel in the operation of the pilot monitoring station 2-4. To install a hazardous waste analysis laboratory in CENICA 2-5. To plan and carry out an investigation on analytical methods of hazardous waste 2-6. To advise and guide counterpart personnel in the operation of the laboratory 3-1. To plan and carry out technical research necessary to support development of environmental protection standards 3-2. To inform relevant Mexican authorities about research results 4-1. To formulate training courses and seminars for federal government officials, local authorities and industry personnel 4-2. To conduct training courses and seminars 5-1. To collect and analyze information on environmental matters 5-2. To publicize information on environmental matters	INPUTS * Japanese fiscal year (April - March)		* Counterpart personnel remain in CENICA
		1997 1998 1999 2000	
	Japanese Side	Long-term experts Short-term experts Counterpart training in Japan Provision of machinery and equipment	
	Mexican Side	Counterpart and other staff Land and buildings Local cost	PRE-CONDITIONS * Construction of CENICA building completes on schedule.

**Annex 8-b Project Design Matrix (PDM) of the Project
(Extension period: July 2000 – June 2002)**

<p align="center">Project Design Matrix (PDM) National Center for Environmental Research and Training (Phase II: Extension) Project Period : July 1, 2000 to June 30, 2002</p>		<p>Target Group : CENICA</p>	
<p>To improve the ability of environmental protection in the United Mexican States.</p>	<p>Several regulations, guidelines and official standards are reviewed according to the General Law for Ecological Equilibrium and environmental Protection.</p> <p>- the number of personnel is increased and the roles of each area are defined.</p> <p>- the laboratory is accredited in Mexico.</p> <p>- Results of research and training activities are integrated.</p>	<p>- Comprehensive Report (White Book) or official reports from the Secretaries and agencies involved.</p> <p>- Comprehensive Report (White Book) or official reports on environmental status issued by state and municipal governments.</p> <p>- Activity reports corresponding to several years. (Annual reports among others).</p> <p>- Record of personnel management classified by Department, type of work, and title.</p> <p>- Assessment of CENICA's performance done by stakeholder institutions (survey/interview).</p>	<p>- Environmental pollution prevention has a high priority status among the national policies of the Mexican government.</p> <p>- Participants to the training courses hold appropriate positions at the stakeholder institutions.</p> <p>- Environmental information obtained by CENICA is utilized to develop programs to reduce environmental pollution.</p>
<p>Structures and activities of the National Center for Environmental Research and Training (CENICA) are strengthened.</p>	<p>1-1. Mid-term plan is defined and the activities are implemented strategically.</p> <p>1-2. Information from each area are shared and feedback is done on activities in a reciprocal manner.</p> <p>1-3. Activities are coordinated with external institutions.</p>	<p>- Organization chart, internal guidelines on working topics</p> <p>- Mid-term activities plan.</p> <p>- List of budget and personnel assigned.</p> <p>- Personnel assessment performed with surveys and interviews.</p> <p>- Record on the activities done under cooperation with the external institutions.</p>	<p>- The significance and role of CENICA as an environmental research institute is recognized among the environmental agencies of Mexico.</p>
<p>1. The management of CENICA is improved.</p>	<p>2-1. The capacity to manage analytical data is increased.</p> <p>2-2. The entire staff has the understanding on safety procedures at the laboratory and on the waste treatment requirements, and works accordingly.</p> <p>2-3. The entire lot of equipment are operated and used appropriately.</p>	<p>- The status on the arrangement of results from the analytical assignments and experiments.</p> <p>- Assessments on the staff through surveys and questionnaires.</p> <p>- Records on the operating log of the equipment.</p> <p>- Operation manuals</p>	
<p>2. Operation and management of the monitoring stations and the laboratory are strengthened.</p>	<p>3-1. Guidelines for sampling and analysis are established for environmental pollutants.</p> <p>3-2. The state of air pollution in Mexico City and in the main cities of the country are known.</p> <p>3-3. Technological transfer to establish and to review several standards related to air pollution is implemented.</p> <p>3-4. Guidelines for sampling and analysis of hazardous wastes are developed.</p> <p>3-5. Technological support for hazardous waste treatment is implemented.</p> <p>3-6. The working network with external institutions is strengthened.</p>	<p>3- Guideline proposal regarding air pollution.</p> <p>- Analytical results of the mechanisms for air pollution formation.</p> <p>- Analytical results of the air pollutants characterizations.</p> <p>- Results of the assessment of health effects</p> <p>- Results of information provided for establishment and review of air pollution standards, and the results of participation on the standards working committees</p> <p>- Results of information provided for establishment and review of hazardous waste standards, and results of participation on the standards working committees.</p> <p>- Records of survey related to appropriate way of treatment of hazardous waste.</p> <p>- Results of information provided to governmental offices on appropriate way of treatment of hazardous wastes.</p> <p>- Results of activities for the Mexican waste management network REMEXMAR.</p>	
<p>3. Technical information related to the establishment of the environmental protection standards is provided to relevant Mexican authorities.</p>			

