Great Treatment

by Mary J. Pedrosa
Stratford WPC, CT

Recently I was privileged to participate in the Operator Exchange program and visit a number of plants in New Hampshire. On arrival at the Nashua, NH plant I was immediately impressed by the cleanliness of the plant. On my way to the office, I passed the trophy room, filled with certificates, awards, banners and news clippings about the employees and their enviable accomplishments. When my tour guide, Kenneth Lowe, arrived, I was elated to learn that he was a maintenance technician! This brought a new perspective to the tour and it was exciting to see and hear about all of the projects that the employees had completed, such as the biofilter for odor control of the aeration tank influent channel. I was impressed by the size and cleanliness of the maintenance area and the neatly organized spare parts storage area. Although hypochlorite solution is used around the plant, regular visits by the ‘leak patrol’ kept the piping and fittings in tip-top shape. Kenneth continuously bragged about the excellent support the employees had received from management and how they have worked together to minimize costs and operate as efficiently as a private company. I asked so many questions that I never made it to my next scheduled tour in Concord . . . sorry!

That evening I was privileged to meet Association President, Mary Dowse and members of the New Hampshire Water Pollution Control Association Board of Directors while attending their Annual Board Dinner meeting at a local restaurant. The meal was terrific and the company congenial. I actually started to feel like one of the Directors and at one point I almost forgot I was a visitor when a discussion about computer software ownership came up . . . a subject dear to my heart and wallet!

The following day was filled with more firsts. I met my guide, Sarah Goyette, at the Exeter plant . . . my first lagoon! I had visions of spending a relaxing summer day in the boat taking D.O.’s out of the blue lagoon! (I’m sure it’s blue when it’s not raining!) And just when I thought that lagoons were simple . . . with few moving parts . . . I found myself face to face with two walls lined neatly with organized racks of color coded, laminated maintenance cards that would bring order and reality to every day on the lagoon!

The Dover plant was my first covered aeration tanks and enclosed biofilters, not to mention my first look at a beautifully composted sludge. Doug Steele and staff had just completed a grueling and expensive week-long job of changing the media in the biofilters. Innovative operators were at work at this plant too, having designed and built a cleaning rack for the UV disinfection tubes. It was interesting to learn that the plant was once privatized, but now was being run by the city, who by the way, hired back all of the private employees. An interesting twist!

While driving to our next destination, I learned how a lab chemist became an operator as Sarah explained the chain of events that lead to her being hired to operate the pre-treatment plant at the Redhook Brewery. My first brewery! What a cool place to work! Temperature is something we don’t usually think too much about, since Mother Nature takes care of that for us. But here, it’s a constant concern since the waste discharges are usually very hot . . . too hot and the bugs in the anaerobic digesters die . . . so Tim Fry explained how heat exchangers are used to cool things down. The sludge from the grain had a very strong odor and I was surprised that it was so dark in color. There was a hot line from the lab direct to the Pease plant so that the operator at Redhook could warn the operator at Pease of any impending danger from changes in the effluent.

My next first were the Sequencing Batch Reactors at the new Pease plant. I must admit that the drab olive green influent was a bit scary, but Bill Peterson assured us that every day the influent was a different color and not to worry. Although he only got to work at the plant periodically, he was excited about learning the process and being actually able to make changes to it. He also ran lab tests and showed us a really neat Dynajet dry polymer mix/storage/feeding system from Fluid Dynamics. He said that he really felt like an operator when he worked here!

The next day, I drove to North Conway to be treated to some additional firsts . . . my first zero (groundwater) discharge plant,
5. Trade Fair: Doug and Mary will shortly be sending our reminder cards to vendors for next spring's annual Trade Fair.

6. NEWEA Update: Victoria reported that George Laney, long time State Coordinator for Operators Challenge has submitted his resignation. Nominations for a replacement will be solicited at the winter meeting, and directors were asked to make suggestions as well. Mary Pedroza, operator from Stratford, Connecticut, visited several New Hampshire plants recently as part of the Operator Exchange Program, and was very pleased with her experience. Unfortunately, some fumbling by our counterparts in Connecticut resulted in our being unable to send a New Hampshire operator there. Victoria and Doug will discuss this with NEWEA's representative for the program to see how this can be avoided in the future. Victoria disclosed names of nominees for New Hampshire Operator of the Year and the Peloquin Award, to everyone's hearty approval. Mary will attend the next NEWEA meeting in Victoria's place on November 18; the annual conference will be in Boston January 23-26, 2000.

