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PumpTech Pipeline

Providing Knowledgeable Solutions

Lower Elwha Vacuum Sewer System

Doug Davidson, Bellevue

PumpTech is involved in two projects in the Lower Elwha region just outside Port Angeles WA. My fall article dealt with pumps installed to prevent flooding of the homes at the mouth of the river. This article involves the vacuum sewer collection system we supplied to provide reliable sewer service for approximately 300 homes on the Klallam tribe's reservation. In the past, the community was served by individual septic tanks & drain fields. However, after removal of the Elwha and Glines Canyon Dams the ground water level is expected to rise and render the existing septic tanks and drain fields useless.



The engineering firms of Womer & Associates in Spokane and Gray & Osborne in Seattle were tasked with finding the most reliable and environmentally sound collection system that offered low maintenance costs. It was no small task. They

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MicrOclor - Making Bleach Made Easy

Ed Smith, PumpTech Moses Lake
Thom Tackman, PSI

PumpTech Inc is pleased to announce that the new MicrOclor On-Site Sodium Hypochlorite Generator is up operating in Coeur d'Alene, Idaho.

Recently Ed Smith from our Moses Lake office accompanied Thom Tackman of Process Solutions Inc. on a start-up of a new 20 pound per day MicrOclor, On-site Sodium Hypochlorite Generator (OSHGS). This is the second MicrOclor unit purchased by the Coeur d'Alene Water Department and, according to staff members Tom Howard and Glen



Poelstra, installation and start up was a breeze.

On-Site sodium hypochlorite generators provide an alternative to

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Mercer Island - First Hill Rehab

Jack Boyd, PumpTech Bellevue

The First Hill area on the west side of Mercer Island, Washington is a well established older neighborhood with larger lots and vintage homes. As the area has grown the redevelopment trend has resulted in larger, up-scale homes or more than one new home on the original lot. The City had two problems to address. One was insuring adequate flows for the expected increases in demand but, the larger concern was being able to provide acceptable flows for fire protection.

The solution would require two projects – 1) replacing undersized water mains and 2) upgrading an existing booster station. PumpTech was invited by Rona Lin, Mercer Island Utilities Engineer, to suggest options for the booster pump station upgrade. The existing booster station and emergency generator was below grade in a concrete vault sharing a homeowner's property. The home is well established with wonderful landscaping that was so developed the existing pump station was virtually unnoticeable.

PumpTech's task was to focus on the inner workings of the station and provide a system that met the City's goals. After providing drawings for several different pump configurations, a custom designed pumping system package was developed that best utilized the limited space available.

The original station consisted of four constant speed pumps (3 – 5HP & 1 – 3HP). System pressures were controlled by two pressure reducing valves. The new station design



utilized four 3HP vertical multistage pumps controlled by variable frequency drives (VFD's). These new duty pumps are inherently more efficient as well as more energy efficient due to the variable frequency operation. Electrical savings have averaged 38.4% over the past seven months.

Two new, 40 HP pumps were added to provide the required fire flow capacity. These are also driven by VFD's to provide the greatest range of operational flexibility. The modular design configuration was factory built for a vertical installation and the two large centrifugal pumps were positioned on the adjacent

wall with vertically mounted motors aligned beneath what was the vault's main entry hatch. The new pump package design opened up 60% floor space allowing a new entry hatch to be added. The existing hatch was retained for maintenance tasks.

As with many station rehabilitation projects there were numerous challenges and a few surprises from as-built discrepancies such as actual pipe location and elevations when excavating on site. R.L. Alia Company (Renton) was the general contractor and did an excellent job making adjustments on site. As project manager, I was on site each day as



site revelations that impacted critical dimensions were addressed. The project required everyone to be creative, and in some cases, innovative. The construction process was underscored by daily cooperation between the city, the contractor and his key suppliers. Stead & Associates provided the controls upgrade and Ashford Electric handled the system electrical requirements.

