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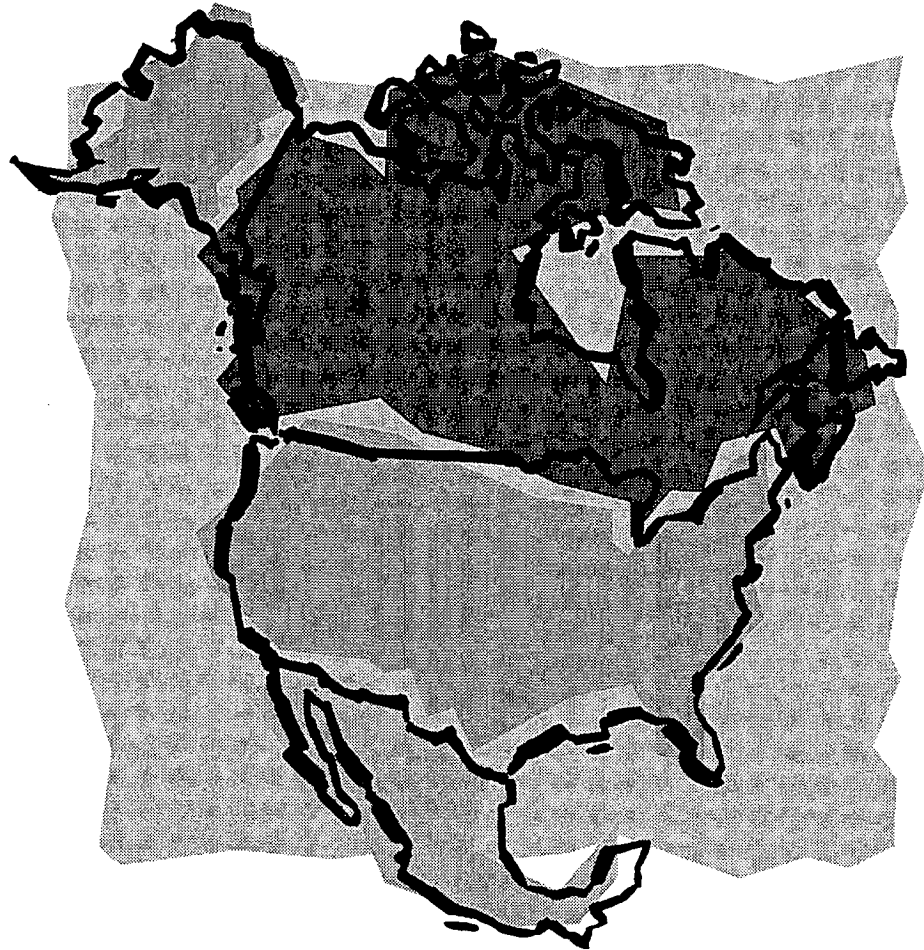
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INDUSTRIAL
WASTEWATER
MANAGEMENT



MEXICO MARKET PROFILE



INDUSTRIAL WASTEWATER MANAGEMENT

WORKING DOCUMENT
MARCH 1994

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EXECUTIVE SUMMARY

The environment has become a hot topic in Mexico. Air, water, and solid waste pollution is reaching critical levels. Many of the current environmental problems are attributable to the rapid urbanization of the Mexican population and an emphasis on economic development at all costs. Additionally, enforcement of environmental regulations has been patchwork to date.

These environmental problems are visible in day-to-day life: toxic industrial waste is deposited in municipal dumps; in an effort to reduce air emissions Mexico City car owners only drive their vehicles six days of the week; and water is increasingly polluted due to untreated industrial and municipal wastewater.

The 1991 closing of Pemex's Azcapotzalco refinery — one of the company's largest — signalled the government's intent to get tough on environmental degradation. Since that date, the federal government has undertaken a variety of environmental initiatives. This report focuses on developments in the field of industrial wastewater management.

Specific opportunities for Canadian companies in the wastewater management field are identified. Potential buyers represented in this report are concentrated in five industries: mining, pulp & paper, food & beverage, chemical & petrochemical, and autoparts.

In industrial wastewater, government action has focused on the development and implementation of water discharge norms. 33 norms, covering a wide variety of industries, have been established to date. An additional 12 norms are expected to be implemented in 1994. Each norm provides parameters within which water discharges from a specific industry or municipality must comply. In general, these norms are similar to Canadian wastewater regulations. The penalty for wastewater discharges exceeding specified parameters may be as stiff as plant closure.

Enforcement is based upon a zoning system which classifies towns, cities, and states by waste-

water treatment priority. For example, a factory located in zone one is likely to feel greater pressure from environmental protection authorities to treat water than a similar plant in zone four. In spite of this zoning system, the enforcement of discharge norms has been scattered. Only 28%¹ of companies pay water discharge taxes on excess pollution levels. Alarmingly, 69% of firms admitted that they don't currently comply with wastewater norms. Nevertheless, the majority of firms interviewed for this study expect wastewater enforcement to become more stringent in the near future.

There is a significant lack of resources for treatment of both industrial and municipal wastewater. Capacity exists for the treatment of only 25% of industrial effluent. As a result, almost 50% of Mexican BOD effluent remain untreated. To solve this problem, environmental authorities are pushing the private sector to invest in additional treatment plants.

72% of companies have expressed an interest in purchasing wastewater goods and services. Most companies are looking to buy advanced technology, as opposed to equipment components or services. Interestingly, recycling systems were also considered a probable future purchase by 39% of respondents. Whereas wastewater is purchased for legal benefit, most companies consider recycling equipment a money saving purchase. Given the high cost of water, recycling is expected to significantly reduce input costs.

Most Mexican companies consider foreign wastewater technology superior to domestic technology. This perception provides foreign vendors with an

Interesting Notes:

Industrial wastewater control is based upon effective enforcement. In turn, enforcement requires accurate and rapid chemical analysis. While there are over 5500 laboratories in Mexico, only 71 are licensed by SEDESOL to serve the entire industrial wastewater analysis market. Companies often wait significant time periods for wastewater discharge analysis. Opportunities may exist for Canadian companies in this field.

Through the course of this study, opportunities in municipal wastewater management also became apparent. Sources estimate that as much as \$US 3.0 billion will be spent on the construction of wastewater treatment plants on the U.S./ Mexico border alone. Canadian wastewater management firms may also wish to investigate this opportunity.

1. Wastewater statistics listed in this report refer to the results of a survey conducted with a sample base of 125 companies. For further information, please see the section entitled "Methodology".

advantage, given that most companies indicated that quality was the most important factor in the purchase decision.

Additionally, potential buyers emphasized that they are looking for a "total solution" to wastewater problems. Many companies don't have the knowledge to solve their own problems, and are looking to "buy their way out." In effect, the buyer is not purchasing equipment, technology, or services, but instead a guaranteed solution. This implies that equipment and technology vendors must take responsibility for equipment that doesn't perform to specifications.

Although Mexican companies perceive foreign technology as superior, they are wary of buying goods and services from companies without a presence in the local market. It is critical that Canadian companies make a firm commitment, both to business activity in the Mexican market, as well as to the Mexican client. Potential strategies include local representatives, partnerships with Mexican wastewater equipment vendors, or joint-venture agreements with local construction and engineering companies.

Survey results differed by sector. For example:

- Autoparts companies are more likely to require stand alone or portable wastewater equipment. Water usage is generally low, and wastewater problems tend to be less complicated;
- In general, chemical and petrochemical firms showed the greatest interest in wastewater management. 41 of the 125 firms that participated in the research process are classified in the chemical sector;
- Pulp and paper companies are under extreme pressure to solve wastewater problems. Given government pressure and a small target market, Canadian companies looking to focus on these firms will find that speed is critical;
- Food and beverage companies will come under increased pressure to find solutions to high BOD and suspended solid levels. New municipal norms expected in 1994 provide significantly more stringent control of these factors; and

Interesting Notes:

The leather industry presents an interesting opportunity for Canadian wastewater firms. While the industry was not included in this analysis, several companies were interviewed after expressing a strong interest in treatment equipment (see "Other Industries" section of report). Canadian companies may wish to examine this market in further detail.

In many cases, toxic substances are removed from wastewater and then stored in mud form for later disposal. However, in Mexico, removal of such muds may be expensive and time-consuming. Only one toxic waste disposal site currently exists to serve the entire country. Many Mexican companies are storing toxic materials until alternative solutions are found. Canadian waste management companies may be interested in exploring opportunities in this area.

- The mining sector provides fewer opportunities for Canadian wastewater companies. New discharge regulations focus on the design of engineered drainage ditches, as opposed to water treatment equipment.

One final point is critical: Mexican companies have no knowledge of Canadian capabilities in this field. Canadian companies wishing to take advantage of Mexican demand for wastewater goods and services will need to undertake significant promotion strategies.

Mexican companies have shown a strong interest in wastewater goods and services. Market potential is significant. Nevertheless, Canadian companies interested in pursuing opportunities will need to carefully tailor their services to market factors: quality wastewater solutions offered with a local market presence.

METHODOLOGY

Research for this report was conducted primarily in the cities of Mexico City, Monterrey, Guadalajara, León, and Toluca.

The report can be divided into two components:

- 1) overview information on industrial wastewater in Mexico, and
- 2) specific information about the wastewater management plans of Mexican companies in the chemical/petrochemical, mining, food & beverage, pulp & paper, and autoparts industries.

The methodology for each sector was as follows:

Overview Information

Interviews were conducted with a variety of organizations active in the wastewater field, including:

Comisión Nacional del Agua, Instituto Nacional de Ecología, CANACINTRA, NAFINSA, Tecman SA de CV, Atlatec (a division of Grupo Cydsa), Asociación Nacional de Fabricantes de Equipos y Servicios Para Agua, Asociación Canadá-México de Guadalajara, Asociación Nacional de la Industria Química, Camará Nacional de la Industria Minera, Camará Nacional de la Celulosa y del Papel, the Canadian Embassy, the Canadian consulate in Monterrey, the Environmental Committee of the Mexico City Chamber of Commerce, and AMPIP (the Mexican Association of Industrial Parks).

Secondary information was also used extensively. Sources included:

1. March Consulting Group, "Environmental Opportunities on the U.S./Mexico Border," (Mexico City, The British Embassy, May 1993)
2. SEDESOL, "Normas Oficiales Mexicanas en Materia de Protección Ambiental," (Mexico City, Diario Oficial de la Federación, 1993)
3. SEDESOL, "México: Informe de la Situación General en Materia de Equilibrio Ecológico y Protección al Ambiente," (Mexico City, SEDESOL, 1993)
4. *El Financiero*, various articles, (Mexico City, El Financiero SA de CV, 1993)
5. Comisión Nacional del Agua, "*Ley Federal de Derechos en Materia de Agua*," (Mexico City, CNA, February 1993)

6. External Affairs (EAITC), "*The NAFTA Manual*," (Ottawa, EAITC, March 1993)
7. Probe Consulting, "*Market Study of Mexican Environmental Opportunities*," (Ottawa, EAITC, August 1993)
8. Environmental Resources Limited, "*Identifying Market Opportunities in Environmental Goods and Services: Mexico*," (Washington D.C., International Finance Corporation, March 1991)
9. NAFINSA, "*Programas de Apoyo Crediticio: Mejoramiento del Medioambiente*," (Mexico City, NAFINSA, June 82)
10. Estado de Baja California, "*Reglamento de la Ley del Equilibrio Ecológico y Protección al Ambiente del Estado de Baja California*," (Ensenada B.C., Empresas Bahía, November 1992)

Sources of industry specific information are recognized in the appropriate chapter.

Company Specific Information

Over 700 Mexican companies in the industries mentioned above were faxed questionnaires. The questionnaire covered a variety of issues, including: general company information, future purchasing plans for wastewater equipment and services, product preferences, purchase time frames, experiences with environmental enforcement, perceptions of equipment suppliers, and water cost and usage data.

To the extent possible, follow-up interviews were arranged, in order to discuss in greater detail future wastewater projects.

Companies selected to participate in the research process complied with a variety of criterion, including: geographical location, size, industrial sector, and publicly held companies (where possible).

INTRODUCTION

In general, three forces are driving the demand for wastewater goods and services in Mexico: extremely high levels of water pollution, particularly in the 20 most polluted river basins; a general shortfall of water resources; and North American Free Trade and related pressures from the Canadian and U.S. governments to adopt stricter environmental standards.

Pollution problems — water, air, and solids — have reached unacceptable levels in Mexico. For example, many of the largest Mexican rivers will require as much as forty years of zero discharge levels in order to regain their environmental health. After decades of focusing on economic growth, the Mexican government has finally realized that environmental problems have a significant impact on the quality of life. In an attempt to avoid further degradation, several environmental initiatives have been undertaken. Industrial wastewater treatment is one focus area.

Mexico has traditionally suffered from regional water shortages. 80% of water resources are located in unpopulated areas; conversely, only 20% of water is easily accessible to large urban centres. Shortages have made water an important — and expensive — national resource (see Appendix 1). New government policies discouraging further pollution reflect this reality.

Finally, the negotiation of NAFTA has made Mexico increasingly susceptible to pressure from Canada and the U.S. to clean up its environment. In order to show improvement in this area, the Mexican government has been anxious to crack-down on environmental offenders.

As a result of these three factors, interest in wastewater management in Mexico has grown rapidly. However, serious shortfalls in treatment capacity exist.

TREATMENT CAPACITY

Mexican discharges of wastewater averaged 184m³/second in 1992. 42% of the total was attributable to industry. However, nearly 2/3 of the 2.4 million tons of biochemical oxygen demand (BOD) in wastewater was of industrial origin. In general, there is a significant lack of capacity for the effective

Most Polluted Rivers

Many Mexican rivers suffer from extreme pollution. Environmental authorities identify the following as the twenty most polluted rivers in Mexico:

Pánuco, Guayalejo, Lerma - Santiago, Balsas, Culiacán, Armería, Salado, Colorado, Jamapa, Sonora, San Juan, Bravo, Nazas, Coahuayana, Blanco, Tijuana, Conchos, Fuerte, Antigua, and Yanqui.

treatment of wastewater. In the industrial field, 282 treatment plants manage to neutralize the toxic content of only 20m³/second of water. In effect, less than 30% of industrial wastewater can be treated.

Many companies discharge directly to municipal drainage systems. However, municipal plants lack capacity - as well as the resources and know-how - to treat this industrial waste. Only 23% of municipal waters are effectively treated. Of the 289 municipal plants in current operation, 53% are stabilization ponds, 23% use activated sludge techniques, 2% are aerated ponds, 3% are oxidation ditches, 4% use trickling filters, and 15% use "other" techniques. Only 2/3 of existing plants are in operation. Additionally, between 20% and 50% of operating plants treat water ineffectively.

This lack of treatment capacity, coupled with increasingly strict legislation, is forcing industrial users to assume greater responsibility for wastewater treatment. Even companies that currently own primary treatment facilities are considering

Summary Chart: Mexican Wastewater

	Industry	Municipal
Total Wastewater in 1992	79 m ³ /s	105 m ³ /s
Treatment Capacity in 1992	20 m ³ /s	45 m ³ /s
Estimated Wastewater Year 2000	89 m ³ /s	207 m ³ /s
1992 BOD Content	64% of total	36% of total

secondary treatment, as existing municipal plants cannot cope with demand.

Several industries are particularly heavy discharge offenders. The sugar industry discharges 38.8% of all industrial effluent; the chemical industry 21%; the pulp & paper industry 6%; the petroleum industry 8.2%; the beverage industry 2.4%; the textile industry 2.7%; and the steel industry 1.7%.

LEGISLATIVE BODIES

Concern for water pollution in Mexico has led to renewed efforts to establish effective regulatory bodies. Before 1992, water discharge standards did exist; however, they were rarely enforced. To combat this problem, Mexico has restructured responsibility for industrial water pollution. Three levels of government now play a role in wastewater management: federal (SEDESOL, the Secretariat of Social Development, and SARH, the Secretariat of Agriculture and Water Resources), state, and municipal. Mexican companies can be subject to regulations from any or all three authorities. In general, jurisdiction is determined by which government authority retains control over the body of water to which effluent is discharged.

In theory, each government organization has specific enforcement responsibilities. In practice, an offending company can be inspected by any or all government authorities. This situation is expected to continue until management systems are put in place and backlogs eliminated.

SEDESOL

SEDESOL (Secretariat of Social Development) was formed in 1992 by the consolidation of the Secretariat of Urban Development and Ecology (SEDUE) and the National Solidarity Program (PNS). There are two departments within SEDESOL that impact industrial wastewater treatment: The National Institute for Ecology (INE) and The Federal Attorney General for the Protection of the Environment (PROFEPA).

In general, INE is responsible for the development of national environmental standards (NOMS) and regulations. All NOMS developed by INE are classified as federal, and represent the minimum allowed standard in Mexico. The organization also administers environmental impact assessments for industrial operations.

SEDESOL:

Federal government ministry responsible for the creation of all environmental standards and norms; also charged with the development of environmental impact assessments and enforcement of environmental regulations; has the authority to close plants not complying with wastewater norms.

SARH:

Federal government ministry that administers agricultural and water resources; while SEDESOL can enforce water pollution standards, it is SARH that has the direct responsibility to do so; taxes for non-compliance with wastewater regulations are paid to SARH.

STATE/MUNICIPAL:

Have jurisdiction over discharges to state or municipal drainage systems; standards must be as strict or stricter than federal authorities; responsible to SARH for their own discharge to national water bodies.

In October of 1993, INE published revised standards for industrial and municipal water effluent. These standards are significantly stricter than previous legislation, and will have a positive impact on the demand for wastewater equipment. 30 standards are classified by industry, and provide parameters with which all companies operating within that sector must comply. Another norm regulates conditions for discharges to municipally operated drainage networks. Finally, two norms control the quality of water that can be used for irrigation purposes (see Appendix 2 for full list of existing norms). Twelve additional standards (see Appendix 3) are expected to be implemented in 1994. The environmental standards developed by INE are on par with those of Canada and the United States. In many cases they have been developed by international consultants or modelled on standards developed by the Environmental Protection Agency in the U.S.

As previously mentioned, all norms published by INE represent the minimum legal standards for water discharge. Stricter regulations may be imposed on a per company basis. INE maintains the right to impose specific discharge conditions (*Condiciones Particulares de Descarga*). These conditions are negotiated with individual companies

according to special effluent content or critical location of discharge. For example, many companies with highly toxic discharges operating in polluted areas have negotiated special arrangements with SEDESOL.

PFPA is the department of SEDESOL that is responsible for the enforcement of all ecological norms. While the department does not hold direct jurisdiction over water resources, it does have overriding power in environmental issues. PFPA can visit and demand an environmental impact assessment from any Mexican company. Such an assessment includes air emission, solid waste, water discharge, and health and safety issue analysis. If a company does not comply with federal standards, several options exist: permanent plant closure, temporary plant closure, and fines.

SARH

SARH is the federal department that is responsible for the administration of agricultural and water resources. The department maintains authority over the use and exploitation of water. Two departments within SARH impact industrial wastewater: The National Water Commission (CNA) and The Mexican Institute for Water Technology (IMTA).

CNA is responsible for the regulation of all national water resources (rivers, canals, lakes and oceans). As such, the organization monitors industries and municipalities that retrieve or discharge water to or from national water bodies. Consequently, the commission has enforcement responsibilities for any industry that discharges water to public bodies. In contrast, municipalities have the authority to enforce discharges to municipal water networks and drainage systems.

Companies that obtain water from sources designated as national water also fall under the jurisdiction of the CNA. Fees for water retrieval from these sources must be paid.

In order to regulate water resources, the CNA has developed two important laws: The *Ley de Aguas Nacional* (The National Law of Water), and The *Ley Federal de Derechos en Materia de Agua* (The Federal Law of Rights in Terms of Water). The National Law of Water has few specific implications in terms of wastewater. In contrast, the Federal Law of Rights in Terms of Water sets the prices companies must pay for effluent discharge to federal water bodies.

Under the law, each municipality in Mexico has been classified in one of four zones according to water availability, pollution levels, and water consumption. In some cases an entire state has been designated as one particular zone. For example, the states of Aguascalientes, Baja California, Nuevo Leon, Baja California Sur, Coahuila, Mexico D.F., and Guanajuato are classified as zone one. Water and water-discharge costs vary by zone, with zones 1 and 4 the most and the least expensive, respectively. Costs may fluctuate by as much as 440%.

A series of calculations are used to determine the cost of water discharges to national bodies. Total charges are based upon the toxicity of the discharge (as measured by the chemical oxygen demand and total suspended solids) and the total volume of discharged wastewater. Again, calculations are based upon the geographical zone of operation. Please consult the table on the following page for further details.

In general, the cost of water discharge in zone 1 is approximately 4 times as expensive as it is in zone 2. Companies operating in the metropolitan area of Mexico City, the cities of Puebla, Veracruz, or Guadalajara, or the states listed above, have a much greater economic incentive to purchase wastewater equipment.

For the purpose of this law, any company discharging from land directly into the ocean is considered to operate in zone 1. However, any facility discharging from a marine platform is considered to be in zone 4.

Companies located in zone 1 are required to pay a minimum of NP1.30 for each cubic metre of water they consume. In reality, the cost of water can range significantly higher, as it is generally calculated as 75% of the cost of potable water in the nearest municipality. In turn, companies located in zone 2, 3, or 4 pay a minimum of NP 0.90, NP 0.32, and NP 0.24 per cubic metre respectively.

Several incentives can be found within the context of the law designed to encourage pollution control. For example: water users returning water to the original place of extraction, without any alteration in pollution levels or water temperature, are freed from paying for the used water; the cost of wastewater control and treatment equipment can be offset against the costs of water discharges; and

• Wastewater Overview •

wastewater equipment can be depreciated by 50% in one year.

Discharge Costs by Region (NP)

	Basic Charges	Supplementary charges, as determined by pollution levels	
	Volume of Water (per m ³)	Chemical Demand for Oxygen (per kg)	Total Suspended Solids (per kg)
Zone 1	.5083	.3304	.5846
Zone 2	.1270	.0825	.1461
Zone 3	.0508	.0330	.0584
Zone 4	.0253	.0165	.0292

State & Municipal Governments

The second important organization within SARH is The Mexican Institute for Water Technology. This organization provides technical support to companies and public institutions for technology in the treatment of water. To date, public awareness of the Institute is minimal; only five companies interviewed identified the centre as a potential source of assistance.

While CNA has jurisdiction over national water bodies, state and municipal governments hold responsibility for municipal water and drainage systems. There is no clearly defined distinction between state and municipal responsibilities. In general, cities large enough to administer water treatment programs are permitted to do so. Those that lack resources rely on the state government for support. Some states are more inclined to take responsibility than others; for example, the state of Nuevo Leon works closely with municipalities to regulate industrial wastewater discharge.

In order to encourage local governments to take such responsibility, the CNA monitors state and municipal wastewater discharges. Like the private sector, state and municipal governments must comply with federal wastewater regulations. Water that is discharged from a municipal drainage system to a federal body, by a municipal government, can be taxed for not meeting wastewater norms. As a result, municipal or state governments are highly motivated to effectively enforce local industry.

State and municipal governments may impose stricter standards according to local water availability and pollution levels. Nevertheless, most state

and municipal governments follow the SEDESOL standard NOM-CCA-031 for discharge to a municipal drainage system. In addition to norm 31, three more SEDESOL standards for municipal discharges are awaiting final approval. These new standards provide guidelines for municipal discharges, as determined by city size. Standard specifics can be found in the table on the following page.

Many companies discharge effluent to municipal drainage systems. As a result, SEDESOL's municipal discharge regulations are extremely important.

Once the new municipal norms come into effect, companies discharging to municipal drainage systems will be forced to comply with the conditions laid out in norm 31, as well as the standards outlined in the new regulations. It is important to note that the old municipal norms did not regulate BOD, COD, and suspended solid discharges. Upcoming municipal norms do include parameters in these areas. As a result, companies will find it more difficult to comply with municipal discharge standards. Purchases of wastewater equipment should increase as a result.

Maximum Permissible Limits: Daily Average

	Norm 31: Current Municipal	Proposed Norm: Cities < 14,999	Proposed Norm: Cities < 99,999	Proposed Norm: Cities > 100,000
PH levels	6 to 9	6 to 9	6 to 9	6 to 9
Sedimented Solids (ml/L)	5.0	1.0	1.0	1.0
Fats and Oils (mg/L)	60	30	20	10
Electric Conductivity (m/cm)	5000			
Aluminium (mg/L)	10			
Arsenic (mg/L)	0.5			
Cadmium (mg/L)	0.5			
Cyanide (mg/L)	1.0			
Copper (mg/L)	5.0			
Hexavalent Chromium (mg/L)	0.5			
Total Chromium (mg/L)	2.5			
Fluorides (mg/L)	5.0			
Mercury (mg/L)	0.01			
Nickel (mg/L)	4.0			
Silver (mg/L)	1.0			
Lead (mg/L)	1.0			
Zinc (mg/L)	6.0			
Phenols (mg/L)	5.0			
Total Suspended Solids (mg/L)		150	75	40
BOD (mg/L)		150	75	40
COD (mg/L)		300	150	80
M.B.A.S.	30		3.0	3.0

ENFORCEMENT

Wastewater enforcement has been organized on a geographical basis. Plants located in zone one priority areas for wastewater treatment should be required to implement wastewater solutions before similar factories found in zone 2, 3, or 4. Nevertheless, enforcement to date has been piecemeal. Many companies operating within municipal jurisdiction are enforced by the CNA or PFFA. Additionally, some companies report that they are being enforced by SEDESOL, SARH, and municipal governments. This demonstrates a lack of organization among enforcement agencies.

