

**Not Enforcement, Reinforcement
Caution! You're about to enter a
No-Swim Zone! ☺**



New Wastewater Operators Newsletter

Volume 2, Issue 11, January 2012

Dear Ladies and Gentlemen:

Strength in Numbers: My email victims' list is now at 256, we gained 6 subscribers since December's issue. Subscribers include wastewater operators (municipal and industrial), public works directors, civil engineers, Ecology employees and other interested parties.

Why this newsletter?: The main purpose of this voluntary exercise is to showcase cool ideas (and the people responsible) I see or hear about in the wastewater treatment industry, mostly in Eastern Washington. I've also got both eyes open for surplus items around the state, which could be of use to other wastewater facilities. When I get word of training opportunities and job openings, I'll share them with you, hopefully in a timely manner. ☺

Share with us: Everyone reading this is part of the wastewater community in some way. If you have an idea or interesting project you'd like to share, please email me about it. It's a newsletter (duh!)—share the news, people! Please?

Issue Summary:

- [Page 2:](#) Equipment for sale or to give away: Simplot Moses Lake has a microscope.
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Equipment for sale or to give away:

Simplot Moses Lake has a nice compound microscope, practically new in a nice soft nylon zippered compartmentalized case for sale. They originally bought it to observe methanogen bacteria (methane producing), but found out they're super small and they'd need an electron microscope to ID them.

Anyway, I saw the instruction sheet for it, and it can be configured (with optional parts) to be a phase contrast scope (which is great for viewing activated sludge biomass, resolving filaments), or as a fluorescence scope, etc. Currently it is a bright field scope. It's Chinese made and I couldn't find a brand name, but the model number is N400ME. If interested, you can contact Jackie Keele via email, go see it and make an offer. Jackie's email address:

Biological Microscopes (N-400M Series)

[Close](#)



Jackie.keele@Simplot.com

Update: I did an Internet search and found out the N-400M series of microscopes (an example shown above) is supplied by the Wuzhou New Found Instrument Co., Ltd.

I also emailed them for more information on the scope—the spec sheet leaves a lot to be desired.

As always, let the buyer beware. By the way, I checked eBay, and they have tons of new and used microscopes there if you're in the market.

Job Openings:

Greetings all. Please distribute this job announcement to potentially interested parties.

Thanks

Cliff L. Lough

WWTP Supervisor

City of Pullman

509/338-3233

Job Announcement:

Date: January 23, 2012

Position: INDUSTRIAL MECHANIC

CLOSING DATE: February 24, 2012

INDUSTRIAL MECHANIC- \$3,331—\$4,058 per month. This position troubleshoots, repairs, maintains and replaces wastewater treatment plant equipment and systems. The incumbent plans and maintains the plant's preventive maintenance program. Work is performed according to standards of the plumbing and electrical trades and involves the use of blueprints, electronic schematic drawings and manufacturer's installation/repair instructions. The Industrial Mechanic is primarily responsible for performing major repair work as the plant's only skilled mechanic.

Minimum qualifications: Education and experience equivalent to completion of a related technical apprenticeship program or related technical vocational degree with 3 years job-related experience. Possession of or ability to obtain a valid commercial driver's license.

Applications available at City Hall, Human Resources Department, 325 S.E Paradise, Pullman, WA 99163. <http://www.pullman-wa.gov> Closing Date: February 24, 2012. E.O.E.

Thanks, Cliff!

Maintenance (Preventive/Corrective) programs sought:

Awhile back I asked the victims to send me information about computerized maintenance programs available “out there”, especially ones which are cheap and effective. I got a number of replies by email, but that was before I lost my hard drive last June. All that information was lost (Poof!). Search as I have, I can’t find a trace of it.

Well, there’s still interest, so if you respondents who sent email about that subject earlier could check your Sent Items folder and resend them to me, it would be much appreciated.

Brenda Bach, an operator of the City of Kittitas wrote me back in November (sorry about the delay, Brenda):

Darrel-

hi Darrel, I was talking with Ron About putting the Kittitas WWTP on a computerized Maintenance record keeping system, And he thought you would have Expert knowledge on a system that you know about , and where we could get one. I would appreciate any and all input you would have. looking forward to hearing from you, Sincerely Brenda Bach City of Kittitas

Thanks, Brenda. we’re working on it.