During construction the existing service area could not be taken off-line. PumpTech also provided the interim pumping package (a Grundfos Triplex BoosterpaQ system with an integrally mounted VFD on each motor) which was linked with the City's existing telemetry and operated flawlessly throughout the construction process. With the upgrade, operational flexibility and pump performance has been enhanced

while energy consumption has been reduced. The overall goals of the city will come to fruition this summer when the distribution pipeline improvements are completed.



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Lower Elwha Vacuum Sewer System continues

eliminated gravity sewers and lift stations due to the high ground water which would constantly pose a risk for a conventional gravity design as well as the cost of digging the gravity sewers in a high water table area. Individual grinders were eliminated due to reliability issues and the cost of maintenance.

After careful consideration, the engineering team focused on the Airvac vacuum sewer collection system for five major reasons: **Environmental** - with vacuum collection there is no exfiltration, **Reliability** - with vacuum collection there is a centralized collection station where the vacuum pumps, sewage pumps, controls and backup generator are centrally located, **Ease of maintenance** - with all pumps and electrical equipment centrally located, maintenance is minimized and operators are not exposed to sewage even at the vacuum valves and sumps, **Ease of installation** - with vacuum sewers there is minimal excavation for the collection piping, **Cost** - even with all of the above benefits the vacuum sewer collection system was the most cost effective solution when operation and maintenance were considered.

The layout of the vacuum sewers were done by Womer & Associates while Gray & Osborne was tasked with designing the collection station, sewage pumps, and force main. This posed a considerable engineering challenge because after collection the sewage had to be pumped off the reservation to an elevation rise of approximately 230' and then on to the City of Port Angeles WWTP over 5 miles away. Gray and Osborne, with the assistance of PumpTech and

Cornell Pump, came up with a series pumping system utilizing Cornell model 4X4X14T solids handling pumps with 40 hp motors that delivered 300



gpm at 350' TDH. Airvac worked with L2 Systems in Everett to assure that local support would be available for all of the controls. The control system was designed to provide both reliability and redundancy complete with spare pumps & VFD's.

The team of Larkor Construction and Macro Z Technology (MTZ) was selected as the general contractor and built the collection station. They hired Pivetta Brothers of Sumner to install the collection piping. The project was substantially complete in March of this year and connections to the system commenced shortly thereafter.

Now that the dams have been removed the salmon runs can begin their return. The Lower Elwha Klallam tribe is poised to welcome them back to a clean and natural environment with no risk of pollution due to its Airvac vacuum collection system. PumpTech, Airvac, Cornell and L2 Systems are proud to be part of this project.

MicrOclor continues

commercial bleach and chlorine gas applications. Producing bleach as it is needed, in a safe and cost effective manner, is easily accomplished with the MicrOclor OSHGS.

The OSHGS units require only salt to make bleach and the cost is around 40 cents per pound of chlorine. And, one load of salt is equal to five loads of delivered bleach. Also, salt has an indefinite shelf life and is always readily available. According to the Coeur d'Alene's water department staff the equipment installation, operation and maintenance are easily accomplished and the MicrOclor units use far less salt than the other on-site sodium hypochlorite generators they own. They also agree that MicrOclor is the most reliable and efficient system they have seen so far.

The picture to the right shows the generator, brine tank, hypochlorite tank and other components. With the exception of the tanks, most of the equipment can be wall mounted to reduce the overall footprint.

For more information on MicrOclor OSHG systems contact any of our PumpTech sales engineers.



METERMAN Selected by Grundfos as a Key Systems Provider



Several years ago, Grundfos came up with an innovative idea that took advantage of the special capabilities of some of their distributors. The Key Systems Provider (KSP) program allows Grundfos to contract with their distributors to build chemical injection skids that they sell to other customers. The program gives Grundfos the capability to provide sophisticated systems without having to invest in the infrastructure necessary to produce them. MeterMan was selected because of its history of producing “engineered” skids that are designed specifically for a particular customer process. Our experience with Bayer, GE, Boise Cascade, Georgia Pacific, Weyerhaeuser, Kaiser Aluminum and Reynolds Metals placed MeterMan in the upper tier as a engineered systems provider.

