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MEXICO WATER REPORT

A Message from Vince Lencioni, Director of Wisconsin's Trade Office in Mexico

Yes, it is October, and we are only now getting the "Summer" edition of the Mexican Water Report finished. Sorry about the delay. Despite the insecurity issues in Mexico, issues that have been at the forefront of virtually all news about Mexico in 2010, the Mexican economy is growing and should be a target for companies looking for international growth markets in Asia and Latin America. And, 2011 should be an even better year for both private and public sector water projects.

In this edition we will address:

- **Signs of Strong Economic Recovery in Mexico**
  As the name implies, *The Quarterly Mexico Water Report* is focused on water-related topics and products in the Mexican market. However, in this issue we would like to highlight some macroeconomic data that shows just how vibrant the overall Mexican economy is. Some commentators may cite security issues as a reason to avoid Mexico and perhaps revisit it in the second half of 2011 (or perhaps 2012). We feel that it is important, if not vital, to provide you with some information about just how dynamic Mexico's import sector has been so far this year, how it has improved since 2008, and how that growth will continue and expand further in 2011. Mexico is not a market to be avoided or ignored.

  As we stated in a blog posting earlier this year, Mexico took a very hard hit in 2009. Brazil was touted for its quick exit from the global economic crisis and turnaround in the last quarter of 2009. The BRIC markets (Brazil, Russia, India, and China) were expected to greatly outpace Mexico in trade during the next few years, and therefore be better markets for U.S. products and services. This very negative perspective about the Mexican economy proved to be untrue for 2009 and the first half of 2010 is looking much better when one analyzes the Mexican economy and Mexican import figures. In addition, these half-year trends should only get better and stronger in the second half of 2010 and into 2011.

- **Top Five Targeted Sectors for Industrial Discharge Enforcement**
  In an attempt to provide a better understanding of the private sector industrial opportunities in the Mexican water sector, here is an analysis of the five sectors that Mexican water officials have been targeting for priority enforcement of existing water regulations. The next edition of *The Quarterly Mexico Water Report* will analyze additional sectors that deserve attention, including the construction and agriculture sectors..

- **Potable Water Plants & Mid Year Treatment Plant Update**
  The previous edition of *The Quarterly Mexico Water Report* included an extensive analysis of wastewater treatment plant infrastructure and growth plans through the end of 2009. This edition will cover new information from the Conagua National Treatment Plant Inventory (December 2009) for both potable water and wastewater plants as well as the expectations and realities for the first half of 2010 through 2011.

- **Mexican Industrial Discharge Regulations & Enforcement**
  For years, business executives in the environmental sector have recognized the need and potential for products and services presented by 500,000 Mexican companies discharging waste into water systems. In 1996, the Mexican Secretary of the Environment (SEMARNAT) passed the first two comprehensive wastewater discharge regulations to meet these needs: NOM 001 for wastewater discharges into federal bodies of water and NOM 002 for wastewater discharges into municipal sewer systems that eventually pass into federal water bodies.

- **Analysis of the 2007-2012 Water Plan & the 2030 Water Agenda**
  This spring, the Mexican National Water Commission (Conagua) presented additional details about its 2030 Water Agenda, a program that establishes the water-related objectives for the next 20 years in order to create a sustainable water strategy and to ensure that future administrations recognize the water sector as a strategic priority. This agenda will have for pillars: rivers free from trash, universal potable water coverage, 100% treated wastewater, and adequate protection and long term plans for all

populations vulnerable to flooding.

Before analyzing the long term goals of the 2030 Water Agenda, it is important and prudent to analyze the current short-to-medium term Calderon Administration's five year (2007-2012) Water Plan.

Signs of Strong Economic Recovery in Mexico

As the name implies, *The Quarterly Mexico Water Report* is focused on water-related topics and products in the Mexican market. However, in this issue we would like to highlight some macroeconomic data that shows just how vibrant the overall Mexican economy is. Some commentators may cite security issues as a reason to avoid Mexico and perhaps revisit it in the second half of 2011 (or perhaps 2012). We feel that it is important, if not vital, to provide you with some information about just how dynamic Mexico's import sector has been so far this year, how it has improved since 2008, and how that growth will continue and expand further in 2011. Mexico is not a market to be avoided or ignored.

As we stated in a blog posting earlier this year, Mexico took a very hard hit in 2009. Brazil was touted for its quick exit from the global economic crisis and turnaround in the last quarter of 2009. The BRIC markets (Brazil, Russia, India, and China) were expected to greatly outpace Mexico in trade during the next few years, and therefore be better markets for U.S. products and services. This very negative perspective about the Mexican economy proved to be untrue for 2009 and the first half of 2010 is looking much better when one analyzes the Mexican economy and Mexican import figures. In addition, these half-year trends should only get better and stronger in the second half of 2010 and into 2011.

Mexico's Macroeconomic and Growth Figures

During the last quarter of 2009, Mexican economic growth for 2010 was expected to be 2.9%, somewhat similar to the 2.5% estimated economic growth in the United States. However, shortly after the beginning of the year, the figure for Mexico was increased significantly to 4.5%. As of October, that higher estimate continues to hold true. Economic growth in 2011 is currently expected to be more or less the same at 4%. By the end of 2011, Mexico should be able to return to pre-crisis GDP and per capita income figures.

