

Groundwater Remediation

Introduction

Good quality groundwater is an important natural resource. It provides drinking water for the public as well as process water for industrial applications. Groundwater can become contaminated through a number of ways including improper handling of process chemicals or disposal of wastes. Although the Federal Water Pollution Control Act (Clean Water Act) now mandates regulation of industrial and municipal discharges, many bodies of water have become polluted over time prior to such environmental legislation. Municipalities are required to remediate ground water to reduce public and wildlife exposure to dangerous toxins, including polychlorinated biphenyls (PCBs), dioxins, fertilizers, and pesticides. This Customer Application Brief (CAB) focuses on the importance of filtration in the remediation of polluted groundwater.

The Process

Figure 1 shows a typical groundwater treatment system. Contaminated source water is pumped from the remediation site to a holding tank. From the holding tank, the water flows through a series of increasingly fine filtration steps to reach the necessary effluent levels suitable for municipal or environmental discharge. First, sand filters are used to reduce the level of suspended organic and inorganic macro particles. Next, nominally rated cartridge filters are employed to reduce the level of solid particulates down to the 1-micron level. Finally, filters containing specialty media, such as activated carbon, zeolites, or ion exchange resins, reduce the level of organics, inorganics, and heavy metals down to acceptable levels. The treated effluent is then either discharged to a municipal sewer or to a designated environmental discharge zone, such as a lake, river, or stream.

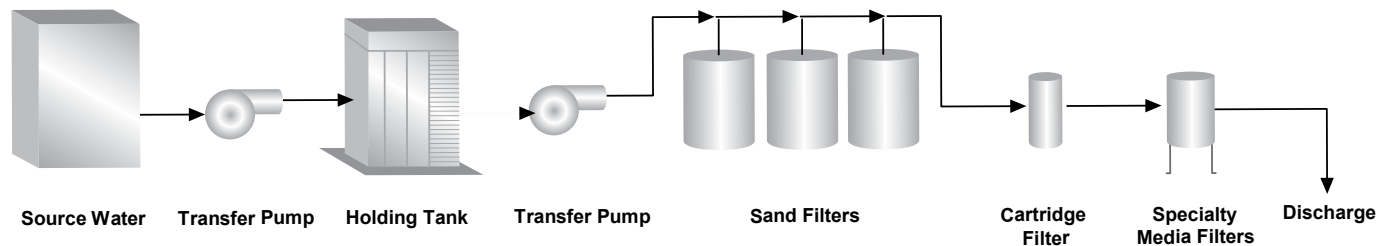


Figure 1 - Typical Groundwater Remediation Process

The Problem

Depending on the extent of contamination and the volume of contaminated source water, flow rates through the remediation process can be very high. It is not uncommon to encounter flow rates as high as 3000 gpm. Sizing an appropriate cartridge filtration system for these high flow rates would require very large housings with hundreds of conventional 2.5" diameter filter cartridges. This can require high capital costs, large system footprint, and long shutdown periods during filter change-outs. In addition, because treated groundwater is usually discharged into a municipal sewer or to the environment, remediation programs under federal or state mandates specify tight effluent discharge limits for particulates. Nominally rated filter cartridges or filter bags cannot consistently and reliably meet the effluent discharge requirements for effective remediation.

The Solution

3M Purification Inc. offers a wide variety of absolute-rated filtration cartridges for use in the remediation process. Although the actual micron grade required will vary with the particulate being filtered, typically 10 μ m absolute is appropriate for this application.

The 3M™ High Flow series filter system is ideally suited to provide effective filtration at the high flow rates typical in groundwater remediation. The 3M High Flow series filter system utilizes large diameter (6.5”) compound radial pleated cartridges in a compact housing design. High efficiency polypropylene microfiber media is used in the 3M High Flow series filter cartridges resulting in good chemical compatibility with a wide variety of chemicals and consistent, predictable particle retention efficiencies.

Compared to nominally rated 2.5” diameter filter cartridges or bag filters, the 3M High Flow series filter system offers the following advantages:

Higher Particle Retention Efficiencies (99.9%) – providing for consistent and reliable filtration of particulates that can cause off-spec effluent.

High Flow Capability – the construction of the 3M High Flow series filter systems permits flow rates up to 500 gpm with a single cartridge.

Compact Housing Design – the high flow capability results in a smaller housing required for a given flow rate translating into reduced up-front capital expenditure requirements and footprint.

Ease of Use – with fewer required cartridges, filter change-outs are quicker and easier. In addition, the High Flow system incorporates a “twist-to-lock” cartridge seating mechanism, providing for a positive indication of proper sealing and reducing the possibility of bypass.

Figure 2 shows the benefits of the 3M High Flow series filter system vs. a conventional 2.5” diameter cartridge system for a 2000 gpm flow requirement. For more information on the 3M High Flow series filter system, please request literature 70-0201-8710-3 (LITCHF1).

Conclusion

Effective and reliable filtration of contaminated groundwater is essential to help protect the environment. In addition, large scale remediation processes require a practical approach to reduce capital cost and system footprint. The 3M High Flow series filter system is ideally suited to address these issues. The high efficiency media incorporated into the 3M High Flow series filter cartridges results in consistent filtration levels and effluent quality. The high flow capability, up to 500 gpm per cartridge, translates into smaller filter housings, lower capital expenditures, and reduced time and labor costs for filter change-outs.

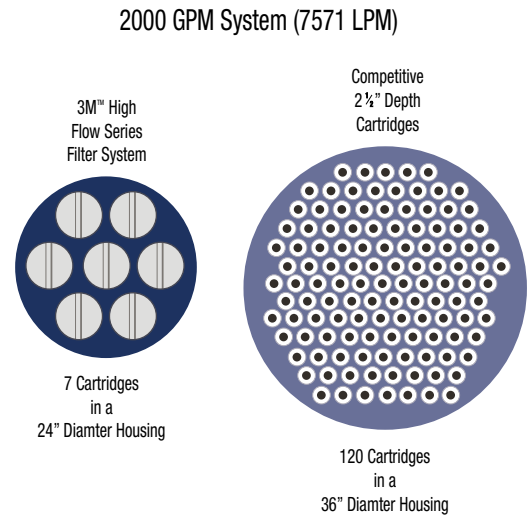


Figure 2 - 3M™ High Flow Series Filter System vs. Conventional 2.5” Cartridge System

Technical Information

The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

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3M Purification Inc.
 400 Research Parkway
 Meriden, CT 06450
 U.S.A.
 Phone (800) 243-6894
 (203) 237-5541
 Fax (203) 630-4530
 www.3Mpurification.com

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