

## OVERVIEW OF THE PRINCIPAL ISSUES AND THEMES

The mission of the Pollution Prevention Workgroup is to demonstrate and promote pollution prevention benefits to protect the environment and human health and encourage sustainable development in border communities. Investing resources to reduce pollution and prevent it from being generated is a more sustainable method of improving the environment and avoiding health problems than investing resources in regulation, treatment, disposal, and storage of waste. An overarching function of the Pollution Prevention Workgroup is to coordinate efforts to define and implement pollution prevention projects in the border area and to support the efforts of other Border XXI workgroups to implement and promote pollution prevention practices.

# Pollution Prevention

## OBJECTIVES OF THE POLLUTION PREVENTION WORKGROUP AND PROGRESS TOWARD GOALS

To achieve the mission of protecting the environment through pollution prevention, the workgroup has focused its efforts on capacity building, coordinating similar pollution prevention activities, and building partnerships along the border. Input from the industrial sector, academic institutions, and border communities has helped the workgroup decide where to focus pollution prevention efforts and has provided a means for obtaining new ideas about how to effectively communicate the benefits of pollution prevention practices. Partnerships with these various entities have made possible the success of projects and initiatives such as the development of bilingual manuals, conferences and video conferences, and case studies based on the results of site assessment visits. Partnerships have also made possible the provision of technical assistance to the *maquiladora* industry in the form of workshops and seminars. The objectives defined by the Pollution Prevention Workgroup in the *1996 U.S.-Mexico Border XXI Program: Framework Document (Framework Document)* are listed in Table 11-1.



## Objectives

- Increase technical exchange at all levels of government to enhance assistance and outreach to industry.
- Increase technical assistance and outreach to federal, state, and municipal authorities and the general public.
- Increase cooperation and coordination with other Border XXI workgroups and other entities involved in promoting pollution prevention.

The objectives listed above may have been paraphrased from the *Framework Document*. For a more detailed description of these objectives, please refer to that report.

The objectives described in this section may be referred to by number. The numbers are intended for ease of reference only and do not imply order of importance.

Table 11-1

## Progress Toward Goals

Table 11-2 on the following page lists initiatives as they pertain to each of the objectives. The objectives are identified as they are addressed in each of the geographical areas of the U.S.-Mexico border, as well as border wide.

### Increase Technical Exchange, Outreach to Industry, and Cooperation with Other Entities Involved in the Promotion of Pollution Prevention

- **Arizona-Sonora Region** – Pollution prevention efforts in the Arizona-Sonora region have focused on objectives 1 and 3 and initiatives C, D, and F. The Arizona Department of Environmental Quality's (ADEQ) Arizona-Mexico International Green Organization (AMIGO) Program, funded through the U.S. Environmental Protection Agency (EPA) in partnership with Mexico, is a voluntary and nonregulatory partnership between government and industry in the Arizona-Sonora border region. The program brings companies together to share technologies that reduce waste and pollution and increase profits, worker safety, and environmental health. Through facility tours, workshops, and conferences, participants benefit from networking opportunities, technology, and information exchanges focused on promoting pollution prevention and improving waste management practices.

As a result of outreach activities in the area, industry groups in Arizona and the maquiladora industry in Nogales, Sonora have established a membership base for technology exchange and assistance. Two workshops



have been held for environmental health and safety managers on the fundamental principles of pollution prevention. The workshops featured a site visit to a manufacturing

facility in Tucson to provide technical transfer opportunities to workshop participants. Other binational facility site visits have provided networking and technical transfer opportunities for similar industries.

A binational pollution prevention conference consisting of presentations by Arizona industries, including Allied Signal, Inc; International Business Machines Corporation (IBM); Intel Corporation; and Motorola, Inc., was held on May 14, 1998, in Nogales, Sonora. Both U.S. and Mexican government officials discussed hazardous waste and other applicable regulations governing industries in the border region. A second conference was held during Pollution Prevention Week in September 1999 in Tucson, Arizona. Presentations focused on case studies conducted by companies from Arizona and Sonora on aspects of pollution prevention, such as planning for projects, gaining economic benefits, and incorporating Design for the Environment principles in the manufacturing process.