Likewise, Mexican international commercial activity is dynamic again. From the beginning of the year through August, Mexican imports

were up 33%. Total exports (including oil) were up 35.6%. When oil is removed from the equation, total exports were still up 34.5%. Manufactured exports grew by 35.2% and machinery and equipment exports were up 40.7%. These are strong signs of the commercial recovery in Mexico. However, with the U.S. consuming over 80% of Mexican exports, another slump in the U.S. economy could seriously impact Mexican export activity and the country's overall economy.

U.S. Exports as an indicator

If export volume and growth are good indicators of economic dynamic, one must conclude that the Mexican economy is experiencing a strong recovery. In the first half of 2010, U.S. exports to Mexico were up 32%. U.S. exports to China were up a very similar 35.2% in the same time period. It is important to note that U.S. export growth to Mexico in 2008 was positive and that in 2009 it fell by only 14.5%, meaning that U.S. exports to Mexico are already up in absolute terms 10-15% over pre-economic crisis levels. U.S. exports to Mexico increased from 11.75% of total exports in 2008 to 12.2% in 2009 to 12.64% in the first half of 2010. During the first half of 2010, the only top 25 export destinations where U.S. exports experienced greater than 30% growth were in several Asian countries, Brazil (38%), Colombia (35%), and Mexico (32%).

During 2009, total U.S. exports to all of the BRIC countries combined amounted to $118 billion while total U.S. exports to Mexico exceeded the figure by $11 billion and reached $129 billion. In the first half of 2010, U.S. exports to Mexico represented 12.4% of total exports while U.S. exports to BRIC countries represented 11.4%. U.S. export growth to Mexico (32%) also stayed on par with the dynamic average growth in the BRIC countries (32.7%).

Wisconsin Exports as an Indicator

Wisconsin numbers are even more pronounced in favor of the Mexican market in 2009 and 2010. In 2009, Wisconsin exports to Mexico dropped, as did U.S. exports to Mexico and the rest of the world, but only by single digit figures. Also, even with this decrease, as with total U.S. export figures, Wisconsin exports to Mexico as a percentage of total Wisconsin exports increased from 7.9% in 2007 to 8.6% in 2008 and 9.5% in 2009. In 2010, Wisconsin exports to Mexico represent 10.3% of total exports, and considerably more than the 6.6% of total exports for China. In 2009, Wisconsin exports to China fell more than they fell to Mexico. And, in 2010, Wisconsin exports to Mexico grew by an impressive 34%, three times the 10.5%-growth rate in Wisconsin exports to China.

In relation to other parts of the growing Latin America region, 2009 Wisconsin exports to Mexico decreased less than the average decrease to the top 10 Latin America export destinations. In 2010, Wisconsin export growth to Mexico (31%) was well above the average increase to the next top 10 Latin America export destinations (14%) and still double the figures to the five top Latin America export destinations (15%). Nonetheless, it is important to note that exports to Brazil are up 57% and to Colombia up 88%. It is also important to note that first half

2010 Wisconsin exports to Mexico ($963 million) remain more than a third more than total Wisconsin exports to the next top 10 Latin American export destinations ($640 million).

While Wisconsin exports to the four BRIC countries (11.1% of total exports) were somewhat more significant than Wisconsin exports to Mexico (10.4% of total exports), Wisconsin export growth to Mexico (34%) was almost double the average Wisconsin export growth in these supposedly much more growth-orientated BRIC countries (18%).

Conclusion

The above figures demonstrate that during the worst of the economic crisis in 2009 and during this year of recovery, Mexico has demonstrated to its doubters and critics that it could endure the economic crisis and recover. Mexico has always been a good market for almost all U.S. goods and it should neither be overlooked nor underestimated now. So, for those companies that decided to look elsewhere in 2009 and thus far in 2010, Wisconsin's Trade Office in Mexico would like to suggest that they reconsider Mexico. It is still the United States' second ranking export destination and one that is more than keeping pace with the rest of the world markets.

Top Five Targeted Sectors for Industrial Discharge Enforcement

In an attempt to provide a better understanding of the private sector industrial opportunities in the Mexican water sector, here is an analysis of the five sectors that Mexican water officials have been targeting for priority enforcement of existing water regulations. The next edition of *The Quarterly Mexico Water Report* will analyze additional sectors that deserve attention, including the construction and agriculture sectors.

Principal industries that generate industrial discharges

Treatment of industrial discharges in Mexico is improving thanks in part to improved enforcement and implementation of wastewater standards, industrial water price increases and related reuse strategies, some general and sector-specific fiscal incentives, and government efforts focused on key industries. Mexican firms are required to comply with two major regulations depending on where their wastewater is discharged: NOM 001 covers discharges into federally regulated bodies of water and NOM 002 covers discharges into municipal systems. NOM 003 regulates the treatment of wastewater for agricultural, recreational, and industrial reuse. If you would like a translated copy of these standards, please contact us.

