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MEXICO WATER REPORT



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

This edition of the Mexico Water Report has a mixture of private and public sector articles. The first article deals with the problems that foreign companies are facing when trying to participate in water government procurement bids and the reality that many government bids are no longer viable for US companies under newly published rules and despite the existence of NAFTA – and how we can do something to change these regulations.

The second article deals with channel realities for selling to the water sector in Mexico. Our next edition will have an article that completes our analysis on this all important theme. The next two articles deal with private sector analysis.

The third article continues our analysis of economic segments that require water equipment - their current dynamic and water problems and opportunities– reviewing the dairy, textile/clothing and metal working/automotive sectors.

The fourth article provides an overview of water in agriculture in Mexico – where almost 80% of national waters are destined (4th highest in the world) but where less than 2% of water revenue is based. The final article describes the water infrastructure and opportunities that exist in the all important Mexican Federal District/Mexico City area.

In this edition we will address:

- [Bid Concerns for Foreign Companies](#)
When the International economic crisis hit Mexico in late 2008, Conagua (Mexican Water Commission) established that its funding of public sector water projects would continue forward without delays. And, while one can argue that many projects did continue forward, especially in 2009, projects in 2010 were dramatically affected by budget, political/electoral, and typical Mexican bid bureaucracy.

It appears now that many projects delayed in 2010 will likely come back on line in 2011. However, Wisconsin's Trade Office in

Mexico warns that for foreign companies, it sees only serious concerns and larger problems and deceptions affecting their participation, or ability to participate, in Mexican public sector projects now and in the foreseeable future.

- [Channel Market Strategies in the Mexican Water Segment \(Part 1\)](#)

Channel market strategies are vital in all industries in all countries. However, if you are a foreign company trying to sell products into the Mexican water sector, they are even more important. As the previous article on government procurement mentions, Mexican law requires that all sales to Mexican government entities (federal, state, municipal, parastate) be carried out formally by a Mexican company. So, unless you have an office in Mexico, this means that selling to the Mexican government without a Mexican intermediary or a Mexican Corporation is technically illegal.

If we divide the Mexican water sector into public and private opportunity areas, approximately half of the opportunities (public) cannot be sold direct or via a representative or agent. On the private sector side, no such barriers exist. However, questions of service, regulatory issues, credit, and payment make it so that selling direct in many cases is not optimal or even desired. Therefore, most US companies wanting to sell to the Mexican private sector start by selling indirectly through distributors, reps or agents, and Partners in the market.

- [Sector Analyses: Dairy, Textile and Metal Works](#)

In our last edition, we described the five most important sectors in terms of discharge concerns, all of which had some kind of special Conagua sectoral program to regulate their discharges, above and beyond standard wastewater discharge regulations.

In this edition, we are analyzing the following three, large and important manufacturing sectors, providing a feel for their size, current dynamic, and details about their environmental problems and related opportunities: A. Dairy Industry, B. Textile and Clothing Industries, and C. Metalworking and Automotive Industries.

- [Agriculture and Water in Mexico](#)

This article will review, as an introduction of sorts, the characteristics of the Mexican regions, by water and agricultural characteristics, to give the reader a perspective on Mexican water use and related national and regional goals and objectives to make the Mexican agriculture system more productive, efficient, and sustainable by means of better water management. Future editions will deal with each of these issues and other related issues in greater detail.

- [Water Projects and Infrastructure in Mexico City](#)

Mexico City, known officially as the Mexican Federal District (DF), is one of the largest cities on the planet with more than 10 million inhabitants although less than half of the size of the Valley of Mexico which includes another 10 million people. Due to these numbers, the major problem which it faces is rooted in the lack of public services and the water sector is no exception.

Upcoming Visits by the Mexico Trade Office Director

Vince Lencioni, Director of Wisconsin's Trade Office in Mexico, will be in California in March, Washington, DC and Pennsylvania in April and June, and the upper Midwest in May. If any companies would like to meet with the director during these trips, please see the below visit details and contact us so that we can try to schedule a visit.

March: 2030 Mexico Water Program Announcement and Analysis – In March, the Mexican federal government will give out details concerning the proposed 2030 Water Program. LGA Consulting will provide a full analysis of these concrete points related to what Mexico plans to do regarding water technology and infrastructure during the next 20 years. Please let us know if you would like to receive this analysis.

April 19-21: Waste Water Equipment Manufacturers Association (WWEMA) Annual Convention in Washington, DC - The director will be participating and presenting about the water sector in Mexico, and available to meet with businesspeople.

May 9-13: Annual Visit to Wisconsin - The director's of Wisconsin's four international trade offices (Mexico, Canada, Brazil, and China) will be visiting various locations in Wisconsin to speak on developments and opportunities in their markets as well as have one-on-one appointments with Wisconsin businesses seeking to expand their export sales.

June 12-16: AWWA ACE11 Event in Washington, DC - The director will be attending the show and available to meet with businesspeople.

Bid Concerns for Foreign Companies

When the International economic crisis hit Mexico in late 2008, Conagua (Mexican Water Commission) established that its funding of public sector water projects would continue forward without delays. And, while one can argue that many projects did continue forward, especially in 2009, projects in 2010 were dramatically affected by budget, political/electoral, and typical Mexican bid bureaucracy. It appears now that many projects delayed in 2010 will likely come back on line in 2011. However, Wisconsin's Trade Office in Mexico warns that for foreign companies, it sees only serious concerns and larger problems and deceptions affecting their participation, or ability to participate, in Mexican public sector projects now and in the foreseeable future.

This article will explain the blurring that has taken place between National and International bids in general and especially with new and stricter national content regulations, as well as how ineffective NAFTA has been in protecting US and Canadian companies from this new Mexican protectionism. It will also discuss how and why foreign companies and companies trying to provide non-Mexican made product should be concerned about remaining viable in the Mexican public water sector.

Evolution of National Content Regulations in Mexican Government Procurement

In November of 1994, six months after NAFTA went into affect, Mexico established a rule that 50% of the contracts of federal, state, and municipal governments should be with small or medium Mexican companies, an interesting, progressive measure that for the most part was not enforced or enforceable. Ironically, although the NAFTA chapter on government procurement was supposed to create opportunities for US and Canadian companies and protect at least them from protectionist procurement measures in Mexico, said rule served as a precursor for much more protectionist measures in this area that would come from the Mexican federal government in November of 2000 and even more strongly in October of 2010.

In November of 2000, Mexico published its first Rules for the Determination and Accreditation of the Amount of National Content for Federal Government Procurement. In these rules, the Mexican government established that all federal government procurement goods purchases needed to have at least 50% national content. While procurement laws established that public works contracts could only be bid on by Mexican based companies, said contracts did not have any national content requirements. While said regulations allowed Mexican federal dependencies to establish national content minimums, this was something that was rarely done.

While these new national content requirements for the purchase of goods (but not on public works) now existed, said regulation (a) was not implemented with a heavy hand at the federal level, (b) state and municipal procurement officials virtually ignored these stipulations, and (c) federal officials looked the other way at these state and municipal transgressions. As a result, despite the creation of these 2000 Rules foreign companies could find a viable way to do business in the Mexican procurement system.

In October of 2010, the 2000 Rules were modified to make it even more difficult for foreign companies to participate in the great majority of government bids at the federal, state, and municipal levels. And more importantly, the implementation of these rules appears to be real and consistent this time, unlike in the case of past procurement and national content laws and regulations. Prior to the October 2010 National Content rules changes, the opportunities for foreign companies could be understood to be generally viable and even somewhat ample. If a foreign company had a Mexican subsidiary or sold its products through a Mexican intermediary, then they could participate freely in all bids, including national bids. However, the new 2010 regulation and its heightened implementation dramatically affected this viability. With the extension of national content to public works and the more strict enforcement of the national content regulations, foreign companies are effectively excluded from being able to participate in national bids even via a Mexican intermediary because said bids now require 55% national content, and they will require at least 65% national content in less than 18 months (in July 2012). And, the 2010 regulations are being interpreted so that even international bids are subject to national content requirements when Mexican products and technology can meet bid requirements.