<p>4. Knowledge and techniques of federal government officials, local authorities and industry personnel on environmental protection are improved.</p>	<p>4-1. Training events are systemized. 4-2. Participants are evaluated and progress is followed.</p>	<p>4- Implementation plan for training events - Training results (number of events and of participants) - List of participants - Survey on the participants - Information provided to the requests from participants.</p>	
<p>5. The role of CENICA in data collection and publications related to environmental matters is improved.</p>	<p>5-1. Human resources and their capabilities of related institutions are known. 5-2. Mutual exchange of requested information with environmental institutions is possible. 5-3. Information access and provision system is consolidated.</p>	<p>5- List of books and references collected - Frequency of utility of the book collection assessed through records of requests from external users. - Frequency and scope of publications such as scientific reports and papers. - Results on information sessions done with related institutions. - Results of information exchange with related institutions.</p>	<p>- Counterpart staff remains in CENICA (Or support for CENICA's operation from outside organization). - Trainees from related institutions participants on the training courses and seminars. - Appropriate budget is provided for operating costs of CENICA, (or supports CENICA's activity) - Appropriate number of staff is allocated to CENICA.</p>
	<p>Mexican Part 1. Counterpart personnel needed for the Project. 2. Necessary budget for the operation of CENICA.</p>	<p>Japanese Part 1. Long term experts (3 experts/year) Chief adviser, Coordinator, Senior adviser, experts on air pollution and hazardous waste management. 2. Short term experts. According to needs. 3. Acceptance of participants in training events. 4. Equipment donation.</p>	