Because of high volumes of water usage and/or toxicity of discharges, Conagua (the Mexican Federal Water Commission) has identified the following five sectors as priorities for ensuring not only compliance with NOM 001 or NOM 002, but also with additional, higher standards:

- Sugar Mills
- Paper Mills
- Chemical Factories
- Petroleum and Petrochemical Factories and Refineries
- Pork Industry

In the majority of cases, these sectors are dominated by 10-20 large companies that are discharging 75-80% of the contaminants. Mexican water authorities are targeting and visiting these firms with some regularity. However, Mexican water officials have estimated that there are about 500,000 additional companies that are discharging wastewater. Only 1,387 companies are monitored for direct discharge into federal bodies of water. The great majority send their wastewater into municipal water systems that eventually flow into these federal water bodies.

Sugar Mills

There are about 60 sugar mills in Mexico. One third of these are located in the state of Veracruz with the rest of the states having between one and three mills each. The technology used in these mills is 80-90 years old, very inefficient, and leads to considerable discharges of organic material. During the first half of the past decade, programs were created and enforcement was enhanced both to cut down on biochemical oxygen deman (BOD) discharges and to get companies to adopt water reuse strategies. In the majority of cases, the focus was to update the manufacturing process and reduce the need to build treatment plants at the end of the process. Reportedly, about one-third of the sector is still non-compliant with existing rules. Providing solutions to facilities in this situation, and helping the other two-thirds stay compliant, should allow for considerable business opportunities.

While Mexico remains one of the principal sugar-consuming nations of the world (per capita sugar consumption of almost 60 kg per year is double the world average), the country's sugar production industry is in decline. The sector has been hit hard by NAFTA and increased fructose imports from the United States. Mexico has the fourth highest incidence of diabetes in the world, and the current trend towards low or sugar-free products has also hurt the sector. Mexico maintains a sugar quota of 250,000 tons per year to protect the industry, although the local soft-drink industry has lobbied hard to allow for an increase in the quota. Last year's harvest was poor and adversely affected local sugar mills.

Production should go up in 2011, and there are plans to expand some production facilities, but it would be hard to characterize the industry as one of high growth and security in the future. If Mexican sugar producers hope to stay competitive they will need slow but steady

improvement in harvesting techniques as well as increasing field and factory technological improvements to lower costs, improve margins, and avoid fines for non-compliance with wastewater regulations.

Paper Mills

The paper industry in Mexico generates more than 64,000 direct and 235,000 indirect jobs. National paper manufacturing represents $10.3 billion annually, equivalent to 7.1% of the Mexican manufacturing GDP and almost 5% of the industrial GDP. National paper companies manufacture about 70% of all the paper products consumed in Mexico. In terms of production and discharge volumes, about 20 companies produce virtually all of the waste product with the top 10 companies responsible for approximately 80% of the entire sector. Recycled paper is the strength of the Mexican paper industry. Mexican consumption of recycled paper is third highest in the world.

So far in 2010, paper production has increased by more than 30%, although part of this growth is the recuperation of production lost during the 2009 economic downturn. However, like in most Mexican industries, the Mexican paper industry is very dependent on the United States for all types of process inputs.

Conagua recognized that it had to step up its vigilance of the paper industry to eliminate the extensive discharge problems. As a result, Conagua created a specialized program to prioritize vigilance to ensure compliance well beyond NOM 001 and 002 levels. Unlike the sugar industry, paper manufacturing processes in Mexico are fairly modern. However, the discharges are still of great concern and require extensive treatment plant infrastructure. Nine out of 10 of the companies that belong to the Mexican Paper Chamber have at least secondary biological treatment plants and several of them hold the somewhat exclusive Mexican Secretary of the Environment Water Quality Certification (Certificado de Calidad de Agua). Many companies in the sector have taken advantage of financial incentives that supply free water for manufacturing processes if their discharges exceed NOM 001 and 002 standards which would meet or surpass even U.S. EPA standards. While the top 10 Mexican paper companies are fully compliant with Mexican regulatory requirements, the next 10 companies, considered the medium-sized producers, need assistance to become or stay compliant. Many of the smaller producers remain non-compliant and will likely be future targets for Conagua regulatory enforcement efforts in the sector.

Chemical Factories

The Mexican chemicals industry, like the Mexican sugar industry, is dealing with the challenge of trying to upgrade process technologies from the 1920s and 1930s to become more efficient and comply with Mexican environmental regulatory standards. At the same time, this industry resembles the paper industry, in that 80% of production and discharges are generated by 10-20 companies, and their solutions require treatment plant infrastructure. In fact, the larger manufacturers tend to have activated carbon and tertiary rather than secondary treatment systems to deal with solvent, hormone, and other BOD discharges, with solvents being the top problem. A secondary problem

that both these companies and water authorities are dealing with is the cleaning of the aquifers that have been heavily and historically polluted by chemical company discharges. Conagua maintains specialized programs to ensure that chemical companies surpass NOM 001 and 002 standards and assist in the rehabilitation of aquifers affected by historic company discharges.

The 230 companies in the Mexican Chemical Chamber represent close to 90% of the sector's production and discharges. This association also includes the great majority of companies that manufacture chemicals for water treatment. According to Conagua officials, the majority of the problematic companies in the segment are found in and around the Valley of Mexico (including Tlaxcala) and in the state of Veracruz.

