Wastewater Treatment Operations at the “Home of the World’s Worst Weather”, Mt Washington State Park, elev. 6,288’.
By Mike Pelchat, DRED

The weather conditions atop Mt Washington are well known for extremes in temperatures, wind, precipitation and frequent cloud cover. The Mt Washington Observatory has been recording weather statistics from the summit daily since 1932 and has recorded minimum temperatures of -47°F. Hurricane force winds occur an average of 100 days per year with a peak wind gust of 231mph recorded in 1934. Wind chill values often drop to below -100°F during winter months. Annual melted perception is 102” with an average of 312 inches of snow in winter. Summer time temperature has only reached an all time high of 72°F. During the summer tourist season the park sees an average of 300,000 visitors making the trip to summit via the Cog Railway, Auto Road or one of twelve hiking trails. These 300,000 visitors generate over 500,000 gals of wastewater using the facilities within the Sherman Adams Visitor Center. The population using the facilities reduces dramatically after the common forms of visitor transportation stop for the season. There normally are only 5 weather observatory and park staff members during the off-season. How do we deal with all of this wastewater and flow variability in an environmentally responsible way, especially considering the summits notorious weather conditions and the sensitive alpine flora that surrounds the park?

HISTORY
In the early days of tourism and human occupation of the summit, since the mid 1800’s little consideration was given to the consequences of waste water. The early hotels had potable water pumped from the Ammonoosuc River via huge coal fired steam pumps from Marshfield Base Station via an iron waterline.

(Continued on page 3)
Safety Corner - The Big One That Got Away by Chris Hipkiss

The title of my article may sound like a fish story but then this is the Safety Corner and if the title got you this far please read on.

The Situation: Operators needed to lower a spare pump from a second story storage area to the floor below to swap out with a pump that needed to be rebuilt. The lifting device was an electric winch rated at 2700 lbs and commonly referred to by the trade name of a Strong Arm Winch.

Prior to carry out the operation the operators inspected the winch and noticed that there was a section of the wire rope cable that was frayed and had a kink in it. Their supervisor directed them to cut out the bad section of cable and reattach the thimble and hook which they did using some wire clips they had in the shop.

The operators then proceeded to lift the pump from its storage location and lower it to the floor below thru an access hatch. One operator was operating the winch and the other operator was guiding the pump down to the floor below where halfway down the clips slipped and the pump dropped to the floor below. The pump survived the ordeal and luckily no one was hurt although a check of skives was in order.

Where to Go For Guidance: When I heard of this Near Miss I started to do some research and asked some question around the plant as to the proper way to attach a thimble and hook to a wire rope cable. For larger overhead cranes we would get an outside certified contractor to do the work but for the small stuff like a "come-along" or a portable electric winch what was the proper procedure to follow and where is that information to be found.

An internet search revealed that there are two basic types on wire rope clips which are Malleable and those with a Forged base. The Federal Specifications FF-C-450 D provides more detail but for the purpose of this article you would be looking for Type 1, Class 1 clips for overhead lifting. I went to my local hardware store looking for wire rope clips to see if there were any identifying marks to identify the type and class of the clip without much luck. I would therefore suggest that you obtain clips that meet the FF-C-450-D specifications from suppliers such as Grainger or Fastenal.

After obtaining the proper type clips, follow the manufactures recommendations for their installation. The procedures for attaching a wire rope to a thimble can be found at "www.rigging.net/clips.html" and include the amount of wire rope to be turned back from the thimble, the placement and order of placement of the clips, the number of clips to be used and the amount of torque to be applied to the clips U-Bolts. (Note: the proper placement of the clip has the u-bolt portion of the clip against the turn back portion of the wire rope.)

In closing always keep your lifting gear in good working order and when repairs need to be made use the proper repair parts and follow the manufactures instructions for their application and you will be able to keep that "Big One from Getting Away".

Do you have a near miss story to share? All story material is anonymous and you can reach me at (603)-934-2809 or e-mail me at vernon.hipkiss@des.nh.gov
which lay on the ground near the Cog tracks. Wastewater simply went overboard from the hotels via a straight pipe towards the East side of the summit away from the prevailing NW wind.

When the USAF began using the summit as an Icing Research Lab in the late 1940’s they drilled the first water wells (up to 1,200’ deep) and built the summit’s first wastewater treatment system which consisted of solids holding tanks, which were periodically emptied by tanker truck, with the grey water treated by sand filter beds. Expansions and upgrades of this basic system served the summit up to this year. Instead of rebuilding the sand filter beds for a fifth time with the same limited summer use only system it was time to come up a better wastewater treatment solution for the summit that could produce a higher quality effluent and operate under freezing conditions. With the Cog Railway extending the length of its shoulder season from late April into November and with the increased winter water use of Observatory personnel the method of storing wastewater in holding tanks for summer time treatment had become no longer practical. With many months of research beginning in 2007, Jobie Chase P.E. from NH Bureau of Public Works along with input from NH Dept of Environmental Services conducted a nationwide search for a different type of wastewater treatment system that could operate in winter as well as summer-time.