- 1-1. To formulate the mid-term action plan (five years).
- 1-2. To formulate the mid-term plan for the counterpart personnel allocation.
- 1-3. To formulate the mid-term plan for revenue and expenditure.
- 1-4. To expand and clarify scope of responsibility of each deputy director with delegation of authority.
- 1-5. To strengthen management meeting.
- 1-6. To build a system of considering research plan and reporting on results.
- 1-7. To implement cooperative activities and information exchange with relevant organizations.
- 2-1. To keep collected data in useful condition at any time.
- 2-2. To prepare manuals for safety measures to handle dangerous chemicals and to clarify responsible persons.
- 2-3. To prepare manuals for treatment of hazardous waste discharged from the laboratory and to clarify responsible persons.
- 2-4. To allocate responsible persons for equipment management and to manage maintenance and supplement of equipments according to a regular.
- 3-1. To formulate guidelines concerning sampling and analysis of air pollutants.
- 3-2. To analyze air pollution trend.
- 3-3. To study on air pollution formation mechanism through vertical observation of air pollution.
- 3-4. To analyze and evaluate volatile organic compound.
- 3-5. To evaluate personal exposure.
- 3-6. To evaluate suspended particulate matter.
- 3-7. To evaluate hazardous air pollutants.
- 3-8. To provide technical information about draft and revision of norms for air pollution prevention through participation in working groups.
- 3-9. To collect information of analysis methods through practice with several equipment for preparation of analysis guidelines including sampling and pretreatment of hazardous waste.
- 3-10. To analyze field samples and to evaluate analytical data of hazardous waste.
- 3-11. To establish classification method for CRETE.
- 3-12. To provide technical information about draft and revision of norms for hazardous waste through participation in working groups.
- 3-13. To support for administration on appropriate treatment for hazardous waste.
- 3-14. To support for strengthening hazardous waste management capacity through REMEXMAR activities.
- 4-1. To make plans and implement training courses in the fields of air pollution, hazardous waste and support for industry.
- 4-2. To strengthen administration of the training section.
- 4-3. To carry out evaluation and follow-up for attendants in training courses through providing information.
- 5-1. To acquire information about human resources in relevant institutions.
- 5-2. To set up practical liaison meeting regularly with relevant institutions.
- 5-3. To establish network with relevant institutions for information exchange.
- 5-4. To obtain relevant domestic/foreign information regularly.
- 5-5. To prepare means to deliver basic information of CERICA.

Third Party Review by External Experts

Ex-Post Evaluation on the National Center for Environmental Research and Training (Phase II) Project

* This Third Party Review by External Experts is to examine the end-product (an evaluation report and a summary sheet) of ex-post evaluation of the above-mentioned project in light of its structure, verification procedure and overall consistency. It is to be noted that the review is not to question the validity of the evaluation results per se.

* On the leftmost column of each item, choose the rating from A as 'excellent', B as 'good', C as 'acceptable' and D as 'unacceptable'.

* When you choose D for an item, specify the reason in comment fields.

* For more details of viewpoints for each item, refer to the corresponding page of 'JICA Project Evaluation Guideline' which is indicated on the rightmost column of each item.

1 Evaluation Framework

Reference page No.
of 'JICA Project
Evaluation Guideline'

B	(1) Time Frame of Evaluation Study	97
Viewpoint	Necessary field survey activities such as data collection and discussion with counterparts are appropriately set within the time frame of the evaluation study. Time frame also contains preparations such as distribution of questionnaires, and are appropriate in terms of timing, length and schedule of the evaluation study.	
C	(2) Study Team	107
Viewpoint	Team members are assigned on an impartial basis, and are with balanced speciality.	
Comment		

2 Data Collection and Analysis

B	(1) Evaluation Questions	51
Viewpoint	Evaluation questions are in line with evaluation purposes and set properly in the evaluation grid. General questions as to the five evaluation criteria are narrowed down to more specific sub questions to identify necessary information/data to be collected.	
B	(2) Data Collection	72
Viewpoint	Data collection is conducted based on the evaluation grid, and is sufficient for obtaining answers for evaluation questions. Additional information are collected for unexpected and newly confronted questions during the process.	
B	(3) Measurement of Results	61
Viewpoint	Achievement level of overall goal is examined on the basis of appropriate indicators, being compared with targets.	
B	(4) Examination of Causal Relationship	62
Viewpoint	The causal relationships whether the effects for the beneficiaries resulted from the project is examined either in a qualitative or quantitative manner (i.e. Are the effects at the overall goal level caused by the project intervention?)	
Comment		

3 Evaluation Results

B	(1) Impact	57, 85-86
Viewpoint	Perspectives for evaluation of 'Impact' (e.g. achievement level of the overall goal, causal relationships between the outcome of the project and overall goal, ripple effects) are substantially covered. Grounds for judgment are clearly stated in a convincing manner.	
B	(2) Sustainability	58, 85-86
Viewpoint	Perspective for evaluation of 'Sustainability' (e.g. probability of activities to be continued and outcomes to be produced in terms of 1)policies and systems, 2) organizational and financial aspects, 3) technical aspects, 4) Society, Culture and environment and) are substantially covered. Grounds for judgment are clearly stated in a convincing manner.	