Annually, the Mexican chemical industry manufactures over $17 billion of product annually, which represents close to 12% of the manufacturing GDP and 8.5% of the industrial GDP of the entire country. Prior to the economic crisis in 2008, annual investment in the industry was more than $1 billion per year. While there is some growth potential for this segment, the chemical industry is considered to be somewhat depressed, losing 20% of its production during the economic crisis. Pre-crisis production levels are not expected to be reached until late 2011 or possibly late 2012.

Petroleum and Petrochemical Factories and Refineries

The Mexican petroleum and petrochemical industries face similar challenges as the general chemical industry, with the greatest problems being solvents and toxicity. The important difference is that there are only four private petrochemical companies in all of Mexico, located in Veracruz, northern Tamaulipas (Poza Rica), and Chihuahua, while Pemex (the state-owned petroleum producer) operates eight petrochemical complexes and 39 petrochemical plants throughout the country.

Pemex has almost 7,000 wells and 400 production fields, over 230 marine platforms, 11 gas refineries, and six oil refineries, making it one of the most important worldwide oil companies. It is the third-largest oil-producing company and 11th largest in oil sales. Mexico ranks 6th in oil production, 12th in natural gas production, 13th in oil refining capacity, and 17th in oil reserves. In 2009, Pemex invested over $20 billion (100% more than in 2005) with over $2 billion destined for refinery infrastructure (65% more than 2005). Total Pemex sales in 2009 were $87 billion although production, currently at 2,600 barrels per day, has fallen annually since 2005 with a 14% decrease from 2005 to 2009.

Conagua officials say that Pemex has been targeted for enforcement during the last few years and that it will remain a priority target for the foreseeable future. While it appears that Pemex has the financial resources necessary to obtain technology and equipment to remain compliant, this point of view is a bit too simplistic. There are several important limitations when considering Pemex business and its ability to obtain technology and equipment to remain compliant with wastewater regulations. The vast size and nature of its facilities makes Pemex

infrastructure expenditures expensive. Since revenue from Pemex funds approximately one-third of the federal government's expenditures, there are a lot of demands for the revenue generated by the firm. Pemex does not always have the liquidity or funds to meet these required expenses so readily. While Pemex might be generating significant revenue, it is also accumulating significant debt and little in the way of profits. It should not be overlooked that since Pemex is generating so much revenue for the federal government, it is unclear to what extent Pemex wastewater violations are conveniently overlooked. Doing business with Pemex is complicated, often requiring the right contacts, because it is part of a large bureaucracy.

Pork Industry

The Mexican pork industry produces over 1.1 billion tons of product each year. The states with the most production are Sonora (20%, principal export state), Jalisco (19%, no exports), Guanajuato (9%, no exports), Puebla (9%, no exports), and Yucatan (8%, important exporter).

Production has been flat over the last few years (2009 production figures are equal to 2006 figures) and increased demand has been met by imports during the last five years. Imports grew from 25% of total sales in 2003 to 33% in 2009. While growth might be limited in the sector, discharge problems are extensive and therefore despite low growth it appears that there will be a need and probably a demand for equipment and services for this sector for many years.

The sector has serious discharge and waste problems, compounded by its small and decentralized nature. Conagua is stepping up its enforcement of this decentralized sector despite the rural enforcement challenges and has established a specialized program to monitor this relatively unsophisticated industry.

Several other segments are also important consumers of equipment and services for water treatment such as food and beverage (including bottling, baking, and dairy), metalworking, cement, pharmaceuticals, textiles, hotel/restaurant, and construction. The next edition of *The Quarterly Mexico Water Report* will deal with these sectors plus the challenges faced by the agricultural sector, which represents only 4% of GDP but where over 83% of Mexican water resources are consumed. Conagua increased funding for agricultural-related wastewater and infrastructure projects by 60% in 2010 recognizing the need to address both the high water consumption and pollution/discharge issues of this large and often highly inefficient sector.

Potable Water Plants & Mid Year Treatment Plant Update

The previous edition of *The Quarterly Mexico Water Report* included an extensive analysis of wastewater treatment plant infrastructure and growth plans through the end of 2009. This edition will cover new information from the Conagua National Treatment Plant Inventory (December 2009) for both potable water and wastewater plants as well as the expectations and realities for the first half of 2010 through 2011.

Potable Water Plant Infrastructure

While the number of potable water plants is about one-third the number of wastewater plants, they are still an important and growing segment. In 1994, Mexico had 300 potable water treatment plants, of which 233 were in operation. By 2000 those numbers grew to 400 plants (336 in operation) with 110,118 liters per second (l/s) installed capacity and 78,319 l/s in treated flow. In 2007, Mexico had 621 total plants (541 in operation) and made up for a lag in installed capacity for the first time since 2004. At the end of 2008, Mexico had just over 683 potable water plants with an installed capacity of 130,878 l/s with a treated flow of 87,310 l/s. At the end of 2009, Mexico had added an additional 27 plants, representing a 4.5% increase, which resulted in a 3.1% increase in treated flow (to 90,040 l/s) but with only a 1.7% increase in installed capacity (133,090 l/s).