The answer was found with LIFEWATER Engineering Company from Fairbanks, Alaska who custom built a WWT package plant we now call the Extreme Sewage Treatment Plant or ESTP. The LIFEWATER Co. had built packaged treatment plants for Alaska’s North Slope and for small villages and resorts through Canada and Alaska where cold temperatures and permafrost prevented the use of conventional treatment plant systems.

The system they manufactured for Mt Washington is housed entirely inside a 40’ long, insulated, high cube, standard width shipping container so that all normal operating and maintenance procedures can be performed within the protection of the enclosure. The system is remote controlled via the internet to further simplify its operation and minimize the need for operators to journey out into the weather.

**TREATMENT OVERVIEW**

Sewage flows by gravity through a 4” heat traced ‘Arctic’ pipeline from the Sherman Adams Building to the ESTP located 600’ below the summit. The treatment process begins with fine screening. A 1.5 mm perforated screen removes hair and other solid particles that could foul downstream processes. An auger lifts, dewateres and places screenings into a trash bag for disposal. The screen operation is sealed and nearly odorless. The screen is cleaned by spray nozzles using treated effluent from the permeate tank. Screened wastewater is pumped out of the screen tank to an anoxic tank to assist in the process of denitrification.

The anoxic tank has a mixer and a sensor to measure Dissolved Oxygen (DO) so that adjustment can be made to keep the DO low to accomplish denitrification. The incoming BOD₃ and the retention time in the anoxic tank drives the DO down to <0.5mg/l. A carbon source (either a sugar solution or micro-c) is used as necessary to help increase the BOD₃ to drive down the DO and complete the conversion of nitrate to nitrogen gas. Since the anoxic tank is always full the same amount of water entering overflows into the next tank for aerobic treatment.

Biological treatment of the wastewater by the activated sludge process takes place in the bioreactor tank. A regenerative blower rated for a 125 cfm supplies an array of aeration diffusers each capable of 10cfm. When the bioreactor is at full capacity, excess mixed liquor overflows a baffle into the surge tank. Detention time within the bioreactor is approximately 15 hours. Sensors monitor dissolved oxygen, total suspended solids and pH. Aeration heads

(Continued on page 4)
inside the surge tank continue to mix its contents and prevent solids from settling. Spray nozzles discharge permeate water periodically to control foam build up. When water in the surge tank reaches a prescribed level a 10 hp centrifugal pump transfers mixed liquor to four tubular membrane filters arranged in series. The four X-Flow Model 33G tubular membranes each have 4 square meters of surface area. A clean-in-place (CIP) system is provided for the tubular membranes. Membrane permeate water is used to mix chemicals needed to clean the membranes. The following chemicals are used in membrane cleaning: Citric Acid, Sodium Hypochlorite, Sodium Hydroxide, and Sodium Metabisulfite. Clean water from the membranes is stored in a 600 gallon permeate tank until a predefined volume has accumulated, after which permeate effluent is batch discharged through a UV disinfection system and then onto to the ground near the plant. Heat traced and insulated discharge pipe will allow discharge doses to continue through the winter months. Excess mixed liquor sludge is removed by either pumping into underground holding tanks for vacuum truck removal or with a sludge bagger with polymer addition.

All pumps within the ESTP have variable speed controllers and tanks have high/low water level transducers controlled by the plant’s programmable logic controller (PLC). Heating requirements for the plant are met by heat liberated from the sewage treatment equipment and supplemental heat provided by an electrical unit heater. Ventilation is provided by two louvered fans protected against icing and high winds on the exterior by lexan shields. A 'Artic Entryway' protects the entrance door from freezing and snow drifts. The NHDES issued groundwater permit requires weekly testing to insue the following effluent parameters are not exceeded: $<$ or $=$ 10 mg/l BOD$_5$, $<$ or $=$ 10 mg/l TSS, 0 Fecal Coliform and pH must be within 6-9.

**THE CHALLENGES**

The responsibility of operating the ESTP 24/7, 365 days a year falls onto a park staff of four. Operation of the ESTP is only one of the many and complex duties of summit staff. Staff access to the summit park is a daily challenge in fall/winter/spring. Travel along the Auto Road can require operating a 4 wheel drive tire chained plow truck to a BR275 snow tractor.

