



Komline
Heron

SSAF

Suspended Air[®] Flotation (SAF[®])

Proven Colloidal Gas Aphron (CGA)
Technology Since 1998

The
Clear
Advantage

SAF®

“Three years ago, we started to learn about the SAF® technology. Some of the claims they were making were new to us. We didn’t fully understand the technology, and we thought... some of the things may be hard to achieve. But we’ve since learned they are capable of that.”

– Seth Walters, SVP Engineering,
Simmons Food

Heron Innovators Inc. is Now Komline-Heron

Launched in 1998 by an entrepreneurial biochemist in Loomis, California, Heron Innovators has impacted water and wastewater treatment for industry and municipalities with its Suspended Air® Flotation (SAF®), proven colloidal gas technology. SAF® is consistently outperforming conventional systems in separating solids from water. SAF® boosts efficiency, increases flow capacities, utilizes a smaller footprint, simplifies installation, and lowers operational and maintenance costs.

With installations in hundreds of sites across the U.S., Canada, and Mexico, Heron Innovators is now Komline-Heron, proudly joining the Komline family, a global leader in separation technology. Still a family business, Komline-Heron’s commitment to excellence — from our personalized customer service to our engineering expertise — endures.

Next-level Separation for Today’s Wastewater Treatment Demands

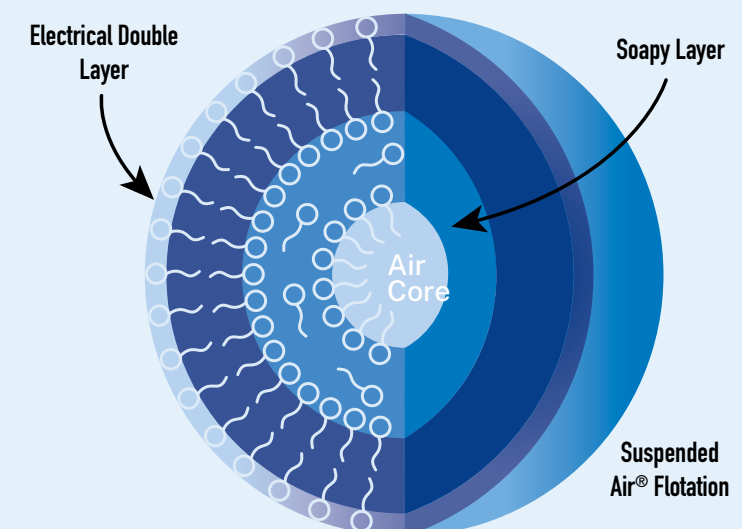
Suspended Air® Flotation (SAF®) advances the field of water and wastewater treatment with proven performance in both municipal and industrial settings. In industrial applications, SAF® is especially effective in sectors such as dairy, protein processing, paper and pulp, and oil and gas. SAFs® proprietary technology does not dissolve air into the process but uses microscopic, gas-filled bubbles called colloidal gas aphrons (CGAs). When utilizing a surfactant less than 2ppm, CGAs attach to oppositely charged particles in the wastewater, causing them to capture and float up particles immediately to be skimmed off.

In addition to biosolids removal and thickening, Suspended Air® Flotation has proven a cost-effective approach to algae and fats removal, oil and water separation, primary and secondary treatment, surface water treatment and polishing for discharge or reuse.

Customers choose SAF® because it works fast, allowing operators to treat more water in a smaller physical footprint, and it combines clarification and thickening in a single step — significantly reducing the amount of chemical use. From flows as low as 1,000 gallons per week to over 8,000 gallons per minute, Suspended Air® Flotation (SAF®) delivers consistent performance, exceptional results, increased capacity with significantly lower energy consumption, and is United Laboratories (UL) certified to meet NSF/ANSI 60/61 standards for use in drinking water systems.



Colloidal Gas Aphron



With a quicker startup, lower operational costs and less maintenance, Komline-Heron’s Suspended Air® Flotation (SAF®) technology is the choice for water and wastewater treatment.