In April we shipped nine skids to NA Water (a division of Veolia). They will be used for water treatment at the Plains Exploration & Production Company (PXP) in San Luis Obispo county. PXP has a 100% interest in the Arroyo Grande oil field which is older and produces heavier oil. Their wells have an average depth of 1700 feet and require continuous steam injection because of the heavy oil. The MeterMan skids are designed to supply various chemicals including sulfuric acid, hydrochloric acid, hydrogen peroxide, calcium chloride, sodium bisulfate, caustic soda and an antiscalant.

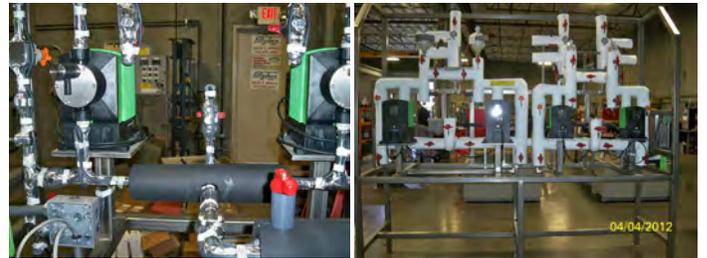
Eight of the skids were plumbed with CPVC pipe which is compatible with all of the chemicals except sulfuric acid. That skid was plumbed with Kynar pipe that was welded by a CC machine that welds the pipe and fittings and also provides a certification label for each weld. All of the skids were constructed with heavy duty , welded stainless steel frames and Grundfos smart metering pumps. The pictures on the right show the computer controlled welding machine. The one in the upper right column shows a finished sulfuric acid skid.



The caustic soda skids were a bit more of a challenge. Caustic soda has a relatively high freezing point (a 45% solution of NaOH can freeze between 50 and 60° F) so several additional procedures were required.



All of the piping was covered with aluminum heat transfer tape and then a 120 VAC, heat trace cable was installed. The entire assembly was then covered with an engineered foam insulation. Finally, a white engineered coating was applied to protect the insulation from moisture and UV rays. The pictures below shows a skid during insulation installation and the finished skid after coating.



Four of the nine skids were designed with a feed tank integrated into the system. These tanks, known as “Mother Tote Bins” are the sole source of the chemical pumped by that particular skid. The tank and pump skid are installed on top of a stainless steel base designed to contain any leakage due to system failure. One of the skids was heat traced and insulated while the other three were un-insulated. The photos above right show the insulated skid under construction and ready for shipping.



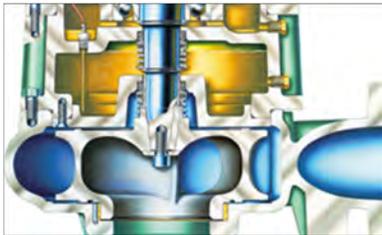
For more info contact Scott Bush in our Canby office.

Pump Ed 101— How Lower Pump Efficiency Can Reduce Operating Costs

Joe Evans, Ph.D Education & Training

When we start the pump selection process for a particular application, one of our major concerns is efficiency. If several different models, of similar quality, meet our conditions we will usually select the one with the highest efficiency. After all, higher efficiency reduces power consumption and its associated cost. There are times, however, when efficiency can take a back seat to the true, overall cost of operation.

Solids handling pumps used in municipal and industrial applications are a good example. Large sewage pumps can use radial or mixed flow impellers with little concern of plugging or clogging due to the inherent size of the flow passages. As discharge and vane size decrease, however, the potential for clogging increases. In the early 1900's a new impeller design was developed by A. B. Wood of the New Orleans Sewage and Water Board. Known as the "non clog" impeller, it consisted of two vanes with blunt leading edges that allowed passage of larger solids and reduced the opportunity for stringy material to accumulate at the vane entry. Today, most solids handling pumps, with discharges smaller than 10", utilize some variation of this design. The figure to the right is a cross section of a typical non-clog volute and impeller.



