United States General Accounting Office

GAO

Report to the Chairman, Committee on Commerce, Science, and Transportation, U.S. Senate

November 1993

U.S.-MEXICO TRADE:

The Work Environment at Eight U.S.-Owned Maquiladora Auto Parts Plants

GAO/GGD-94-22

GAO

United States
General Accounting Office
Washington, D.C. 20548

General Government Division

B-243936

November 1, 1993

The Honorable Ernest F. Hollings
Chairman, Committee on Commerce, Science,
and Transportation
United States Senate

Dear Mr. Chairman:

As you requested, we have reviewed labor practices under the Mexican maquiladora program. Specifically, this report (1) evaluates the safety and health work environment at eight U.S.-owned maquiladora auto parts plants, (2) describes the Mexican system for safety and health oversight, and (3) discusses U.S.-Mexican cooperative efforts to enhance working conditions.

We are sending copies of this report to the U.S. Secretaries of State and Labor, the U.S. Trade Representative, and interested congressional committees. In addition, we will provide copies to the Mexican Secretaria del Trabajo y Prevision Social (Labor Ministry) and the Instituto Mexicano de Securidad Social (Social Security Institute). Copies of the report will be made available to other interested parties on request.

Please contact me on (202) 512-4812 if you have any questions concerning this report. The major contributors to this report are listed in appendix II.

Sincerely yours,

Allan I. Mendelowitz, Managing Director
International Trade, Finance,
and Competitiveness

Executive Summary

Purpose

The North American Free Trade Agreement (NAFTA) was signed by Canada, Mexico, and the United States on December 17, 1992. Before NAFTA goes into effect in the United States, implementing legislation must be prepared and approved by the Congress. Worker safety and health issues are addressed in the NAFTA Supplemental Agreement on Labor Cooperation signed in September of 1993. Many Members of Congress are concerned that disparities between U.S. and Mexican labor standards could lead to a loss of jobs in the United States and the diminution of workplace standards. As the Congress considers the potential impact of NAFTA on labor issues on both sides of the U.S.-Mexico border, insights can be gained on occupational safety and health by reviewing the work environment at U.S.-owned maquiladora plants in Mexico.

In response to a request from the Chairman of the Senate Committee on Commerce, Science, and Transportation to assess working conditions in U.S.-owned auto parts plants in Mexico, GAO reviewed the working conditions at eight auto parts plants. Specifically, this report (1) evaluates the occupational safety and health work environment at eight U.S.-owned maquiladora auto parts plants, (2) describes the Mexican government's oversight of occupational safety and health, and (3) discusses ongoing cooperative efforts between the United States and Mexico to enhance working conditions.

Background

Mexico established the maquiladora program in 1965 to promote foreign investment and exports. The program allows duty-free imports of materials and manufacturing components to Mexico. These materials are then processed or assembled into products that must be reexported from Mexico unless special approval is given to sell them in the Mexican market.

Employment in the maquiladora transportation equipment sector, the sector that includes auto parts, has grown faster than any other maquiladora sector since 1980. The work performed at auto parts maquiladoras generally consists of assembly and/or light manufacturing, with numerous repetitive tasks. While the potential for exposure to industrial hazards in assembly and light manufacturing plants is lower than in heavy industry, inherent ergonomic, safety, physical, and chemical hazards remain. Ergonomic issues involve an assessment of (1) workplace geometry, (2) working postures, and (3) repetitive motions and forceful actions. Safety issues include fire prevention and emergency response, and

tool and machine operation. Physical issues include exposure to noise and heat. Chemical issues include exposure to hazardous materials.

The United States and Mexico have similar laws protecting workers. According to U.S. and Mexican labor officials, Mexican and U.S. labor laws and regulations generally address similar workplace hazards, although the standards published to date have not been identical. These officials stated that Mexican safety and health standards are less specific than U.S. Occupational Safety and Health Administration (OSHA) standards. Maquiladoras are subject solely to Mexican safety and health laws and regulations.

Mexico requires the establishment of joint labor-management committees, made up of representatives from management and production workers at each plant. In this report, such a committee is referred to as the "joint commission." These joint commissions perform several functions, including identifying and documenting safety and health concerns, making recommendations for hazard control, and investigating accidents and illnesses.

GAO contracted with the University of California, Los Angeles, School of Public Health to obtain technical expertise in occupational safety and health. Based on location, company size, and product line, GAO judgmentally selected for review 12 out of a total of 104 U.S.-owned auto parts maquiladora plants that GAO identified. The limited number of plants and the selection process preclude statistical projection of the study results to the entire maquiladora auto parts industry. With a pledge to leave undisclosed the identity of companies, GAO obtained access to eight plants to conduct an assessment of the maquiladora work environment. Criteria for this assessment were based on U.S. standards contained in 29 C.F.R. 1900, and the consultants' knowledge of good safety and health practices. (See ch. 1 for a complete discussion of GAO's scope and methodology.) Since GAO did not review the safety and health conditions of auto parts plants located in the United States, GAO makes no direct comparisons between conditions in the United States and Mexico. However, GAO discussed safety and health conditions in the auto parts industry in the United States with OSHA officials and representatives of the United Auto Workers union and the auto industry.

Results in Brief

The work environment at the eight maquiladora auto parts plants GAO visited was generally orderly and well maintained. Company officials at all

of the plants emphasized the importance of worker safety and health. Seven of the eight plants had identified personnel with safety and health responsibility and had implemented some safety and health programs and training. However, GAO and its consultants observed safety and health hazards of varying severity in all of the plants visited. Furthermore, the plants lacked or had incomplete hazard-specific programs and training necessary to mitigate certain observed hazards. According to GAO's technical consultants, the work environment at the eight plants could be enhanced by more systematic evaluation of safety and health programs and further implementation of hazard-specific programs and training.

At the eight plants visited, GAO's consultants observed safety and health hazards of the type inherent in light manufacturing and assembly operations. The consultants observed varying degrees of hazards in four areas: ergonomic, safety, physical, and chemical. According to these consultants, some of these hazards were serious, although none presented an imminent danger to the workers' lives or health. According to OSHA officials, the types of hazards observed are present in the U.S. auto parts industry as well.

Parent companies of six of the eight plants GAO visited provided guidance and technical support for safety and health to their maquiladoras. However, according to GAO consultants, parent company monitoring could be enhanced to ensure implementation of corporate safety and health policies in Mexico.

In Mexico, safety and health oversight includes three interrelated components: joint commissions at each plant, injury and illness reporting, and plant visits by government officials. Mexican labor officials recognize that the Mexican approach to occupational safety and health oversight can be improved. Mexican oversight may be adversely affected because plants are selected for inspection using a risk assessment based partly on incomplete injury and illness data and joint commission reports.

The United States and Mexico have initiated several joint and cooperative efforts to address safety and health issues since May 1991. These efforts include exchanges of information on standards and procedures and sharing of technical assistance and training. U.S. and Mexican labor officials recognize that opportunities exist for enhanced cooperation.

Principal Findings

Plants Missing Some Hazard-Specific Programs and Training

Overall, U.S. parent company officials of the eight plants GAO visited recognized the need to provide employees with a safe and healthy work environment. Seven maquiladoras had established some complete or partial safety and health programs, and all eight provided general safety and health training. None of the plants had complete programs necessary to address all of the hazards observed. According to GAO's consultants, all of the plants needed a more systematic evaluation of existing programs and further implementation of hazard-specific programs and training. Most of the plants were missing or had incomplete programs for hazard communication, hearing conservation, and safe machine operation. Two plants were in the process of developing an ergonomic program.

The consultants observed ergonomic, safety, physical, and chemical hazards that fell into OSHA's "serious" and "other than serious" categories. Some of the hazards observed could cause permanent or prolonged damage to the body and would be considered serious. Hazards categorized as "other than serious" would not generally cause serious physical harm to the worker. None of the hazards observed presented an imminent danger to a worker's life or health.

Ergonomic hazards, due to repetitive motion processes, were the most significant hazards found at the plants visited. Neither the United States nor Mexico has promulgated specific regulations for ergonomics; however, OSHA holds employers responsible for correcting ergonomic hazards under employers' general duty to ensure a safe work environment. Most of the production workers at all eight plants were exposed to ergonomic hazards of the assembly process.

The most frequently observed safety hazard was machines that lacked machinery guards and had exposed machine parts. Consistent with this observation, the most common injuries recorded by the companies were contusions, lacerations, and hand injuries that were treated on site. The most frequent physical hazard identified was excessive machine noise. Although workers were provided with personal protective hearing devices at the plants, many were wearing them improperly or intermittently. The use of chemicals was limited at the plants visited.

