



CREATIVE
WATER
SOLUTIONS

Breakaway[®] Flush

Air Scouring and cleaning for filters
and media

Breakaway[®] Flush Protocol

Particulate Filters in Commercial Pools

Breakaway[®] Flush and Breakaway[®] Flush/Air Scour

Introduction



A complete guide to the powerful CWS Breakaway[®] Flush Air Scour and Cleaning Process for traditional and regenerative media filters.

Includes instructions and materials list for use with virtually all of today's common filters and media types.

Maintaining effective and efficient filtration in particulate filters using sand, glass, or synthetic media is critical to achieve water clarity, efficient chemical use, and minimize water loss due to frequent backwashing. **Organic contamination** of filter media due to deposition of proteins, sugars, urea, cells, lotions, and other materials from bather loads, coats each particle in the filter and provides a biologic glue that sticks particles together under the pressure across the filter. As the organic contamination builds up over time, **individual media particles can become larger and larger clumps that eventually form solid “rocks” of sand, glass or synthetic media that provide no filtration at all.**

As organic contamination builds up in the filter it becomes a biologic/chemical reactor, and a central production environment for disinfection by-products (DBP). This results in increased combined chlorine levels, foul smelling air, skin and eye irritation, and lung irritation.

Backwashing particulate filters is the time-honored method to “clean” the filter media. By forcing pool water in reverse, backwashing is designed to remove debris from the filter and send it to waste water. The problem with traditional backwashing is that **organic contamination is very sticky and water flow is not enough to remove the molecules from the surface of the media particle.** In fact, as this process of gluing the particles together continues channels are created in the media that directly connect the laterals to the media surface. **Water always follows the path of least resistance and** the physics of laminar fluid flow means that there becomes very little interaction between the water and the particulate filter media during filtration and backwashing as these channels develop.

The extreme of this condition exists in particulate filters with old media in spas, therapy pools, and children's pools where the water is warm, biologic molecule concentration is high, and organic contamination is maximal. The media in these filters can become a solid rock with a few channels connecting the top of the media to the laterals.

This process of gluing the media particles together is progressive. As time passes, more and more particles are glued together forming ever-larger aggregates until rocks are formed. Some particulate filters have gravel in the bottom around the laterals with the media on top. This interface between the gravel and sand seems to be the area where solidification occurs. Once this happens, the water is channeled through holes in this layer during filtration and backwashing, which greatly reduces filtering efficiency and backwashing effectiveness.

Why air scour? During the development of Breakaway[®] Flush, we had a customer with a Plexiglas window on the sand filter (for a commercial spa), so we could watch the backwash process. As the backwash began, we observed that small vents of disturbed sand occurred around the surface of the media. As the backwash proceeded, there were about 10 small vents where all the water was escaping. This covered less than 10 percent of the surface area of the sand. The pool operator said this happened and he had to pump air from the spa to "explode" the sand. He let the backwash proceed until the water level of the spa dropped below the skimmers. As air was pumped through the laterals, the sand exploded. He then restarted the filtration and backwashed again. This time, the backwashing process disturbed almost 70% of the sand. We then experimented until we developed a controlled way to air scour a filter combining the effect of Breakaway[®] with the disruptive power of the turbulence of the air-water interface.

Creative Water Solutions LLC has developed Breakaway[®] Flush, which effectively removes organic contamination in particulate filters. We also developed a method of breaking up the media using a combination of Breakaway[®] and air scouring. The ideal combination to maintain maximally efficient filtration is to combine Breakaway[®] Flush with PoolNaturally[®] Plus treatment of the water. Breakaway[®] Flush treatment and Breakaway[®] air/scour reduces the organic contamination in the filter media, allowing PoolNaturally[®] Plus to condition all the water and other surfaces in the pool. They work together to provide optimal and maximally efficient water treatment.

