



South Carolina  
**Office of Regulatory Staff**

# **THE WATER WELLSPRING**

*A Flowing Source of Information for Water and Wastewater Utilities*

*Spring 2018*

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## **Thank You!**

Thank you to all who attended the Water/Wastewater Workshop on April 20, 2018. We had wonderful speakers who shared their knowledge and experience on successful utility consolidation, trenchless technology, cybersecurity, updated environmental regulations, and the usefulness of drones in the utility industry. Two of our speakers came from out of state to participate in the workshop. The speakers received a lot of positive feedback, and we appreciate your time in completing the surveys after the workshop.

## **Impact of Tax Cuts and Jobs Act**

In December 2017, the ORS filed a petition (Docket No. 2017-381-A) requesting the Public Service Commission (PSC) to require utilities to report the impact of the federal tax changes on the company's operations. The Tax Cuts and Jobs Act, effective January 1, 2018, reduces the federal corporate tax rate from 35% to 21%, among other changes. These new federal requirements affect the current tax expense and deferred tax accounting methods used by utilities. PSC Order 2018-308, issued April 25, 2018, requires water/wastewater utilities with operating revenues that are equal to or greater than \$250,000 to track and defer the effects resulting from the Tax Act in a regulatory liability account. The issue will be addressed in the next rate case or other proceeding for each of the affected water/wastewater utilities.

# A Changing World: Machinery Health and Predictive Diagnostics

*This is the second in a series of short articles designed to highlight the benefits that the best of today's advanced automation systems can bring to water and wastewater utilities.*

Advanced automation solutions are enabling forward-thinking water and wastewater authorities to improve their operations significantly by addressing some of the greatest challenges facing the industry. The challenge we're talking about today is avoiding the time and expense associated with equipment downtime.

Water and wastewater utilities operate large and expensive machinery including pumps, centrifuges, mechanical separation and filtration equipment, and a host of other assets. With advanced, predictive machinery health solutions, it's possible to better monitor the health of large rotating assets and predict problems before they occur. This simple shift from emergency, reactive repairs to preventative diagnostics and maintenance can save money, reduce unplanned service outages, protect critical assets and improve the safety of both workers and the public. Vibration analysis is an important tool to ensure that rotating assets are performing as specified. According to the US Bureau of Labor Statistics, approximately 32% of treatment facility employees will be eligible to retire in less than 10 years. Among the retiring will be those with advanced knowledge of vibration analysis. These people may or may not be replaced. If they are, it's likely that they won't possess the same level of experience and knowledge as those who are walking out the door. To fill this gap, the case for automation couldn't be stronger.

As many know, the primary causes of machine vibration are:

- Repeating forces caused by imbalanced, misaligned, worn or improperly driven machine components
- Looseness due to excessive bearing clearances, loose bolts, corrosion or cracked cases
- Resonance which occurs when machines vibrate at certain oscillation rates or resonant frequencies

To monitor and diagnose problems caused by excessive vibration, some municipalities take a manual, route-based approach in which a vibration analyst moves from machine to machine taking vibration samples at periodic intervals. The asset manager uses this sample data to trend the health of equipment over time. Although this approach requires little capital investment, it isn't without risk. The issue with this approach is that equipment failure caused by excess vibration can often be sudden – with symptoms and failures occurring between sampling intervals. For example, if a sample is taken on a machine for 30 seconds every 30 days, then over 99.99% of the time the equipment's health is not actually being monitored.

For large rotating assets, some water and wastewater authorities choose protection-only systems that automatically shut down the equipment in the event of severe vibration, thereby preventing further damage or injury to personnel. The problem with these vibration protection systems is that by the time the equipment shuts down, the damage has already been done and repairs are required before the equipment can be returned to service. Depending on how critical the equipment is for ongoing operations, repairs can be quite costly. In fact, reactive repairs can cost 50% more than planned repairs due to expedited parts and unscheduled work orders.

Another issue with protection-only systems is that they don't track equipment health over time. Consequently, equipment is often over- or under-maintained. In addition to spending money unnecessarily, over-maintenance can inadvertently induce equipment failure. For example, if bearing replacements are installed improperly, they can introduce additional faults. It's obvious to everyone that under-maintenance can result in significant equipment problems. What may be worth thinking about though, is that those problems may present themselves at the most inconvenient times — during high-demand periods such as weekday mornings or weather events, for example — exacerbating an already difficult situation.

Today, the science of vibration monitoring has matured. Online monitoring systems can now provide both protection and prediction of critical rotating assets. They study characteristics in the vibration waveform to not only help identify what is causing the increased vibration, but also provide an early warning of potential machinery health issues.