The parent companies of six of the eight plants visited provided safety and health guidance and limited technical support to their maquiladoras. Four of these six parent companies provided the maquiladoras with written, standardized, hazard-specific safety and health programs. However, the parent companies did not conduct comprehensive annual safety and health audits as warranted by good practice, according to GAO consultants, to monitor implementation of corporate safety and health policies and programs.

According to OSHA officials, the types of safety and health hazards observed at the eight auto parts maquiladora plants visited exist in U.S. auto parts plants. Information on the frequency and seriousness of the hazards in U.S. auto parts plants could not be compared to GAO's findings due to differences in the types of manufacturing processes and reporting requirements.

Mexican Officials Recognize Oversight Could Be Improved

Mexican labor officials recognize that the Mexican approach to occupational safety and health oversight can be improved. In Mexico, safety and health oversight includes three interrelated components: injury and illness reporting, joint commissions at each plant, and plant visits by government officials.

Generally, the eight maquiladoras were not reporting all injuries and illnesses to the Mexican authorities as required. Usually, companies only report injuries or illnesses if the worker is treated at a government clinic or if the worker or the union requests that the incident be reported. GAO could not compare Mexican injury and illness rates to U.S. injury and illness rates because the two countries have different criteria for defining a reportable injury. GAO's review of joint commission minutes, and the consultants' observations of hazards in the workplace, indicated that joint commission members did not recognize or document many of the hazards at the plants.

The Secretaria del Trabajo y Prevision Social and/or the Instituto Mexicano de Securidad Social visited the eight maquiladoras during 1991 or 1992. However, Mexican officials recognized that occupational safety and health inspection strategies may have been adversely affected because selection of plants for inspection used a risk assessment based partly on incomplete injury and illness data and joint commission reports.

Opportunities Exist for Further Binational Cooperation

Due to concerns about working conditions in Mexico in a free trade environment, Mexico and the United States have agreed to cooperate to promote occupational safety and health in both countries. Binational agreements specify activities to jointly identify and control workplace hazards, improve data collection, exchange information on standards and procedures, and share technical assistance and training. GAO's review of eight auto parts maquiladora plants and discussions with U.S. and Mexican labor officials identified opportunities to improve the work environment. U.S. and Mexican labor officials recognize that there are opportunities for enhanced cooperation, specifically in the areas of (1) ergonomic issues; (2) hazard communication issues, including training; (3) occupational safety and health training for joint commission members; and (4) data reporting of occupational injuries and illnesses.

Recommendations

This report contains no recommendations.

Agency Comments

GAO provided summarized information to and discussed the issues in this report with officials from the U.S. Department of Labor's International Labor Affairs Bureau, its Bureau of Labor Statistics, and OSHA. GAO also met with officials at the U.S. embassy in Mexico City, as well as Mexican officials at the Instituto Mexicano de Securidad Social and the Secretaria del Trabajo y Prevision Social. These officials generally agreed with the facts presented, and their comments have been incorporated into the report where appropriate. GAO also provided summarized information to the parent companies of the eight maquiladoras visited. The comments GAO received were generally critical of GAO's approach. For example, they expressed concern that the study unduly focused on ergonomic factors for which there are no governmental standards in either country. They also expressed concern that the presentation of data focused on individual plants. GAO recognizes that, although ergonomic standards are still being developed, OSHA currently requires companies to address ergonomic issues. GAO modified the presentation of data on safety and health programs and hazards to emphasize summary findings and better ensure the confidentiality of the plants visited. The comments made by the parent companies and some additional information they provided were incorporated as appropriate.

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Abbreviations

C.F.R.	Code of Federal Regulations
dBA	Decibel
GAO	General Accounting Office
IMSS	Instituto Mexicano de Securidad Social
MSDS	Material safety data sheet
NAFTA	North American Free Trade Agreement
OSHA	Occupational Safety and Health Administration
SECOFI	Secretaria de Comercio y Fomento Industrial
SEDESOL	Secretaria de Desarrollo Social
STPS	Secretaria del Trabajo y Prevision Social
UAW	United Auto Workers
UCLA	University of California, Los Angeles

Introduction

The United States and Mexico have similar laws protecting workers.[1] Although safety and health regulations and standards are not identical in the United States and Mexico, they were established to address similar workplace hazards. In a 1991 study, we could not conclude that either the United States or Mexico had substantially more protective laws and regulations—each country has some regulations that are more protective than those of the other. In Mexico, establishment and enforcement of occupational safety and health standards in all industries, including companies operating under the maquiladora program, are responsibilities of the Secretaria del Trabajo y Prevision Social (STPS). Other agencies are also engaged in safety and health oversight.

In the United States, the Occupational Safety and Health Administration (OSHA) was established to administer the Occupational Safety and Health Act of 1970. OSHA sets mandatory safety and health standards; through its regional area and district offices, OSHA inspects private sector worksites, proposes penalties, and prescribes abatement dates for employers found violating the standards or failing to meet their "general duty" to provide a workplace that is free from safety and health hazards. In addition, OSHA provides education to workers, employers, and the public, mostly through grant activities.[2] OSHA's strategy largely relies on voluntary compliance by employers and workers. This strategy is backed up by enforcement activities that are characterized by inspection of high-hazard industries; response to formal worker complaints; pursuit of civil penalties; reduction of fines for prompt abatement; and reliance on employers' assurance that abatement took place.

Mexican Regulatory System

Mexican labor regulations for protecting workers have their foundation in the 1917 Mexican constitution. In 1978, Mexico's labor laws were consolidated in the General Regulation for Labor, Health and Hygiene, which was issued by STPS. Since 1983, various instructions have been published on specific occupational safety and health regulations. Although U.S. and Mexican occupational safety and health standards are similar, they are not identical—each country has some regulations that are more protective than the other's. According to STPS and OSHA, both countries generally address the same workplace hazards.

[1]Occupational Safety and Health and Child Labor Policies of the United States and Mexico (GAO/T-HRD-91-22, Apr. 30, 1991).

[2]See Occupational Safety and Health: Options for Improving Safety and Health in the Workplace (GAO/HRD-90-66BR, Aug. 24, 1990).

According to OSHA and STPS, Mexican safety standards tend to be briefer, broader in scope, and more performance oriented than the U.S. standards. Some U.S. safety standards contain extensive specifications. Similarly with health standards, while many of the chemical exposure limits are identical in both countries, there are differences with respect to exposure limits for key hazardous substances. The United States has ancillary provisions for a few standards. These provisions include requirements for exposure monitoring, medical surveillance, training, hygiene facilities, respirators, and protective clothing. Mexican standards do not contain such protection.

STPS is responsible for enforcing labor standards in all industries, including maquiladoras. According to Mexican labor officials, STPS targets its occupational safety and health inspections, giving priority to industries with large numbers of workers and those engaged in high-risk activities, such as mines and foundries. STPS has enforcement authority that includes assessment of fines on companies that do not correct violations cited by STPS inspectors. In addition to enforcing labor laws and regulations, STPS has jurisdiction over occupational safety and health training.

A key difference between the two countries' approach to occupational safety and health is that Mexico requires the establishment of a joint labor-management committee in each workplace, composed of production workers and managers. In this report, such a committee is referred to as the "joint commission." In the United States, OSHA issued voluntary guidelines in 1989 that discuss joint labor-management committees as one way of encouraging employee participation in plant safety and health programs.

Joint commissions are responsible for monitoring compliance with Mexican labor standards. They are supposed to perform several functions, including identifying and documenting safety and health concerns, making recommendations for hazard control, and investigating accidents and illnesses. Other commission functions include monitoring waste disposal and general environmental conditions in and around the plant. Joint commission members are required to be certified by STPS and must conduct monthly safety and health inspections, document concerns, and notify plant management of potential problems. If plant management does not address its concerns, the joint commission is to notify STPS. Joint commissions, along with company illness and injury reporting, and inspections, make up key interrelated components of the Mexican approach to overseeing occupational safety and health conditions.

According to Mexican labor officials, STPS uses joint commission minutes, and illness and injury reports, in its strategy for selecting plants to inspect. If plant management disregards the problems identified and documented by the joint commission, then STPS may send in government inspectors or seek punitive action.

The Instituto Mexicano de Securidad Social (IMSS) plays a key role in promoting safety and health and in gathering data on occupational injuries and illnesses. According to IMSS officials, this role derives from its responsibility to assess companies' premiums for workers' compensation insurance and to provide health care through a nationwide system of clinics.