One source of maintenance software is www.mtcpro.com . I helped the author (Brian Kennedy) beta test a couple of universal maintenance products (STRACFast™ and MyWorld Maintenance™) back in the 90s and 2000s. As maintenance products go, the general pricing of maintenance software ranges from free (trial downloads) to several thousands of dollars. Brian’s products are “reasonably” priced, and he has a good reputation for providing tech support in a timely manner. His new version of MyWorld Maintenance™ is called “Maintenance Pro™ (starts at \$495 for the standard version), and there’s a trial download (30 days) available.

Another popular wastewater software package back in the ‘80s+ was Operator 10™ . Operator 10™ was (is) a be-all package for water or wastewater treatment. I looked up Operator 10™ and found it belongs to Allmax Software, Inc. Their stand-alone maintenance program is called Antero—Maintenance Data Management™ . There is a trial version of that for download as well, [here](#) . Hmm, I don’t see any prices—they must be very proud of their products.

My experience with maintenance software in small to medium sized wastewater treatment plants is the following:

- 1.** There’s a learning curve—you have to read a lot of instructions to figure out how to get set up.
- 2.** You have to spend some serious time entering information about your equipment and facilities to be maintained. This means sitting down with your O&M manual and entering names, model numbers, parts vendors and their contact info, on and on and on... Not to mention assigning maintenance activities for each “unit”. Typos and duplicate entries seem inevitable.
- 3.** Generally, reports of what maintenance activities are due (or overdue) are viewable or printable, depending on the software. If you don’t keep up with it, you’ll find yourself under a stack of paper as high as the sky.

Maintenance (Preventive/Corrective) programs sought, cont.:

4. It's easy to get discouraged and give up on the program altogether. In my case, what I did wrong was include the daily activities in the database. This causes "to-do" lists which print out or scroll down to infinity! ☹️

You're better off, especially in a small to medium (1 to 3 operators) facility, to create a daily plant check sheet (I have examples of those, in Excel format, if anybody is interested, which you can modify and print out for your use). You can add daily, weekly or monthly activities to the check sheet, reserving the big stuff like oil changes, equipment calibration, drive belt replacement and vehicle servicing for the software package. Below is a screenshot of one of my generic 2-week plant check sheet headers. Note the use of "Sheet No.," which makes it easy to file and find these (as opposed to "Date").

If you're skilled in a database program such as MS Access®, you can create your own preventive/corrective maintenance database yourself. This might be preferable to spending thousands on a software package, with only a fraction of the functions being used.

PLANT CHECK												SHEET NO. _____									
XYZ TOWN WASTEWATER TREATMENT PLANT																					
YEAR	PREVIOUS RDG.		PREVIOUS RDG.		HEADWORKS		AERATOR		RAS SYS.		CLARs		UV SYS.		DIGESTER		WASTING		INIT.		
Month(s)	INF. FLOW READING	FLOW mgd	EFF. FLOW READING	FLOW mgd	FINE SCREEN	GRIT Gsl.					1 2		1 2		PUMP		GAL. WAS x10 ³				
dow DAY TIME																					

Control of Nocardia Foaming:

Here's the scenario: You run an activated sludge plant and have an increasing amount of foaming on the aeration basin, likely caused by *Nocardia* bacteria (note that there are several kinds of foaming, with various causative agents involved). [Here](#) are some shots of *Microthrix parvicella*, which are 2nd in frequency of causing foaming. Without control, it becomes a serious problem, spreading to your clarifiers and even interfering with sludge settling and disinfection of the plant effluent at the extreme end.

