

# Silver Bullet Water Treatment Case Study:

## Drip Irrigation Runoff Collection and Reuse



### The Grower's Need: Effective Microbial Control for Irrigation Water

A northern California indoor cultivation facility sought an effective and innovative treatment solution for both source water and irrigation reuse. The water treatment requirements of the facility are:

- Treatment of irrigation water for risk management of bacterial and fungal water borne pathogens;
- Ability to capture and reuse irrigation water to meet the business' resource savings goals and to comply with regulatory requirements; and
- Treatment technology that is compatible with hydroponic plant production, does not contribute to plant stress and mitigates crop loss.

**“OUR SILVER BULLET UNITS PROVIDE US WITH A CONSISTENT LEVEL OF DISINFECTION, ENSURING US A QUALITY HARVEST EVERY TIME.”**

**~ CUSTOMER TESTIMONIAL**

The grower also desired a cost-effective water treatment system that could scale with long-term plans for the business.

### Facility Profile

Incoming municipal source water is delivered and stored in four black poly tanks that are located indoors under controlled climate conditions. The facility uses reverse osmosis to treat all incoming source water.

Each flower room is designed with custom rolling grow tables. Plants are grown on stationary flood and drain tables and drip irrigated with a customized blend of nutrient fertilizers. The grow tables are fabricated to allow excess irrigation water that is not absorbed by the media, or taken up by the plant, to be gravity drained from the table. The leachate drain water is collected from each table and drains to a collection tank.



### Competitively Priced, Sustainable and Professionally Serviced Water Treatment Solution Impresses Grower

Water management plays a critical role in the function of this facility. The grower chose Silver Bullet because of multiple benefits:

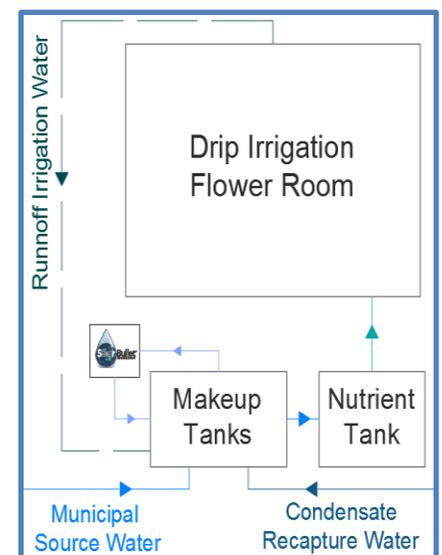
- A sustainable, “green chemistry”-based solution
- Proven bacterial and fungal control for other Silver Bullet customers;
- Professionally designed, engineered and installed water treatment system; and
- Silver Bullet's service, maintenance and water analysis program.

### The Silver Bullet Solution: AOP and UV Combination System

To maximize the facility's water treatment program, Silver Bullet installed its Advanced Oxidation Process (AOP) System, paired with direct UV disinfection. The combined technologies provided redundancy in disinfection treatment. The AOP system ensures the recirculated, treated water has slight residual disinfectant properties, which further aids in keeping the storage tanks clean and free of microbiological growth.

The facility uses a closed-loop irrigation system, where the required water pressure is provided by means of a pump. In this closed-loop system, water from the municipal utility, the climate control system and irrigation run-off are blended together, treated and re-used as irrigation water.

Within each plant production room, irrigation water is delivered to two, vertical poly tanks. These tanks are continuously treated and conditioned using the Silver Bullet-UV Treatment System. Irrigation water is then pumped to a single poly tank that is used to mix nutrient fertilizers and condition the water prior to being delivered to the plants.



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## Drip Irrigation Runoff Collection and Reuse

All run-off irrigation water is drained and collected in two holding tanks. Irrigation run-off is composed of several constituents that require disinfection and conditioning. Although this water allows for mineral nutrients not taken up by the plants to be recycled and reused, it also includes elevated levels of bacteria, unwanted organic content and suspended solids. Water from all three sources was continuously treated and blended into reliable irrigation water that is compatible with the facilities nutrient formula to prevent biological fouling.

### Proven Microbial Control

Silver Bullet developed an intensive water monitoring program around the production schedule for two of the facility's plant production rooms to ensure the water treatment solution met customer expectations. For third-party validation of Silver Bullet's performance, samples were delivered to North Coast Laboratories, a respected, state-certified third-party laboratory located a short distance from the facility. Founded in 1975, North Coast Laboratories is a full service environmental laboratory with a national client base and a reputation for expertise in the analysis of organic chemicals in a variety of agricultural commodities.

The Silver Bullet treated water in make-up storage tanks for both Flower Rooms A and B showed an exemplary level of disinfection, while the untreated run-off water had significantly higher levels of bacteria. Analysis of Heterotrophic plate count (HPC) confirmed Silver Bullet's efficacy in managing microbiology in the water (Table 1).

**Table 1. HPC 10-Week Average: Silver Bullet's Success Killing Microorganisms**

	<b>Untreated Run-Off Water</b> <i>cfu/cc</i>	<b>Silver Bullet Treated Run-Off Water</b> <i>cfu/cc</i>	<b>Avg. HPC</b> <b>Log Reduction</b>
<b>Flower Room A</b>	<b>359,000</b>	<b>30,700</b>	<b>1.07</b>
<b>Flower Room B</b>	<b>58,810,000</b>	<b>775,800</b>	<b>1.88</b>

Source: North Coast Laboratories

On average, over the ten-week production cycle, Silver Bullet treated run-off water in Flower Room A had 328,300 cfu/cc lower HPC count than the untreated run-off water with a 1.07 average bacteria log reduction. Flower Room B's results were even more impressive with a 58,034,200 cfu/cc lower average HPC count with a 1.88 average bacteria log reduction rate.

The consistent log reduction for each sample demonstrates Silver Bullet's efficacy in managing microbiology over a multi-week period. Ongoing HPC monitoring since the end of this demonstration has resulted in continued grower satisfaction with microorganism levels.



### Silver Bullet Contributes to Phytotoxicity Management Practices

Silver Bullet's water treatment solution helped the facility manage phytotoxicity effectively in the plants by eliminating or significantly limiting the use of harsh or hazardous chemicals, such as chlorine during the grow cycle. Phytotoxicity usually occurs in plants that are overly sensitive to a wide variety of compounds, including trace metals, salinity, pesticides, phytotoxins or allelochemicals.



### Clean, Silver Bullet Treated Re-Use Water Limits Facility Liquid Discharge

Effective treatment of the irrigation run-off water by the Silver Bullet water treatment solution has allowed the grower to eliminate their water discharge and reuse irrigation runoff water that otherwise would have been too contaminated to recycle.

### Silver Bullet Earns the Grower's Trust and Endorsement

After meeting the facility's water quality expectations, Silver Bullet earned the endorsement of the grower. Because of this support, Silver Bullet is actively working with several industry consulting agencies and cultivators to expand the adoption of its treatment technology in similar applications.

If your business could benefit from improved water treatment methods, contact Silver Bullet Water Treatment for a complimentary evaluation of your water system.