The weekly testing of time sensitive effluent samples will be difficult due to slow and inconsistent travel to and from the summit in winter storms. Staff is researching the requirements and equipment necessary to conduct its own effluent tests at the summit. There will be many adventures and lessons learned as the ESTP heads into its first winter on the summit of Mt Washington.

Many thanks to NH Bureau of Public Works, NH Natural Heritage Bureau and NH Dept of Environmental Services for their help, advice and support in the design, installation and operation of the summits' new ESTP. We’ll let you know in the 2010 spring edition of the NHWPCA newsletter how we survived!
A STATE-WIDE PUBLIC WORKS AGENCIES SUMMIT

By
Dave Danielson

On Wednesday, July 22, 2009 a unique meeting was held at the Manchester Community College in Manchester, NH. It marked the first time in the state the six groups representing the public works profession met to discuss issues of common interest. The participating groups included the NH Public Works Association, the NH Road Agents Association, the NH Water Pollution Control Association, the NH Public Works Mutual Aid Program, the NH Water Works Association, and the NH Public Works Standards & Training Council. The group (Richard Lee, President, and Brian Barden of the NH Road Agents Association; Dave Lent, President, and Carl Quiram (past NE APWA President) of the NHPWA; Gerry Curran and Peter Goodwin, Board members, NHWPCA; Jim Terrell, President, and Kurt Grassett, Board member, NHPWMAP; Steve Guercia, Board member, and Dave Danielson, NHWWA chair, APWA SC/RC Forum; Bruce Berry, Chair, and Kevin Sheppard (Director, NE APWA), NHPWS&TC) met for nearly six hours in a facilitated meeting that all felt beneficial. As one participant noted “This is the first time we’ve ever all sat down with each other.”

Arranged by the NH Public Works Standards & Training Council, the idea was to “raise the bar” for the public works profession in the state. The population of the state (just over 1.3 million residents) and the municipal make up (only two cities over 50,000) provides a state that deals with the same issues addressed by others yet small enough that many public works professionals know each other. During their first discussion the group recognized that while the public works agencies are declared “first responders” in the same directive that established the Homeland Defense Department and that many levels of government say “you’re important”, there is still a need to fight their way to the table with police and fire agencies. Also, when an issue important to the public works profession arises it often is missed or the response by the profession appears “disjointed” or “confusing”. Perhaps echoing members of municipal boards or state legislature, a participant asked “What does Public Works do?” A public works director noted that “There is no clear definition. Everyone’s different”. And because of the different organizational structures (water/wastewater departments, districts, commissions) and perceived focus (road agents, either elected or appointed as compared to public works directors) the profession lacks a clear identity.

One of the first actions was to poll the participants on their feelings of priorities. Effortlessly the group agreed that advocacy, raising the level of professionalism, image building, sharing resources, providing a unified voice in relations with the NHDOT and NH Department of Environmental Services, consideration of regionalization to address costs, increased communication between the professional groups, and overcoming complicated and costly policies and procedures that the agencies often face. Possible concerns surfaced as well: what might the professional organizations have to give up, losing local control, the possibility of “yet another” organization that would take more time away for participation.

Consideration was also given to possible “push back” from those in individual organizations. Concerns about not needing another organization, what happens to current organizations, what happens to dues/operating budgets of the organizations, what are the benefits of a combined effort, more meetings, what will success look like, what will the combined messages contain were all considered important and that would have to be addressed.

There was support for the continuation of the professional organizations as it was recognized that technical regulations and proposed legislation often requires specialized knowledge. However, it was also recognized that the NH Road Agents and NH Public Works Association could find benefit in working together to review proposed legislation and regulation proposals. This would provide for a common response to policy and regulatory proposals that would assure an optimum solution for the agencies and for the public. Also recognized was the need for continued training. Water and waste water operators today have to meet basic licensing requirements and continued education to maintain their licenses. Many public works and town road employees attend Technology Transfer (T2) training and many have attained the level of Master Road Scholar. However, it was recognized that there are areas of cross training that could be cost effective and beneficial. Examples included backhoe operations, chainsaw safety, other safety programs and management training for managers at all levels.

At the end of the day, it was determined by the group that their goals would be to agree on a common purpose (a (Continued on page 6)
(Continued from page 5)

first draft "Public Works seeks to provide a sustainable quality of life that includes the health and well being of supported residents."); to agree on a public relations effort; to establish ongoing communications between the professional organizations; to research other models or organizational structures nationally (particularly in reference to lobbying efforts) ; to research funding sources for the potential organization.