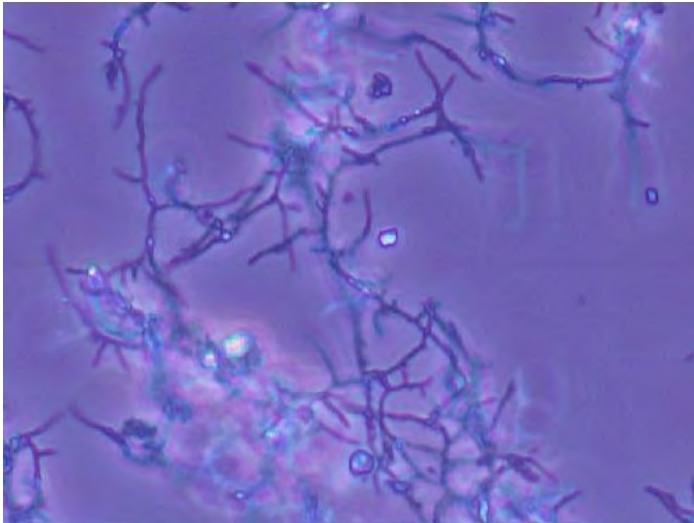
By the way, here's a great article by the New York Department of Environmental Conservation about the "[Practical Control Methods For Activated Sludge Bulking and Foaming](#)". And here's another from a [PNCWA \(copyright CH2MHill\)](#) presentation on the same subject with some horrific photos of the various types of foaming. [You need to read both of these if you have a foaming problem. Even if you don't, there's a huge amount of good info in them.](#)

Control of Nocardia Foaming, cont.:

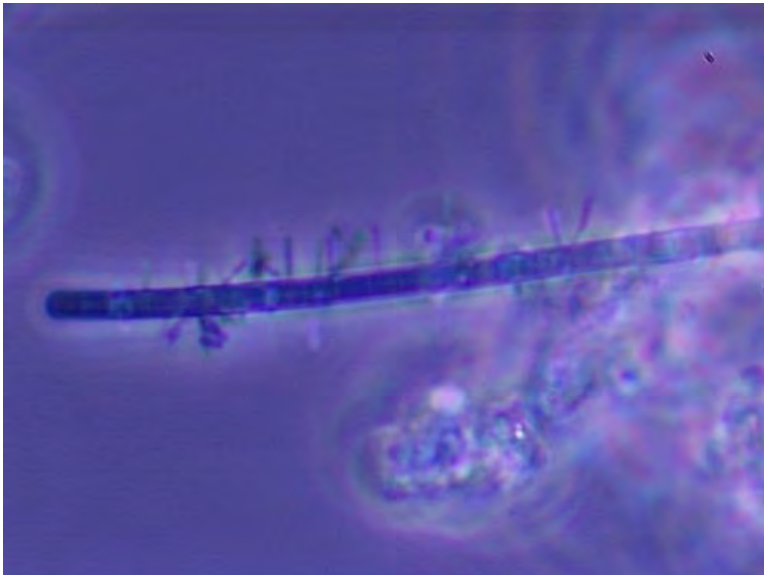
Here is a shot of *Nocardia* filaments. Bacterial photographs provided courtesy of the late Ronald Corner, Former Laboratory Manager, City of Cadillac Wastewater Treatment Plant. I found these on the Michigan Dept. of Environmental Quality web page located [here](#).

I believe the shots below are from a Gram stain or a simple Gentian Violet stained slide. The *Nocardia* remind me of little tumbleweeds. They are generally Gram positive, and have true branching.

I have seen *Nocardia* foaming at several facilities in Washington State. Usually, not many of the



Nocardia structures are seen in the mixed liquor unless the problem is very severe—they like to live in the foam if they can.



However, other filamentous organisms are often present which contribute to settleability problems. One such culprit looks like the photo below. The one shown is identified as Type 0041 by the Michigan DEQ site, having extracellular growth, not true branching. The website above is wrong about the magnification, I think. The *Nocardia* shot is probably at 400X (not 40X) and the Type 0041 at left is probably at 1000X (not 100X).

