SINKING UNDERGROUND INTO ONE OF OUR MAIN PROBLEMS

By Jonathon Barnes

Our water mains play a crucial role in delivering clean and safe water to communities. One of our "main" problems, however, is that the soil composition surrounding these pipelines can significantly alter corrosion rates across NY, where the soil content varies. Understanding the relationship between soil composition and water main corrosion is essential for maintaining an efficient and long-lasting water distribution system. I'd like to shed some light on how different soil types in the region can affect water main corrosion and some of the measures that can be taken to address and work towards understanding a "main" issue with our water distribution mains.

Soil Acidity:

One of the primary factors influencing water main corrosion is soil acidity. Acidic soils, often found in NY, can accelerate the corrosion process. Acidic soils contain high levels of dissolved ions and organic matter, which can increase the corrosivity of the environment surrounding the water mains. These ions, such as sulfates and chlorides, can react with the metal pipes, leading to accelerated corrosion rates.

Moisture Content:

The moisture content of the soil can also affect water main corrosion. Wet soil conditions promote the formation of an electrolyte, allowing the flow of electrical currents between the pipe and the soil. This creates an electrochemical reaction known as galvanic corrosion. In NY, where rainfall is relatively high, the moisture content of the soil can contribute to increased corrosion rates.

Soil Resistivity:

Soil resistivity measures the ability of the soil to resist the flow of electrical current. Lower soil resistivity values indicate higher conductivity, which can enhance corrosion rates. NY soils, such as clay and loam, often have moderate to high resistivity levels. However, in the presence of moisture, dissolved salts, and other corrosive agents can significantly reduce the resistivity of the soil, increasing the corrosion risk for water mains.

Soil Composition:

Different soil types in NY can influence water main corrosion differently. For example:

Clay Soils:
Clay soil tends to retain moisture, creating an environment conducive to corrosion. Additionally, clay particles can trap and retain corrosive substances, such as salts, exacerbating the corrosion process.

Sandy Soils:
Sandy soils drain water more efficiently, reducing the likelihood of prolonged moisture exposure. However, sandy soils may contain abrasive particles that can cause physical damage to pipe coatings, increasing vulnerability to corrosion.

Loamy Soils:
Loamy soils, a combination of clay, silt, and sand, can possess varying characteristics depending on their composition. The corrosiveness of loamy soils will depend on factors such as moisture content, organic matter, and dissolved salts.

Alleviation Strategies:

To alleviate water main corrosion amongst NY soil in particular, several strategies can be implemented:

Protective Coatings:

Applying protective coatings, such as epoxy or polyethylene, to the water mains can provide a physical barrier between the pipe and the surrounding soil, reducing corrosion rates.

Cathodic Protection:

Cathodic protection systems, like the sacrificial anode systems, can help prevent corrosion by directing the flow of electrical current away from the water main.

Soil Testing:

Conducting soil testing to assess its corrosivity can provide information critical to the selection of appropriate corrosion control measures. Understanding the soil composition and its corrosivity allows for targeted strategies to address the area.

Regular Inspections and Maintenance:

Implementing a comprehensive inspection and maintenance program is crucial. Regularly monitoring the condition of water mains, identifying signs of corrosion, and promptly addressing any issues can help prolong the lifespan of the infrastructure.

The soil content surrounding our water mains plays a significant role in water main corrosion. Factors such as soil acidity, moisture content, soil resistivity, and soil composition can all contribute to accelerated corrosion rates. By understanding these factors and pursuing appropriate steps, every Operations Specialist can effectively manage and reduce water main corrosion, ensuring a reliable and long-lasting water tight distribution system for years to come. 💧💧💧

Jonathon Barnes
Circuit Rider
barnes@nyruralwater.org