On the national level there seems to be an even greater focus on "mega-regions" in the belief that it will be cost-effective as it will address the needs of the most people. However, there are miles of roads, miles of water and sewer pipes, numerous bridges, and an economy, dependent on a solid infrastructure that thrives in small cities and rural communities throughout the nation. Indeed, there is a need for those public works agencies not included in a "mega-region" to see how they can serve their constituencies effectively and efficiently. Working together would provide a way. Speaking with each other is a beginning.

There is certainly more work to be done however, this is the first step in what could be a very positive initiative for the public work profession in New Hampshire. The positive energy that came from this first meeting has prompted a commitment to meet again in late September. This will assure that all the participating organizations will have had time to review the summary of the meeting, comment on that work and make suggestions for consideration by the work group.

Dave Danielson, Manager of Forece Advocacy, LLC, is chair of the APWA Small Cities/Rural Communities Forum. He can be reached at d.danielson@comcast.net

SEACOAST SEWER SNAKES TEAM 2009
Placed third over all in Division II
Photo taken at the WEFTEC Operations Challenge awards ceremony in Orlando last Fall

Sewer Snakes in stripes from left to right:
Paul Fritz, John Sykora, Sean Greig, Jeremey Boston, Paula Aunia and Tim Vadney
New Choices in EPA-approved Methods for e-Coli Analysis
By Stephanie Rochefort, Somersworth WWTF

When I first started working at the Somersworth WWTP it happened to coincide with our permit’s switch to the mTec method for e-coli analysis. The mTec method was all that I knew for years! When I wasn’t busy with our three times per week set-up, I was reading plates, making plates, making dilution water and doing a LOT of clean-up. It was difficult to keep other staff members up-to-date on how to run and read this test. (yellow? yellow-green? yellow-brown?) At least once, I forgot to move the plates into the water bath at the end of their “stress-recovery” incubation at the lower temperature. Talk about stress — after that I’d wake up in the middle of the night wondering where my e-coli plates were!

Needless to say, I was quite excited to hear about the new choices in EPA-approved methods for e-coli analysis. At first, I used Hach’s mColiBlue method. Although I still had the work of setting up a membrane filtration method and the associated clean-up, the plates were much easier to get ready. These plates were easier to read – blue is blue, no second-guessing. Best of all, there is only one incubation temperature, so I was able to find a new use for my water bath.

Here’s some information from Amy Pollock at Hach about this method.

**m-ColiBlue24 Broth Provides Quick Coliform Detection Within 24 Hours**

**Loveland, Colorado—November 9, 2009**—Hach’s m-ColiBlue24 Broth simultaneously detects and identifies both total coliforms and Escherichia coli (E. coli). Complete enumeration is accomplished in only 24 hours — no confirmation step is required.

Testing with Hach’s m-ColiBlue24 Broth requires no fluorescent lamps or color comparators—interpretation of the results is done by easy, visual identification. E. coli colonies are blue, other coliforms are red; total coliforms are the sum of the two. Results are enumerated directly, which is more accurate and precise than statistical-based tests, such as Multiple Tube Fermentation (MTF) and Most Probable Number (MPN).

This method has been approved by the EPA for monitoring drinking water and wastewater and can be used to detect coliforms in other types of waters—bottled, surface, ground, well and recreational (fresh or marine) as well as process water for ultrapure chemical processing. Hach Company not only offers m-ColiBlue24, but also the total solution for your microbiology testing needs, including other media (m-Endo, m-FC), Petri dishes, membranes, filtration equipment and manifolds and field testing equipment.

For more information on Hach Company’s m-ColiBlue24 Broth or other water analysis products, visit www.hach.com or call 800-227-4224 and request literature #2628.

Then the new budget year came around and I was fortunate to be able to purchase IDEXX’s sealer and begin to use IDEXX’s Quanti-tray system. I’m definitely sold on how quick this method is to set-up and how easy it is to teach to all staff members. Of course, I am discovering that mistakes can still be made, but no sense embarrassing myself.

Here’s some information from Gil Dichter at IDEXX about this method:

**Introduction:**
Current microbiological methods for the quantitative detection of E. coli bacteria in water samples are typically tedious and labor intensive. Advances in water testing suggest that there is a need to have accurate methods, rapid

*(Continued on page 8)*
results and an economical, easy-to-use method. The use of Colilert® with the automated Quanti-Tray® system has been recognized in many studies and approvals as accurate, economical and easy-to-use.