Analysis of the Changes Resulting from the October 2010 Regulations

The most important change for the water sector brought about by the October 2010 National Content rule changes was related to the establishment that all municipalities and states that used any federal funding (80-90% of these cases or more) would have to abide by these new regulations as well. This change at the municipal level is something new and particularly damaging for foreign companies in the water sector since more than 95% of Mexican bids in this sector are municipally procured, and since municipal and state government bodies are exempt from NAFTA protection. It is interesting to note that while the Mexican federal government insists on the exclusion of municipal and state procurement from NAFTA protection, arguing that said entities are not truly federal and therefore exempt, it nonetheless conveniently uses municipal dependence on federal funding to insist that said entities have to comply with these federal regulations. This makes these entities de facto federal bodies from a national regulatory perspective but evidently and conveniently not from a NAFTA perspective. Is this a legitimate legal loop hole or a classic example of having your cake and being able to eat it – we see it as the later.

Another negative has emerged from this heightened enforcement and percentage increases in national content rules. Foreign companies and/or their Mexican intermediaries or partners, are being forced to decide between being excluded from the Mexican government procurement system altogether or lying and stating that their products meet national content minimums and bribing local officials to look the other way, hoping that federal oversight will not catch their digression. Wisconsin's Trade Office in Mexico is already aware of a few cases of this type of behavior by foreign companies. This is not only inappropriate and illegal in Mexico, it also goes against US export practice laws that the US federal government promotes and enforces, thus providing US companies with another barrier to remaining viable in its second most important export market, a market where NAFTA was supposed to mean the elimination of old trade barriers and not the creation of new ones. We fear that too many local Mexican water procurement officials will become more aggressive in the future at using

this national content rule as a tool for corruption, being able to function even more effectively and efficiently with it as gate keepers approving or eliminating bids at the beginning of the process using this legal “ruler” more adeptly than previous more onerous and questionable instruments.

It is important to mention that foreign manufacturers and Mexican intermediaries who sell foreign products into the Mexican public water sector are now beginning to see the implementation of these changes, that is, a commitment by the Mexican federal government to enforce these regulations and subsequently a new adherence by municipal and state governments to these regulations. Some companies who sell components to Mexican integrators, where a large part of a public work is labor or construction, seem to be less affected so far by these regulations. However, in 18 months when the percentage of minimum national content is 65%, this could and probably will change. And, it is important to clarify that these percentages are MINIMUM requirements and that foreign companies and Mexican distributors of their products are saying that they are now routinely running into bids where the percentages are above 65% and has high as 100%. For a company trying to sell product via a Mexican distributor to the Mexican government in a bid only for that product, virtually any national content requirement, as is the case in Mexico, will serve as an effective way to exclude these products from the market.

Analysis of NAFTA Government Procurement Provisions

Above we mention that NAFTA Chapter 10 Government Procurement does not seem to offer US and Canadian companies adequate protection from Mexican protectionist government procurement policies. When one reads the key articles in this Chapter, it is hard to imagine how US and Canadian companies are not protected from these types of actions.

Article 1003 – National Treatment and Non-Discrimination

1. With respect to measures covered by this Chapter, each Party shall accord to goods of another Party, to the suppliers of such goods and to service suppliers of another Party, treatment no less favorable than the most favorable treatment that the Party accords to (a) its own goods and suppliers; and (b) goods and suppliers of another Party.
2. With respect to measures covered by this Chapter, no Party may treat a locally established supplier less favorably than another locally established supplier on the basis of degree of foreign affiliation or ownership, or discriminate against a locally established supplier on the basis that the goods or services offered by that supplier for the particular procurement are goods or services of another Party.

Even US federal government officials responsible for NAFTA issues confirm that said articles do not protect US and Canadian companies from unjust Mexico government procurement procedures, specifically prohibiting US companies to bid directly without Mexican intermediaries and prohibiting Mexican government entities from using restrictive national content regulations to exclude US companies

from the sector.

Likewise, Article 1024 (Further Negotiations), referenced extensively above in Article 1001, which discusses the initiation of negotiations for improvements in Chapter coverage to include local/state entities under Chapter 10 provisions, has NEVER taken place even though said article mandated that negotiations were supposed to start between the three parties no later than 1998 - 12 years of no activity on the issue.

In the case of international bids, it is now illegal, not to mention completely impractical as the system exists today, for a foreign company to bid on any international bids without a Mexican corporation, partner or intermediary as the formal bidder. As a result, any foreign company hoping to employ a rep or agent for this purpose can no longer do so. If NAFTA was supposed to help in this area, it absolutely has had no effect except to deceive US companies into believing that somehow they were better protected from these types of issues and problems after 1994 than before 1994.

Another problem lies with the Mexican government procurement system. Said system is structured so that effectively three types of bids are permitted: (a) national bids in which only Mexican-based companies can participate, (b) international bids where companies from countries with free trade agreements (like NAFTA) with Mexico can participate, and (c) open international bids where companies from any foreign country can participate. However, foreign companies cannot participate in any of these bids without a Mexican entity, despite what NAFTA seems to establish. One might argue that foreign companies should be content to be able to participate in the international bids and agree to set up Mexican corporations to participate in national bids or simply allow Mexican companies to have these national bids that one might assume are of lower value and probably fewer in number than the international bids. However, Wisconsin's Trade Office in Mexico analyzed all public sector water bids between July 2009 and June 2010, and found that during that year period, only 2.28% of all such bids were international in nature. In speaking with Mexican water government officials involved in procurement bids, it appears that this is a trend that will continue and by no means an exception.

These Chapter 10 articles have been ignored or Mexican officials have found ways to change their meaning and circumvent their enforcement so that Chapter 10 is completely ineffective and out of step with if not contradictory to the spirit and purposes behind the inclusion of a government procurement chapter in NAFTA. As a result, one has to ask, does Chapter 10 have any merit or help protect US and Canadian companies in any way from Mexican government protectionism in government procurement – we have to conclude that it does not.

U.S. and Canadian Procurement Laws vs. Mexican Procurement Laws

The above information in this article demonstrates that Mexican government procurement laws and regulations are clearly protectionist in

general and even towards US and Canadian products, something clearly not in the general spirit of NAFTA nor the spirit or evidently the reading of Chapter 10. An easy but incorrect assumption might be made that the US and Canadian government procurement laws and regulations are probably just as protectionist as those in Mexico. While Wisconsin's Trade Office in Mexico has not studied this issue exhaustively, from conversations with US federal government officials and from some investigation of some applicable regulations, it seems that the US does not treat NAFTA partners, nor for that matter countries with which it does not have free trade agreements, in the same negative way that Mexico does. The US does offer protection for some metal/steel producers in government procurement bids, but said protection is clearly temporary in nature. These US measures neither apply to all products that are procured by the federal government nor are written into the law as something intended to be permanent, as is the case with the Mexican National Content Regulations published in October of 2010.

It is important to mention that all of Canada's provinces and almost 2/3 of US states have ratified the GATT Agreement on Government Procurement, which establishes that these entities cannot discriminate against foreign products the way that the Mexican federal government is currently doing. And, to our knowledge, not a single Mexican state has made any effort to look into the ratification of this GATT Agreement. One has to ask why this is so and why the Canadian provinces and 2/3 of the US states should adhere to these more stringent, non-protectionist GATT policies if their NAFTA partner counterparts have expressed no interest or willingness to pursue similar actions.

Conclusion

Many U.S. and Canadian manufacturers who were expecting government procurement opportunities to come from NAFTA and the supposedly more liberal, open Mexican economy have to be feeling deceived. One can easily argue that Mexican laws and NAFTA have not only not created procurement opportunities, they have restricted if not eliminated most opportunities that existed before NAFTA. This claim is serious because it comes with three very negative implications: (1) NAFTA is almost useless and even detrimental for government procurement opportunities in Mexico, (2) in the area of government procurement there exists a serious lack of commitment by Mexico to trade relations with its most important trade partners, and (3) Mexico's government procurement policies demonstrate serious contradictions in the loud and proud stance of the Mexican federal government that if a country signs a free trade agreement with Mexico, its market will be opened to the products of the companies from these nations.

