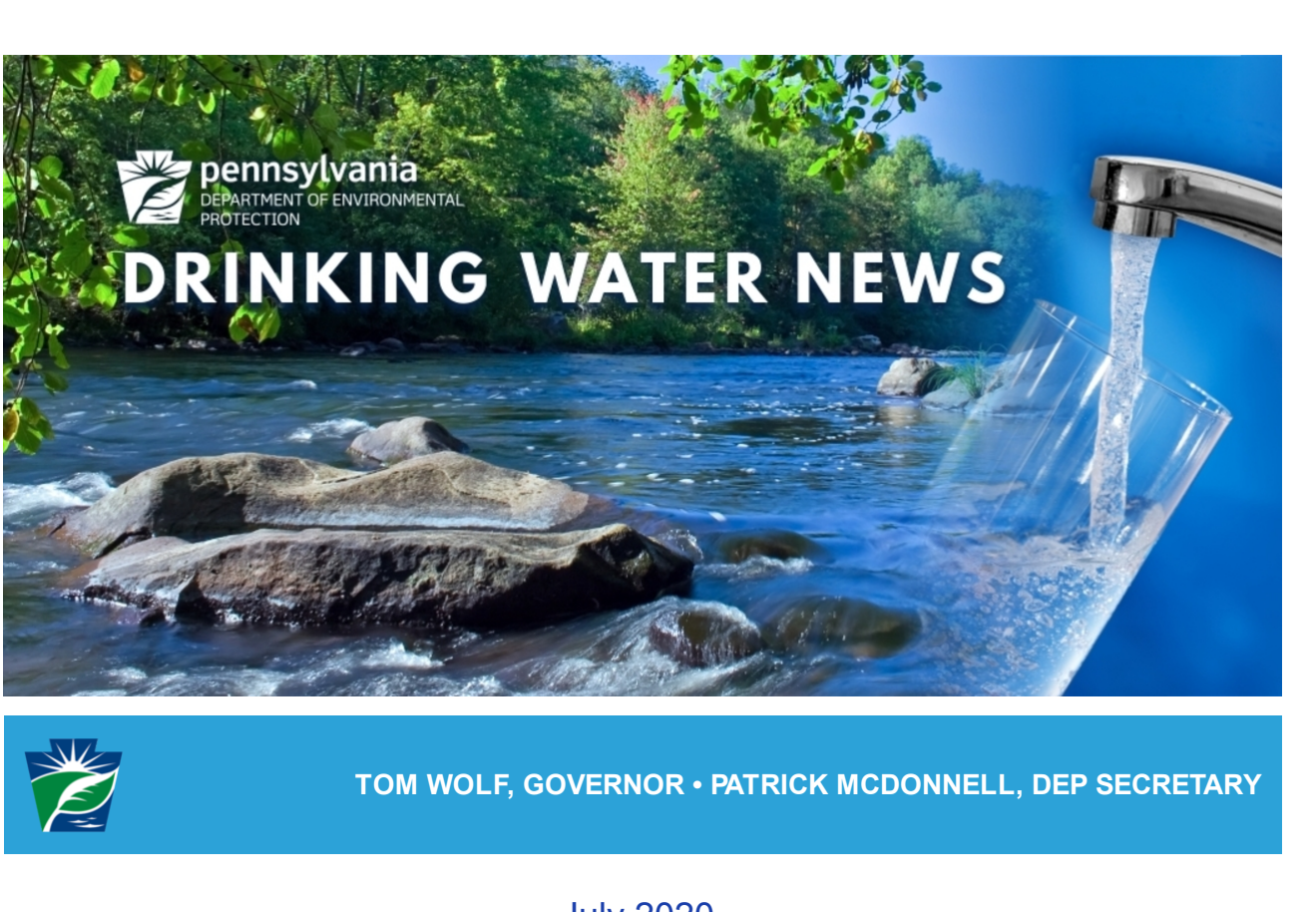


TOM WOLF, GOVERNOR • PATRICK MCDONNELL, DEP SECRETARY

July 2020

The Pennsylvania Department of Environmental Protection (DEP) Bureau of Safe Drinking Water is proud to provide updates, information, explanations, and reminders to you with this edition of the Drinking Water News. In this issue:

Your feedback and suggestions are welcome and can be submitted to dagrube@pa.gov.

Report Data Correctly to Reduce Violations

PADWIS Section, Central Office

Why is correct data reporting important?

- If you are a responsible official of a public water system, it is your responsibility.
- We (DEP) use an automated compliance evaluation process to evaluate data you submit or data your Certified Drinking Water Laboratory submits on your behalf to determine compliance with drinking water rules and changes in monitoring frequencies. Reporting data incorrectly is a violation of drinking water rules.
- We host public water system data, including system inventories, monitoring schedules, sample results, violations and enforcements on our public Drinking Water Information System (DWRS) at www.drinkingwater.state.pa.us. The public can view data a few days after the reporting deadline.
- EPA hosts public water system data on the Federal Safe Drinking Water Information System (SDWIS) and EPA's Enforcement and Compliance History Online (ECHO) web sites. We provide state data to EPA on a quarterly basis.

How are data received and processed?

We receive data through our electronic reporting system (DWELR) which is accessed through DEP's Greenport Portal. We receive a lot of data: around 200,000 records per month. Data are submitted directly to DWELR by public water systems and by Certified Drinking Water labs on behalf of public water systems. Data are due by midnight of the 10th of the month following sample collection. We move all data submitted to DWELR by midnight on the 10th to our PA Drinking Water Information System (PADWIS), at 12:01 am on the 11th, where we apply additional validation checks. Only valid data move to the sample result file to be evaluated for compliance. Invalid data resides in a REJECT file and is not evaluated for compliance.

What tools and advice will help with reporting data correctly?

Keep in mind that you may make corrections to your data in the DWELR application until midnight on the 10th of the reporting month. We recommend submitting data early in the reporting period, then taking the time to review your data before the end of the reporting period.