Colilert®

Colilert is based on IDEXX’s Defined Substrate Technology® and, in combination with IDEXX’s Quanti-Tray® and Quanti-Tray®/2000, detects and enumerates total coliforms and E. coli in the waters indicated above. Total coliforms incubated at 35°C grow in Colilert® reagents. The coliform bacteria utilizes the enzyme β-galactosidase to metabolize the chromogenic nutrient indicator, ortho-nitrophenol β-D-galactopyranoside (ONPG), resulting in the sample changing from colorless to yellow. E. coli uses β-galactosidase to metabolize the fluorogenic nutrient indicator, 4-methylumbelliferyl-β-D-glucuronide (MG), resulting in a blue fluorescence when exposed to a long wavelength ultraviolet light (UV-365nm). (See figure 1.)

Quanti-Tray® System

The IDEXX Quanti-Tray® system is an automated MPN method for bacterial enumeration in 100-mL water samples. When used with IDEXX DST® reagents (Colilert®), Quanti-Tray® provides an automatic sample-handling system to produce bacterial counts in a 100-mL samples. The Quanti-Tray® has 51 wells and provides counts from <1 to 200 cfu/100 mL. The Quanti-Tray/2000 has 97 wells and provides counts from <1 to 2419 cfu/100 mL. This system greatly reduces the need for making manual dilutions of heavily contaminated water samples.

To run a sample, a blister pack (Colilert®) of reagent powder is added to a sterile test vessel containing 100 mL of sample. After the powder is added, the vessel is shaken to dissolve the powder. This is then added to a Quanti-Tray® or a Quanti-Tray®/2000 and sealed with the Quanti-Tray® Sealer. The tray is placed into an incubator at the specific temperature and time required for the particular test. (See Figure below.)

Quanti-Tray® Demonstration

Use of these innovative IDEXX methods result in faster response to potential problems in as little as 18 hours. They are easy-to-use, require minimal training and are fast and accurate without the need for confirmatory testing.

Many studies performed around the world comparing IDEXX’s Colilert®, Colilert®-18 and Enterolert® to a variety of reference methods have successfully validated the use of IDEXX methods for testing drinking waters (finished), raw waters, recreational waters, wastewater samples and sludge.

I was watching the Discovery channel on Saturday when who came on TV but Geoff Howe and the Howe and Howe Tech Show! Geoff and his brother Mike, identical twins, have been working on an unmanned vehicle for the US ARMY and have their own TV show. Geoff used to work at the Portsmouth WWTF. Do you know of other NH operators with special talents? Let us know. I hear there are biogas car enthusiasts, ham radio operators, banjo players….editor

Become a sponsor of the NHWPCA Newsletter. Your company name, phone number and contact person will be placed in the collector each issue for only $100 per year. Contact the editor.
Operator Exchange Program
By Kristin Noel, Concord Hall St. WWTF

As a participant in this year’s Operator Exchange program sponsored by NEWEA in conjunction with NHWPCA and the CWPPA, I was fortunate to have the opportunity to tour several facilities in the state of Connecticut. My first stop upon reaching the state was a tour of the Bridgeport (East) Wastewater Treatment Facility which is owned by the City of Bridgeport but privately operated by KGL, a British company. Steve Silverbush is the Chief Operator of the Bridgeport plant along with Dave Carfo, my host for the day. As the Assistant Chief Plant Operator, Dave gave me an informative tour of the facility, its upgrades and SCADA system.

The Bridgeport Wastewater Treatment Facility was initially put into operation in the 1950’s and was subsequently upgraded in 1972. In the 1990’s the facility was again upgraded to include biological nutrient removal of nitrogen as required by the State of Connecticut’s Department of Environmental Protection. Currently the facility is a 10 MGD activated sludge treatment plant with a normal plug flow design. Due to the city’s combined sewer system, during high rain events, the facility can be switched and operated as a step feed system to accommodate for those high flows. The facility is operated and maintained by their dedicated staff 24 hours a day/seven days a week and includes; operators, maintenance and collection system personnel.

In the past, this facility had a very low rating for its treatment of wastewater in the State. However, due to the many improvements including facility wide upgrades, a new BNR process as well as their knowledgeable staff, that rating is a thing of the past. The Bridgeport facility now meets its NPDES requirements and has since been recognized as #2 in the State for nitrogen removal as well as achieving a removal efficiency of 98% for both TSS and BOD. Typically the resulting final effluent is so clear it has a NTU of 1.0 and nitrogen levels are reduced more than ten fold before final discharge to Long Island Sound.

Connecticut WWTF’s are required by the DEP to remove much of the nitrogen from their effluent discharge streams. If a facility is unable to meet their permit requirements for nitrogen removal, then those falling short of those limits are required to purchase nitrogen credits as part of a statewide nitrogen cap and trade system. The new upgrades have made it possible for the Bridgeport facility to receive $250,000 in nitrogen credits this year alone which is quite a savings for KGL, a for-profit, privately operated company.

