

The Mysteries, Dangers and Risks of Underground Piping Repair

Introduction

Underground water piping systems are the veins and arteries of our nation. They transport something that's vital to everyone's well-being and are essential for protecting lives and property from fire and smoke damage.

As with your own internal circulatory system, when problems develop in these piping systems they can cause serious health and safety concerns. Water piping leaks and failures have been known to pose significant hazards for nearby residents, work crews, adjacent infrastructure, motorists and even the local economy.

The tradesmen and women that service these systems and repair breakages do so at great personal sacrifice and risk, often under very trying circumstances. They are the first responders for breakdowns in the nation's water supply system, and, as such, they deserve our respect, consideration and gratitude.

The state of the nation's piping infrastructure

It's no secret that American infrastructure – both nationally and locally – is in need of significant maintenance and upgrades. The 2021 Bipartisan Infrastructure Law is helping to address some aspects of the problem, but its reach won't extend into every local community.

In the Chicago area alone, there are numerous industrial parks that were built in the nineteen fifties, sixties and seventies. The water piping systems in these areas weren't intended to last more than 50 years or so, and they're now at or about to reach the end of their functional lifespan.

It's often true that problems that are visible are prioritized over problems that aren't, and this applies to the water piping infrastructure in many local communities. The age-related deterioration of these systems frequently isn't addressed until a leak develops and literally rises to the surface.

Repairing and replacing piping infrastructure is complex

We're all familiar with seeing work crews along local roadways digging up the ground for one reason or another. It's such a commonplace sight that it seems routine and simple to the casual onlooker.

In fact, in many situations, it's difficult, arduous and often dangerous work. It can also be very complicated.

A typical underground water piping repair doesn't simply involve a handful of "workers." Work crews require a number of specialized skills, training, OSHA Certification and will often include machine operators, laborers, industrial semi-truck drivers, plumbers and sprinkler fitters.

Their efforts need to be carefully coordinated, almost choreographed, to ensure a successful outcome. Because this work involves a number of hazards and dangers that will be discussed shortly, it's critical that tasks are performed in the right sequence, with the right attention to detail and with a high skill level.

What most of us do not see as we drive past a work crew are the numerous considerations related to the actual work. For example, there are almost always permits and licenses to acquire, notifications required for nearby residences and office spaces, coordination with the utility location service JULIE, and so on.

There's also the time and effort spent coordinating and communicating with local building, fire and water departments, along with tenants, the building owner, a fire watch provider, the property manager and the insurance carrier.

In addition, it's not unusual for pipe infrastructure issues to develop near hubs of human activity, such as office buildings, railways, highways and airports. So repair crews also need to go about their work in ways that minimize the impact on the commercial activity going on around them.

Piping repair work can be dangerous

Again, because the sight of work crews digging up the ground along roadways is so routine, many of us assume there's nothing particularly dangerous about it. In fact, there are a host of hazards and complicating factors inherent in most of these projects that pose significant risks for the work crews and nearby residents.

Here are some of the most prominent dangers these crews regularly face.

Frozen earth

Bitter winter cold isn't simply inconvenient to work in; it can also be life threatening. Crews are often required to work outside all day and night in the type of conditions that prompt weather services to advise the rest of us to strictly limit our time outside.

The presence of snow or freezing rain makes things even more challenging for crews. They have to simultaneously try to stay warm, hydrated, keep the machinery clean and struggle with decreased visibility. (Imagine sharp pellets of hail or freezing rain pelting your face incessantly.)

What's more, extreme cold is very hard on machinery and increases the chances for breakdowns. When those happen, trying to effect repairs in these conditions is even more challenging.

Finally, extended cold can thoroughly freeze the earth six or more feet below the surface. When that happens, the ground develops the consistency of hardened concrete and becomes extremely difficult to both excavate and work in.

Buried power and gas lines

Obviously, it's critically important that crews identify the presence of underground power and natural gas lines before initiating any work. But even when those lines aren't near where the excavation is occurring, they can still pose a significant risk if there are ground disturbances or collapses at the excavation site.

Also, leaks or failures in an underground water piping system mean that there is often running water present at a work site. Clearly, the combination of running water and nearby electrical lines poses a very dangerous combination and a very real threat to work crews.

Ground collapse and subsidence

Ground collapse presents a frequent issue for work crews. Keep in mind that when there's a leak or a failure in an underground water pipe system, it's not always apparent until many days or weeks later when the visible presence of pooling water alerts people to the issue.

Because of all the time that has passed from the initial failure to when the problem is first observed, the work site is often thoroughly water-logged. This makes the ground extremely unstable, exponentially increasing the possibility of excavation site cave-in or collapse.

That's why crews are required to use trench boxes and other shoring methods to help stabilize the excavation site, keep themselves protected, and prevent heavy machinery from falling into the hole.

Proximity to nearby activity

Unfortunately, pipe leaks and failures aren't restricted to remote, non-urban areas. Piping systems are there to serve humans, so when they fail there's often considerable human activity nearby. (Imagine a truck terminal with fully loaded semi-trucks constantly pressing the earth as they move around.)