Here are four steps you should take every reporting period:

Collecting Samples:

1. Complete Chain of Custody Correctly. The Chain of Custody (CoC) is a legal document that you complete and submit to the lab with your drinking water samples. For correct reporting, make sure the following information is included on the CoC and is correct:

a. **PWSID**

b. **Sample Location (include correct 3-digit sample location AND description of location)**

c. **Sample Type (E-Entry Point, D-Distribution, C-Check, S-Special, P-Plant, R-Raw)**

d. **Sample Date**

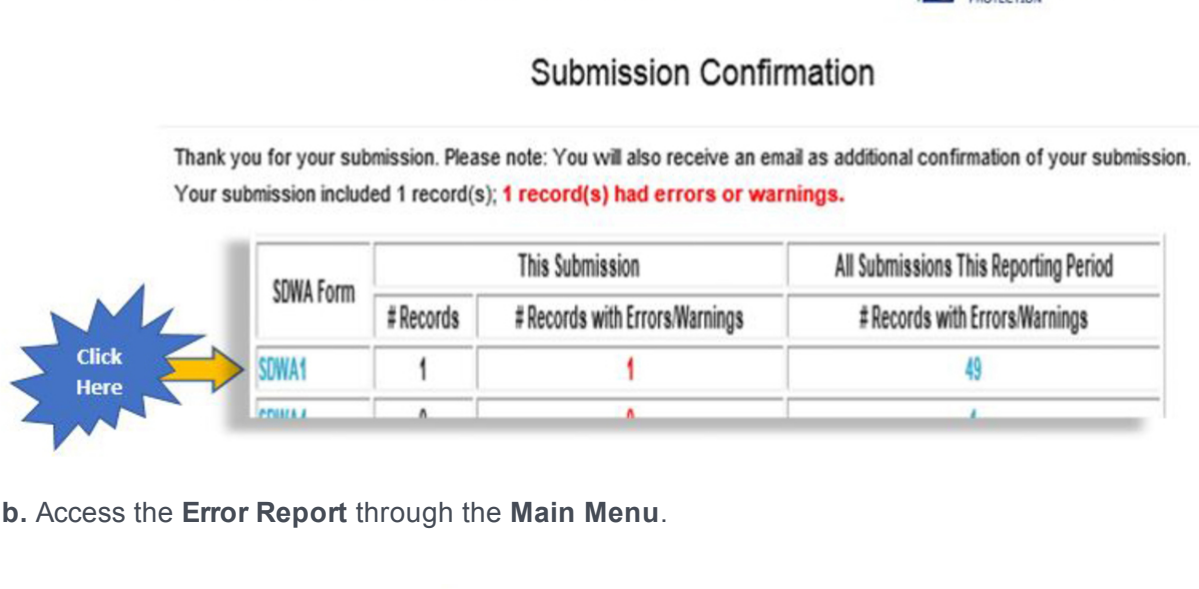
e. **Sample Time**

f. **Sample Collector Name**

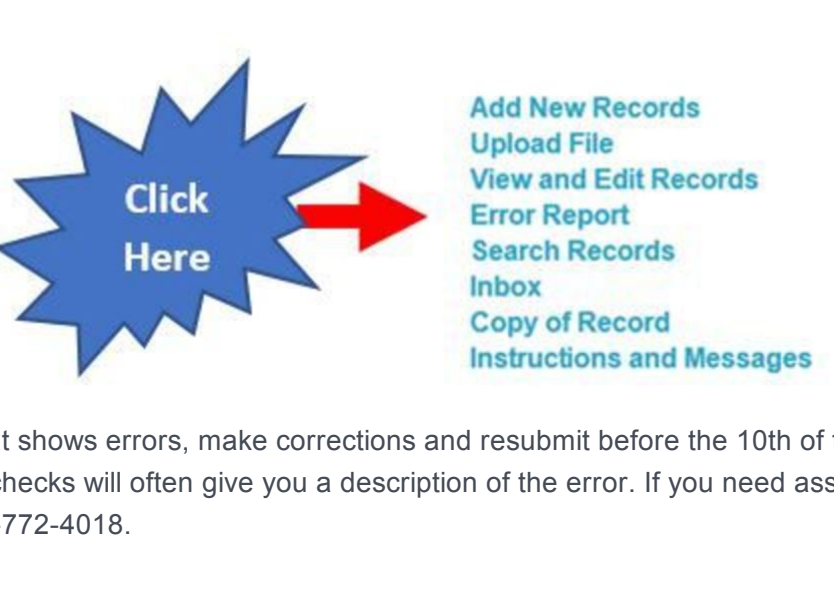
Reporting Via DWELR:

2. Check Error Report after Pressing Submit. We have two ways to do this:

a. Review your Submission Confirmation page as below.

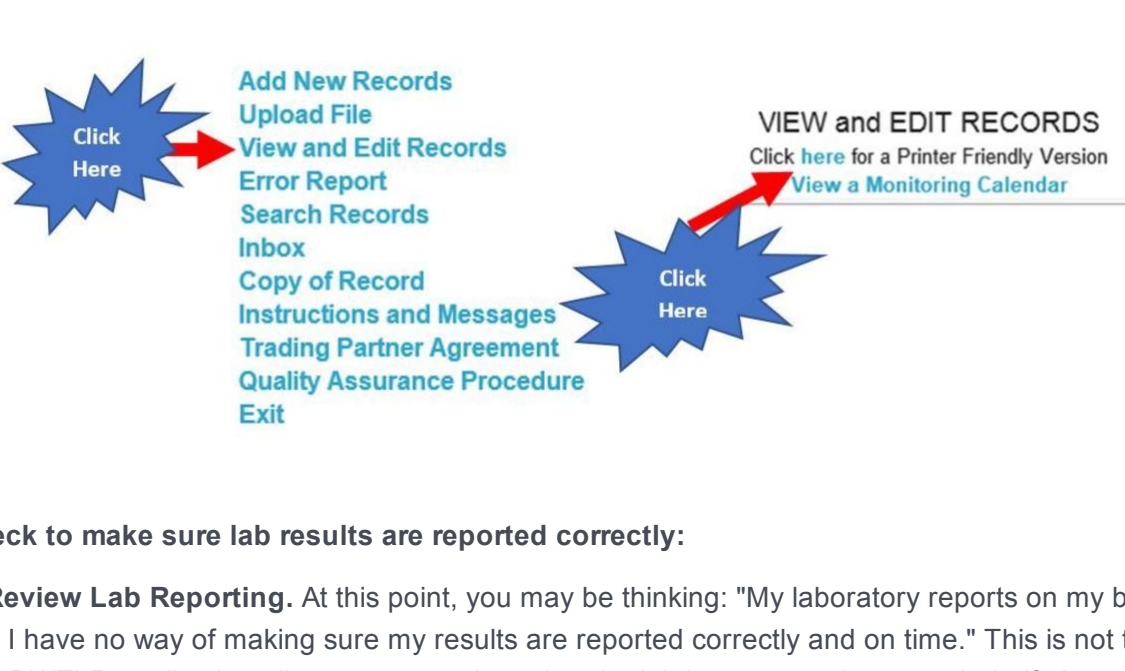


b. Access the **Error Report** through the **Main Menu**.