28% of companies interviewed for this report indicated that they do not pay any taxes on their wastewater discharges. By the same token, 69% of companies admitted that they are not currently complying with discharge norms. Alarming, this situation is equally prevalent among companies that discharge high volumes of toxic material.

Most companies see this situation changing rapidly. Environmental enforcement is expected to become significantly more stringent within the next year. As local government improves its enforcement systems individual municipalities will assume greater responsibility for water administration. At that point, CNA and PFFA should refocus their enforcement activities, as defined under federal law. This increased enforcement will encourage additional wastewater equipment sales.

Key Initiatives

Several initiatives by both government and industry reflect the renewed focus on wastewater treatment in Mexico. These include:

Movement to Industrial Parks

Due to general water shortages and high pollution levels in many industrial areas, water costs are rising rapidly. Companies often find it too expensive to operate plants within these areas, and are being forced to relocate. In some cases, heavily polluting industries are ordered to move out of the city by government authorities. Consequently, industrial parks have increased in importance. Many such parks provide wastewater treatment to companies as a pay per use service. Three interesting implications arise from this trend: industrial parks may be a potential client for Canadian wastewater vendors. Such customers will require larger capacity systems

Industrial Parks Provide Opportunities

\$US 2.7 billion will be spent over the next fifteen years on the development of an industrial park in San Luis Río Colorado, Sonora.

The development consortium is controlled by Canadian, U.S., and German investors, and headed by the Matthews Group, of Ontario. Industrial parks of this nature may provide Canadian wastewater goods and service providers with interesting opportunities.

in order to serve park industries; because wastewater services are offered in industrial parks, companies with low pollution discharges are unlikely to require additional treatment equipment; and treatment services at industrial parks are normally offered on a pay-per-use basis, and heavy polluters may find it less expensive to invest in their own technology.

State/Industry Initiatives

Many companies located in polluted areas do not have the space or resources for water treatment plants. As a result, there are several examples where state governments have approached companies with wastewater solutions. For example, the state of Guanajuato, in conjunction with the local leather industry, has recently commissioned a wastewater treatment plant outside of León. The government is providing financial and technical support to relocate large tanneries to an area from which the treatment plant can be accessed. State authorities hope to move all leather factories out of the city of León by 1997.

NAFINSA Financing Programs:

NAFINSA, the Mexican industrial development bank, has established an environmental protection program. This program is designed to support smaller companies, who have limited access to financing, with environmental projects. Under the program, NAFINSA will finance up to 80% of an environmental protection project undertaken by private industry with a maximum value of \$US 1 million. Larger projects are financed to a maximum value of 50%. Financing is provided at a reduced interest rate. Loan applications have almost doubled between 1992 and 1993, reflecting an increased interest in environmental technology. In the first 10 months of 1993 550 loans were granted under the program. Approximately 165 loans focused on wastewater treatment projects.

SURVEY RESULTS

Buyers of wastewater goods and services in Mexico have repeatedly emphasized several issues. The points raised by the companies contained in this report provide important insights for Canadian companies wishing to take advantage of the Mexican market for environmental — and specifically wastewater — goods and services. They include:

Quality is critical:

Almost all companies identified product quality as the single most important factor in the purchase decision. The private sector is increasingly aware that pollution of water resources may eventually result in plant closure. Companies that have decided to take action to avoid such problems wish first and foremost to ensure that their wastewater equipment purchase will allow them to meet — or surpass — environmental requirements. As a result, quality and reliability are critical.

Almost all of the companies listed in this report believe that foreign vendors offer wastewater goods and services superior to that of local suppliers. Additionally, there is a strong perception that most Mexican vendors lack experience in the wastewater field. Given the preference for quality, Canadian suppliers may wish to take advantage of these perceptions in their marketing efforts.

Solutions oriented:

In general terms, Mexican companies are searching for environmental solutions as opposed to specific equipment, product, or component items. Several of the companies contained in this report demand guarantees that installed equipment will allow the buyer to meet discharge regulations; that is, they are demanding that the supplier sell them a solution to a significant problem. Even companies that do not demand such guarantees have expressed a preference for companies able to guarantee and service their work.

The desire for a "total solution" is compounded by a lack of knowledge of wastewater management. Buyers — even in larger companies — rarely know what kind of equipment they require. Buyer education will be important particularly with smaller companies.

Compact solutions:

Many plants, particularly those located in larger metropolitan areas, suffer from a lack of space. These companies often require compact wastewater treatment solutions. As a result, detailed and innovative design is frequently a requirement for these customers.

Water resources:

Many companies view wastewater equipment as the first step in the implementation of a full water management program. While 72% of companies expressed an interest in wastewater equipment, another 39% also indicated that water recycling equipment is a probable future purchase.

Mexican companies consider water recycling a money saving strategy. With the cost of water averaging 4.4 NP/m³, annual expenditures on water are significant. In fact, some companies have expressed a willingness to redesign their entire production process to reduce water costs.

Local market presence:

While most companies acknowledged that foreign technology was superior, very few companies were willing to buy from a supplier without a presence in the Mexican market. Several companies have also mentioned that they prefer to buy from a company that has already completed a project in Mexico. As a result, Canadian companies will find it essential to make a firm commitment to the market. Potential strategies include a distributor, representative, joint-venture partner or establishing a local office.

Financing is preferred:

Most companies interviewed suggested that financing would have some impact on the buying decision. Many of the exceptions belonged to large Mexican conglomerates or multinational parents. Preferred financing periods average approximately five years.

Lack of promotion

Canadian companies suffer from a lack of promotion in the Mexican market. Not one Mexican company interviewed for this report was able to name a Canadian supplier active in the wastewater field. In order to be successful in the Mexican market, Canadian companies will need to significantly increase their marketing efforts.

MINING INDUSTRY

Mexico has traditionally been an important producer of a wide variety of minerals, including such materials as silver, copper, manganese, and iron ore. Total industry sales in 1990 exceeded \$US 3.6 billion. The sector is highly dependent on export earnings, with over 42% of production sold abroad.

The industry is dominated by five private sector conglomerates, each controlling a series of smaller mining companies. The conglomerates are: *Industrias Peñoles SA de CV*, *Grupo Industrial Minero Mexico SA de CV*, *Corporación Industrial San Luis SA de CV*, *Empresas Frisco SA de CV*, and *Compañía Mineral Autlan*. Although the five conglomerates only control 44 of the 6000 Mexican mining companies, their total assets exceed \$US 4.5 billion. The conglomerates also manage most of the larger mineral deposits in Mexico. In general, 2.4% of all companies are classified as "large" and control 82% of Mexico's mining exports. The average export volume of these firms is \$US 8.5 million.

Revenue concentration within the industry results in a high proportion of relatively small firms. Sales of wastewater equipment to such companies will be more difficult, as they are often reticent to commit to a large "non-productive" investment. Additionally, before a sales pitches to such companies can be made, the buyer will need to be educated about wastewater equipment. Lead times may be extensive.

In 1990, 59% of total mining production focused on non-ferrous industrial metals. In turn, 8.4% of production centred on steel related metals and minerals, 14.2% on non-metallic minerals, and 18.4% on precious metals. Technologies that focus on the treatment of water polluted by non-ferrous metals will have a substantially larger market.

Production volumes in the Mexican mining industry rank on a global scale. Mexico ranks as one of the top three producers of silver, bismuth, cadmium, antimony, celestite, fluorite, and graphite. Although Mexican production is less than the Canadian equivalent, a substantial market exists nevertheless.

A large number of foreign mining companies are active in the Mexican market, controlling a total investment of over \$US 500 million. Companies from Canada, Japan, United States and Germany are particularly active. Examples include Noranda,

Norms & Enforcement:

No water discharge norms have yet been developed for the extraction of minerals. However, industry representatives are working with authorities to develop such regulations. The first norm, expected by the end of 1994, regulates the construction of drainage ditches used in the process of mineral extraction. The norm will not include specific pollution parameters such as BOD.

Perspectives:

Significant growth is expected. Only 20% of Mexican territory has been surveyed for mineral deposits.

Target Market:

Over 6000 companies operate in the mining industry. However, the industry is dominated by 5 mining consortiums. An additional 139 companies are classified as "large."

Placer Dome, Cominco, Mitsubishi, and Metalgesellschaft. However, foreign ownership of mining deposits is still limited to a maximum of 49%. Additionally, in some strategic areas such as sulphur, potassium, and phosphorous, foreign participation can be limited to 34%. In either case, legal mechanisms allow nominal control by foreign companies.

Between 1990 and 1994 over \$US 2.1 billion has been invested in the Mexican mining industry. 41% of investment for that period focused on new projects, while 34% focused on capacity and efficiency improvements. This second category also includes money programmed for environmental projects; in 1992 \$US 13.4 million was spent on environmental protection and preservation.

High investment levels reflect the opportunities available in the Mexican mining industry. Industry experts estimate that only 20% of the country has been surveyed in sufficient detail to enable the exploitation of mineral resources. As more territory is surveyed the total number of commercially usable mineral deposits is expected to rise. Given the relative isolation of new mineral deposits, each new development will require its own wastewater treatment facility.

Companies Controlled by Industrias Peñoles SA de CV:

Cía. Minera Cedros, Fluorita Río Verde, Minera Las Torres, Minera la Negra, Campana de Plata, Cía. Fresnillo, Zimapán, Metales Peñoles, Metmex Peñoles, Refractarios Mexicanos, Refractarios Green, Dolorey, Química Magna, Minera Capela, Peñoles do Brasil, Peñoles Metals and Chemical, Química del Rey, La Encantada, and Minera Santa Lucía

Companies Controlled by Grupo Industrial Minero México Sa de CV

Mexicana de Cobre, Mexicana de Acido, Minerales Metálicos del Norte, Carbonífera de México, Zinc de México, Minera Normex, Reactivos Mexicanos, Aerominerales, Minera Picachos, Minera San Isidro, Minera Selene, Industrial Mineral México, and Minera Pilares

Government policy changes have also had a positive effect on the industry. Several large government owned mining firms have been privatized (CANAMEA and Mexicana de Cobre), and government involvement has been scaled back to focus on strategically important minerals. For example, 38 minerals were monopolized by the government in 1982; by 1993, only five minerals (iron ore, coal, sulphur, phosphates, and potassium) were controlled by the state. Companies selling technology focusing on these minerals must deal with government clients.

At the same time, revised legislation has streamlined the taxation of mining companies and facilitated foreign involvement in the mining industry. Such deregulation has improved the overall attractiveness of the Mexican mining sector. Investment levels should rise as a result.

North American Free Trade is expected to have a positive impact. Given the high cost of transportation of metals, distance plays a critical role in mineral sales. Mexico and Canada have a strong advantage over other mineral exporters given their proximity to the large U.S. market. Under NAFTA, Mexican penetration of the American market is expected to rise.

Perspectives in the Mexican mining industry are generally positive. Investment levels will continue to rise as new mineral deposits are discovered. Growth

in non-metallic minerals such as sulphur and salt will be particularly important. Although there is no direct relationship between industry growth and wastewater sales, it is likely that wastewater sales will experience a positive spin-off effect.

While no water discharge norms have been developed for the extraction of minerals, government authorities and representatives from the mining industry are together developing wastewater regulations. The first norm, expected to be implemented by the end of 1994, focuses on the design, construction, and operation of drainage ditches. By improving this aspect of the production process, authorities expect to reduce wastewater discharges. This regulation is expected to have little effect on the demand for wastewater equipment within the mining sector.

In the future, authorities also expect to create two norms focusing exclusively on the extraction of metallic minerals and non-metallic minerals. It is quite likely that such norms will include a "total recycling" commitment, under which mining companies would be prohibited from discharging any kind of wastewater.

As a general rule, mining companies are most interested in the elimination of suspended solids. However, given the remote location and arid environment of many sites, recycling and treatment of service water is also important. Many mines are located in arid zones where water extraction is costly. As a result, mining companies are often

Companies Controlled by Corporación Industrial San Luis SA de CV

Industrias Luismin, Minas San Luis, La Domincia

Companies Controlled by Empresas Frisco SA de CV

Minera Lampazos, Minera Real de los Angeles, Química Flúor, Cobre de Sonora, Minera Cumobabi, Molytex, San Francisco del Oro, Aerofrisco, Minera Promet, and Cerro de Plata

Companies Controlled by Minera Autlán SA de CV

While this company is one of the largest mining companies in Mexico, it does not have direct subsidiaries.

looking for recycling solutions that will provide an economic benefit.

The majority of mining companies have yet to purchase wastewater technology. However, many of the larger companies have implemented such systems. As a result, experts estimate that between 60% and 70% of the industry's total production volume is already served by wastewater treatment.

In general, the mining sector appears to be less interested in wastewater technology, as indicated by survey results. This may largely be a of the lack of regulation and enforcement to date. Additionally most mining operations are not located in wastewater priority zones. As a result, water discharge is not yet expensive, and mining companies have less incentive to make an investment in wastewater treatment.

However, each of these factors is likely to change over the short and medium term. Norms are already being developed. Once regulations have been implemented, authorities will monitor water discharges more carefully, particularly discharges occurring in zone 1 or zone 2 locations (ie. the State of Nuevo Leon). In addition, water costs are rising regardless of geographic location. Rising costs will force mining companies, particularly those located in arid zones, to more carefully manage their water resources.

Sources:

1. The Mexican Investment Board, "*The Mining Industry*," (Mexico D.F.: Grupo Financiero Banamex, 1992)
2. Promociones Industriales Banamex, "*Mexico: The Mining Industry*," (Mexico D.F.: Promociones Industriales Banamex, 1991)
3. The Canadian Embassy, "*Market Study on the Mining Industry in Mexico*," (Mexico D.F.: Canadian Embassy, 1992)
4. Presidencia de la República, "*Cuarto Informe de Gobierno*," (Mexico D.F.: Presidencia de la República, 1992)

**SERVICIOS ADMINISTRATIVOS LUISMIN,
SA DE CV**

Pino Suárez 308 Oriente
Durango, Durango
Phone: (181) 76181
Fax: (181) 12837

Luis Manuel Arroyo Dominguez

Company Size:

The company is a medium sized mining enterprise. No specific data was provided.

Primary Products:

Information not provided.

Export Levels:

Information not provided.

Plants:

The company has four mining locations.

Wastewater Status:

It can be assumed that Luismin is not currently complying with wastewater discharge norms.

Potential Opportunities:

Luismin currently has no wastewater or recycling equipment. Filters and interchangers are required in all four mining locations. The company identifies problem areas as "all environmental parameters."

Recycling projects have also been identified by the company as a potential purchase area.

Purchase Time Frame:

The purchasing process would begin in 1994. Projects will continue throughout the next five years.

Additional Comments:

Approximately 700m³/day of water is consumed, at a price of 4 NP/m³.

COMPañIA MINERA AUTLAN SA DE CV

Mariano Escobedo 510, piso 9
Col. Polanco
11590 Mexico D.F.
Phone: (5) 545-7094, 250-1977
Fax: (5) not available

Lizardo Galvan G.
Consultant - Corporate Division

Company Size:
2000 employees

Primary Products:
Manganese ore and manganese ferro-alloy

Export Levels:
Varies

Plants:
Molango (Hidalgo) - mine and smelting plant
Nonoalco (Hidalgo) - mine and smelting plant
Tamós (Veracruz) - smelting plant
Texiutlán (Puebla) - smelting plant

Wastewater Status:
Does not comply with wastewater discharge standards

Potential Opportunities:
Minera Autlan uses water for the extraction and smelting process as well as for sanitary purposes. Settling tanks and sewage treatment facilities are located at each mining location. Water for cooling in the smelting plants is recycled. As such, the maintains that it complies with all current regulations. However, officials recognise that they do have a problem with high suspended solids in the Molango mine. During the rainy season, currently used settling tanks are not adequate to process the volumes of water. The company is interested in technology that can be installed within the mine to speed the process of removing suspended solids. In addition, the company is interested in new cost effective technology for other treatment plants such as sewage. If regulations become more stringent, alternative technology to thickening tanks will be required.

Purchase Time Frame:
Molango mine - within one year

Additional Comments:
Previous environmental purchases have been financed under the NAFINSA program. Financing is important.

MATERIAS PRIMAS MONTERREY

José Benítez 2728
Col. Obispado
64060 Monterrey, N.L.
Phone: (8) 329-2831, 329-2800
Fax: (8) 329-2812

Pascual Díaz Ruiz
Restoration of environment

Dr. Calixto Ramirez
Manager of Operations

Company Size:
Information not provided.

Primary Products:
Silica sand, feldspar, and processing of these materials

Export Levels:
Information not provided.

Plants:
Canoitus (Coahuila) - silica sand
Lampazos (Nuevo Leon) - processing plant
San José (Guanajuato) - silica sand and feldspar
Ahicazotepec (Puebla) - feldspar
Jaltipan (Veracruz) - silica sand
Aguilera (Veracruz) - silica sand

Wastewater Status:
Does not comply with wastewater discharge regulations.

Potential Opportunities:
Materias Primas Monterrey has a problem with water loss through infiltration. This problem is most prevalent in the mines in Puebla and San Jose, where water consumption is 40,000 m³ and 38,000 m³ per month, respectively. The company is currently looking for ways to decrease both water use and water loss. It is recognised that due to stricter norms imposed by the CNA, an investment in wastewater technology will be required.

Purchase Time Frame:
As regulations require.

Additional Comments:
The company has budgeted \$US 1 per ton of production for environmental protection. In general, 50 % is spent for water protection. Financing of any purchase will be important.

CEMEX

Independencia 901-A Ote.
Col. Cementos
Monterrey, N.L.
Phone: (8) 351-5100 ext 1882
Fax: (8) 351-8350

Miguel A. Gonzalez Salinas
Manager of Ecology

Company Size:

Information not provided; however, the company is one of the largest Mexican producers of cement.

Primary Products:

Cement

Export Levels:

10% - U.S., Canada and South America

Plants:

18 plants in operation, 1 plant under construction

Wastewater Status:

Currently complies with all discharge regulations.

Potential Opportunities:

The primary use of water is for cooling and service purposes. Cemex recycles most of its water cooling water, and consequently effluent discharges are sanitary service waters only. Cemex has septic tanks in the old plants and aerobic treatment processes in new plants. The company claims that its main problem is with air pollution, and decision makers do not anticipate any spending increase on wastewater treatment. As such the only potential opportunity may be in the installation of water treatment in the new plant.

Purchase Time Frame:

Unknown.

Additional Comments:

No additional comments.

INDUSTRIAL MINERA MEXICO, SA DE CV

Baja California 200
06760 Mexico D.F.
Phone: (5) 574-6764, (5) 264-7244
Fax: (5) 264-7664

Vidal Muech Dip
Manager of Engineering and Construction

Company Size:

This company is one of the five largest mining conglomerates in Mexico. Total workforce is approximately 14,000.

Primary Products:

Gold, silver, copper, lead, zinc

Export Levels:

Information not provided.

Plants:

The company has operations in several states throughout Mexico.

Wastewater Status:

Currently complying with ecological norms.

Potential Opportunities:

Minera Mexico currently uses wastewater and recycling equipment in the majority of its mining locations. Chemical balancing is the primary technology.

Purchase Time Frame:

Purchases unlikely for the near future.

Additional Comments:

No additional comments.

SERVICIOS INDUSTRIALES PEÑOLES, SA DE CV

Calle Río de la Plata
0650 Mexico D.F.
Phone: (5) 286-3555, (5) 286-8133, x3100
Fax: ()

Federico Kunz
Legislative Manager

Company Size:

The company is one of the five biggest mining consortiums in Mexico. There are approximately 9500 employees.

Primary Products:

Gold, silver, lead, zinc, cadmium, sodium sulphate, and magnesium oxide

Export Levels:

Approximately 40% to 50%

Plants:

Mining locations exist in 10 states in Mexico: Coahuila, Zacatecas, Guanajuato, Nuevo Leon, Durango, Chihuahua, State of Mexico, and Tamaulipas.

Wastewater Status:

The company complies with ecological norms.

Potential Opportunities:

The company has no need of recycling or treatment equipment. Peñoles already recycles 100% of its water and recently installed wastewater treatment technology.

Purchase Time Frame:

Future purchases unlikely.

Additional Comments:

No additional comments.

PULP AND PAPER INDUSTRY

Mexican pulp and paper industry represents less than 1% of national GDP, 6% of all water borne pollution is produced by companies in this sector. Such high levels of pollution have resulted in significant attention from environmental authorities, and most pulp and paper companies have been pressured to implement environmental solutions. Many companies have already invested in wastewater technology and those that haven't will be required to do so quickly. From the perspective of the Canadian supplier, two points are key: i) given the limited target market and mounting government pressure, speed is critical; and ii) resources within the industry are scarce, and consequently financing is important.

The federal government currently allows companies a maximum two year period to implement wastewater solutions. This time period is strictly enforced in the pulp and paper sector. Given decision and construction lead times, those companies that have yet to purchase technology are looking to do so quickly.

Additionally, there are only 73 plants operating in this sector in Mexico. 7 focus exclusively on the production of pulp, 58 focus on the production of paper, and the remaining 8 are involved in both pulp and paper processes. Many plants already have some form of wastewater technology, further reducing the number of potential customers. Given such a small target market, Canadian companies will need to move quickly in order to obtain a customer in the pulp and paper field.

Both the pulp and the paper segments of the industry have fallen upon hard times. The combined growth rate for both segments in 1992 was -1.6%. The comparable figure for 1991 was -3.1%. Pulp producers, in particular, are faced with significant problems: only 52.2% of installed capacity was used in 1992. Production in 1992 was 20% less than in 1991, while the total market size has decreased 40% in 4 years. Reductions are largely due to a significant increase in the use of secondary (recycled) pulp. Over the long term, use of secondary pulp is expected to continue to rise, further dampening the outlook for pulp producers.

In fact, the only growth area in pulp is the manufacture of secondary pulp. Mexican production in 1992 was estimated at \$US 398 million; total market value for 1996 is projected at \$US 487 million.

Norms and Enforcement:

Three norms — 15, 24, and 25 — regulate the discharge activities of pulp and paper companies. Nearly 50% of all plants are located in zone 1 enforcement areas, and are being strongly encouraged to treat their liquid discharges.

Perspectives:

The industry is in a state of decline. While the paper segment can expect to regain growth in the future, pulp producers will continue to suffer.

Target Market:

There are only 73 pulp & paper plants in Mexico, owned by approximately 60 companies.

Like the pulp segment, the Mexican paper industry also experienced a slight shrinkage in 1992. Demand problems were complicated by falling exports and rising imports. For example, 1992 paper imports were nearly 75% higher than the 1991 statistic.

While there is no direct relationship between the contraction of the industry and wastewater equipment sales, it is probable that cash resources within the industry are scarce. As a result, financing will be critical in most deals made with pulp and paper companies.

Industry Summary (Millions of Tons)

	Pulp	Paper
Current Capacity	1.072	3.935
Capacity in 1997	1.104	4.295
Investment Projects	0.032	0.360

Although both segments are suffering, the paper industry holds more long-term potential than the pulp sector. Wastewater suppliers may wish to focus their efforts in this area. While the pulp market is shrinking, demand for paper is expected to grow 4.5% annually over the next several years. The industry association expects the demand for paper to expand by 650,000 tons per year by 1997. Similarly, experts estimate that an additional

A Minimal Target Market

It is unlikely that the Mexican pulp & paper industry will undergo a significant capacity increase in the near future. Capacity utilization in Mexico currently stands at 71.8%. As a result, Canadian companies hoping to provide wastewater equipment for new production facilities may find a minimal target market.

360,000 tons of total capacity will be installed by the same year. Current capacity totals 3.935 million tons per year. Additional capacity construction may offer medium-term opportunities for equipment suppliers as new plants will also require treatment equipment. Once immediate demand for wastewater equipment is satisfied, equipment vendors may wish to monitor future capacity developments.

Investment projects in the pulp segment total only 32,000 tons per year by 1997. Current capacity stands at 1.072 million tons per year.

Three environmental norms govern the discharge of water in the pulp and paper industry. Norm 15 provides guidelines for companies involved in the production of pulp. Norm 24 focuses on companies that manufacture paper from virgin pulp, while norm 25 regulates firms that produce paper from recycled pulp. Norm specifics are found in the chart on the following page.

Many pulp and paper manufacturers are searching for wastewater treatment vendors that will guarantee operation within these norms. Given the high profile of the industry, most producers fear continued attention from environmental authorities, and wish to comply with regulations as soon as possible.