7. WEB SITE: Rick Cantu reported that the NHDES Web Server Administrator has – somewhat surprisingly – declined to host our proposed web site. The directors felt that a meeting with the Administrator and other DES officials might be beneficial to persuade them to reconsider, as we feel this arrangement would be a "natural."

8. Other Business:
   A. Mary is preparing the year 2000 calendar.
   B. John Scott reported that he will be stepping down as Consultant Director when his term is up in the spring. A replacement will be sought.

9. Next Director’s Meeting: Friday, November 19, 1999 at 9:00 a.m. at Concord’s Hall Street facility.

Meeting adjourned at 11:15 a.m.

Could this be a witch's brew bubbling in this cauldron, or could it be yet another attempt to nitrify a lagoon effluent? Stay tuned for the rest of the story in the next issue of The Collector.
Water Treatment Courses

The following Water and Wastewater Treatment courses will be offered at the New Hampshire Community Technical College – Laconia. Starting January 10, 2000

<table>
<thead>
<tr>
<th>TUESDAYS</th>
<th>COURSE #</th>
<th>COURSE NAME</th>
<th>CREDITS</th>
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<tr>
<td>4:00 – 6:30 p.m.</td>
<td>WWT213</td>
<td>Treatment Plant Hydraulics</td>
<td>3</td>
<td>$336.00</td>
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<tr>
<td>6:30 – 9:00 p.m.</td>
<td>WWT214</td>
<td>Advanced Wastewater Treatment</td>
<td>3</td>
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<th>WEDNESDAYS*</th>
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<tr>
<td>4:00 – 6:30 P.M.</td>
<td>WWT113</td>
<td>Water &amp; Wastewater Maintenance</td>
<td>3</td>
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<td>6:30 – 9:00 p.m.</td>
<td>WWT112</td>
<td>Water &amp; Wastewater Analysis</td>
<td>3</td>
<td>$380.00</td>
</tr>
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</table>

For more information or to register for classes, please call the Laconia College at 524-3207 or the Berlin College at 1-800-445-4525. Students may also register the first night of classes.

*Wednesday classes will be held in the Training Center at the Winnipesaukee River Basin Wastewater Treatment Plant in Franklin.

New Hampshire Community Technical College
379 New Prescott Hill Road
Laconia, New Hampshire 03246
(603) 524-3207 Fax (603) 524-8080

The College reserves the right to cancel classes due to insufficient enrollment

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City of Lebanon
Public Works Department
Utility Operations Group

Employment Opportunity

The City of Lebanon, New Hampshire, Utility Operations Group is seeking to fill the regular full-time position of Laboratory Technician / Plant Operator at the Water/Wastewater Treatment Plants.

Responsibilities include routine water and wastewater analysis, treatment plant operations and assistance with the Industrial Pretreatment Program. Minimum requirements include possession of, or ability to obtain within one year, a New Hampshire Grade II Wastewater Treatment Plant Operator’s certification. A valid Class B commercial driver’s license is also required within six months of appointment.

Current pay range for this position is $15.59 to $18.58 per hour. This position is included in the AFSCME Local 1348 bargaining unit. The City of Lebanon is an EEO employer.

Applications and job descriptions are available from the Lebanon Wastewater Treatment Plant at 130 South Main St., West Lebanon, NH 03784 or by calling 603-298-5986.

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DMR Study #19
by Tim Lofus

The DMR-QA study consists of a series of samples of which the concentration of the analytes required for testing are unknown to the participating laboratory. This is one of the ways the EPA checks on wastewater treatment plant laboratories.

As many of you are aware, the EPA’s DMR-QA Study #19 has had its share of problems this year. Over the course of 1999, I received many letters stating program delays, so called “final dates,” cancellation, the program is on again, then more delays. Of course, some of these letters were inaccurate (false) and some were accurate (true).

So, in the spirit of the DMR-QA Study #19, I have listed those statements given to me concerning the study. Your job is to answer the question: Which statements are true?