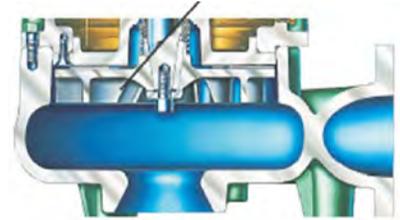
Those of us familiar with these pumps know that there is no such thing as a non clog - - "seldom clog" is probably a better terminology. But, as discharge size decreases to 4" or smaller, "often clog" can become the description of choice. Now, some 3" & 4" pumps with single or two vane impellers can pass a full 3" spherical solid. But, some applications cannot accommodate the higher flows they produce and high concentrations of stringy material can still cause plugging. If a small non clog performs well in an application it is probably the best choice but, if plugging is a continuous problem, you may want to consider an alternative.

A cross section of that alternative is shown in the figure at the top of the right hand column. The vortex pump, or recessed impeller pump, is a member of the centrifugal family. But unlike the typical centrifugal pump, its pumping action is a two stage process. The impeller, which is located outside the flow area of the

volute, produces a vortex or swirling action in the water that resides in and around its vanes.

This vortex creates a circular motion in the volute that produces flow. The two stage process is shown in the figure below.

The pumping action of the vortex pump offers several significant advantages. Since the impeller is recessed, it has little contact with the majority of the pumpage. Even when solids do contact the impeller, they do not have to traverse the vanes so the potential for erosion is greatly reduced.



In addition to reduced wear, its recessed position also allows the passage of larger solids and stringy materials that might otherwise plug a standard impeller. Almost any solid that can enter the suction will exit the volute and stringy materials pass through without entanglement. Still another advantage is a reduction in the radial forces that act upon its impeller. Because of this reduction, many vortex pumps can operate at very low flows for extended periods without damage.

Unfortunately, that two step pumping process has a disadvantage - - a much lower hydraulic efficiency. This trade off tends to be acceptable in many industrial markets but, unfortunately, it will often eliminate the vortex pump from consideration by some specifying engineers in the municipal arena.

A typical 4" vortex pump will have a hydraulic efficiency of about 50%. A 4" non-clog with a similar performance will have an efficiency of 68% to 75% - - 18 to 25 points better. If we relate efficiency to BHP it would take a 10 HP vortex pump to meet the flow and head of a 7.5 HP non-clog. But most of these pumps run just a few hours a day and some run less than an hour so the overall cost of power may not be a major factor. So what is the major factor? The cost of pulling that non-clog weekly for cleaning. Those maintenance costs will far exceed any increased electrical costs due to lower hydraulic efficiency.

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iRover Increases the Control Flexibility of PolyMan Skids

MeterMan works with a number of companies that produce and supply chemical products for the oil, mining, paper, food and pharmaceutical industries. Many of these suppliers also provide the equipment necessary to store, mix and pump their chemicals.



Recently, a supplier purchased four PolyMan, polymer make down skids with our iRover interface. They are being used to activate and make down polymers used in the paper industry. A particular polymer dilution can vary depending upon the product that is being produced by the mill. The photo to the right shows one of the skids prior to shipping.



In the past, they would send a technician to the mill when production changed and the polymer solution needed adjustment. If the mill was located in a remote area of Washington or Oregon, a three hour drive would be typical. With iRover technology, that commute will seldom be needed. iRover is an app that was developed by Chris Suskie of PumpTech and runs on the Apple

iPad (see the Fall 2011 edition of Pipeline for more information). It allows the iPad to interface directly with the Unitronics touch screen display used in our control panels. It allows connection via WiFi, the internet or a 3G connection. The photo on the right shows Chris accessing the PolyMan control panel directly from his iPad. With the PolyMan system you have easy set point control of the polymer solution. No need to recalibrate the pump, water flow or flowmeters.



With iRover technology, their technicians can make dilution adjustments from their office and avoid that time consuming commute. They can also monitor the system, view alarm conditions and react as needed. The photo on the right shows one of the PolyMan skids installed in a paper mill. PumpTech is currently working on an iRover Tank Management system that will display the tank levels for all of the chemicals stored on site.