Principal Players

Principal players in the pulp & paper industry include:

Kimberly Clark (pulp and paper), Crisoba (pulp and paper), Empaq, Lypps, Copamex (paper), Smurfit (paper), Mexicana de Papel Periodico (pulp and paper), and Fabrica de Papel Monterrey (paper). Three companies managed to increase sales in spite of industry shrinkages: Kimberly Clark (2.1%), Empaq (5.0%), and Crisoba (7.6%).

As a whole, the Mexican pulp & paper industry exhibits a strong interest in wastewater management techniques. However, operating conditions within the industry create a demanding environment for the equipment vendor. These pressures and target market size will force Canadian suppliers to move quickly. At the same time, scarce resources will create a strong demand for financing, particularly from companies that are not affiliated with an industrial group.

Maximum Permissible Limits: Daily Average

	Norm 15 & Norm 25:	Norm 24
PH Levels	All norms specify between 6 and 9	
Biochemical Demand for Oxygen (BOD)	Both norms specify 200 mg/l	125 mg/l
Solid Sediments	Both norms specify 8 mg/l	4 mg/l
Suspended Solids	Both norms specify 200 mg/l	125 mg/l
Oils and Fats	Both norms specify 40 mg/l	20 mg/l

Sources:

1. Banca Serfin, "Industry Review: Paper and Cardboard," (Mexico D.F.: Grupo Serfin, 1993)
2. CNICP, "Memoria Estadística 1993," (Mexico D.F.: CNICP, 1993)

MADERAS CONGLOMERADAS, SA DE CV

Avenida San Jose - 2
54180 San Juan Ixhuatepec, State of Mexico
Phone: (5) 569-0133
Fax: (5) 569-0048

Moises Gutierrez Padilla
Plant Manager

Company Size:
550 employees

Primary Products:
Particle board, wood board, fibre board

Export Levels:
Approximately 20%

Plants:
The only plant is at the above address.

Wastewater Status:
Information not provided, although it can be assumed the company is not currently complying with ecological norms.

Potential Opportunities:
The company is looking for a simple system that will reduce toxicity to the level where water can be legally discharged to the municipal system. The primary area of concern is the elimination of suspended solids (primarily wood particles); a filtration system is already in operation. The company is also searching for economical recycling solutions, so that previously used water can be re-used in the production process.

Purchase Time Frame:
As soon as possible

Additional Comments:
The volume of water currently used is 150 litres per second. Nevertheless, the company is looking for compact systems, as the available space is approximately 3m². Financing would play an important role in any contract. Education and training for equipment operation is a requirement. Additionally, the company is looking for a supplier that can fully guarantee "results" (ie. a "no reservation" guarantee that the system will discharge water that complies with ecological norms.)

INDUSTRIAL PAPELERA, SE DE CV

Km 3,5
Carretera Uruapan - Tareten
60000 Uruapan, Michoacan
Phone: (452) 31699, (452) 31767
Fax: (452) 30867

Victor Vargas

Company Size:
Approximately 250 employees

Primary Products:
Printing and writing paper

Export Levels:
None

Plants:
The only plant is located at the above address.

Legal Status:
The plant complies with all water discharge regulations.

Potential Opportunities:
The company is planning to invest in tertiary water treatment. The plant currently has a primary and secondary water treatment facility, uses flocculation, sedimentation and activated sludge techniques. However the company is interested in activated carbon filters. Currently water use is approximately 3000 - 4000 cubic metres per a day.

Purchase Time Frame:
Within one year

Additional Comments:
The company is interested in investing in tertiary treatment for economic reasons. As this company is located in an agricultural area, the authorities are strict with the quality of water effluent. If the quality of water discharge is good enough to use for agricultural purposes, the company will avoid all effluent taxes.

PAPELERA MALDONADO, SA DE CV

Pinguinos 101
Colonia Cuauhtemoc
66450 San Nicolas de los Garza, Nuevo Leon
Tel: (8) 352-1947
Fax: (8) 352-0399

Jaime Broce Segovia
Engineering and Projects

Jesus Julian
Engineering and Projects

Company Size:
Approximately 750 employees

Primary Products:
Kraft paper - medium, printing, writing and specialty papers

Export Levels:
Low

Plants:
The only plant is at the above address.

Legal Status:
This plant does not comply with municipal waste water regulations.

Potential Opportunities:
This company has no water treatment facility and must invest immediately. The plant uses approximately 8000 cubic metres of water per day, and effluent is contaminated with fine suspended solids and a high BCD. The company is planning to share the plant with Papeles Higienicos de Mexico, located close by (see entry). They are currently looking for primary and secondary treatment.

Purchase Time Frame:
Immediate

Additional Comments:
This company is under pressure from the authorities to comply with regulations. There is need for immediate support. They are currently reviewing sedimentation, flocculations and activated sludge techniques for water treatment, but are unsure of the best solution. The company has a strong preference to deal with a company that is not linked to any product line, they would prefer an unbiased opinion. In addition, they would prefer to contract a company that has experience with pulp and paper companies, particularly those with fine suspended solids.

PAPELES HIGIENICOS DE MEXICO, SA DE CV

Pinguinos 101
Colonia Cuauhtemoc
66450 San Nicolas de los Garza, Nuevo Leon
Phone: (8) 352-1940
Fax: (8) 352-0399

Jaime Broce Segovia
Engineering and Projects

Jesus Julian
Engineering and Projects

Company Size:
Approximately 400 employees

Primary Products:
Napkins, toilet tissue, towels

Export Levels:
Low

Plants:
The only plant is located at the above address

Legal Status:
The plant does not comply with municipal discharge regulations.

Potential Opportunities:
The plant has no water treatment facility and must invest in primary and secondary treatments in order to comply with regulations. The company uses approximately 3000 cubic metres per day. The water treatment plant will be shared with Papelera Maldonado (see entry).

Purchase Time Frame:
Immediate

Additional Comments:
(see Papelera Maldonado)

PAPELERA DE CHIHUAHUA, SA DE CV

Plaza Ferrocarril Kansas #1
Colonia Popular
31350 Chihuahua, Chihuahua
Phone: (14) 159008
Fax: (14) 156770

Jose Peregrina

Company Size:
Approximately 350 employees

Primary Products:
Multi wall sacks, printing, writing and specialty paper

Export Levels:
Low

Plants:
The only plant is located at the above address

Legal Status:
The plant does not fully comply with federal regulations

Potential Opportunities:
This company needs to install secondary water treatment. The plant currently uses flocculations for primary treatment and is considering aeration lagoons or activated sludge as a secondary technique. The plant uses approximately 4500 cubic metres of water per day.

Purchase Time Frame:
Within 2 months

Additional comments:
None

**CELULOSA Y CORRUGADOS DE SONORA,
SA DE CV**

Carretera Internacional Navojoa-Los Mochis
Km 8.5
Navojoa, Sonora
Phone: (642) 20155
Fax: (642) 27229

Refugio Mendoza
Plant Manager

Company Size:
525 employees

Primary Products:
Kraft and medium paper, cardboard boxes

Export Levels:
Information not provided

Plants:
The only plant is located at the above address.

Wastewater Status:
Currently not complying with ecological norms.

Potential Opportunities:
The company is currently implementing a wastewater treatment project. Important factors include BOD and suspended solids. Filters were identified as probably future purchases. The required capacity for equipment is approximately 16 litres per second.

In spite of the above project, company officials identified recycling as the area of major opportunity in the near future.

Purchase Time Frame:
Within one year

Additional Comments:
The company uses 1450m³/day of water, at an approximate price of NP 1.47/m³. Future purchase areas are identified as high technology systems and equipment components.

**SMURFIT CARTON Y PAPEL DE MEXICO,
SA DE CV**

Jaime Balmes 11
Torre D, piso 7
Col. Polanco
11000 Mexico D.F.
Phone: (5) 395-5022 (number is changing to 729-2300)
Fax: (5) 395-5776

Carlos Sacal
Javier Priego

Company Size:
2700 employees

Primary Products:
Medium and liner paper for boxes, corrugated boxes, and plastic bottles

Export Levels:
Information not available

Plants:
Tlalnepantla (State of Mexico)
Santa Clara (State of Mexico)
Naucalpan (State of Mexico)
Monterrey (Nuevo Leon)

Wastewater Status:
Currently does not comply with norms

Potential Opportunities:
Smurfit Carton y Papel is in the process of building two wastewater treatment facilities in Tlalnepantla and Santa Clara; water consumption in these plants is 1,120,000 m³ and 1,211,000 m³ per year, respectively. The treatment plants are scheduled to be in operation by April 1994, and will cost approximately \$US 4,500,000 each. Installed treatment will consist of fibre solid removal, activated sludge and primary and secondary clarifiers. Treated water will comply with all regulations. While these contracts have been awarded, additional opportunities may arise in the Naucalpan and Monterrey plants. Water consumption is significantly less in these locations (169,000 m³ and 144,000 m³ per year, respectively). Current treatment consists of the removal of solids with disk filters and discharge does not comply to the new regulations. As a result investment in equipment to reduce the BOD levels will be required.

Additional upcoming projects include the installation of water treatment for a plastic bottling division. Project value is expected to be in the \$US 150,000 - 250,000 range.

Purchase Time Frame:
0 - 2 years

Additional Comments:

Smurfit Carton y Papel's bidding process is broken into two parts: detailed engineering and equipment supply. Engineering bids are sought from at least three internationally reputable companies. There is a strong preference for engineering companies that do not manufacture or supply equipment.

Once the engineering has been supplied, Smurfit Carton y Papel seeks at least three quotations from suppliers of proven equipment and technology. To date, most wastewater treatment services and technology has been supplied directly from the U.S.

Decisions are based on quality, price and service. Financing has no significant importance on the final choice.

MANUFACTURAS GARGO, SA DE CV

Zaragoza 15
52900 Atizapan, State of Mexico
Phone: (5) 822-1087
Fax: (5) 572-0644

Guillermo Cavazos Mesa
Director General

Company Size:
Approximately 225 employees

Primary Products:
Paper products

Export Levels:
Information not provided.

Plants:
The only company plant is located at the above address.

Wastewater Status:
The company is not currently complying with wastewater norms. However, equipment is now being installed that will allow the company to meet environmental requirements by June of 1994.

Potential Opportunities:
A primary and secondary wastewater system (cost: US \$2.0 million) is being installed; this will allow the company to comply with current legal norms. Although no tertiary system has been purchased, additional wastewater purchases are not planned for the near future. However, the company is interested in a water recycling system.

Purchase Time Frame:
Within the next two years.

Additional Comments:
The purchase of a recycling system will be based upon economic benefit; the company is currently paying 4.27NP/m³ of water. Average daily consumption is 420 m³. However, the company would initially consider a system that would recycle approximately 60% of total consumption. The company feels strongly about demanding guarantees on all equipment purchased, including payment withholding and surety bonds.

CARTONAJES ESTRELLA, SA DE CV

Poniente 122, #430
02300 Mexico D.F.
Phone: (5) 368-0033, (5) 587-6166
Fax: (5) 567-0434

Salvador Carrasco Narro
Technical Manager

Company Size:
Approximately 1000 employees.

Primary Products:
Cardboard cartons, linen paper, medium weight paper

Export Levels:
None

Plants:
Mexico D.F.
Santa Clara, State of Mexico
Tizuyuca, State of Hidalgo

Wastewater Status:
The company maintains they are fully complying with ecological norms.

Potential Opportunities:
Future opportunities focus on advanced treatment systems in the Mexico City plant. The company already operates a US \$1.75 million wastewater treatment facility at this plant, but is interested in improving water quality with 3rd and 4th level treatments. The ultimate goal is to develop a "closed circuit" system that would entirely eliminate wastewater discharges (this obviously includes a recycling component). Decision makers mentioned such equipment as reverse osmosis and reverse electrolysis machinery, with a capacity of approximately 500 to 1000 m³/day. The company also has an interest in consulting services, which could be provided in either Spanish or English.

Purchase Time Frame:
Within 3 to 4 years.

Additional Comments:
In general, the company doesn't require support services such as maintenance. For example, the system currently used was installed by the company's own engineers. However, financing over a three to five year term is critical. Future purchases will be a result of economic benefit as opposed to legal regulations. As such, the company will wish to compare equipment costs with current water costs (4.3 NP/m³) and discharge costs (2.5 NP/m³, even if complying with ecological norms). On average, the company consumes 2000 m³/day of water, and discharges 1000 m³/day of water.

SONOCO PRODUCTS COMPANY

Federico T. de la Chica 2-201
Ciudad Satelite
53100 Naucalpan, State of Mexico
Phone: (5) 562-6210, (5) 562-9786
Fax: (5) 393-7731

Filiberto Rubio O.
Vicepresident Mexico

Company Size:
Information not provided

Primary Products:
Carton and paper products

Export Levels:
Exports are considered insignificant.

Plants:
The company operates a variety of plants throughout Mexico, under the names of subsidiary companies.

Wastewater Status:
Sonoco Products is fully complying with wastewater discharge norms.

Potential Opportunities:
The company recently purchased new technology for wastewater treatment. The corporate head office in the United States is highly involved in purchases of this type.

Purchase Time Frame:
Future purchases are highly unlikely.

Additional Comments:
Little technical information was provided, other than to identify suspended solids as the single most important discharge factor. The importance of the U.S. head office cannot be sufficiently stressed; head office provides most technology and consulting services. Changes in suppliers is not likely.

CHEMICAL & PETROCHEMICAL INDUSTRY

Mexico's traditional economic policy of import substitution has met with considerable success in the chemical and petrochemical field. Throughout the past 40 years, industry growth has averaged 12% per year. Import substitution has allowed a number of large Mexican chemical companies to develop, including firms such as ALFA, CELANESE, and CYDSA. At the same time, large foreign players have invested in the sector. International giants such as BASF, BAYER, DOW CHEMICALS, ICI, and HOECHST have all established a manufacturing presence in Mexico.

The industry is one of Mexico's largest, with a total production valued at \$US 14.7 billion. Approximately 400 companies, operating 700 plants (excluding PEMEX, the state oil monopoly), account for the vast majority of industry production. Additionally, industry experts estimate an additional 3000 micro-companies are operating in this sector. Approximately 20% of total investment is controlled by foreign companies. In general, these plants tend to be more advanced in terms of wastewater treatment.

PEMEX plays a critical role in the chemical industry. In addition to monopolizing the exploitation of petroleum resources, the company is also the sole legal producer of basic petrochemicals. PEMEX operates over 100 chemical production facilities. In fact, PEMEX is the 7th largest producer of petrochemicals in the world.

This study focuses on private sector wastewater treatment opportunities; that is, PEMEX is not included. As a government corporation, dealings with PEMEX often require extensive time commitments. Additionally, PEMEX has already purchased a large percentage of its wastewater requirements. Nevertheless, given the sheer size of the company, wastewater management suppliers may wish to consider PEMEX as a potential client.

PEMEX

PEMEX is the sole Mexican producer of eight basic petrochemicals. These substances include: ethane, propane, butanes, pentanes, hexanes, heptanes, raw material from carbon black, and naphta. As a result, the only Mexican client for treatment processes focusing on these chemicals is PEMEX.

Norms and Enforcement:

Four norms- three, four, five, and twelve - govern the water discharge activities of the chemical/petrochemical sector. Many companies operating in this industry are under pressure to better treat discharges, as they are located in zone 1 priority areas.

Perspectives:

Over the short term, the industry is expected to suffer under NAFTA. Medium and long term growth will resume with the implementation of advanced technology. Domestic capacity is expected to increase.

Target Market:

Over 400 companies operate 700 plants. The industry is highly international, with almost 50% of all investment controlled by foreign companies.

Mexican petroleum reserves have been an important factor in the development of the chemical and petrochemical industry. Most of these reserves are located in the Gulf of Mexico. As a result, a significant portion of petrochemical and chemical plants are located in such coastal cities as Coatzacoalcos (Veracruz) and Tampico (Tamaulipas).

Production facilities generally fall into one of two categories: state of the art or antiquated. In the early 1980's, many Mexican chemical manufacturers brought new facilities into operation. These plants were frequently equipped with wastewater equipment from the outset. Canadian wastewater treatment vendors should focus on plants using older technology. A significant number of such plants are located in the Industrial Vallejo area of Mexico City and the industrial suburbs of Mexico City. In contrast, newer plants are generally found in the coastal regions mentioned above.

Current production capacity can be broken down as follows: basic petrochemicals (reserved for Pemex) 31%; inorganic chemicals 26%; fertilizers 16%; intermediates 15%; synthetic resins 5%; synthetic fibres 1%; and other 6%. In general, the Mexican chemical industry requires a larger capacity. As growth continues, new installations will be needed. Given environmental regulations, these plants will need wastewater treatment capabilities.

Principal Players

Several companies dominate the chemical/petrochemical industry in Mexico. The following table identifies these companies, and lists their 1991 sales in million of \$US.

Celanese Mexicana	975.0
CYDSA	808.0
Novum	587.0
Industrias Resistol	460.0
Petrocel	222.0
Fibras Químicas	191.0
Pennwalt	175.0
Tereftalatos Mexicanos	157.0
Poliolés	142.0

The future prospects for the industry are positive. Experts estimate that immediately after the implementation of NAFTA, the industry will suffer due to poor economies of scale and outdated technology. Nevertheless, over the next four years primary petrochemicals are expected to grow 8% annually, intermediate petrochemicals 7% annually, and specialty petrochemicals 5% annually.

Depending upon the product manufactured, several norms apply to the chemical and petrochemical industry. Norm 3 regulates discharges of refiners of petroleum and petrochemicals. Discharges from the manufacture of fertilizers are covered by norm 4. Norm 5 controls the production of synthetic polymers and plastic products, while norm 12 regulates the rubber industry. The specifics of each norm can be found in the table on the following page.

In general, interest levels in wastewater technology are high. Of the all companies that responded to this survey, 43 operate in the chemical/petrochemical sector. Many production facilities are located in zone 1 priority areas for wastewater control. For example, Mexico D.F. and Tlalnepanitla as zone 1 areas. As a result, wastewater enforcement is more stringent than in other industries, and interest in treatment techniques is higher.

Companies active in this sector can be classified in one of three groups: smaller companies that only invest in environmental technology when forced to; medium to large companies that are proactive, and invest in technology for economic benefit; and multinational players, undertaking sustainable development projects as required by corporate head offices.

Wastewater treatment requirements vary accordingly. Smaller companies normally require basic primary treatment technology. Medium sized players often have the knowledge to develop simple primary and secondary solutions, but need assistance in more specialized water problems. Finally, multinational firms have sufficient technology for most wastewater needs, except highly toxic substances.

Maximum Permissible Limits: Daily Average

	Norm 3	Norm 4	Norm 5	Norm 12
PH Levels	All norms specify between 6 and 9			
Oils/Fats	30 mg/l	NA	70 mg/l	NA
Biological Demand for Oxygen (BOD)	60 mg/l	60 mg/l	100 mg/l	50 mg/l
Sulphur	0.2 mg/l	NA	NA	NA
Hexavalent Chrome	0.05 mg/l	NA	NA	NA
Total Chrome	1.0 mg/l	NA	NA	NA
Phenols	0.5 mg/l	NA	0.5 mg/l	NA
Suspended Solids	70 mg/l	60 mg/l	NA	60 mg/l
Fluorides	NA	10 mg/l	10 mg/l	NA
Total Phosphorous	NA	40 mg/l	NA	NA
Total Nitrogen	NA	30 mg/l	NA	NA
Sedimented Solids	NA	NA	15 mg/l	NA
Chemical Demand for Oxygen	100 mg/l	NA	200 mg/l	180 mg/l

NA = Not applicable

Sources:

1. Promociones Industriales Banamex, "*Mexico: The Chemical & Petrochemical Industry*," (Mexico D.F.: Promociones Industriales Banamex, 1991)
2. ANIQ, "*Informe Anual 1992*," (Mexico D.F.: ANIQ, 1992)
3. The Mexican Investment Board, "*The Petrochemical Industry*," (Mexico D.F.: Grupo Financiero Banamex, 1992)
4. Banca Serfin, "*Industry Review: Basic Chemical Industry*," (Mexico D.F.: Grupo Serfin, 1993)..

IMPERQUIMIA, SA DE CV

San Pedro # 24
09300 Mexico, D.F.
Phone: (5) 694-1911
Fax: (5) 694-7786

Hector P. López
Plant Manager

Company Size:
Approximately 80 employees

Primary Products:
Chemicals used in the construction industry, particularly chemicals and sealants

Export Levels:
No specific percentage was provided, although export levels are minimal.

Plants:
The company currently has two Plants:
• Mexico, D.F.
• Tecamac, State of Mexico
Imperquimia plants to consolidate its production facilities in the Tecamac plant in the near future.

Wastewater Status:
The company maintains they are complying with ecological discharge norms.

Potential Opportunities:
Imperquimia currently has no water treatment equipment. Company officials declined to mention wastewater focus areas; however, suspended solids are believed to exceed discharge standards. Current levels are estimated at 1780 mg/litre. Two separate types of effluent are discharged: one from service and sanitary waters, and the other from equipment and holding tank cleaning. The two discharges are not mixed.

Purchase Time Frame:
Currently in purchasing process

Additional Comments:
No additional comments

CUPROQUIM DE MEXICO

Km 12.5 Via Dr. Gustavo Baz
Barrientos
54110 Tlalnepantla, State of Mexico
Phone: (5) 310-0346
Fax: (5) 310-6846

Jose Fueyo Macdonald
Director of Operations

Company Size:
Approximately 200 employees

Primary Products:
Inorganic chemicals based on copper

Plants:
Tlalnepantla (State of Mexico)
Chihuahua (State of Chihuahua)
Plant to be built by 1995/96, location as yet undecided

Wastewater Status:
The plant in Tlalnepantla complies with ecological norms. In contrast, production facilities in Chihuahua do not comply with norms.

Potential Opportunities:
The plant in Chihuahua currently operates no wastewater management process. Discharges of approximately 130 m³ have high levels of sodium chloride in the water (up to 30 grams per litre), resulting in abnormally high conductivity. Currently, wastewater also has high levels of copper (up to .5 parts/million versus the norm of .1 parts/million) and is extremely discoloured. The plant that is to be built by 1995/96 will produce pesticides, herbicides, and insecticides. Although total volumes of discharge are expected to be low (10 m³/day), quality and reliability will be absolutely essential. Given the high cost of water in the Chihuahua area (up to 6.4 NP/m³), the company is seriously examining the potential of a recycling system. The approximate capacity of such a system would be 130 m³/day, of which only 15 m³/day is sanitation and service water.

Purchase Time Frame:
Wastewater treatment for Chihuahua -
as soon as possible
Wastewater treatment for new plant - before 1996
Recycling system for Chihuahua - 3 to 5 years

Additional Comments:
The company expects to purchase consulting services (in Spanish or English) before equipment and technology. Equipment purchases in this area (equipment) are expected to focus on state of the art technology. Financing is not critical. The company would consider out-sourcing the operation and maintenance of the treatment plants.

QUIMIKAO, SA DE CV

Km 22.5
Carretera Guadalajara - El Salto
45680 El Salto, Jalisco
Phone: (3) 688-0422
Fax: (3) 688-0681

Rubén Sandaz
Technical Development Director

Ricardo Pérez Aguas
Environmental Supervisor

Company Size:
\$US 20 million

Primary Products:
Fatty aminos and their derivatives.

Export Levels:
Approximately 30%.

Plants:
The only plant is located at the above address.

Wastewater Status:
Not currently complying with discharge norms.

Potential Opportunities:
Although the company currently has a treatment plant using coagulation, flocculation, and biological treatment technologies, capacity is insufficient. Monthly discharges average 6500m³ while capacity totals approximately 1200m³. Decision makers prefer to optimize the current plant by upgrading the biological treatment. A second option is an increase in system size.

Another area of interest for QuimiKao is a recycling system. The company currently utilizes 8000m³/year of water, at a cost of 2 NP/m³.

Purchase Time Frame:
Wastewater treatment equipment - as soon as possible
Recycling system - within the next three years

Additional Comments:
The company does not require external financing.

KEMEK DIVISION DE CONDUCTORES MONTERREY, SA DE CV

Apartado Postal 2039
64000 Monterrey, N.L.
Phone: (8) 379-2089, 379-2000
Fax: (8) 377-2669

Jorge De La Rosa Sanchez
Plant Manager

Company Size:
Information not provided.

Primary Products:
Polyester and fenonic resins

Export Levels:
30 % - Canada, U.S., South America

Plants:
The only plant is located at the above address.

Wastewater Status:
Kemek does not comply with wastewater norms.

Potential Opportunities:
Kemek discharges a relatively small amount (100 m³ per month) of toxic water. Currently the water is mixed with sanitary waters from the adjoining plant, and standard municipal discharge taxes are paid. However as norms become more stringent, the company will have to invest in treatment of the toxic water. Water characteristics include high phenols, cresylic acids and polymers, and suspended solids (organic). Kemek already has a primary treatment, but must employ a secondary treatment.

Purchase Time Frame:
Within 6 months.

Additional Comments:
Kemek will only consider proven technology.