Carlos Paiva, the 1st Shift Supervisor, gave me a demonstration of their SCADA system which controls nearly all aspects of their wastewater operations. Bridgeport’s solids handling consists of gravity belt thickened primary sludge mixed with waste activated sludge resulting in a 5-7 % TS which is then hauled by truck to a regional facility for incineration. I want to thank all the staff at the Bridgeport plant for their time and attention while I toured their facility and a special thanks to Dave Carfo for hosting me on the first day of the tours.

Dave Carfo my host in Bridgeport then brought me to the Stratford WWTF, located in the Town of Stratford, CT. It was at this facility that Dave Carfo spent most of his career (30 years) in Wastewater before retiring and reentering the field at the Bridgeport facility. Jim Makraus, 1st Shift Supervisor, was our tour guide who explained all the changes that had been made at the facility since Dave’s short retirement nearly five years ago. The Stratford facility is an activated sludge treatment plant with BNR and UV disinfection. The resulting solids are dewatered by gravity belt thickeners and filter belt presses and the resulting belt press cake is also transported to a regional facility for incineration.

The Stratford WWTF was originally established in 1919 and has had several upgrades over the following decades. However, the most recent upgrade was just completed this year by the engineering firm, CDM, at a cost of $62 million dollars. This facility is rated to 11.5 MGD with typical daily flows consisting of 8.0 MGD but as a result of the new changes it is capable of managing flows of up to 32 MGD.

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This facility is also operated and maintained 24 hours/day seven days/week with a staff of 17 employees. In 1996 the EPA awarded the Stratford facility its “Best in Operation & Maintenance Excellence in Region 1” award. According to Peter Stallings, the Superintendent of the Stratford plant, we were fortunate to be among the first people to see the new facility-wide upgrades. Upon the projects completion, an open house tour was arranged and attended by the Town’s Mayor and Selectmen; however, most have not yet toured the facility. It was a pleasure to tour such a newly upgraded facility and I thank Jim Makraus for all his time that day.

On my second day in Connecticut I met with Terry Smith, Superintendent of the Wallingford WWTF, who introduced me to his Assistant Superintendent, Dan Sullivan. Dan began the tour in the laboratory where Kim Maloney, the facilities Laboratory Director, oversees all water and wastewater testing for the City of Wallingford. Several Operators from the surrounding area WWTF’s joined us in a tour of the facility to increase their knowledge about wastewater testing and various treatment processes in preparation for taking the DEP’s wastewater examinations. Wallingford’s wastewater treatment plant was the first RBC facility I had ever toured and it was a unique and educational experience.

The facility is designed as an 8.0 MGD Hybrid Suspended Growth/RBC Nitrogen Removal Process consisting of a suspended growth anoxic reactor coupled to RBC secondary treatment. Influent wastewater enters the headworks, passes through bar screens and enters the aerated grit chambers where it continues on to the primary settling tanks. The flow then enters the anoxic basins for nitrogen removal and is discharged to a reaeration channel to increase the D.O. before entering the fixed film RBC’s. Secondary treatment is provided by 56 Rotating Biological Reactors (RBC’s) arranged in eight trains. Once the flow has passed the RBC’s it then enters the secondary settling tanks and on to the post aeration basins. Once the effluent leaves the post aeration basin it is disinfected by UV light and discharged to the Quinnipiac River.

In this process the resulting sludge is sent to a gravity thickener where it then enters primary digesters which are able to reduce solids by 30% and the captured methane is reused as fuel to continually heat the digesters. As most of the facilities in Connecticut, the digested sludge is sent to belt filter presses and transported to a regional incineration facility for disposal. Once we had completed the tour of Wallingford’s WWTF, the group went on to the next phase of our tour to see how most WWTF’s in Connecticut dispose of their resulting sludge and belt filter cake.

The Veolia Wastewater Treatment Plant located in Naugatuck, CT, is a facility that treats approximately 6-8 MGD of industrial and domestic wastewater. Along with treating wastewater this plant is also a regional incineration facility. Tom Deller, an Operator at the Veolia plant, escorted our group around the facility to demonstrate how they dispose of all the solids produced by the surrounding facilities. The plant is an activated sludge treatment plant with a BNR process but its main purpose is as an incinerator for disposal of sludge and cake solids.

The facility is in operation 24 hours/day seven days/week with two trains of incinerators that burn incoming solids derived from wastewater treatment plants. This facility is capable of processing 84 dry tons per day. The facility was intended to treat industrial wastewater but over the years the need for industrial wastewater treatment has diminished while processing of sludge and solids has actually increased. This facility is able to turn a profit by the sheer volume of incoming solids that are processed.

