The PIPELINE

May - June 2001

NEWS & VIEWS FROM THE WV Division of Environmental Protection, Dept. of Health and Human Resources and WV Public Service Commission

Another Grants Program?

By: Mike Johnson, P. E. - WV Department of Environmental Protection

Now that I have your attention, let's discuss the possibility of future federal grants but only for addressing combined sewer overflows (CSO's) and sanitary sewer overflows (SSO's). The Consolidated Appropriations Act for FY 2001 enacted December 21, 2000 contained provisions, which amended the Clean Water Act (CWA) creating a new federal grants program for addressing overflows from sewer systems. The actual title of this legislation is the Wet Weather Water Quality Act of 2000 (Public Law 106-554). Section 221 authorizes up to $750 million nationally for FY 2002 and $750 million for FY 2003. Congress is currently working on the budget for FY 2002 set to begin October 1, 2001. Unfortunately, the Bush Administration has chosen to fund this new grants program by taking money from the annual Clean Water State Revolving Fund (CW SRF) allotment. If enacted this would mean a 40% reduction in our annual allotment of CW SRF funds (in West Virginia this would mean a reduction from about $20 million to $12 million). Our position on this matter is that any new program needs new sources of money. Diverting funds from one badly needed program to a new program is nothing more than a numbers game. Let's not rob Peter to pay Paul. This ongoing budget battle is beginning to heat up and will be resolved sometime this summer (I hope).

I will tell you everything I know so far about this new grants program. It will provide funding for the planning, design and construction of treatment works to intercept, transport, control or treat CSO's and SSO's. These grants will be CWA Title II federal grants (anyone remember the former EPA construction grants program?). Some of those Title II requirements will again apply. In FY 2002 the program is supposed to be a direct grant program from the EPA to municipalities. In FY 2003 it would be a mixture of direct grants to municipalities and an indirect grant program in which EPA would award grants to States. Statutory language says that priority funding should be given to financially distressed communities and that the federal cost share for projects should not be less than 55%. Priority shall also be given to communities that have implemented or are complying with an implementation schedule for the 9 minimum controls specified in the national CSO control policy and have begun implementing a long term control plan. The definition of a "financially distressed" community will be left up to each state using its own affordability criteria. The allocation in FY2003 will be based upon the most recent Clean Water Needs Survey (underway right now updating the last survey performed 4 years ago). Not later than December 31, 2003, the EPA shall transmit to Congress a report containing recommended funding levels for future grants under this program to ensure expeditious implementation of CSO and SSO controls nationwide. Finally, the EPA and states may retain up to 4% of any grant made to a community under this program for the reasonable and necessary costs of administering the grant.

One of the intents of this Act is that the award of these project grants should be coordinated with the CW SRF program. CW SRF funds can be used as a match with the grant. This is specifically allowed under the Act. Historically, CW SRF loans have not been allowed to match grants administered by the EPA. EPA has established a work group and sub work groups to discuss issues such as a national priority rating system, defining financially distressed communities and the allotment formula. I will be participating

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Another Grants Program?

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in those discussions. In the meantime we have indicated to EPA that West Virginia's enabling SRF legislation and existing regulations are sufficient to administer this new grants program. A requirement of our regulations mandates that a grant recipient also be a recipient of a CW SRF loan. Using this methodology the project would then be administered as an SRF project. Using our existing regulatory language means DEP will not have to undertake any more rule making. Of course, federal regulations whenever they are published will also apply to every grant awarded under this program.

So there you have it; that's all I know at the present time which isn't much! Remember this grants program is for communities with existing sewer system "overflows". The current CSO list maintained by this Office includes 56 communities. You know who you are! We do not have an official list of communities with only SSO's, although unofficially we know of several if not many all around the State. As in any federal program it will probably get more complicated as we learn more in the coming months. My office will try to keep you updated in future newsletters on the progress of establishing this program.

Ultraviolet Light Disinfection Technology

By: Ingrid Ferrell - PSC Engineering Division

Recently, my father sent me an article from his hometown newspaper, the Butler Eagle, in Pennsylvania titled "UV Lights Zap Bacteria". This article really struck me. Of course, we are all familiar with wastewater effluent being treated by UV light instead of by chlorination and de-chlorination. But this article was about using UV light to disinfect drinking water! Chlorination has been the standard method of treating drinking water since the turn of the century in North America. However, the reactions between chlorine and complex organic chemicals are suspected to produce carcinogens. Therefore, alternative methods of disinfection are being pursued. The Butler Eagle article stated that West View Water Authority has installed Pennsylvania's first ultraviolet disinfection system for water treatment.