1. The number of the first true statement added to the number of the second false statement gives the number of a statement that is true.
2. There are more true statements than false ones.
3. The number of the second true statement added to the number of the first false statement gives the number of a statement which is true.
4. There are no two consecutive true statements.
5. There are at most three false statements.
6. If this puzzle consisted of statements 1 to 5 only, then the answer to the initial question would still be the same.
Manchester W.W.T.E. Odor Control Project

by Tom White

... and so we finally accept one axiom of wastewater – it does stink. This fact now being accepted by even the most conservative of engineers. Also, now that we've opened the Screening Room door, even the most seasoned W.W.T.E. operator has at some time or other experienced the "gag" reflex – however never revealing this to co-workers. The problem is that the plant neighbors do not appreciate experiencing the "gag" reflex with their entire B.B.Q. crowd just prior to serving the steak. Here in lies the problem of odors and wastewater and the human nose.

Odors from wastewater facilities and pump stations have become far less tolerated by the plant neighbors then in the past. The public awareness and concern over toxics in the environment is here to stay. The first step in odor control is to recognize that an odor does exist and to involve the neighbors in the solution. The Nashua W.W.T.E. staff knows this very well. Tom Seigle, Chief Sanitary Engineer for Manchester, has also faced large crowds of angry residents in meetings designed to "clear the air" so to speak. The outcome of these meetings, hopefully, results in an odor study and the installation of equipment, after financing is arranged of course.

The Manchester W.W.T.E., the largest facility in NH with a design flow of 34 MGD and one that also handles 13 million gallons of septage per year, has invested 5 million dollars over the past two years to take drastic action to reduce the odor problems. Camp, Dresser and McKee was retained to design the solutions after a complete odor study was performed. Basically, several outdoor tanks were covered and all of the foul air is collected, piped into two large blowers and pumped through two very large in-ground biofilters for cleaning.

The details of the project and these pictures are compliments of Tom Corey. Picture #1 reveals a rather bizarre scene of the 3 primary clarifiers in the foreground with the aluminum bridge type supports holding up the clarifier covers. In the background are the 12 aeration basins – mechanical aerators with their fiberglass covers supported from beneath by fiberglass box beams. The white piping works to carry the off gases from these areas as well as the grit tanks and all channells to the brick blower building on the left.

The foul air being drawn off the tanks requires several adjustments prior to biofilter application. Photo #2 reveals the massive housing for the in line air degreasing unit prior to the blowers.

Photo #2

Photo #3 shows the rectangular fiberglass covers over the mechanical aeration tanks and air duct work and support.

Photo #3

Photo #4 reveals the two long biofilters running along the length of aeration. During cold weather, the air is heated prior to entering the biofilter to assist in microbiological breakdown of the odors within the filter. Misters are also operated in the ductwork prior to the biofilter to add moisture.

Photo #4
Wakefield W.W.T.F.

The Town of Wakefield, NH has a small wastewater treatment system that consists of 2 Gorman Rupp pump stations pumping to several septic tanks laid out in series at the treatment plant. These septic tanks remove most settleable solids and some B.O.D.

The effluent supernatant from the septic tanks is pumped onto one of several rapid infiltration beds and eventually, after treatment through the soil, flow into the groundwater.

Monitoring wells surrounding the site assure that the groundwater is not being negatively impacted by the treated wastewater – must meet drinking water standards.

Kevin Foley, plant operator, in front of one rapid infiltration bed at the Wakefield W.W.T.F.

Two septic receiving pits are used to dry the septage from the town and plans are to utilize the dried septage as landfill cover.

Kevin Foley, pictured, is the facility operator who used to perform lab work and other operator duties at the Wolfeboro W.W.T.F.

Kevin, who is now working for Woodard and Curran in Wakefield, maintains the pump stations and the plant grounds and rapid infiltration beds.

He is a dedicated operator who doesn’t mind working alone at this facility.

Photo #5 shows the hot 1938 Nash called “Nashty” belonging to Tom Corey, used for quick “get aways” with Tom Seigle from neighborhood odor meetings.

Another approach that was taken by many plants – Nashua, for one, was to address each odorous area separately or combine several and treat the odorous air with multiple air scrubbers and/or biofilters. This approach divided the project up and can allow for multiple smaller budget items to serve as the solution.

Which methodology applies to your situation requires some study and costs comparisons. Thank you to Tom Corey for his assistance in assembling this article.