According to IMSS officials, Mexican law requires that companies report to IMSS all occupational injuries and illnesses. IMSS uses the data to assign a risk grade to a company for assessing annual workers' compensation insurance premiums. IMSS officials visit plants to verify injury and illness records, and provide management and workers with information on occupational safety and health hazards. The agency does not have the authority to enforce labor standards; however, according to IMSS officials, if IMSS specialists observe any potential violations of labor standards, they either discuss their observations with plant management or write up a report requiring the plants to conduct further study.

The Secretaria de Desarrollo Social's (SEDESOL) environmental responsibilities cover occupational safety and health in the area of worker exposure to hazardous waste during handling and storage. SEDESOL does not have the authority to enforce occupational safety and health regulations. It issues permits for air emissions, water discharges, and hazardous waste management. According to plant officials, SEDESOL's environmental surveys of the workplace focus on handling and disposal of hazardous waste, air emissions, and the discharge of industrial waste water. According to STPS officials, if SEDESOL officials observe occupational safety and health hazards during an environmental inspection, they may notify STPS.

In June 1993, STPS, IMSS, and SEDESOL signed an agreement to strengthen enforcement of safety, hygiene, and environmental protection in industry. The three agencies agreed on a program to strengthen the capabilities of joint commissions. According to STPS officials, the focus of the program is on improved training for joint commission members.

The Maquiladora Program

Mexico established the maquiladora program in 1965 to create job opportunities along the country's northern border, and to obtain foreign investment by granting trade incentives to international companies for foreign investment and exports. The maquiladora program allows duty-free imports into Mexico of materials and components from foreign suppliers. These processed materials are assembled into finished products that must then be exported from Mexico unless special approval is given to sell them in the Mexican market.

Between 1980 and 1992, the number of maquiladora plants grew from 620 to 2,075. Maquiladora growth accelerated in the mid-1980s due in part to the devaluation of the peso in 1983. This devaluation caused further decline of Mexican labor costs in relation to U.S. labor costs. During the same 12-year period, total employment in the maquiladora sector grew from 120,000 to over 500,000. At the same time, employment in the maquiladora transportation equipment sector, the sector that includes auto parts, grew from fewer than 10,000 people in 1980 to 124,000 by 1992.[3]

Officials from some of the parent companies of the eight auto parts maquiladora plants we visited said that in order to produce quality products, employees must be provided with a safe and healthy work environment. They further stated that their maquiladoras produce world-class quality products made of materials supplied from the United States that are integral to the final assembly of automobiles in the United States. At one plant, company officials said that the products produced at their maquiladora exceeded their corporate quality standards for defects.

The increased internationalization of business and improved transportation and communication systems have led U.S. companies to move or establish manufacturing facilities outside the United States to take advantage of lower production costs and to gain access to foreign markets. According to a report by the Office of Technology Assessment, several reasons explain why U.S. firms move to Mexico rather than to other countries.[4] These reasons include low wage and benefit costs for "unskilled" and "semiskilled" workers; a trainable workforce with an average of about 6-1/2 years of schooling; a lack of strong independent unions in many parts of the country; a proximity to the United States that eases many logistics problems; and a growing Mexican domestic market.

[3]See North American Free Trade Agreement: U.S.-Mexican Trade and Investment Data (GAO/GGD-92-131, Sept. 25, 1992).

[4]U.S.-Mexico Trade: Pulling Together or Pulling Apart?, Office of Technology Assessment (Washington, D.C.: Oct. 1992).

Researchers have also noted Mexico's low tariffs, transportation cost advantages over Asian firms, and the relative political stability and movement toward an unrestricted market economy as further reasons why U.S. firms locate in Mexico.

According to company officials at the maquiladora plants we visited, a primary reason why their firms located in Mexico was for lower labor costs. Some company officials said that operations were opened in Mexico because decreasing labor costs increased the global competitiveness of the corporation. Mexican production workers employed in auto parts maquiladoras earn less than U.S. auto parts production workers. In 1991, the average total compensation cost for Mexican transportation equipment maquiladora workers was $1.61 an hour. For U.S. workers in motor vehicle assembly, parts, and equipment manufacturing, average total compensation costs were $24.21 per hour.[5]

A complete evaluation of the relative labor costs between the United States and Mexico would require additional information, which was not readily available. A comparison of total relative labor costs requires information on the relative productivity of Mexican workers compared with their U.S. counterparts. However, productivity varies according to worker skill levels. For example, Mexican workers in auto parts maquiladoras typically perform a limited range of repetitive assembly and light manufacturing jobs. In contrast, U.S. auto parts plants rely on more technology for skill-intensive heavier manufacturing. Primarily as a result of its capital intensity, such heavier manufacturing tends to have higher labor productivity and correspondingly higher wages.

Although maquiladoras are moving toward semi-automation, the work performed at auto parts maquiladoras generally consists of low-skilled assembly or light manufacturing, requiring repetitive work tasks. According to our consultants, while the potential for exposure to traditional industrial hazards is lower than in heavy industry, safety and health hazards, especially ergonomic hazards, remain. Mitigation of these hazards necessitate hazard-specific safety and health programs and training.

Ergonomics is a multidisciplinary field that studies the long-term physical impact on workers who perform repeated physical activities.[6] Currently,

[5]See U.S.-Mexico Trade: Information on Wages, Fringe Benefits, and Workers' Rights (GAO/NSIAD-91-220, May 10, 1991).

[6]See glossary for an explanation of ergonomic terms.

ergonomic hazards in the workplace are treated differently in the United States than in Mexico. In the United States, while specific standards do not exist, OSHA uses the general duty clause of the Occupational Safety and Health Act of 1970 (29 U.S.C. 654) to require that employers correct ergonomic hazards in the workplace. This clause requires that each employer furnish to each employee a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to the employees. In 1989 and 1990, OSHA, the United Auto Workers (UAW), and auto industry management signed agreements that set the basis for a standard for the industry. In addition, OSHA has drafted general ergonomic guidelines for U.S. industries and specific ergonomic guidelines for meat-packing plants. According to our ergonomic consultant, industrial ergonomic programs and training within the U.S. automobile industry are being developed. The Mexican government has only recently recognized the importance of ergonomic hazards and has begun studying the efforts of other countries to reduce or mitigate ergonomic hazards' impact on workers. According to Mexican labor officials, Mexico does not enforce ergonomics under a general duty clause as is done in the United States.

Objectives, Scope, and Methodology

The Chairman, Senate Committee on Commerce, Science, and Transportation, asked us to review labor practices under the Mexican maquiladora program. Specifically, this report (1) evaluates the safety and health work environment at eight U.S.-owned maquiladora auto parts plants, (2) describes the Mexican regulatory system for safety and health oversight, and (3) discusses U.S.-Mexican cooperative efforts to enhance working conditions.

Information in this report regarding Mexican law and regulatory standards applying to safety and health does not reflect original analysis on our part. It was derived from interviews with Mexican government officials and other secondary sources. We interviewed officials from OSHA, STPS, and IMSS, and reviewed published materials prepared by the U.S. and Mexican labor departments. To gain access to the plants and obtain proprietary information from the companies visited, we worked under a pledge of confidentiality that the identities of the companies visited would not be disclosed, as authorized by the Senate Commerce Committee Chairman. We conducted on-site assessments between September and December 1992 of safety and health conditions inside eight auto parts maquiladoras to supplement limited existing information on Mexican maquiladora working conditions. Since we did not review the safety and

health conditions of auto parts plants located in the United States, we make no direct comparisons between conditions in the United States and Mexico. However, we discussed safety and health conditions in the auto parts industry in the United States with OSHA officials and representatives of the UAW and the auto industry.

We contracted with the University of California, Los Angeles (UCLA), School of Public Health, Center for Occupational and Environmental Health, to obtain technical expertise in occupational safety and health. The criteria used to assess the work environment were based on OSHA standards (29 C.F.R. 1900) and the consultants' professional opinions of good safety and health practices. Mexican standards were not used because we did not have the expertise needed to interpret and apply Mexican laws and regulations. The ergonomics assessment was based on relevant academic literature and the professional expertise of our ergonomic consultant from Mexico's National Institute for Public Health. Our consultants participated in all plant visits. The names and professional qualifications of the consultants are listed in appendix III.

To select plants for site visits, we first identified the universe of U.S.-owned auto parts maquiladoras, using Mexico's Secretaria de Comercio y Fomento Industrial's (SECOFI) maquiladora registry. SECOFI reviewed our list, identified plants currently operating, and identified additional plants. After establishing the final population of 104, we selected two plants in each of six border locations to include small plants employing fewer than 200 employees as well as larger plants, and plants representing a variety of production processes and potential workplace hazards. A map of the U.S.-Mexico border and the locations we visited is in appendix I.