SAF® Solution: Thickening

High Performing Solids Removal

Selecting a wastewater treatment design can be complicated by the system's operational costs, its performance, and the facility's physical footprint. Komline-Heron's Suspended Air® Flotation (SAF®) has been demonstrated to outperform more conventional technologies such as dissolved air flotation for thickening (DAFT), rotary drum thickeners (RDT), and gravity belt thickeners (GBT) for waste activated sludge (WAS), activated sludge mixed liquor, and anaerobically digested sludge within a small footprint.

Unlike DAF, which uses dissolved air under pressure to remove solids and contaminants from wastewater, Komline-Heron's SAF® uses colloidal gas aphron (CGA) technology. The SAF® process generates a suspension of micron-sized (5-25µm) air bubbles at atmospheric pressure (CGA), each encapsulated in a thin film of electrically charged, chemically active surfactant. This unique combination created outside the flotation cell gives SAF® bubbles increased surface tension keeping the bubbles stable and uniformly small, maximizing surface area for contact. Meanwhile, the charged layer creates an electrostatic affinity with oppositely charged or neutral particles in the water. Together, these properties drive rapid and reliable attachment, allowing SAF® bubbles to attract, bind to and lift suspended solids. These interactions result in efficient flotation, driving particles to the surface where they are easily removed.

While both DAF and SAF® use flotation to separate solids and liquid, SAF® does not require pressurization or recirculation to create the CGA froth. SAF® delivers 40% air by volume to the treatment process, compared with DAF's 2-4%. While DAF technology tends to produce bubbles that merge into larger ones, SAF® microbubbles are engineered to resist coalescence. This stability preserves a dramatically higher total surface area, enhancing solids capture, accelerating rise rates, and producing a stable, more robust float.

There are also marked operational differences between SAF® and DAF technologies. In most applications, SAF® has a 10-fold increase in solids loading over DAF. SAF® can handle high and variable concentrations of suspended solids of up to 2% or 20,000 Mg/L, and SAF® is simpler and faster, consumes less energy, and requires less time to process solids in a reduced footprint.

“The ability to achieve high performance under a wide range of feed sludge conditions has made the SAF® an indispensable tool for managing the anaerobic digestion process.”

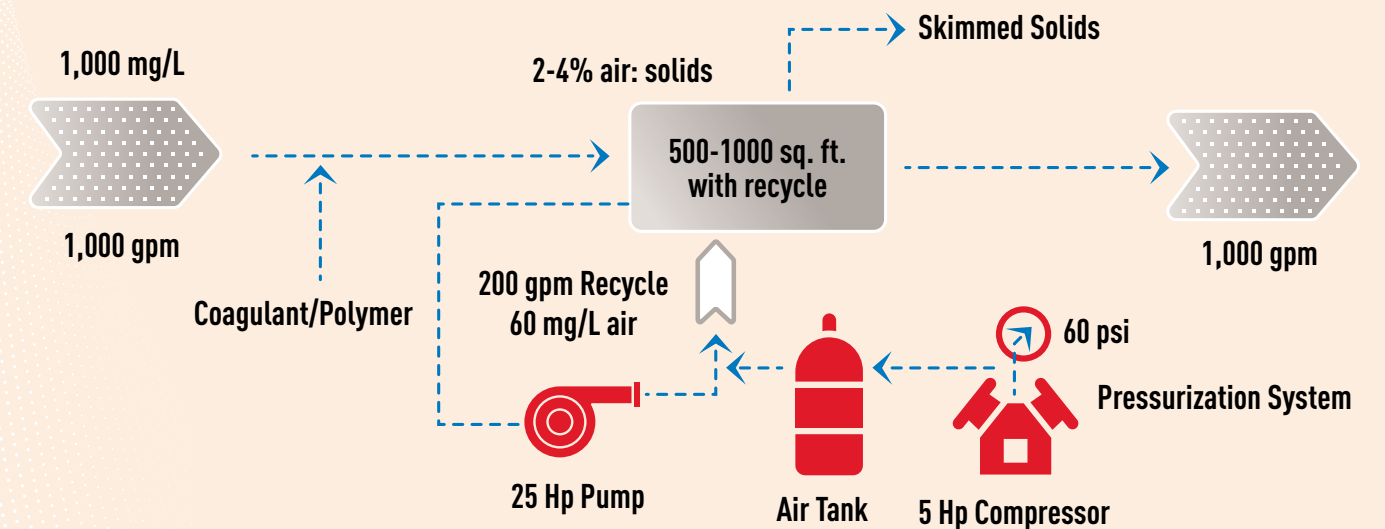
Harold Leverenz, Ph.D., P.E.,
author of “THICKENING ACTIVATED SLUDGE
WITH SUSPENDED AIR® FLOTATION (SAF®)
Summary of three case studies”

