



## CASE STUDY: WATER TREATMENT

### Addressing Irrigation Source Water Challenges in the Middle East

#### PROJECT DETAILS ::

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Project Location	Riyadh, Saudi Arabia
Project Type	Treated Sewage Effluent Filtration
Project Time Frame	Completed in 2024
End User/Customer	Saudi Arabia Government
Engineering Firm/ Consultant	RADIUS
Product Name	Yardney Sand Media Filter
Model Number	SM-350-3616-3-CS-A-CS- A-105-IE
Targeted Contaminants	Organic and Microbial Contaminants
Flow Rate	360 GPM
Pressure	105 psi
ASME Code or Non-Code	Non-Code
Quantity Of Systems	1
Vessels Per System	3
Size	36" diameter, 16" side shell
Filtration Media Type	Sand

## CHALLENGES

The Middle East is among the most arid and water-stressed regions in the world. With high year-round temperatures, minimal rainfall, and scarce renewable freshwater sources, countries across the region rely heavily on nontraditional water supplies to meet municipal and irrigation needs. Desalinated seawater serves much of the municipal demand, while treated sewage effluent (TSE) is the predominant source of irrigation water for urban landscapes, parks, and golf courses.

As a reclaimed source, TSE offers a consistent and reliable supply. However, its composition presents significant water quality challenges. TSE is typically high in organic content and microbial contaminants. Without proper filtration, algae, bacteria, and suspended organic matter can accumulate in irrigation infrastructure—fouling pipelines, clogging emitters, and driving up maintenance and replacement costs.

At the forefront of addressing these regional challenges is Dubai-based RADIUS, a consultancy and supplier of smart water control systems and filtration solutions. Founded by Fawzi Melhem in 2010, RADIUS serves public and private sector clients across the Middle East, specializing in the design and delivery of sustainable irrigation systems. The company is a trusted authority for the growing network of smart and sustainable cities across the Arabian Gulf and Middle East region, offering expert guidance in water-efficient practices for urban planning, agriculture, and landscape management. RADIUS also delivers education to the market through RADIUS Academy, a program that offers training courses to irrigation and water management professionals.

Melhem, a certified landscape irrigation auditor through the Irrigation Association (IA), became acquainted with Yardney Water Filtration Systems during an IA Irrigation Show & Education Week event in the U.S. *"Once I learned about Yardney's water filters, I thought these systems could be very effective for projects I was involved in across the Middle East,"* Melhem said.

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## ABOUT YARNEY WATER FILTRATION SYSTEMS

Founded in 1965, Yardney Water Filtration Systems is a recognized leader in water filtration solutions for agriculture, golf, turf, landscape, industrial, commercial, and municipal markets worldwide. Featuring built-to-last fabrication and Made in USA quality, Yardney filters deliver reliable, long-term performance and extended product lifecycles. Yardney's offerings include filtration systems in either ASME code or non-code construction utilizing technologies such as manual and automatic screen filters, centrifugal sand separators, sand media, multimedia, granular activated carbon (GAC), and specialized media to address contaminants such as iron, manganese, arsenic, and PFAS. The company supports a sales network spanning the United States, Mexico, and Europe, bolstered by strategic dealer alliances that ensure a robust global presence.

## Targeting Organic Contamination at the Source

According to Melhem, the risk of using TSE for irrigation is the potential for organic buildup inside pipelines—a condition known as the *"pie effect"*, which reduces the effective inner diameter and impairs system efficiency. *"Over time, as organic residuals accumulate, water flow becomes increasingly restricted due to higher friction, leading to pressure losses and poor emitter performance,"* he explained. *"Eventually, emitters clog completely despite flushing attempts. At that point, the only solution is replacement, which is both costly and a hassle."*

High ambient temperatures across the Gulf region intensify these challenges by accelerating bacterial growth and biofilm formation in stagnant or slow-moving water. This reinforces the need for high-performance filtration to prevent irrigation lines from becoming breeding grounds for microbial contamination.

*"These types of contaminants are very difficult to remove with a standard two-dimensional screen filter,"* Melhem noted. *"Even vacuum suction filters allow algae and organic matter to break down at the screen and pass through, ultimately contaminating interior pipe surfaces."*

A more effective approach for targeting organic material, he said, is a sand media filter, which relies on three-dimensional filtration. *"Unlike a screen, a sand media filter uses the depth of the media bed to trap a broader range of contaminants—it mimics a natural filtration process."* Melhem characterized Yardney as the undisputed leader in sand media filtration. *"They are the number one sand media filter producer, the best in terms of quality."*

One of Riyadh's landmark Vision 2030 Mega Projects, the Sports Boulevard was launched by King Salman bin Abdulaziz in March 2019 and is overseen through a governance framework chaired by Crown Prince Mohammed bin Salman. The initiative forms a core pillar of Riyadh's transformation toward enhanced livability, active lifestyles, and sustainable urban growth.

Yardney Sand Media Filters are engineered for the most challenging dirty water conditions in irrigation systems, delivering reliable removal of algae, biofilm, and other organic contaminants, as well as inorganic materials like sand, rock, and grit. With fine filtration down to 200 mesh (75 microns), the system effectively protects drip and micro-irrigation systems from plugging. Superior performance is achieved by several key design features, including a larger inlet, a two-stage deflector for uniform laminar flow across the media bed, and a 14-inch media depth with a gravel pack for enhanced particulate retention. A hydraulically balanced underdrain creates a low pressure drop, enabling longer run times between backwashes.



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