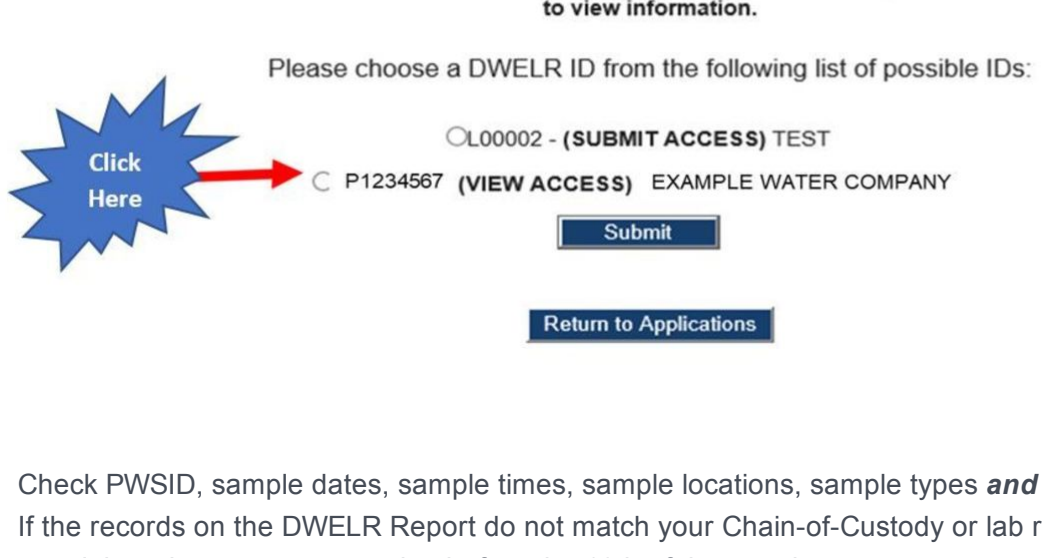
Click on the form that shows errors, make corrections and resubmit before the 10th of the month. Our data validation checks will often give you a description of the error. If you need assistance, just give us a call at 717-772-4018.

3. Proofread Your Data. Our data validation checks catch a lot of errors, but not everything. So, after you correct any errors, be sure to get a Printer-Friendly version of your submission and carefully proofread it to make sure you have reported the correct dates, locations, and results. Make corrections as necessary. Re-check the **Submission Confirmation** and/or **Error Report** to make sure you have no errors.



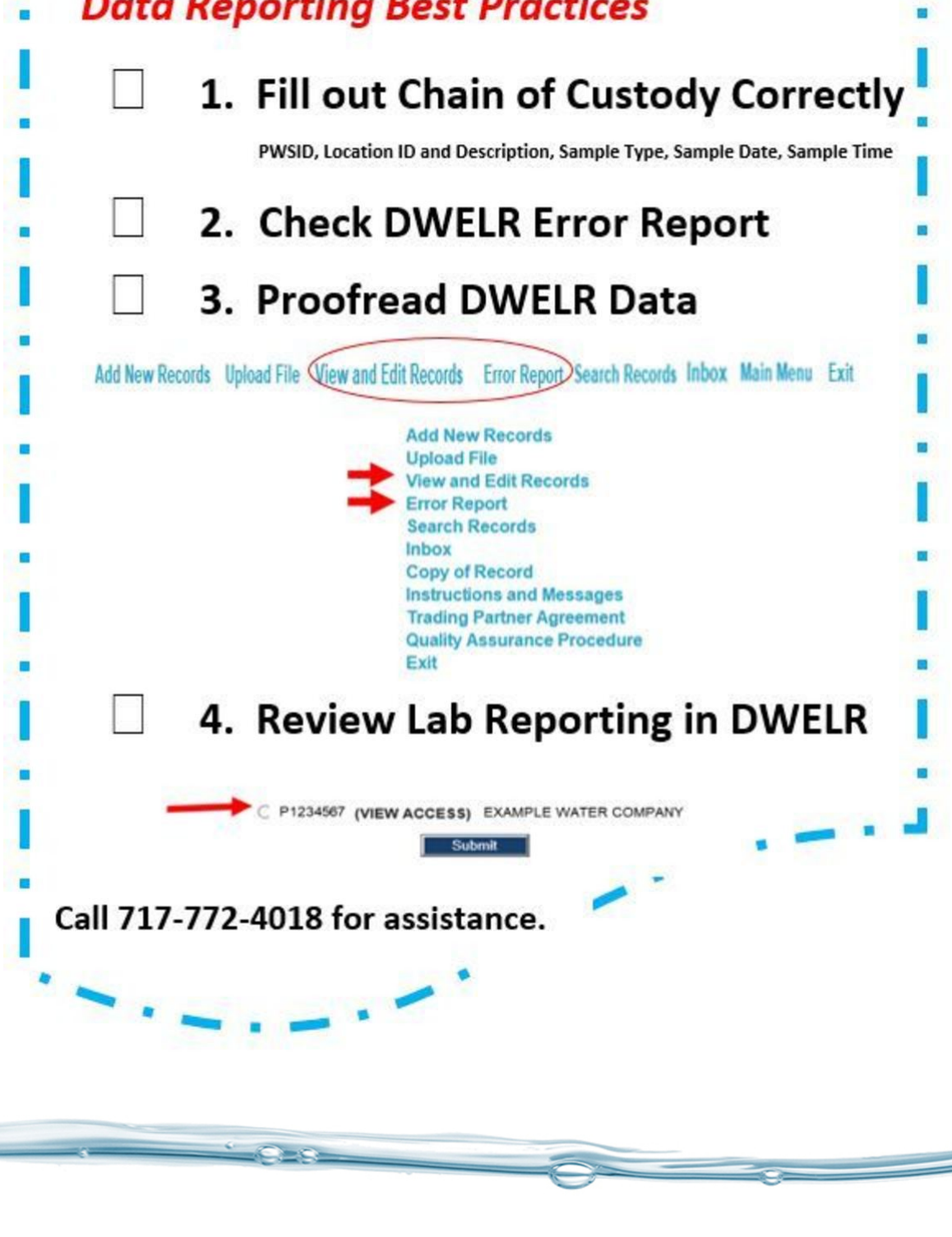
Check to make sure lab results are reported correctly:

4. Review Lab Reporting. At this point, you may be thinking: "My laboratory reports on my behalf and I have no way of making sure my results are reported correctly and on time." This is not true. The DWELR application allows you to review what the lab has reported on your behalf. Just enter the application through **VIEW ACCESS** and choose **View and Edit Records** from the **Main Menu**. If your account does not have **VIEW ACCESS**, it's easy to request (even if you don't report data through DWELR). Just call us at 717-772-4018. You can also request that your lab provide you with a Printer-Friendly version of your DWELR report that you can proofread.



- Check PWSID, sample dates, sample times, sample locations, sample types *and results*.
- If the records on the DWELR Report do not match your Chain-of-Custody or lab report, contact your lab and request a correction before the 10th of the month.

Use the checklist below to help you make these practices a habit each month and you will greatly reduce or eliminate monitoring/reporting violations! Be sure to call us at 717-772-4018 for data reporting and DWELR assistance.



