Stormwater Treatment

For Industrial Applications













stormwaterx.com

Since 2006, StormwateRx LLC has been helping industrial customers meet and exceed their water quality goals with the most effective stormwater treatment systems and BMPs on the market.

Your Industrial Stormwater Experts

At StormwateRx we specialize in industrial stormwater pollutant removal. We understand the needs of industrial customers, and we know how stormwater acts on pollutants in industrial environments. This expertise helps us get results fast. Our team will design or advise on equipment integration specific to your site at little-to-no additional cost. See examples of our customer installations at **stormwaterx.com/projects**.

Committed to Quality and Innovation

We never stop innovating. We're continually enhancing our existing products, developing new technologies and applications, and subjecting them to ongoing, rigorous field and third-party testing.

Your Stormwater Compliance Partner for Life

We're in it for the long haul. We offer installation, inspection, operation and maintenance support for the life of your treatment system. Whether you want turn-key support or do-it-yourself consumables supply, our team will provide you with efficient and effective service so your treatment technology or system provides the best possible results. Go to stormwaterx.com/services for more information.



"If we develop a no-cost improvement to any of our products within one year of your system purchase, we will upgrade your system with that improvement for free."

~ Calvin Noling, Founder & General Manager

Which treatment is right for your site?

Our four foundational technologies: the Clara[®] gravity separator, Aquip[®] passive media filter, Purus[®] stormwater polisher and Zinc-B-Gone[®] downspout filter can be used individually or in combination to create the right solution for your site's needs. Visit our website to find out more: stormwaterx.com/products/.

	Clara	Aquip	Purus	Zinc-B-Gone
Free oil	Excellent	Moderate		Moderate
Floatables, trash & debris	Good	Moderate		Good
Solids & particulates	Good	Excellent	Moderate	Moderate
Metals	Moderate	Excellent	Excellent (dissolved)	Excellent (dissolved)
BOD/COD		Good	Good	
Nutrients		Excellent (phosphorus)	Excellent (nitrate)	
Bacteria			Excellent	

Reclaiming the World's Water.®

StormwateRx[®] Products



* The Washington Department of Ecology has approved the Aquip stormwater filtration system for use for basic (TSS), enhanced (dissolved metals)

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Settling & filtration

 Target Pollutants

 Free oil
 Metals

 Sediment
 Floatables & trash

Clara Gravity Separator

A below-ground, patented, grit-trash-oil-water separator for stormwater

A built-in, internal high flow bypass traps pollutants in this below-ground structure during low and peak runoff events. Clara is recommended when suspended solids are greater than 200 mg/L and oil is greater than 10 mg/L.

- Traps pollutants within the system—no wash out
- Treatment flow rates up to 2700 gpm
- Available with integrated pump package to pump to downstream treatment
- Optional screen insert for removal of plastics larger than one (1) mm
- Optional enhanced design includes a coalescing media pack for highest oil and hydrocarbon removal efficiency



Model	Treatment Rate (gpm)	Buried Footprint (ft x ft)	Sediment Storage (cu yd)	Oil/Floatable Storage (gal)
25	320	7 x 9	1.8	185
40	540	7 x 13	3.0	310
70	900	8 x 16	5.0	510
90	1120	9 x 17	6.4	650
110	1400	11 x 17	8.0	820
210	2700	11 x 28	10.0	1500

Clara Filter

A patent-pending[†], passive media filter for sediment removal and pretreatment

This system operates with gravity—no power and no mechanical or moving parts to malfunction. The overunder flow path design allows treatment flow to bypass plugged chambers. Its media is formulated for high-flow capacity and high sediment loading.

- Removes free oil, trash, suspended solids, metals and other pollutants from stormwater runoff.
- System is housed in a concrete structure with access through manhole or hatch openings.
- Extends maintenance interval of downstream treatment BMPs
- ,Excellent as pretreatment BMP to infiltration.