We were able to visit 6 large plants, ranging in size from 542 to 4,946 employees, and 2 smaller plants each employing fewer than 200 people. These 8 plants employed a total of 12,493 workers, or about 13 percent of the 94,495 workers in the 104 U.S.-owned auto parts maquiladoras.

We were not able to visit all 12 plants due to our inability to schedule plant visits, inaccuracies in a list of auto parts maquiladoras, and/or company lack of interest in participating in the study.

Our access to the U.S.-owned Mexican auto parts industry depended upon the voluntary cooperation of the parent company and maquiladora managers. Site visits had to be planned and scheduled in advance. The

limited number of plants visited and the selection process preclude us from statistically projecting the study results to the entire maquiladora auto parts industry. However, results from the eight cases offer useful insights into occupational safety and health issues for the maquiladora auto parts industry.

To assess the safety and health work environment at each plant, we conducted a 2-day survey focusing on plant safety and health programs and the four hazard areas that our consultants identified as the most important, given the nature of the industry: ergonomic, safety, physical, and chemical.[7] The study was not designed to measure maquiladora compliance with U.S. regulations. However, we make reference to OSHA regulations and our consultants' opinions of generally accepted safety and health practices as criteria to place our consultants' observations in context. We refer to Mexican regulation only in regard to the joint commissions and accident and injury reports, which are key components of the Mexican regulatory system.

We verified the existence of written safety and health policies, procedures, and programs; maquiladora and corporate safety and health audits; reports issued by Mexican regulatory agencies; joint commission reports; and plant injury and illness reports. We reviewed these documents and records as time permitted.

We held discussions with plant management and staff responsible for safety and health at each plant to obtain an understanding of the facility, its work processes, and its safety and health policies and programs, and to assess parent company oversight of the maquiladoras on safety and health issues. Our consultants assessed the adequacy of 3 of the 10 hazard-specific programs at the eight plants for which complete information was collected: hearing conservation, hazard communication, and energy control. The adequacy of the other programs was not assessed because only partial information was collected. Based on discussions with plant management and plant walk-throughs, our consultants limited their review to work processes that presented the greatest potential for serious harm to workers. According to OSHA, "serious" hazards could result in permanent or prolonged damage to the worker's body and/or in death.

[7]Ergonomics involves an assessment of (1) workplace geometry, (2) working postures, and (3) repetitive motions and forceful actions. Safety issues include access and egress, fire, housekeeping, lock-out/tag-out, and tool and machine operation. Physical issues include exposure to noise and heat. Chemical issues include exposures to lead, solvents, or other hazardous materials.

Our consultants determined potential hazards and chemical exposures based on a walk-through of each facility, the facility's work processes, and their professional judgment. Such walk-through surveys are a standard industrial hygiene survey method. Direct-reading instruments were used to estimate the potential for worker exposure to specified chemical and physical hazards. The instruments used included an anemometer to measure air velocities, a sound-level detector to measure noise levels, a photo-ionization and colorimetric detector for volatile organic chemicals, and an aerosol meter for detecting particulate matter. Our ergonomist used a field instrument and an anthropometer to evaluate the ergonomic aspects of workstations. Our consultants collected 23 air samples for analysis of contaminant levels. According to our consultants, the samples were mailed to OSHA for analysis, but OSHA did not receive the samples. The loss of this information did not affect the results of the study, according to our consultants, because chemical hazards were not significant, and the 23 air samples were collected supplementary to 334 direct-reading samples, which provided immediate information on contaminant levels.

We held a limited number of discussions with some production workers at all eight plants to obtain their perspectives on occupational safety and health programs, including training and use of personal protective equipment. Plant management established interview ground rules, including the timing and location, and were present at some of the interviews. Because we visited the facilities during regular business hours, our survey and worker interviews were limited to the day shift. Seven plants operated more than one shift. Worker interviews were generally brief and conducted off the production line.

We discussed U.S.-Mexican cooperative efforts to improve the work environment with officials from the U.S. Department of Labor's International Labor Affairs Bureau, its Bureau of Labor Statistics, and OSHA. We also met with officials at the U.S. embassy in Mexico City, as well as Mexican officials at STPS and IMSS. In addition, we reviewed the 1991 Memorandum of Understanding between the U.S. and Mexican secretaries of labor and its 1992 Action Plan, which identifies various labor cooperative activities. We did not review the NAFTA Supplemental Agreements signed in September 1993.

We did our work between August 1992 and July 1993 in accordance with generally accepted government auditing standards.

We provided summarized information to and discussed the issues in this report with officials from the U.S. Department of Labor's International Labor Affairs Bureau, its Bureau of Labor Statistics, and OSHA. These officials generally agreed with the facts presented, and their comments have been incorporated where appropriate. We also met with officials at the U.S. embassy in Mexico City, as well as Mexican officials from STPS and IMSS. They generally agreed with the content of the draft report as well.

We also provided summarized information to the parent companies of the eight maquiladoras we visited. The comments we received were generally critical of our approach. For example, they expressed concern that the study unduly focused on ergonomic factors for which there are no governmental standards in either country. They also expressed concern that the presentation of data focused on individual plants. Our report recognizes that although ergonomic standards are still being developed, OSHA is currently requiring companies to address ergonomic issues under the general duty clause of the Occupational Safety and Health Act. We modified the presentation of data on safety and health programs and hazards to emphasize summary findings and better ensure the confidentiality of the plants visited. Additional information they provided on safety and health programs was incorporated where appropriate.

The Work Environment at Eight Maquiladora Auto Parts Plants

The work environment at the eight maquiladora auto parts plants we visited was generally orderly and well maintained. Company officials at the plants articulated a policy emphasizing the importance of worker safety and health. According to our consultants, seven of the eight plants had designated personnel with safety and health responsibility and had implemented certain safety and health programs. However, generally the plants lacked hazard-specific programs and training necessary to mitigate some of the hazards observed. While ergonomic hazards were the most significant hazards observed at the eight plants, none of the plants had implemented ergonomics programs and training. However, one plant was beginning to develop a program locally, and another had received corporate ergonomic program information translated into Spanish.

Our consultants observed safety and health hazards of the type inherent to light manufacturing and assembly operations at all eight of the plants we visited. The consultants observed hazards in all four areas: ergonomic, safety, physical, and chemical. According to our consultants, these hazards varied in degree and could constitute violations under OSHA's "serious" or "other than serious" categories.[1] None of the hazards observed presented an imminent danger to the workers' lives or health. According to the consultants, local management alone, or in conjunction with the parent companies, could address these hazards by more systematic evaluation of current safety and health programs and further implementation of hazard-specific programs and training. According to OSHA officials, the types of hazards observed at the eight auto parts plants are also present in the auto parts industry in the United States.

At the eight plants we visited, our consultants found that the parent companies could enhance the work environment by more actively monitoring their maquiladora plants to ensure that corporate safety and health policies were being fully implemented. According to our consultants, the safety and health work environment could be improved at subsidiary plants if the parent companies work actively with their subsidiaries.

Mexican officials recognized that the Mexican regulatory system for safety and health oversight could be enhanced to improve the work environment. Occupational injury and illness rates between the United States and

[1]OSHA issues citations and penalties for violations that are designated "serious" where there is substantial probability that death or serious physical harm could result and that the employer knew, or should have known, of the hazard. It designated "other than serious" violations as those that have a direct relationship to job safety and health but probably would not cause death or serious physical harm.

Mexico are not comparable because the two countries have different criteria and requirements for reporting. In addition, officials from both countries acknowledged that underreporting is a problem in their countries.

Hazard-Specific Safety and Health Programs and Training Generally Not Complete

Seven of the eight plants we visited had designated personnel with safety and health responsibility and had implemented or partially implemented several hazard-specific safety and health programs. According to our consultants, the plants lacked some hazard-specific programs or had programs missing key components. Hazard-specific programs are required by OSHA or good practice to mitigate specific hazards, given the production processes observed at each plant. Training, a necessary component of all safety and health programs, was provided generally as part of employee orientation. However, most of the companies lacked 7 of the 10 hazard-specific training programs the consultants deemed necessary.

Seven of the eight plants had staff directly responsible for safety and health. Seven of the eight plants had physicians, either full-time or part-time, and nurses who conducted routine employee medical exams and treated nonserious illnesses and injuries. In addition, all of the plants had joint commissions made up of production workers and managers who are responsible for safety and health functions.

Given the work processes at each of the plants, our consultants determined that generally eight hazard-specific programs should be in place at most plants in order to mitigate the four hazard areas: (1) ergonomics; (2) fire protection; (3) personal protective equipment; (4) hearing conservation; (5) respiratory protection; (6) hazard communication; (7) energy control, or lock-out/tag-out programs for out-of-service machinery; and (8) hazardous material handling. Lead exposure and confined space programs should be in place on a more limited basis. We could not categorize these programs by the four hazard areas because many of the programs overlap more than one area.

