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UTILI GRAM

"Providing and Protecting Kenosha's Greatest Natural Resource ... Water"

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MEMBRANE UNITS GET NEW FIBER

In March of this year, a semi truck arrived at the Water Production Plant pulling a special heated trailer. Inside the trailer were several large wooden crates containing enough membrane fiber modules to replace an entire train (row) of microfiltration units inside the plant. This is the first of three shipments of replacement modules.

Each of these modules contains thousands of tiny hollow polymeric fibers which are bundled together to make up the module. If allowed to dry out, these tiny fibers can become quite brittle and susceptible to damage. For this reason the modules are shipped wet from the manufacturer inside special plastic bags to keep them from drying out while in transit to their destination. However, this also makes them vulnerable to freezing if they are shipped during the cold winter months. To prevent the modules from freezing, they are shipped in a heated trailer. Once the modules arrive on-site, they can be stored in a warm location until they are installed in the microfiltration units.

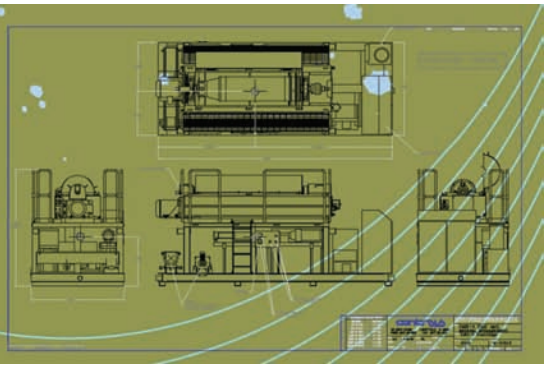
Each individual fiber described above contains millions of tiny pores. During the water filtration process, raw water is made to pass through the pores in these fibers. Filtering occurs because the pores are large enough to allow water to pass through, yet small enough to restrict the passage of undesirable materials. The fibers themselves must be cleaned periodically to remove any debris that can get trapped in the pores. After several years, the condition of the fibers begins to degrade to the point where the microfiltration unit can no longer function at its optimum level of performance. When this occurs, the fiber modules must be replaced.

As part of a maintenance agreement, the fiber modules get replaced by the manufacturer of the microfiltration units when the overall performance of the units has degraded to a predetermined level. Although the membrane plant is still performing quite well and producing extremely high quality water, the decision was made by KWU and the manufacturer to replace the fiber modules in all of the units this year.

This is a very time consuming process when you consider the fact that each microfiltration unit in the first and second trains contains 90 fiber modules, and each microfiltration unit in the third train contains 108 fiber modules. The fiber modules are housed inside large plastic tubes. These tubes must be completely removed from the microfiltration unit and then disassembled to remove the old fiber module. The old fiber module is then discarded and a new fiber module is placed inside the plastic tube. Finally, the entire assembly is installed back into the microfiltration unit. Initially, it took three days to replace all of the fiber modules in a single unit. To assist with this process, the Water Production Plant has solicited help from Wastewater Treatment, Water Distribution and Sewer Collection and Engineering Divisions.

The membrane replacement project coincides with another project at the production plant to replace all of the valves in the membrane units in the first and second trains. All this work will go a long way in enabling the plant to continue producing high quality water for the its customers in Kenosha, Pleasant Prairie, Somers and Bristol.

Putting a New Spin on Activated Sludge



KWU has always prided itself in its willingness to keep pace with leading edge technologies. For example, the Utility was the first in the State of Wisconsin to install microfiltration units for filtering water taken directly from Lake Michigan. Now several utilities along the shores of Lake Michigan have installed similar devices. In order to keep up with leading technologies, utilities have to be cognizant of the technologies that are available and they must be fully aware of the advantages and disadvantages associated with these technologies. Furthermore, utilities must be willing to take a chance on some of the newer yet not fully proven technologies. Nevertheless, utilities need to be careful when making these kinds of investments. In Kenosha, it is often said that KWU wants to be on the "leading edge" of technology not the "bleeding edge" of technology.

With this spirit in mind, the Utility has been working closely with Centrisys Centrifuge Systems (Centrisys) to pilot centrifuge technology at the Wastewater Treatment Plant. Centrisys manufactures and repairs centrifuges for a variety of applications, and they are located right here in Kenosha. Last year, they received the distinct honor of being voted Wisconsin's Manufacturer of the Year.