Model	Treatment Rate (gpm)	Buried Footprint (ft x ft)	Sediment Capacity (cu yd)
25	130	7 x 9	0.6
40	240	7 x 13	1.1
70	380	8 x 16	1.8
90	480	9 x 17	2.3
110	610	11 x 17	2.9
210	1,080	11 x 28	5.1



Clara 25C with grate inlet

Oil trapped inside Clara

Clara Filter installation

Reclaiming the World's Water.®

COUID[®] passive media filter

Aquip is a patented[†], passive media filtration technology for enhanced stormwater treatment. Its simple, easy-to-operate system uses media that can be formulated to remove a wide range of pollutants, from fine particulates to dissolved metals. Sized to fit the hydrology of the site, Aquip is typically installed above ground and fed by a simple pump station.

- Removes suspended solids, turbidity, dissolved pollutants (including heavy metals), organics and phosphorus
- Targeted metals include copper, zinc, iron, lead, aluminum, nickel and others
- Patented filtration-no chemicals, no backwash
- Passive gravity flow-through system—no moving parts
- Open top for easy access and maintenance
- Operates unattended
- Simple and safe effluent sampling
- Available structures include steel, concrete, and plastic
- Freeze protection, cover and other options available
- Tape CULD approved*

Target Pollutants		
Suspended solids	BOD/COD	
Turbidity	Phosphorus	
Metals		

Model	Treatment Rate (gpm)†	Footprint (ft x ft)
10S/P	5 - 15	3 x 9
25S	12 - 40	5 x 9
50S	25 - 75	7 x 12
80S	40 - 120	7 x 16
110S	60 - 170	8 x 18
160S	80 - 240	8 x 27
210S	100 - 320	8 x 32
300S	150 - 450	13 x 36
400S	200 - 600	13 x 47

[†]Standard. Varies by application.





Aquip 110S with optional freeze protection and rolltop cover

Aquip 250C underground (full gravity flow) Twin Aquip 10P's

* The Washington Department of Ecology has conditionally approved (CULD) the Aquip enhanced stormwater filtration system for use for basic, enhanced and phosphorus treatment. The CULD was granted as a part of the Technology Assessment Protocol Ecology (TAPE) process upon review by a Board of External Reviewers consisting of stormwater experts from across the United States. According to Ecology, "...several other states, counties, and cities use TAPE certification to determine whether a technology can be installed within their jurisdiction, including Sacramento CA, Denver CO, St. Louis MO, the State of New Hampshire, Portland OR, the Oregon Department of Transportation, and the State of Rhode Island. Aquip is arguably the first and only industrial stormwater treatment BMP approved for the treatment of solids, metals, and nutrients." The CULD approval means that Aquip can be specified and is approved for use on new and redevelopment projects in Washington as well as retrofits without additional review.

DUCUS[®] stormwater polisher

Target Pollutants

Colloidal solids Dissolved metals Nitrate Toxic organics Bacteria

Purus, a group of stormwater polishing technologies, is designed to provide the most advanced level of stormwater treatment in the most challenging water quality conditions. The Purus system is ideal for industries where higher concentrations of specific pollutants are common, or where more stringent or watershedspecific water quality standards apply. Purus is typically installed after the Aquip stormwater filtration technology in a treatment train configuration.

> Purus Metals, Nitrate or Organics vessel(s)

> > stormwateRx

Repressurization pump

- Flow matched to upstream treatment rates
- Slip-stream treatment configuration available
- Modular—adding additional capacity is easy
- Targets individual site-specific parameters

Purus Basic vessels

Removes trace pollutants

Inlet

Model	Pollutant Type
Basic	Fine particulates, colloidal solids and turbidity
Metals	Dissolved metals to the parts-per-billion range
Organics	Categorical organics such as BOD and COD; toxic organics such as PCBs and PAHs; and dissolved organics such as petroleum hydrocarbons (TPH) and VOCs
Bacteria	Bacteria, such as E. coli and fecal coliform
Nitrate	Intermediary degradation product of organic nitrogen, ammonia and urea