Unlike protection-only systems which typically look only at the overall vibration value over time, continuous online vibration monitoring systems dig deeper. They look at waveform patterns to identify specific mechanical issues such as imbalances, misalignments or bent shafts, well before the overall vibration value even changes. Armed with this information, reliability and maintenance personnel can respond accordingly to prevent equipment damage.

Some forward-thinking automation suppliers have taken this a step further by integrating online protection and prediction into their control system platform, eliminating the need for a separate system altogether. With this, operators will now receive actionable alerts about developing equipment issues while they are monitoring plant operations. They'll receive specific direction on actions that need to be taken or maintenance that should be planned to avoid equipment damage or failure.

This one-platform approach offers numerous benefits over an isolated system that sits outside the realm of plant control. The use of a single platform for control and online monitoring means that equipment is no longer over or under-maintained; training on

multiple systems is no longer required, parts inventory is reduced, and even cybersecurity is enhanced.

A properly functioning predictive maintenance program can provide a savings of 8-12% over a program utilizing preventative maintenance alone<sup>1</sup>. Aging equipment ... increasing regulatory requirements ... budget reductions ... the pressure to do more with fewer and less experienced personnel ... the challenges facing the water and wastewater industries are formidable. Fortunately, unplanned equipment downtime *can* be avoided. With advanced online predictive monitoring technology, there's no longer a need to leave machinery health to chance.

<sup>1</sup>US Department of Energy's O&M Best Practice Guide, 2010

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## **Water and Wastewater Pipeline Infrastructure Opportunities**

*By Pete Antoniewicz, Industry Content Writer, Water Online.com*

There is little doubt that America's infrastructure is aging, and in some cases, operating well beyond its originally intended lifespan. Here is a look at historic failure rates, causes, and factors to consider when replacing existing water distribution and sewer networks.

*A Study of Water Main Break Rates in the USA and Canada*, published by Dr. Steven Folkman of the Utah State University Buried Structures Laboratory, examined trends for 117,603 miles of water mains managed by 188 utilities across the U.S. and Canada. The study documented an average of 11 failures per 100 miles per year, across all materials, but differences ranged from a low of 2.6 failures/100 miles/year for polyvinyl chloride pipe (PVC) to a high of 24.4 failures/100 miles/year for cast iron pipe (Figure 1). Other, unspecified types of pipe materials, including galvanized steel, copper, and high-density polyethylene (HDPE), accounted for less than 4 percent of the total mileage and were not individually identified by failure rate.

Eighty percent of the utilities in the study combined a range of materials in their water mains — cast iron at 28 percent, ductile iron at 28 percent, and PVC pipe at 23 percent. Each material type satisfies a range of more favorable and less favorable performance scenarios.

Preferences for non-metallic piping replacement options — particularly PVC and HDPE — are being expressed by both utilities and the engineering firms that work with them (Figure 3). In addition to cost savings, part of this shift is related to improvements in the materials themselves, 100-year performance life expectancy, as well as advantages in the installation processes associated with those materials. For example, both are compatible with trenchless installation technologies.

View the complete article, including statistical charts, at

<https://www.wateronline.com/doc/water-and-wastewater-pipeline-infrastructure-opportunities-0001>

*This summary is based on an article that originally appeared on the Water Online website in March 2018, and is being printed with permission from Water Online.*

# **Accounting for Depreciation Expense**

## ***What is the Accounting definition of Depreciation?***

- Accounting uses “cost” rather than “value” to define depreciation
- Any asset which is useful for more than one accounting period should have its cost charged to several periods of time
- Depreciation converts cost into expense over accounting periods
- Depreciation matches the cost of the asset used to produce revenues for a particular accounting period
- Depreciation is an Operating Expense

## ***Does Depreciation require a cash outlay?***

No. Depreciation is a non-cash transaction which recognizes the proper allocation of costs.

## ***What factors are needed to determine depreciation expense?***

- Service life of the asset
- Net Salvage Value if applicable
- Depreciation Method to be used

## ***What is the recommended Depreciation method used in Utility regulation in South Carolina?***

Historically in South Carolina, the straight-line method is used which is designed to distribute the depreciable cost of an asset in equal amounts over its useful life.

## ***Is Group Depreciation acceptable in South Carolina?***

Yes. When unable to track each individual asset, group depreciation allows for large amounts of similar items to be depreciated as one unit.

## ***How is an asset retired from service?***

When an asset is retired, the original cost of the item is removed from the utility’s accounting records. Following is the journal entry to retire an asset:

*Dr. Accumulated Provision for Depreciation of Plant in Service*

*Cr. Plant in Service*

*Source: Public Utility Accounting: Theory and Application, James. E. Suelflow*

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