The efforts of these companies led to the establishment of an award program to recognize AMIGO partners who demonstrate leadership in reducing the amount and toxicity of hazardous wastes and the use of toxic substances in the Arizona-Sonora border region. Awards are given in two categories: (1) process improvements and (2) pollution prevention promotion. The awards are presented by the governors of Sonora

and Arizona during the Fall Plenary Session of the Arizona-Mexico Commission and its sister organization, the *Comisión Sonora-Arizona* (Sonora-Arizona Commission). These organizations have been in existence for 40 years and are a branch of the governor's office in each respective state.

The awards for excellence in process improvement went to SUMEX in 1998 and to General Instruments Corporation in 1999. The recipients of the award for excellence in pollution prevention promotion were *Circuitos Mexicanos* in 1998 and SUMEX in 1999.

A special recognition was presented to the Association of Professionals in Safety, Health and the Environment, in appreciation for its support and partnership in promoting the goals of pollution prevention and the efforts of the AMIGO Program.

**Note:** Projects for the Arizona-Sonora area are coordinated with the Hazardous and Solid Waste Workgroup and incorporate pollution prevention concepts. Table 11-3 on the following page presents highlights of the activities conducted under the AMIGO Program. The section of this report that discusses the activities of the Hazardous and Solid Waste Workgroup provides more information about related projects.

Overview of the Strategy			
Initiative	Objective 1	Objective 2	Objective 3
<b>A.</b> Develop bilingual pollution prevention manuals for priority industrial sectors.	•		•
<b>B.</b> Expand pollution prevention technical assistance to small business operations.	•		•
<b>C.</b> Expand pollution prevention assistance to <i>maquiladoras</i> .	•		•
<b>D.</b> Develop an initiative on recycling and solid waste handling activities.	•	•	•
<b>E.</b> Establish a pollution prevention office in SEMARNAP.			•
<b>F.</b> Continue technical support in recycling and pollution prevention in cooperation with Mexican state governmental agencies.		•	•
• Initiative addresses this objective			

Table 11-2

AMIGO Highlights		
Facility	Environmental Savings	Cost Savings
<b>SUMEX:</b> Recycling and remanufacturing facility for copier and printer cartridges in Nogales, Sonora for the XEROX Corporation	January-October 1998: 2,828,204 pounds of recycled materials	Not available
	January-September 1999: 3,498,533 pounds of recycled materials	Not available
	June-September 1999: 200,000 pounds of toner recovered after an initial investment of \$30,000 for toner recycling equipment	Savings of \$12,000 from June-September 1999
	Projected for 2000: One million pounds of toner to be recuperated	Projected savings for 2000 is \$60,000
<b>Circuitos Mexicanos:</b> Automotive harness manufacturing company in Nogales, Sonora for the Chrysler Corporation	January 1997: Cardboard barrel recycling program initiated	Estimated annual savings \$264,000
	January-October 1997: Recycled 44,000 cardboard barrels	
<b>General Instruments Corporation:</b> <i>Maquiladora</i> in Nogales, Sonora for the General Instruments Corporation	1999: Through pollution prevention process improvements, generation of lead solder dross reduced by 50 percent from the previous year, despite a rise in production	Through various recycling and product substitution efforts, \$102,000 saved in a period of eight months
	1999: 22 Savings of 5,800 gallons of water through water conservation methods	Not available



*Presentation of 1998 AMIGO Program Awards by Arizona Governor Jane Dee Hull and Sonora Governor Armando López Nogales*

- California-Baja California Area** – Pollution prevention efforts in the California-Baja California area have focused on objectives 1 and 3 and initiatives C, D, and F. The primary initiatives of the California Department of Toxic Substances Control (DTSC), led by the Office of Pollution Prevention and Technology Department, has been to increase communication and technical exchange of information through coordination, partnership meetings, and workshops. With funding from EPA, DTSC has worked to forge partnerships with the state of Baja California and area academic institutions to increase technology exchange and provide outreach to the community. Together with its partners, DTSC has emphasized the need to reduce the amount of hazardous waste generated along the border through pollution prevention techniques.