QUIMICA PENNWALT, SA

The company is a holding organization for four smaller firms: Cloro de Tehuantepec, Petroquímica de Pennwalt, Pennwalt SA de CV, and Pennwalt de Pacifico.

Río San Javier 10
Fracc. Viveros del Río
54060 Tlalnepantla, State of Mexico
Phone: (5) 397-6933
Fax: (5) 361-1154

Jorge Arias Barajas
Corporate Manager, Environmental Control and Security

Company Size:
1500 employees
Sales: \$US 175 million

Primary Products:
Basic chemical products, Organic peroxides

Export Levels:
Approximately 10%

Plants:
Coatzacoalcos, State of Veracruz (Cloro de Tehuantepec)
Coatzacoalcos, State of Veracruz (Petroquímica de Pennwalt)
Santa Clara, State of Mexico (Pennwalt SA de CV)
El Salto, State of Jalisco (Pennwalt de Pacifico)

Wastewater Status:
Not all of the plants are fully complying with legal regulations. For example, the Petroquímica de Pennwalt has a serious BOD and suspended solids problem, while Pennwalt de Pacifico has high levels of suspended solids.

Potential Opportunities:
Three of the plants are expected to need wastewater treatment equipment in the future (both plants in Coatzacoalcos and the plant in El Salto). Petroquímica de Pennwalt produces only organic peroxides, an area in which the company has little experience in wastewater management. Opportunities in the wastewater field are greatest at this plant and Cloro de Tehuantepec. Both of these plants already have some equipment, but management wishes to improve and expand existing facilities.

Recycling is also an area of interest for the company. Volume estimates range between 50 and 1000 litres per minute depending on the plant.

Purchase Time Frame:
Within the next year.

Additional Comments:

The company requires very little after sales service, as they normally maintain their own equipment. In fact, Pennwalt normally buys components and machines, and provides integration services internally. Financing periods of three to five years would be considered advantageous, but not necessary. Although the company is currently undertaking an environmental consulting project, specific equipment requirements have yet to be identified.

ABBOT LABORATORIES DE MEXICO, SA DE CV

Avenida Coyoacan 1622
03100 Mexico D.F.
Phone: (5) 726-4627
Fax: (5) 726-4659

Dr. Salvador Calvo
Head of Security and Technology

Jose Sevilla Kram
Manager, Factory Engineering

Company Size:
700 employees

Primary Products:
Pharmaceutical products

Export Levels:
Information not available

Plants:
The company has two Plants:
• Mexico D.F. (above address)
• Tlaxcala, Tlaxcala

Wastewater Status:
Information not provided

Potential Opportunities:
The company currently uses a catatonic interchanger and a filtration process to treat water, primarily for oils and fats and sedimented solids. Additionally, a cooling tower is used as part of the treatment process. Nevertheless, the company admits that the process is not fully effective. Future purchases will focus on equipment that can better treat the above mentioned factors. The company is also looking to purchase volume and toxicity measurement equipment.

Purchase Time Frame:
Within the next year.

Additional Comments:
The company is searching for a supplier that can provide a guaranteed solution to the above problem. Total water consumption is 7000m³/month.

ABRASIVOS AUSTROMEX, SA DE CV

Avenida Michoacan 45
09300 Mexico D.F.
Phone: (5) 694-5900
Fax: (5) 694-5900

Jorge A. de la Rosa de Dios
Project Manager

Company Size:
200 employees

Primary Products:
Abrasive products

Export Levels:
No direct exports

Plants:
The only plant is located at the above address.

Wastewater Status:
The company is currently complying with ecological norms.

Potential Opportunities:
Abrasivos wishes to recycle water for use in irrigation. Current treatment equipment will need to be expanded. The company already uses anaerobic treatment, a sedimentation tank, a filtration system, and chlorination. The goal is to recycle 25% of the 10m³ of water that is used daily.

Purchase Time Frame:
Within the next year.

Additional Comments:
The company is also interested in consulting and design services.

FORDATH SA DE CV

Vasconcelos Ote. 650 1er. Piso
Fracc. Valle del Campestre
Garza Garcia, Nuevo Leon
C.P. 66265
Phone: (8) 3357071
Fax: (8) 3787267

Claudio Ramirez
General Manager

Company Size:
Revenue \$US 7-8 million

Primary Products:
Industrial resins, stripping agents

Export Levels:
Information not available

Plants:
Ciudad Mitras (Nuevo Leon)
Cuautitlan (State of Mexico)

Wastewater Status:
The plant in Ciudad Mitras does not comply to regulations

Potential Opportunities:
The company currently uses an activated carbon system to reduce fenol resins from water effluent. However, the current system is not adequate to deal with the high concentrations of pollutants. The company is currently undertaking a pilot project and installing a boiler that will react the fenol content to allow water to pass through the activated carbon filter. If this project fails they will be looking for immediate solutions to reduce phenol resins in effluent.

Purchase Time Frame:
Within one year

Additional Comments:
Fordath has a strong preference for a supplier of equipment with a representative or office in Mexico. They have an environmental budget of US\$40,000 per year. Financing is viewed as an economic benefit and not a necessity. The company is 49% British owned. While there are no main buying links to Britain, support is occasionally obtained on large projects. The company usually looks to the U.S. first for technology unavailable in Mexico, due to geographical proximity.

CIBA GEIGY MEXICANA, SA DE CV

Calz. de Tlalpan 1779
Colonia San Diego
Mexico D.F.
Phone: (5) 549-3012
Fax: (5) 544-4344

Juana Miguel López

Company Size:
Approximately 350 employees.

Primary Products:
Voltaren, teretoc, tesalon, loproresor

Export Levels:
Information not available.

Plants:
The only plant is located at the above address.

Wastewater Status:
The company is currently surpassing environmental norms.

Potential Opportunities:
Ciba Geigy already has a treatment system in-house but is looking to optimize it. Potential purchases include a carbon activated filter and mud filtering technology. The company requires near drinkable water for its production process, and consequently quality and reliability are critical.

Purchase Time Frame:
Purchases will likely begin within the next year, and continue over a five year period.

Additional Comments:
Any supplier must have a local market presence. Ciba Geigy uses approximately 220m³/day of water, at an average cost of 6.15 NP/m³.

PROTEXA, SA DE CV

Carretera Monterrey - Saltillo
KM 330
Santa Catarina, Nuevo Leon
Phone: (8) 336-2030
Fax: (8) 336-2685

Horacio Valle

Company Size:
365 employees

Primary Products:
Oxidized asphalts and asphalt membranes

Export Levels:
Information not provided.

Plants:
The only plant is located at the above address.

Wastewater Status:
It can be assumed that the company does not currently meet with discharge regulations.

Potential Opportunities:
The company has expressed an interest in purchasing equipment for wastewater treatment. Decision makers have indicated that probable purchases include a flocculator, sedimentation tanks, and a filtration system. The capacity of the equipment would be approximately 15m³/day. Problem areas include BOD, suspended solids, and oils.

Purchase Time Frame:
Within the next year.

Additional Comments:
No additional comments.

ARYLO DE MEXICO, SA DE CV

Avenida Industria Nacional 21-B
Fracc. Ind. Alice Blanco, 2a sección
Naucalpan, State of Mexico
Phone: (5) 358-8625
Fax: (5) 358-9785

Luis Peniche Monje

Company Size:
58 employees

Primary Products:
Chemical substances for the textile and metal-mechanical industry.

Export Levels:
Information not provided

Plants:
The company has two Plants:
• Naucalpan, State of Mexico (above address)
• Queretaro, Queretaro

Wastewater Status:
The company is not currently complying with wastewater norms. However, an improvement project is currently being managed.

Potential Opportunities:
The company has identified water recycling equipment as the focus of future purchases. Interestingly, although recycling appears to be the focus, future companies were identified as sedimentation tanks, flocculators, and filters. Additionally, Arylo has indicated an interest in purchasing equipment components, high technology, and services.

Purchase Time Frame:
Within one year.

Additional Comments:
The company uses 10m³ per day at an approximate cost of 5.7 NP/m³. The capacity of a recycling system would be roughly equal. Additionally, meteline blue activated substances has been identified as one of the critical factors in current emissions.

TALOQUIMIA, SA DE CV

KM 4.5 Carr. S.J.R. - Tequisquiapan
76800 San Juan del Río, Queretaro
Phone: (467) 20669
Fax: (467) 20187

Luis Octavio García Espino

Company Size:
Approximately 40 employees

Primary Products:
Synthetic pine oil, dipentene, terpinolene, tall oil

Export Levels:
Information not provided

Plants:
San Juan del Río, Qro. (Pine oil, dipentene, terpinolene)
Anahuac, Chih. (tall oil)

Wastewater Status:
Currently complying with norms.

Potential Opportunities:
Taloquimia has expressed an interest in a wastewater treatment plant for the San Juan plant. Treatment would focus on high BOD levels. A capacity of 150m³/day would be required.

Interest also exists in a recycling system. Equipment would require a capacity of 200m³/day. Current water costs are 3 NP/m³.

Purchase Time Frame:
Decision makers expect to purchase wastewater equipment in 1994. Recycling equipment is classified as a medium term project (3 to 5 years).

Additional Comments:
Financing is an important aspect to the buying decision. The company has also indicated that they would be interested in buying consulting services.

MANUFACTURAS Y PROCESOS INDUSTRIALES, SA DE CV

Lázaro Garza Ayala 1312 Ote.
C.P. 66230 Garza García, N.L.
Phone: (8) 338-0853, 338-8274
Fax: (8) 338-4850

Ing. Homero García Castillo
General Manager

Ing. Bernardo Rojas Mayo
Manager of Operations

Company Size:
120 employees

Primary Products:
Lubricants, greases and oils

Export Levels:
Information not provided

Plants:
At the above address

Wastewater Status:
Complies with regulations

Potential Opportunities:
The company is in the process of moving its production facility. Wastewater treatment technology purchases will occur this year to meet stricter regulations. In addition, the company wishes to reuse its water at the new site for irrigation purposes. Water use is currently 245 m³ per month, and characteristics include a high BOD and mineral oil content as well as a varying PH level. The company is currently looking for quality solutions.

Purchase Time Frame:
Within one year

Additional Comments:
If no alternative financing is available, the company will apply for financing under the NAFINSA program. While financing is important, the company will not sacrifice quality. They are looking for the best equipment available.

FORDATH, SA DE CV

Vasconcelos Ote. 650 1er. Piso
Fracc. Valle del Campestre
66265 Garza Garcia, Nuevo Leon
Phone: (8) 3357071
Fax: (8) 3787267

Claudio Ramirez
General Manager

Company Size:
Revenue \$US 7-8 million

Primary Products:
Industrial resins, additives for brake lining, resins for manufacturing of moulds, stripping agents

Export Levels:
Information not provided.

Plants:
Ciudad Mitras, Nuevo Leon
Cuautitlan, Mexico

Wastewater Status:
Effluent from Ciudad Mitras do not comply to all municipal standards. The plant in Cuautitlan uses very little water and is currently complying to all required standards.

Potential Opportunities:
The company currently uses an activated carbon system to reduce phenol resins from water effluent. However, the system is not adequate to deal with high concentrations of pollutants. The company is undertaking a pilot project and is installing a boiler that will alter the phenol content to allow water to pass through the activated carbon filter.

If the project fails they will be looking for immediate solutions to reduce phenol resins in effluent.

Time frame: Within 1 year

Additional Comments:
The company has a strong preference for a supplier of equipment with a representative or office in Mexico. They have an environmental budget of \$US 40,000 per year. Financing is viewed as an economic benefit and not a necessity. The company is 49% British owned. While purchases are not decided in Britain, support is occasionally obtained on large projects.

ACERTEK, SA DE CV

Av. Constituyentes de Nuevo Leon 103-A
Colonia Escamilla
67120 Guadalupe, Nuevo Leon
Phone: (8) 379-2215
Fax: (8) 377-9863

Miguel Gallegos Torres

Company Size:
50 employees

Primary Products:
Steel girders for use in railway car brake systems

Export Levels:
Information not provided.

Plants:
The only plant is located at the above address.

Wastewater Status:
Not currently complying with discharge norms.

Potential Opportunities:
The company requires wastewater treatment to remove greases, oils, and sediments from effluent. Decision makers have identified potential purchases as sedimentation tanks, filtration systems, and neutralizers. The required capacity of equipment is 9m³/day, with a constant discharge of 30 litres per hour.

Purchase Time Frame:
Within one year.

Additional Comments:
Acertek already has one natural sedimentation system with a capacity of 9m³/day. Potential problem areas are identified as BOD, suspended solids, oils, and fats. Quality is critical.

QUIMICA HOECSHT, SA DE CV

Plasticos 28, Santa Clara
55540 Santa Clara, State of Mexico
Phone: (5) 229-5500, 229-5514
Fax: (5) 569-7518

Dr. Constantino Alvarez
Production Area D and Technical Services

Company Size:
1455 employees

Primary Products:
Organic and inorganic chemicals, colorants, pigments, resins, plastics, human and veterinary medicines, and vaccines

Export Levels:
Information not provided

Plants:
Santa Clara (above address),
Ocoyoacac - State of Mexico

Wastewater Status:
The company does not comply with regulations

Potential Opportunities:
Hoechst must implement a secondary water treatment within the next year. The company is currently negotiating with Smurfit Carton (located next door) to share their plant that is in construction. If the treatment is not adequate, Hoechst will invest in its own secondary plant. Plant capacity would need to be 800 m³ per day. Water characteristics include: approximate COD of 3000 mg/l, BOD of 1000 mg/l, suspended solids of 50 mg/l and detergents of 30 mg/l.

Purchase Time Frame:
Within one year

Additional Comments:
Quimica Hoechst generally works with UHDE, a sister company that operates in the wastewater field. Most wastewater technology operated by Quimica Hoechst is developed by the Hoechst group in the United States. While the company does allow other vendors to bid on wastewater projects, there would have to be a significant advantage to accepting an outside proposal. Financing is normally done internally, large financing requirements are supplied by the head office in the U.S.

GRUPO PRIMEX, SA DE CV

Unidad Cuautitlán
KM 24 Carretera Puente de Vigas Tepoztlán
54830 Cuautitlán, State of Mexico
Phone: (5) 325-2501
Fax: (5) 325-2545

Maximo Jimenez Loya
Unit Manager

Company Size:
Approximately 600 employees

Primary Products:
PVC resins, DOP, PVC products

Export Levels:
30%

Plants:
The company has three Plants:
• Puebla, Puebla
• Cuautitlán, State of Mexico
• Tampico, Tamaulipas

However, in May of 1994 the first two plants will be closing; all production lines will be re-established at the Tampico facility.

Wastewater Status:
Currently complying with norms.

Potential Opportunities:
The factory in Tampico currently has a wastewater treatment plant. However, the equipment was installed before the decision to close the Cuautitlán and Puebla plants was taken. As a result, there is a strong possibility that treatment capacity will be insufficient. Additionally, production processes are different in the three plants. Wastewater processes may need to be expanded to deal with different types of effluent contaminants. This is especially important given that the wastewater equipment currently located at the Cuautitlán plant will remain there.

In Cuautitlán, effluent contained high levels of BOD, COD, and suspended solids.

Purchase Time Frame:
If purchases are required, within the next year.

Additional Comments:
Two people are in charge of environmental affairs at the Tampico plant:

Martin Condé
Chief of Security and Ecology

Carlos Manrique
Plant Manager

JT BAKER SA DE CV

Plomo No. 2
Xalostoc, Edo. De Mexico
Phone: (5) 569-1100
Fax: (5) 755-2978

Ing. Teodulo Pérez Montesinos
Coordinator of Quality

Company Size:

Information not available

Primary Products:

Resins and adhesives

Export Levels:

Information not available

Plants:

The only plant is located at the above address

Wastewater Status:

The company complies with current regulations

Potential Opportunities:

Water discharge has a high BOD with chloridic, sulphuric and nitric acid contents. The company has installed settling and separation tanks and is currently neutralizing the PH levels. In the future the company will need to invest in technology to reduce the BOD in order to comply with stricter regulations. The plant uses approximately 7000 litres of water per day.

In addition, J.T. Baker is interested in recycling water. However, any purchase of equipment would depend upon an economic benefit.

Purchase Time Frame:

Within one year

Additional Comments:

Smaller equipment purchases will be financed internally.

NATIONAL STARCH AND CHEMICAL DE MEXICO SA DE CV

Av 16 de Septiembre 374
San Martin X. Azcapotzalco
Mexico D.F.
Phone: (5) 382-5122
Fax: (5) 382-8966, 382-1799

Sunil Shenoy

Director of Operations

Company Size:

155 employees, sales \$US 2,000,000

Primary Products:

Resins, Adhesives

Export Levels:

Approximately 10%

Plants:

Monterrey (Nuevo Leon) -
Holt melt and pressure sensitive adhesives
Toluca (State of Mexico) -
Water based resins, water based adhesives

Wastewater Status:

The company does not fully comply with regulations

Potential Opportunities:

The main water discharge problem is in the Toluca plant. National Starch and Chemical currently employs a primary treatment and then sends the water to a government pay-for-use industrial plant. Discharge levels are 20 m³ per day, and the company pays approximately \$ NP 5000 per month for secondary treatment. Water discharges comply with all parameters except for BOD and COD levels. Current BOD is approximately 700 mg/l and the company is trying to reach level of 380 mg/l. As a result, investment in a secondary biological treatment will be required. The estimated budget for secondary treatment is \$US 500,000.

Purchase Time Frame:

Within 2 years

Additional Comments:

National Starch and Chemical is a member of the Lever Brothers Group. Financing is usually provided internally, however large purchases must be approved by the head office in the U.S.. After sales service is extremely important.

ANCO DE MEXICO SA DE CV

Rio Lerma 215
AP 32016 Tlalnepantla
Mexico D.F.
Phone: (5) 390-1812, 390-1622
Fax: (5) 390-9087

Mauricio Islas Ibararán
Manager of Engineering

Company Size:
75 employees, sales \$US 5,000,000

Primary Products:
A variety of autoparts

Export Levels:
None

Plants:
The plant is located at the above address

Wastewater Status:
The company complies with all standards

Potential Opportunities:
Water is used primarily for cooling. Anco discharges approximately 8,000 m³ per year. While the company currently complies with all norms, future water treatment purchases will be necessary in order to comply with international head office standards. Anco was recently taken over by Cooper (U.S.A.), and as such, must meet environmental standards of Cooper plants. An environmental audit is scheduled for 1994, after which, upgrades will be made. However, head office policies for equipment purchases and financing are still unclear.

Purchase Time Frame:
Within 2 years

Additional Comments:
None

CLARIMEX SA DE CV

Rayón 18
Col. San Lorenzo Tlalnepantla
Edo. de Mexico
Phone: (5) 390-8711, 390-8401, 390-8697
Fax: (5) 565-3249

Enrique Rangel Peniche
Director General

Company Size:
Information not available

Primary Products:
Activated Carbons

Export Levels:
approximately 30%

Plants:
Hidalgo Attalaquia (Hidalgo)

Wastewater Status:
Water discharge does not currently comply with regulations

Potential Opportunities:
Clarimex is interested in equipment that will recover phosphoric acid for reuse from water discharge. Currently, this purchase would be due to an economic benefit. However, if norms become more strict, the company will need to treat water effluent for phosphate content. In addition, Clarimex has high levels of suspended solids and acidity in water discharge. Currently installed sedimentation tanks do not operate efficiently.

Purchase Time Frame:
Within 2 years

Additional Comments:
Financing would be external.

The company is interested in meeting with a Canadian wastewater treatment company that supplies activated carbons. Clarimex is interested in entering the Canadian market for activated carbons.

ICI EXPLOSIVOS

San Lorenzo 1009
03100 Mexico D.F.
Phone: (5) 688-5344, (5) 605-8206
Fax: (5) 688-4763

Fernando Alatorre Huerta
Engineering Manager

Company Size:

Approximately 600 employees.

Primary Products:

Explosives, ammonium nitrate, nitric acid, acrylics, paints, and pharmaceutical

Export Levels:

Between 20 and 30%

Plants:

The company operates seven Plants: Monclova, Coahuila; Huehuetoca, State of Mexico; La Presa, State of Mexico; Toluca, State of Mexico; Lomas Verdes, State of Mexico; Cuatrociénegas, Coahuila; and San Miguel de los Jagüeyes, State of Mexico. An eighth plant is being established in San Luis Potosí.

Wastewater Status:

ICI maintains they are complying with ecological norms.

Potential Opportunities:

Wastewater equipment is used to treat effluent waters. Oil and fat separation, sedimentation, clarification, aeration, and flocculation technology is used. The company maintains that they are fully complying with ecological norms; however, treatment is admitted to be only 50% effective. Effluent contains: ammonium nitrate, aluminum, sodium nitrate, titanium dioxide, pigments, and a small level of heavy metals. BOD levels can be as high as 300 mg/l in some plants.

The pharmaceutical division requires a pretreatment system. High levels of microbes have been detected in water destined for the production process; drinkable (or nearly drinkable) water is required. Consequently, the company is looking to purchase a chloride system.

In general, the company is constantly purchasing water equipment. A pre-approved budget for purchases up until 1995 has been established.

Purchase Time Frame:

Within two years.

Additional Comments:

Water consumption totals 700,000m³ in all existing plants.

EGON MEYER, SA DE CV

Henry Ford #38
Fracc. Industrial San Javier
54030 Tlalnepantla, State of Mexico
Phone: (5) 310-5766
Fax: (5) 310-4649

Aurelio Martinez Vivanco
Corporate Manager, Quality and Ecology

Company Size:

Approximately 130 employees

Primary Products:

DEP, DNP, DBP, DOP, DIDP, DTOP, TOTM (plastics)

Export Levels:

Information not provided

Plants:

The only plant is located at the above address.

Wastewater Status:

The company currently complies with ecological norms.

Potential Opportunities:

Egon Meyer is just now installing a wastewater treatment system, designed to neutralize the chemical residue for the production process of the above plastics. The technology allows the company to utilize the treated waters for equipment cooling. The system cost approximately \$80,000. No future wastewater equipment purchases are likely.

Currently, service and sanitary waters are not treated. Approximately 10% of the 2700 litres per day consumed are waters of this type. The company is considering a treatment project for these discharges in the medium term.

Purchase Time Frame:

2 to 3 years

Additional Comments:

Suppliers are required to provide a 10% surety guarantee until the equipment is installed and running to specifications.

ADHESIVOS, SA DE CV

Fuego 719
01900 Mexico D.F.
Phone: (5) 568-0505
Fax: (5) 568-5638

Juan Basurto

Company Size:
Approximately 70 employees.

Primary Products:
Formaldehyde, resins, and hexamine

Export Levels:
Information not provided.

Plants:
The only plant is operated at Ixtacuixtla, in the state of Tlaxcala.

Wastewater Status:
The company is currently complying with wastewater discharge norms.

Potential Opportunities:
Future purchases will focus on water recycling. The company plans to recycle 100% of all residual water. Decision makers have identified high technology equipment as a likely purchase item. Current water consumption totals 166m³/day; however, required capacity would total only 100m³/day.

Purchase Time Frame:
The company plans to purchase such equipment in the medium term, between two and five years.

Additional Comments:
Financing was identified as the second most important factor in the purchasing process, after quality.

QUIMICA ESTEROIDAL, SA DE CV

Narciso Mendoza 22
54180 San Juan Ixhuatepec, State of Mexico
Phone: (5) 714-6308
Fax: (5) 714-8065

Victor Hugo Juarez Montaño

Company Size:
Approximately 150 employees

Primary Products:
Hormonal steroids

Export Levels:
Information not provided

Plants:
The only plant is located at the above address.

Wastewater Status:
It can be assumed the company is not currently complying with discharge norms.

Potential Opportunities:
Química Esteroidal has high BOD and COD levels. The company anticipates the purchase of equipment capable of reducing these levels, with an approximate capacity of 50m³/day. Decision makers have recently embarked upon a study to determine the best methods of cleaning pollution levels in effluent discharges.

Química Esteroidal also anticipates the purchase of a recycling unit.

Purchase Time Frame:
Approximately 2 to 5 years

Additional Comments:
A compact solution is important, given tight space limitations. Total water use averages 74m³/day.

EQUIMSA

Vasconcelos 650 Oriente
Fracc. Valle del Campestre
66265 Garza García, Nuevo Leon
Phone: (8) 336-2376
Fax: (8) 336-2707

Alberto Aranda Herrera

Company Size:
90 employees

Primary Products:
Hydraulic fluids, oxidization inhibiting fluids

Export Levels:
Information not provided.

Plants:
The only plant is located in Santa Catarina, Nuevo Leon.

Wastewater Status:
It is unlikely that the plant is currently meeting discharge regulations, as it does not own water treatment equipment.

Potential Opportunities:
Purchases will focus on wastewater treatment equipment. Potential areas of interest include filtration systems, skimming machines, and sedimentation tanks. The company also identifies services as a possible purchase. The capacity of such a system would be approximately 10 - 15 m³/day.

Purchase Time Frame:
Medium term, between two and five years.

Additional Comments:
Price has been identified as the most important factor in the buying decision. Additionally, Equimsa has suggested that a supplier must be able to guarantee the equipment to be purchased will allow the company to operate within discharge norms.