My search on the internet led me to a site called New Advances in Ultraviolet Light Disinfection Technology. This site gave many interesting and some very technical information. Ultraviolet radiation is actually high energy light composed of photons vibrating to produce a narrow band of wavelengths. Studies show that the DNA and RNA molecules in the nucleus of micro-organisms absorb this radiation. The organism may not be killed instantly, but it is rendered non-viable. The disruption of the bonds results in a scrambling of the genetic messages and prevents reproduction. This is termed induced lethality and the amount of ultraviolet energy required to produce this effect is normally referred to as lethal dosage.

The two best known parasites in the water industry are probably cryptosporidium and giardia due, mainly, to newspaper headlines. These are made harmless by ultraviolet disinfection. There is a whole list of bacteria and viruses that are destroyed or made harmless by use of ultraviolet disinfection.

One of the most common negative comments expressed about the use of ultraviolet light as a disinfection agent for potable water is that it does not provide a residual. Separate studies carried out by the University of Michigan and the United States Navy tend to negate these arguments. Both studies found that water that has been irradiated by ultraviolet rays appears to be bacteriostatic. Cultures placed in the water remained dormant. As of yet, the agent involved in this phenomenon has not been isolated. West View Water Authority is still using chlorine in its system but the plant manager has said that the ultraviolet system has allowed them to decrease chlorine content by 33 percent. The system has been in operation for approximately a month now and he expects that the need for chlorine will be reduced even more. It would be great if the above studies lead to a finding that chlorine could be eliminated completely.

I am not aware of any water systems in West Virginia using this technology at this time. If you are out there, let me know so we can find out how it's working for your system and then let our readers know.

THINGS TO HELP BALANCE THE BUDGET WITHOUT RAISING RATES

By: Jim Boggess-PSC Water and Wastewater Division

1. Collect overdue accounts: Are you one of those utilities who would rather apply for a rate adjustment than collect overdue accounts? I have dealt with many utilities who would do just that. Collection and termination policies must be strictly enforced and uniformly applied. Customers who pay promptly should not be subsidizing the ones who don't.

2. Get serious about leak detection: You know who you are. The PSC allows for 15% unaccounted-for-water. Any percentage above fifteen and the utility is required to take action to bring the percentage back down. It's simple math...and should be calculated every time you bill. The formula is:

$$\frac{\text{Gallons produced or purchased - Gallons sold}}{\text{Gallons produced or purchased}}$$

3. Update your fees: Review your tariff. Do you have a returned check charge on your tariff? You may charge a customer for a bad check whatever the bank charges you, up to $15.00 provided you file to have it placed in your tariff.. What about tap fees? A larger contribution from a new customer's service connection offsets the cost to all the customers. A $100 to $200 tap may be too low if it has been in effect for 10 years and you may need to file for a higher fee. What about your reconnection fee when service is terminated? If it is less than $20, it is out of step with what is being approved. Also, review your leak adjustment rate. You could be giving too much of an adjustment. If you are uncertain as to how to calculate the rate, contact the Assistance Section of the Water and Wastewater Division. The formula for a utility that produces its own water is:

$$\frac{\text{Power purchased for pumping + Chemicals for treatment + Sludge removal costs}}{\text{Gallons of waterproduced}}$$

4. Get tough on cheaters: Survey your system and determine if there are multiple connections. Two separate premises being served through one meter is costing your utility revenues. Typically, two minimum charges for 3,000 gallons amount to more than a single billing for 6,000 gallons.

5. Meter testing: This is a big one. Meters slow down, they don't speed up. I know of one sizeable water public service district that had meters in the ground for 21 years and only replaced a meter when it went dead. Meters must be tested a minimum of once every seven years. Much revenue is lost this way.

6. Add new customers: Are you serving all the people you could reasonably serve?

7. Put your money to work: Non profit utilities can and should be earning interest on their accounts, even the cash operating account. Are you getting the highest interest rate possible? Interest rates are negotiable. When you collect revenues, do you deposit them right away into an interest bearing account? You should.