On my third day of tours, I was met by the Chief Operator, Kevin Cini and Operator Stuart Peckham of the Groton WWTF, there I toured a 3.1 MGD conventional activated sludge treatment plant with a BNR process.
and anaerobic digester. Influent, mostly industrial wastewater (up to 65% of the total flow) from two nearby facilities, Pfizer Research & Development and General Dynamics, along with domestic wastewater enters diffused air grit chambers and then on to the step screen and shredder. The flow continues to the primary settling tanks and then onto the aeration basin which is divided into an anoxic zone and a fine bubble aeration zone. After aeration, the flow enters the final settling tanks through the Parshall flume and into the chlorine contact chamber where the final effluent is chemically disinfected and discharged to the Thames River.

The sludge treatment process involves settled solids from the primary settling tanks where they are combined with thickened sludge from the sludge storage tanks for digestion in two tanks that are operated in a series. The thickened sludge is achieved by using a rotary drum thickener where waste activated sludge from the final settling tanks is thickened by mixing with polymer. The resulting thickened sludge, approximately 6 to 8% solids, is pumped to the sludge storage tank where it can be pumped into a truck and hauled to a regional incineration facility.

While I was there Stuart Peckham was testing solids from the anaerobic digestion process to obtain data for improving the process. Currently, the digesters can reduce solids by 58-60%; however, Stuart and the other Operators are working to develop better methods to increase the digesters ability to reduce solids which in turn will reduce transportation costs associated with the sludge disposal. This facility was awarded 2nd place in the “Intermediate/Advanced Treatment” category by the EPA in 2007 and after touring this facility it is easy to see why they were awarded that honor.

Stuart then took me over to see Steve Banks, the Chief Operator of the Highlands WWTF located in Ledyard, CT where he gave me a tour of this “unconventional” conventional activated sludge, SBR facility with BNR and tertiary treatment. Although it is a small facility, typically treating less than 0.17 MGD, it is capable of treating up to 0.80 MGD. Upgraded with two SBRs and BNR capability, along with tertiary treatment in 1997, this plant produces nearly potable effluent.

The process begins with primary treatment. Influent flows through a coarse bar rack then enters the aerated grit chamber. Following the grit chamber the flow continues to the SBR’s (Sequence Batch Reactors) which in a conventional activated sludge process, separate units would perform aeration and settling. However, at this facility both processes are performed in one reactor. This is accomplished by a three hour fill cycle where influent wastewater is pumped into one of the two SBR tanks. The next phase is the react mode where microorganisms are mixed with the wastewater and aerators are cycled on and off to accomplish nitrogen and BOD removal. The aeration is then shut off and final settling occurs. The final stage of the SBR is the decant/idle phase where the treated wastewater is drawn off the top of the tank and discharged into the flow equalization basin. In the idle stage, a portion of the settled sludge is pumped out as waste sludge. The flow from the equalization basin then goes into the final process and enters the sand filters which remove additional suspended solids and insoluble BOD from the SBR process. Once the effluent leaves the sand filters it is disinfected using UV. From there the effluent is aerated by cascade aeration and discharged either to the seepage beds which allow the water to filter into the water table gradually or during high rain events directly to the brook.

Activated sludge is wasted each day and is thickened with polymer prior to entering a Rotary Sludge Thickener (RST) which is able to increase the percent solids in the sludge from 0.7 to 5.5%. After thanking Steve for the great tour, Stuart and I were off to have a special tour of the Coast Guard Academy and to meet Dr. Zelmanowitz.

We arrived in the middle of Dr. Zelmanowitz’s class on wastewater analysis where she was instructing her students on how to analyze the BOD₅ of wastewater. Although we had a short tour, we were able to see a few of the different laboratories at the Academy. The Groton facility has been able to teach students about the importance of wastewater treatment and the students have obtained hands on experience. Her classes have worked with closely with the Groton operators to learn more about Wastewater and several future engineers aided with chemical

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analysis to optimize the new BNR process. It was great meeting Dr. Zelmanowitz, a great environmentalist, who
appreciates all that we do in the wastewater industry.

Lastly, I just want to thank everyone who made this experience possible, i.e., NEWEA, the NHWPCA,
CWPAA and the City of Concord as well as all the people who welcomed me to Connecticut and guided my tours.
It was a great experience and I would recommend to any operator, especially those new to the field, to experience
the Operators Exchange Program.