FERTILIZANTES DE MINATITLAN, SA DE CV

Carretera Trasistica KM 26.5
Minatitlán, Veracruz
Phone: (922) 40391, 92, 93
Fax: (922) 46302

Angel Mario Ochoa Castillo

Company Size:
Nearly 700 employees

Primary Products:
Chemical fertilizers, including superurea, supernitrate, and triple 17

Export Levels:
Information not provided

Plants:
The only plant is located at the above address.

Wastewater Status:
The company does not comply with discharge norms.

Potential Opportunities:
The company needs wastewater solutions designed to eliminate amoniocal nitrogen and organic nitrogen. The first step is such a process will be the update of an existing distillation tower. Required treatment capacity is approximately 27m³/hour.

Purchase Time Frame:
Between two and five years

Additional Comments:
Financing has been identified as the second most important factor in the buying decision, after quality. Total water consumption is approximately 350m³/day, at a cost of 0.2 NP/m³. Purchases have been classified as equipment and components as well as services.

CHRISTIANSON, SA DE CV

Calle 37E #434
Civac
62500 Jiutepec, Morelos
Phone: (73) 192322
Fax: (73) 300960

Alberto Zamora Muñoz

Company Size:
Approximately 100 employees

Primary Products:
Detergents

Export Levels:
Information not provided

Plants:
The only plant is located at the above address.

Wastewater Status:
Information not provided.

Potential Opportunities:
Very little information was provided. While the company does suggest that future purchases are possible, no specific equipment types were mentioned. Interest is in advanced technology, services, and equipment and components. Production level increases are identified as the driving factor behind wastewater equipment purchases.

Purchase Time Frame:
Medium term, 2 to 5 years

Additional Comments:
No additional comments

CELANESE MEXICANA

Av. Revolucion # 1425
01040 Mexico D.F.
Phone: (5) 325-5159
Fax: (5) 325-5575

Enrique Viveros Villa
Director of Environmental Protection

Company Size:
6800 employees, annual sales: \$US 975.0 million.

Primary Products:
Fibres, chemicals, packaging

Export Levels:
25 - 30% of sales.

Plants:
Toluca (State of Mexico), Queretaro (Queretaro), Ocatlan, Zacapu, Celaya (Guanajuato), Cangrujera Oasoleacaqui, and Demacsa.

Wastewater Status:
Most plants comply with regulations.

Potential Opportunities:
The company is considering the installation of a treatment plant in Zacapu. Currently, wastewater treatment plants are in operation in Queretaro, Ocatlan, Celaya and Cangrujera. Water from the Oasoleacaqui is shipped by truck and treated at Cangrujera. However, the plant at Zacapu uses large quantities of water and has no treatment facility.

In addition, the company is considering the installation of a recycling unit in Queretaro. There is a strong desire to reuse water, achieving zero discharge in this plant.

Purchase Time Frame:
Within three years

Additional Comments:
Celanese Mexicana is continually investing in environmental protection. Ongoing opportunities are apparent with Celanese. However, they have expressed a preference for U.S. and German suppliers. The purchasing process has recently been decentralised. All projects are approved at head office, but equipment is purchased at the plant level.

DU PONT, SA DE CV

Homero 206
Colonia Polanco
11570 Mexico, D.F.
Phone: (5) 250-9033 ext 2228
Fax: (5) 255-2251

Javier Villarreal M.
Manager of Environmental Control

Company Size:
Approximately 4500 employees.

Primary Products:
Explosives, paint and paint bases, chemicals, lousidic acid, freon refrigerants, nylon - interim lycra, and agrochemicals

Export Levels: Approximately 30 - 40%

Plants:
Lerma (state of Mexico), Matamoras (Tamaulipas), Monterrey (Nuevo Leon), Tlalnepantla (state of Mexico), Santa Clara (state of Mexico), Tampico (Tamaulipas), Torreon, Puebla (Puebla), Coatzacoalcos (state of Veracruz)

Wastewater Status:
All plants are currently complying with federal regulations or are undertaking measures to comply. For example, the Tlalnepantla plant is currently participating in a shared wastewater facility for secondary and tertiary treatment (scheduled completion of spring 1994).

Potential Opportunities:
The company is embarking on a project to investigate recycling alternatives. The priority in all plants is the use of water. Total water consumption is approx. 3 million m³/year. Du Pont is looking to recycle water and recover by-products for reuse. Decision makers are particularly interested in ferrichloride for water treatment, and are currently looking for technology used in this process.

Purchase Time Frame:
Within three years.

Additional Comments:
Du Pont will continue to increase spending levels on waste water over the next few years. This increase is driven by economic benefit (cost control) and the desire for a good image. The company is looking for innovative solutions.

Currently, most waste water technologies come from the U.S. head office. However, project control is maintained at Du Pont Mexico.

Each plant maintains autonomy in technology purchases for small projects; however, large projects that affect all plants are coordinated at head office. Solutions will be implemented company wide. All financing is done internally.

MEXICANA DE RESINAS, SA DE CV

Potreros 12
P. Ind. Netzahualcoyotl
57819 Netzahualcoyotl, State of Mexico
Phone: (5) 227-0250
Fax: (5) 227-0250, extension 177

Marcelina Nolasco
Manager, Quality and Technology

Company Size:
70 employees

Primary Products:
Unsaturated polyresins

Export Levels:
Approximately 4%

Plants:
The company has one plant, located at the same address as above.

Legal Status:
The plant does not currently comply with government norms. Both BOD and COD are legislated at levels of 60 and 300 respectively; current discharges are in the area of 1000.

Potential Opportunities:
The company recently purchased a new water treatment plant, and is currently fine tuning its operation. However, Mexicana de Resinas is interested in purchasing a water recycling system, primarily due to the rising cost of water. Such a recycling system would need to be compact, yet have a capacity of approximately 5 tons of water/day.

Purchase Time Frame:
Within the next six years.

Additional Comments:
Current water costs average 4000 NP/month, and any decision to buy recycling equipment would use this figure to determine economic benefit. Financing over a three to five year period will be important. Additionally, the company has expressed interest in contracting maintenance services on any new equipment.

WITCO MEXICO, SA DE CV

CALLE GUADALUPE NO. 410
C.P. 54880, EDO. DE MEXICO
Phone: (5) 565-9088, 565-9287
Fax: (5) 872-3083

Alejandro Zamorano
Vice President

Company Size:
80 employees

Primary Products:
Additives, plastics, stabilizers and lubricants

Export Levels:
Low

Plants:
Located at the above address

Wastewater Status:
The company currently complies with regulations

Potential Opportunities:
While water discharge is within environmental standards, the company believes that they will have to invest in additional technology in order to comply with increasing legislation. Witco uses approximately 2500 m³ per month, and water discharge characteristics include oils and greases, metals, and fatty acids. Current wastewater treatment involves settling and separation tanks as well as chemical neutralization.

Purchase Time Frame:
As soon as regulations require it

Additional Comments:
The company relies on its head office in the U.S. for technical solutions, and large equipment purchases must be approved by them. Financing would be required, but is obtained locally.

LINDE DE MEXICO SA DE CV

Blvd. M. Avila Camacho No. 32
Lomas de Chapultepec
1100 Mexico D.F.
Phone: (5) 627-9538, 627-9500 ext 2508
Fax: (5) 627-9566

Victor M. Quiroz
Commercial Manager

Company Size:
700 employees

Primary Products:
Industrial gases: oxygen, nitrogen, hydrogen

Export Levels:
None

Plants:
Monterrey (Nuevo Leon)
Coatzacoalcos (Veracruz)
Mexico D.F.

Wastewater Status:
The company complies with all regulations

Potential Opportunities:
Water is used for services and cooling only. Water used for cooling is pretreated with chemical and recycled. Effluent goes to the municipal sewers in all plant locations except Mexico D.F.. Discharge from the D.F. facility is sent to an industrial water treatment plant on a pay for use basis. While no immediate opportunities are apparent, the company has expressed an interest in equipment that will allow them to recycle discharges.

Purchase Time Frame:
Will depend on economic benefit of project

Additional Comments:
Linde de Mexico is currently developing an entry strategy for the Mexican wastewater treatment market. The company has developed its own technology for water treatment.

ADITIVOS MEXICANOS, SA DE CV

KM 19.5 Carretera Mexico - Cuautitlán
Tlalnepantla, State of Mexico
Phone: (905) 310-1177
Fax: (905) 310-7413

Jose Zuñiga García
Environmental Control Manage

Company Size:
180 employees

Primary Products:
Calcium phenate, zinc ditiophosphates

Export Levels:
Approximately 50%

Plants:
The company manages two Plants:
• Tlalnepantla (above address)
• San Juan del Río, Queretaro

Wastewater Status:
Both plants currently have treatment technology, including agitators, flocculators, filtration equipment, and biological and chemical treatment. The company has mentioned that they have long-term, but undefined, projects in water recycling.

Potential Opportunities:
Purchases not likely in the short to medium term.

Purchase Time Frame:
No additional comments

Additional Comments:
No additional comments.

ESPECIALIDADES QUIMICAS GRACE DE MEXICO, SA DE CV

Calle 8 #710
Fraccionamiento Industrial
Toluca, State of Mexico
Phone: (72) 161200
Fax: (72) 166490

H. Francisco Reyes S.
Plant Manager

Raymundo Rosales Muñoz
Industrial Chemist

Company Size:
Annual revenue: \$US 30.0 million

Primary Products:
PVC barrier sheets, plastic packaging materials

Export Levels:
Approximately 5%

Plants:
The only factory is located at the above address.

Wastewater Status:
Currently complying with ecological norms.

Potential Opportunities:
Opportunities are limited. The factory is located in an industrial park which provides wastewater treatment services to the company for only 10000 NP per year. Discharge volumes are normally less than .5m³/hour. Additionally, toxicity is low; only 20% of wastewater comes from the production process, with the remainder sanitation and service water. The only potential cause for equipment purchase would be EPCCA's inability to effectively treat discharges.

Purchase Time Frame:
Purchases unlikely, unless EPCCA becomes ineffective or increases its rates significantly.

Additional Comments:
No additional comments.

FENO RESINAS, SA DE CV

División del Norte 415-1
Colonia del Valle
03100 Mexico D.F.
Phone: (5) 536-1559, (5) 536-2535
Fax: (5) 669-3010

Alfredo Mejia Sardo
Sales Manager

Company Size:
120 employees

Primary Products:
Fenol resins, formol

Export Levels:
Information not provided

Plants:
The only plant is located in Tizayuca, Hidalgo.

Wastewater Status:
The company is currently complying with wastewater norms.

Potential Opportunities:
No future purchases are likely unless discharge regulations become significantly stricter. Current wastewater technology is sedimentation, centrifugal force, decantation, and flocculation.

Purchase Time Frame:
As regulations require.

Additional Comments:
The volume of any future equipment purchases would be between 300,000 and 400,000 litres.

DOW QUIMICA MEXICANA, SA DE CV

Paseo de las Palmas 555
Lomas de Chapultepec
11000 Mexico D.F.
Phone: (5) 227-1993
Fax: (5) 227-1976

Lic. Victor Bermudez Cancino
Director of Communications and Public Relations

Company Size:
Information not available

Primary Products:
Chemicals, plastics, paints, and varnishes

Export Levels:
Information not provided

Plants:
Tlalnepantla (Mexico) - coated metals, cables
Tlaxcala (Tlaxcala) - poxy resins, paints and varnishes
Cuernavaca (Morelos) - antibiotics

Wastewater Status:
Information not provided

Potential Opportunities:
Dow Química considers itself a leader in maintaining environmental standards. As such, Dow works towards exceeding wastewater discharge standards. Decision makers believe that spending on wastewater technology, equipment and services will increase. Increased spending will be due to company growth and improvement of existing treatments. Technology purchases will focus on waste reduction and recycling of products from water.

Purchase Time Frame:
Unknown

Additional Comments:
Technology from the Dow Química U.S., implemented by a Mexican contractor, is normally used for large projects. Bids are open, though only reputable companies are asked to bid. Smaller purchases are made directly at the plant level.

Plant managers include:
Jorge Zavala (Cuernavaca) - (73) 200542
Roberto Garcia Espana (Tlaxcala) - (241) 27080

PROBST, SA DE CV

Calzada de Las Armas
54080 Tlalnepantla, Edo. de Mexico
Phone: (5) 394-4261, 394-7866
Fax: (5) 382-4306

George A. Egli
Director of Production

Company Size:
100 employees

Primary Products:
Adhesives and tints

Export Levels:
low

Plants:
Located at the above address

Wastewater Status:
Complies with current regulations

Potential Opportunities:
The company maintains that it complies with all standards. There is currently no water treatment systems in place. However, there is possibility that they will change the process to use water based inks in the future. In this case, the company recognises that it may have to invest in some wastewater equipment to meet the increased standards.

Purchase Time Frame:
Unknown

Additional Comments:
The company holds close ties to Switzerland (while the company is legally 100% Mexican owned, the owner is Swiss). For this reason, there is a strong managerial preference to purchase Swiss technology. Financing for smaller purchases would be done internally.

SIKA MEXICANA SA DE CV

Bldv. M. Avila Camacho No. 675
Fracc. Ind. Alce Blanco
Naucalpan Edo. de Mexico
C.P. 53370
Phone: (5) 576-6311, 576-6871
Fax: (5) 576-6145

Pedro Serrano Ramos

Company Size:
110 employees

Primary Products:
Add-mixtures for cement and concrete, sealants with silicone and poly-urathtane

Export Levels:
Approximately 5%

Plants:
Queretaro, Queretaro

Wastewater Status:
Sika Mexicana complies with all current wastewater standards.

Potential Opportunities:
Sika Mexicana installed a wastewater treatment system in the plant in 1993, in order to comply with new municipal regulations. Treatment equipment is developed at the head office in Zurich, where the Sika Worldwide ecology department is located.

Purchase Time Frame:
Future purchases unlikely

Additional Comments:
None

CALZADO SANDAK, SA DE CV

Av. Tláhuac No. 105
Iztapalapa
09820 Mexico D.F.
Phone: (5) 670-8744
Fax: (5) 582-3483

Manuel Sanchez Avila
Quality Control

Company Size:
Sales: \$US 40,000,000, employees: 1000

Primary Products:
Plastic and leather shoes

Export Levels:
10-15%

Plants:
Above address - plastic shoes
Calpulalpan (Tlaxcala) - leather shoes
Ameca Meca (Mexico) - synthetic leather shoes
Chalco (Mexico) - plastic shoes

Wastewater Status:
The company complies with all standards.

Potential Opportunities:
Sandak uses very little water. Water use is primarily for steam generation and cooling. Cooling water is reused and then discharged; however, effluent complies with all regulations. As a result no immediate or future purchases are planned.

Purchase Time Frame:
Future purchases unlikely.

Additional Comments:
Sandak is owned by Bata Shoes of Canada. As a result, they must follow strict environmental regulations as outlined by the head office in Canada.

PRODUCTOS SIGMA, SA DE CV

Calz. Glez Gallo #3049
44890 Guadalajara, Jalisco
Phone: (3) 635-2152
Fax: (3) 635-5312

Manuel Flores Flores
Director General

Company Size:
Annual Sales: \$US 8.0 million
32 employees

Primary Products:
Adhesive products based in solvents

Export Levels:
No exports

Plants:
The only production facility is located at the above address.

Wastewater Status:
Currently complying with all norms.

Potential Opportunities:
Only 10% of water is used in the production process, and only for equipment cooling. Discharges do not register prohibited substances. Low water volumes discourage any necessity for recycling systems.

Purchase Time Frame:
Future purchases unlikely.

Additional Comments:
No additional comments.

AUTOPARTS INDUSTRY

The autoparts industry continues to be one of the most dynamic sectors of the Mexican economy. Local manufacturers have been successful both at home and abroad. For example, since 1989 vehicle exports have risen nearly 300%, creating a \$US 1.4 billion trade surplus in total automotive trade. Autoparts exports have grown on a similar scale, making Mexico the world's largest exporter of gasoline engines. At the same time, domestic consumption of autoparts has risen considerably, largely due to growth in the number of vehicles in Mexico. In fact, the Mexican market is the only North American vehicle market that is currently growing.

Increased exports and rising local demand have together resulted in annual growth rates of over 20% in the autoparts industry. Expansion on a similar scale is expected for the next several years. Analysts expect total growth between 1992 and 1995 to exceed 50%, resulting in industry sales of \$US 17 billion.

Growth within the industry has resulted in significant expansion projects. Between 1990 and 1993 over \$US 3 billion was committed to capacity expansion projects, primarily in new facilities. Much of this investment was a result of the renewed internationalization of the industry, as companies such as Daimler Benz (re)established a market presence. Future investment commitments indicate further growth; in 1994, \$US 919 million will be invested; in 1995, \$US 1108 million; and in 1996 \$US 1188 million. Given the high levels of new facility construction, wastewater vendors targeting the automotive field may wish to create relationships with construction firms involved in new plant construction.

Industry growth is largely a result of deregulation. For example, all import restrictions for autoparts components have been eliminated, as long as the Mexican company exports equal or surpass the value of imports.

Local content requirements for vehicles to be sold in the Mexican market have been reduced from 60% to 36%. Finally, all restrictions on vehicle model lines in Mexico have been eliminated. As a result of deregulation, Mexican companies have been forced to respond to global pressures. Export and growth statistics indicate that the Mexican industry has responded to these pressures successfully.

Norms and Enforcement:

No specific norms apply to the autoparts industry. Instead, companies normally comply with municipal norms or product specific norms, such as glass, glass fibres, and finished metal products. Enforcement is relatively strict, as most companies are located in zone 1 priority areas.

Perspectives:

The industry is expected to grow 50% between 1992 and 1995. Over \$US 3 billion in investment is planned in the years 1994, 1995, and 1996.

Target Market:

500 companies operate in the autoparts industry, of which 211 export. An additional 100 companies produce autoparts in the maquiladora industry. The industry is highly concentrated, with 60% of all companies located in Mexico D.F.

The Mexican autoparts industry is highly international in nature. Over 43% of total investment is controlled by foreign autoparts firms, including such industry giants as Eaton, GKN, Dana Corporation, Magna, Budd, TRW, Rockwell, and Spicer.

The industry is highly concentrated in priority zones for wastewater management. For example, 60% of all companies are located in Mexico D.F. (zone 1), 12% in Monterrey (zone 1), Puebla 6% (zone 1), Toluca 6% (zone 1), and Queretaro 6% (zone 1). As a result, many of these companies are under considerable pressure to both reduce water consumption and treat wastewater discharges, if any.

There are no wastewater norms that apply specifically to the autoparts industry. Instead, some companies may be bound by one of three norms, depending upon their product line: norm 10, regulating companies that manufacture glass or glass fibres; norm 11, governing producers of blown glass; norm 17, controlling discharges from producers of finished metal products.

Given the wide diversity in products produced by the autoparts industry, it is difficult to generalize as to total interest levels in wastewater equipment. Nevertheless, water is not often an integral part of the production process, and is more frequently used

for such activities as machine cooling. Water volumes and pollution levels are generally low; consequently enforcement has been lax. As a result, companies have less motivation to make an investment in wastewater treatment equipment.

**Maximum Permissible Limits:
Daily Average**

	Norm 10:	Norm 11:	Norm 17:
PH Levels	All norms specify limits of 6 to 9		
Oils/Fats	Both norms specify 30 mg/l		NA
Total Suspended Solids	40 mg/l	30 mg/l	20 mg/l
Biological Demand for Oxygen (BOD)	30 mg/l	NA	NA
Chemical Demand for Oxygen	100 mg/l	NA	NA
Total Phosphorous	5 mg/l	10 mg/l	NA
Amoniacal Nitrogen	NA	20 mg/l	NA
Lead	NA	0.6 mg/l	0.6 mg/l
Hexavelant Chromium	NA	NA	0.1 mg/l
Total Chromium	NA	NA	1.0 mg/l
Copper	NA	NA	0.5 mg/l
Nickel	NA	NA	2.0 mg/l
Zinc	NA	NA	1.0 mg/l
Iron	NA	NA	1.0 mg/l
Cadmium	NA	NA	0.1 mg/l
Cyanide	NA	NA	0.3 mg/l
Aluminium	NA	NA	2.0 mg/l
Barium	NA	NA	2.0 mg/l
Manganese	NA	NA	2.0 mg/l
Silver	NA	NA	0.2 mg/l

Sources:

1. The Mexican Investment Board, "*The Autoparts Industry*," (Mexico D.F.: Grupo Financiero Banamex, 1992)
2. Promociones Industriales Banamex, "*Mexico: The Autoparts Industry*," (Mexico D.F.: Promociones Industriales Banamex, 1991)
3. The Canadian Embassy, "*Market Study on the Mining Autoparts in Mexico*," (Mexico D.F.: Canadian Embassy, 1992)
4. INA, "*La Industria Automotriz en el Entorno Nacional*," (Mexico D.F.: INA, 1993)

**UNICORP (PREVIOUSLY DIRECSPICER,
SA DE CV)**

Bosque de Ciruelos 278
Bosques de las Lomas
11700 Mexico, D.F.
Phone: (5) 726-8122, x8245
Fax: (5) 726-8162

Sofia Rangel Figueroa
Environmental Engineering Projects

UniCorp is a holding organization for 25 companies active in the autoparts industry, owned by the Mexican conglomerate DESC. Sample products include: transmissions, pistons, gear boxes, and spark plugs. Each company has direct responsibility for their own environmental purchases; however, each project is approved by the environmental department at the corporate level (see above).

Plants are located throughout the country: Mexico D.F., Celaya, Queretaro, Chihuahua, and Aguascalientes. In general, current environmental equipment is considered rudimentary. Many plants simply flocculate water until sedimentation occurs. If treatment exists, most plants are only treating sanitary and service water discharges. Few of the companies are treating water discharges from the production process. In general, plants that are located outside of Mexico City are considerably more advanced in their wastewater treatment abilities than those located within the metropolitan area.

Given the similarity of products throughout the 28 companies, discharge problems can generally be characterized as high concentrations of the following sub-stances: phosphates, soluble oils, greases, and detergents. An important factor in equipment purchases is corporate policy: group members must search for total water solutions, over the long term incorporating wastewater treatment, recycling, and water reduction equipment into overall system.

Given their urban location, most of the plants are attempting to comply with SEDESOL norm 31, which regulates discharges to municipal drainage systems.

Each company has had an environmental budget approved for 1994; the budget provides approximate spending guidelines only.

Corporate personnel indicate that the strongest wastewater market (within the company) are those group members located in Mexico City. Purchases will likely focus on wastewater equipment for process waters. Provincial opportunities focus on system optimization.

UniCorp Members

The following table is a brief summary of key information on group members, as provided by the group environmental coordinator.