According to our consultants, based on either OSHA standards or good practice, each hazard-specific program should have a written program and a training component. Other necessary components vary for each hazard-specific program. For example, the hazard communication standard requires that employers (1) develop a written hazard communication program, (2) maintain a file of material safety data sheets

(MSDS) for the chemicals they use in their operations, and (3) train workers about the standards and precautions in the safe handling and use of hazardous chemicals. The necessary components of a fire protection program include (1) a written program, (2) appropriate fire extinguishers and equipment, (3) adequate access and exits from the building, (4) fire safety training, and (5) a fire brigade. We looked at whether the various components of these 10 programs existed. We found that while a few programs were complete and had all of the necessary components, many programs were missing key components or did not exist. (See table 2.1.)

Table 2.1: Summary of Hazard-Specific Safety and Health Programs at Eight Maquiladora Plants

Hazard-specific program (Basis of requirement)	Complete[a]	Partial[b]	No program	Not required
1. Ergonomic (29 U.S.C. 654)	0	2	6	0
2. Fire protection[c] (29 C.F.R. 1910.155-165)	6	1	0	0
3. Personal protective equipment[c] (29 C.F.R. 1910.132-137)	1	5	1	0
4. Hearing conservation (29 C.F.R. 1910.95)	0	5	2	1
5. Respiratory protection (29 C.F.R. 1910.134)	0	4	3	1
6. Hazard communication (29 C.F.R. 1910.1200)	1	6	1	0
7. Hazardous energy control (29 C.F.R. 1910.147)	2	4	1	1
8. Hazardous material handling (good practice)	0	5	2	1
9. Lead exposure (29 C.F.R. 1910.1025)	0	2	0	6
10. Confined space entry[d] (good practice)	0	0	2	6

[a]Complete: program included all necessary components.

[b]Partial: program included some of the necessary components.

[c]We did not determine if programs existed at all eight plants.

[d]At the time of our visits, our consultants found this program warranted by good practice. OSHA issued regulations for confined space entry in January 1993.

Source: GAO occupational safety and health consultant analysis.

None of the plants had implemented a complete ergonomics program, the area considered most important by our consultants because of the potential long-term health effects. According to our consultants, ergonomic programs are important in the auto parts maquiladoras due to the predominance of repetitive tasks in the assembly process. According to our consultants, two plants had partial programs because they were still being developed, and six plants had no program. One company showed us manuals that contained corporate ergonomic programs translated into Spanish. Another plant was in the process of developing a program locally. Officials from three plants told us their parent companies had developed ergonomic programs in their facilities located in the United States, but they had not yet been implemented in Mexico.

Among the programs we reviewed, fire protection was most often complete. The program was complete at six of the eight plants, and partially complete at one plant. The remaining plant was not assessed. According to our consultants, an adequate fire protection program includes written plans and procedures and training on maintenance and use of fire extinguishers and other equipment, and evacuation routes. Most of the plants provided training to their workers as part of their fire protection program.

Some of the programs at the plants, such as hazard communication, personal protective equipment, hazardous material handling, and hearing conservation, had some of the necessary components but were not complete. For example, one plant had a partial hearing conservation program that included a written program, sound level surveys, audiometry, and hearing protective devices, but it lacked noise dosimetry and training. The most frequent component missing from the partial programs was a written program as required by OSHA or warranted by good practice.

Our consultants fully assessed the adequacy of 3 of the 10 hazard-specific programs at the 8 plants: hearing conservation, hazard communication, and energy control. This assessment was based on their determination of whether the complete or partial programs included critical components and whether these components met OSHA standards or good practice. They found that generally these three programs could be strengthened to more fully achieve the companies' safety and health objectives.

Our consultants found noise levels in excess of 90 decibels (dBA) at six plants. At an additional plant, noise surveys previously conducted by plant management also indicated noise levels in excess of 85 dBA. In the United

States, noise levels exceeding an 8-hour time-weighted average of 85 dBA establish the need for a hearing conservation program (29 C.F.R. 1910.95(c)). Such a program should include (1) a written program, (2) noise dosimetry to measure noise exposure over time,[2] (3) training, (4) audiometric testing of each employee, and (5) hearing protective devices. At the seven plants that required programs, we found that five had partial programs and two plants had no programs. Our consultants considered all five partial programs inadequate because they did not conduct noise dosimetry and lacked either a written program or training.

Based on OSHA regulations and good practice, the consultants found that one plant had a complete hazard communication program, six plants had partial programs, and one plant had no program. According to the consultants, an adequate hazard communication program includes (1) maintaining an inventory of all chemicals used, (2) requiring proper labeling of chemicals used in the workplace, (3) establishing a written hazard communication program that includes training, and (4) maintaining MSDS documents. Four of the partial programs were inadequate because all or some of the MSDS forms were kept in English not in Spanish, the language spoken by the majority of workers. Another program was considered inadequate because training was limited to handling acidic substances, even though other chemicals were used at the plant. Adequacy of the other partial program and the complete program could not be determined because the inventory of chemicals and training was not assessed.

Hazardous energy control programs were required at seven of the plants, according to our consultants. Energy control programs require that machinery out of service or being repaired be identified with a tag and locked out of operation to assure that workers are not injured accidentally. Based on OSHA criteria and good practice, an adequate energy control program includes (1) a written program/procedure, (2) training, and (3) a lock-out/tag-out mechanism. Two plants had a complete program, four plants had a partial program, and one plant had no program. Our consultants analyzed the complete and partial programs and found one adequate and five inadequate programs. These six plants had written energy control programs. However, the consultants considered five of these written programs inadequate because they were not specific to the plants and their types of machinery.

[2]Noise dosimetry establishes a baseline and measures continuing exposure of workers to noise over time.

According to Mexican and U.S. labor officials, training is a key component of safety and health programs and an important means to address many occupational safety and health hazards. All of the companies provided new employee orientation that included some general safety and health training, such as safe operation of equipment and/or procedures for fire protection and emergency response. Training was not included in some of the hazard specific programs. The three types of hazard-specific training programs found at most of the plants were fire protection, use of personal protective equipment, and hazard communication. (See table 2.2.)

Table 2.2: Profile of Hazard-Specific Safety and Health Training at Eight Maquiladora Plants

Hazard-specific training (Basis of requirement)	Training program	No training program	Training not required	Not determined
1. Ergonomic (29 U.S.C. 654)	0	6	0	2
2. Fire protection (29 C.F.R. 1910.155-165)	7	1	0	0
3. Personal protective equipment (29 C.F.R. 1910.132-137)	7	1	0	0
4. Hearing conservation (29 C.F.R. 1910.95)	2	4	1	1
5. Respiratory protection (29 C.F.R. 1910.134)	3	4	1	0
6. Hazard communication (29 C.F.R. 1910.1200)	7	1	0	0
7. Hazardous energy control (29 C.F.R. 1910.147)	2	3	1	2
8. Hazardous material handling (good practice)	4	3	1	0
9. Lead exposure (29 C.F.R. 1910.1025)	0	2	6	0
10. Confined space entry (good practice)	0	2	6	0

Source: GAO occupational safety and health consultant analysis.

Hazards Observed

Our consultants observed specific hazards at the eight maquiladoras in each of four categories generally associated with assembly and light manufacturing of auto parts: ergonomic, safety, physical, and chemical. According to our consultants, these hazards varied in degree, and would constitute violations under OSHA's "serious" or "other than serious"

categories. None of the hazards observed presented an imminent danger to the workers' lives or health. Identification of some of the hazards was based on our consultants' professional judgment of good safety and health practice and may not be covered by specific U.S. or Mexican regulations. According to our consultants, more systematic hazard evaluation and further implementation of hazard-specific programs and training would enhance the work environment at the eight plants.

Ergonomic Hazards

Neither the United States nor Mexico has published standards for ergonomics. The application of ergonomics seeks to adapt the job and workplace to the worker by designing equipment, tools, and tasks that are within the worker's capabilities and limitations. According to our ergonomic consultant, instituting programs in ergonomics can reduce cumulative trauma disorders and improve productivity.

No final OSHA ergonomic regulations have been published. However, OSHA has addressed cumulative trauma disorders, musculoskeletal injuries, and stress-related injuries under the clause of the Occupational Safety and Health Act that imposes a general duty on employers to ensure a safe work environment. OSHA has provided training seminars to STPS, IMSS, and SEDESOL on various occupational safety and health issues, including ergonomics. In Mexico, recognition of ergonomics hazards is growing. Mexican labor officials told us that they are currently studying ergonomics standards being developed in the United States and Canada and by the International Labor Organization.