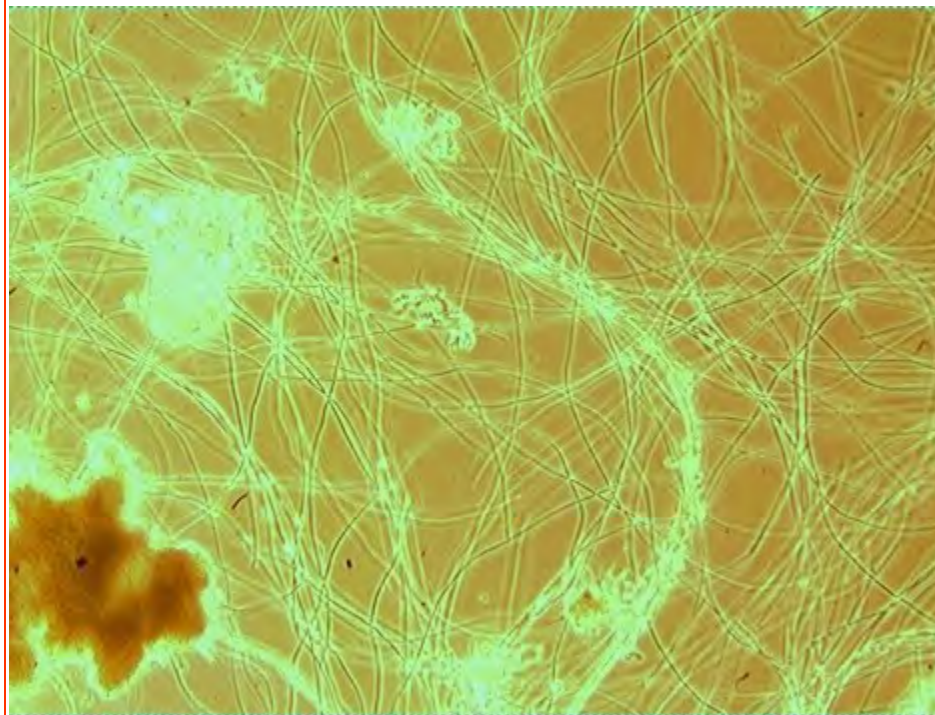
Control of Nocardia Foaming, cont.:

I don't have access to the reagents and super nice microscope to identify the filamentous bacteria shown below, photographed in one facility's mixed liquor at 200X phase contrast, when the settleability was bad, but not terrible. They could be *Microthrix* spp, frequent foam-makers. Like *Nocardia*, they love fats, oils and grease.



See how there's considerable bridging between floc particles, but no sign (that I could see) of the typical *Nocardia* branching.

Contrast that with another town's severe filamentous bloom at 100X phase contrast (left). This is a totally different bug. No extracellular growth—very smooth filaments. Bridging is much worse, and so was the settleability. It was treated with chlorine to a satisfactory end.



7

Control of Nocardia Foaming, cont.:

Corrective measures:

You can use a vacuum truck to suck the heavy foam off the aeration basins and deposit it in drying beds where it can't get back into the activated sludge system. These bugs are relatively slow-growing, so with that effort, you can make good progress to reduce their effect.

Chlorination and water sprays:

If the aeration basin is small, or if you have an oxidation ditch, you can spray the foam with a chlorine solution contained in a backpack sprayer or install a chlorine spray bar across the ditch like we did in the Grand Coulee-Electric City WWTF (photo below). To take care of a settling



problem (which is usually caused by a different filamentous organism in conjunction with the *Nocardia*), you can inject chlorine into (preferably) an RAS (return activated sludge) line with a little chemical feed pump attached to a drum of sodium hypochlorite (12 or 15%). Or you can utilize an existing chlorination system (these are disappearing from the scene as UV disinfection is taking over).

Now you have to be careful not to overdose with the chlorine when your process goal is to nitrify (change ammonia to nitrate). Two bacterial genera are responsible for nitrification: *Nitrosomonas*, which oxidizes ammonia (NH_3) to nitrite (NO_2), and *Nitrobacter*, which oxidizes the nitrite to nitrate (NO_3). To do that, you need aeration (DO) and alkalinity to complete the reactions. This is an over-simplification of how it works, but the point is, *Nitrobacter* are more sensitive to chlorine than *Nitrosomonas* are. [Here's how I remember which genus is which: *Nitrobacter* backs up the *Nitrosomonas* in the nitrification process, get it? A little play on words.]

So if the operator has a way of testing for NO_2 (Hach® has a powder pillow method for this), he'll see a spike in that chemical if he's overdosing the chlorine. From experience, NO_2 is unstable, and wants to be NO_3 , but if too many *Nitrobacter* die in the chlorination of the RAS, the NO_2 will

Control of Nocardia Foaming, cont.:

Corrective measures, cont.:

jump from the usual concentration of less than 0.1 mg/L in the effluent up to 0.5 mg/L or more (sometimes much more). This is not good, because NO₂ on an aquatic toxic level, is nearly as harmful as NH₃ (ammonia). See this short and sweet little article by the Canadian Council of Ministries of the Environment [here](#) regarding nitrate and nitrite toxicity.