Company Data	Contact Person	Existing Equipment	Future Purchase Likely
Aleaciones Finas Autometales Huehuetoca, Mexico ² Tel: (591) 80318 Fax: (591) 80263	Jacqueline Valdez	None	No
Autometales S.J. Ixhuatepec, Mexico Tel: (5) 586-0022 Fax: (5) 586-5700	Javier Galuiz	Biological treatment of service and sanitary waters	Yes
Autopar Distribuidora Naucalpan, Mexico Tel: (5) 726-8222 Fax: (5) 726-8228	Jorge Villena	None	No
Autoprecisa Xalostoc, Mexico Tel: (5) 714-2783 Fax: (5) 714-0815	Silvia Espinosa	None	Yes
Bujias Mexicana Tlalnepantla, Mexico Tel: (5) 382-3100 Fax: (5) 382-5880	Juan Mercado	None	Yes
Cardanes Queretaro, Queretaro Tel: (42) 170369 Fax: (42) 170963	Antonio Cardanes	Biological treatment of service and sanitary waters	Yes
Componentes Precisión Cauatitlán, Mexico Tel: (5) 565-7411 Fax: (5) 872-2602	Estephan Esquinel	None	Yes
Comercializadora DM Mexico D.F. Tel: (5) 577-2122 Fax: (5) 577-0462	Roberto Luna	None	Yes
Ejes Tractivos S.J. Ixhuatepec, Mexico Tel: (5) 726-8022 Tel: (5) 586-6285	Rodolfo Valencia	Biological treatment of service and sanitary waters; currently installing further wastewater equipment	Yes
Engranos Conicos Queretaro, Queretaro Tel: (42) 170551 Fax: (42) 170452	Juan Castro	Biological treatment of service and sanitary waters	Yes
Forjas y Maquinas Aguascalientes, Ags. Tel: (491) 68834 Fax: (491) 66591	Gustavo Martinez	Biological treatment of service and sanitary waters	Yes
Autoforjas Queretaro, Queretaro Tel: (42) 170924 Fax: (42) 170975	Teresa Torres	Biological treatment of service and sanitary waters	Yes

• *Autoparts Industry* •

Company Data	Contact Person	Existing Equipment	Future Purchase Likely
Forjamex S.C. Xalostoc, Tlaxcala Tel: (241) 30183 Fax: (241) 71510	Jesus Gonzalez	Biological treatment of service and sanitary waters	Yes
Frenso y Mecanismos Queretaro, Queretaro Tel: (42) 170239 Fax: (42) 170488	Daniel Ozuna	Biological treatment of service and sanitary waters	Yes
I.E.A. Los Pirules, Mexico Tel: (5) 379-9377 Fax: (5) 379-5715	Dr. Luis Tapia	None	Yes
Kelsey Hayes de Mexico Xocoyohualco, Mexico Tel: (5) 562-4933 Fax: (5) 572-3397	Gabriela Maya	Biological treatment of service and sanitary waters	Treatment plant recently put out to bidding process
Kelsey Hayes de Chihuahua Chihuahua, Chihuahua Tel: (14) 201002 Fax: (14) 200226	Francisco Javier Presa	Biological treatment of service and sanitary waters; chemical treatment of effluent from painting facilities	Yes
Moresa Mexico D.F. Tel: (5) 567-4700 Fax: (5) 587-3473	David Moreno	None	Definite purchase within next year; see entry on Moresa
Morestana Aguascalientes, Ags. Tel: (491) 73230 Fax: (491) 73264	Eloisa Ruiz	Biological treatment of service and sanitary waters	Yes
PEMSA Celaya, Guanajuato Tel: (461) 45404 Fax: (461) 45049s	Julio Cesar Alcaraz	Biological treatment of service and sanitary waters; chemical treatment of effluent from painting facilities	No
Servispicer Mexico D.F. Tel: (5) 368-1633 Fax: (5) 567-0085	Jose Castañeda	None	Yes
Tecnomac Queretaro, Queretaro Tel: (42) 170257 Fax: (42) 170349	Dagoberto Carrillo	Biological treatment of service and sanitary waters	Yes
T.S.P. Queretaro, Queretaro Tel: (467) 50150 Fax: (467) 50222	Elias Perea	Biological treatment of service and sanitary waters	Yes
T.F. Victor Naucalpan, Mexico Tel: (5) 576-1122 Fax: (5) 358-7646	David Aguilar	Currently purchasing wastewater equipment for process waters	Definite purchase within next 18 months; see entry on T.F. Victor
Velcon Celaya, Guanajuato Tel: (461) 10433 Fax: (461) 10494	Carlos Cachu	Biological treatment of service and sanitary waters	No

It is important to realize that all plants in Queretaro are located in their own industrial park; as a result, purchases may be shared among plants. Similarly, two plants in Celaya (Velcon and Fupresa) currently share a biological treatment plant. Future purchases may also be shared.

COOPER BUJIAS CHAMPION DE MEXICO

150 Poniente 956
Colonia Industrial Vallejo
02300 Mexico, D.F.
Telephone: (905) 567-7200
Fax: (905) 587-5335

Dr. Enrique Ramirez Corona
Industrial Security

Company Size:
Over 700 employees

Primary Products:
Spark plugs

Export Levels:
Approximately 15%

Plants:
The only plant is located at the above address.

Wastewater Status:
The company maintains they are complying with ecological discharge norms.

Potential Opportunities:
The company has treatment equipment primarily utilizing sand filtration techniques. Discharges contain elements of greases and oils, detergents, sedimented solids, lead, copper, cyanide, zinc, fenols and cadmium. Additionally, BOD levels in some discharges can be as high as 3700 mg/litre.

Discharges are currently kept separated. Six different water discharges occur in total. In 1994, Bujias Champion plans to reorganize their drainage system, to permit one single water discharge.

Purchase Time Frame:
Mid 1994

Additional Comments:
No additional comments

MORESA INDUSTRIAL, SA DE CV (MEMBER OF UNICORP)

Norte 35 #895
Colonia Industrial Vallejo
02300 Mexico D.F.
Phone: (5) 567-4700
Fax: (5) 567-0940

David Moreno
Chief, Security & Training

Company Size:
No revenue figures were provided, however the company is the largest producer of automobile pistons in Mexico. Employment levels exceed 900.

Primary Products:
Pistons for automobile engines

Export Levels: None

Plants:
The company has two plants, one across the street from the other: Norte 35 #895 & Norte 35 #903

Wastewater Status:
The company is outside of ecological discharge norms.

Potential Opportunities:
Neither plant has wastewater treatment equipment for process waters. Problem areas in water discharge include: suspended solids, oils and greases, and MBAS. Both plants exceed norms in all three areas. In spite of the fact that the plants are very near to each other, two treatment plants would need to be purchased. Required capacity of either treatment plant is small: 3 litres/second at 903 Norte, and 2 litres/second at 895 Norte. Decision-makers identified potential equipment purchases as filters and decantation systems for solids. A third area of interest is treatment equipment for sanitary waters, estimated at 65% of the annual consumption of 33000m³ (figure includes both plants). Such a plant would have a capacity of roughly 3 litres per second, and use anaerobic technology. Only one plant would be bought to serve both factories.

Purchase Time Frame:
The company has late 1994 to prove to SEDESOL that one of the two plants is complying with ecological norms. Given higher water consumption at 903 Norte, the company plans to focus on that plant first. 895 Norte will also receive a treatment plant in early 1995. Recycling projects will be undertaken within two years.

Additional Comments:
The budget for the first treatment plant (903 Norte) has been set at approximately \$CDN 350,000. The company requires a supplier with a local presence. A guarantee that the equipment functions as specified is required.

**T.F. VICTOR, SA DE CV
(MEMBER OF UNICORP)**

Calle 4 #22
Fracc. Industrial Alce Blanco
Naucalpan, State of Mexico
Phone: (5) 576-1122
Fax: (5) 358-7646

David Aguilar
Security and Environmental Control

Company Size:
Annual sales: \$US 60.0 million

Primary Products:
Couplings and locks for the automobile industry

Export Levels: None

Plants:
The company has two Plants:
• Naucalpan, State of Mexico (above address)
• Naucalpan, State of Mexico (Calz. La Naranja, #1)

Wastewater Status:
Currently not fully complying with ecological norms.

Potential Opportunities:
The company is already undertaking a wastewater treatment project. High levels of the following substances are evident: phenols, zinc, phosphates, and greases and oils. The project is costing approximately \$CDN 150,000.

The most probable immediate purchase is recuperation equipment, used to capture toluene vapours from recycled water used for the cooling process. Traces of alcohols are also found. Equipment would require a capacity of 173 litres per hour.

Another likely future purchase is equipment to be used for the treatment of sanitation and service waters. Total consumption of non-process waters in the two plants are: Calle 4 (15000m³/year); La Naranja (5000m³/year). The company doesn't meet with norm 31 in the discharge of its service waters. High concentrations of COD, detergents, and oils and greases have been found.

Purchase Time Frame:
Recuperation equipment: within one year
Service water equipment: within 18 months

Additional Comments:
Treatment equipment would need to be compact and mobile. Decision-makers are considering anaerobic treatment equipment. Automated equipment, with minimum maintenance, is preferred.

**RINES DE ACERO K-H, SA DE CV (KELSEY
HAYES - PART OF UNICORP)**

Avenida Hidalgo # 8
Esquina Plano Regulador
Xocoyahualco
Tlalnepantla, State of Mexico

Gabriela Alejandra Maya Marquez

Company Size:
Approximately 450 employees

Primary Products:
Information not provided

Export Levels:
Information not provided

Plants:
The company's only plant is located at the above address.

Wastewater Status:
This information was not provided. However, the company is attempting to comply with norm 31, governing discharges to municipal drainage systems.

Potential Opportunities:
The company currently uses a biological treatment plant to treat discharge waters. Decision-makers are planning on purchasing a chemical treatment plant. Such a plant would need to provide solutions to discharges carrying concentrations of BOD, COD, and suspended solids.

Purchase Time Frame:
Within one year

Additional Comments:
No additional comments

GRUPO URREA

Dr. R. Michel #825
44940 Guadalajara, Jalisco
Phone: (3) 619-4480, (3) 619-3310
Fax: (3) 619-4170

Anuar F. Bitar
Manager, Engineering Division

Company Size: \$US 160 million

Primary Products:
Plumbing valves, Plumbing faucets, High pressure valves

Export Levels: Approximately 5%

Plants:
The company maintains 7 plants, four in Guadalajara and 3 in nearby El Salto.

Wastewater Status:
Several of the company plants are not currently complying with wastewater discharge norms.

Potential Opportunities:
Grupo Urrea needs to increase the treatment capacity of one of its manufacturing plants in El Salto. Capacity is 15000m³/year, and production levels are expected to generate 25000m³/year by the end of 1994. Two types of equipment are needed: evaporators to eliminate chromium and nickel residues, and technology to reduce suspended solids and biological demand for oxygen (BOD). Management is considering the purchase of recycling equipment for one of the El Salto plants. Water consumption now totals 180000m³ per year, at a cost of 3.5 NP/m³. The company may purchase equipment to treat sanitary waters. Plants in Guadalajara are currently not complying with sanitary water norms. Should city officials begin to enforce discharges, treatment would become a priority. Estimated required capacity is approximately 50000m³ per year. Similarly, one of the plants in El Salto may require a capacity expansion for the treatment of sanitary waters.

Purchase Time Frame:
Evaporation equipment in El Salto: within one year
BOD and suspended solid equipment in El Salto: within one year
Recycling equipment at El Salto: within three to five years
Sanitary water treatment in Guadalajara: dependent on municipal enforcement
Sanitary equipment at El Salto: within three to five years

Additional Comments:
Company decision makers expect maintenance services to be provided internally. However, the company is looking for an "equipment performance guarantee."
Environmental officials at GRUPO URREA estimate that over the next five years, approximately \$US 500000 will be spent on wastewater equipment. A similar amount will be allocated to recycling equipment.

SPIRAX SARCO MEXICANA, SA DE CV

F.I. Madero 280
Santa Catarina, Nuevo Leon
Phone: (8) 336-3248
Fax: (8) 336-2215

Eduardo Hernandez
Plant Manager

Company Size:
112 employees

Primary Products:
Filters, regulators, and valves for the management and control of water vapour and other liquids

Export Levels:
Information not provided

Plants:
Spirax has one plant, located at the above address.

Wastewater Status:
The company maintains that they are currently complying with wastewater norms.

Potential Opportunities:
Spirax identifies future purchase areas as both wastewater and recycling equipment. The factory does not currently have a treatment plant; however, discharge volumes appear to be low. Areas for concern in the discharge include: oils and fats, BOD, COD, and heavy metals. The company has identified potential purchases as filtration and post treatment equipment.

Purchase Time Frame:
Within one year

Additional Comments:
The company is currently in negotiation with Sanborn and Aquaser/Cromaglass. The required capacity for the equipment has been identified as 2.35m³/month. However, water consumption totals 233m³/month, at a cost of NP 2.7/m³.

IDDEA, SA DE CV

Calle 2 #2371, Zona Industrial
44940 Guadalajara, Jalisco
Phone: (3) 610-1794, (3) 610-1795
Fax: (3) 612-5360

Manuel Alvarez Martinez
General Manager

Company Size:
Annual Sales: \$US 3.0 million
110 employees

Primary Products:
Automobile spare parts.

Export Levels:
Approximately 10%

Plants:
The only plant is located at the above address.

Wastewater Status:
Not currently complying with wastewater norms.

Potential Opportunities:
The company is currently searching for a supplier of equipment that will reduce heavy metals and suspended solids from wastewater emissions. Required capacity is approximately 200m³/month. The technology must be particularly effective at eliminating high levels of chromium.

Purchase Time Frame:
Within one year.

Additional Comments:
Financing will be key in any contract with Iddea.

BUNDY MEXICO PEMSA

Via José López Portillo 8-A
54940 Tultitlán, State of Mexico
Phone: (5) 310-8878

Guillermo Camino
Manager, Technical Development

Company Size:
250 employees

Primary Products:
Metal tubing primarily used in automobile braking and gasoline systems.

Export Levels:
10%

Plants:
The company has one plant, located at the above address.

Wastewater Status:
Information not provided.

Potential Opportunities:
The company already has a wastewater treatment plant operating at the production location. However, decision makers are interested in purchasing a system that will assist in the overall reduction of discharge levels. Interest in such a system is a result of a new (to be implemented in 1994) requirement to pay for (even) non-toxic water discharges into the municipal system. Water recycling is expected to be an integral part of any solution to this problem. Approximate required capacity is 2.5 litres per second.

Purchase Time Frame:
Within one year.

Additional Comments:
Discharges from the production process are characterized by either high acidity or high alkalinity. Significant levels of toxic suspended solids are also registered (zinc, cadmium, and hexavalent chromium). The current plant (in-house) treats these effluent chemically. The treated water is then discharged to the municipal water network.

GALVANIZADOR DE OCCIDENTE, SA DE CV

Calle 7 y 20, Zona Industrial
44940 Guadalajara, Jalisco
Phone: (3) 611-3207, (3) 611-3992
Fax: (3) 611-3519

Salvador de la Fuente Mejia
Technical Director

Manuel Alvarez Martinez
General Manager

Company Size:
Annual Sales: \$US 1.0 million

Primary Products:
The company provides a metal finishing service (product oriented) for other companies.

Export Levels:
No exports.

Plants:
The only plant is located at the above address.

Wastewater Status:
Not currently complying with wastewater regulations.

Potential Opportunities:
The company requires equipment that eliminates suspended solids and heavy metals. On occasion, the company is also outside of official norms in terms of biological demand for oxygen (BOD). The equipment would need an average capacity of 400m³/month.

Purchase Time Frame:
Purchase will likely take place by the end of 1994.

Additional Comments:
The company is capable of undertaking their own equipment installation. Financing is critical. Finally, equipment size is an important factor, given the space limitations within the plant.

GALVANIZADORA Y HERRAJES DE GUADALAJARA, SA DE CV

Calle 11 #426
Colonia Ferrocarril
44440 Guadalajara, Jalisco
Phone: (3) 610-4662
Fax: (3) 612-3337

Oscar Nuñez Ruesga
Owner

Company Size:
Annual sales: \$CDN 330,000

Primary Products:
Galvanized products for steel structures

Export Levels:
None

Plants:
The only plant is located at the above address.

Wastewater Status:
The company does not currently comply with discharge norms.

Potential Opportunities:
The company's primary interest area lies in the elimination of suspended solids. To that end, sedimentation equipment was purchased in November of 1993. Approximate cost was \$CDN 10,000. Future purchases in wastewater management are unlikely.

The company has also identified recycling as a future project. The current wastewater system will be adapted to provide recycling services as well. In all likelihood, the changes will be implemented by the same provider of the wastewater equipment.

Purchase Time Frame:
Within one year.

Additional Comments:
While there is a preference to utilize the same supplier to adapt the existing equipment, financing is critical. A Canadian company willing to finance over a five year period a small equipment purchase may have an advantage.

EATON EJES, SA DE CV

A. Einstein y Ind. Químicas
Zona Industrial
50071 Toluca, Mexico.
Phone: (72) 161666
Fax: (72) 160015, (72) 160439

Eduardo Jasso
EHS Manager

Company Size:
Information not provided

Primary Products:
Axles for medium sized trucks

Export Levels:
Information not provided

Plants:
The only plant is located at the above address.

Wastewater Status:
The company is complying with wastewater discharge norms.

Potential Opportunities:
The company is interested in purchasing a flocculator with a capacity of approximately 250m³/day.

Eaton Ejes currently has no recycling equipment. Current water use total 376m³/day.

Between the above two projects, decision makers estimate that water management expenses will rise 100%.

Purchase Time Frame:
Within the next year.

Additional Comments:
General areas of concern in wastewater treatment include: BOD, suspended solids, PH factor, and heavy metals.

PLASTICOS LAMINADOS, SA DE CV

Sor Juana Inés de la Cruz - 520
54000 Tlalnepantla, State of Mexico
Phone: (5) 565-3544
Fax: (5) 565-4582

Francisco Javier Diaz
Coordinator, Environmental Control and Industrial Security

Company Size:
180 employees

Primary Products:
Plastic Fabrics (for use in automobiles), Plastic shoes

Export Levels:
Approximately 10% to 15%

Plants:
The company has only one plant, located at the same address as the above.

Wastewater Status:
Plasticos Laminados is already complying with all water discharge norms.

Potential Opportunities:
The company uses very little water in the manufacturing process; in fact, 80% of all water (roughly 1000 m³ per month) is used in sanitation services. The water used in the manufacturing process is employed for equipment cooling and is not discharged. However, significant interest does exist in recycling equipment that would allow the company to reuse sanitary waters 6 or 7 times before discharge is required. The company would like to purchase advanced technology, as opposed to services or system components.

Purchase Time Frame:
Within the next two years.

Additional Comments:
Water consumption currently costs 1.20 NP/m³ and any recycling system would need to have an economic benefit. Financing is important, particularly as price rises. Preference for compact equipment has been expressed.

**ELEMENTOS DE FRENO PARA AUTOMOCION,
SA DE CV**

Calle A #300
Parque Industrial El Salto
El Salto, Jalisco
Phone: (3) 688-1015
Fax: (3) 688-0887

Salvador Cruz

Company Size:
Approximately 120 employees

Primary Products:
Bearings for brake parts

Export Levels:
Information not provided

Plants:
The only plant is located at the above address.

Wastewater Status:
Information not provided

Potential Opportunities:
The company has suggested that future purchases are unlikely. Nevertheless, no equipment is currently used to treat effluent. High levels of suspended solids are apparent.

Purchase Time Frame:
Although no concrete opportunities were identified, officials expressed an interest in equipment and components over the next two to five years.

Additional Comments:
Water use totals 16m³/day, at a cost of 2 NP/m³.

SIMIL CUEVO PLYMOUTH, SA DE CV

Calle 4 # 38
Fraccionamiento Rustica Xalostoc
Ecatepec, State of Mexico
Phone: (5) 569-7245
Fax: (5) 569-8944

Francisco García Ruiz

Company Size:
Over 600 employees

Primary Products:
Plastic fabrics

Export Levels:
Information not provided

Plants:
The company runs three production facilities, all within the same city district. The plants include:

- Calle 10
- Calle 20
- Avenida Electricidad (temporarily closed)

Wastewater Status:
None of the plants complies with wastewater norms.

Potential Opportunities:
Wastewater equipment is a likely purchase for all three plants. Focus areas include the following:

- Calle 10 (BOD, heavy metals)
- Calle 20 (BOD, suspended solids)
- Avenida Electricidad (BOD, suspended solids)

Wastewater purchase projects are underway for the plant at Calle 10; the other facilities have not yet entered the planning stage. Approximate water volumes are the following: Calle 10 (100m³/day), Calle 10 (15m³/day), Avenida Electricidad (15m³/day). The company is looking to buy primary treatment plants.

Purchase Time Frame:
Within two to five years

Additional Comments:
No additional comments

ATSUGI MEXICANA, SA DE CV

Avenida del Parque 8
Parque Industrial Lerma
Apartado Postal 3
52000 Lerma, State of Mexico
Phone: (728) 50955
Fax: (728) 50634

Juan Clement Juarez
Legal Consultant

Company Size:
320 employees

Primary Products:
Engine components for automobiles.

Export Levels:
The company does not export.

Plants:
The only plant is located at the above address.

Wastewater Status:
Effluent are currently sent to a wastewater treatment plant owned by the State of Mexico (EPCCA) and located within the industrial park. To date, these discharges are fully treated (to within legal norms).

Potential Opportunities:
Atsugi's wastewater needs are currently looked after by the above plant. However, the company is considering the purchase of an in-house treatment plant. Such a plant would treat water that is used in equipment cooling (discharged twice per year) and water used in the finishing process (ie. water sanding). Effluent primarily contain oils and aluminium particles.

A more immediate opportunity lies in recycling systems. Such a system would require a capacity of approximately 35000 litres per day.

Purchase Time Frame:
Wastewater equipment - 7 years
Recycling equipment - 3 years

Additional Comments:
Financing in any deal would be critical, as the company is in a tight cash flow position. Additionally, the company is owned by a Japanese consortium, and as a result there is expected to be a strong preference for Japanese suppliers.

Current discharge volumes are estimated at approximately 1,000,000 litres per month. The local wastewater plant charges approximately 1200 NP per month for treatment services.

**MANUFACTURERA MEXICANA DE PARTES DE
AUTOMOVILES, SA DE CV**

Poniente 150 #872
Colonia Industrial Vallejo
02300 Mexico D.F.
Phone: (5) 587-0300
Fax: (5) 587-6888

Ruben Barron
Plant Manager

Company Size:
330 employees

Primary Products:
Radiators and heaters for cars and trucks.

Export Levels:

Plants:
The only plant is located at the above address.

Wastewater Status:
Fully complying with all ecological norms.

Potential Opportunities:
The plant currently has a wastewater treatment system that was installed in 1992, with a capacity of approximately 2.2 litres per second. Only 70% of capacity is used. However, the current plant is aerobic in nature, and management is seriously considering expanding the treatment process to include anaerobic treatment. The most important factor in water discharges is heavy metals.

A recycling system is also a likely purchase in the future. Such a system would need an approximate capacity of 1.0 litres per second.

Purchase Time Frame:
Anaerobic wastewater treatment plant - 6 years
Recycling plant - 3 to 5 years

Additional Comments:
Purchase of a recycling plant will be a result of rising costs of water. The company currently spends approximately 65000 NP/month on water consumption (0.8 litres/second). Financing of such a system is not an important factor in the purchasing decision.

AUTOTEK INDUSTRIAL DE MEXICO, SA DE CV

Calle F # 50
72000 Puebla, Puebla
Phone: (22) 826157
Fax: (22) 826154

Javier Quiñola

Company Size:

Information not provided

Primary Products:

Wide variety of autoparts

Export Levels:

Information not provided

Plants:

The only plant is located at the above address.

Wastewater Status:

Currently complying with ecological norms.

Potential Opportunities:

The company has wastewater equipment, focusing on coagulation, flocculation, sedimentation, and filtration technologies. Nevertheless, interest was expressed in both wastewater and recycling purchases.

Purchase Time Frame:

Information not provided

Additional Comments:

The required capacity of water management equipment is of approximately 33m³/day. Services were also identified as a potential purchase area

ABB MOTORES, SA DE CV

Via Gustavo Baz y Henry Ford
54030 Tlalnepantla, State of Mexico
Phone: (5) 328-1400
Fax: (5) 310-3029, (5) 328-1694

Eduardo Bermudez de León
Traffic

Hugo Rodriguez
Environmental Control Chief

Company Size:

Annual sales: \$CDN 16.0 million, over 300 employees

Primary Products:

Industrial motors, frequency changers, industrial control equipment

Export Levels:

15%, including Canada

Plants:

The company operates five Plants:
- Tlalnepantla, State of Mexico (above address)
- Tlalnepantla, State of Mexico
- Guadalajara, Jalisco
- Monterrey, Nuevo Leon
- Puebla, Puebla

Wastewater Status:

The company meets discharge norms.

Potential Opportunities:

The company has a yearly budget for technology update. Nevertheless, ABB already has wastewater equipment. Water is recycled in the company's painting division only.

Purchase Time Frame:

As required to meet norms; unlikely in 1994.

Additional Comments:

No additional comments

FRENOS LUSAC, SA DE CV

Canela #379
Colonia Granjas de Mexico
08400 Mexico D.F.
Phone: (5) 657-0666
Fax: (5) 657-0177

Leopoldo Weiss M.
Director, New Products and Strategic Planning

Company Size:
Approximately \$CDN 20.0 million/year

Primary Products:
Parts and replacements for hydraulic brake systems

Export Levels:
Information not provided

Plants:
The only plant is located at the above address.

Wastewater Status:
The company has recently bought new wastewater equipment. The first discharge sample was recently sent to CNA for analysis.

Potential Opportunities:
In short, management has suggested that no further equipment will be purchased unless water rises significantly in price or regulations become more stringent. In such a case, purchases would focus on recycling systems for sanitary water discharges.

Purchase Time Frame:
As regulations require.

Additional Comments:
Only 10% of the 335m³ of water used quarterly is integrated into the production process; the remainder is service and sanitary waters. The equipment recently installed focuses only on water used in the production process, and provides filtration and chemical treatment. Service and sanitary waters currently receive no treatment. Decision makers expressed a strong preference for Mexican suppliers.

HOESCH SUSPENSIONES AUTOMOTRICES, SA DE CV

Marconi # 9
F. Ind. San Nicolas
54030 Tlalnepantla, State of Mexico
Phone: (5) 310-9730, (5) 310-7092, x56
Fax: (5) 310-9282

Carmelo Medina Trejo
Production Coordinator

Company Size:
300 employees

Primary Products:
Suspension and stabilization systems for the automotive industry.

Export Levels:
Approximately 10%

Plants:
The only production facility is located at the above address.

Wastewater Status:
The company is complying with ecological norms.

Potential Opportunities:
Current technology includes: chemical neutralization, flocculation, and filtration. The treatment system is new, and was supplied by Durr Technology, of Germany. Phosphate, nickel, manganese, and chromium levels are effectively eliminated by the equipment.

Purchase Time Frame:
Future purchases unlikely.

Additional Comments:
150 litres of water is consumed daily. One of the most important factors in the decision to buy wastewater equipment is that the supplier have a local market presence.