Table 11-4 lists workshops focused on the electronics, metal finishing, and wood finishing processes that have been presented to *maquiladoras* and other industries in the California-Baja California area. In partnership with local border universities, DTSC also presented workshops on reducing generation of volatile organic compounds (VOC).

Partnerships continue to be fostered among DTSC, the *Procuraduría Federal de Protección al Ambiente* (PROFEPA,

or Mexico's Federal Attorney General for Environmental Protection), local industry, academic institutions, and municipalities to promote the concepts of pollution prevention and sustainability through a variety of activities. As a result of meetings and other events, more than 250 people in the California-Baja California border area have been trained in methods of reducing generation of air pollutants and hazardous waste. Through other collaborative efforts, the Pollution Prevention Workgroup will work to develop methods of gathering data to identify trends in quantities of wastes coming from *maquiladoras* into California. The workgroup will also strive to develop binational strategies to more effectively coordinate with the *maquiladora* industry in the California-Baja California area.

**Note:** Projects for the California-Baja California area are coordinated with the Hazardous and Solid Waste Workgroup and incorporate pollution prevention concepts. The section of this report that describes the activities of the Hazardous and Solid Waste Workgroup provides more information about related projects.

- New Mexico-Chihuahua Area** – Pollution pre-

Pollution Prevention Workshops		
Pollution prevention workshop for <i>maquiladoras</i> : Focus on electronics industry	May 1997 May 1998	San Diego, California Tijuana, Baja California
Pollution prevention workshop for <i>maquiladoras</i> : Focus on wood finishing and metal finishing	March 1997	Tijuana, Baja California
Pollution prevention workshop: Focus on reducing VOC generation	May 1999 June 1999	Mexicali, Baja California Tijuana, Baja California

**Table 11-4**

vention efforts in the New Mexico-Chihuahua area have focused on fulfilling objectives 1 and 3. New Mexico State University (NMSU), the *Instituto Tecnológico y de Estudios Superiores de Monterrey* (ITESM, or Monterrey Institute of Technology and Advanced Studies) and EPA Region 6 have partnered to address environmental legislation and regulation and to incorporate business models that include natural resource conservation, as well as minimization of toxic output to the environment. Two workshops were held at ITESM for *maquiladora* managers from Ciudad Juárez, Chihuahua, titled Environmental Management and Natural Resource Economics and Environmental Regulation for the Maquiladora Industry. Both sessions emphasized methods of reducing costs by minimizing pollution, adopting more environmentally sustainable business practices, and avoiding costs associated with pollution cleanups and regulatory violations. Participants indicated their desire to receive additional instruction on each of the topics. One company credited the seminars with helping it institute an aluminum recycling program. The program helped the company reduce waste and save a significant amount of money. This project produced a video and bilingual workbooks of the seminars for future reference, as well as a bilingual CD ROM of the workshop materials. For additional information, contact the NMSU management department at (505) 646-1434.

• **Texas-Chihuahua-Coahuila-Nuevo León-Tamaulipas Area** – Pollution prevention efforts in this area focused on objectives 1 and 3 and initiatives B and C. In collaboration with Mexico's *Instituto Nacional de Ecología* (INE, or National Institute of Ecology), PROFEPA, local governments, industry, and academic partners, the Texas Natural Resources Conservation Commission (TNRCC), through funding from EPA, has implemented technical assistance programs, site visits, and capacity-building programs along the Texas-Mexico border. In conjunction with PROFEPA's voluntary auditing program, 21 on-site technical assistance visits to *maquiladoras* have been completed. Reports from the participating *maquiladoras* indicated annual reductions of 9,600 tons of hazardous waste, 88,600 pounds of VOCs, and 57,400 tons of non-hazardous waste. In addition, 37 million gallons of water and 77 million kilowatt hours

of electrical energy were conserved. The *maquiladoras* have attributed annual savings of almost \$10.1 million to pollution prevention and energy conservation methods.