8. Fire Departments: Volunteer fire departments are notorious for causing high unaccounted for water. If your community fire department is being paid for hauling water to residents in dry periods, then you should insure that you have a policy that allows you to be notified of these withdrawals and provides for payment to you for the water. Fire departments can charge a fee for this service, but the water must be paid for by the person receiving it.

9. Get rid of gas guzzlers: Gas prices are soaring. Review gasoline usage of all your vehicles. Also, review your vehicle insurance for ways to save money. Shop around.

Adapting -- "Reasonable people adapt themselves to the world. Unreasonable people attempt to adapt the world to themselves.

All progress, therefore, depends on unreasonable people." -- George Bernard Shaw, Irish Playwright

EMERGING BACTERIOLOGICAL CONSIDERATIONS

By: Victor R. Wilford, P.E., Director
Environmental Engineering Division, OEHS Bureau for Public Health

When considering disinfection of public water supplies, one often thinks only of the coliform bacteria for which the microbiological test uses as an indicator organism for assuring water quality. These coliform organisms have been considered as microbiological contaminants for the past eighty years. It is well documented that chlorination practices initiated in the 1920s essentially eliminated many of the microbiological concerns in drinking water. Today, however, science is currently reviewing a number of emerging microbiological issues for consideration in drinking water. The United State Environmental Protection Agency (EPA), under the *Safe Drinking Water Act*, along with the National Academy of Sciences, is reviewing information for revision of the Total Coliform Rule (TCR). A number of microbiological bacteria are being considered as TCR revisions proceed. This paper provides information and background on a number of these bacteria.

Acinetobacter

Acinetobacters have often been associated with outbreaks in hospital settings but have not been documented in treated public drinking water supplies. Research is still underway to determine if they are a concern in drinking water.

Aeromonas

Recently, aeromonas have been recognized as a cause of waterborne/floodborne outbreaks of disease; however, no outbreaks of Aeromonas gastroenteritis have been documented in association with treated public drinking water supplies. Counts of Aeromonas in contaminated well water associated with cases of gastroenteritis range between 0.7 cfu/mL and 460 cfu/mL. The potential for outbreaks is likely to occur in susceptible individuals, e.g., infants, children on ampicillin, persons with underlying disease, or the immuno suppressed. Because significant contamination is unlikely in a municipal water system, the probability of large, identifiable outbreaks is remote. Recognition of increased numbers of sporadic cases in a community is equally unlikely, because sporadic cases are below the detection threshold of current epidemiological surveillance systems. Aeromonas gastroenteritis is not a reportable disease in most states and clinical laboratories rarely include a search of aeromonas in routine stool culture procedures, unless requested by the physician. Colonization in treatment plants and distribution systems has been documented and ancedontal information suggests that susceptible persons may be at risk of developing Aeromonas gastroenteritis as a result of continuous exposure to a low level of aeromonas in treated drinking water.

Campylobacter

A large number of waterborne outbreaks of campylobacter have been reported in the literature, often affecting hundreds or even thousands of persons. Despite the large outbreaks, the organism causing the outbreaks has seldom been isolated from the drinking water supply. The lack of isolation may be due to a sporadic occurrence, poor detection techniques, or the presence of viable but non-cultural organisms. Sources of these waterborne outbreaks have included surface water, unchlorinated water, storage tanks contaminated with bird feces, groundwater contaminated by surface run-off, and mains contaminated by cross-connections. While drinking water may be a major risk factor, there is no evidence that campylobactors can colonize or even survive in water distribution systems, thus, consumption of properly treated drinking water is unlikely to result in infections.

Cyanobacteria

There have been numerous reports of poisoning of livestock, pets and wildlife by waters laden with cyanobacteria. Outbreaks of human gastroenteritis from ingestion of toxic cyanobacteria in public water supplies occurred in Charleston, West Virginia and the area served by the Anacosta reservoir near Washington, D. C., during the drought years of 1930-31. More recently (1981) an outbreak of human poisoning occurred in northeastern Pennsylvania where twelve children and one adult were affected by the Anabaena sp. bloom. In another case study (1990), a localized outbreak of diarrhea occurred among the residents of a Chicago apartment building. This incident was traced to cyanobacteria toxins in an open water supply storage tank. Apparently, the cover of the tank had been left ajar so that light and air-borne cyanobacteria in dust particles gained access, grew and, in time, released toxic by-products throughout the plumbing system of the building.