ARVIN DE MEXICO, SA DE CV

Carretera Constitución KM 9.5
Parque Industrial Benito Juarez
Queretaro, Qro.
Phone: (42) 181018
Fax: (42) 180183

Jorge Luis Vega

Company Size:
350 employees

Primary Products:
Exhaust systems

Export Levels:
Information not provided

Plants:
The only plant is located at the above address.

Wastewater Status:
Arvin is fully complying with wastewater discharge norms.

Potential Opportunities:
The company already has a treatment system (sedimentation filter and chlorination). Primary areas of concern are BOD, suspended solids, oils and fats, and choliforms.

Purchase Time Frame:
Future purchases are unlikely, unless environmental regulations become significantly stricter.

Additional Comments:
If norms become stricter, potential purchase areas include recycling systems and wastewater treatment systems. Current water use is approximately 20m³/day. Water costs average NP 6.7/m³.

VIDRIO PLANO DE MEXICO

Avenida Vidrio Plano
14710 San Juan Ixhuatepec, State of Mexico
Phone: (5) 227-6000 x1003, (5) 227-6067 (direct line)
Fax: (5) 227-6060

Victor Montes Lopez
Energy and Ecology

Company Size:
1500 employees

Primary Products:
Glass sheets, Tempered glass, Security products

Export Levels:
Approximately 15%

Plants:
The only plant is located at the above address, and is approximately 35 years old.

Wastewater Status:
The plant fully complies with legal discharge requirements.

Potential Opportunities:
The company is currently purchasing a wastewater management system, and plans to have it installed by January 1994. Water recycling is already being done in a municipal treatment plant. While company experts do not expect additional purchases in the future, they do note that the municipal treatment plant does not provide water of sufficiently high quality.

Purchase Time Frame:
Future purchases are unlikely.

Additional Comments:
None

SUDISA (SUPER DIESEL SA)

Calz. Lomas # 205
45560 Tlaquepaque, Jalisco
Phone: (3) 635-3666
Fax: (3) 657-1058

Carlos Tanaka
Director of Operations

Company Size:
Annual Sales: \$US 25.0 million

Primary Products:
Brake systems, Trailer axles

Export Levels:
Approximately 15%.

Plants:
The only plant is located at the above address.

Wastewater Status:
Currently complying with discharge norms.

Potential Opportunities:
The company has no industrial discharges of wastewater. 90% of water is sanitation services. Additionally, total water volumes are too low to create any need for recycling equipment.

Purchase Time Frame:
Future purchases unlikely.

Additional Comments:
No additional comments.

CARTEC, SA DE CV

Carril Norte San Cristobal
KM 134 Autopista Mexico-Orizaba
72290 Chachapa, Puebla
Phone: (22) 860303
Fax: (22) 860606

Adrian Guadarrama

Company Size:
Information not provided

Primary Products:
Information not provided

Export Levels:
Information not provided

Plants:
The only plant is located at the above address.

Wastewater Status:
It is unlikely that the company is complying with wastewater norms.

Potential Opportunities:
The company already has an extended aeration system, with additional chlorination equipment. These systems help to reduce levels of the following factors: suspended solids, BOD, greases and oils, coliforms, and organic nitrogen.

Purchase Time Frame:
Future purchases unlikely

Additional Comments:
The company notes that many of its nearby neighbours are highly interested in wastewater equipment, particularly total aeration equipment. These companies are currently exploring the market in this area.

FOOD PROCESSING INDUSTRY

The food and beverage industry constitutes the single largest component of the Mexican manufacturing sector, with approximately 1/3 of total production. Over 60,000 companies are active in the industry; however, 95% of these establishments are micro-enterprises that have no interest in wastewater equipment. In general, only the medium to large size firms express an interest in wastewater technology. Such companies are generally concentrated in the following sub-sectors: breweries, soft drinks, edible oils, processed foods, and sugar mills. While wastewater treatment opportunities are apparent in all five areas, this study does not examine the sugar industry. However, the sugar industry produces over 30% of industrial water pollution in Mexico, and consequently demands high capacity treatment equipment. The industry is also highly concentrated, with very few producers.

In general, the food and beverage industry enjoys a strong growth rate, estimated at 7% annually between 1990 and 1994. Growth will continue in the future, as Mexico's population continues to increase 2% per year. Domestic producers are currently serving a market of over 85 million Mexicans. By the year 2000 the population is expected to reach 104 million. As the population expands, the industry will require greater capacity to serve the market. New plants will need to be served by increasingly sophisticated wastewater treatment technologies.

Mexican food and beverage companies are only just beginning to take advantage of international export markets. However, many companies indicated that export markets currently offer the greatest growth potential.

Many of the larger companies are concentrated in Mexico D.F. Industry experts estimate that 25% of processed food production occurs within the city's metropolitan area. Concentration is even higher in the brewery, soft drink, and flour milling industries. Mexico City is classified as a zone 1 priority area for wastewater treatment. Consequently, companies located in the area are under significant pressure to treat their effluent to the greatest degree possible.

The 1994 production of food alone is estimated at \$CDN 18 billion. Focus areas are as follows: meat & milk, 35.2%; corn milling, 18.1%; wheat milling, 12.0%; coffee, 5.9%; processed fruits and vegetables, 3.5%; animal feed, 2.5%; and other, 22.8%.

Norms and Enforcement:

11 norms are applicable to the food and beverage sector. They control the following industries: sugar production, flour industry, beer & malt producers, milk and milk derivatives, soft drink production, meat packaging and processing, conserved foods industry, coffee industry, and processing of seafood products.

Perspectives:

The industry will maintain a minimum growth of approximately 2% for the medium term. However, market segments such as North American style processed food are growing significantly faster.

Target Market:

60000 companies are active in this sector, of which 3000 may be large enough to be interested in wastewater equipment.

Many multinational players in the food processing industry are active in the Mexican market. For example Danone, Gerber, Del Monte, Kraft General Foods, Purina, and Nestle's all have a local market presence. Industry experts believe that North American Free Trade will have a strong positive impact on direct investment in food processing facilities. To date, 19 U.S. processed food companies have established 45 joint-ventures or plants in Mexico, worth \$US 4.6 billion.

Cervecería Cuauhtemoc has recently been loaned \$US 23 million for the construction of five wastewater treatment plants. The plants will be constructed at Cuauhtemoc breweries in the states of Mexico, Baja California, Nuevo Leon, Sonora, and Jalisco.

The brewery also plans to construct two new brewing plants, one in the state of Chihuahua (1995) and one in the southeastern Mexico (1997). Given the company's emphasis on wastewater responsibility, the two new plants will most likely be equipped with water treatment facilities.

Please see the company heading "Cervecería Cuauhtemoc", on page 72, for more information on this company's wastewater plans.

The soft drink industry is highly successful in Mexico. After the United States, Mexico is the greatest per capita consumer of soft drinks in the world.

Principal Players

The following is a list of the fifteen largest Mexican food companies. 1990 sales figures (in billions of old pesos) follow. The companies include:

Cía. Nestlé	2,311
Anderson Clayton	773
Herdez	567
Ganaderos Productores de Leche Pura	547
Sigma Alimentos	414
Univasa	373
Productos de Leche	238
Nabisco-Famosa	228
Lechera Guadalajara	226
Helados Holanda	192
Molinos Azteca	179
Ingenio Tres Valles	159
Ingenio Tamazula	131
Derivados de Maíz Alimenticia	120
Laboratorios y Agencias Unidas	112

Additionally, Mexican consumption patterns are increasing four times as fast as the American equivalent. Growth in consumption, combined with significant price hikes in the past year, have resulted in a 9% growth in revenue in the first half of 1993. A 4% growth rate is expected for 1994.

Two producers dominate the market: Pepsico and Coca Cola. Between them, the two companies control 67% of the national soft drink market. In addition, there are approximately 200 bottling plants in Mexico. Many of these plants will need to expand their capacity in the coming years. For example, over the next five years, industry players have committed \$US 4.3 billion to investment projects.

Bottling plants may offer substantial opportunities, given their large water consumption. One important use of water is bottle cleaning and sterilization, a process using concentrated detergents. As a result, high levels of M.B.A.S. may be apparent.

Approximately 100 companies produce consumable oils and fats. 60% of these firms target the human market, while the remainder focus on animal products. The industry is highly concentrated, with 7 players controlling 50% of the market. Construction of additional capacity is unlikely in this sector. North American Free Trade may have a negative effect on

the industry, reducing demand for local products. Additionally, capacity utilization currently runs at only 57%. Canadian companies may wish to avoid targeting this sub-sector

Maseca: Processing Plant Construction

Maseca - one of the largest agroindustrial companies in Mexico - has announced that it will invest \$US 1.1 billion in the construction of nine processing plants. The plants will be located in Mexico, Central America, and the United States. Construction projects are expected to be completed by 1996.

The food and beverage industry is governed by nine wastewater discharge norms. Additionally, 2 norms exist regulating the use of water for irrigation. Details on these norms can be found in the tables on the previous page. Although specific norms exist for most aspects of the food and beverage industry, to date enforcement has been relatively lax.

However, municipal discharge norms expected in 1994 will regulate BOD, COD, and total suspended solids for the first time. Given that many food and beverage makers discharge to municipal drainage systems, and that their prime area of concern is often these factors, enforcement will become significantly more stringent. As a result, many food & beverage companies are already searching for potential wastewater equipment suppliers.

Sources:

1. *El Financiero*, assorted articles, (Mexico D.F.: El Financiero SA de CV, July 26, October 25, November 1, and November 29 of 1993)
2. Grupo Financiero Serfin, "Indicador Sectorial," (Mexico D.F.: Grupo Financiero Serfin, 1993)
3. The Canadian Embassy, "Food Processing and Packaging Equipment," (Mexico D.F.: Canadian Embassy, 1988)
4. Cross Cultural Consulting Inc., "The Mexican Food and Beverage Industry," (Winnipeg, Manitoba: Western Economic Diversification, 1993)

**Maximum Permissible Limits:
Daily Average¹**

	Norm 2	Norm 6	Norm 7	Norm 9	Norm 16
PH Levels	6 to 9	6 to 9	6 to 9	6 to 9	6 to 9
BOD	60	150	150	100	180
Sedimented Solids	1.0	1.0	1.0	NA	1.0
Oils & Greases	15	NA	30	20	30
Phenols	0.5	NA	NA	NA	NA
Total Suspended Solids	NA	150	NA	100	180

	Norm 22	Norm 23	Norm 27	Norm 28
PH Levels	6 to 9	6 to 9	6 to 9	6 to 9
BOD	200	100	150	200
Total Suspended Solids	200	100	150	200
Oils & Greases	30	20	NA	40
Sedimented Solids	1.0	NA	1.0	1.0
Amoniacal Nitrogen	20			

JUGOMEX, SA DE CV

KM 19.5 Ant. Carretera a Pachuca
55400 Tulpetlac, State of Mexico
Phone: (5) 726-9055, x2123
Fax: (5) 726-9055, x3298

Jorge Eduardo Ortiz Moore
Project Engineering

Company Size:
2,000 employees

Primary Products:
Fruit juices, fruit concentrates

Export Levels:
World wide exports; however, the exact percentage value was not provided.

Plants:
Xalostoc, State of Mexico
Tulpetlac, State of Mexico

Wastewater Status:
It can be assumed the company is not complying with ecological norms.

Potential Opportunities:
The company currently has some wastewater technology, including water softeners, sand filters, and reverse osmosis machinery. However, the equipment is not fully effective given that salt and iron particles plug the system. Jugomex is looking to purchase additional technology to eliminate this problem.

Purchase Time Frame:
As soon as possible.

Additional Comments:
Water usage averages 1400m³ per day in the Tulpetlac plant and 500m³ in the Xalostoc plant. Important factors in the buying decision include: technical support and maintenance services.

SIGMA ALIMENTOS, SA DE CV

Ernesto Pugibet #2
Fracc. Industrial Xalostoc
55340 Ecatepec, State of Mexico
Phone: (5) 227-1700, (5) 227-1765

Ruben García Martínez
Plant Manager

Company Size:

The company is one of the largest Mexican producers of processed meats. Employment totals about 3000 people.

Primary Products:

Processed meats

Export Levels: None

Plants:

The company has four Plants:

- Guadalajara, Jalisco (under construction)
- Monterrey, Nuevo Leon
- Chihuahua, Chihuahua
- Ecatepec, State of Mexico

Wastewater Status:

The company maintains they are fully complying with ecological norms.

Potential Opportunities:

A wastewater plant is currently installed in the Ecatepec plant with an approximate capacity of 2300m³/day. No details were provided on specific technology or equipment components. However, the plant is currently running at 100% capacity. Officials maintain that the plant allows them to reduce BOD levels to 60 mg/litre, as well as suspended solids to 1 part per million.

The Chihuahua plant also has a treatment plant.

The factory under construction in Guadalajara is purchasing a wastewater treatment plant; however, the project has already gone to bid.

Recycling of water is not currently done. Decision-makers mentioned that water recycling equipment will be purchased in the near future. An approximate capacity of 1100m³/day is required.

Purchase Time Frame:

Recycling equipment: early to mid 1994

Additional Comments:

To date, the plant has not been inspected for wastewater effluent discharge. Further opportunities may arise should inspection reveal high BOD or suspended solids in water effluent.

ZANO ALIMENTOS, SA DE CV

Calzada Mexico - Xochimilco # 388
Colonia Tabla del Llano
14380 Mexico D.F.
Phone: (5) 673-1847, (5) 673-4262
Fax: (5) 673-4987

Hector M. Camacho
Operations Manager

Company Size:

Approximately 70 employees; profit margins are 10%

Primary Products:

Packaged and frozen orange juice

Export Levels:

None

Plants:

The only plant is located at the above address.

Wastewater Status:

It can be assumed that the company is not complying with ecological discharge norms.

Potential Opportunities:

Zano Alimentos has no treatment plant. Total discharges average 15000 litres per day, with BOD content as high as 700 to 800 mg/litre. Fruit pulp is also present. Given high BOD elements, and stricter norms, equipment purchases are considered to be probable.

Purchase Time Frame:

During 1994

Additional Comments:

Quality equipment is critical. Additionally, the company is looking for a supplier that can provide ongoing service support.

ARANCIA, SA DE CV

López Cotilla 2030, first floor
44100 Guadalajara, Jalisco
Phone: (3) 615-1212
Fax: (3) 630-3479

Ruben R. Rosales G.
Corporate Manager, Environmental Protection

Company Size:
1250 employees

Primary Products:
Corn starches, Glucoses, Dextroses

Export Levels:
Minimal

Plants:
Guadalajara (State of Jalisco)
Tlalnepantla (State of Mexico)

Wastewater Status:
Currently not complying with wastewater norms.

Potential Opportunities:
Neither plant has wastewater treatment equipment. The Tlalnepantla facility discharges approximately 12000 litres per hour of effluent. Biological demand (BOD) for oxygen has been recorded as high as 3700 mg/l, while suspended solids can reach 430 mg/l. At the Guadalajara plant discharges average 15000 litres per hour, with BOD levels recorded as high as 9000 mg/l. Suspended solids at that plant have reached levels of 1900 mg/l. In both plants, the company is examining integrated solutions to all of its water problems. Such a solution would likely include recycling equipment, as well as membrane filtration, reverse osmosis, and anaerobic treatment technologies.

Purchase Time Frame:
Tlalnepantla facility - within one year
Guadalajara facility - within two years

Additional Comments:
The company will require consulting services before equipment is purchased. Additionally, the supplier will probably be asked to supply maintenance services on any equipment. Finally, both plants suffer from significant space limitations.

FRITOS ENCANTO

R. Díaz de la Vega 1812 Pte.
Fracc. Industrial
Monterrey, N. L.
Phone: (8) 351-1421, 351-1706
Fax: (5) 3351-6420

Alejandro Aguirre Treviño
Administration

Filiberto De la Cruz A.
Production Manager

Company Size:
300 employees

Primary Products:
Potato chips, pork rinds and snacks

Export Levels:
Low

Plants:
Located at the above address.

Wastewater Status:
Does not comply to regulations.

Potential Opportunities:
This company currently has no wastewater treatment systems. Water discharge characteristics include a high BOD (can go over 1500 mg/l) and high suspended solids (organic). Fritos Encanto is being forced to invest in settling tanks. The company uses approximately 1000 m³ of water per month.

Purchase Time Frame:
Within one year.

Additional Comments:
Fritos Encanto was approached by a German company offering reverse osmosis technology. Management liked the equipment but felt that it was too expensive. The company will try to finance internally; however, a bank loan may be necessary.

DANONE DE MEXICO, SA DE CV

Planta ex-hacienda de Xalpa
Huehuetoca, State of Mexico
Phone: (591) 80088
Fax: (591) 80132

Hugo Necoechea Mondragon
Plant Manager

Company Size:
Over 1000 employees

Primary Products:
Dairy products

Export Levels:
None

Plants:
The company has one plant in operation at the above address. A second plant is currently under construction, in Irapuato. The plant is expected to come on line in January of 1995.

Wastewater Status:
Danone is now complying with ecological norms.

Potential Opportunities:
Future equipment purchases in the wastewater field are highly unlikely, as the company installed a treatment plant in August of 1993. Technology includes: oxidation lagoon, aerobic biological reactor, and a sedimentation tank.

The purchase of wastewater equipment for the new plant in Irapuato went to tender in November of 1993.

Recycling may hold an opportunity in the production facility in the state of Mexico. Water costs average 3.5 NP/m³, and total use averages 1000m³/day. Approximately 20% of this volume could be recycled.

Danone also identified consulting services as a potential purchase area. Current levels of BOD — even with treatment equipment — average 2200 mg/l; the company feels consulting services may be necessary to optimize the performance of the treatment plant.

Purchase Time Frame:
Within one year

Additional Comments:
Purchase of a recycling system would be highly contingent upon perceived economic benefit.

KRAFT GENERAL FOODS, MEXICO

Poniente 116 # 553
Industrial Vallejo
02300 Mexico, D.F.
Phone: (5) 325-0999
Fax: (5) 587-7979

Alberto Marin Flores
Environmental Engineering Manager

Company Size:
Information not provided.

Primary Products:
A variety of processed food products.

Export Levels:
Kraft General Foods does not export.

Plants:
The company maintains three Plants:
• Mexico D.F. (Poniente 553)
• Mexico D.F. (Pino 459)
• Ecatepec, State of Mexico

Wastewater Status:
The company is currently complying with water discharge norms.

Potential Opportunities:
Kraft General Foods Mexico has a stringent environmental policy. For example, water discharges are required to register approximately 50% below government norms. As a result, the company is highly proactive in the environmental field. Decision-makers are currently awaiting the results of an environmental assessment before determining their next area of purchase. However, purchases of some kind can be expected.

Current treatment technology focuses on boiling tanks.

Kraft General Foods does not currently recycle water.

Purchase Time Frame:
Within one year.

Additional Comments:
Water discharges contain the following materials: soluble coffee residue, liquid sugars, suspended solids, and fats and oils.

ALIMENTOS LIBAY, SA DE CV

Ave J. Cantú Leal No. 1320 Sur
Col. Buenos Aires
Monterrey, N.L.
Phone: (8) 359-4200 ext 5033
Fax: (8) 359-5778

Ing. Daniel Moreno Garza
Superintendent of Quality Control

Company Size:
500 employees

Primary Products:
Sausage, ham, weiners, bologna, chorizo and salami

Export Levels:
Unavailable

Plants:
Located at above address.

Wastewater Status:
The company does not comply with discharge regulations.

Potential Opportunities:
Water effluent has high BOD and suspended solids levels. The company currently utilizes settling tanks and suspended solids traps. However, the National Water Commission has advised Alimentos Libay to reduce its BOD level. As a result, investment in advanced treatment technology is necessary. The plant uses 140,000 litres of water per day.

Purchase Time Frame:
Within one year.

Additional Comments:
Service is extremely important to the purchase decision. Equipment must be compact due to lack of available space.

SABRITAS, SA DE CV

Norte 45 No 740
Col. Industrial Vallejo
02300 Mexico D.F.
Phone: (5) 227-5835, 227-5822
Fax: (5) 567-9038

Juan J. Paisan Rabassa
Director of Engineering and Technical Services

Silvia Tapia Flores
Manager of Engineering

Company Size:
14000 employees

Primary Products:
Cornmeal chips, tortillas, wheat products

Export Levels:
5% - primarily to U.S. and South America

Plants:
Mexico City (D.F.) Tijuana (Baja California)
Guadalajara (Jalisco) Monterrey (Nuevo Leon)
Toluca (state of Mexico) Obregon (Sonora)
Mexicali (Baja California)

Wastewater Status:
The company does not comply with regulations.

Potential Opportunities:
The primary wastewater issue is high levels of BOD (2400 mg/l) and suspended solids (2800 mg/l). Sabritas has advanced primary treatment Guadalajara, Obregon, Saltillo, and Mexicali. Treatments of flocculation, coagulation and sedimentation screening are employed in these plants. However, wastewater treatment in the Mexico City plant is limited to oil and solids tanks. As a result Sabritas is considering a treatment installation in Mexico City. In addition, the company must install secondary treatments in other plants. Water discharge in Mexico City is approximately 35 litres per second and in other facilities 15 litres per second.

Purchase Time Frame:
Mexico city - within 1 year
Other plants - within 5 years

Additional Comments:
Space is at a premium in Mexico City, and as a result compact detailed design is required. Sabritas would prefer to work with a company that has a proven track record in the snack food industry. Also, Sabritas (Mexico) wants to commission wastewater plants in South America and so would prefer a supplier that can provide services throughout Latin America

INDUSTRIAL DESHIDRATADORA, SA DE CV

Av. Tlalhuac # 4615
09880 Mexico D.F.
Phone: (5) 656-0024, (5) 656-6438, (5) 656-0105
Fax: (5) 656-0225

Carlos Reyes Rodriguez
Technical Director

Company Size:
300 employees

Primary Products:
Fruit and vegetable powders, coffee whitener, ketchup and syrups.

Export Levels:
2-3% of sales

Plants:
San Juan del Río (Queretaro) and at the above address.

Wastewater Status:
Plants do not comply to all wastewater regulations.

Potential Opportunities:
The company is seeking solutions to separate greases and oils from the water. Effluent has a high BOD and suspended solid levels in both plants. Water consumption is approximately 8 cubic metres per week in San Juan del Río, and 14 cubic metres per week in Mexico D.F.

In addition, the company requires a high quality of water for use in the process. Opportunities for pretreatment equipment may arise.

Purchase Time Frame:
Within one year

Additional Comments:
Primary purchases will be technology and equipment; however, the company also requires consulting services. There is a strong preference for compact equipment, due to lack of space. Internal financing is expected.

LA COSTEÑA, SA DE CV

Kilómetro 19.5 Antigua Carretera a Pachuca
55400 Tulpetlac, Edo de Mexico
Phone: (5) 775-5999
Fax: (5) 775-1940

Fernando Manzanique
Plant Manager

Company Size:
Sales: \$US 160,000,000 Employees: 1000

Primary Products:
Jalapeños, tomato paste, tomato puree, marmalades, peaches

Export Levels:
18% - primarily to U.S. and Japan

Plants:
Above address: jalapeños, marmalades and peaches
Guasave, Sinaloa: - tomato paste

Wastewater Status:
The company does currently comply with wastewater regulations.

Potential Opportunities:
Wastewater problems consist of a high BOD, COD and suspended solids, as well as a low PH level. La Costeña has recently decided to invest in an anaerobic reactor with aerobic post treatment in the Tulpetlac plant. The technology has been chosen and installation will begin in June 1994. The company is currently investigating wastewater solutions for the plant in Sinaloa. They have not decided on whether to invest in anaerobic or aerobic treatment, and are looking for the best solution.

Purchase Time Frame:
Sinaloa - installation by January 1995

Additional Comments:
Purchase decisions are based on quality and price of equipment, as well as experience of the supplier. Guaranteed success is extremely important. Financing is not required. In addition, there is a preference for a compact solution as the Sinaloa plant is expected to expand operations.

**EMPACADORA DEL GOLFO DE MEXICO,
SA DE CV**

J. Azueta #1041
Veracruz, Veracruz
Phone: (29) 314688
Fax: (29) 326770

José Antonio Sainz Trapaga Aja

Company Size:
260 employees

Primary Products:
Canned food products, primarily peppers and olives

Export Levels:
Information not provided

Plants:
The only plant is located at the above address.

Wastewater Status:
It is unlikely that the company is complying with wastewater norms.

Potential Opportunities:
The firm currently has no wastewater equipment, and is interested in buying a system including sedimentation tanks, flocculators, filters, and interchangers. Primary areas for concern include suspended solids and BOD.

Purchase Time Frame:
Equipment will be purchased in the medium terms, between two and five years.

Additional Comments:
The company identified equipment and component purchases more likely than high technology. Total water consumption averages 300m³/day; however, required capacity for wastewater equipment is estimated at 200m³/day. The company relies on two industry chambers — CANAINCA and CONCAMIN — for wastewater advice.