The number of plants in a state is not a good indicator of installed capacity or water treated. Sinaloa has the most plants (142), but it ranks seventh for installed capacity and fifth for most water treated. The plants in a number of states are small and/or handle very low flows. The three states with the largest installed capacity and treated flows (State of Mexico, Jalisco, and Nuevo Leon) are in or around the three largest cities in Mexico. The 47 plants in these three states account for less than 7.5% of the total number of plants, but represent about 40% of installed capacity and 35% of all water treated.

The Federal District, with 38 treatment plants (the fifth largest concentration in the country), treats 40% of the volume treated by the State of Jalisco, just over 30% of the amount handled by Nuevo Leon, and less than 18% of that handled by the State of Mexico. In fact, although Guadalajara and Monterrey have considerably smaller populations, they have 15% more installed capacity than the State of Mexico and Federal District, home to 25 million people combined.

Over 80% of the treatment processes used in potable water treatment plants fall into one of the following three categories: Conventional Clarification (31%), Reverse Osmosis (27.5%), and Patent Clarification (22%). However, 67% of installed capacity and 69% of treated water are handled by Conventional Clarification plants, with Direct Filtration a distant second (18% of installed capacity and 16% of flow treated) and Patent Clarification third (less than 8% of installed capacity and flow treated). It is important to note that while 27.5% of potable water plants use reverse osmosis technology, they make up less than 1.5% of installed capacity and flow treated.

Only three states do not rely on conventional clarification for less than 75% of their potable treatment plant technologies - Nuevo Leon (less than 20%), Baja California (20%), and Sinaloa (just over 40%). States that have made commitments to “alternative” process technologies for potable water include Zacatecas, Colima, and Durango (Reverse Osmosis); Sinaloa (Patent Clarification and and Iron/Manganese Treatment); Baja California, Nuevo Leon and to a lesser extent the Federal District and Tamaulipas (Direct Filtration).

Wastewater Plant Infrastructure

At the end of 2008, Mexico had 1,833 wastewater plants in operation with an installed capacity of 113,024 l/s with a treated flow of 83,640 l/s, equivalent to 40% of all generated municipal wastewater. At the end of 2009, Mexico had added an additional 196 plants, representing a 10% increase, which resulted in a 5.4% increase in treated flow (to 88,127 l/s) and an almost 7% increase in installed capacity (120,862 l/s).

Unlike the potable water plant situation, wastewater treatment capacity and treated flow amounts are much more equally distributed throughout the country with only 25% of the treated flows and installed capacity in the four states around the three main urban areas of Mexico City, Guadalajara, and Monterrey (State of Mexico, Federal District, Jalisco, and Nuevo Leon).

Over 80% of the treatment processes used in Mexico fall into one of the following four categories: Sludge (546 plants, 46% of treated flows), Stabilization Ponds (707, 16%), Advanced Primary (16, 11%), and Aerated Ponds (32, 8%). There are some "alternative" technologies in use: dual plants (10, 4.75%), biological percolating technology plants (42, 5.25%), and RAFA or WASB plants (162, 1.5%). Mexico has 158 septic facilities and 81 Imhoff tank facilities, but these plants treat less than 1% of flows. Aerobic (7 plants), anaerobic (52 plants), and biological (18 plants) technologies are used in these plants also to treat less than 1% of flows.

In addition to sludge facilities that exist in all states but Chiapas, two-thirds of states have a significant numbers of plants or flow treatment that use other technologies:

- Aerated Ponds – Baja California, Durango, Sonora, Tlacala
- Stabilization Ponds – All states except Baja California, Campeche, Federal District, Hidalgo, Morelos, Queretaro, Quintana Roo, Yucatan
- Advanced Primary – Baja California, Chihuahua, Guerrero, Puebla, Sinaloa
- Anaerobic – Jalisco and Veracruz
- Dual – Aguascalientes, State of Mexico, and San Luis Potosi
- Biological Filters/Percolators – Chiapas, Jalisco, Morelos, Nayarit, Queretaro, Tabasco
- Septic Systems – Sinaloa and Aguascalientes, Queretaro, Veracruz, Colima

- RAFA or WASB – Colima, Guanajuato, Jalisco, Puebla, Queretaro, Tlaxcala, Veracruz
- Enzymatic Reactor – Sinaloa, Zacatecas
- Oxidation – Baja California, Jalisco
- Wetlands – Oaxaca, Chihuahua
- Primary/Sedimentation – Guanajuato
- Imhoff Tanks – Tabasco

Updated Wastewater Plant Information

During the last four years, Mexico has constructed 244 plants and rehabilitated 50 plants. Of those, 99 new plants were built last year and 11 existing plants were rehabilitated in 2009. At the end of 2009, 59 plants were still under construction and 36 went out to bid in the first quarter of 2010. Approximately 100 plants were scheduled for construction in 2010. In the late summer, 64 plants were still on schedule for bids in 2010. However, at the half way point this year, only 24 plants were still planned for construction and only three had actually been built.