**OPERATOR EXCHANGE: A HOST’S PERSPECTIVE**

**Michael D. Sullivan, from David Sullivan and Associates**

The NHWPCA recently hosted Stuart Peckham, an operator at the Groton, CT WWTP, for this year’s Operator
Exchange Program. Within minutes of meeting him you could tell he was a perfect candidate for this program. He
is fairly new in the business having been an operator for only three (3) years; however, he had spent twenty-five
years in the high tech business in Connecticut. Due to overseas outsourcing in his previous industry, he was
forced to do a course correction and found his way into the wastewater treatment field. Throughout his time with
us in New Hampshire, he had continuous questions on the sites, equipment, and processes that he was shown and
approached each plant tour with youthful enthusiasm.

Stuart met up with George Neill on his first day in the Granite State and was shown the Pease Development Au-
thority facility followed by a tour of Dover and lunch with “First Day” Ray Vermette. Following that George and
Stuart made it to Somersworth where Jamie Wood gave them ample time at his facility.

On the next day, Mike Sullivan took Stuart on a tour of the Monadnock Region starting at Keene where he was
most intrigued by their foam suppression system for their aeration tanks as well as their efforts to achieve low ef-
fluent phosphorus limits. After lunch we stopped in at the innovative lagoon treatment system in Troy before end-
ning the day at the recently commissioned advanced treatment system serving Jaffrey.

The Board of Directors of NHWPCA annually holds an informal dinner meeting in the Concord area coinciding
with the Operator Exchange candidate’s visit and this year was no exception. Stuart got to meet the Board mem-
bers and share his experiences of the first two days of his trip.

Friday, October 2, NHWPCA had their Fall Meeting at the Manchester WWTP where two presentations were con-
ducted focusing on their most recent project involving centrifuge dewatering and new secondary clarifier mecha-
nisms. These talks were followed by a tour of the upgraded facilities. The group, with Stuart in tow, then pro-
cceeded to the business luncheon at the Executive Court Conference Center where Stuart concluded his visit before
returning home.

On behalf of all of us at NHWPCA, I thank Stuart for visiting with us and for his keen interest in our Association
and at the facilities that he toured. I would also like to express my appreciation to the following people who played
a role in making this year’s Operator Exchange run so smoothly:

Paula Anania and Roxanna Chomas – City of Portsmouth
Ray Vermette – Dover
Jamie Wood – Somersworth
Donna Hanscom and Aaron Costa – Keene
Randy Loupa – Troy
Jason Beckwith – Jaffrey
Mike Hanscom and Kristin Noel – Concord
Fred McNeill and the Staff of Manchester WWTP
Nancy Lesieur
George Neill
Dave Carfo – Connecticut WEA

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Finally, we thank Elizabeth Cutone and NEWEA for encouraging operators to participate and for their continued sponsorship of this program.

A NOTE FROM OUR EXCHANGE OPERATOR FROM CONNECTICUT

To My Gracious Hosts of NHWPCA, 10/6/09

I am writing this letter to thank you and all those responsible for allowing me the pleasure and the opportunity to be involved in the Operator Exchange program last week September 30th – through October 2nd. I had an excellent time and experience. I got to meet a lot of very nice people and see their plants. I would like to say that all the people went out of their way to make me feel welcome and show me their operations. I would especially like to thank; Mike Sullivan President of NHWPCA, George Neil (retired) NHDES, Paula Anania / Pease, Ray Vermette Jr. / Dover, Jamie Wood / Somersworth, Superintendent Donna Hascom and Aaron Costa / Keene, Randy Loupa / Troy, Jason Beckwith / Jaffery, Kristen Noel / Concord, and Frank McNeil / Manchester, for all their help and hospitality during my visit to your great State of New Hampshire.

I know I learned some new ways of doing things and I hope I was able to pass on some of the knowledge I have. We have very strict Nitrogen limits here in Ct. and I learned about your strict limits on Phosphorus. I was also intrigued by your aeration of the effluent. I found many interesting bits of information along the way. Your hospitality was outstanding and it was a pleasure to meet everyone involved in the exchange program. I think it will be a great experience for anyone who would be involved. It is nice to know that in this business people will exchange information so we all can do our jobs better and more efficient and always learn something new.

In November New Hampshire will be exchanging an operator with us and we look forward to having Kristen come and visit our plant here in the City of Groton, in lovely Groton Ct. I think my experience was a great time and I look forward to more experiences in the future to learn and help others learn in this field. This was an exciting trip and very helpful in showing me different ways of doing things. I hope more operators take advantage of this program in the future and look forward to helping in any way I can. Again thank you all so much for a great time.

Sincerely yours,
Stuart Peckham
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