Town of Hanover, New Hampshire is seeking a Full Time Water/Wastewater Technician – $12.38/hour to start. Minimum Qualifications: NH Drivers License; has or can obtain Grade II NH Water/Wastewater License. Closing date is December 29, 1999. For more information contact:

Human Resources Director
Town of Hanover
41 South Main Street
P.O. Box 483
Hanover, NH 03755
Public and Private Can Work Together
by Dana Clement

With the EPA Risk Management Plan filing deadline of June 1999 fast approaching, and the Town insurance carrier expressing its concerns over chlorine gas, the Suncook Wastewater Facility started looking for alternative disinfection systems early in 1999. After looking at all available options it was decided to investigate a chlorine gas to sodium hypochlorite conversion.

Plant superintendent Dana Clement solicited information from many industry sources as well as NHDES concerning this project. Initially the Sewer Commissions of Allenstown and Pembroke were looking to secure SRF funding for the project. To do this, the project had to have an engineering endorsement. However, when preliminary estimates were coming back from engineering firms for design/build in the $80,000.00 range, the Sewer Commission asked for a more cost effective approach. At this point Peter Boettcher of Boettcher Electric Company was solicited for a proposal to design/build the project. Mr. Boettcher has been in the wastewater field for 25 years, holds a master electrician’s license as well as water and wastewater operator certifications, and operates a company serving the industry from routine maintenance and small projects to contract operations and large contract projects.

March 9, 1999 Mr. Boettcher submitted a proposal including design, construction, start up, and warranty of a completely automated system. The system includes: 2-500 gallon storage tanks, 2-60 gallon per day LMI pumps with 4 to 20 MA speed control, outside fill and vent systems, spill containment, Hach CL17 chlorine analyzer, PID controller, chart recorder, alarms, lighting, sampling pump, water flushing, and a new 10’x14’ concrete building with double doors installed next to the chlorine contact chamber. Also included was wiring from the pump building to their new chlorine building, and instrumentation wiring to the operations control room. The total price for this project was $47,500, a substantial savings from the engineered project.

On 3/22/99, a joint meeting was held with the Allenstown and Pembroke Sewer Commissions who both share the flow at the Suncook Wastewater Plant. A contract was awarded to Boettcher Electric for the system with a completion deadline of June 21, 1999. This only gave approximately 90 days to complete the project. One has to wonder if an engineering firm can perform within this kind of time limitation.

Mr. Clement and Mr. Boettcher met with Franz Vail PE, from State of NHDES and submitted the design and specifications of the hypochlorite disinfection system to be sure that it met all the department’s requirements as stated in Env-Ws 700. Mr. Vail was very helpful with this process and subsequently forwarded a letter stating the system met all requirements.

Peter and Dana worked together going over the materials list to be sure that the materials supplied met the plant’s needs and that plant personnel would be satisfied with the end product. The building was bought directly from CSI Shelter Technologies. It is a precast concrete building which, after suitable ground preparation, was delivered via tractor trailer to the site and put in place using a large crane. This type of building was the best option as it can be supplied to specifications, including penetrations for piping, exhaust fans, vents, etc. We were also able to choose the exterior colors, door finishes, and hardware. The Hach CL17 chlorine analyzer utilizes two separate chemicals which last approximately 30 days before needing to be changes. Three additional months of chemicals were supplied on start-up. The signal from the Hach analyzer goes to a PID controller to control the pumps automatically to maintain a set point. LMI pumps were used for their reliability, ease of operation, and availability of spare parts.

After testing the system with water, one tank was drained and filled with 15% hypochlorite and the system was put on-line June 14, 1999. During the following week training was conducted with plant personnel and adjustments made.

A couple of shady characters. Peter Boettcher and Dana Clement inside the new chlorine building at Suncook W.W.T.F.
After testing the system with water, one tank was drained and filled with 15% hypochlorite and the system was put on-line June 14, 1999. During the following week training was conducted with plant personnel and adjustments made to the system to be sure that the PID loop and all systems were operating correctly. With training complete and a full week of operation, the system was handed over to the plant and the warranty was started. As of this writing there have been very few problems with the system.

By working together, plant and contract people were able to complete a simple and reliable system at a much lower cost. This arrangement lends itself to easily make adjustments as necessary during the construction phase so as to maintain the highest possible quality at the lowest possible price. Using a design/build contractor is not for every project. However, in this instance it was the best of both worlds. Most plant operators know what they need. Being able to work with a contractor who listens to their needs and has been in their shoes is a great advantage to all.