When asked about the existence of so many discrepancies between the number of plants scheduled for construction, construction bids, and actual completions, Conagua officials clarified that it had nothing to do with lack of budgeted money or budget outlay delays. They stressed that the availability and attractiveness of funding and financing were even better in 2010 than in 2009. In 2009, Conagua generally provided only 50% funding to municipalities for the construction of plants. In 2010, the APASO program funding allowed the federal government to provide up to 64% of funds for construction and with the special Fondo Concurable, this federal funding availability increased to 70% of plant costs. These progressive financing and funding options will remain in place in 2011 and into the foreseeable future. Because of midterm elections, many states (Zacatecas, Hidalgo, Puebla, Veracruz, Aguascalientes, Sinaloa, Oaxaca, among others) postponed bids and construction. Two states, Hidalgo and Oaxaca, returned significant amounts of funding for plant construction to Conagua. Several plants (Queretaro, Jalapa, Poza Rica, Veracruz, Juarez, Parral, San Juan del Rio) that should have come on line in the first half of the year were delayed. Also, the large Caracol and Zumpango plants in Central Mexico, which were slated for late 2010 are almost certainly going to be pushed back into 2011. As a result of these political decisions and delay situations combined with previous plant construction plans, 2011 should be as good of a year or better than 2009, especially for medium-sized plants, and over 100 plants should again be bid and built during 2011.

Mexican Industrial Discharge Regulations & Enforcement

For years, business executives in the environmental sector have recognized the need and potential for products and services presented by 500,000 Mexican companies discharging waste into water systems. In 1996, the Mexican Secretary of the Environment (SEMARNAT) passed the first two comprehensive wastewater discharge regulations to meet these needs: NOM 001 for wastewater discharges into federal bodies of water and NOM 002 for wastewater discharges into municipal sewer systems that eventually pass into federal water bodies.

Conagua and municipal enforcement realities

Enforcement of these two standards is somewhat confusing at best. There are about 150 Conagua officials spread across all of the Mexican states, averaging five per state, who are in charge of the implementation of NOM 001 with companies and municipal entities that discharge municipal and/or industrial waste into federal bodies. NOM 002 is regulated exclusively by each municipality without state or federal supervision. Profepa, the Mexican "environmental police," does not have a role in the enforcement of these NOMs.

Conagua currently monitors 1,387 companies that discharge waste into federal bodies of water. These companies register and pay for a right to discharge certain flows and levels of contaminants. Supposedly they also pay fines when the volume or contaminant level of discharge surpasses these limits. While the number of companies that are discharging waste into federal bodies of water is much larger than 1,387, the limited number of officials who monitor these companies and their discharges seem to be doing a reasonably good job with the limited resources.

NOM 002 municipal system monitoring is often described as a pre-treatment phase for NOM 001 federal system implementation, where efforts are focused mostly on removing metals and toxic substances and leaving organic waste in the system for later federal treatment and testing. Unfortunately, monitoring and enforcement of municipal discharges is tricky and very political. NOM 001 establishes that by January 2010, all municipalities with more than 2,500 inhabitants were supposed to be 100% compliant with NOM 001 and all of its 17 parameters. However, Conagua does not have the manpower, legal resources, nor probably the political will, to enforce NOM 001 with the municipalities – or, as mentioned earlier, to ensure that the municipalities are monitoring and enforcing NOM 002.

Article 115 of the Mexican Constitution gives municipalities almost exclusive responsibility for local water infrastructure development and effectively excludes uninvited state and federal involvement, thus insulating municipalities from federal (Conagua) controls and supervision. Municipalities often lack adequate implementing legislation, knowledge and training, manpower, and/or funding to carry out this function – and to ensure that bribery and corruption are prevented. One Conagua official confirmed that the way the law reads today, the only thing that Conagua can do is fine the municipality since they cannot deny them water nor funding, nor can they threaten anyone in the municipality with penal actions. As a result, under current legislation, if Conagua tried to take legal action against a Mexican municipality, it would be futile and only lead to additional resistance from the municipality to work with Conagua in the future.

Few municipalities are interested in working with Conagua to help with enforcement or to provide statistics from their municipalities. As a result, Conagua officials honestly have no idea about the level of industrial discharges into municipal systems or, for that matter, the level, frequency, or efficiency of municipal enforcement of NOM 002. NOM 001 establishes that municipalities with more than 50,000 inhabitants are expected to test monthly and report results quarterly, with smaller municipalities testing quarterly or twice per year, and reporting twice a year or annually, respectively. However, it appears that municipal cooperation and compliance in this regard is irregular at best.

Testing Procedures and their Problems

Depending on the discharge volumes, a company is "required" to take samples of its discharges quarterly, semi-annually, or annually and provide them to one of 29 private laboratories certified by Conagua. These laboratories run a variety of tests on these discharges, provide the results to the company, and maintain the samples on file. The company is then responsible for sending these results to responsible Conagua officials in each state.

While it is the responsibility of each company to comply with these standards, Conagua officials do make regular visits to targeted and to randomly chosen businesses. Headquarters officials determine 80% of the priority visits while local/state officials are responsible for determining the other 20%. The visits are carried out by the local/state officials.

There are four fundamental problems with the current industrial wastewater monitoring process. First, there is not enough Conagua enforcement staff to adequately visit all of the companies that need to be visited and therefore companies slip through the cracks. One Conagua official said that during the Fox Administration, he believed that Conagua officials were able to visit and adequately monitor all of the companies that are discharging waste into federal water bodies once during the six-year administration rather than once, twice, or three times per year as NOM 001 requires.