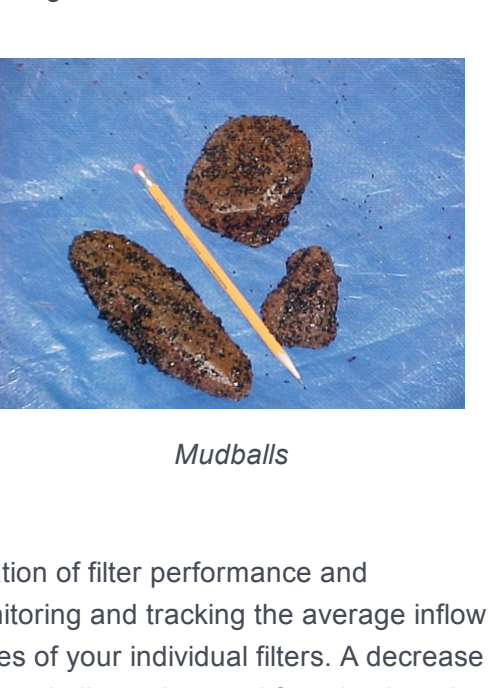
The Importance of Maintaining Your Filters

Andrew Kaufman, Compliance Specialist, Southwest Region

There are several types of filter systems and each one has its place and value for its needs. There are Greensand filters primarily used to treat for iron and manganese, Dual Media filters for surface water, Slow Sand which is one of the simplest in complexity and also probably one of the oldest filter technologies, all the way up to newer technologies such Membrane Filters and Reverse Osmosis.

However, it doesn't matter what your needs are or if you have the best filter to meet those needs if even the most basic maintenance of that filter is not routinely performed. The first line of defense in upkeep of your particular filter is as simple as routine daily maintenance. This can include observing at least one backwash a day for each filter, comparing inflow and outflow pressures, and tracking turbidity levels to establish routine baseline levels. Lack of even basic filter maintenance can lead to problems such as media loss, mudball formation, and break-through.

Observation of backwash procedures on an at least daily basis allows an operator to visually evaluate both the effectiveness of the backwash and possibly identify any problems or irregularities present in the filter. You as an operator can identify issues such as, depressions in your media, media loss itself, possible "boiling" of the media happening during air scour which can all indicate areas of possible break-through in the filter bed, or even cracked or broken under drains. Backwash observation can also help identify the effectiveness of your media's ability to filter and if your media needs to be cleaned, through things such as identification of the development of mudballs.


Mudballs

Another great indication of filter performance and effectiveness is monitoring and tracking the average inflow and outflow pressures of your individual filters. A decrease in outflow pressure can indicate the need for a backwash cycle, but an overall decrease over a longer span of time, can indicate clogging of your filter media. And even the opposite can be true, where an increase in the outflow pressure can indicate break-through of the media, or even problems with the filter's under drain system. Likewise, in certain filters such as membrane filters big fluctuations between inflow and outflow pressures can indicate potential problems developing or even total failure of the membrane.


Cracked Underdrain

Building off of knowing your filter's normal operating pressures, you should also be monitoring and tracking your system's inflow and outflow turbidity levels for each filter. So, knowing the normal operational turbidity readings of your filters and how effective each one is at removing turbidity is another great indicator of your filter's health. Turbidity history has the ability to help an operator verify if a sudden fluctuation in filter inflow and outflow pressure is truly a problem or not. It can also help indicate the effectiveness of the filter media, because if your filter is consistently having shorter runs between backwashes due to increased turbidity levels on filter outflow, then it can indicate that your filter's media could be nearing the end of its effective life. But sudden increased turbidity levels could also be an indicator of media break-through and/or underdrain problems as well.


Visible Underdrain Due to Media Loss

In short, while there are many things which can help you as an operator to produce high quality drinking water for everyone's consumption, some of the most basic of these, primarily normal maintenance and upkeep of your filter can be the most important steps which you can perform in order to achieve this task.

Improving Processes for Iron and Manganese Sequestration

Richard Kirby, Compliance Specialist, Northwest Region

Iron and manganese are two contaminants commonly found in groundwater sources throughout Pennsylvania. Their presence causes brown and/or black staining, an unpleasant odor, and metallic taste of the water. The preferred method of dealing with these contaminants is through removal by oxidation and filtration. However, filtration can be expensive due to both the initial purchase of the filters and the ongoing cost of waste disposal. If the raw water has a combined iron and manganese level up to 1.0 mg/L **and** a manganese level less than 0.3 mg/L, sequestration is another option to help improve the water quality provided to customers.

Notably, sequestration does not remove these contaminants from the water. The polyphosphate forms a bond around these contaminants that delays oxidation and the subsequent undesirable problems such as staining, odor, and metallic taste. While filtration can remove all or the majority of the iron and manganese from the water, sequestration is never 100% effective. Several factors influence the effectiveness of sequestration: raw water quality, application of sequestering chemical, and water age. Any one of these factors may result in little or no benefit from the sequestration process.

Sequestration is more effective at lower pH and lower hardness in the raw water. At higher pH levels, the iron and manganese are more readily oxidized prior to chemical addition. The calcium in hard water competes with the other metals for the sequestering agent, reducing the sequestering chemicals effectiveness.

Once sequestration has been selected as a treatment process, determine the best polyphosphate product to use and the best feed dosage of this chemical, by preparing a series of samples at different concentrations in clear glass beakers. Add chlorine and observe daily against a white background. The best polyphosphate dose is the lowest dose that does not noticeably discolor the water samples for four days.

As a reminder, iron, manganese, hardness, and orthophosphate should be analyzed regularly to ensure raw water quality has not changed and to verify that the polyphosphate is dosed appropriately. In addition, the quality of groundwater can change over time and may degrade to the point that sequestration is no longer a viable treatment method.

Design standards state that the separation between polyphosphate injection and chlorine injection should be at least 2.5 times the pipe diameter. If the injection points are installed at this minimum distance, little time occurs for the polyphosphate to thoroughly mix and react with the metals (iron and manganese) prior to chlorination/oxidation. Sequestration is more effective if there is a static mixer, bends in the pipe, or as much distance as possible between the chemical injection points. Another common issue is the installation of an oversized polyphosphate chemical feed pump. As this oversized pump is pulsing, especially when injection points are close together on straight pipe, only part of the water flowing through the water treatment plant will be sequestered prior to oxidation/chlorination. An appropriately sized pump should run constantly to ensure the phosphate chemical is fed continuously and the metals are sequestered prior to the addition of chlorine.

As everyone in the water industry knows, water quality does not improve as the water ages. This is especially true if sequestration is used. After about five days, depolymerization of the polyphosphate begins to occur allowing the iron and manganese to react with the available free chlorine and oxygen in the water. To ensure the best water quality possible, the Department recommends that the distribution system should be flushed regularly, and water age kept to less than five days.

