

The implications of Fusion 44X's success could extend beyond swimming pools, offering a more eco-friendly solution for water management in sectors where water purity is paramount.

Fusion 44X Water Quality Case Study

April 2019-April 2020

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Purpose and Scope

Fusion 44X represents a significant advancement in water management technology, particularly for swimming pools. Its chemical-free approach to balancing pH and alkalinity has garnered attention, not only for residential use but also for potential applications in various industries. The technology's effectiveness is underscored by case studies and user reviews, which highlight its ability to maintain water quality without the traditional reliance on chemicals. This innovation could lead to a broader rethinking of water management practices across different sectors.

44X would likely focus on its efficacy in maintain water quality, the sustainability of its application, and the feasibility of its use across various industries. Such research is crucial, as it validates the technology's claims and ensures safety and compliance with regulatory standards. The implications of Fusion 44X's success could extend beyond swimming pools, offering a more eco-friendly solution for water management in sectors where water purity is paramount. The integration of smart technologies, like wireless sensor networks, could further enhance the capabilities of Fusion 44 X by providing real-time monitoring and control, which is essential for water resource management.

Introduction

This study presents a comprehensive analysis of 29 swimming pools in Arizona, examining a variety of factors that could influence water quality and maintenance needs. The pools varied significantly in volume and were equipped with different types of surfaces and filtration systems. The absence of stabilizers, chlorine or pesticides in the pools is particularly noteworthy, as these chemicals are commonly used to maintain pool hygiene. The finding of this study could provide valuable insights into alternative pool maintenance strategies that minimize chemical use.

Surfaces	Filtration	Pumps
Plaster (20)	Cartridge (19)	Multi-speed (19)
Pebble Tech (6)	Sand (10)	Single speed (10)
Fiberglass (3)		

Pool volumes: 12,000 to 28,000 gallons

Flow rates: 60 – 95 gpm

The independent study was conducted by Institute of Water Studies from April 2019 through April 2020 on residential pools that were used by homeowners with potential high swim activity, particularly during April through September. Pool owners were responsible for general maintenance of their pools and were committed to reporting any unusual events, conditions or changes in pool water quality and balance. Field tests were conducted randomly by Institute of Water Studies technicians each month on all 29 pools.

Arizona pools were chosen for this case study due to the severity of desert climate and its impact on pool maintenance. Extreme environmental factors of heat, dust/dirt and heavy rains can greatly affect pool water quality and traditional methods of sanitation. It is anticipated that the performance of Fusion 44X in this environment would translate to regions with less severe environmental factors.

Testing

The study tested the claim of a chemical free pool that was drinkable. The critical parameter in testing was bacterial since no sanitizing agent was being added to the pools.

Watersafe® Test kits for freshwater/well water were used to analyze for drinkable water quality and bacteria (eColi, coliform and other bacteria), eXact iDip 486101-KP photometer and Taylor® pool testing kits were used for pool water balance and water quality. Samples were compared to tap water from the home. Random water samples from pools with high recreational activity were also tested by EPA testing labs for drinking water analysis to verify results obtained in the field.

Although pool owners were responsible for the maintenance of their pool—cleaning debris, maintaining fill levels, and testing pH and alkalinity periodically—they also agreed to not add anything to their pools except water. During random field testing, water quality analysis included pH, alkalinity, hardness, metals (Cu, Ag, Fe), TDS, nitrates and phosphates, and bacterial testing. In addition, although chlorine, stabilizer and pesticides were not added to any pool, these were also tested for to ensure pool owners had not added them independently. Water clarity, color and odor of each pool was also noted.

Table 1. Comparison of testing parameters

	Swimming Pool	Drinking Water
pH	7.2 - 7.8	6.5 – 8.5
Alkalinity	80 – 120 ppm	30 – 400 ppm
Hardness	200 – 400 ppm	120 -170 ppm ^a
Metals (Cu, Ag, Fe)	0 ppm	0 ppm
TDS	400 – 1500 ppm	50 -300 ppm
Chlorine	Recommended 3 ppm ^b	Up to 4 ppm ^b
Nitrates/Phosphates	< 500 ppm	0.05 – 0.1 mg/L
Bacterial	235 cfu/100 ml	100 cfu/100 ml ^c

a: Hardness levels greater than 170 ppm in drinking water is reflective of very hard water but is still considered drinkable up to 300 ppm. Hardness may vary and is directly related to the originating source of tap water used to fill swimming pools. Minimum Hardness levels of 200 ppm are required for pool surface preservation.

b: Fusion 44X requires no chlorine and should maintain at 0 ppm.

c: Rapid tests for the presence or absence of bacteria such as e Coli, coliforms and other bacteria were used for the study.

Drinking water standards are determined by the Environmental Protection Agency (EPA) and are established for the health and safety of individuals. Where applicable, certified EPA testing labs were used to verify field test results.

Results

Visual clarity with no color changes detected. Pool owners reported that no unusual changes of cloudiness or color were observed during regular weather patterns. Under extreme weather patterns of monsoons, water clarity returned after dirt and debris were cleaned and filtered through the pool equipment.

pH and Alkalinity remained consistent for all pools with registered values within the normal ranges recommended for balanced pool water quality. No pools had pH below 7.2 and all pools maintained alkalinity within 20% of their initial value.

Water Hardness changed slightly over the course of the one-year study due to the addition of water to maintain pool water volume, however water hardness did not exceed 400 ppm in any pool. Compared to City Water reports, Hardness levels were not significantly elevated for drinking water quality.

Chlorine was not detected in any pools, confirming that pool owners were not supplementing sanitation by the addition of chlorine, bleach or shock treatments.

Metals analysis for Copper, Silver and Fe showed no detectable presence, confirming that alternative methods of sanitation such as ionizers or algaecides were not used.

Nitrates/Phosphates did vary in pools depending on the surrounding environment and weather patterns/conditions, however they did not have impact on pool water quality or result in any visible algae growth.

Bacterial testing consistently registered negative results for the presence of bacteria at the detection levels of the test kits. This indicated the absence of bacteria that could impact the health and safety of humans. Field tests results were verified by EPA test labs.

Summary

The Fusion 44X System effectively managed pool water over the course of study. The system required no chemical additions of chlorine, stabilizer or pesticides during typical pool use or weather conditions. Pool owners frequently commented on the ease of use of the system and were impressed with the pool water clarity and feel.

In addition to maintaining pool water quality, tests indicate that the water also passes drinking quality standards established by the EPA. Field testing showed no significant changes compared to tap water quality over the course of 12 months.

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Additional Notes:

During random testing of pools, it was observed (and pool owners commented) that the acid where the Fusion 44X probe resides appears to get depleted over the course of a month. The manufacturer confirmed that this is normal and provided assurances that the acid is not going directly into the pool. Both pH and alkalinity testing supports the claim since neither parameter significantly decreased in any pool throughout the study.

Homeowners frequently commented on the shine of the water and lack of odor, side effects and no visual staining of the pool surface and surrounding pool decking materials (which include cool deck, travertine, flagstone, etc.).