Purus Basic



Outlet

Purus base tank

Purus Organics and Metals

Purus Bacteria

Purus Nitrate

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ZINC downspout filter

Target Pollutants

Roof litter

Zinc-B-Gone[†], a patent-pending, cost-effective, standalone stormwater treatment technology, provides an advanced level of dissolved metals removal. Designed specifically for filtration of rooftop runoff or other relatively clear water sources, these units reduce zinc, copper and other dissolved metals to below

b-gone

Zinc-B-Gone Basic

For downspout applications

- Fits 3" 4" round or square downspouts
- Ideal for TSS <10 mg/L</p>
- Contains 10 lb dissolved metals removal capacity
- Over 400,000 gal of treatment capacity, rated at 15 gpm
- Reversible: right or left inlet/outlet
- Integrated, cleanable debris screen
- Drain port for winterization
- Do-it-yourself installation and maintenance
- Compact design (L = 46", W = 21", H = 43"; 950 lbs) with a lockable lid

benchmarks or action levels. Zinc-B-Gone is available in various sizes, from a unit for an individual downspout (Basic), to larger sizes for combined downspouts (Pro). All sizes are effective and simple to operate and maintain while delivering the highest zinc removal capacity on the market.

Zinc-B-Gone Pro

For large-scale roof runoff applications

- Super-duty tank for many years of service
- Rated from 25 gpm to 1200 gpm
- Highest zinc removal capacity on the market
- Separate pretreatment and filtration chambers for reduced maintenance
- Internal high flow bypass, totalizing flow meter, flow control valve, inlet and outlet sample ports
- Includes factory assistance for installation
- Cover, freeze protection and other options available



Removes other metals, too!



Zinc-B-Gone Basic

Zinc-B-Gone Basic debris screen

Zinc-B-Gone 160 Pro

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StormwateRx[®] Applications

StormwateRx products apply in virtually every industrial stormwater application. You'll find our systems in industries including metals, recycling, energy, petroleum, marine chemicals, food processing, solid waste, transportation, wood products, light industry, and more.

Shipyards Boatyards Marina wash racks Fuelina Vessel cleaning



Municipal (MS4) Applications



Land Transportation

Galvanizing Foundries Smelting Die casting Metal manufacturing Steel mills

Maintenance activities Trucking **Railroad terminals** Airport maintenance Warehousing Unpaved yards

Galvanized roofing Air emission deposition Non rooftop zinc sources





Other Industries



Energy & Power Generation

* Representative cross-section of industry sectors.

Reclaiming the World's Water.®

Redevelopments Remediation

New industrial

developments



Marine terminals Towing & tugboat Deep sea transport

Power plants Coal handling Blowdown Tank farms Cogeneration Bulk fuel terminals

Non-ferrous metals Recycling Shredders Paper, plastic, glass Automobile salvage

Sawmills Asphalt paving Building materials Landfills Manufacturing

Warehouses

Ferrous metals

Customer Profiles





Alaska Marine Lines (AML), a subsidiary of Lynden Incorporated, provides marine freight transportation from Seattle, Washington to and from Alaska, Prince William Sound, Hawaii and the Yukon Territory of Canada. The 70acre Terminal 115 facility in Seattle handles 750,000 tons of goods annually, making it the West Coast's largest barge terminal. In 2011, AML initiated a program to retrofit its facilities with stormwater treatment to remove copper, zinc and turbidity from stormwater. Since 2011, the facility has retrofit five of its facilities with Aquip® enhanced stormwater filtration systems, including three Aquip 210SBEs, an Aquip 160SBE, an Aquip 110SBE and three

Zinc-B-Gone Pros to provide a total of almost 1,000 gpm of treatment capacity. In 2015, the industrial general permit was modified to include an effluent limit for TSS for discharge to a 303(d)-listed water. Because of Alaska Marine Lines' stormwater improvements



and StormwateRx's treatment systems, the AML facilities have been in consistent attainment and full compliance with the Washington Industrial Stormwater General Permit. Another Lynden subsidiary, Brownline, installed an Aquip 300SBE at its Mount Vernon, Washington facility in 2018.