B	(3) Factors Promoting Sustainability and Impact	85-86
Viewpoint	Promoting factors on 'Impact' and 'Sustainability' are analyzed properly based on the information obtained through evaluation process.	
B	(4) Factors Inhibiting Sustainability and Impact	85-86
Viewpoint	Inhibiting factors on 'Impact' and 'Sustainability' are analyzed properly based on the information obtained through evaluation process.	
C	(5) Recommendations	87-88
Viewpoint	Recommendations are made thoroughly based on the information obtained through the process of data analysis and interpretation. Recommendations are specific and useful for feedbacks and follow-ups, preferably being prioritized with a time frame.	
C	(6) Lessons Learned	87-88
Viewpoint	Lessons learned are derived thoroughly based on the information obtained through the process of data analysis and interpretation. Lessons learned are convincing and useful for feedbacks, being generalized for wider applicability.	
Comment		

4 Structure of Report

C	(1) Writing Manner	89,103
Viewpoint	Logical structure and major points are clearly described in an easily understandable manner.	
B	(2) Presentation of Primary Data and Utilization of Figures	89,103
Viewpoint	Sufficient primary data such as on the target, contents and results of interviews and questionnaires are presented properly in the report. Figures and tables are utilized effectively to present statistics and analysis results.	
Comment		

5 Overall Review based on 'Criteria for Good Evaluation'

B	(1) Usefulness	13-14
Viewpoint	In light of the effective feedback to the decision-making of the organization, clear and useful evaluation results are obtained.	
B	(2) Impartiality and Independence	13-14
Viewpoint	Evaluation is impartially conducted in a neutral setting	
B	(3) Credibility	13-14
Viewpoint	In light of the specialties of evaluators, transparency of the evaluation process and appropriateness of the criterion of judgment, evaluation information are credible.	
B	(4) Participation of Partner Countries	13-14
Viewpoint	Partner countries' stakeholders participate actively in the process of evaluation, not just provide information.	
Comment		

5 Overall Comment

The evaluation is appropriate. It serves to the intended purpose. Presentation is not so good.

Date

Name of the Third Party

Dr. Matilde E. Espinosa Rubio.



Designation

Name of the Institution

Third Party Review by External Experts

Ex-Post Evaluation on the National Center for Environmental Research and Training (Phase II) Project

* This Third Party Review by External Experts is to examine the end-product (an evaluation report and a summary sheet) of ex-post evaluation of the above-mentioned project in light of its structure, verification procedure and overall consistency. It is to be noted that the review is not to question the validity of the evaluation results per se.

* On the leftmost column of each item, choose the rating from A as 'excellent', B as 'good', C as 'acceptable' and D as 'unacceptable'.

* When you choose D for an item, specify the reason in comment fields.

* For more details of viewpoints for each item, refer to the corresponding page of 'JICA Project Evaluation Guideline' which is indicated on the rightmost column of each item.

1 Evaluation Framework

Reference page No.
of 'JICA Project
Evaluation Guideline'

	(1) Time Frame of Evaluation Study	97
Viewpoint A	Necessary field survey activities such as data collection and discussion with counterparts are appropriately set within the time frame of the evaluation study. Time frame also contains preparations such as distribution of questionnaires, and are appropriate in terms of timing, length and schedule of the evaluation study.	
	(2) Study Team	107
Viewpoint	Team members are assigned on an impartial basis, and are with balanced specialty.	
Comment	<i>No elements for judgment have been supplied for item 2.</i>	