Great Treatment — Continued from page 1
first Rotamat rag washer & dryer, first covered secondary tanks, first plate & frame presses, first on-site hypochlorite generation system and first plant disguised as a beautiful farm nestled amongst trees and fields and bounded by a river. The dark red and green decor in the administration building was very appealing and the ladies room rated an A++. Following the tour, a catered lunch and meeting were held at a nearby restaurant. During the meeting, we learned about the obstacles that the design engineers had to overcome to build a plant with no odor and zero discharge!

During my scenic 6 hour drive home, I thought about all the different people I had met. All with unique combinations of educational backgrounds and skills... assorted job titles and individual ideas... all working together and sharing their expertise as OPERATORS!

Sincere thanks to the New England Water Environmental Association, the New Hampshire Water Pollution Control Association and the Connecticut Water Pollution Abatement Association for making this opportunity available. Special thanks to everyone who took time from their busy schedules to show me around their facilities and answer my myriad of questions.
Signs of Toxicity

by Tim Loftus

Toxic wastes are not necessarily just those compounds listed by the Federal and State government as toxic. They can be a host of other compounds, whether by themselves or in congregate, that create problems at your wastewater treatment plant. A toxic waste in a treatment plant will not always kill off the whole system. It may not even lead to an NPDES permit violation. But it will lead to reduced treatment efficiency and inefficient plants are not only more difficult to operate, they are more expensive to run.

One of the major problems we have at a WTP with toxic wastes is that we often find out about it too late. The waste is already in the plant and causing the problems. But when we can identify times that toxicity shows up, we are at the first step in solving the problem. From here we can formulate a plan to narrow the search for the source of toxicity. It’s not perfect, but oftentimes it’s all we have to go on.

Of course, we all can recognize a major upset: drastic changes in process efficiency, high turbidity in the effluent, and so on. But what about milder forms of toxicity – where no violations occur? Below are a few indicators of toxicity. While each one in itself does not absolutely point to toxic wastes, they do suggest that you look into it further.

Through the Microscope

Microscopic observation of the mixed liquor shows a rapid shift in the types and numbers of microlife that you normally see. While it could be a result of a process change, it may not be. Often the filaments that hold the floc together will be the first to die off from a toxic waste. There will be lot of dispersed growth due to the defloculation. This is usually followed by a bloom of flagellates (predatory protozoa reacting to a sudden availability of a food source). You may also notice a sudden die-off of ciliates and rotifers. If the toxicity is severe enough, foam will appear with aeration. Check the foam under the microscope, too. If you see lysed cell contents from dead microfiche, you are most likely seeing the results of toxicity.

In the BODs

The BOD5 take-down shows that different dilutions for a sample calculate out to different results. Specifically, you notice that the higher the dilution of the sample, the higher the BOD5 results. (For example, 2 mL of sample into a 300 mL bottle with seed results in a BOD5 of 450 mg/L, 3 mL - 375 mg/L, and 4 mL - 250 mg/L.) This indicates a sample that is toxic. In this case, the sample may not be very toxic, but at higher volumes, it will have a toxic effect on the biomass.

Through Respirometry

Many operators or lab technicians are using some form of respirometry for a quick check on WTP treatment efficiency. The method can be adapted to test for toxicity of an industrial waste or other wastewater sample. It consists of measuring the oxygen uptake rate (OUR) of the mixed liquor in the endogenous stage (where all the food is gone and the bugs are just waiting for more food – usually at the end of the aeration tanks). Then you add a sample of industrial wastewater (or whatever sample you want to test) and check the OUR while the bugs are eating. The OUR should be higher than the endogenous rate. This would indicate that the sample is easily biodegradable. If the OUR is less, then it may be a sign that the sample is toxic. The oxygen uptake rate can be done using expensive equipment specifically designed for this, or it can be done using a simple, although much less accurate, BOD bottle and probe (see 2710 B in Standard Methods 20th ed.)

While these indicators of toxicity may not be totally definitive, they should be seen as warning signs for potential problems.

If you have any questions, suggestions, or comments, please contact LPC Chair Paul Fitzgibbons at (401) 222-6780 ext. 118 (lab@narrabri.com) or Tim Loftus at (508) 949-3865. You can also visit our website at newea.org. Once on the website, press the Lab Practices button.