Hydronix 421 Insert - The Easy Way To Upgrade Those Old Concrete Wet Wells

The Hydronix 421 Retrofit is a fiberglass insert complete with pumps, rail system, valves and piping that slips inside an existing concrete wet well. Once installed, the space between the walls is filled with a special non shrink grout that holds the insert in place. It provides the most cost effective way to retrofit old stations and upgrade to high efficiency, submersible pumps. Features include:

- Integral valve vault
- iRover compatible controls
- Minimal down time
- Minimal excavation costs
- Non-Clog or Chopper options

Contact your local PumpTech branch for more information.



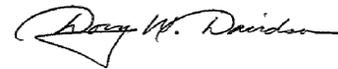
PumpTech PumpChat - From the Presidents Desk - Spring Means Tradeshows !!

In my former career as a commercial beekeeper spring meant pollination time. For those in the pump business spring means trade shows and technical exhibits. The first week in May PumpTech will be both presenting and exhibiting at the PNWS-AWWA conference in Yakima. In addition to our standard pumping products we will be featuring some new product lines such as SolarBee mixers, Process Solutions MicrOclor onsite chlorine generation and Arden industries tablet chlorinators.

After the local AWWA show Ed Smith and I will be headed to Munich Germany for the IFAT conference (the largest environmental conference in the world). There we will see firsthand what the Europeans are doing in the water and waste field in regards to energy savings as well as pumping and processing the new, low water sewage. This will be our first trip

to attend IFAT and we are both looking forward to seeing what is offered in Europe that will make its way to our shores in the months to come.

In June we will be presenting and exhibiting at the WW regional short school in Lynwood and then we will attend the National AWWA-ACE conference in Dallas TX. Spring has always been a busy time, whether in the bee business or the pump business, and there is a certain similarity to both. In the honeybee business spring meant pollinating the crops to ensure a harvest in the fall. In the pump business trade show season means that we are educating and interfacing with those in our industry to provide them the tools to harvest the benefits of our products and services for years to come.



PumpTech Engineer Receives FBI Service Award

Musse' Olol, PumpTech Canby, was invited to Washington DC in March to receive the FBI's annual Community Service Award. He is chairman and spokesperson for the Somali American Council of Oregon and was recognized for his many years of work building positive relationships between the Somali community and law enforcement. He also works as a volunteer assisting new Somali refugee families as an interpreter, facilitator, counselor and co-sponsor. Musse' has lived in Oregon for over thirty years and graduated from PSU with a degree in

Mechanical Engineering. He joined PumpTech as a design engineer in 2002. The picture to the right shows Musse' receiving the award from



Robert S Mueller. Every year, one person from each state is selected for this award. Congratulations Musse' from all of us at PumpTech.

Hello's & Goodbye's at PumpTech Canby

Frank Baker is the newest member of our inside sales team in Canby. He has over thirty years experience in the pump industry and has worked for Jacuzzi, Cornell, PACO and Grundfos. Frank lives in Oregon City with his wife of 36 years. Welcome aboard Frank.



Bill Starks joined our engineering department in March. He brings with him thirty years of experience in mechanical design with Hyster and Westinghouse. Bill lives in Tualatin and builds custom cars and trucks in his spare time. Welcome aboard Bill.



Matt Browne is the newest member of our outside sales team and comes to PumpTech from Fine Line Instrument. He will be responsible for MeterMan and industrial sales in Oregon and Southwest Washington. Matt lives in Vancouver and is an avid surfer and snowboarder. Welcome aboard Matt.



Beth Halstead retired from PumpTech in April after many years in the pump industry. She started with Cornell in 1984 and was working for Hydronix when PumpTech acquired them in 2001. Now she is spending time with her grandkids. Have a happy retirement Beth!



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- 5/10 Professional Engineers of OR Conf - Eugene
- 5/23-24 WWCPA - Kelso
- 6/5-6 Western WA Short School - Lynnwood
- 6/10-14 AWWA ACE 12 - Dallas, Texas
- 8/28-30 OR Operators Conf - Seven Feathers Canyonville