Active partnerships have been cultivated through TNRCC to promote capacity building along the Texas-Mexico border. Through an agreement between the municipal government of Ciudad Juárez, the state government of Chihuahua, the *Universidad Autónoma de Ciudad Juárez* (Autonomous University of Ciudad Juárez), INE, and TNRCC, a case study was developed to include university staff as part of the site assistance visit team and to develop a seminar for the Permanent Pollution Prevention Program. The case study resulted in engineering changes that streamlined production and reduced waste through pollution prevention techniques. Because of the success of the case study, a permanent position was established in the university's *Centro para Estudios de Medio Ambiente* (CEMA, or Center for Environmental Studies) to address pollution prevention concerns, together with area industry.

In partnership with the El Paso, Texas Independent School District Technical Center and Texas State Technical College (Harlingen), TNRCC's Small Business Assistance Program provided training on paint-spraying techniques and the use of the Spray Techniques Analysis and Research (STAR) Training Program. The techniques demonstrated in the training help to reduce overspray, coating costs, and VOC emissions and minimize the amount of hazardous waste that is generated. The overall benefit is the increase in the energy efficiency rating of the sprayer. As a result, material costs were reduced by as much as 24 percent, and VOCs were reduced by as much as 23 percent (or 23 pounds). In this study, a savings of as much as 57 percent in transfer efficiency was achieved.

In addition, TNRCC has completed 40 pollution prevention site assistance visits to a variety of small businesses along the Texas border. Compliance assistance for regulatory and enforcement problems, as well as pollution prevention solutions to save money and avoid compliance problems, was provided.

More detailed information about various aspects of this program is available on the TNRCC web site at [www.tnrcc.state.tx.us/exec/oppr/border/border.html](http://www.tnrcc.state.tx.us/exec/oppr/border/border.html).

### **Increase Technical Assistance and Outreach to Federal, State, and Municipal Authorities and the General Public**

Efforts in this area have focused on initiatives D and F and objective 2. State-to-state partnerships have been formed between Texas and the neighboring Mexican states to develop programs modeled on the Texas Clean Cities Program, which encourages cities to strive for environmental excellence (see [www.tnrcc.state.tx.us/exec/oppr/cc2000](http://www.tnrcc.state.tx.us/exec/oppr/cc2000)). Highlights include state-to-state strategic environmental plans with the state of Tamaulipas to identify common priorities and to chart future actions. In addition, the state of Tamaulipas has established an agreement with TNRCC, the *Universidad Autónoma de Tamaulipas* (Autonomous University of Tamaulipas) (*Unidad Rhode* in Reynosa, Tamaulipas), and the *Secretaría de Medio Ambiente, Recursos Naturales, y Pesca* (SEMARNAP, or Secretariat of Environment, Natural Resources, and Fisheries) delegation in Tamaulipas to incorporate pollution prevention studies into the curriculum on a permanent basis. In the state of Chihuahua, TNRCC has also established partnerships with Ciudad Juárez and the local university.

To further promote recycling, TNRCC has partnered with border universities and local municipalities to provide recycling and municipal solid waste management training to local municipal solid waste managers. To foster partnerships in the effort to cultivate international trade linkages in the recycling industry, TNRCC also joined Texas companies in participating in the Mexican National Recycling Association Conference. More than 1,500 participants attended the conference, including equipment manufacturers, collectors, and processors, as well as representatives of trade associations and Texas firms. Recyclers networked with corporations in Mexico to establish new markets for recyclable materials and to explore new opportunities.

During the Texas Recycling Summit, more than 40 representatives of some of the largest recyclers in Nuevo León attended the Texas-Nuevo León Invitational Luncheon to encourage the development of international recycling markets and information networks. The luncheon was the culminating event of the Nuevo León Recycling Development Roundtable held in 1998 in Laredo, Texas.

As outreach to the local community, TNRCC initiated a pilot training for *colonias* on basic recycling techniques.

*Colonia* residents have requested more assistance in developing community recycling programs.

ADEQ has integrated technical assistance binationally through collaboration with Sonora and Sonoran industries. The efforts have been integrated into the AMIGO program. The Arizona-Sonora section of this chapter provides more specific information.

DTSC also has initiated outreach to other government authorities through the Waste Wi\$e Program. The Hazardous and Solid Waste Workgroup chapter provides more information about that program.