Shouldn't Mexico exclude countries that have signed free trade agreements with Mexico, especially the U.S. and Canada, from these blatantly protectionist measures? And, if it does not see the reasoning and prudence of doing so, shouldn't the U.S. and Canadian federal governments be more vocal in public and more active in bilateral and trilateral negotiations with Mexican officials about these concerns. In the next edition of the Quarterly, we are going to discuss options for how U.S. and Canadian water-focused companies and their respective

associations can work together with their respective governments to get these measures modified if not repealed. If any foreign companies or Mexican intermediaries would like to interface with Wisconsin's Trade Office in Mexico to discuss these issues and future lobbying efforts, please do not hesitate to contact us.

Channel Market Strategies in the Mexican Water Segment (Part 1)

Channel market strategies are vital in all industries in all countries. However, if you are a foreign company trying to sell products into the Mexican water sector, they are even more important. As the previous article on government procurement mentions, Mexican law requires that all sales to Mexican government entities (federal, state, municipal, parastate) be carried out formally by a Mexican company. So, unless you have an office in Mexico, this means that selling to the Mexican government without a Mexican intermediary or a Mexican Corporation is technically illegal. If we divide the Mexican water sector into public and private opportunity areas, approximately half of the opportunities (public) cannot be sold direct or via a representative or agent. On the private sector side, no such barriers exist. However, questions of service, regulatory issues, credit, and payment make it so that selling direct in many cases is not optimal or even desired. Therefore, most US companies wanting to sell to the Mexican private sector start by selling indirectly through distributors, reps or agents, and Partners in the market.

Following are the most common channel options for a foreign company manufacturing water products or providing water services in the Mexican market.

Direct from abroad vs. Indirect sales via a local intermediary

As mentioned above, except in some rare exceptions, direct sales by a foreign company is not an option for sales to the Mexican public water sector at any level. Also, even if these legal restrictions were lifted, Mexican government officials would prefer dealing with Mexicans and Mexican companies. On the private sector side, first sales by a company to Mexico generally consist of reacting to a request from an end-user or reseller in the country, accepting an upfront payment, and shipping the product to Laredo or El Paso. While these types of sales might work without a Mexican intermediary, companies have to ask if many of those sales to the border repeat themselves or are of a size that is truly interesting to the company in the medium and long run.

Nonetheless, selling direct can be viable if not in some cases a necessary evil. If the value of the product and the size of the market and its potential are considerable, a foreign company might want to sell direct to meet pricing requirements or to avoid having to share margins, and it might have to do so if said products are unique to the market and cannot be serviced locally. However, in these cases, the company has to want to do this and it has to have employees with the time and cultural, language, and technical skills to make it

work, something which many almost no small companies, few medium size companies, and not all large companies can count on.

While cutting costs and eliminating the middle man is important, that strategy in Mexico too often results in a considerable reduction in sales as well – not a trade off that a sound business will make. Likewise, the hidden costs associated with this move for most companies end up being more expensive than sharing margins with an intermediary. Sales and service support, in-country logistics and inventory, regulatory issues, credit extension, and accounts receivable are a few of the more obvious areas that a foreign company may have problems addressing in a more cost effective manner than a local intermediary.

In the private water sector, the above issues are even more valid than for more general merchandise. B2B water product and equipment sales tend to have important installation and/or service components. However, the manufacturer can generally count on being able to teach its intermediaries to handle these situations.

Local Distributor

The most common and often the best intermediary option in the Mexican water sector is using a local distributor or distributors – selling to a Mexican company that buys, imports, and resells your product to the end-user.

Because Mexico was such a protectionist market prior to NAFTA, many Mexican companies were vertically integrated. They manufactured and sold their product in the market without having to share margins with intermediaries. Those manufacturers that used intermediaries almost exclusively relied on distributors. The buying and reselling of product at a profit is more of the traditional entrepreneurial mindset in Mexico. In part this was because of a lack of trusting manufacturers to pay commissions, the lenient bankruptcy rules in the country allowing small companies and individuals to take on the risk and reward of distribution vs. representation, and the need and ability to make larger margins as a distributor.

With the new government procurement national content regulations, if you try selling your product by itself through local distributors, you will not be able to sell your products in the majority of cases. As a result, signing a distributor to sell your product into the Mexican public water sector will, most of the time, be a waste of time. On the private sector side, distributors are the preferred way of selling at this time, both in general and in light of the underdeveloped rep and agent situation in the country. The advantage of working with a distributor is that they will (or should) hold stock in the country, they normally assist with marketing and after sales service, and most importantly, they take on the credit and payment issues. That being said, if your distributor sells a bunch of product with credit to non creditworthy clients, both your company and your distributor will have to bear the payment problem burden.

When product is low in value (less than \$5,000 US), is a commodity, a replacement part, if stocking is required or broad market coverage is needed, then a distributor is generally the best option. However, if you need to control prices and margins to be competitive, if you feel the need to control branding and marketing, if you need your intermediary to not carry competitive product, and if you need for your intermediary to broaden its focus to cover your new lines and do some business development and not just be an order taker, then a distributor is probably not going to be your best option in the Mexican private water sector.

Local Rep or Agent

In a perfect Mexican world, where payments are fluid and stocking products locally is not required, everyone should want to work with a rep or agent – selling to a Mexican end-user by means of an intermediary that finds and services the client and receives a commission when the client pays. A rep provides the best of both worlds: control over your pricing and marketing, service assistance, and someone locally with vested interest in seeing that you get paid. Also, reps tend to be more Business development orientated and not order takers like so many Mexican distributors can be. Reps will also generally work with fewer products and therefore afford your product the time and attention that you feel is necessary for success in the market while distributors might not even make an effort to sell your product if it does not fit nicely within its current channel and customer focus.

The good news is that with the push to avoid high, sometimes almost usury distributor mark-ups, there is a tendency for industrial clients to want to go direct, something which makes the rep/agent in greater demand. The bad news is that there is a dearth of reps in Mexico. Those that do exist are small companies or not companies at all, mostly ex-employees of companies that used these products who realized the potential for the product to be sourced from the vendor in a different, more efficient way. Wisconsin's Trade Office in Mexico is an active member of MANA (Manufacturers & Agents National Association) and has done studies for it, the most important rep association in the US, and determined how reps and rep agencies are few, extensively underdeveloped, and very hard to locate. Some distributors have tried creating a rep division inside of their operations, some in anticipation of these changes and others as a direct result of requests from US companies who want them to rep their product rather than distribute it. These efforts have had mixed results to date.

In the next edition of the Quarterly, we will discuss integrator, strategic alliance, and subsidiary office pros and cons as well the important issues of exclusivity and the usefulness and limitations of channel carrots and sticks in Mexico.

Sector Analyses

In our last edition, we described the five most important sectors in terms of discharge concerns, all of which had some kind of special Conagua sectoral program to regulate their discharges, above and beyond standard wastewater discharge regulations. In this edition, we are analyzing the following three, large and important manufacturing sectors, providing a feel for their size, current dynamic, and details about their environmental problems and related opportunities: A. Dairy Industry, B. Textile and Clothing Industries, and C. Metalworking and Automotive Industries.

A. DAIRY INDUSTRY

Size & Current Dynamic

Mexico consumes about 15 billion liters of milk annually but only produces 10.8 billion liters domestically. One important reason why Mexico has to rely so heavily on milk imports is water deficit issues. To produce one liter of milk in Mexico, 300 liters of water are required. Many of the leading production sites are in some of the driest areas of Mexico. With a growing urban population, milk demand in Mexico is growing three times faster than production.

Mexico currently produces almost 75% of the milk demanded by its domestic market. Imports represent about 40% of all processed final and intermediary dairy products, both because of price and because many local producers fail to meet quality standards. The US provides two-thirds of all milk and milk product imports with 15% coming from New Zealand and the other 20% from Chile, Argentina, Uruguay, and Australia. Although Mexico has historically relied on imports of milk powder, in the last 10 years it has been able to become more reliant on local product, thanks to the development and increased presence of Alpura and Lala.