As a reminder DEP approval is needed prior to the installation or modification of any treatment at a public drinking water facility. Reach out to your local DEP office for assistance.

A Closer Look at *Giardia* in Drinking Water

Sasha Minium, Environmental Group Manager, Northcentral Region

Microorganisms are nearly everywhere, and a primary responsibility of a certified drinking water operator is to optimize plant operations to prevent harmful microbes from contaminating the water we drink. While some microbes can be beneficial to us, there are plenty of others that can be harmful. *Giardia*, a microscopic parasite, is one type of potentially harmful microbe that can sometimes be found in inadequately treated drinking water. What makes *Giardia* special is its life cycle. *Giardia* organisms can spend part of their life cycle in a free-swimming form and part of their life cycle in a cyst form. The cyst is a tough shell-like coating that completely encloses the organism and protects it from harsh environmental conditions. When people ingest *Giardia* cysts by drinking contaminated water, it can lead to a gastrointestinal illness called giardiasis.


Depiction of Giardia by Sasha Minium

One of the largest concerns about *Giardia* in drinking water relates to water systems that use surface water sources or groundwater sources under the direct influence of surface water (commonly referred to as GUDI). It is impossible to completely prevent the introduction of *Giardia* into surface water due to the numerous sources of *Giardia* contamination within a watershed that are outside the control of the water supplier.

Pennsylvania's Safe Drinking Water Program has taken a "multiple barrier" approach to protecting public water supplies. The first barrier is the protection of the source water quality to minimize contamination through source water assessments, source water protection plans, pollution control laws and local municipal action. The second barrier, the most effective method of protecting a drinking water system from *Giardia*, is a properly designed and operated surface water treatment plant. The surface water treatment plant provides its own "multiple barriers" of public health protection, including coagulation, sedimentation, filtration and disinfection treatment processes. Filtration and disinfection are the primary ways that *Giardia* cysts can be effectively removed and inactivated. Proper filtration can physically remove *Giardia* cysts. Proper disinfection, which involves both the appropriate amount of disinfectant and enough contact time for the disinfectant to work, ensures that any remaining cysts are inactivated and no longer able to cause illness. Highly skilled and properly certified water treatment plant operators at these plants must ensure that each process is properly operated to effectively **remove** and **inactivate** *Giardia* cysts. Finally, distribution system pipes and storage facilities must be in good repair to protect the water from re-contamination as it moves from the treatment facilities to the customer's drinking water taps.

All filtration plants are required to consistently monitor and maintain disinfection residual and other operational parameters to provide adequate *Giardia* inactivation, the same way they are required to consistently maintain low filter effluent turbidity. Additionally, operators must calculate their *Giardia* log inactivation at least once daily at peak flow in order to show that enough *Giardia* are being inactivated from the finished water being sent to users. If a system fails to maintain > 1.0-log (or 90%) *Giardia* inactivation for more than four hours, the system is required to notify DEP within one hour of discovery, and additional action will need to be taken to re-establish the required level of log inactivation. In addition, a system must also calculate their *Giardia* log inactivation if the entry point disinfectant residual falls below 0.20 mg/L. The calculation must be repeated at least once every four hours until the disinfectant residual is restored. The Winter 2018 issue of the Drinking Water News offers an in-depth explanation of the reporting and notification requirements for both *Giardia* and virus log inactivation that you may find helpful. If the required *Giardia* removal and inactivation treatment is not achieved due to a failure to maintain *Giardia* log inactivation, disinfection, or other treatment, a Tier 1 public notification in the form of a Boil Water Advisory will be necessary.

What about standard groundwater systems and *Giardia*? While the risk to standard groundwater sources is lower than the risk to surface water or GUDI sources, there are still things that can be done to keep that risk even lower. One of the most important ways is to pay attention to wellhead protection. Stormwater runoff should not be allowed to pool near the wellhead, as that water could potentially contaminate the well with *Giardia* or other harmful microbes. Manure spreading or other similar activities should also be prohibited, especially within the Zone I wellhead protection area, to prevent *Giardia* and other harmful microbes from entering the well and the surrounding groundwater. Finally, similar to surface water and GUDI systems, if you are required to provide disinfection for your groundwater system, it is also very important to ensure proper disinfection, as this will help inactivate any *Giardia* or harmful microbes that may be present.

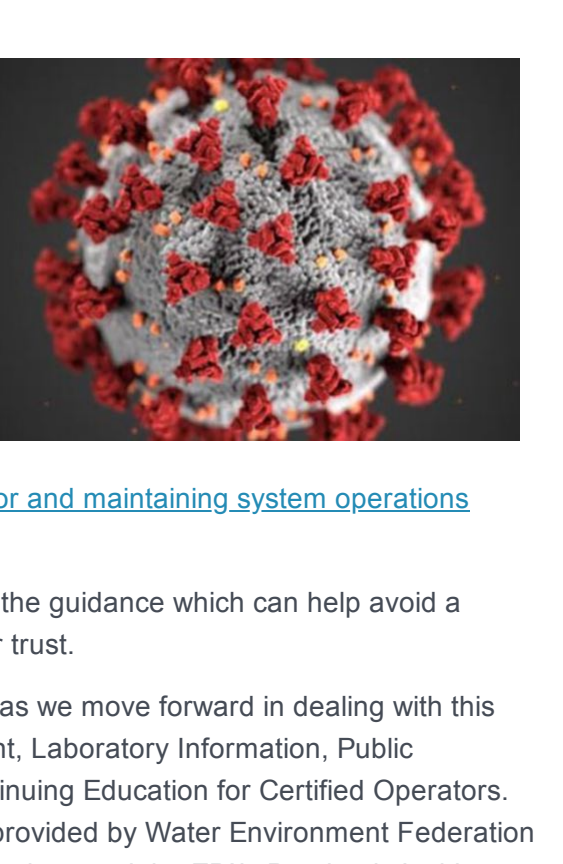
Remember that DEP has lots of resources to help you deal with *Giardia* in drinking water. One of the best resources is our staff. The sanitarians, compliance specialists, and filter plant optimization staff can all offer valuable advice or compliance assistance. Another great resource is our website. When the latest version of the Disinfection Requirements Rule went into effect, DEP worked with EPA to develop a *Giardia* inactivation calculation spreadsheet that water systems can use to organize and report log inactivation data. Again, the Winter 2018 issue of the Drinking Water News offers some excellent tips for how to use the Giardia inactivation spreadsheet.

Additional information about *Giardia* can be found in the DEP publication called "Cryptosporidium and Giardia: Are they in your Drinking Water?"