### **Increase Cooperation with Other Border XXI Workgroups and Other Entities Involved in Promoting Pollution Prevention Border Wide**

This section addresses all three objectives and describes a border-wide collaborative effort of the Pollution Prevention Workgroup, the Hazardous and Solid Waste Workgroup, and the Cooperative Enforcement and Compliance Workgroup.

- **Pollution Prevention Office in the *Secretaría de Medio Ambiente, Recursos Naturales, y Pesca***

– In October 1995, an office of pollution prevention was created as a subdirectorate in INE. The office participated in the development of the national executive proposal *Registro de Emisiones y Transferencia de Contaminantes* (RETC, or Pollution Release and Transfer Register), which was published in March 1997. On April 9, 1998, the multimedia format of the *Cédula de Operación Anual* (Report of Annual Operations), the instrument that will provide the data to be used in the RETC, was established. The implementation of RETC is incomplete because of pending modifications in the regulations that govern hazardous wastes, the water discharge reports, and the authorization of the list of substances that are to be reported.

- **Bilingual Pollution Prevention Manuals and Conferences**

– The Pollution Prevention Workgroup developed a series of bilingual manuals to promote pollution prevention in specific industries that are heavily represented in the border region. The workgroup has distributed more than 200 of the manuals to relevant companies and organizations on both sides of the border. Upon completion of the manuals, the workgroup

organized bilingual conferences for the specific industry sector to promote the manuals (Table 11-5).

Bilingual Conference	Location	Date
Pollution Prevention in the Textile Industry	Brownsville, Texas El Paso, Texas	Summer 1998 Summer 1998
Pollution Prevention in the Metal and Wood Finishing Industry	El Paso, Texas	Summer 1995
Pollution Prevention Workshop: Focus on Metal Finishing and Wood Finishing Industries	Ciudad Juarez, Chihuahua Laredo, Texas	Summer 1994
Pollution Prevention in the Metal Finishing Industry	El Paso, Texas Laredo, Texas	Summer 1996 Summer 1996
Pollution Prevention in the Electronics Industry	Tijuana, Baja California	Spring 1997
Pollution Prevention Workshop: Focus on Electronics Industry	San Diego, California	Spring 1997

Table 11-5

- Training Video** – To promote pollution prevention as a solution to compliance problems, the Pollution Prevention Workgroup worked with the Cooperative Enforcement and Compliance Workgroup to produce a bilingual video titled *Environmental Auditing and Pollution Prevention: Strategies for Compliance in the Maquiladora Industry*. The video outlines pollution prevention-based compliance strategies for the maquiladora industry and explains the benefits of Mexico’s environmental audit program. TNRCC and ADEQ assisted in the distribution of the video and, to date, have distributed more than 400 copies.

- Partnerships** – The workgroup continues to partner with other workgroups and agencies to promote pollution prevention through such efforts as the AMIGO and Clean Texas programs and California-Baja California workshops. Other partnerships have included that of EPA, INE, PROFEPA, and TNRCC, in collaboration with the U.S. Agency for International Development (USAID), to work in energy conservation and pollution prevention with the *maquiladoras* in the Reynosa, Tamaulipas; Matamoros, Tamaulipas; and Nuevo Laredo, Tamaulipas areas. Those efforts culminated in a conference that showcased the successes achieved by the *maquiladoras*.

In partnership with TNRCC, EPA, SEMARNAP, and U.S. and Mexican industry, the University of Texas (UT)-Pan-America and UT-Brownsville developed a pollution

prevention engineering curriculum. The curriculum also considers the legal and regulatory environmental requirements of Mexico, the United States, and Canada.