Calbag Metals Co., Portland, Oregon – Metal Recycling

Calbag Metals Co. operates a 4-acre, non-ferrous metal recycling facility in Portland, Oregon. Initially, the facility had been using catch basin inserts, along with an oil water separator and a cartridge filter with compost media, to treat the site's stormwater prior to discharge. Though the cartridge filter noticeably reduced contaminants in Calbag's stormwater discharge, it was not able to achieve adequate copper or zinc removal to meet the site's stormwater permit requirements. In 2008, StormwateRx designed an Aquip® Model 160SBE system for Calbag Metals using historic stormwater sampling data from the site, as well as the known pollutants commonly found in scrap yard stormwater runoff. StormwateRx integrated the Aguip into the original design of the site's

stormwater conveyance system, keeping the oil-water separator as pretreatment to the Aquip. With this approach, the stormwater runoff first passes through the existing oil-water separator vault for pretreatment and is then pumped above ground where it flows through the Aquip filtration system for treatment. The success of this system led Calbag to install



StormwateRx Aquip filters at two of its other facilities in Oregon and Washington in 2010 and 2012. A Purus polishing system was added in 2016 to meet new lower benchmarks for copper. Again in 2019, Calbag Metals received a monitoring waiver for all pollutants.



Polymer Compound Manufacturer, Southern California – Plastics Manufacturing

A 4-acre polymer compound manufacturing facility in Southern California was well over numeric action levels for zinc and TSS. The company sought StormwateRx's help to lower their discharge concentrations to comply with NPDES regulations and to avoid legal action. The facility's acreage is split into two outfalls that flow to the street. The 1.1-acre north outfall includes partial roof runoff and has sheet flow across the pavement. The 3.4-acre south outfall includes a paved manufacturing surface as well as roof runoff which flows through a buried 18-inch corrugated metal pipe to the street. To verify performance of the recommended advanced filtration treatment technology for their application, the customer conducted an independent pilot test using

an Aquip[®] 10PBA. Because the rooftop runoff was a known zinc hotspot, the pilot unit was connected to the downspout of the roof at the north outfall. The

laquip[®]

pilot test exceeded the company's performance expectations for compliance, so they purchased an Aquip 80SBEA (80 gpm) with a bypass pump vault for the northern acreage, and an Aquip 210SBEA (180 gpm) with a bypass pump vault for the southern drainage sub-basin to treat the entire facility. With their StormwateRx systems, the company remains in compliance, below the action levels and eligible for Sampling Frequency Reduction. An added benefit expressed by the company's management was that the units are low-maintenance.



Testimonials



"Canal Boatyard has always been known as one of the cleanest facilities on the waterfront. We are proud to be at the forefront of the effort to keep runoff pollution to a minimum. The 2009 installation of the StormwateRx system filters runoff water from the entire yard, ensuring contaminants don't make it into the waterway."

- Ivaylo Minkov , Manager, Canal Boatyard, Seattle, Washington, USA

"StormwateRx represents best of class solutions that provide a ROI every manger will appreciate. Given the choice to proactively make a capital investment versus being subject to third party lawsuits I will always choose to invest in the future of our business. This is why we partnered with StormwaterRx."

- Edward Kangeter IV, CEO, CASS, Inc., Oakland, California, USA

"Locally-available treatment systems seemed to offer a short-term solution, but we wanted to future-proof our site for generations to come, and we found the ability to do so with the systems we invested in from StormwateRx." — Trevor Munro, Managing Director, Metalcorp NZ Ltd., Christchurch, New Zealand

"We are always looking for ways to improve the efficiency and sustainability of our operations, and making sure we have the best stormwater treatment equipment is part of that commitment. The StormwateRx treatment train has put Davis Industries at the forefront of environmental technology for the scrap metal recycling industry and we are proud to own one of the most environmentally protective systems on the East Coast."

Bill Bukevicz, Executive Vice President, Davis Industries, Lorton, Virginia, USA



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