Information Resource for Public Water Suppliers During the COVID-19 Pandemic

Matthew Shope, Compliance Specialist, Northeast Region

It goes without saying, the COVID-19 pandemic has been an unprecedented global experience. One that has placed the vulnerabilities of the infrastructure we take for granted suddenly foremost on everyone's minds. The public's concern as to whether their water is and remains safe to consume is one that can be relieved through the diligence of public water system efficiently operating under practical and safe system management practices.



The Safe Drinking Water Program has recently developed a website to assist water suppliers in planning for and maintaining system operations during this pandemic.

It is greatly encouraged for public water systems to review the guidance which can help avoid a breakdown in treatment and the resulting loss of consumer trust.

The website is broken into six important topics to consider as we move forward in dealing with this crisis: Staffing, Essential Treatment Chemicals & Equipment, Laboratory Information, Public Notifications, Compliance Monitoring and Maintaining Continuing Education for Certified Operators. Additional resources are also provided by links to a guide provided by Water Environment Federation which is specifically tailored to wastewater system considerations and the EPA's Pandemic Incident Action Checklist.

Public water systems should evaluate potential staffing problems not only for maintaining the physical plant operations but supply chain inhibitions that can develop. Absenteeism due to the illness caused by the coronavirus can affect plant operations and maintaining the inventory of necessary treatment chemicals and critical equipment. Developing and maintaining Standard Operating Procedures (SOPs) could help staff adapt as such contingencies arise.

It is important to remember the crisis does not exempt any system from the regulatory requirements nor does it absolve any late reporting or notification infractions. Again, ensuring all information is up-to-date and effective SOPs are available to staff will help public water systems persevere and maintain regulatory compliance.

As previously stated, there are no exemptions to compliance with the Safe Drinking Water regulations. Community systems should realize properly operated filtration and/or disinfection treatment practices under the Surface Water Treatment Rule (SWTR) and the Groundwater Rule (GWR) are expected to provide protection against the Coronavirus. Therefore, maintaining treatment and ensuring sample collection and analyses are conducted as required is critically important.

Finally, the State Board of Certification of Water & Wastewater Operators and the Department's Operator Certification Training Program has provided guidance on how operators are to maintain their certification during the pandemic. In addition to temporary extensions of expired licenses under extenuating circumstances a list of DEP-approved distance learning courses is provided for the required continuing education requirements.

Avoiding Pitfalls in System Specific Management Plans

John Cairnes, Compliance Specialist, Southeast Region

All community and nontransient noncommunity water systems are required to have personnel certified by Pennsylvania's Water and Wastewater Operators Certification Act to operate a system's drinking water facilities. An operator may be an employee of the system, or an independent contractor who is self-employed or employed by an agency that provides operator services to water systems. Contract operators, or "circuit riders" may be providing operator services to more than one water system. To ensure that system owners are fully informed of the services they are purchasing, contract operators are required to provide a system specific management plan (SSMP) to the owner of each system at which they are employed.

The regulations requiring SSMPs and the minimum requirements for their content are enumerated in 25 Pa. Code Chapter 302, Section 1207(f). But upon review of SSMPs, DEP field staff have discovered a number of common deficiencies that call into question the efficacy of the plan and the effectiveness of the operator's services. Operators developing an SSMP should plan them carefully and ensure that their duties and activities are well-documented within the plan.

A common error in SSMPs can often be found in the contact information. Telephone numbers should include cell phone numbers at which an operator can be reached on short notice. If the operator is employed by an agency, the agency number is insufficient unless it is capable of taking calls at any time. A breakdown in treatment may require a rapid response by the operator to circumvent or minimize risks to public health. Operators should provide a realistic estimated response time in their plans.

Operators should avoid using standardized forms for their SSMP. Each system will have its own needs and challenges. If a system adds or alters a treatment process, those needs will change as well. Operators should be aware of a system's needs and plan accordingly. There are no set requirements regarding how many hours or days per month an operator is required to be on site at any system at which they are employed, or how many operators a system should employ. But owners are required to ensure their treatment plants are adequately staffed, and operators are expected to devote as much time as is necessary to meet a system's needs. If operators are visiting more than one system per day, travel time between systems should be considered when planning out a typical work day. If a circuit rider agency is contracted by many systems, the deployment of human resources can be very complex.

Another frequent omission from many SSMPs is the time and frequency an operator confers with a system's owner. As set forth in 25 Pa. Code Chapter 302, Section 1201(c), an operator should inform a system's owner of any violations, or any circumstances that have caused or may cause violations of Federal regulations, State regulations or permit conditions that are occurring at the system. Regular and timely communication between owners and operators is a crucial tool in avoiding violations that can lead to enforcement actions by DEP, or even civil penalties.

To summarize, a system specific management plan is the beginning of a beneficial rapport between a water system owner and contract operators employed there. An operator should craft a management plan with diligence and care. Operators are advised to consult with DEP field staff for additional guidance. And if a plan should be altered, an operator should always discuss those changes with system management and provide the system owner with a revised plan.

Standard Operating Procedures

Lori Wise, Water Program Specialist, Central Office

System owners have a valuable tool to use when they employ a limited number of fully certified operators that can be on site at any given time. This tool is known as "standard operating procedures", SOPs, and is regulated by Pennsylvania Code Title 25 Chapter 302.

Owners should always maintain a minimum number of available operators to comply with regulatory requirements. Use of SOPs allow employees under the direct supervision of the operator-in-responsible-charge (ORC) to implement process control decisions. The need to use the SOP might arise at times when the ORC is on leave or is not immediately available.

Circuit riders also use the SOP when they have been designated as the ORC but are visiting on a weekly or monthly basis. The SOP should be reviewed by management and during inspections by the Department to be sure staff are adhering to established protocol which will help the system to maintain compliance.

SOPs should be easily available for retrieval, whether in paper or electronic format. SOPs must meet the following requirements (25 Pa. Code §302.1204):

- ***include the name of the ORC,***
- ***identify operators who may use the procedures to make process control decisions,***
- ***state which treatment processes are covered, and***
- ***identify the trigger parameters for the treatment processes and the appropriate actions to be taken for each treatment process.***
- ***be approved in writing and dated by the operator(s) in responsible charge and available at the system for review.***

The PA DEP has more information in its Operator Certification Program Handbook, Chapter 7 Part D. A template is available in Appendix D of the handbook.

For questions about using standard operating procedures, call your regional sanitarian or the Central Office at 717-772-4056.

