

**Summarized Case Study:  
Glendale Water & Power (PW)  
Glendale, CA**

**Key words:** Glendale, CA, potable water, stratification, water age, nitrification, chloramine, chemical savings



**Photos:** First photo shows the installation of a SB1250v12-PW collapsible model through the 24" diameter access hatch; second photo shows the SolarBee control box and solar panel mounted on the tank; third photo shows the 55-foot tank into which this SolarBee was deployed.

**System Overview and Reservoir Data:** Glendale Water & Power (GWP) operates and maintains a potable water system serving some 210,000 people with approximately 380 miles of distribution system piping and 28 storage facilities. The potable storage facilities consist of in-ground reservoirs, above ground steel tanks, and partially buried reservoirs with storage capacities that range from 80K gallons to 57 million gallons. The tallest storage facility is a 50+ ft above-ground tank with difficult road access. Approximately 70% of the water supply is from Metropolitan Water District that supplies water treated with chloramines for disinfection. The remaining 30% is supplied from groundwater. There are seven major pressure zones in the system, and typically the lower zones operate in a chloraminated state and the upper zones in a chlorinated condition.

**Reported Problem Before SolarBee Installation:** In order to provide sufficient reserves for fire suppression and maintain Glendale's top insurance rating, storage facilities are large relative to potable demand. Storages are located at a wide range of elevations, and have historically experienced widely varying water age that created challenges in maintaining disinfection residuals and preventing nitrification. Based on routine monitoring data, actions were taken to control nitrification, trim in the chloraminated areas, and deep-cycle stored water to reduce water age. These actions maintained water quality, but also created taste and odor issues. Typically, powdered HTH (or in some cases, liquid sodium hypochlorite) was applied through one or more dosing ports in the roof of the reservoir or tank. But because these disinfectants have a specific density greater than 1.0, they would sink and create significant "slugs" of disinfectant at the lowest part of the storage, which is also the location of the common inlet/outlet piping. Therefore, the chlorine disinfectant was not actually mixing with the stored water and instead high concentrations were drawn into the distribution system. This invariably resulted in numerous chlorine taste and odor complaints.

**Objectives of the SolarBees:** The primary objectives of the SolarBees were to thoroughly mix the tanks to prevent stratification and control nitrification from occurring. Other objectives included using the SolarBees to provide a more effective and efficient means of injecting disinfection chemicals, when required.

**SolarBee Installation Dates:** In May 2006, four (4) units were installed Glendale's potable system. In December 2006, thirty-four (34) additional SolarBees were installed to ensure that all tanks within their treatment system would have circulation and a means of controlled dosing. In this application, all models of SolarBees (from the SB1250v12-PW to the SB10000v12-PW) were installed in the various size tanks, including the SB1250v12-PW collapsible unit that fits through a 24" diameter opening (see photo above).

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**Results:** Results from the initial four (4) SolarBees over the 2006 summer showed dramatic improvements in mixing, elimination of stratification, reduction in water age and temperature, and overall water quality. In fact, results were so positive that Glendale purchased 34 more SolarBees, so now their entire potable water storage system operates with SolarBees. Overall, the system is performing very well, including tanks in the upper portion of the system that historically had difficulty maintaining uniform water age, residual and water quality. Since full implementation, GWP is finding the highest residual retainage ever recorded system-wide. Circulation, together with a better control plan and increased monitoring, greatly reduced nitrification throughout 2007, resulting in a 20% reduction in chlorine use for trimming to tie up ammonia to maintain the desired residual. The combination of deep mixing and use of the chemical dosing rings for chlorination applications have eliminated the formation of slugs. More significantly, high chlorine complaints have been reduced to near zero. The SolarBee service crew also earned very high marks from Glendale for diligence, professionalism and resourcefulness when faced with difficult installation challenges. Since the installations, all objectives are being met and Glendale is pleased with the improved, consistent water quality and the potential for economic and chemical savings.

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