Steps to determine what to do:

- 1) **Observe and record the pool's flow rate, differential pressure across the filter, and combined chlorine.** If the backwashing frequency is greater than once a week, the backwashing frequency is increasing over time, or the flow is decreasing – it's time to flush and air scour. If the combined chlorine levels are consistently elevated and customers are complaining of skin, eye and lung irritation, kids use their inhalers while swimming, and customers complain of the “pool smell” – its time to flush and air scour.
- 2) **Open your filter and inspect the surface of the media.** Note whether there is an uneven distribution of debris on the top of the media. Look for small mounds of media slightly above the flat surface. Remove any matted material on the top of the media. Take some media in your hand and rub it between your fingers. If there is significant organic contamination, it will be sticky. Taking care not to damage a lateral or any internal filter structures, use a pole to probe the media looking for areas that are firmer and difficult to penetrate. These are areas where the organic contamination is binding the media together. Check the edges of the filter with the probe. Many times solidification of the media is more prominent at the edges of the filter where flow is decreased. Before proceeding with the flush and/or air scour break up as much of the sand as possible. If the media has turned to solid, flushing and air scouring will not break it up. The media must be changed and then flushed and air scoured to remove the organic contamination that coats each media particle.
- 3) **Smell the media and smell your hand.** If there is significant organic contamination, both will stink. If significant organic contamination is present, you may notice that your hand itches where the media touched your skin.
- 4) **Determine the age of your media.** If you can't remove the tops of your filter body and don't have records, you can assume it is over 3 years old.
- 5) **Determine the temperature of the pool, bather load and type of bather.** Organic contamination is proportional to all factors.

Procedure for Breakaway[®] flush without air scour

- 1) Check and record the differential pressure, prior to starting the process.
- 2) Backwash the filter
- 3) Add Breakaway[®] to strainer basket using 1 gallon/10 square feet of media surface area
- 4) Close the strainer basket port
- 5) Run the filter in backwash mode to suck the Breakaway[®] into the filter until foamy water exits the backwash pipe or foam appears in the backwash sight glass and then immediately shut the pump off.
- 6) Allow the Breakaway[®] to sit for an hour
- 7) Backwash Breakaway[®] out of filter until effluent is clear and stops foaming in the discharge water
- 8) Restart filtration

Procedure for Breakaway[®] flush with air scour

Preparing the Filter to Air Scour

Insert an air scour adapter into the outflow pipe of the filter body. We use a $\frac{3}{4}$ " tap and insert a quick release connector.

Attach the air delivery hose to the air scour adapter. We use an air scour delivery apparatus that connects to a Cyclone 3 HP pool liner blower. This blower delivers enough air at a high enough pressure to air scour most spherical and horizontal sand filters. The blower creates a lot of heat, so we use a polypropylene 1 $\frac{1}{2}$ " hose from the blower to a "T" connector fitted with ball valves on the blower side and the hand pump tube. We use a $\frac{3}{4}$ " nylon hose from the "T" connector to the quick release connector.

Air scour procedure with filter cap removed – recommended for first air scour and flush

- 1) Check and record the differential pressure, prior to starting the process.
- 2) Backwash the filter.
- 3) Isolate the filter(s) to be air scoured from the pool inflow.
- 4) Remove the filter body access hatch.
- 5) Inspect the media and remove all matted debris.
- 6) Attach the air hose to the quick connect on discharge pipe of the filter.
- 7) Turn on the blower and open the valve to deliver air to the filter.
- 8) You achieve a “rolling boil” that does not eject media out of the filter. Turn off the blower and close the valve from the blower to the “T” connector and open the valve to the hand pump.
- 9) Using the hand pump that is attached to the air scour adapter, pump Breakaway[®] into the filter media. Dose 1 gallon / 10 square feet of filter surface area.
- 10) Close the valve to the hand pump and continue to deliver air to the filter for fifteen minutes.
- 11) Turn off the air and allow the Breakaway[®] to sit for at least half an hour, longer if possible.
- 12) Restart the blower and air scour the media for another 15 minutes.
- 13) Close the access port to the filter body.
- 14) Backwash the filter until the water becomes clear and does not foam.
- 15) Restart filtration.

Air scour procedure without filter cap removed

This procedure can be done on newer filters with an acrylic cover on the access port so you can see the media.