Second, there is no supervision of the sampling procedure to ensure that they are the actual discharges of the companies in question. As a result, it is possible that these laboratories are testing samples that are not representative of regular wastewater flows. In fact, one Conagua official said that there is no current way to know if a company is supplying a sample of its water from the coffee machine and submitting it to laboratories as representative of their official industrial discharges.

Third, while NOM 001 provides test parameters for 17 different materials or conditions, in reality Conagua only requires companies to test for and pass two tests, one for BOD (referred to as BDO in Mexico) and one for Total Suspended Solids (referred to as SST). The other 15

materials or conditions mentioned in NOM 001, but not enforced routinely, or at least not in non-priority sectors, are: (1) temperature, (2) fats and oils, (3) floating matter, (4) sediment solids, (5) total nitrogen, (6) total phosphorus, (7) arsenic, (8) cadmium, (9) cyanide, (10) copper, (11) chrome, (12) mercury, (13) nickel, (14) lead, and (15) zinc. The parameters for these 15 categories have different compliance levels or conditions, organized in three areas: rivers, reservoirs, and coastal waters. If you would like to receive information on these details, Wisconsin's Trade Office in Mexico can provide your firm with a translated copy of NOM 001 or NOM 002.

Fourth, even if there is adequate enforcement and if all of the above parameters were tested, the levels permitted in Mexico are well above U.S. minimum standards. As a result, many U.S. products, services and technologies suggest and provide for"overkill" solutions. Please request and consult our English translations of these two wastewater standards to determine to what extent they are similar or dissimilar to U.S. EPA wastewater discharges – Wisconsin's Trade Office in Mexico would appreciate receiving this feedback as well.

Conclusion

We can conclude that Conagua monitoring and enforcement of industry discharges to NOM 002 is improving but still inadequate. It is also difficult for Conagua to monitor and enforce NOM 002 with municipalities due to political and other factors. The good news on this front is that the federal government has proposed changes to legislation that could come on line in 2011 that would allow Conagua and perhaps even states to have a more shared role in municipal water infrastructure development. These legislative changes would allow for more effective penalties for municipalities, and their water utility directors, if they chose to not comply with NOM 002, not enforce NOM 001, and/or not provide access to and information about flows and activities.

The extent of municipal monitoring and enforcement of NOM 002 is difficult to gauge because no one is gathering and/or analyzing this information and it appears that municipalities are unwilling to share this information at this time. Nonetheless, the top 12 states, and in general the municipalities from these states, with the best reputations for wastewater compliance, according to a number of sources, have been the following: Aguascalientes, Chihuahua, Jalisco, Nuevo Leon, Puebla, Queretaro, Quintana Roo, San Luis Potosi, Sinaloa, Tlaxcala, the Yucatan, and the Federal District.

Analysis of the 2007-2012 Water Plan & the 2030 Water Agenda

This spring, the Mexican National Water Commission (Conagua) presented additional details about its 2030 Water Agenda, a program that establishes the water-related objectives for the next 20 years in order to create a sustainable water strategy and to ensure that future

administrations recognize the water sector as a strategic priority. This agenda will have for pillars: rivers free from trash, universal potable water coverage, 100% treated wastewater, and adequate protection and long term plans for all populations vulnerable to flooding.

Before analyzing the long term goals of the 2030 Water Agenda, it is important and prudent to analyze the current short-to-medium term Calderon Administration's five year (2007-2012) Water Plan.

Details of the 2007-2012 Mexico Water Plan

At the beginning of the six-year Calderon administration in 2006, plans began for a comprehensive infrastructure program with a significant focus on water and a 20-year water agenda. Later that year the President released his five-year Water Plan. The plan is intended to improve insufficient and lagging public water infrastructure, allowing Mexico to catch up with advancing Latin American countries. Mexico ranked 64th in the world on the Infrastructure Index of Competitiveness, compared to Chile at 35th and Panama at 46th. A second, more long-term goal is to get Mexico into the ranks of developed economies such as South Korea (21), Spain (22), Malaysia (23), and Ireland (31) by 2030.

The 2007-2012 Plan has eight general objectives. Each one of these general objectives has 5-10 specific, measurable, operational strategies. This was something fairly novel for the water sector and for Mexican government entities in general. Many of these strategies have multiple components and require periodic reports to demonstrate progress. The objectives are to:

1. Improve water productivity in the agricultural sector;
2. Increase the access and quality of potable water, sanitation, and sewage systems;
3. Promote the integral and sustainable management of river basins and aquifers;
4. Improve the technical, administrative, and financial development of the sector;
5. Consolidate the participation of end-users and society in the management of water and the promotion of appropriate water use and water culture development;
6. Prevent risks derived from storms and heavy rainfall and deal with their effects;
7. Evaluate the effects of climate change in the water cycle in the country; and
8. Create a tax-paying water culture and promote compliance with the National Water Law.