At all eight plants, our ergonomic consultant observed ergonomic hazards that could have long-term health effects. Generally, these problems were due to processes and technology in the industry that exposed workers to repetitive motion stress.

Our ergonomic consultant's discussions with 175 workers at a large plant determined that 42 percent reported actual pain in the upper limbs; 37 percent reported pain in the hand and wrist; 30 percent in the lower limbs, including 19 percent that reported pain in the feet and ankles; 25 percent in the neck and shoulders; and 14 percent reported having pain in the lower back. According to our ergonomic consultant, these data are significant because almost 70 percent of the workers interviewed had been working in the facility for less than 6 months.

Safety Hazards

According to our consultants, the most serious safety hazard observed at all eight plants involved workers' exposure to hot, moving, or sharp machine parts because of a lack of protective guarding. OSHA standards requiring machine guarding in the United States are found in 29 C.F.R. 1910.211-222. Missing or inadequate machine guarding can result in hand injuries. Consistent with our observations, the most common injuries recorded by the companies were contusions, lacerations, and injuries to the hands.

In six of the plants we observed either a lack of necessary exits, inadequately marked exits, or doors that were blocked by materials and carts that could inhibit workers from leaving the workplace in the event of a fire or other emergency. The OSHA standard (29 C.F.R. 1910.36) lists the general requirements for the number and locations of emergency exits.

In five of the plants, there were inadequate safety warning signs, and some were in English only. OSHA requires the use of signs to define specific hazards that may lead to accidental injury or to property damage (29 C.F.R. 1910.145), and good practice warrants that the language of most workers be used on the signs. A housekeeping problem found at four plants was the unsafe storage of materials on overhead shelves. At four facilities, the plants either did not have or had not implemented lock-out/tag-out procedures to protect workers from the sudden start-up of machinery during maintenance (29 C.F.R. 1910.147).

Physical Hazards

In six facilities, our consultants used direct reading instruments and found workers exposed to noise in excess of 90 dBA. Noise exposure at this level can result in hearing loss, according to our consultants. U.S. standards require equipment modification to reduce noise levels if noise levels reach 90 dBA for 8 hours (29 C.F.R. 1910.95 (b)). In addition, a hearing conservation program is required by U.S. standards whenever employee noise exposures, over an 8-hour time-weighted average, equals or exceeds a sound level of 85 dBA (29 C.F.R. 1910.95(c)).

In each of the six plants where noise levels were detected in excess of 90 dBA, workers had been given ear plugs for hearing protection. However, many workers at each plant were wearing them improperly or not at all. Although the six plants had done sound level surveys to determine if a hearing program was needed, we did not find evidence that any had identified the severity of the noise problem and analyzed worker exposure over time. According to our consultants, in four of seven plants

audiometric testing was conducted. Without complete analysis of the noise hazards, companies do not have enough information to determine if hearing protection is adequate to protect workers while other actions, such as engineering controls or equipment modification, are accomplished. According to our consultants, the fact that workers were observed not wearing ear plugs correctly indicated the need for better hearing protection programs, enforcement, and training on how to use protective equipment.

According to prior IMSS reports and the minutes of the joint commissions, workers were exposed to excessive heat at two plants. At both plants, ventilation problems were noted in the joint commissions' reports and mentioned in 1991 IMSS reports. According to our consultants, the failure of the facilities to address these problems could place workers at risk for heat stress. Although OSHA does not have a specific standard for excessive heat, our consultants emphasized that good practice warrants that workers not work under conditions that could result in heat stress.

Chemical Hazards

The nature of the production processes at the auto parts maquiladoras we visited required limited or no use of chemicals. However, our consultants observed some workers at seven of the eight plants exposed to hazardous substances including lead, silica dust, solvents, and welding gasses and fumes.

The lead standard in the United States (29 C.F.R. 1910.1025) presents the requirements for occupational exposure to lead. The hygiene requirements under OSHA standards 29 C.F.R. 1910.1025(h) and (i) are for workers exposed to lead above a given airborne concentration. A few workers were observed exposed to lead at three plants. Only one plant was routinely monitoring blood lead levels, and none of the plants monitored for air lead levels. At one plant, our consultants observed a worker using solder that contained lead. The bench, chair, and floor around the solder station were littered with small flakes of solder debris. As a result, the hair, skin, and clothing of the worker could be contaminated with lead, and the lead could then be carried home where it could accumulate and present a hazard to others.

At another plant, our consultants observed a worker using a solvent labeled as "perchloroethylene," a probable carcinogen, to clean metal. According to our consultants, the worker did not wear personal protective

equipment that would be required by OSHA (29 C.F.R. 1910.132); therefore, there was potential for skin contact and inhalation of hazardous vapor.

At one plant, welding was widely used in the production process, and our consultants found that workers were exposed to welding fumes that may have contained high concentrations of contaminants. OSHA regulations governing adequate ventilation in welding areas are found in 29 C.F.R. 1910.252 (c)(2), Most of the welding was carried out in partially enclosed work areas equipped with exhaust hoods to extract the welding fumes. The hoods were located above or behind the heads of the workers, drawing the fumes directly past their faces as they worked. Using an anemometer to measure air velocities, our consultants noted the inefficiency of the exhaust system. In addition, the presence of a visible haze of welding fumes above the area suggested that fumes may have contained components of the stainless steel base; zinc-coated steel base; and the filler wire containing iron, chromium, and nickel, as well as other oxides. Chromium and nickel are classified as carcinogens. Using a direct reading colorimetric tube, our consultants measured the level of ozone gas in the breathing zone of a welder. The level exceeded U.S. permissible exposure limits; ozone is an eye and respiratory irritant.

Generally, according to our consultants, the plants did not have the specific programs to identify and monitor the levels of contaminants to which the workers may be exposed. Several hazard-specific OSHA regulations require that worker exposures be assessed and medical monitoring of workers be conducted to determine the need for a program to protect them from workplace exposure to relevant hazards. For example, the lead standard in 29 C.F.R. 1910.1025(d) requires airborne monitoring to determine if workers are exposed to lead, and 29 C.F.R. 1910.1025(j) requires medical monitoring when workers are exposed to lead above the action levels. Only one of the eight plants working with chemicals had a medical monitoring program in place and conducted periodic blood-lead monitoring of those workers who work regularly with lead. One company gave us information after our site visit indicating that they perform environmental and biological monitoring to identify contaminants in the plant. According to our consultants, facilities that use hazardous materials should monitor the level of exposure, inform workers about potential hazards, and have proper ventilation or require the use of respirators or other personal protective equipment if determined necessary. If the level of worker exposure exceeds permissible levels, routine medical monitoring of workers should be instituted.

U.S. suppliers of chemicals are required to distribute MSDS documents that describe known hazards and precautions to be taken while handling chemicals (29 C.F.R. 1910.1200(g)). Of the six plants where our consultants reviewed MSDS forms, only one had translated all of these forms into Spanish. Four plants had translated some of the forms into Spanish, and one plant maintained the forms in English only. According to our consultants, good practice warrants that these documents be translated into the language spoken by the majority of production workers.

Seven plants had distributed respirators to mitigate airborne chemical exposure. Respirators are required to mitigate airborne hazards when effective engineering controls are not feasible or while they are being instituted (29 C.F.R. 1910.134(a)(2)). However, respirators were not being properly used and maintained at any of these plants, according to our consultants. At one plant, workers who were using lead were wearing respirators with cartridges that did not protect them from exposure to lead. At three plants, workers wore dust masks, which were inappropriate to control their hazardous chemical exposure. Respirators with the correct chemical cartridges would have provided the needed protection, according to our consultants. At three plants, our consultants observed that respirators were not being cleaned after use, and in two instances respirators were shared among employees without being cleaned. One plant was distributing respirators without a written program or the necessary training on equipment maintenance and use.

Three of the seven plants had written respiratory protection programs, but only one of these programs was available in Spanish. Three of the seven had a respiratory training program, while another plant offered some training, but this training was not part of a written program on respiratory protection.

Parent Company Safety and Health Oversight

General guidance and technical support for safety and health were provided to six of the maquiladoras by their parent companies. However, according to GAO consultants, parent company monitoring could be enhanced to ensure implementation of corporate safety and health policies in Mexico. Parent company officials from the plants we visited said that their corporatewide policy was to provide a healthy and safe work environment for all employees. According to our consultants, it is good practice for the parent company to oversee safety and health to ensure that corporate policies are implemented. Our consultants defined "safety

and health" oversight as incorporating these elements: (1) providing guidance in establishing safety and health policies and programs, (2) providing technical support for implementing safety and health policies and programs and new industrial processes, (3) requiring and reviewing annual safety and health audits, and (4) specifying regular visits by corporate safety and health officials. Generally, our consultants found that the parent companies were not routinely monitoring their maquiladora plants to ensure implementation of specific safety and health programs.