Komline-Heron can easily convert an existing DAF for any application by adding a SAF® Generator and a ClearMixer®.

Conversion results are clear:

- Increased capacity for hydraulic loading and solids
- Improved separation for cleaner effluent
- Dryer skimmed float
- Reduced operations, energy and maintenance costs
- Start-up within minutes not hours

Dissolved Air Flotation (traditional models)



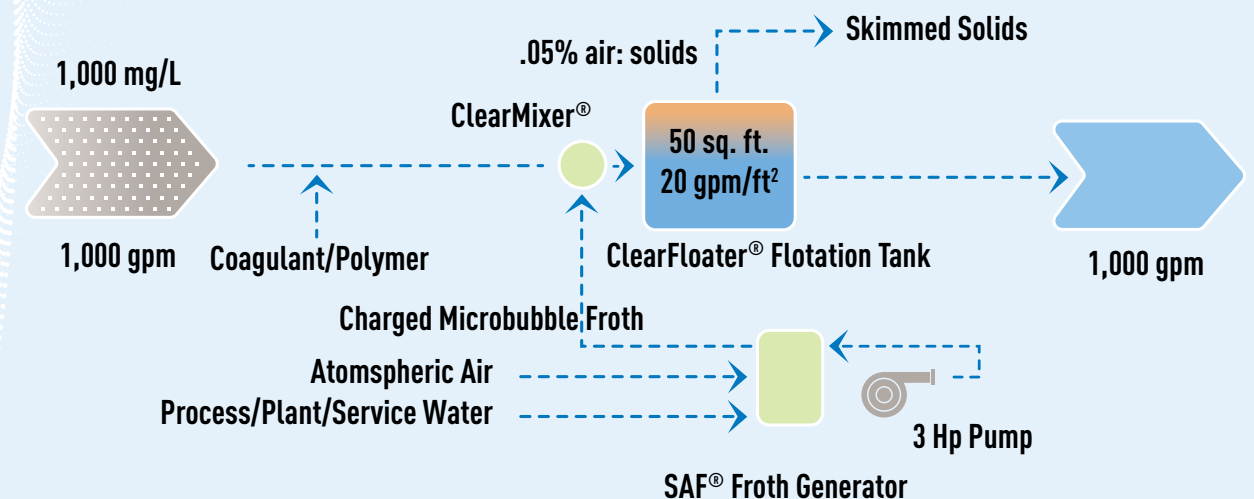
CASE STUDY



Scan to see
the case study

The **Warminster, Pennsylvania Municipal Authority's** wastewater facility had used a DAF process to thicken solids in the range of 3.5 to 4.5%. The low concentration of solids in the thickened WAS affected solids retention times in the anaerobic digesters. Also, due in part to mixing limitations within the digesters, foaming events occurred. The municipal authority replaced the DAF with a SAF® unit, and the thickened solids increased to 5.5%, which improved the digestion process and eliminated the foaming problem.