E. Coli.

Waterborne transmission is an important factor

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of epidemiology of all dirrheogenic E. coli. infections, while most common in children, can also occur in adults. A major outbreak occurred in 1971 affecting more than a hundred individuals attending a conference near Washington, D. C. The pathogen was isolated from drinking water and fecal specimens. An unchlorinated groundwater supply contaminated by sewage was determined to be the source of the outbreak. A similar waterborne outbreak of had previously been reported in Sweden in 1965 and the largest U. S. waterborne pathogenic E. coli outbreak occurred in 1975 at Crater Lake National Park in Oregon. More than 2000 individuals experienced gastrointestinal disease. The causeive organism was a strain that produced both heat-liable and heat-stable toxins. This serotype was found in both water and fecal coliform samples. A shallow spring supplying the park's drinking water supply was found to be contaminated with sewage. Although chlorination was used, areas of the distribution system were found to contain no detectable chlorine residual. Two outbreaks reported in Japan were also linked to a contaminated drinking water supply. An outbreak in Cabool, Missouri was epidemiologically linked to unchlorinated drinking water supply and the source of contamination was attributed to contamination through line breaks within the distribution system.

Legionella

The largest outbreak of Legionnaire's disease occurred among persons attending an American Legion convention in Philadelphia, Pennsylvania in July 1976 where over 200 cases and 34 deaths were reported. Since this outbreak, the majority of Legionella cases have been linked to contaminated hospital water distribution systems. The reservoirs that have been associated with community-acquired legionellosis have been cooling towers or evaporative condensers, and more recently, whirlpool spas. Most community-acquired cases occur in the summer months, whereas, nosocomial legionellosis occurs year-round. Although Legionella bacteria have been implemented in a number of outbreaks, the recovery Legionella from environmental sources does not constitute proof the source of the infecting agent. Four criteria must be meet to confirm the source of Legionella outbreak: (1) association between exposure to a potential source, (2) identification of the mechanism of aerosol production, (3) occurrence of disease established, and (4) isolation of similar Legionella subtypes from the patient and the suspected environmental site.

Mycobacterium Avium Comlex

M. Avium strains have been detected in reservoirs, ice machines, hot and cold water faucets, toilets, sinks and other water sources in patient-care sites. The strains were seriologically similar to clinical isolates. M. Avium strains from infected AIDS patients have been shown to be genetically related to isolates recovered from water to which the patients were exposed through drinking or bathing. An epidemiological study of 290 homes of HIV patients found MAC in 0.76% of the water samples, 1 of 397 food samples but in 55% of 157 soil samples taken from potted plants. Other environmental mycobacteria may be of health concern. M. xenopi was detected in drinking water faucets and showers from 5 of 11 apartments of patients infected with the organism.

Salmonella

The vast majority of waterborne outbreaks of salmonellosis were classified as acute gastrointestinal illness of unknown etiology. Waterborne outbreaks in the United States usually involve poor quality source water, inadequate treatment, or contamination of the distribution system (e.g., cross connections). Large outbreaks of waterborne salmonellosis have not been reported in the United States with the exception of the 1965 Riverside, California outbreak which affected some 18,000 people. The water supply was implicated, but the source of contamination was never determined. During the period of 1976 -1980, 223 cases of waterborne salmonellosis were reported from small water supplies and private wells. In 1993 a waterborne outbreak in Gideon, Missouri affected more than 650 people and resulted in 7 deaths. Contamination was traced to a water storage tower with defective roof vent covers that allowed access by birds.

Shigella

Water outbreaks of shigellosis most commonly result from fecal contamination of non-chlorinated private and non-community public water supplies. Treatment deficiencies, septic tanks, contamination of wells, or cross connections between wastewater and potable water lines are the most commonly implicated causes of drinking water

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EMERGING BACTERIOLOGICAL CONSIDERATIONS

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outbreaks. The availability of running water in the home is key to reducing the spread of cases through poor personal hygiene habits. Outbreaks were also associated with recreational exposures to fecal-contaminated swimming and wading pools and polluted surface waters, such as lakes and ponds. Over a 10-year period, Shigellae caused 17 of 21 (81%) of drinking water outbreaks. Drinking water outbreaks occur year-round while recreational outbreaks typically occur in the summer months.