- U.S.-Mexico Pollution Prevention Roundtable for Sustainable Solutions** – U.S.-Mexico Pollution Prevention roundtables were initiated in June 1998 in Brownsville, Texas and continued in February 1999 in Reynosa and November 1999 in El Paso as opportunities to explore partnerships between *maquiladoras* and research institutions in one setting. The roundtable meeting held in November 1999 in El Paso included presentations that illustrated the potential partnerships and the market available for the promotion of pollution prevention and energy efficiency as a profitable and sustainable methodology for industries, academic institutions, and the border community. Roundtable members, including the *Fundación de México-Estados Unidos para la Ciencia* (FUMEC, or Mexico-United States Foundation for Science), Mexico’s *Consejo Nacional de la Industria Maquiladora* (AMAC, or National Association of *Maquiladoras*) industry representatives, border academic institutions, INE, PROFEPA, EPA, and TNRCC, hosted the roundtable. Members made a commitment to examine the concerns and needs of the *maquiladora* industry and the capabilities of local academic institutions to address those needs as a basis for the establishment of sustainable cooperative programs. Next steps have been contemplated and will be reported in future publications. The project was sponsored by EPA through a grant to TNRCC.

## ENVIRONMENTAL INDICATORS

Types of Environmental Indicators	
<b>P</b>	PRESSURE: ACTIONS OR ACTIVITIES THAT INDUCE PRESSURE ON THE ENVIRONMENT
<b>S</b>	STATE: ENVIRONMENTAL AND NATURAL RESOURCE QUALITY AND QUANTITY
<b>R</b>	RESPONSE: ACTIONS TAKEN TO RESPOND TO ENVIRONMENTAL AND NATURAL RESOURCE PRESSURES

In 1997, the Pollution Prevention Workgroup drafted an ambitious set of environmental indicators as a means of measuring the workgroup's progress in accomplishing its pollution prevention goals. However, due to the lack of a standardized data collection system and the voluntary nature of the pollution prevention initiatives, data are limited. The information is neither systematically organized nor comparable because *maquiladoras* use different pollution prevention methodologies. As a result, the indicators have relied heavily on voluntary data from participating *maquiladoras* and workshops. The workshops were developed to build capacity at all levels of government, universities, industry, and the community.

The indicators will be revisited and revised as necessary to attempt to track trends in the effectiveness of pollution prevention and energy efficiency methodologies as they are applicable to site-specific industries and workshops. Presented below are the Pollution Prevention Workgroup indicators, which include data collected under the Border XXI initiatives.

**Note:** In addition to the reductions listed below, the participating *maquiladoras* credited annual savings of \$10.1 million by implementing sustainable pollution prevention, energy efficiency, and water conservation methods.

**P** AMOUNT OF WASTE GENERATED IN THE BORDER AREA IN SPECIFIC SECTORS OR INDUSTRIES AFTER IMPLEMENTING POLLUTION PREVENTION METHODS, NORMALIZED FOR PRODUCTION

**Reduction in the amount of waste generated (normalized for production)**

- Reports from participating *maquiladoras* indicate average annual reductions of 9,600 tons of hazardous waste, 88,600 pounds of VOCs, and 57,400 tons of non-hazardous waste produced. These numbers are derived from specific site visits and through voluntary reports. Reports may be obtained through TNRCC.
- Other site-specific savings are included in the Arizona-Sonora section. Due to the design of the program, annual figures were not averaged.

**Reduction in the amount of water consumption normalized for production**

- Reports from participating *maquiladoras* indicate average annual reductions of 37 million gallons of water consumed. That figure is derived from specific site visits and through voluntary reports. Reports may be obtained through TNRCC.

- Other site-specific savings are included in the Arizona-Sonora section. Due to the design of the program, annual figures were not averaged.

**Reduction in the amount of energy consumption normalized for production**

- Reports from participating *maquiladoras* indicate average annual reductions of 77 million kilowatt hours of electrical energy consumed. The numbers above are derived from specific site visits and through voluntary reports. Reports may be obtained through TNRCC.

**Reduction in air VOCs, oxides of nitrogen (NO<sub>x</sub>), and particulate matter (PM) emissions in the El Paso-Ciudad Juárez-Sunland Park, Texas area**

- Current data are not available.