Suspended Air® Flotation (SAF®) by Heron Innovators



SAF® Solution: Clarification

Superior Clarification for Cleaner Effluent and Cost-Efficient Operations

Municipal and industrial wastewater treatment typically involves separate systems for primary clarification, secondary clarification and thickening, and tertiary polishing. Suspended Air® Flotation (SAF®) can be applied effectively at each of these stages. It functions as a primary clarifier, combines clarification and thickening in the secondary position, and provides final polishing prior to discharge or reuse. With the SAF® technology, thickening and clarification occur in one integrated system. SAF® does this using a Suspended Air® froth generator. The froth is comprised of colloidal gas aphrons (CGA) — trillions of tiny bubbles delivered at atmospheric pressure. When the influent moves through the system it is conditioned with polymer and coagulant and then through a serpentine style mixer before entering a ClearMixer® attached to the flotation cell.

The ClearMixer® is an in-line mixing chamber in the SAF® process, where the externally generated CGA froth is injected and gently stirred into the influent, driving the bubble-to-particle reactions before the flow enters the flotation cell. The solids rise to the top immediately and are then scraped off into a hopper. Solids can be further dewatered by gravity if they're needed for other uses, such as fertilizers.

Thanks to its rapid flotation mechanism, SAF® supports significantly higher hydraulic loading rates than conventional systems without compromising performance. Its ability to remove high concentrations of total suspended solids (TSS) and fats, oils, and grease (FOG) also drives substantial biochemical oxygen demand (BOD) reduction, often eliminating the need for separate treatment steps. The compact footprint, lower chemical demand, and minimal maintenance requirements make SAF® a practical and cost-efficient choice for both conversions and new system designs.

CASE STUDY

The **City of Austin, Minnesota** conducted a pilot study of both DAF and SAF® in 2020 for industrial wastewater separation. The SAF® system outperformed the DAF system on several fronts, beginning with system setup, which demanded more time for the DAF. In repeated tests of influent and effluent, SAF® yielded a higher average percentage of total suspended solids (TSS). Operationally, SAF® was more reliable, easier to operate, recovered more quickly from failures, ran more quietly, and did a better job handling changes in total suspended solids than DAF. The greater need for chemicals and for a larger footprint made DAF 25% more costly than SAF®.



Scan to see
the case study



“SEH recommends the suspended air flotation technology for industrial separation based on both monetary and non-monetary considerations. This technology has the lowest capital cost of the technologies considered.... The SAF offered greater treatment consistency and reliability when compared to the DAF.”

SEH Pilot Testing Results,
Industrial DAF Pilot Study, Austin, Minnesota



SAF efficiently captures algae for clear effluent that meets or exceeds standards.

SAF® Solution: Algae Removal

Cleaner Water for a Healthier Environment

Algae blooms in settling ponds and municipal water facilities scavenge nutrients, increase total suspended solids (TSS) and biological oxygen demand (BOD), contaminating the water and clogging downstream filtration systems. Algae growth can hamper a community’s ability to discharge treated water into waterways. Its removal is essential to improving the water system function, water quality, and the environment.

Suspended Air® Flotation (SAF®) is a cost-effective solution to algae removal. Designed to handle a range of algae blooms, SAF® consistently delivers low-turbidity effluent with levels below 1 Nephelometric Turbidity Unit (NTU) — regardless of the type of algae or wastewater.

Komline-Heron’s unique technology, which uses CGA microbubbles to capture algae, is an efficient alternative to any algae removal process or technology.

Komline-Heron’s municipal customers rave about SAF®, especially in states like California, which has stringent regulations governing the use of recycled water.

“People don’t always want something new. Do we need to continue with things that were developed in 1911 and that are shown to be less efficient than things now available in industry? I believe not.”

Robert Rawson, General Manager, Graton Wastewater Treatment Plant



Photo Credit: Brian Macmanus, PE, General Manager, East Rio Hondo Water Supply Corporation

CASE STUDY



Scan to see the case study

In the small **Sonoma County** town of Graton, for example, state officials told town officials that it could no longer discharge from its oxidation and settling ponds into the Atascadero Creek because of excessive algae and bacterial growth. The newly formed Grayton Community Services District got to work, piloting solutions. They determined that if they used the more conventional DAF® technology, they’d have to recycle 50% of the flow they were trying to produce, but with SAF®, they would only have to recycle 2%.