Mexico ranks 8th in the world in terms of milk and dairy product production with 11.1 million tons of milk and milk products (2009). The industry is divided between 20 large, highly technical companies with approximately 70% of the production. The two largest companies, Lala and Alpura, control approximately half of that segment. An estimated 259,000 small manufacturing operations account for the remaining 30%. The ability to tackle water issues is significantly different depending upon whether a firm is one of the large or small producers.

Lala has doubled its size during the last three years and has become the leading dairy company in all of Latin America. It also has an important presence in the United States. Between its production and purchases, market experts estimate that it controls 60% of the liquid milk market and 45% of the milk products market. The company's headquarters is in Torreon, at the center of the Lagunera Region which has become the hub of sophisticated Mexican dairying. It has 11 major operation centers located throughout the country and annual revenue of over US\$5 billion, making it the 25th largest company in Mexico.

The Alpura Group is the second largest dairy company in Mexico with over 82,000 cows in 160 stables that produce more than 2 million liters of milk per day, approximately 10% of all of the milk produced in Mexico. It has 15 distribution centers with 60 distributors located throughout the country. The Alpura Group consists of 11 companies specialized in every stage of milk production and milk product development and sales. Alpura is headquartered in the State of Mexico, near Mexico City, and has production facilities in eight states in the northern and central parts of the country.

Despite the success of Lala and Alpura in the last 10 years, most of the other dairy companies have faced serious threats from increased imports, increased costs, and government imposed price controls. Mexican milk producers must sell their product at low government-set prices which dramatically affects the profitability of the small and medium-sized producers. These smaller operations insist they cannot afford to modernize unless milk prices are allowed to increase. As a result of these pressures, and the lack of adequate financial supports, many small producers have closed their stables for good.

While Lala and Alpura are better equipped to provide additional domestic production to meet this demand, half of their milk comes from small and medium producers. As a result, even before the arrival of the current international economic crisis, these low milk prices affected the abilities of small, medium, and large producers/processers to meet the growing domestic demand.

Opportunities

There is a general feeling that the residual products from dairy production processes are not harmful to the environment. However, while dairy process waste is mainly organic and is not toxic, its increased concentration in Mexican ecosystems has become a real concern and caused an important environmental disequilibrium. This is especially significant in rivers located near large milk production plants. Aside from concerns about waste volumes, the organic fats and proteins waste products, independent of concentrations, require more and better treatment. Corporate culture and concern about public complaints together with increased Conagua enforcement measures have made milk producers, large and small, take notice and acquire appropriate equipment to provide solutions to these problems.

The production process of the largest Mexican dairy plants is increasingly using new technology, at least in part to better handle the disposal and treatment of organic waste. Smaller companies are not so fortunate in light of the considerable expense and important investment required to adequately modernize and maintain some of these treatment solution systems. Mexican companies recognize the prudence of meeting Mexican wastewater standards. As a result, we see the demand for treatment solutions in the dairy sector growing as the sector grows. Large companies will meet requirements because they are in the spotlight and have the ability to pay for these solutions, and medium and small companies due to increased vigilance by local water and Conagua officials.

A large number of small producers are struggling to remain viable and lack the capital to implement anything other than rudimentary processes. More stringent regulations or more comprehensive enforcement would benefit the Mexican consumer, but its cost would likely cripple the small- and medium-sized milk producers.

B. TEXTILE & CLOTHING INDUSTRIES

Size & Current Dynamic

The textile and clothing sector is very important in Mexico, generating a fifth of the country's manufacturing jobs and contributing 8% to manufacturing GDP. The sector generates annual revenues of over US\$9 billion. Thanks to NAFTA, Mexico has become the United States' top supplier of apparel and the second most important supplier for textiles, just behind Canada.

Illegal imports of counterfeit consumer clothing is having an adverse effect upon Mexico's domestic producers. Domestic production methods remain outdated and inefficient and most companies feel they cannot afford to invest in better manufacturing processes and related equipment. Despite the threat from Asian, and to some extent, Caribbean competitors, large transnational firms are able to succeed in Mexico based on foreign financing, modern technology, and an emphasis on production for export to the United States. To increase the competitiveness in the Mexican clothing and textile industries, companies need to capitalize and modernize their facilities. While the sector absolutely requires more capital, credit, and financing, increased combat against smuggling is also important.

Opportunities

The textile industry is a large water polluter due to the use of dyes. One of the alternatives to avoid this type of pollution is the use of natural absorbents and synthetic pollution removal solutions like chromium, arsenic, inorganic compounds and fluoride, among others. The public is alarmed when dyes discharged into municipal sewer and rainwater drainage systems change the color of rivers and streams. Less visibly, dyes severely affect water in lakes and rivers because the different dye contaminants prevent the passage of sunlight which is essential to photosynthesis in the affected watersheds. Decreased photosynthesis reduces the amount of dissolved oxygen in the water available to fish and other water life. This causes a kind of methanogenic fermentation. Synthetic absorbents are used to both reduce industry pollution and discharge toxicity, and modify the artificial color of the water.

The textile industry is regulated by standards that deal with the discharge and treatment of waste and wastewater. In the past, the two applicable standards, NOM 001 for discharges into municipal sewer systems, and NOM 002 for discharges into federal bodies of water, did not include parameters for certain contaminants. Many of the contaminants that the EPA regulates in the United States are not mentioned in Mexican regulations. Mexico also lacks the manpower and will for the enforcement of these general wastewater standards. However, in light of these deficiencies, Conagua officials are carrying out specialized monitoring in areas where there is a concentration of clothing and

textile production to ensure that these companies, especially large- and medium-sized companies, meet environmental regulations by properly treating their waste before it enters municipal systems and federal water bodies.

Like the dairy industry, one of the main problems is the difficulty in identifying and monitoring small company discharges that go directly into sewer systems. While large companies will produce larger volumes of discharge, their more modernized process equipment frequently means that the level of contaminants in their discharges will be much lower and generally less toxic than those of smaller producers who create much less discharge but with much higher contaminant levels. Wisconsin's Mexico Trade Office sees opportunities in this sector in both areas, especially since dye contaminants and related water discoloration can be readily identified by the public and it appears that the Mexican public is increasing complaints to Conagua officials who have the authority to fine and even close plants for this type of non-compliance.

C. METALWORKING/AUTOMOTIVE INDUSTRIES

Size & Current Dynamic

There are about 24,000 companies that are directly involved with the metalworking industries in Mexico. The metallurgical industry in Mexico produces and generates economic benefit equal to \$21 billion USD country-wide. In the last few years, the lack of sophistication and technological level and in general the lack of equipment have led companies to seek partnerships that will bring them the technology and investment they require. This sector is responsible for 1 million jobs representing 13.5% of the country's manufacturing value, contributing nearly 3% to the Mexican GDP.

The automotive sector is key to the metallurgical industry in Mexico, responsible for 17.3% of the manufacturing GDP with more than 20 assembly factories, located in 12 different states. The auto parts industry has plants in 26 of the 31 Mexican states and counts with a network of more than 1400 dealers in urban areas across the country. About one million jobs depend on the automotive and auto parts sectors in the country, apart from the 1 million described above for metalworking industries. The greatest challenge for automotive companies is to reduce costs and processes while continuing to meet high quality requirements, challenges that have somewhat negatively affected Tier 1 and Tier 2 contracts with OEM companies in the sector during the last few years.

Year end 2010 figures for the automotive industry demonstrate very healthy relative growth compared to the stagnant 2009. Year end production (2,260,776 vehicles) was up 50 % over 2009 figures with over 750,000 more units built in 2010. Also, exports were up 50% and domestic sales were up 8.7% for the year, and up 14% during the month of December 2010. However, the 2010 increase vs. 2008 figures was more mixed. Compared to 2008, Mexico produced 12% more vehicles while exporting 3% less and selling almost 50% more into the domestic market.