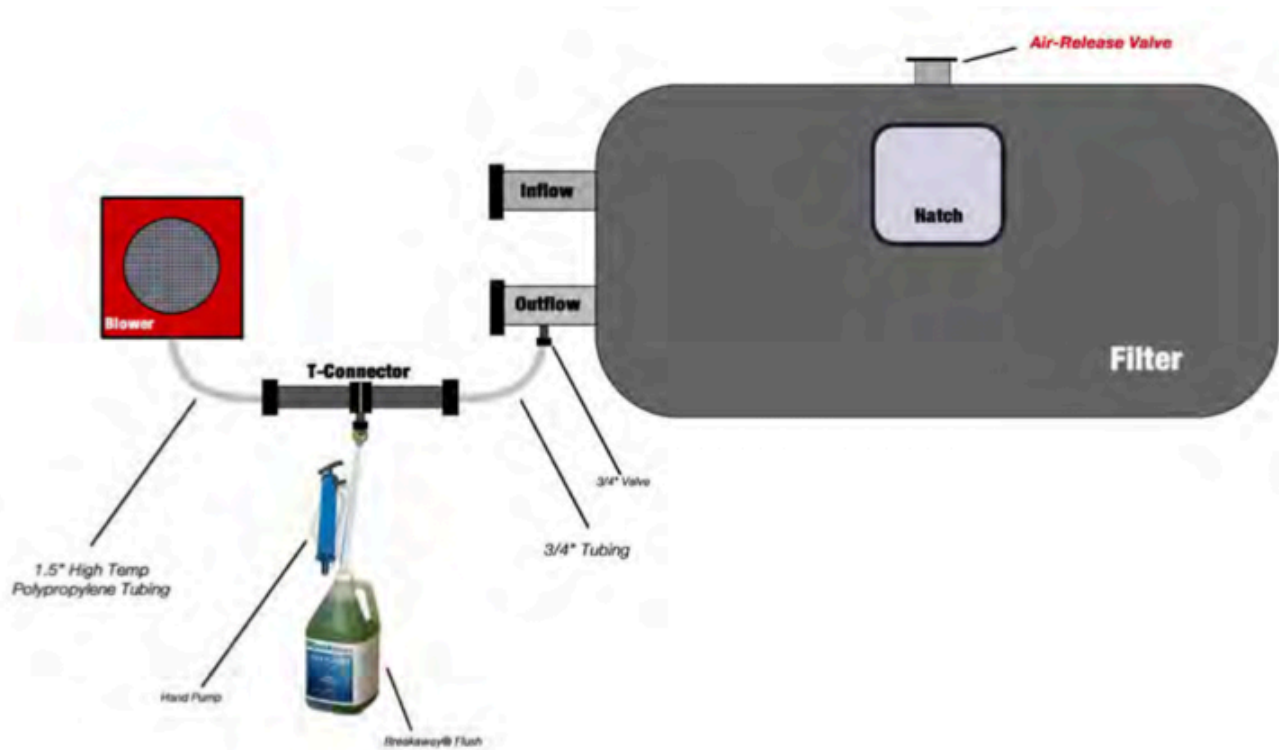
- 1) Check and record the differential pressure, prior to starting the process.
- 2) Backwash the filter.
- 3) Isolate the filter(s) to be air scoured from the pool inflow.
- 4) Attach the air hose to the quick connect on discharge pipe of the filter and **open the air release/escape valve on the top of the filter body.**
- 5) Turn on the blower and open the valve to deliver air to the filter. Observe the media bed to be sure there is a rolling boil. If the media bed does not boil, try running the filter in backwash mode with the valve opened to the lowest flow and add the air to the backwash water. The combination may provide enough disturbance to break up the media and allow it to boil. When it does, turn off the backwash and continue the air scour.
- 6) Turn off the blower and close the valve from the blower to the “T” connector and open the valve to the hand pump.
- 7) Using the hand pump that is attached to the air scour adapter, pump Breakaway[®] into the filter media. Dose 1 gallon / 10 square feet of filter surface area.
- 8) Close the valve to the hand pump and continue to deliver air to the filter for fifteen minutes.
- 9) Turn off the air and allow the Breakaway[®] to sit for at least half an hour, longer if possible.
- 10) Restart the blower and air scour the media for another 15 minutes.
- 11) Close the air escape valve on the top of the filter body.
- 12) Backwash the filter until the water becomes clear and does not foam.
- 13) Restart filtration.


Air scour system parts list:

Cyclone 3HP 120V Liner Vac/Blower

- (1) 1½" Hose Shank x FCL Coupler and Polypropylene Cam Lock
- (1) 1½" MPT x MCL Adapter and Polypropylene Cam Lock
- (2) 1½" Stainless Hose Clamps
- (1) 1½" Male Pipe Thread x 1½" Pipe Barb (10 ft.)
1½" Hose (Food Grade Transfer Hose)
- (1) 1½" Threaded Ball Valve
- (1) 1½" Close Nipple
- (1) 1½" Threaded "T"
- (2) 1½" x ¾" Threaded Reducer Bushing
- (1) ¾" Male Pipe Thread x ½" Hose Barb
Transfer Pump With Hose (Camco Antifreeze Hand Pump Kit)
- (1) ½" Stainless Hose Clamps
- (2) ¾" MPT x MCL Adapter and Polypropylene Cam Lock
- (2) ¾" FPT x FCL Coupler and Polypropylene Cam Lock
- (2) ¾" Jaco Tube x FPT
- (10 ft.) ¾" Tube Polypropylene Or Polyethylene (Between T And Pool Pipe)
- (2) ¾" Ball Valve
- (2) ¾" Close Nipple