Value of Operational Treatment Schematics

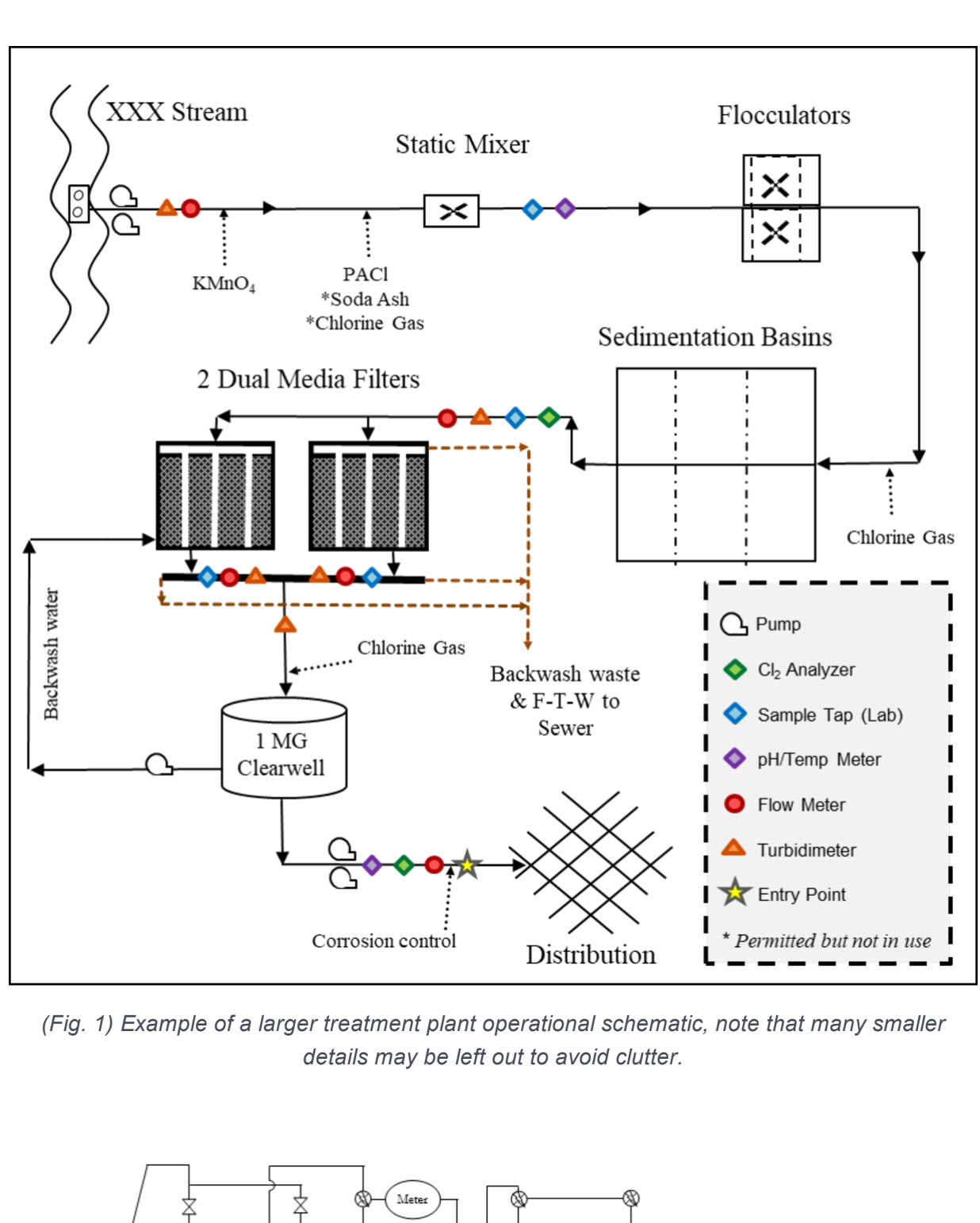
Drew Hoffman, Compliance Assistance Specialist, Southcentral Region

Schematics were probably created for your treatment plant when it was first built, and could be in your records to fulfill certain required elements of your Operation & Maintenance Plan, but how often do you reference that schematic in the routine operations of the plant? For some systems, the answer might be: "Well, I have a schematic built into my SCADA, so I use it every day." For others, maybe that schematic has been sitting away in a folder going unused, and maybe it's not even up to date after some upgrades. Treatment plant schematics may not seem as necessary for a simple system or an operator that has had the same plant for years and knows that plant inside and out. But even for the simplest of plant and most veteran of operator, a good schematic that is accurate and up to date can be beneficial for several reasons.

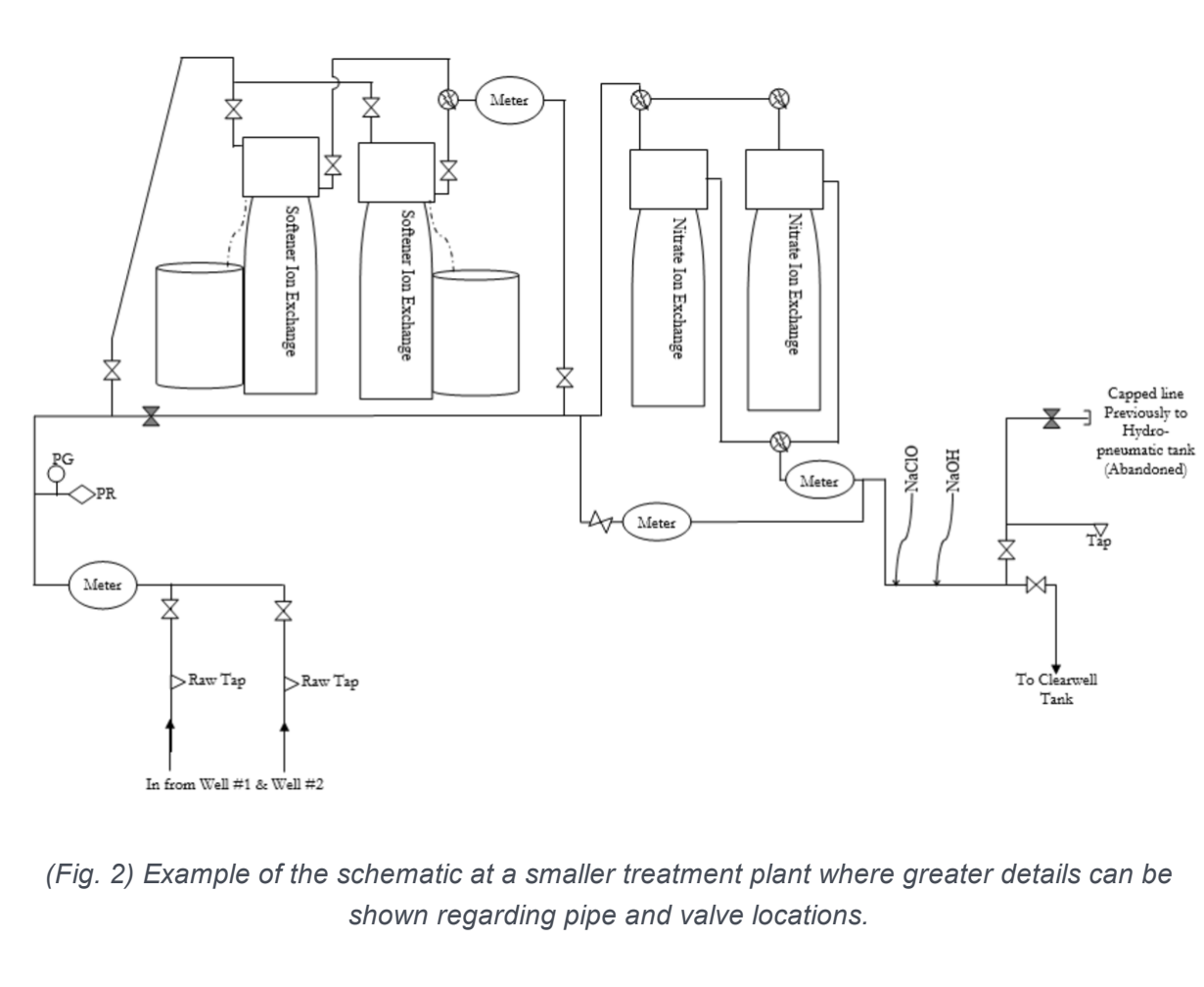
For many small treatment plants, uncertified personnel are the ones conducting the day to day operations under the supervision of a certified operator. In these cases, a copy of the schematic can be a useful reference or addendum to the SOP to indicate which valves should be open/closed during normal operation. With a treatment system which includes adsorption filters where lead and lag filters may change places in order, understanding what is going on might be challenging. In such cases, a schematic, supplemented by some labels and adjustable signage, could be handy. Benefits from access to schematic pipe labels, and sample tap labels extend beyond operations staff, to sampling personnel as well. I can think of at least one occurrence at a system, in which the raw and mid filter taps were alternated based on valve opening arrangement, and confusion resulted from the ensuing samples. *(See Fig. 3 for example)* This mix up of raw and mid filter sample results may have led to premature filter media replacement.