The contraction of the exportation of auto parts and Tier 1 and Tier 2 segments during the last few years was sharper than the fall off of sales to the domestic market. Nonetheless, and although domestic sales are growing, the rebuilding of the vehicular base now that recovery is on the way is still a year or two away. As for the current dynamic in these sectors, while 2010 was better than 2009 and 2011 will be better than 2010, recovery in the sector is not expected until 2012 when it is hoped that production levels will return to 2008 (pre-crisis) levels.

Opportunities

The metallurgical industry, in addition to this important production contribution, generates tones of hazardous and non-hazardous waste. This includes iron chips from grinding and drilling operations which usually are impregnated with oil and lubricant soluble. These are often sold to foundries or deposited in municipal waste centers. Iron waste not only serves as an important source of raw materials for metallurgical industry, it is also used as a reducing agent in the treatment of different pollutants.

In terms of water pollution, the automotive industry has had serious historical and some current problems dealing with compliance issues. Large OEM companies as well as Tier 1, Tier 2, and auto parts manufacturers have problems with the inappropriate use of and care for toxic chemicals in the manufacturing process. Automotive companies, especially small and medium non-OEM companies, too often discharge metal waste byproducts and chemicals without control, measurement or treatment, causing serious damages to aquifers and other water bodies.

It appears that the most serious discharge and contamination issues in this industry are more or less under control, especially with the larger metalworking and OEM companies. Increased government monitoring of associated water supplies and environmentally responsible corporate cultures has led to rather consistent compliance with Mexican environmental regulations and, with regards to historic problems, the carrying out of cleaning and restoration efforts of contaminated aquifers by these large and important producers. However a lot of auto parts, “Tier 1” and “Tier 2” companies are not nearly as well regulated, compliant, or identifiable, and these companies too often discharge directly into municipal sewer and drainage systems, and therefore federal water bodies, without any treatment.

Conclusions about Opportunities in these Sectors

Like in the case of several of the above mentioned sectors, there are three distinct types of opportunities for environmental equipment sales and solution providing. The first and most obvious is with the larger manufacturers who often have corporate cultures or public images related to the environment that they must preserve and they are generally under the microscope of government authorities. The good news is that they have the funds and impetus to find and implement solutions. While many of these companies require on-going assistance, many also already have systems in place.

The second is with small companies who have enormous needs but who are short of funds, can't get financing, do not have appropriate corporate cultures and are difficult for the government to identify and enforce. It takes a special, low-cost solution that allows for a fairly quick return on investment for a company to find a niche with these types of companies.

In the middle are medium-size companies, in the case of the automotive sector many auto parts, "Tier 1" and "Tier 2" companies. These companies have some of the funding but probably do not have adequate financing to purchase the systems that larger companies can, but with enforcement of NOM 001, NOM 002, and special sector program progressing from larger to medium-size companies, these companies sooner than later will be faced with the reality that they, like their larger counterparts, will need to make similar environmental equipment investments to remain compliant. Medium size companies, like medium-sized cities, will be targets for compliance and environmental investment in Mexico during the next ten to twenty years.

Agriculture and Water in Mexico

This article will review, as an introduction of sorts, the characteristics of the Mexican regions, by water and agricultural characteristics, to give the reader a perspective on Mexican water use and related national and regional goals and objectives to make the Mexican agriculture system more productive, efficient, and sustainable by means of better water management. Future editions will deal with each of these issues and other related issues in greater detail.

This article will specifically address the following agricultural-related water issues:

- Water Use in Mexican Agriculture
- Mexican Hydro-Agricultural Infrastructure
- Mexican Agricultural Water Systems, Distribution and Productivity
- Mexican Federal Budget for Agricultural Water Projects

General Overview

The agricultural sector is by far the largest user of water in Mexico with 77% of its water resources destined for agriculture, representing the fourth largest percentage in the world and almost twice the US figure of 40%. At the same time, the Mexican agricultural sector provides Conagua, the Mexican federal water commission, with less than 2% of its total revenue while contributing significantly to the degradation of land, deforestation, and the overexploitation of aquifers. For these reasons, we feel the need to

increase our analysis of this sector and we see the need for Conagua and other Mexican water entities to increase their analysis of these issues and government funding of related hydro-agricultural programs, projects, and solutions.

The geographical area dedicated to agriculture in Mexico is about 21 million hectares, which represents 10.5% of the total Mexican land surface. On average, Mexico harvests about 19.6 millions of hectares per year with 6.5 million under irrigation and 14.5 million dependent almost exclusively on seasonal rains. The crops grown in irrigated areas receive water from surface and/or groundwater supplies.

When comparing national land mass dedicated to agricultural activities, Mexico (10.5%) is not dramatically different from its trade partners nor those Latin American countries with similar or significant agricultural focuses:

- a. US 16% (164 million hectares)
- b. Brazil 8% (66 million hectares)
- c. Argentina 10.5% (29 million hectares)
- d. Canada 7% (69 million hectares)

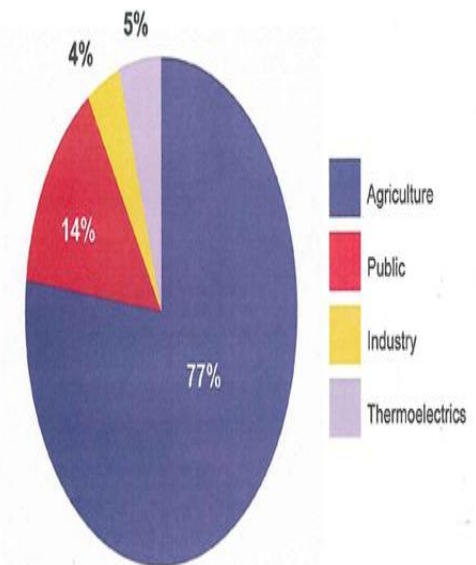
However, none of these countries provides anywhere close to Mexico's 80% of total water supply for the agricultural sector:

- a. US 40%
- b. Brazil 61%
- c. Argentina 74%
- d. Canada 12%

There are several factors that contribute to the extensive use and excessive waste of water by Mexican agriculture. The most obvious causes are the low price of water for Mexican farmers and the lack of accurate measurement of water consumption. Without adequate metering technology and despite the lack of water in different regions of the country, farmers only pay a very small part of their water cost, paying a base rate that serves as a poor, low estimation of their consumption.

There is another somewhat unique Mexican factor that leads to this misuse. The low volume assignments due to low levels of water in dams creates an interesting phenomena. Under this circumstance, when Mexican farmers irrigate their crops, they extend the irrigation time to

Water Use in Mexico



ensure that their fields get an exaggerated amount of humidity in case water is not available at the later, programmed time.

A final factor is the need for modern irrigation methods and the training of Mexican farmers in irrigation processes which could and should be an important part of the solution for these problems. It is estimated that these efforts could impact the total amount of agricultural water loss by as much as 60-70%.

Analysis of Mexican Water Basins and Regions

For our analysis, we divided the country into 5 regions that group states with similar characteristics like weather, population, and aquifer resources with each region including two or more basins:

1. Northwest Region (formed by the following states): Sonora, Sinaloa, Baja California and Baja California Sur

Water Basins (inside of the region): Baja California Peninsula, Northwest and North Pacific

Despite being one of the driest regions in the country, this region is where the greatest national agricultural production is located, especially in the North Pacific water basin. This region is characterized by its extensive irrigation, its adoption of technologically intensive modern inputs, and its high percentage of land ownership concentration which has led to a very homogeneous level of development in the agricultural sector.

At the turn of the last century, this region of Mexico had more sophisticated irrigation systems than the US. While during the last 100 years, the US has caught up and passed the region in this area, it nonetheless is still the most developed region in Mexico in this regard. The State of Sinaloa is the most important agricultural producer in the country, being the leading producer of corn, beans, chili and tomatos. The land dedicated to agriculture in the region is the largest in the country with 850,000 hectares and the highest in crop value representing more than \$2.33 billion USD. The third largest water basin in Mexico in terms of volume is the North Pacific where the El Fuerte River is located, which is 540 Km. in length.