Air scour Schematic



 Effect Matrix	PoolMoss® + Breakaway® Flush + Air Scour	PoolMoss®	Breakaway® Flush + Air Scour	Air Scour	Breakaway® Flush
Absorb Positively Charged Ions Ca ⁺⁺ , Fe ⁺⁺ , Fe ⁺⁺⁺ , Mg ⁺⁺ , Mn ⁺⁺ etc	++++	++++	0	0	0
Buffer pH	++++	++++	0	0	0
Reduce Disinfection by Products	++++	++++	+	0	+
Improve smell	++++	+++	+	0	+
Decrease eye, skin and lung irritation	++++	+++	+	0	+
Clarify Water	++++	+++	+	0	+
Remove Overall Organic Contamination	++++	+++	+	0	+
Filter media	++++	+	++	0	++
Pool and infrastructure surfaces	++++	++	0	0	0
Remove Scale from Pool Surfaces	++++	++++	0	0	0
Remove Staining from Pool Surfaces	++++	++++	0	0	0
Inhibit Corrosion	++++	++++	0	0	0
Heat exchangers	++++	++++	0	0	0
Pump seals	++++	++++	0	0	0
Metal surfaces	++++	++++	0	0	0
Reduce Chemical Use	++++	+++	0	0	0
Reduce Water Use	++++	+++	++	+	+
Reduce Liner Deterioration	++++	++++	0	0	0
Reduce and Simplify Pool Water Management	++++	+++	0	0	0

Legend

Maximal Effect	++++
Significant Effect	+++
Moderate Effect	++
Minimal Effect	+
No Effect	0

Breakaway[®] Flush Protocol

Regenerative Media Filters in Commercial Pools

Cleaning With Breakaway[®] Flush

Introduction

Buildup of organic contaminants on the filtration surfaces of regenerative filters inhibits proper filtration. Breakaway[®] Flush is designed to remove organic contaminants from surfaces by penetrating the channels within the organic contaminants and “breaking the contaminants away” from the surface. This product works most efficiently when the visible buildup on the filtration surface is physically removed. To effectively remove these contaminants from the filtration sleeves we developed the following protocol.

Process

- 1) Check and record the differential pressure, prior to starting the process.
- 2) Determine the volume of the regenerative filter body to be treated
- 3) Remove all regenerative media from the filtration sleeves according to the manufacturers directions and rinse the sleeves.
- 4) Through the side access port, remove all visible contamination with a power washer or hose spray paying special attention to the top of the filter where accumulation of organic contaminants often is the greatest and most difficult to access. If no buildup of visible organic contamination is present proceed to next step.
- 5) Through the side access port, add Breakaway[®] Flush into the filter.

Tank Volume

Gallons

100 - 150

151 - 250

251 - 400

401 - 600

601 - 800

801 - 1000

m³

.379 - .568

.572 - .946

.950 - 1.51

1.52 - 2.27

2.28 - 3.03

3.02 - 3.79

Breakaway[®] Flush Needed

Gallons

1

1.5

2

3

4

5

Liters

3.8

5.7

7.6

11.4

15.1

19

- 1) Close the side access port.
- 2) Fill the filter with water and run the circulation pump in precoat mode for half an hour.
- 3) Bump the filter fingers to expose the mesh to Breakaway[®] Flush for one-half hour if using an automated system, or once a minute for one-half hour if you have a manual unit.
- 4) Run in precoat mode for another half an hour
- 5) Repeat steps 7 and 8 for as long as feasible. The longer Breakaway[®] Flush is in contact with the filtration elements, the better it works. The minimum is two cycles or 2 hours of contact time.
- 6) Drain the filter.
- 7) Paying attention to the top of the filter, remove the access port and inspect all the sleeves.
- 8) If needed repeat the process from step 4 to 10.
- 9) Rinse the filter to remove all Breakaway[®] Flush. (Foam will disappear from effluent flow.)
- 10) Recoat and return the filter to service.
- 11) Monitor differential inflow – outflow pressure and flow rate.
- 12) Repeat process when differential pressure rises for flow rate falls.

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