According to our consultants, the parent companies of six of the eight plants visited provided some guidance to the maquiladoras with regard to safety and health issues.[3] These six plants' parent companies had corporatewide policies for safety and health and appointed corporate personnel responsible for overseeing corporate policies. Four of the six parent companies provided the maquiladoras with standardized worksite safety and health programs.

According to our consultants, the parent companies of five plants provided technical advice and support for implementing safety and health policies and programs and for equipment modification and new industrial processes. For example, corporate safety and health officials provided training in the use of new personal protective equipment at three of the plants.

Seven parent companies did not require comprehensive annual safety and health audits that would allow for hazard identification and evaluation of existing programs and training. We did not determine if the parent of the eighth plant required annual safety and health audits. Three plants told us they routinely send injury and illness reports and/or safety and health audits to their parent companies. Officials from three of the plants told us that they have on occasion sent task-specific checklists for at least one program or work activity to corporate safety and health officials. At one small plant, the U.S. owner told us that because he was often present at the maquiladora, he did not require audits.

According to our consultants, visits by corporate safety and health officials to subsidiaries are important to ensure full implementation of safety and health programs. Corporate safety and health personnel were present during six of our plant visits. At four of the plants, these officials were industrial hygienists. However, according to these officials, none

[3]Two smaller companies were not assessed because they did not have a written corporate health and safety policy.

make regular annual or semiannual visits to the maquiladoras. The two smaller plants did not have corporate safety and health personnel.

Older Equipment Can Create Safety and Health Hazards

Our consultants observed workers using older machinery at three plants that would have to be modified to meet current OSHA standards if used in the United States. At these three plants, machines did not have proper safety guards. At two of these plants, our consultants observed that this older equipment had not been adapted to reduce noise, which our consultants measured in excess of 120 dBA. In two of these facilities, ergonomic hazards derived from equipment designed for workers who on average are taller than the maquiladora workers.

Mexican Officials Recognize That Safety and Health Oversight Could Be Improved

In Mexico, safety and health oversight includes three interrelated components: joint commissions at each plant, injury and illness reporting, and plant visits by government officials. Mexican labor officials recognize that the Mexican approach for occupational safety and health oversight can be improved. Mexican oversight may be adversely affected due to joint commission reports' overlooking some hazards in the workplace, and employers' underreporting of injuries and illnesses. STPS and IMSS use joint commission reports and injury and illness reports to determine which plants to visit. For Mexico and the United States, the information that is required to be filed is not comparable. Regarding Mexico, Mexican officials from either STPS, IMSS, or SEDESOL visited all eight maquiladora plants in 1991 or 1992.

Joint Commissions Did Not Identify Some Safety and Health Hazards

Plant management at all eight facilities told us that they had established joint commissions responsible for safety and health. Mexican law requires that the joint commissions consist of equal numbers of management and labor representatives. The commissions are responsible for investigating the causes of accidents, proposing measures to avoid their occurrence, and monitoring compliance with these recommendations. Mexico has no specific training requirements for members of the joint commissions. According to OSHA officials, the joint commissions do not contain safety and health professionals and should not be expected to identify the full range of hazards in the workplace.

In seven of the facilities, documentation confirmed that the commissions were meeting, conducting monthly safety and health inspections, and writing up reports of their plant walk-throughs and minutes of their

meetings.[4] Joint commission members from two plants had received some special training.

We reviewed joint commission reports at six plants and found that they overlooked some safety and health hazards that our consultants observed. Discrepancies between the joint commission reports and our consultants' observations led our consultants to conclude that commission members needed more knowledge to identify the full range of the hazards in the workplace. Some specific problems noted by our consultants but overlooked by the joint commission are noted as follows:

- At one facility, a joint commission report near the time of our visit did not include important ergonomic, safety, and chemical hazards, such as improper respirator use.
- At another plant, the joint commission reports focused on minor safety hazards and housekeeping issues and did not address such matters as excessive noise, excessive heat, chemical exposure, and the need for exposure monitoring.
- Another facility's joint commission reports did not include noise and chemical hazards that were inherent to the operations at this plant.

All Eight Maquiladoras Underreported Accidents and Injuries

We found that the eight auto plant maquiladoras did not report all accidents and injuries directly to STPS or IMSS as required. According to information provided by the plants, cases reported were generally those considered serious, those the worker requested be reported, and those cases treated at an IMSS clinic. Seven plants had in-house medical staffs that treated most minor injuries, primarily contusions, lacerations, and hand injuries. These seven plants provided on-site medical treatments for work-and non-work-related injuries and illnesses and recorded them in plant medical logs, but did not report all incidents to the Mexican government.

IMSS uses injury and illness data to assign risk grades to companies in order to assess the annual workers' compensation premium. If these incidents are underreported, IMSS could then make inaccurate risk grade assessments, resulting in a lower annual premium for the company. Since STPS uses IMSS risk grades in deciding which industries to inspect, inaccurate data could negatively affect inspection strategies.

[4]At one small plant, management told us that they kept the commission's reports and other documents at their attorney's office. Most of these documents were not available for review.

Information on U.S. and Mexican Occupational Injuries and Illnesses Is Not Comparable

In both Mexico and the United States, federal governments require employers to keep records of and report workplace injuries and illnesses to the central government. However, the two countries have different criteria for defining a "reportable" injury or illness that inhibit an accurate comparison of injury and illness rates. For example, Mexico includes accidents and injuries that occur while in transit to and from the workplace, whereas the United States does not. However, while Mexico requires employers to report all injuries and illnesses, the United States requires employers to maintain a log of all injuries and illnesses and report to OSHA only those resulting in death or serious injury.[5]

Both countries rely on the compliance of employers to implement reporting requirements. However, because of limited employer reporting, both countries are concerned with the underreporting of occupational injuries and illnesses. Mexican labor officials estimated that 80 percent of the employers are not reporting worker-related injuries to STPS. Mexico relies on data supplied by the IMSS clinics, which are the most complete source of data. In the United States, national rates of injury and illness are not based on actual reports, but are projections based on OSHA data from a sample of employers supplemented by state workers' compensation records. While the two countries have established different criteria governing record-keeping, both the United States and Mexico seek to obtain information on serious injuries and illnesses.

Mexican Officials Visited All Eight Maquiladoras

Officials from STPS and/or IMSS who are responsible for administration and promotion of occupational safety and health visited the eight maquiladoras during 1991 or 1992. According to STPS officials, maquiladoras are treated like all operations in Mexico, and inspectors apply uniform standards and inspection methods. Based on injury and illness statistics reported to IMSS and complaints by joint commissions, STPS devises an inspection strategy to target plant visits to high-risk industries that employ the largest number of workers. When STPS visits a plant, inspectors focus on joint commission reports to review the safety and health issues at the facility.

According to plant managers, STPS visited all eight plants. At four of the eight plants, STPS inspectors reviewed documents; at four plants, inspectors conducted a walk-through of the plant and a document review. Since 1991, STPS has implemented a special inspection program focusing

[5]Reportable injuries are those that result in a fatality or in lost workdays; require transfer to another job, termination of employment, or medical attention (more than first aid); or result in loss of consciousness or restriction of work or motion (29 C.F.R. 1904.12(c)).

on the maquiladoras. An internal STPS report on safety and health conditions in the maquiladoras is being prepared.

According to several plant managers, IMSS reviewed their injury and illness records. In addition, IMSS visited at least two of the eight plants, and at one conducted noise level surveys while joining STPS for a record review at the other. According to IMSS officials, if they perceive a problem, they may conduct independent visits or request that the company conduct a specific study. According to plant officials, IMSS generally requests injury and illness records for review.

According to plant officials, SEDESOL visited all eight plants and were the most frequent Mexican government visitors during 1991 and 1992. Because of environmental hazards in the production process, SEDESOL conducts surveys focusing on the handling and disposal of hazardous materials and on air emissions and water discharges. At one plant, SEDESOL required the plant to perform environmental monitoring for copper and lead emissions from welding stacks and soldering operations. At another plant, officials showed us documentation required by SEDESOL for an emissions permit.

Safety and Health Hazards in the U.S. Auto Parts Industry

According to OSHA officials, recent OSHA inspections of auto parts plants in the United States found that few are in compliance with OSHA standards. OSHA's data show that the types of occupational safety and health hazards we found in the maquiladoras are also present in the United States. An OSHA official told us that injury and illness reporting remains a significant problem in the United States and that their inspections are affected by incomplete data.