Work crews have to coordinate their activities with the activity from nearby hubs, such as office buildings, airports, rail lines, highways and pedestrian traffic. That obviously complicates their efforts to complete the repair.

But nearby human activity can also result in ground vibration and other types of disturbance that can contribute to instability at the excavation site. So work crews have to balance their own safety with minimizing the possibility that their work will impede the commercial activity going on around them.

Other considerations and complications

In addition to the risks and hazards just described, there are a host of other complications and considerations that have to be addressed in order for work crews to complete their work safely, efficiently, effectively and in compliance with local and federal regulations.

Here are some of the more common complications.

Age of the affected piping system

If a leak or a failure has occurred in a piping system, there's a good chance that it's an older system. That means that there could be instabilities throughout the system, not just where the leak is occurring.

If that's the case, work crews will need to take that into consideration and try to put as little stress on the entire system while they repair the issues.

Leak chasing

It may surprise people to know that once you've repaired a leak in one section of a piping system, leaks may start to appear in other weaker areas of the system. After all, the age and wear-and-tear on the pipe system that contributed to the original leak remain present throughout the system. Additionally, the annual winter freeze and thaw cycle is particularly harsh on underground pipes.

The initial leak may have eased water pressure in other parts of the system. But with that leak now repaired, the pressure may build back up and create problems in other, vulnerable parts of the system. *In other words, a recently repaired leak has now become the strongest part of the fire loop!*

Contamination

You might think that aside from being...well...dirty, the ground surrounding a water piping system would generally be safe. However, it's not unusual for viruses, bacteria, pollutants and other contaminants to be present in the ground around piping infrastructure.

This means that as work crews repair the leak and replace the damaged piping, they have to take extreme care to ensure that contaminants aren't introduced into the piping infrastructure and the water that nearby businesses and residents use.

Boulders

We tend to think of boulders as purely above-ground phenomena, but, believe it or not, it's not unusual for work crews to encounter huge underground boulders when they excavate. This obviously complicates a job because boulders may be too large to simply lift out of the ground. They may have to be blasted or jackhammered into more manageable-sized pieces that can then be more easily and safely removed.

Spoils removal

It's not widely known that when a repair crew digs up the ground, they can't simply refill the hole with the dirt they previously removed. In accordance with EPA regulations, excavated soil must be considered as spoils and taken for testing and disposal to an EPA-approved testing site. This clearly adds time, effort and cost to repair projects.

Necessity of hand digging

Even though heavy machinery performs much of the excavation at a work site, it's also often the case that crews will need to hand dig at the site, which adds time and labor costs. Hand digging is required for a number of reasons, including ensuring that no working sections of the pipe system are damaged during excavation and ensuring that no stones or contaminants are able to enter any newly installed piping. This includes having to work around buried cable TV, electrical, telephone, internet, high pressure natural gas lines and other lines.

Danger from nearby construction

It's not unusual for excavations to occur in areas that are proximate to other types of construction or road repair. In these situations, crews need to be wary of falling slag and other debris coming from those nearby work sites. Each member of an excavation crew must have the complete and implicit trust of every coworker. This is considered to be highly dangerous work!

Ancient artifacts and wildlife

Anyone who's spent time doing excavation work knows that when you dig up Mother Earth, you really never know what you're going to find. It's not unheard of for excavation crews to encounter what may be ancient artifacts or even fossils as they go about their work.

Obviously, when that happens, work is interrupted and the appropriate experts are called in to assess the finds and determine what they are and how many of them may be present in the work site.

Even above ground, work crews sometimes have to contend with wild animals or even hooligans looking to rob the crew or steal tools thereby requiring special precautions to be taken.

The cost of water piping system repair

As mentioned earlier, repairing and replacing piping infrastructure can be very complex. Not surprisingly, that complexity can generate significant costs.

Repair crews often include a number of tradesmen employing a variety of different skills and equipment. The cost of that labor and equipment drives most of the expense for these repairs.

In addition, crews must have continual 24/7 access to fuel, emergency power and lighting. And due to the hazards related to the work, everything and everyone needs to be insured, which includes Explosion, Collapse and Underground coverage (XCU).

Since piping failures don't recognize weekends, there are also labor costs related to overtime and Sunday work. There are also situations where shifts have to extend through the night, since restoring fire protection and potable water is of paramount importance. Nursing homes, prisons,

hospitals, and tire storage facilities cannot have their fire protection systems out of service for an extended period of time. A fire protection system should not be out of service for more than 10 hours, unless 9 specific steps have been taken. (NFPA 25 Section 15.5.1.)

For all of these reasons, when a piping leak or failure occurs there are often significant costs associated with repairing it. Fortunately, insurance can often cover all or part of the expenses described here.

A case study

Here's a short case study of a repair that occurred during the summer of 2023. A company in the Chicago suburbs called to fix an obvious underground leak that was observed nearby. This case study provides a clear example of the logistical complexity and amount of equipment involved in these types of repairs.