The Plan has four specific and concrete goals for 2012 (related to the second objective above):

1. Increase potable water coverage to 92% nationwide,

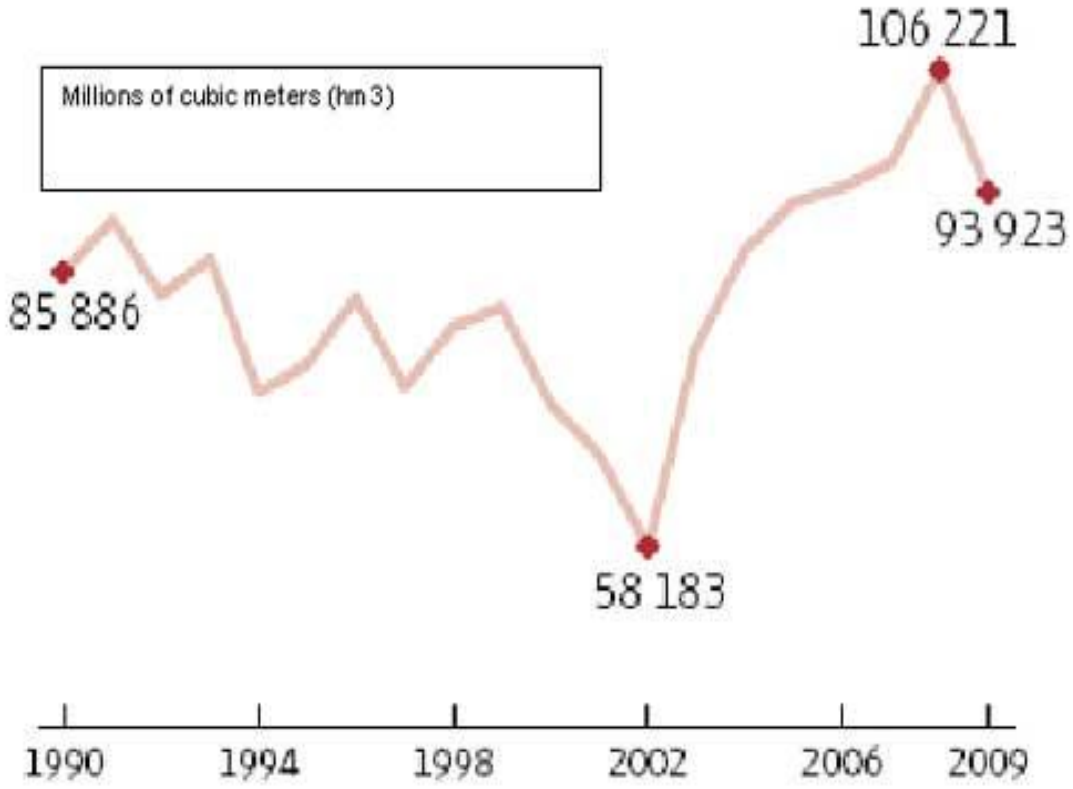
2. Increase sanitary/sewage coverage to 88% nationwide,
3. Increase wastewater treatment coverage to 60% nationwide, and
4. Increase the level of efficiency in 80 local water utilities by 8%.

Some might say that these goals are lofty, especially considering that while 97% of urban areas have access to potable water, only 76% of the rural areas have such access; while 96% of the urban areas have access to sanitation/sewer systems, only 63% of the rural areas have similar access; and while about 33-40% of the wastewater is currently treated in the country, only 10% of the wastewater in the Greater Mexico City area and 0% of the wastewater in the Greater Guadalajara area are currently treated. The competitiveness of Mexico's water and sewage systems is considered to be 20% below the Latin American average, well below Argentina, Brazil, Chile, and Colombia and just below severely underinfrastructured Peru.

Details of the 2030 Mexico Water Agenda

The Water Agenda 2030 was announced with the five-year plan. However, it was not until a few months ago that the plan truly began to take shape. Even more importantly, the concrete strategies for the agenda will be determined later this year as Conagua interacts with government, NGO, and business interests to obtain ideas and suggestions for approaches and technologies. In this way, Conagua hopes to construct a platform that will establish the necessary procedures to strengthen the water sector to comply with still unfulfilled 2012 goals as well as the still unspecified long term 2030 strategies.

The Water Agenda 2030 is still in its initial stages in terms of having measurable strategies. However, the following graph illustrates the goals that it hopes to reach:



The general goal for the 2030 Agenda is for Mexico to become one of the 20 most advanced countries in the water sector according to the Index. Its specific and optimistic goals to date are the following:

- By 2015, all river basins will be in equilibrium, all irrigation automated, and all treated water reused;
- By 2016, all major populated areas will be free from risk of flood;
- By 2024, all rural areas will have access to potable water;
- By 2025, all industrial wastewater will be treated; and
- By 2030, all aquifers will be in equilibrium and the diverse sources of contamination will be under control.

With the still lingering international economic crisis, the 2012 Mexican presidential elections, the traditional Mexican political environment and realities, the lack of a significantly increased revenue stream, and the fact that Mexican consumers consider water to be a mere commodity, it is difficult if not impossible to know if these goals will be met. However, in light of the extent of the problems and their urgency, and the evidence of a new, apolitical commitment to water infrastructure issues, Mexican government commitment to resolving these problems will continue to move forward and is almost irreversible.