**R** AMOUNT OF PARTICIPATION FROM INDUSTRY, ALL LEVELS OF GOVERNMENT, UNIVERSITIES, AND COMMUNITIES IN WORKSHOPS PROMOTING POLLUTION PREVENTION TECHNIQUES AND RECYCLING PROGRAMS

**Technical exchange to enhance outreach to industry**

- Bilingual pollution prevention manuals were developed for specific industries, as follows:
  - Pollution Prevention in the Wood Finishing Industry
  - Pollution Prevention in the Electronics Industry
  - Pollution Prevention in the Textile Industry
  - Pollution Prevention in the Metal Finishing Industry
- More than 15 seminars have been presented to various industrial sectors and *maquiladoras* along the U.S.-Mexico border.
- 21 on-site technical assistance visits to *maquiladoras* have been conducted along the U.S.-Mexico border area.
- 40 pollution prevention site assistance visits to a variety of small businesses along the Texas border area have been conducted.
- The AMIGO program successfully established an avenue for technical assistance between similar industries and *maquiladora* sectors and a recognition program supported by the governors of Sonora and Arizona.
- Workshops have been held to promote recycling and waste minimization among sister cities along the U.S.-Mexico border.
- A bilingual training video titled *Environmental Auditing and Pollution Prevention: Strategies for Compliance in the*

Maquiladora *Industry* has been developed in coordination with the Cooperative Enforcement and Compliance Workgroup to promote pollution prevention as a solution to compliance problems.

### **Technical assistance and outreach to federal, state, and municipal authorities and the general public**

- A pollution prevention office has been established in SEMARNAP.
- State-to-state partnerships have been established to promote pollution prevention in the border states.
- The workgroup members continue to foster partnerships with other workgroups, agencies, academia, and industry to promote pollution prevention through programs such as the AMIGO program, Clean Texas, and Industria Limpia (Clean Industry) and through workshops and seminars along the border.
- Pollution prevention has been instituted in the curriculum of two Mexican border universities.
- DTSC has established partnerships with local industry, academic institutions, and municipalities to present conferences promoting the reduction of VOCs and hazardous waste.

### **Number of pollution prevention practices that have been implemented after a site assessment visit, workshop, or training session**

- Reports from participating *maquiladoras* indicate that, on average, three pollution prevention practices are implemented after a site assistance visit. This number is derived from specific visits and through voluntary reports.

### **Amount of non-toxic chemicals or materials substituted for toxic chemicals or materials**

- No data are available.

## **FUTURE PERSPECTIVES**

The activities of the Pollution Prevention Workgroup have gone through a maturation process. A base structure of workshops, manuals, and successful case studies has been established, permitting the workgroup to reach a significant number of industry representatives, *maquiladora* associations,

local and state governments, and academic institutions. On the other hand, the interdisciplinary nature of the activities is now more evident, as is reflected in the reduction of emissions and wastes in the various media areas. Of particular relevance is the compatibility of objectives between the tasks of the Cooperative Enforcement and Compliance Workgroup and those of the Pollution Prevention Workgroup. This compatibility is reflected in the successful inclusion of pollution prevention objectives in the action plans derived from the voluntary auditing program.

Nevertheless, during 1998, public discussion indicated a need to revisit the strategies of the Pollution Prevention Workgroup. In spite of successful case studies, pollution prevention has not become a common practice in demand by industry at large. As a result, the workgroup has made a commitment to work toward developing additional strategies to promote pollution prevention border-wide.

The purpose of this effort is to create conditions in which services will be more accessible to industry and other markets, especially since pollution prevention activities are economically beneficial, as well as environmentally sound. Industry representatives, consultants, and academic institutions are essential partners in creating a sustainable pollution prevention market. Future areas for developing pollution prevention projects include: (1) implementing pollution prevention methods in other areas, such as new international wastewater treatment plants, and (2) continuing to work with local industry, academic institutions, and government to develop pollution prevention roundtables.

Proposed goals for the next five-year period include:

- As a result of the government-industry partnership program, at least 10 percent of the maquiladora industry in the border area will have participated in pollution prevention and waste minimization programs.
- During this period, the legal portion of the RETC will be completed.
- The workgroup will continue to promote pollution prevention through presentation of workshops, development of manuals, and completion of site assistance visits.
- The workgroup will facilitate U.S.-Mexico pollution prevention roundtables to foster sustainable partnerships between academic institutions and industry.