2. North Region: Nuevo Leon, Coahuila, Chihuahua, Durango, Zacatecas, San Luis Potosí and Tamaulipas

Water Basins: Rio Bravo, Central Northern Basin and North Gulf

In this region the weather is moderate warm with little rain throughout the region with a regular spike during the summer months. During both the summer and winter months, the region is known for its dryness and its extreme temperatures. The fourth most important water basin in Mexico, the Rio Bravo (or Rio Grande in the US), is located in this region.

While agriculture is not the economic driver in this region, in light of the business culture and dry nature of the region, it has to rely on water saving measures, irrigation systems, and more modern technologies to remain competitive.

3. Center Region: Jalisco, Colima, Aguascalientes, Guanajuato, Queretaro, Hidalgo, Tlaxcala, State of México, Federal District

Water Basins: Lerma-Santiago-Pacific, North Gulf and Valley of Mexico

This region is surrounded by mountain ranges which are isolated from the humid winds from the sea and negatively affects the level of rainfall that fall each year ensuring that there is always a shortfall in the water levels required for agriculture and dam replenishment. The weather is moderate to very warm with sub-tropical highlands. This is a mixed region being the most important region in terms of economic development and population but still a very important area for agriculture especially in the less developed states in the region. . The Lerma-Santiago-Pacific water basin, located in this region, has the largest volume of water in the country via its two principal rivers, the Santiago River and the Lerma River. Despite this abundance of water and reasonably fertile lands, this all important river basin area was only half has productive in terms of hectares dedicated to agriculture and value of agriculture production.

4. **Southwest Region: Michoacán, Puebla, Guerrero, Morelos, and Oaxaca**

Water Basins: Balsas and South Pacific

In this region, the temperatures are high but generally uniform with regular rainfall although lower than rainfall in the Southeast Region. Agriculture is less corporate and more dominated by communal farming with low technology operations. The region has the second most important basin in terms of volume, the Balsas water basin where the Balsas River, with a length of 770 km., is located. Most of the agriculture in this region, like that of the Southwest Region, is small than larger with some communal farming focus. This fact together with the abundance of rain makes this region's agriculture one of the least sophisticated and the least reliant on irrigation.

5. **Southeast Region: Veracruz, Chiapas, Tabasco, Yucatán, Quintana Roo and Campeche**

Water Basins: Center Gulf, Southern Border and Yucatan Peninsula

In general this region has high temperatures and well distributed rains making this region the one with the highest water availability in the country. The Grijalva River, with an extension of more than 1500 km. which runs from Guatemala to the Gulf of Mexico, is the main river and usually is the major cause of the regular floods of the region. Most of the agriculture in this region, like that of the Southwest Region, is by smaller farms rather than larger ones with a definite communal farming focus. This fact together with the abundance of rain makes this region less sophisticated and much less reliant on irrigation.

Hydro-Agriculture Infrastructure

The Mexican hydro-agricultural infrastructure has the following characteristics. There are over 4000 dams in Mexico from which 667 are classified as large dams according to the International Commission on Large Dams (ICOLD). The storage capacity of dams in Mexico is 150 billion m³ with the 100 most important dams having a total capacity of 118 billion m³, representing 79% of the total storage capacity in the country. Of these top 100 dams, 36 are used exclusively for agricultural purposes while 44 are used for agricultural and other purposes.

During 2008, the irrigated land represented 25% of the total national agricultural land surface, while the other 75% was fed from seasonal water sources. Nonetheless, the production value of irrigated land represented over 60% of total production. Regarding the total amount of water extracted from aquifers, 69% is used for agricultural irrigation.

In Mexico, the infrastructure areas of irrigation represent 6.5 million hectares making it the 6th most irrigated country in the world. Of the surface with irrigation infrastructure, 54% corresponds to 85 Irrigation Districts (IDs) and 46% to the more than 39 thousand Irrigation Units (IUs). The IDs and IUs - defined below - use almost the same volume of water, with the Districts using 48.5% of the total volume of water assigned for the agricultural sector, and the Units use the 51.5%.

Water Irrigation Systems, Distribution and Productivity in Mexico

Irrigation Districts (IDs) - Of the 6.5 million hectares with irrigation infrastructure, 3.5 million (54%) correspond to 85 IDs. Those IDs are located in almost every state except for Campeche, Tabasco, and the Federal District. Almost 75% of the ID areas is concentrated in 6 states: Sinaloa, Sonora, Tamaulipas, Michoacan, Baja California y Guanajuato – four northern states and two central states.

The IDs are established under Presidential Decree and they are formed by one or more surfaces whose perimeters enclose an irrigation area. Said area or ID has hydraulic infrastructure works, superficial and underground water sources and storage which can but do not have to include more than one or several IUs. Each ID must have a concession title that is provided to users (farmers) organized as a User Civil Association (ACU) by Conagua. This concession gives these ACUs the possibility to use a certain amount of water during the year and establishes the source of said water. The main crops in IDs are grains (corn, wheat and sorghum), sugar cane, beans, and to a lesser extent, horticulture products generally fed with underground water from private wells.

Most of the IDs are supplied by superficial water which from storage dams and water channels. Each water basin has a Basin Council which determines the volume of water that will be assigned to users depending of the current dam storage realities. On the other hand, IU main water sources are subterranean (aquifers) generally obtained from wells as well as small dams and other small water storage bodies. And only 1/3 of the water utilized for agriculture which includes agriculture, aquaculture, livestock, and other related areas, comes from subterranean sources.

Irrigation Units (IUs) – Of the 6.5 million hectares with irrigation infrastructure, 3 million hectares (46%) correspond to the more than 39,000 IUs. These IUs are agricultural areas with water infrastructure although different from an ID in that they are commonly operated by small land owners and communal farmers and that they obviously have smaller land surfaces and both less and lower technology than the IDs. IUs can be integrated by ACUs or other entities organized to provide irrigation services and operate hydraulic infrastructure works for the reception, conduction, regulation, distribution and dispersion of national water assigned to agricultural irrigation.

Water productivity in IDs and IUs is a key indicator to evaluate the efficiency in the use of water for agriculture. Said productivity includes the efficiency in driving the water from the source to the field and its use directly in the fields which is where the majority of the way, as

much as 70%, is lost. In general, the productivity of irrigated areas is 3.7 times higher than those fed with seasonal water sources. Despite the fact that irrigated areas are substantially less than those fed by seasonal sources, irrigated land generates more than half of the national agricultural production. Conagua reports that the average productivity in irrigated areas is about 27.3 ton/hectare, significantly higher than in the seasonal surface of 7.8 tons/hectare. However, according to contacts in the industry, while they confirm this 4 to 1 difference in the productivity, they indicate that said productivity per ton is probably closer to half of the figures provided by Conagua.

IUs as well as IDs were established and designed according to technology for the distribution of water by gravity systems. In many cases, they only built channel networks and principal drainage systems leaving the rest of the infrastructure works in the fields to the users. This situation together with accumulated deterioration from several decades of insufficient spending on preservation and maintenance programs generated a backlog of essential rehabilitation requirements that led to a dramatic drop in the efficiency of agricultural and general Mexican water management.

Irrigation methods are rudimentary or traditional in more than 80% of Mexican surface (superficial) irrigation and their efficiency in terms of water use is very low, somewhere between 33 to 55%. With the use of better techniques and irrigation infrastructure modernization, the water use efficiency could increase to 50 to 65%, which would notably lower the extraction of water from Mexican aquifers and allow these water savings to be used in other applications like the better preservation of rivers, lakes and aquifers.

The intensity in the use of land for agriculture is an important characteristic to review when analyzing IDs and IUs. A great part of the IDs are cultivated twice a year in the crop cycles autumn-winter and spring-summer. Nonetheless, some districts are only harvested once a year. In 92% of IUs, with their water source being superficial waters often based on season water sources, only one harvest is programmed due to the lack of water, further exacerbated by the increase non-agricultural water demand, the regular uncertainty of availability, and the drop in the pumping levels. Conagua officials insist that this very high percentage can be reduced through technical irrigation assistance programs for producers as well as the substitution of crops with much lower water demands such as barley and chickpea.