Centrifuges are used in a variety of applications. At wastewater treatment plants, centrifuges are used primarily to decant water from the waste activated sludge. Spinning at 3,500 revolutions per minute, they can be used both to thicken the activated sludge before it enters into the digesters or they can be used to remove water from digested sludge, so that it can be hauled away to a landfill or applied to farm fields. Currently, the Wastewater Treatment Plant uses Dissolved Air Floatation (DAF) units to thicken the waste activated sludge before it enters into the digesters. Likewise, the plant uses plate and frame filter presses to remove water from the digested sludge before it is hauled to the landfill. Plate and frame filter presses do an excellent job removing water from the sludge. The dryness of sludge is expressed as the percentage of dry solids by weight in the dewatered sludge. Plate and frame filter presses produce a dried sludge that contains more than 40 percent of dry solids, while centrifuges produced a dried sludge in the range of 25 to 30 percent of dry solids.

So why would the Utility consider making a change? In order for plate and frame filter presses to produce a sludge with 40 percent of dry solids, large amounts of ferric chloride and lime must be added to the sludge to condition it before it enters the presses. These chemicals add to the volume of the sludge that is hauled away to the landfill. Typically, four 20-ton truck loads of sludge are hauled to the landfill each day. If the ferric chloride and lime were not added to the sludge, one or possibly two of these truckloads could be eliminated each day.

Centrifuges require the use of small amounts of polymer to accomplish the same thing as the ferric chloride and lime do in plate and frame filter presses. Thus, the volume of sludge produced by the centrifuge is about half of that produced by the plate and frame filter press; although it is not as dry. When you consider reductions in costs for ferric chloride and lime and less trips to the landfill, centrifuge technology starts to look pretty attractive. So far, the pilot unit has performed extremely well and all have marveled at how quiet the unit runs. There is still much to consider; however centrifuges might have a future at the Wastewater Treatment Plant.

Pilot Centrifuge Set Up and Operating at the Wastewater Treatment Plant

Rate increases are something that we at KWU do not like to think about. As much as we would like to keep our rates as low as possible and continue to provide affordable water and sewerage services to our customers, the fact of the matter is that there are times when the Utility must raise its rates to keep pace with escalating expenses. At the beginning of this year, rates for both water and sewerage service were increased. When we think about rate increases, we think about all of the work that must take place up front in order to get the rate increase approved by the Board of Water Commissioners and the State of Wisconsin Public Service Commission. However, we often overlook all the work that must take place after the rate increase is approved.

One would think that it is as simple as putting the new rates into a computer and letting the computer punch out the new water bills. In a sense, this is exactly what happens, but someone needs to create the rate tables that tell the computer how to calculate the new bills. For this reason, a group of computer programmers from COMSYS, Inc. was brought on board to make the necessary changes to the rate tables used by the computer to calculate the bills.

KWU has specific rates for a variety of services besides just costs for delivering water and collecting sanitary sewage. When a water or sanitary sewer rate increase goes into effect, many of these rates have to be adjusted accordingly. To complicate matters further, the Utility's customer base is broken into three separate billing districts. Those customers residing in the first billing district are billed on odd months, while residents of the second billing district are billed on even months. Industrial users are billed on a monthly basis. When designing the rate tables, they must be sophisticated enough to account for these different billing periods.

When customers receive their water bills, they are being billed for water that was consumed between the two previous water meter readings. Meters in billing districts one and two are read on a bimonthly basis one month previous to customers receiving their bills. If a rate increase goes into effect at the beginning of the calendar year, meter readings in January would reflect a greater portion of water consumed prior to the new rate going into effect and a lesser portion of water consumed after the new rate went into effect. Similarly, meters being read in February would reflect a lesser portion of water consumed prior to the new rate going into effect and a greater portion of water consumed after the new rate went into effect. From the month of March onward, all meter readings would measure water consumed entirely after the new rate went into effect.

In the past, the Utility would use a blended rate during the first couple of months following a rate increase as a means of phasing in the increase. Although the blended rate favored the customer, it was not the most accurate method of incorporating the rate change. This year, programmers at COMSYS, Inc. devised a way to make these calculations in the fairest way possible. They did this by creating the rate tables in such a way that the exact number of days of water usage at the old and new rates could be determined for each customer. The bill was then calculated using both the old rate and the new rate where applicable. Not only is there a lot more work involved in creating the rate tables, but each of these tables had to be tested extensively in advance to make sure that they were calculating the rates correctly. Once it was determined that the tables were working correctly, they could then be used to calculate actual water bills.

When it is all said and done, there is a lot of work that goes into making a water or sewer rate change at the Utility. We applaud the efforts of those in Business Services and our friends at COMSYS, Inc., who helped make this a seamless transition.