That meant less pumping and material handling, as well as needing smaller pipes. It also proved highly effective. SAF® consistently achieved effluent turbidity well below the state’s Title 22 requirement of 2 NTU, and the district reported a total suspended solid removal of more than 98% and a 92% reduction in biological oxygen demand. Graton’s treated water can now be used by local agricultural producers, offsetting the demand for groundwater and stream resources in the region’s watershed.



SAF® Specifications and Products

SAF® System	Flow Capacity					Float Area		Horsepower		
								SAF®	Feed Pump	Solids Pump
	GPM	MGD	LPS	M3/D	BPD	Ft2	M2			
CF25	50	0.072	3	273	1,714	5.0	0.5	3.75	1.5	3.0
CF50	125	0.180	8	681	4,286	10.0	0.9	3.75	3.0	3.0
CF125	350	0.504	22	1,908	12,000	17.0	1.6	6.0	5.0	3.0
CF250	700	1.008	44	3,816	24,000	35.0	3.3	6.25	10.0	5.0
CF375	1,000					50.0		9.5	15.0	5.0
CF500	1,400	2.016	88	7,631	48,000	72.0	6.7	9.0	20.0	3.0
CF750	2,100									
CF1000	2,800	4.032	177	15,263	96,000	144.0	13.4	19.0	40.0	3.0
CF2000	6,000	8.640	379	32,706	205,714	300.0	27.9	29.5	80.0	5.0
CF3000	8,000	11.520	505	43,608	274,285	400.0	37.2	32.5	100.0	7.5

Now part of Komline, Komline-Heron continues to bring personalized service, expertise, and the agility of a small company to every customer, backed by a global powerhouse in wastewater and water treatment for robust technical resources and long-term stability.

Suspended Air® Flotation (SAF®): Your Solution for Water and Wastewater Management

**Komline-Heron Delivers Quality, Efficiency,
and Cost Savings**

Innovating the field of water treatment technology since 1998, Komline-Heron produces better and immediate results. SAF® is a versatile clarification and thickening technology designed to remove total suspended solids (TSS), fats, oils, and grease (FOG), and biochemical oxygen demand (BOD) across a wide range of water and wastewater types. It is effectively applied in municipal systems for primary clarification, secondary solids thickening and removal, and reuse polishing; in industrial facilities handling food and beverage, protein processing, and pulp and paper; and in challenging waters from mining and oil and gas operations. Whether the goal is meeting discharge limits, recovering product, or improving downstream reliability, SAF® delivers high-efficiency performance in a compact system that is simple to operate and requires significantly less maintenance.

"It just works!"

Andy Brashear, Environmental
Manager, Simmons Foods



Scan to see
the case study

SAF® Advantages:

- **Less equipment:** Requires only a SAF® generator and ClearMixer®
- **Easier installation and startup:** Plumbed, wired, and tested, with flotation and ancillary equipment on a single skid
- **Compact footprint:** Uses about 1/10th of the space of DAF
- **Conversions from DAF:** Better separation, increased hydraulic flow and solids loading capacities, dryer skimmed float, reduced costs and cleaner effluent
- **Cost savings:** Requires fewer chemicals, less energy and less maintenance
- **Reliable:** Manages changing water conditions and is resilient to load changes

**Clarify more.
Remove more.
Expect more.**

The
Benefits
are Clear

**SAF® DELIVERS
SUPERIOR RESULTS
IN LESS TIME AT A
LOWER COST WITH A
SMALLER FOOTPRINT.**

**Solid Flux Rate
>20 lbs/ft²/hr**

**All Water.
One Source.
Your Solution.
Komline.**



Heron Innovators, Inc.

10624 Industrial Avenue

Roseville, CA 95678

Tel: 916.408.6601

KHinfo@komline.com

www.heroninnovators.com



Komline
Heron