To add insult to injury, both the *Nitrosomonas* and *Nitrobacter* are slow-growing, often taking 2 or 3 SRTs (sludge retention times in the aeration basin, in days) to repopulate your mixed liquor.

But fortunately, filamentous bacteria, as stated above, are sticking out of the floc particles, have more surface area exposed to the chlorine, and will start to break into shorter “sticks”. Depending on the chlorine dosage, you can see this happening under your microscope, and it may manifest itself as turbid effluent. On the positive side, you should see your settleability start to improve in a day or two under chlorination. With some of the filamentous bridges broken, the floc particles can compact together better.

One general rule of thumb about chlorine dosage for control of filamentous bacteria: 2 to 6 lb. of chlorine per 1000 lb. of MLVSS (mixed liquor volatile suspended solids) in the active system, per day. Start on the low side, and slowly increase the dosage if you don't see settleability improvement in a few days. You don't want to tickle the filaments, you want to kill them. 😊 ...But not all of them.

If the foaming is so bad that your clarifiers have too much to skim off, one can add a sprinkler or utilize a water spray system to break up the foam on them, exposing them to the RAS chlorine.

From the New York Dept. of Environmental Quality article linked on page 5, they state that 50% of facilities studied used chlorine to control Nocardia foaming.

Process control:

You may notice that the foaming seems to be seasonal. Facilities tend to have longer SRTs in winter, but when wasting increases in the springtime, the foaming tends to decrease due to shorter SRTs and higher F/M ratios, which tend to favor the floc forming bacteria more. Sometimes the foam looks like Nocardia foaming, but is really old sludge. A micro exam of the foam is instrumental for the identification of the causative agent(s).

The key is to not “blast waste” too much of your good settling sludge out, nor decrease the sludge age (SRT) too low, such that the majority of the biomass is “young”. Young sludge in the logarithmic phase of growth, will increase the sludge production rate. Keep track of your F/M ratios and SRTs. Process control is key, my friends.

Preventive measures:

Maintain the collection system. That means having a regular program to jet your pipes so your influent screen can remove the debris, including solidified FOG (fats, oils, grease).

Work with the public to get the word out not to dump FOG (fats, oils, grease) down their drains. Why? Because *Nocardia* (and *Microthrix* and others) eat oleic acids found where, class? Yes, in FOG.

Control of Nocardia Foaming, cont.:

Preventive measures, cont.:

By the way, the [City of Leavenworth](#) WWTP was overwhelmed by the large amount of FOG in their plant influent. I counted over 40 restaurants and other eateries in Leavenworth on one web site—there may be more. They have developed a great FOG program, complete with ordinances, utility bill flyers, laminated posters for the restaurants, surveys and a part time FOG inspector (hi, Kyle!) to keep the FOG down to a manageable amount. The mayor, council, PW Director Dave Schettler, plant Chief Operator Antonio Muro, and operators Darrell Gray and Kyle Breaux are to be congratulated for implementation of their FOG program. It wasn't easy to do. All with an eye to discharging very fine effluent into the nearly pristine Wenatchee River.

Steady as she goes when it comes to process changes. Be patient, add one variable to the mix at a time, and observe the results. That plant will be there tomorrow. Only do radical changes when the situation is dire, and only as a last resort. When in doubt, ask your friends. Your friends can be neighboring operators, and consultants, including those in regulatory agencies. They've seen this before, and can tell you what's worked for them and others to control the various kinds of foaming.

Training opportunities:

Yakima Valley Section of PNCWA 2012 Meeting Schedule

Unless otherwise noted, all training to begin at **8:30 AM** with a brief Section business meeting. Course will be held from 9:00 AM to noon.