2 Date Collection and Analysis

	(1) Evaluation Questions	51
Viewpoint A	Evaluation questions are in line with evaluation purposes and set properly in the evaluation grid. General questions as to the five evaluation criteria are narrowed down to more specific sub questions to identify necessary information/data to be collected.	
	(2) Data Collection	72
Viewpoint A	Data collection is conducted based on the evaluation grid, and is sufficient for obtaining answers for evaluation questions. Additional information are collected for unexpected and newly confronted questions during the process.	
	(3) Measurement of Results	61
Viewpoint A	Achievement level of overall goal is examined on the basis of appropriate indicators, being compared with targets.	
	(4) Examination of Causal Relationship	62
Viewpoint B	The causal relationships whether the effects for the beneficiaries resulted from the project is examined either in a qualitative or quantitative manner (i.e. Are the effects at the overall goal level caused by the project intervention?)	
Comment	<i>item 4. There is an absence of a follow up activities for the courses provided</i>	

3 Evaluation Results

	(1) Impact	57, 85-86
Viewpoint B	Perspectives for evaluation of 'Impact' (e.g. achievement level of the overall goal, causal relationships between the outcome of the project and overall goal, ripple effects) are substantially covered. Grounds for judgment are clearly stated in a convincing manner.	
	(2) Sustainability	58, 85-86
Viewpoint B	Perspective for evaluation of 'Sustainability' (e.g. probability of activities to be continued and outcomes to be produced in terms of 1)policies and systems, 2) organizational and financial aspects, 3) technical aspects, 4) Society, Culture and environment and) are substantially covered. Grounds for judgment are clearly stated in a convincing manner.	
	(3) Factors Promoting Sustainability and Impact	85-86



Viewpoint A	Promoting factors on 'Impact' and 'Sustainability' are analyzed properly based on the information obtained through evaluation process.	
	(4) Factors Inhibiting Sustainability and Impact	85-86
Viewpoint A	Inhibiting factors on 'Impact' and 'Sustainability' are analyzed properly based on the information obtained through evaluation process.	
	(5) Recommendations	87-88
Viewpoint A	Recommendations are made thoroughly based on the information obtained through the process of data analysis and interpretation. Recommendations are specific and useful for feedbacks and follow-ups, preferably being prioritized with a time frame.	
	(6) Lessons Learned	87-88
Viewpoint A	Lessons learned are derived thoroughly based on the information obtained through the process of data analysis and interpretation. Lessons learned are convincing and useful for feedbacks, being generalized for wider applicability.	
Comment	<i>insufficient information has been supplied for the evaluation, for items 1 and 2.</i>	

4 Structure of Report

	(1) Writing Manner	89,103
Viewpoint A	Logical structure and major points are clearly described in an easily understandable manner.	
	(2) Presentation of Primary Data and Utilization of Figures	89,103
Viewpoint A	Sufficient primary data such as on the target, contents and results of interviews and questionnaires are presented properly in the report. Figures and tables are utilized effectively to present statistics and analysis results.	
Comment		

5 Overall Review based on 'Criteria for Good Evaluation'

	(1) Usefulness	13-14
Viewpoint B	In light of the effective feedback to the decision-making of the organization, clear and useful evaluation results are obtained.	
	(2) Impartiality and Independence	13-14
Viewpoint A	Evaluation is impartially conducted in a neutral setting	
	(3) Credibility	13-14
Viewpoint A	In light of the specialties of evaluators, transparency of the evaluation process and appropriateness of the criterion of judgment, evaluation information are credible.	
	(4) Participation of Partner Countries	13-14
Viewpoint	Partner countries' stakeholders participate actively in the process of evaluation, not just provide information.	
Comment	<i>item 4 is not applicable</i>	

Amie

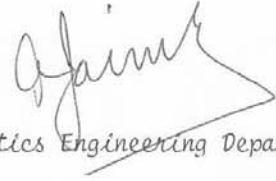
5 Overall Comment

The ex post evaluation is a very good one. And as objective as possible in view of data available. It provides a background for improvement of some actions which would be advisable to be undertaken by CENICA

Date _____

Name of the Third Party

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Designation

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