On average, during the last 5 years, 80 percent of OSHA auto parts plant inspections resulted in citations for safety and health violations. In fiscal year 1992, OSHA cited a total of 740 violations in this industry. The standards most frequently violated addressed hazard communication, machine guarding, and energy control. Other citations included poor record-keeping and reporting; lack of respiratory protection; overexposure to chemicals, lead, and noise; and problems with personal protective equipment. According to safety and health officials from the UAW, ergonomic hazards are responsible for nearly half of the disabling injuries and illnesses in the auto sector in the United States. According to a representative of the U.S. auto industry, a review of industrial operations anywhere in the world would disclose hazards in the work environment.

United States and Mexico Are Cooperating to Address Safety and Health Issues

The United States and Mexico have undertaken several joint cooperative activities to enhance working conditions in both countries. U.S. and Mexican labor officials recognize that there are opportunities for enhanced cooperation on (1) ergonomic issues; (2) hazard communication issues, including training; (3) occupational safety and health training for joint commission members; and (4) reporting data on occupational injuries and illnesses.

Current Joint Efforts to Improve Safety and Health

In response to concerns of U.S. organized labor and Members of Congress, the United States and Mexico have initiated several joint and cooperative efforts to address safety and health issues. In May 1991, the U.S. and Mexican secretaries of labor signed a Memorandum of Understanding that specified five key areas of cooperation: exchanges of professional and technical delegations, exchanges of information on standards and procedures, sponsorship of joint conferences, promotion of joint research, and sharing of technical assistance and training.

The 1992 Action Plan pursuant to the Memorandum of Understanding outlined continuing cooperative efforts through 1995. According to the plan, efforts involve activities to improve safety and health in the work environment. According to OSHA officials, these efforts will have a considerable training component to upgrade enforcement of standards. These activities will be overseen by a U.S.-Mexico Consultative Commission on Labor Matters.

According to the U.S. Department of Labor, the consultative commission is to provide a permanent forum for the promotion of the rights and interests of workers in both countries. The commission is to sponsor seminars and technical meetings. Other planned activities include the development of programs to (1) improve occupational safety and health in small and medium-sized firms, (2) control workplace hazards, and (3) improve inspection techniques for and statistics on occupational safety and health.

The two labor departments have also agreed to work together to upgrade their industrial hygiene programs. According to labor officials, this goal will be reached by (1) developing common approaches to hazard communication standards through requiring chemical manufacturers and importers to evaluate MSDS labeling practices and (2) requiring employers to establish an effective written program to communicate hazard information to workers. In addition, the two labor departments agreed to work jointly on sharing scientific data on permissible exposure limits,

sampling and laboratory analysis of airborne contaminants, analyzing the effects of noise and other physical agents on workers, and defining ergonomic issues. According to OSHA officials, objectives of the agreements were reaffirmed and incorporated into the September 1993 North American Free Trade Agreement's Supplemental Agreement on Labor Cooperation.

Areas for Further Cooperation

Based on discussions with U.S. and Mexican labor officials and our visits to eight maquiladora auto parts plants, we identified four areas that warrant further U.S. and Mexican cooperation on occupational safety and health issues.

Ergonomic Regulatory Program

According to our consultants, an emphasis on ergonomic standards development, hazard evaluation, and training is important in industries where highly repetitive, labor-intensive jobs predominate. Our visits to eight maquiladoras, and our discussions with top Mexican labor officials, confirmed that Mexico has only recently begun recognizing the significance of ergonomic issues.

U.S. and Mexican labor officials have recently discussed ergonomic issues and held five joint ergonomic training seminars in 1992 and 1993. Officials from OSHA and STPS agreed that further cooperation on ergonomic issues would enhance working conditions in Mexico.

According to our ergonomic consultant, the effect of neglecting ergonomic concerns could lead to serious long-term health problems, lower productivity, and increased health care costs for the Mexican social security system. According to safety and health officials from two leading U.S. automobile manufacturers, many U.S. companies are developing ergonomics programs for their facilities in the United States. According to our consultant, a cooperative effort by the U.S. and Mexican labor departments might encourage earlier implementation of training and workstation design changes in maquiladora plants. These changes might address ergonomic issues and ensure that safety and health problems do not increase along with the growth of employment in assembly work.

Hazard Communication

MSDS forms constitute the basic document describing the hazardous characteristics of individual chemicals. According to our consultants, in order to facilitate better hazard communication programs, chemical

inventories and MSDS forms should be available in both Spanish and English. In addition, workers should be trained to understand the hazards associated with the specific materials used in performing their work.

Joint Commissions

The joint commissions provide a potentially effective means to monitor occupational safety and health and ensure regular workplace inspections. In order for this approach to function so that hazards in the work environment are recognized and addressed, the members must be able to recognize occupational hazards and be familiar with appropriate safety and health programs to mitigate problems. As discussed earlier, we found that many joint committees had shortcomings. Opportunities exist for the U.S. and Mexican labor departments to cooperate to establish training specifically for production workers and managers with safety and health responsibilities.

Occupational Injury and Illness Data

According to U.S. and Mexican labor officials, more complete and comparable data on occupational injuries and illnesses are needed to direct scarce inspection resources and to facilitate a better understanding of working conditions. According to labor officials from both countries, this effort would necessitate uniform reporting criteria and data collection forms.

Map of Mexico: Location of Maquiladora Plants

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Glossary

Anemometer and Air Velometer	Both terms refer to devices used to measure air velocity. A thermal anemometer was used to obtain information for this report.
Anthropometer	An anthropometer is an instrument used in ergonomic studies to collect body measurements.
Aerosol	Aerosols are liquid droplets or solid particles dispensed in a gas such as air.
Aerosol Meter	An aerosol photometer is used for direct-reading aerosol sampling. An electrical pulse is generated by a photocell, which detects the light scattered by the particulate. The number of electronic pulses is related to the number of particles in the aerosol.
Chemical Hazards	Chemical hazards include the handling and exposure to chemicals, solvents, or other hazardous materials.
Colorimetric Methods	Colorimetric methods involve employing a direct-reading device that uses the chemical properties of a contaminant to cause a reaction with a color-producing agent. Indicator tubes were used to obtain information for this report.
Confined Space	Confined space exists where access and egress to the work area are severely limited, requiring special emergency evacuation procedures.
Decibel	A decibel (dBA) is a measurement of sound level.
Direct-Reading Instruments	Direct reading instruments are used to obtain an immediate indication of the concentration of aerosols, gases, or vapors or the magnitude of a physical hazard.
Energy Control Programs	Energy control programs, also known as the de-energization of faulty equipment or lock-out/tag-out programs, plan for the disconnection and tagging of "out-of-service" equipment to prevent accidental injuries to workers.

Ergonomics	Ergonomics involves an assessment of (1) workplace geometry, (2) working postures, and (3) repetitive motions and forceful actions that may result in a variety of long-term chronic conditions such as repetitive trauma disorders, musculoskeletal injuries, and other stress-related injuries.
Hazard-Specific Programs	Hazard-specific programs and training involve projects designed to mitigate individual ergonomic, safety, physical, and chemical hazards present in the workplace.
Machine Safety Guards/Exposed Machine Parts	Protective machine safety guards are installed to prevent worker exposure to hot, moving, or sharp parts that often result in hand injuries. If guards are removed, missing, or otherwise inadequate, management is responsible for ensuring proper replacement.
Noise Dosimetry	Noise dosimetry establishes a baseline and measures continuing exposure of workers to noise over time.
Personal Protective Equipment	Personal protective equipment is specific devices adapted to the worker's size and exposure to a hazard such as hearing protection, respirators, gloves, aprons, dust masks, and safety glasses.
Photo-Ionization Detector or Meter	A photo-ionization detector or meter is a direct-reading instrument used to measure airborne solvent concentrations.
Physical Hazards	Physical hazards include worker exposure to excessive noise and heat.
Repetitive Motion and Forceful Actions	Repetitive motion studies involve a review of the repetitiveness and forcefulness of tasks performed by the hands, wrists, forearms, arms, legs, and feet at a given workstation.
Safety	Safety hazards include access and egress issues; fire protection and emergency response; housekeeping; energy control programs—the de-energization of faulty equipment (lock-out/tag-out procedures); and proper tool and machine operation.

Sound Level Meter	A sound level meter is an instrument used to measure sound pressure levels in decibels.
Sound Pressure Level	The sound pressure level is the sound level, in decibels.
Workplace Geometry	Workstation geometry includes a review of the location of display controls; the position of material racks and hand tools; and the physical dimensions of machines, benches, chairs, and shelves in relation to the worker.

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