Date	Training Details	CEU's	Lunch Sponsor	Place
February 29	Subject: Asset Management Presenter: Steve Bash of HDR	0.3 CEU's for class. 0.1 CEU's for optional tour.	CH2M Hill	Grandview WWTP 850 Bridgeview Road Grandview, WA
*April 11	Subject: Pretreatment Program / DOE Update Presenter: Arlene Carter, COY / Donna Smith, DOE	0.3 CEU's for class. 0.1 CEU's for optional tour.	TBA	Kennewick WWTP 416 N Kingwood Kennewick, WA
*June 13	Subject: Laboratory Requirements / WET Testing Presenter: Darrel Fleischman / TBD	0.3 CEU's for class. 0.1 CEU's for optional tour.	TBA	Ellensburg WWTP 2415 Canyon Road Ellensburg WA 98926
*August 8	Subject: Struvite Farming Presenter: Tom Coleman – Coleman Engineering Dan Barbeau – Pharmer Engineering	0.3 CEU's for class. 0.1 CEU's for optional tour.	Gray & Osborne	Yakima WWTP 2220 East Viola Yakima, WA 98901
*November 7	TBA Subject: Collections Systems Related Presenter: TBA	0.3 CEU's for class. 0.1 CEU's for optional tour.	TBA	Pasco WWTP 1015 S Grey Avenue Pasco, WA 99301

*Training date and information is tentative

All training is subject to change. As updates are made, revised schedules will be e-mailed to membership list. CEU's will be given to Section members who have paid annual dues for the year in the amount of \$10.00. Dues can be submitted at each event or sent to Section Treasurer, Steve Hatke at: City of Richland, Wastewater Treatment Facility, P. O. Box 190, MS-27, Richland, WA 99352, Attn: Steve Hatke.

Section Board members: Dean Smith, President – dsmith@ci.yakima.wa.us
Eric, Neumeyer, President Elect – eneumeyer@ci.yakima.wa.us

Rob Stewart, Vice President – rstewart@ci.yakima.wa.us
Steve Hatke, Treasurer – shatke@ci.richland.wa.us
Tom Helgeson, Director (Past President) – Tom.Helgeson@CH2M.com
Mary Ann St Martin, Director (newsletter and mailings) – mstmartin@ci.richland.wa.us

Thanks for the notice, Mary Ann. We appreciate it!

Note that the 34th WOW Conference is in Spokane this year, March 26-29. I'm going (as a student, this time). 😊 Link to info and registration: <http://www.wetrc.org/wow/>

FaceBook Group:

The Friends of New Wastewater Operators Newsletters group is located here:

<http://www.facebook.com/groups/fonwon/>

WWTPO Certification Study Session Scheduled in Grandview-update:

We had 6 attendees for our Saturday, January 7th Certification Review (OIT, 1, 2), including me. It was 3 hours of a questions and answers presentation, plus a plant tour of Grandview's WWTP. Dave Lorenz (Plant Manager) even showed up for a few minutes.

Here's a group photo to prove they were there (L to R): Rey Rodriguez (Grandview), Brad Farmer and Roy Gideon (Quincy Municipal/Industrial), Raul Jasso (Richland) and Patrick Gaeb (Quincy



Muni/Indust.). Thanks for putting up with me, guys, on a Saturday no less! I think we made progress. 0.4 CEU applied for. **Saaaalute!**

Notes for Wastewater Nerds:

Under the live and learn tab: If your facility is inspected by an EPA agent (I'm talking to operators of facilities on federal property), they can cite you for not having a written process control plan. T'was news to me...

Strange science stuff: What's the Red in the Water:

<http://pubs.usgs.gov/gip/microbes/>

Microbes that produce electricity and do other strange things (like breathe rust):

<http://www.geobacter.org/>

They're serious as a crutch category:

EPA counts basement backups as SSO's (Sanitary Sewer Overflows) (from an actual warning letter—check your discharge permits):

- a. An overflow that results in a discharge to waters of the United States; and
- b. An overflow of wastewater, including a wastewater backup into a building (other than a backup caused solely by a blockage or other malfunction in a privately owned sewer or building lateral), even if that overflow does not reach waters of the United States.

**DON'T
HIT KIDS.**
No. Seriously.
They have guns
now.

I did not
hit you
...
I simply high-
fived your
face



Thanks for the funnies, Jackie!

Happy Presidents Day!

Keep up the good work! See you next time.

All the best to you and yours,

Mongoose Man

Spring's not far off now...(next page)



We'll be friends
until we are old and senile.
Then, we'll be
NEW friends.



Parting Shots:

Overview from the million dollar cut, Feb. 1, 2012, digital (Steamboat Rock in the far background)



Below: Grand Coulee Western Wall and Island Trees on Banks Lake, Feb. 1, 2012, digital