Yersinia

Yersinia are recognized mainly as a food-borne pathogen but may often be found in drinking water. The low occurrence of yersinia in treated drinking water (chlorinated) has meant that the disease associated with the consumption of fully treated drinking water has not been reported; but apparent outbreaks of yersinia-related disease have occasionally been associated with the consumption of untreated water, the largest of which occurred in Montana in 1977. In this outbreak no clinical evidence of yersinia infection was demonstrated and no yersinas were isolated from patient stools. The tentative diagnosis of yersinia infection was based solely on finding of various strains of yersinas in the drinking water supplies that had been consumed by those affected.

The Future Holds . . .

In the future, it is likely that we will see more stringent disinfection requirements for public drinking water supplies to assure that bacterium such as these are adequately inactivated. It is also likely that future microbiological testing will be developed to specifically look for various bacteria rather than the coliform organism which has been the standard indicator for the past 80 years.

Change: If we don't change the direction we're going, we're likely to end up where we are headed.

LEGISLATIVE CHANGE FOR MUNICIPAL SANITARY BOARDS

By: Conrad Bramlee - PSC Water and Wastewater Division

In the last regular legislative session a change was made to **West Virginia Code §16-13-3,** Powers of Sanitary Boards. House Bill 2271 (effective June 10, 2001) increased the maximum amount of money a sanitary board can spend without receiving competitive bids from $5,000 to $10,000. That specific portion of the section pertaining to this now reads, "no contract or agreement with any contractor or contractors for labor and/or material, exceeding in amount the sum of ten thousand dollars, shall be made without advertising for bids, which bids shall be publicly opened and award made to the best bidder, with power in the board to reject any or all bids".

The Pipeline
Published Bi-Monthly by
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Units of Measurements Used in Construction

By: Chris Farrish - PSC Engineering

It's very important that accurate measurements be made during the construction of a water or wastewater project. For example, if an error is made during the construction of a sewer system, the slope of the lines may be too gentle or too steep. Unfortunately, it is easy to make mistakes when accurate measurements are not made. In preparing this article, I thought it would be helpful to provide charts which may be used as a tool when reading and converting measurements in the field.

Some construction trades and professions use different measuring units. For example, architects use feet and inches to the nearest sixteenth of an inch. Civil engineers may use feet and decimal parts of a foot to the nearest hundredth of a foot. Table A-1 lists conversions of fractions of an inch to decimals of an inch or foot.

Table A-1

Fraction of an inch	Decimal of an inch	Decimal of a foot	Fraction of an inch	Decimal of an inch	Decimal of a foot	Fraction of an inch	Decimal of an inch	Decimal of a foot
1/16	.0625	.0052	**3/8**	.3750	.0313	**11/16**	.6875	.0573
1/8	.1250	.0104	**7/16**	.4375	.0365	**3/4**	.7500	.0625
3/16	.1875	.0156	**1/2**	.5000	.0417	**13/16**	.8125	.0677
1/4	.2500	.0208	**9/16**	.5625	.0469	**7/8**	.8725	.0729
5/16	.3125	.0260	**5/8**	.6250	.0521	**15/16**	.9375	.0781

Slopes are also described differently. For example, carpenters and plumbers use inches and fractions of an inch of rise per foot of horizontal run. For example, a roof might have a slope of 3 inches per foot (called 3 in 12). Sewer contractors and civil engineers use decimal parts of a foot or percent to indicate slope (such as slope = 0.002, or 0.2 percent). Table A-2 shows conversions of slopes to percent slopes.

Table A-2

Inch Rise Per Foot	Slope	Percent Slope	Inch Rise Per Foot	Slope	Percent Slope
1/16	.0052	0.52	**9/16**	.0469	4.69
1/8	.0104	1.04	**5/8**	.0521	5.21
3/16	.0156	1.56	**11/16**	.0573	5.73
1/4	.0208	2.08	**3/4**	.0625	6.25
5/16	.0260	2.60	**13/16**	.0677	6.77
3/8	.0313	3.13	**7/8**	.0729	7.29
7/16	.0365	3.65	**15/16**	.0781	7.81
1/2	.0417	4.17	**1**	.0833	8.33

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