Conagua Budget for Hydro-Agricultural Infrastructure

In the last five years (2006-2010), the general Conagua budget was increased almost 210%. Meanwhile, the budget for hydro-agricultural infrastructure during this period was increased almost 237% with double figure annual increases demonstrating how Conagua recognizes the importance and severe problems of water in the agricultural sector. Below is the breakdown of the Conagua budget during the last five years and the budget information for 2011:

YEAR	TOTAL BUDGET (Billions of Pesos)	ANNUAL INCREASE	BUDGET FOR AGRICULTURE (Billions of Pesos)	ANNUAL INCREASE
2006	16.6		3.8	
2007	19.5	18%	4.8	26%
2008	29	48%	5.7	18%
2009	32	10%	8	40%
2010	35	9%	9	12%
2011	36.4	4%	N/A	N/A

The Mexican federal government has increased Conagua resources in recognition of the importance of water issues at all levels and in light of the increasing need for potable water treatment, wastewater treatment and water infrastructure. Regarding hydro-agricultural spending, said funding is designated to create and maintain water and wastewater infrastructure, to introduce new water technology and irrigation infrastructure improvements, and to better train users on the benefits of these technologies and improvements. In the next few years, the need for a more efficient agricultural system will be an even greater priority due to the increase of the population that requires both more food and more water, both of which they can obtain from a more efficient Mexican agricultural system.

In our next edition, we will expand on some of the above issues and discuss some other important hydro-agricultural issues in Mexico.

Water Projects and Infrastructure in Mexico City

Mexico City, known officially as the Mexican Federal District (DF), is one of the largest cities on the planet with more than 10 million inhabitants although less than half of the size of the Valley of Mexico which includes another 10 million people. Due to these numbers, the major problem which it faces is rooted in the lack of public services and the water sector is no exception.

Continuous urban growth and a lack of local water sources and other factors have negatively affected the water supply, and deliver and drainage systems for the entity. The Federal District Water System faces considerable challenges in its attempt to repair leaks and treat waste water. In addition, if one bears in mind that 70% of the water supply comes from the aquifer subsystem located underground the city, one begins to understand the problem of the regular if not constant floods provoked by the land sinkage product of the overexploitation of the aquifer subsystem. This continuously uncontrolled water flows lead to infrastructure damages especially to the potable water and sewer/drainage networks. This together with the inadequate management of municipal and industrial waste paints a worrisome picture for the DF water system.

This article will present the current status of the DF water system in relation to existing infrastructure and the future needs for future potable water, potable water and sewer/drainage systems, and potable water and waste water treatment plants.

Potable Water Situation in Mexico City

The Federal District Water System is responsible for the supply of potable water and the storage and management of waste water in the DF whereas Conagua, its federal counterpart, is entrusted to provide the water in block to the DF to operate and maintain the great majority of deep wells and to organize large and interstate and interbasin hydraulic projects.

Despite the existence of 11,000 kms of distribution lines and more than 300 storage tanks with a capacity of more than 1.5 million cubic meters (m³), many DF inhabitants depend on non-water system sources like tanker trucks or local wells and springs to obtain potable water. Likewise, approximately 40% of the southern part of the DF does not have access to sewer or potable water systems. Also, there exists the problem that the DF loses 50 % to 60 % of its potable water between its source and the end-user in the distribution system, As a result, there is a latent need for the construction of new distribution infrastructure and the repair of the existing system.

Before continuing our analysis of DF infrastructure, projects, and budget issues, it is important to mention the vital role that the Lerma–Cutzamala System plays for the DF. This system was constructed to help avoid the overexploitation of the aquifer of the Valley of Mexico, transporting waters from the Cutzamala River to the Federal District via the Peripheral Aqueduct. The water imported is disinfected with chlorine and then incorporated into the Lerma-Cutzamala aqueduct before joining the DF potable water distribution system. The Lerma-Cutzamala System possesses 7 dams, 6 macro pumping plants, almost 73 kms of open channels, 44 kms of tunnels, 218 kms of aqueducts

and the Los Berros water treatment plant that, being the largest potable treatment plant in Mexico, it provides 1.5 billion liters of water to Mexico City, equivalent to 26% of the total DF water supply. Despite the incredible size and dynamic of Lerma-Cutzamala, this infrastructure has turned out to be insufficient to continue to meet the basic, total needs of the DF. As a result, the DF and Conagua authorities continuing working on new water source supplies to resolve this problem.

The DF potable water supply is shaped by external and internal sources located in Mexico City/DF, the State of Mexico which surrounds the DF and the State of Michoacán which neighbors the State of Mexico. The external sources are superficial waters and represent 35% of the total DF system. Internal sources consist of the local aquifer which represents the other 63%, composed of the Lerma-Cutzamala and the Mexico City aquifer.

The biggest problem that the DF distribution system faces is the loss of potable water which can reach upwards of 60% of the total water in the distribution system. This permits many DF zones to be without water service or with intermittent service. The important DF delegations or city subdivisions/boroughs of Álvaro Obregón, Coyoacán and Cuajimalpa are the major but not only delegations that feel the affect of these problems.

In a city where the population grows almost unabated and where the geography is very irregular and thus impedes the delivery of water to its inhabitants, the need to have an more efficient potable water system and a reliable distribution system is clear. In addition, the excessive DF aquifer extraction has forced DF and Conagua officials to bring water into the DF from basins outside of the Valley of Mexico. In light of the uniquely high and difficult DF terrain, bringing in water from outside of the Valley of Mexico has provoked the need for the construction of 227 pumping plants to get water to the 1.5 mile high city and then to provide water to its even higher areas.

The DF potable water distribution system is made up of a principal and secondary network. The principal network has 690 kms of pipelines of between .5 and 1.7 meters in diameter. The secondary network has more than 10,000 kms of pipelines of .5 meters in diameter along with 243 storage tanks with a 1.5 million cm² capacity. The DF Water System's 27 treatment plants and 377 chlorination stations supply close to 35,000 liters of potable water per second but this only meets 90% of the potable water requirements of its inhabitants. The DF potable water supply has always been problematic but this has been accentuated in recent years but some extreme drought conditions. As a result, the DF invested only a modest sum, 1 billion pesos (\$ 83.3 million USD) in 2009, to begin the rehabilitation of potable water lines.

For the improvement of the potable water supply, the DF has a total budget through 2012 of 4.47 billion pesos (\$373 million USD). From these funds, Wisconsin's Trade Office in Mexico expects more related works during 2011 and 2012. It is important to mention that these funds are strictly DF funds and additional Conagua funds for these projects will make total available money more than double the above

mentioned amounts. While DF potable water projects will move forward in 2011, it is important to mention that an even greater ongoing priority is in the rehabilitation of the DF deep drainage system.

Deep Drainage System Situation in Mexico City

The DF system for carrying waste water out of the Valley of Mexico consists of three areas: (a) the above-ground Great Canal, (b) complementary river systems (principally the Hondo River, the Churubusco River, and the De la Piedad River) and (c) the subterranean Deep Drainage System. The DF Deep Drainage System was constructed in 1967 and put in operation in 1975. It is made up of a 6.5 meter in diameter tunnel designed originally to remove waste water and rain.

Originally, it was designed to work exclusively during the rainy season and that during the low water season, it could be closed for inspection, cleaning and maintenance. However, due to some regional collapses in lands affected by these structures, it has not been possible to inspect these tunnels as had been hoped. And, last year, when the tunnel was temporarily closed for some partial inspections during the dry season, an unexpected heavy rain occurred and severe flooding occurred in the eastern part of the city.

In general and as a result of this very controversial flooding incident, the attention of the water sector has refocused extensively on the rehabilitation of the DF deep drainage tunnels. As a result, DF investment on potable water infrastructure decreased last year by more than 50% vs 2009 totals, with said funds being transferred to Deep Drainage System projects.

