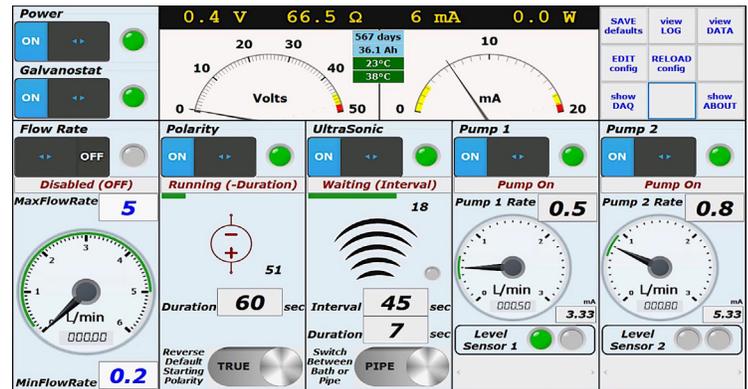


SafeGuard™ H2O: In-Situ Stannous and Tin Dioxide Generator

A fully automated, on-demand, in-situ generator of stannous (reducing agent) and tin dioxide (adsorbent), coupled with online monitoring capability developed by Aqua Metrology Systems (AMS) to address waterborne and airborne contaminants. Tin and electricity are the only consumables. SafeGuard™ H2O removes Cr(VI), Cu, and Pb from drinking water and Cr(VI), Hg, and Se from wastewater; acts as corrosion inhibitor for lead pipes and cooling systems; adsorbs H₂S, NO_x, SO₂ from industrial emissions.



Technology Description

Stannous [Tin(II)] (in the form of stannous chloride [SnCl₂]) and tin dioxide [SnO₂] are widely documented as powerful reducing agents and adsorbents respectively. AMS has designed a powerful and highly automated system, SafeGuard H2O, for the in-situ electro-generation of stannous and tin dioxide reagents from tin, on demand and in a tightly controlled dose. The system's only consumables are tin and electricity. The system has low inertia and backwash can be recycled to deliver a high produced:treated water ratio.

Stannous can be applied to remove a range of contaminants Cr(VI), Cu, and Pb from drinking water and Cr(VI), Hg and Se from wastewater; and also acts as corrosion inhibitor for lead pipes and cooling systems; and adsorbs H₂S, NO_x, SO₂ from industrial emissions. The technology can remove contaminant levels to below non-detect in water and wastewater and provides for the recovery of selenium and mercury in their elemental forms from industrial waste.

SafeGuard H2O is integrated with an online contaminant monitoring capability. High frequency continuous monitoring of contaminants at critical treatment process steps supports process automation, optimization and reliability and can give remote visibility of system performance.

The stannous reagent generator within the SafeGuard H2O system has a modular and flexible design that can be scaled to provide a broad range of treatment options by treating flows ranging from less than 1 gpm to thousands of gpm, and greater than 1 mgd in capacity. The system features low capital and operating costs making it an economical remediation approach.

The SafeGuard H2O system can be fully controlled, monitored and optimized remotely and designed to operate unattended for up to several weeks. This will reduce the requirement of personnel for onsite supervision.

The fully integrated and online SafeGuard H2O treatment approach eliminates the pitfalls of conventional systems and aids in the delivery of an affordable and reliable remediation process. The lifetime costs of this system are considerably less than that of alternative systems with their attendant challenges of toxic waste disposal, high inertia, large footprints, chemical storage and handling that make them cost-prohibitive remediation solutions.

There are no similar technologies to SafeGuard H2O that integrate a low life-time cost contaminant treatment system with real-time performance controls.

Technology Applications

Stannous and tin oxide have multiple applications across multiple industries. In-situ generation eliminates need for shipping, storage and handling of bulk chemicals, many of which are toxic and/or unstable.

Being highly automated the SafeGuard H2O system is especially suited to remote and unattended locations or where there is a shortage of trained personnel.

The system replaces problematic centralized dosing of orthophosphates as corrosion inhibitors in drinking water systems and cooling system with localized, targeted dosing on demand.

The system can be integrated into existing trace metal adsorption systems to replace existing RCF and less efficient, toxic waste producing, adsorptive media.

SafeGuard H2O can be used to enhance biotreatment systems for FGD waste by replacing non-specific dosing of organosulfides for the physchem removal of Hg from FGD waste streams in coal plants and replacing ultrafiltration to remove mercury in final effluent to levels compliant with EGL rule.

SafeGuard H2O is a green-field solution for treating drinking water for which existing technologies are unsuitable owing to their cost (e.g., Cr(VI)). SafeGuard H2O treats a range of waterborne contaminants that are deleterious to human health and the environment. The technology addresses the needs of small water systems for which the lifetime costs of existing technologies make them unaffordable.

SafeGuard H2O can reliably and economically reduce contaminants below non-detect levels, permitting a reduction in MCL for Cr(VI) to <1 ppb.

Market	Application	Arsenic	Chromium (VI)	Iron/Manganese	Lead/Copper	Mercury	Selenium	Iron/Copper	Hydrogen Sulfide	SO ₂ /NO _x /CO	Biocide
Cooling & Heating Systems	Anti-corrosion							•			•
Municipal & Residential	Groundwater	•	•	•		•			•		
	Anti-corrosion				•						•
Heavy Industry & Energy	Process Effluent	•	•								
	Process Effluent (Resource Recovery)					•	•				
	Process Gases, Flue Gas Resource Recovery, Hydrocarbon Production								•	•	
	Nuclear Power									•	
Mineral Mining	Leaching & Byproducts	•	•	•	•	•	•				
Semi-Conductor	Process Effluent	•			•						•

Table 1. SafeGuard™ H2O Markets and Applications