Even for systems where one operator is the only one touching anything within the plant and highly experienced with that plant, an operational schematic is still highly beneficial. A schematic is a clear and concise way to provide information on the plant to a new operator, especially in the event of retirement or unforeseen circumstance.

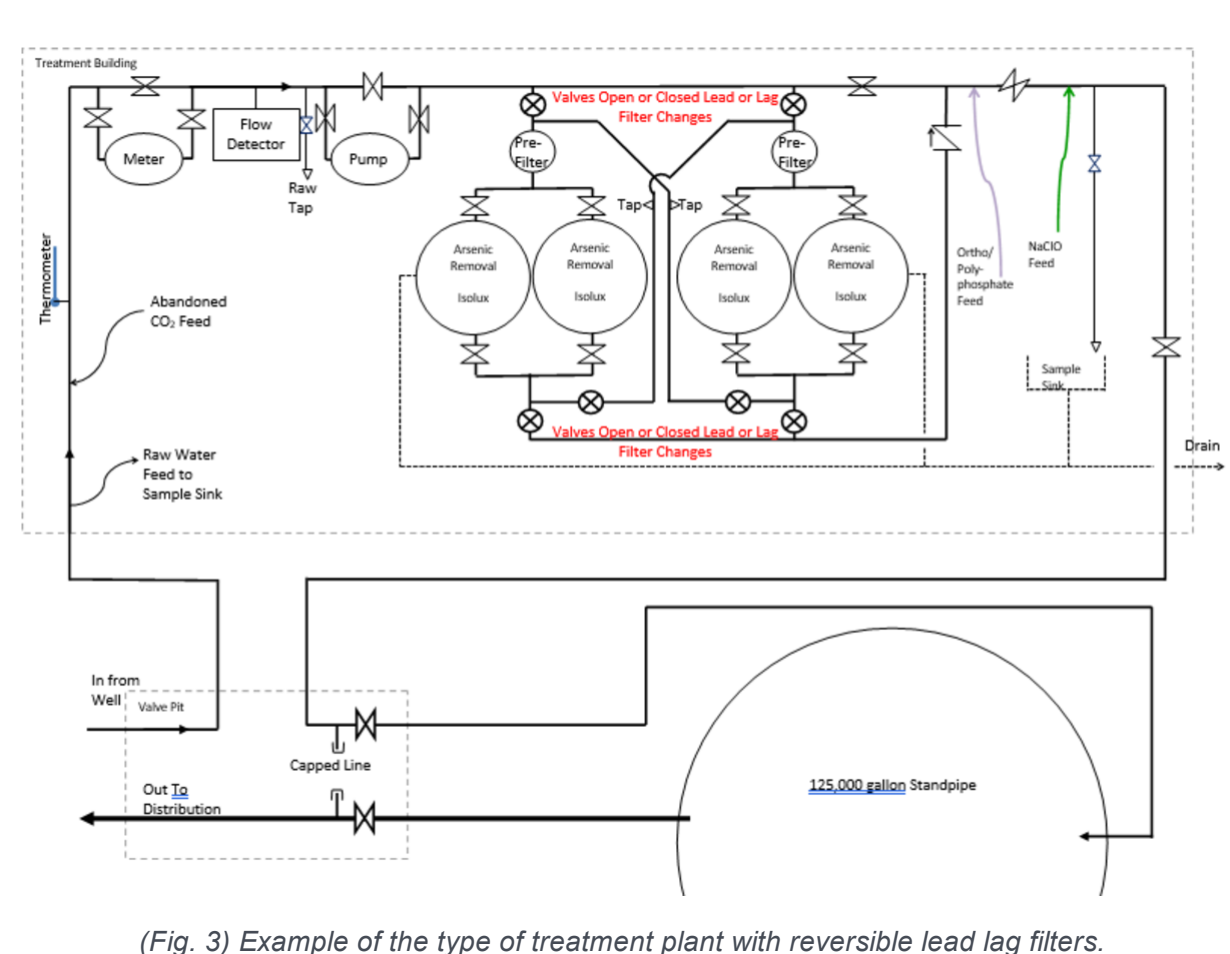
Finally, that schematic is of great benefit when giving a plant tour, especially during a DEP inspection. As much as I, a DEP inspector, found making schematics for many of the very small water systems to be a useful and even an integral part of the job, the inspections generally go much smoother if the operator has their own schematic available to both themselves and the inspector before the on-site portion of the inspection. Schematics make it much easier to track down potential deficiencies such as cross connections and bypasses that don't meet current DEP design standards and possibly even get ahead of those issues before the onsite portion of the inspection.



(Fig. 1) Example of a larger treatment plant operational schematic, note that many smaller details may be left out to avoid clutter.



(Fig. 2) Example of the schematic at a smaller treatment plant where greater details can be shown regarding pipe and valve locations.



(Fig. 3) Example of the type of treatment plant with reversible lead lag filters.

Pennsylvania Department of Environmental Protection, 400 Market Street, Harrisburg, PA 17101