This system includes a Central Issuer Channel, 9 interceptors with a length of 154 kms. Below is a table that shows general information about this system.

DF Deep Drainage System	Length (Km.)	Diameter (m)	Capacity (m3/s)
Central Emission Tunnel	50.0	6.5	220
Central Interceptor	16.1	5.0	90
Interceptor Center-Center	3.7	5.0	90
Interceptor East	22.2	5.0	85

Interceptor Center - East	16.0	4.0	40
Interceptor - West	16.5	4.0	25
Interceptor Iztapalapa	5.5	3.1	20

The Central Issuer has a capacity of 220 m³/s and function as the principal exit tunnel for rainfall and waste water out of the Valley of Mexico and serves as the most important tunnel for the prevention of flooding in the DF.

The Central Interceptor, with a capacity of 90m³/s, relieves the De La Piedad River to help prevent floods and receives the sewer and drainage collections from the four most important city delegations.

The Interceptor Center-Center, with a capacity of 90m³/s, relieves almost 70% of the Mexico City downtown area and is interconnected with Interceptor East and Central Interceptor to facilitate the exit of waters to the Central Emission Tunnel.

The Interceptor East, with a capacity of 85 m³/s, runs north and south and has as principal function relieve to relieve the Great Canal of which 30% of the DF central area and 50% of the DF north area rely.

The Interceptor Center - East, one of the smaller interceptors with a capacity of 40 m³/s, joins Interceptors East and Central Interceptor, assisting the central section of the DF.

The Interceptor West, another smaller interceptor with a capacity of 25 m³/s, initiates in the southwest of the city and comes out into Rio Hondo whose waters come from 16 DF collector sources. This interceptor also is linked to the Chapultepec Park drainage system that helps prevent floods in this part of the city.

The Interceptor Iztapalapa, the smallest of the interceptors with a capacity of 20 m³/s, receives 80% of the waste water from the Iztapalapa Delegation, one of the largest and least developed in the DF.

Present and future Sewer and Drainage System Projects in Mexico City

Currently, the DF Water System has allocated 5 billion pesos (about \$416.6 million USD) as investment funds through 2012 for the rehabilitation of deep drainage system tunnels damaged by the routine dragging of foreign objects and the degradation of the concrete from the vapors emitted by the waste water. In 2009, during the first two stages, the most damaged tunnels were rehabilitated. In 2010, 350 million pesos (over \$29 million USD) were invested in the formal maintenance of the rest of the deep drainage tunnels and 600 million pesos (\$50 million USD) will be allocated each year hereafter for regular maintenance of the system.

In the last 2 years, there have been three important public works projects in the DF Deep Drainage System. The two most important, both in northern Mexico City, are the “Pensador Mexicano” project (almost \$5.5 million USD) and the “Colonia Moctezuma” project (about \$7.25 million USD) both of which changed drains, storage units and key macro valves (“vaso regulador”) to prevent flooding. The third project, the “El Arenal” project, on the east side of the city, carried out the rehabilitation of pumping stations, created an increase in sewage capacity and replaced the drainage/tunnel network. Over 60 million pesos (\$5 million USD) were allocated for this last project. Beside the projects already mentioned, there are still additional needs in these technical areas, so new projects in other parts of the DF with similar investment amounts are expected during the next five years.

In most projects, when tunnel materials are changed, they are changed from concrete to high-density polyethylene since it has better resistance to the problems associated with regular Mexico City land movement and sinking problems. It is noteworthy that many of the Deep Drainage System problems are the result of leaks which are thought to represent as much as 40% of the water in the system at times. To date 2,000 km of drainage network has been changed but the drainage system has 12,000 km of network so still more than 80% of this replacement work still pending. Eventually, the recovered water flow will increase by 3m³/s which will lead to further flood prevention.

It is important to mention that the vast majority of products currently used for these Mexico City projects are manufactured by or at least sold by US companies since these products cannot be found in the Mexican market. In fact, water officials have said that better local distribution and service of these types of products would go a long way towards more comprehensive use of these materials as we as some important cost reductions. When unique materials or technologies are required for solutions in the DF, as is often the case, US companies should continue to expect that these future projects will represent good market opportunities.

Waste Water Situation in Mexico City

Another one of the serious problems that the DF Water System has to face is the lack of waste water treatment and treatment capacity. Currently, there are 25 waste water treatment plants in the DF with an installed capacity of 6,640 lps. However, the capacity of these plants, 2,500 lps, represents only 38% of the capacity that would be needed to treat total DF waste water volumes. With this limited capacity and with the vision of treating DF waste water in Atotonilco, outside of the Valley of Mexico, it is not all that surprising that only 7% of DF waste waters are currently treated.

There are 6 waste water treatment plants in northern Mexico City with a combined installed capacity of 700 lps. In the central area, there are 5 plants whose combined installed capacity is nearly 5 000 lps, with the “Cerro de la Estrella” plant being the largest of these plants with 80% of the total capacity in the central area. Finally, in the southern area, there are 5 plants with a combined installed capacity of 800 lps. It is important to mention that 5 billion pesos (\$416.6 million USD) is currently programmed for the installation of new technology and to increase the production of treated waste water from 2.5 m³/s to 7.2 m³/s by 2012. In the future, the DF hopes that this water treatment will result in important, additional water reuses which will alleviate some DF aquifer concerns and eventually recharge aquifers.

Another challenge has to do with the storage of waste water prior to its treatment or delivery outside of the Valley of Mexico. Most waste water storage areas are located in the northern part of the city where all DF waste water is directed on their way out of the Valley of Mexico. However, this leads to an uneven, less than ideal distribution of waste water storage. To address this the DF has launched projects to add other reserve basins especially in the Iztapalapa area in the southern part of the city.

With recent flooding problems, the DF budget priority has been somewhat away from treatment plants and towards the rehabilitation of deep drainage system tunnels. However, the DF has made the rehabilitation of its existing waste water treatment plants, such as the “Milpa Alta” in southern part of the city, a priority as well. On the potable water side, an important project is the construction of a potable water treatment plant in “Cerro de la Estrella”, in the south area of the city, which seeks to build an infiltration pond and to return this treated water to the aquifer – the first effort of its kind in Mexico. In addition, the DF has sought to invest in wetlands construction and similar “swamps” for waste water maintenance, especially in the water abundant areas of Xochimilco and Tlahuac in the southern part of the city which they hope will also help in with water level issues in these wetland areas.

Conclusion

With the above information on DF potable water, waste water, and water treatment issues, we can get a glimpse of the DF water system and infrastructure challenges. These problems must be attacked on all fronts as they are circular problems. The exploitation of the DF aquifer for drinking water makes Mexico City land continue to sink, in some areas as much as 30 cm per year. With the fall in ground water levels, it is necessary to pump deeper producing lower quality water creating further land degradation which increases operation, maintenance and water purification costs. In addition, the supply and drainage network are affected as land subsidence creates more pressure and leads to cracks and fissures that causes 50-60% potable water loss. When you combine these problems with the lack of wastewater treatment and a growing population, one can visualize the seriousness of the challenge that the DF Water System faces – and the level of assistance that they are likely to require from domestic and foreign companies to help solve these problems.

The DF and Conagua have increased their budgets for DF water projects during the last few years with Conagua funding of DF water projects as its top priority, doubling funding from just over 5 billion pesos in 2009 to over 10 billion pesos (over \$800 million USD) in 2010. This increase made the DF Conagua budget three times that of the State of Mexico and larger than the budgeted funds for the next five most important Mexican states. Still, these funds are clearly not enough to solve these problems in general and because too many important DF projects have had to be put off to address other more urgent and politically sensitive water issues.

In response to these realities, there have been some initial proposals to increase private sector participation in new infrastructure projects and rehabilitation and maintenance programs. Although these measures are still in planning stages, many water officials believe that this is the only way to address the problems of water sector in the DF. These types of programs will create more business opportunities for domestic companies and for foreign companies to provide products and technologies for better funded and therefore more generally stable integrated projects and solutions.