We received a call to repair an underground water pipe leak in an area business park. This was a looped system that served a dozen buildings. Once that happened we:

- Contacted utility locator JULIE and the U.S. Infrastructure Corp. to ensure accurate assessment of underground utilities.
- Mobilized a repair fleet (dump truck, trailer, backhoe) along with material, stone, supplies, tools, trench box, foreman and crew (approximately \$900,000 in equipment).

The leak had been running for weeks and the ground was completely saturated, creating excess mud and generally unsafe conditions. There were also a variety of utilities in the area that we had to work around. We then:

- Located the main "Buffalo Box" (b-box) water shut off valve.
- Opened the earth.
- Pumped water from the hole.
- Performed additional hand digging so as to not damage the working sections of the pipe.

We had fixed a leak on this same pipe system a year earlier. Our initial inspection found that the section we had previously repaired was holding pressure correctly. The problem was in a different section of the pipe system.

When the leak couldn't be precisely located, we had to call in a specialized leak locating company to assist. We then secured the site with safety fencing and cones, barricades and caution tape.

During the days when this work was performed, the heat index in the area reached 120 degrees. So the working conditions for the crew were extremely difficult and demanding.

Once we knew the leak's exact location, we excavated, exposed the leak and provided necessary shoring, a trench box and CA-7 stone for bedding. We then:

- Demolished and removed the leaking pipe section.

- Replaced it with 16 feet of new pipe.

Valley Foreman Rich K. pressure tested the system and concluded there were additional leaks occurring. We had to excavate to expose those leaks and perform repairs similar to those already described. (Imagine a 6 person crew working in blazing sun the entire day while wearing full safety gear covered in sweat and grime from head to toe. Mosquitoes were feasting on the crew as well).

Eventually, we were able to confirm that the system was repaired and holding full pressure. We then had to:

- Reset the electric fire pump, jockey pump and fire alarm system.
- Load up the dirt and spoils and remove them to an EPA-approved testing site. (multiple trips)
- Set bushes and shrubbery aside for the on-site landscaper to replant.
- Finish grading the area.
- Clean and sweep up the asphalt driveway near the work zone.
- Haul all the heavy equipment, tools, barricades, and fuel back to the shop.
- Notify the building tenants, building owner, property manager, fire, water and building departments.

This is just one example of what was required to safely and correctly repair these types of underground piping system leaks.

Excavations can serve up surprises

As mentioned previously, when digging up the ground, you never know exactly what you might encounter. Sometimes you uncover not just leaks and aging pipes; you make truly bizarre discoveries.

I'm personally aware of excavations where work crews found:

- An unopened case of vintage whiskey (from the prohibition era).
- Dinosaur eggs.
- A buried safe with money inside.
- An ancient coffin in an unknown graveyard.
- A fossilized mammoth tusk.

It's often said that outer space holds many mysteries. But as you can see, there are some very strange and puzzling mysteries buried below our feet.

Work crews deserve our gratitude and respect

Because underground water piping systems really are the veins and arteries of our nation, it's not overstating things to say that the crews that work on these systems are genuine first responders that we all need to be thankful for. They truly are "surgeons of the earth" who help

ensure the health and safety of local businesses and communities, by providing a reliable supply of fresh water.

Similar to doctors or paramedics, there are times when the crews that work on piping repair have to be on call. When they're on call, they need to be drug and alcohol free and ready to respond at a moment's notice. Family and personal life have to be put on hold. (In other words, if a tradesman is on call, he or she cannot be out of town or enjoy a can of beer at a family cookout).

As mentioned previously, they often have to work in both bitter cold and desert-like heat, along busy highways and around potentially dangerous utilities and chemicals. So it's critical that they're routinely alert, knowledgeable and conscientious.

They are also far more highly skilled than they are often given credit for. An experienced backhoe operator could "pick a quarter off of your shoulder without you even knowing it."

For all of these reasons, we should always treat these crews with respect, admiration and genuine gratitude.

You often get what you pay for

The statement that "you get what you pay for" may be a cliché, but when it comes to underground piping repair, it's also a valid caution that buyers should beware.

As noted previously, underground piping repair involves a number of skilled union tradesmen driven by pride plus a substantial amount of costly equipment, so it's never inexpensive. That cost leads some businesses and municipalities to lean toward the lowest bidders when repairs are necessary.

The problem is that the rock-bottom bid can sometimes reflect short cuts, quick fixes, poorly maintained equipment, and inferior materials. Having to fix an underground pipe leak is certainly an unwelcome expense, but having to dig up and re-repair a pipe that was recently "fixed" is truly burdensome and a further drain on finances.

So choose wisely and look beyond the cost alone if and when you need to repair an underground pipe system. Making the right choice can be the difference between "one-and-done" and enduring an underground Groundhog Day. Does your underground contractor offer daily video and photographs of the repair to keep you informed and help with the insurance claim process? Will your contractor be around a year from now to honor a potential warranty claim?

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Please join us in celebrating Valley's 50th anniversary this year.