Cascade **Chemistries**
PATHFINDER

WHAT IS THE PATHFINDER?

Although research over the last 20 years has shown distribution and contact of in situ chemistries is a key success factor, injection technology has not advanced. That's why Cascade developed a fully-automated injection system called the Pathfinder, designed to deliver microscale solids like ZVI and activated carbon more effectively in transmissive zones. It addresses the issue of distribution by providing an automated system that takes human variables out of the equation, while Cascade Chemistries products provide persistent contact with contaminants in the subsurface.

HOW DOES IT WORK?

The automated system involves:

- Flow control via automated valves that adjust automatically to meet pressure and flow set points.
- Control of injection pressures, groundwater depth changes, and flows minimizing fracturing, excessive groundwater mounding and short circuiting.
- Continuous monitoring and data logging of injection rates, pressures, and in-well pressure transducers, thermocouples, and water chemistry.

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Pathfinder Benefits

Colloidal solids and liquids can be distributed through transmissive zones via soil pore throats, but existing injection technology is imprecise and cannot prevent distribution through new flow paths by exceeding the fracture pressure or the site's hydraulic capacity. Automation that sets precise shutdown or control setpoints ensures optimal distribution with supporting documentation. This system can achieve injection performance at up to 10 simultaneous locations with direct push or injection wells.

Pathfinder Return on Remediation Investment

- Considering the large life cycle costs of remediation and the investment made in characterization, design, chemistries and their injection, it only makes sense that injection approach be optimized.
- Automation results in lower costs and a shorter time frame to achieving remediation goals.

For more information, visit
www.cascade-env.com/
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TURNKEY SOLUTIONS

While effective chemistries are a key part of successful remediation solutions, Cascade's turnkey solution meets the overall in situ remediation objective "to make contact with contaminant mass for a long enough period of time to achieve destruction." Cascade adds significant value and higher performance to the application its Chemistries by providing:

- High resolution design optimization through our MIHPT and Waterloo^{APS} subsurface technologies to identify target zones based on mass, lithology, and hydraulic conductivity.
- Bench-scale and column testing as needed.
- Advanced automated injection and fracturing technologies for both liquids and solid slurries.
- Client design support for chemistry dosing and critical injection parameters, including spacing and injection volumes and concentrations based on geology and hydraulic conductivity.
- Water hydraulics testing and field design optimization to eliminate any full-scale unexpected conditions.

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