CERVECERIA CUAUHTÉMOC, SA DE CV

Ave. Alfonso Reyes 2202 Nte.
Monterrey, N.L.
Phone: (8) 374-0544, 375-2200
Fax: (8) 372-2925

Ing. Arturo S. Villarreal T.
Manufacturing Planning Director

Company Size:
6500 employees

Primary Products:
Beer - brands include Carta Blanca, Tecate, Superior

Export Levels:
5%, primarily to the U.S.

Plants:
Monterrey (above address), Toluca, Guadalajara, Orizaba, Tecate, Navojoa and Puebla

Wastewater Status:
The company does not currently comply with standards; however five treatment plants are being constructed.

Potential Opportunities:
Cervecería Cuauhtemoc uses a total of 14,000,000 m³ of water per year in six of its seven plants. The company has two treatment plants in operation and an additional five under construction. These plants will bring all seven breweries within water discharge regulations. It is a company requirement that new treatment plants exceed current discharge standards (ie. supplier required to guarantee a BOD of 50 mg/l). While all immediate wastewater treatment projects have been awarded, the following opportunities exist:

- The Toluca plant is still in first phase treatment and new technology will be required.
- Cervecería Cuauhtémoc is planning to build two new brewing plants by 1997. Obviously wastewater treatment facilities will be required.

Purchase Time Frame:
Toluca plant - 2 years

Additional Comments:
Project bids are open, but not published. The company prefers large wastewater contractors that have experience. Financing is not a decision criteria for the bidding process. In past projects Cervecería Cuauhtemoc has obtained competitive financing independently.

PRODUCTOS DE MAIZ, SA DE CV

Kilometro 8
Carretera Aguascalientes - Zacatecas
Aguascalientes, Ags.
Phone: (49) 730473
Fax: (49) 730472

Miguel Licon Davila

Company Size:
Approximately 100 employees

Primary Products:
Mayonnaise

Export Levels:
Information not provided

Plants:
The company's primary plant is located in Lerma, State of Mexico.

Wastewater Status:
Productos de Maiz is complying with ecological norms.

Potential Opportunities:
The company already has a treatment plant, using the following technologies: homogenization, coagulation, flotation, activated sludge, sedimentation, and filtration. Interest areas are BOD, COD, PH levels, and water temperature. Although production capacity is rising, the treatment plant has sufficient capacity to treat effluent.

Nevertheless, potential purchases may be found in recycling equipment. Decision-makers wish to implement a system allowing recycled water to be used for irrigation purposes.

Purchase Time Frame:
Between two and five years

Additional Comments:
Total water consumption is approximately 100m³/day. Future purchases are identified as equipment as opposed to advanced technology.

GANADEROS PRODUCTORES DE LECHE PURA, SA DE CV

KM 37.4 Autopista Mexico - Queretaro
54800 Cuautitlán, State of Mexico
Phone: (5) 729-2012, (5) 729-1001
Fax: (5) 871-4152

Felipe Milmo Ferrero

Company Size:
Ganaderos Productores is one of the largest dairy products producers in the country. The company employs more than 3500 people.

Primary Products: Dairy products

Export Levels: None

Plants:
The company has two Plants:
• Cuautitlán, State of Mexico (address above)
• Ciudad Delicias, Chihuahua

Wastewater Status:
Ganaderos Productores is not currently complying with discharge norms.

Potential Opportunities:
The company recently spent \$US 2.5 million on the construction of a treatment plant for the Cuautitlán plant, primarily using aerobic treatment. To date, the plant has not brought effluent to within norms. For example, suspended solids and BOD levels hover at 2000 mg/l. However, the plant is expected to bring effluent to within 100 mg/l. Discharges total approximately 26 litres per second. Effluent is piped to the municipal system, an important factor given increasingly stringent municipal norms. Also, the company admits the current system is only designed to bring discharges to within current norms (and it appears the technology may not be achieving even those levels). Similar technology was recently purchased for the Chihuahua production location. Currently, no recycling systems are used. While decision-makers acknowledge interest in such a system, there is some fear that water quality would not be sufficiently high. As a result, purchases in this area would need to be excellent quality.

Purchase Time Frame:
Water treatment: unlikely
Recycling: within the next 3 years

Additional Comments:
The company has a high water: total water use in either plant exceeds 1.3 million litres per day. Average cost of water in the Cuautitlán factory is 4.2 NP/m³.

FORMEX YBARRA, SA DE CV

Poniente 146 #658
Colonia Industrial Vallejo
02300 Mexico D.F.
Phone: (5) 368-1751
Fax: (5) 587-1077

Nestor Fernandez Melchiorre

Company Size:
Approximately 200 employees

Primary Products:
Food products: mayonnaise, ketchup

Export Levels:
Information not provided

Plants:
The only plant is located at the above address.

Wastewater Status:
Information not provided

Potential Opportunities:
The company does not expect to be purchasing wastewater equipment in the near future. However, company officials admit that no treatment equipment is currently installed. Oils are the primary area of concern in effluent discharges.

Purchase Time Frame:
Within five to ten years.

Additional Comments:
The company pays 6.1 NP/m³ for the 50m³ of water that are consumed daily.

ALIMENTOS DE VERACRUZ, SA DE CV

Ave. Constitución 405 Pte.
64000 Monterrey, N.L.
Phone: (8) 369-7050, 342-6060
Fax: (8) 342-4451

Daniel Barrera Santos
Technical Director

Company Size:
Information not available

Primary Products:
Juices and other citrus fruit products

Export Levels:
Between 30 % and 70 %, depending on world prices

Plants:
Monte Morelos (Monterrey), Mexico City and Veracruz

Wastewater Status:
The company does not comply with wastewater regulations.

Potential Opportunities:
The main wastewater issue is a high BOD level in the Veracruz and Monterrey plants (Mexico City plant is for packaging only). Average company BOD levels are approximately 5000 mg/l. The company is currently exploring solutions in house, but believes it will have to invest in wastewater solutions very soon.

Purchase Time Frame:
As enforcement requires

Additional Comments:
The company would prefer to invest step by step. Basic solutions would be purchased first and advanced technology in the future. Financing is important, and NAFINSA may play a role. In addition, there is a strong preference to deal with a company with proven technology in the citrus fruit market.

**NACIONAL DE ALIMENTOS Y HELADOS,
SA DE CV**

Ave. San Jeronimo 880
64640 Monterrey, N.L.
Phone: (8) 348-1552, 333-2106
Fax: (8) 348-2531

Felipe de J. Sanchez Perales
Manager of Operations

Company Size:
450 employees

Primary Products:
Corn chips, tortillas, candies, peanuts, sunflower seeds,
cheese puffs

Export Levels:
Does not export

Plants:
The only plant is located at the above address. However,
the company is currently building a new plant in Santa
Catarina (Nuevo Leon).

Wastewater Status:
Does not comply to regulations.

Potential Opportunities:
Wastewater has a high BOD and suspended solids level.
Current treatment consists of settling and separation
tanks. The company recognizes that it will need to invest
in wastewater technology as regulations and enforcement
become more stringent. However, any new investment in
wastewater technology would likely be spent on the new
production facilities.

Purchase Time Frame:
As regulations require

Additional Comments:
Financing is an issue. The company would require a letter
of credit for 35-40 days.

MAIZORO, SA DE CV

Norte 59 # 1100
Colonia Industrial Vallejo
Mexico D.F.
Phone: (5) 567-3811, (5) 567-1220
Fax: (5) 567-0986

Hector Prieto
Manager, Engineering and Maintenance

Company Size:
Approximately 600 employees

Primary Products:
Cereals from corn

Export Levels:
Over 30%

Plants:
The only plant is located at the above address.

Wastewater Status:
Generally complying with norms.

Potential Opportunities:
The company has three discharges; one registers margin-
ally high in sedimented solids while another is slightly
above permissible PH levels. Total discharges are
16500m³/year. The company does not expect to buy
additional equipment, given that most of the companies
production processes are "dry" and do not involve water.

Purchase Time Frame:
Future purchases unlikely.

Additional Comments:
Water use totals 40000m³/year.

ACEITE CASA, SA DE CV

Av. Ceylan 793
Industrial Vallejo
02300 Mexico, D.F.
Phone: (5) 567-9322, (5) 368-6000
Fax: (5) 567-4977

Pascual Maceto M.
Operations Director

Company Size:
160 employees

Primary Products:
Edible oils

Export Levels:
Approximately 5%

Plants:
The only plant is located at the above address.

Wastewater Status:
The company fully complies with ecological norms.

Potential Opportunities:
The company recently bought a full treatment unit. The system provides both wastewater treatment and recycling services.

Purchase Time Frame:
Future purchases unlikely.

Additional Comments:
Water consumption totals approximately 5 litres per second.

OTHER INDUSTRIES

Throughout the research process, several companies that were not classified within chosen sectors expressed an interest in wastewater goods and services. The information obtained from interviews with these companies is presented on the following pages.

The companies represent a variety of industries, including:

- hotels and tourist development;
- iron and steel companies; and
- tanneries and leather factories.

GRUPO SIDEK

Calz. Lázaro Cardenas #601 Oriente
44440 Guadalajara, Jalisco
Phone: (3) 611-6445, (3) 669-5757
Fax: (3) 669-5716

Oscar Cervera
Environmental Coordinator

Grupo Sidek is one of the largest industrial groups located in the Guadalajara area. 1991 sales totalled over \$CDN 550 million. The group runs four distinct divisions: iron and steel, hotels and tourism development, ship repairs, and financial services. It is primarily the first three areas have indicated some interest in wastewater treatment.

In total, Sidek group encompasses approximately 70 different companies. While each unit has input into environmental investment decisions, vendors will wish to approach Oscar Cervera, group environmental coordinator, at the above address.

The following is a list of general opportunity areas within the group. In many cases, water management (wastewater treatment, recycling, consumption reduction, etc.) technology has already been installed. Nevertheless, the company is extremely interested in updating purchases. As a result, most purchases will focus on advanced technology systems.

Grupo Sidek Opportunities

	Location	Company Name	Potential Opportunity
Iron and steel foundries:	Guadalajara	Cía. Siderugica de Guadalajara	Removal of greases, oils, and emulsions in recycled water that is used for equipment cooling; removal of iron oxide particles found in the above systems; pretreatment to reduce calcium and magnesium content in water
SIDEK runs two such facilities. Capacity of both mills is approximately 430,000 tons per year.	Mexicali	Cía. Siderugica de California	
Aluminum production facilities:			Treatment system for waters used in galvanizing, chroming, and other processes; waters need to be recycled and cleaned (to point where they can be legally discharged) and have solid and mud content removed
Dry dock facilities:	Variety of facilities along the Pacific coast	Industria Naval de California, SA de CV Industria Naval de Mazatlán, SA de CV	Waters need to be treated to remove high levels of oil emulsions, suspended oils and greases, and paint residues
Tourism development:	Grupo Sidek is the largest developer of tourism facilities in Mexico. A wide variety of mega-projects have been implemented throughout the country	Numerous	Systems for treatment of sanitation and service waters from hotels and restaurants; recycling systems to reuse water for irrigation purposes

HILOS HERNAN SA DE CV

Industriales 210
Fracc. Julian de Obregon
P.O. Box 79
León, Guanajuato
Phone: (47) 11-25-08, 11-25-46
Fax: (47) 11-40-97

Juan José Hernández Gallo
Director General

Company Size:
Information not available

Primary Products:
Threads for the shoe industry

Export Levels:
None

Plants:
Located at the above address

Wastewater Status:
Does not comply with regulations

Potential Opportunities:
Hilos Hernán has a problem with acetic acid and colorants in water discharge. The company currently has no wastewater treatment technology, and is interested in purchasing a system that will treat water to comply with municipal and industry regulations. There are two areas within the plant that water is discharged, as such it is expected that two equipment purchases will be necessary. Effluents will be

Purchase Time Frame:
As soon as possible

Additional Comments:
Internal financing is expected.

SAN SEBASTIAN CURTE SA DE CV

Ciprés y Perón
Col. Garita
León, Guanajuato
37320, Mexico
Phone: (47) 17-35-00, 17-34-50, 17-59-75
Fax: (47) 17-85-58

Luis Marmolejo Puente
General Manager

Company Size:
Information not available

Primary Products:
Leather

Export Levels:
None

Plants:
Located at the above address

Wastewater Status:
Does not comply with regulations

Potential Opportunities:
The plant is located in the city of León and has no wastewater treatment facilities. As such the company is being forced to move the tannery out of the city. The owner (General Manager) has the land to build a new plant, however financing is limited. Purchases of an entire wastewater treatment system will be necessary in the new plant location. New plant facilities will not be built until competitive financing is obtained.

Purchase Time Frame:
Before 1997

Additional Comments:
Financing is essential. The state government plans to ensure all leather plants are relocated before 1997.

COSMOS PIELES Y CURTIDOS SA

Fernando Montes de Oca No. 118-A
Col. Niños Héroes
León, Guanajuato
C.P. 37190
Phone: (47) 17-95-58, 18-73-18
Fax: (47) 17-92-44

Lic. Vicente Lahud Martinez
General Manager

Company Size:
150 employees

Primary Products:
Leather and shoes

Export Levels:
Information not available

Plants:
Located at the above address, and a tannery located on the outskirts of León.

Wastewater Status:
Cosmos does not fully comply with wastewater regulations

Potential Opportunities:
80% of water discharge generated comes from the blue tanning process. Cosmos has recently been forced to move this process out of the city of León where shared wastewater treatment plant is being built. Effluent has a high chrome content and BOD levels. The company has recently invested in a primary and secondary treatment to reduce chrome levels. Future investment in a biological treatment to reduce the BOD level is expected.

Purchase Time Frame:
Within 2 years

Additional Comments:
None

ENTRY STRATEGIES

The research for this report has indicated that a potentially lucrative market for wastewater technology, equipment, and services exists in Mexico. Nevertheless, Canadian companies interested in pursuing opportunities will need to tailor services to the market: quality wastewater solutions offered with a local presence.

Given market demands, the entry strategy prepared by Canadian companies will have a significant effect on their success in the market. Careful consideration should be given to several important factors:

Local Presence:

Mexican buyers repeatedly indicated that they prefer wastewater goods and services suppliers with a local presence. Geographical proximity is important for two reasons: ease of recourse if technology doesn't perform to expectations, and ability to provide support services.

Potential buyers are generally purchasing "problem solutions", as opposed to stand alone equipment or technology. There is an expectation that vendors must take responsibility for their product. Several companies indicated a requirement for performance guarantees; even those companies that did not state such a preference suggested that suppliers must be able to problem solve as the need arises. In many cases buyers would prefer vendors to provide maintenance services.

Several options exist for gaining a market presence. The two simplest possibilities are the establishment of a local office or the use of a Mexican distributor. Nevertheless, companies that make the effort to develop a strategic alliance with a Mexican firm will be well rewarded. The choice of partner will be dependent upon several factors. Please see the following table for additional comments on potential partner choices.

Potential partners include construction and engineering companies, equipment distributors or Mexican wastewater companies. Obviously, the choice of partner is dependent on overall strategy. A target market of large companies is more appropriate with an engineering partner: these companies are looking for advanced solutions with detailed design that may need to be integrated into complicated production processes. Additionally, smaller

Mexican Firms Surveyed

In an effort to identify potential partners for Canadian companies, Mexican firms were asked to name the five best wastewater goods and services providers currently active in the Mexican market. The following chart identifies companies named more than once, and frequency with which they were named.

Atlatic	7
Degremount	5
ICA	4
Degussa	2
ITMA	2
ICAIS	2
IMASA	3
Sistemas Alotrópicos	2
ITESM	4

An additional 42 companies were named once. The wide range of responses indicates that the market is highly dispersed. Few companies are developing a reputation for excellence on a national scale. For example, potential buyers located in Monterrey frequently mentioned local suppliers; the same is true of Guadalajara and Mexico City. This phenomenon is largely a result of the preference for local service, as well as lack of detailed awareness of the wastewater field.

companies that sell wastewater treatment may not even be able to obtain access to such a customer.

Choice of target industry will also have a bearing on the partner chosen. For example, capacity expansions are expected in the autsparts industry (short and medium term) and the chemical/petrochemical industry (long term). Construction companies capable of building industrial plants of this kind may also prove to be effective partners.

Many Mexican companies suggested that they would prefer to visit an installation already built by the vendor. While this is a considerable barrier for a Canadian supplier, it can be overcome by partnering with a Mexican company already active in the field. However, the market holds a sense of distrust for many suppliers of wastewater equipment and services. Many buyers are particularly wary of Mexican suppliers; there is an overall sense that most Mexican companies do not have the experience or resources to provide effective wastewater solutions. Only a few larger companies - Atlatic and Buffete are two examples - have managed to overcome this barrier. Canadian companies must choose their partners with extreme care. A reputation for quality work is critical.

Potential Partner Choices by Target Market

	Problem Characteristics\ Important Factors	Potential Design Solution	Potential Partner
Mining Industry	Upcoming norm on mining focuses on effective and adequate drainage systems; companies need to reduce levels suspended solids and heavy metals	Redesign of drainage ditches used in the production process	Engineering companies with experience in the mining industry
Pulp & Paper Industry	High levels of water consumption; primary desire to reduce suspended solids	Construction of large sedimentation tanks; advanced treatment to reduce BOD levels; equipment will generally be high volume	Construction companies capable of undertaking large projects; engineering companies with experience in detailed design
Chemical/ Petrochemical Industry	High levels of water consumption; wide variety of potential problems, including highly toxic chemicals	Complex engineering solutions; potential redesign of production process	Wastewater engineering companies
Autoparts Industry	Small water consumption volumes; desire to reduce heavy metals; greater focus on water recycling	Stand alone equipment components; portable treatment systems	Equipment distributors; Mexican wastewater equipment supplies
Food & Beverage Industry	Variety of problems, depending upon product; frequent focus on BOD; upcoming norm to better control BOD discharges to municipal drainage systems	Complex engineering solutions	Wastewater engineering companies with proven experience in field

In addition to looking for a supplier with a local market presence, Mexican buyers prefer wastewater companies that have experience specific to their field. Pulp & paper companies like to buy from suppliers who have successfully implemented wastewater solutions for other pulp & paper companies; the same is true of other industries. One exception is autoparts companies, where the solutions required are generally less complicated.

More on Partners...

Construction companies:

- well respected, with sufficient resources to undertake lengthy contracts;
- excellent project management skills and ability to fulfil time requirements;
- proven experience in construction of wastewater treatment plants; and
- preference for companies with ISO 9000 international quality certificate.

Distributors:

- well known within targeted industry;
- either national coverage or intense local penetration;
- expertise in wastewater equipment; and
- ability to effectively service equipment and technology.

Promotion:

Not one Mexican company interviewed was able to identify a Canadian company active in industrial wastewater management. Promotion will be a critical aspect of any entry strategy.

Buyers tend to identify wastewater solutions from a wide variety of sources. Nevertheless, companies frequently mentioned that they obtain technical assistance from the following organizations: the ecological division of the UNAM (National Autonomous University of Mexico), ITESM, local universities, and chambers of commerce (industry chambers often have environmental committees or representatives). Canadian companies that plan on promoting in the Mexican market may wish to begin in one of these areas. Additionally, local trade shows are important. Many decision-makers find it worth their time to attend seminars or conferences on environmental issues.

Financing:

Nearly 40% of companies identified financing as having some impact buying decision. The primary exceptions to this trend are those firms that belong to a Mexican conglomerate group or a foreign multinational.

Technology financing from other foreign suppliers is extremely competitive. Several sources mentioned that German and Japanese companies are providing 10 year terms at 3 to 4% annually (dollar terms).

NAFINSA — the Mexican industrial development bank — offers financing for environmental improvement programs. The bank will finance up to 80% of purchases under \$US 1 million, or 50% of totals above that level. Although financing rates are reduced, interest charges of over 20% (peso terms) still apply. Some restrictions apply.

Things to Consider

Several points are critical in the development of an entry strategy. Canadian companies are well advised to give each of the following factors serious consideration:

- Companies wishing to be successful in the Mexican market for wastewater goods and services will need a local market presence, preferably a partner;
- Industry specific experience is a strong benefit in dealing with Mexican customers. In contrast, proven technology is a requirement;
- Awareness is key. The market for wastewater technology is not highly concentrated or controlled by one firm. Canadian companies will need to promote heavily; and
- After sales service is critical.

APPENDIX 1: Evolution of Water Costs per m³ (1988 to 1993)²

	Zone 1:	Zone 2:	Zone 3:	Zone 4:
1988	16.0	8.0	4.20	2.20
1989: January - July	200.0	9.0	4.80	2.60
July - November	210.0	10.0	5.0	2.6
December	230.0	11.0	6.0	3.0
1990: January - March	300.0	40.0	10.0	5.2
April - June	330.0	45.0	11.0	6.0
July - September	350.0	45.0	12.0	6.0
October - December	370.0	50.0	12.0	6.0
1991: January - March	700.0	95.0	23.0	12.0
April - June	750.0	100.0	25.0	13.0
July - September	800.0	100.0	26.0	14.0
October - December	800.0	110.0	27.0	14.0
1992: January - March	1040.0	730.0	260.0	195.0
April - June	1100.0	750.0	270.0	210.0
July - September	1100.0	800.0	280.0	210.0
October - December	1100.0	800.0	290.0	215.0
1993: January - March	1.30	0.90	0.32	0.24
April - June	1.3458	0.9317	0.3312	0.2484
July - September	1.3692	0.9479	0.3369	0.2527
October - December	1.3908	0.9628	0.3422	0.256

{2} It is important to realize that in 1993, the peso was replaced by a new currency unit, the new peso. Currently, approximately 2.2 new pesos (NP) are the equivalent of one Canadian dollar. Previously, approximately 2200 pesos equalled one Canadian dollar.

APPENDIX 2: SEDESOL Wastewater Norms

NOM-CCA-001	Thermal Electric Generating Centres Industry
NOM-CCA-002	Sugar Cane Industry
NOM-CCA-003	Petroleum and Petrochemical Refining Industry
NOM-CCA-004	Fertilizer Industry - except the Production of Phosphoric Acid
NOM-CCA-005	Manufacture of Plastics and Synthetic Polymers Industry
NOM-CCA-006	Flour Processing Industry
NOM-CCA-007	Beer and Malt Industry
NOM-CCA-008	Asbestos Industry (Materials for Construction only)
NOM-CCA-009	Dairy Processing Industry
NOM-CCA-010	Glass Industry (Flat Glass and Glass Fibres)
NOM-CCA-011	Glass Industry (Blown Glass)
NOM-CCA-012	Rubber Industry
NOM-CCA-013	Iron and Steel Industry
NOM-CCA-014	Textile Industry
NOM-CCA-015	Pulp and Paper Industry
NOM-CCA-016	Beverage Industry (Carbonated Drinks Only)
NOM-CCA-017	Finished Metals Industry
NOM-CCA-018	Copper Industry (Lamination, extrusion and stretching)
NOM-CCA-019	Wood Processing Industry
NOM-CCA-020	Asbestos Industry (Materials for Textiles only)
NOM-CCA-021	Leather Processing Industry
NOM-CCA-022	Meat Processing Industry
NOM-CCA-023	Food Processing Industry (Canned and Conserved Foods)
NOM-CCA-024	Pulp and Paper Industry (Paper Production from Virgin Pulp only)
NOM-CCA-025	Pulp and Paper Industry (Paper Production from Recycled Pulp)
NOM-CCA-026	Restaurant and Hotel Industry
NOM-CCA-027	Coffee Industry
NOM-CCA-028	Food Processing Industry (Seafood Products)
NOM-CCA-029	Hospital Waste
NOM-CCA-030	Soap and Detergent Industry
NOM-CCA-031	Wastewater from Industrial, Agro-Industrial or Service Activities discharged to a Municipal Drainage System
NOM-CCA-032	Wastewater of Urban or Municipal Origin for Use in Agricultural Irrigation
NOM-CCA-033	Wastewater of Urban or Municipal Origin, or the Previous Mixed with Public Water Bodies, for use in Vegetable or Fruit Irrigation

APPENDIX 2: Proposed SEDESOL Wastewater Norms

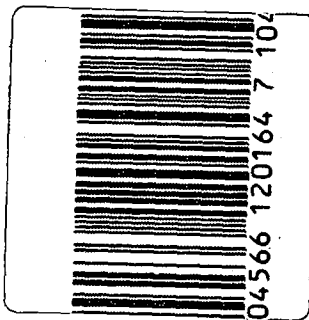
NOM-CCA-037	Galvanized Metal Industry
NOM-CCA-038	Wastewater Discharges to Municipal Drainage System
	1. Cities with a population of less than 14,999
	2. Cities with a population of between 15,000 and 99,999
	3. Cities with a population of over 100,000
NOM-CCA-039	Oil and Fat Industry
NOM-CCA-040	Electric and Electronic Components Industry
NOM-CCA-041	Fruit and Vegetable Industry
NOM-CCA-042	Acids and Salts Industry
NOM-CCA-043	Phosphate Fertilizer Industry
NOM-CCA-044	Pharmaceutical and Pharmochemical Industry

[2]. All units in mg/l, except PH (ph units) and sedimented solids (ml/l)

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