



it once, and let it sit for 12 to 16 hours. The acid dissolves the scale and moves it out of the system," he says. "It doesn't just mask the odor." If buildup is severe, Leclerc suggests several applications spread over the course of a week. Hard-plumbed black-water lines in large yachts tend to build up scale throughout their length, requiring cleaner to be circulated throughout the system.

Black-water tanks also have to be maintained. "Once toilet paper and waste harden on the walls, they're difficult to remove," says Jan

Thomson, a chemist for Thetford Corp. That buildup traps additional material, compounding the problem. "We use surfactants to clean the walls and a deodorant to control odor." Thetford offers three products to clean tanks and control odors: traditional Aqua-Kem, formaldehyde-free EcoSmart and EcoSmart Enzyme.

Toilet and macerator seals also require attention. "When those seals get sticky, they can be damaged every time the valve opens and closes, shortening their lives," Thomson warns. She suggests Thetford's Drain Valve Lubricant or Toilet Seal Lubricant and Conditioner. "Let it sit for six or eight hours," she says. "It absorbs into the seals to let them open and close freely, increasing their life."

Gray-water plumbing is tougher to clean. Food

Go with the Flow Don't let poorly maintained plumbing block your boating activities. By Vincent Daniello

Shower sumps, sea strainers and marine toilets — also known as the more euphemistic marine sanitation device or MSD — aren't given much thought until they don't work. The plumbing that carries gray water, seawater or black water gets even less attention, but neglecting these pipes can cause problems in the systems they support. Potable-water pipes need occasional attention as well. Maintaining that plumbing through periodic cleaning is much easier than replacing it. Once they've been neglected too long, lining those pipes in place is another option.

"Black-water plumbing seems to have the most problems," says Patrick Leclerc, president of TRAC Ecological. "When water mixed with waste evaporates, it leaves behind uric acid scale," he says, causing odor and eventually flow restrictions that lead to poorly working toilets. Yachts with flexible hose for black-water plumbing fare worse than hard-plumbed systems. "Everywhere that hose dips, water sits," he says. "Most of the buildup happens in those dips."

His company's solution, Sew Clean, removes that scale with food-grade phosphoric acid — a stronger solution of the same acid we drink in cola. "Pour a quart of Sew Clean into each head, flush

These seawater pipes servicing air-conditioners and generators were thoroughly cleaned by circulating TRAC Ecological's Barnacle Buster for about 12 hours. After descaling this pipe (top), Nu Flow coats it with epoxy.



particles, body oil, sunscreen, soap scum and hair create a difficult combination. "Soaps combine with fat and oils and become sticky," Thomson says. Minerals in water add to the mess. The result is soap scum. A few ounces of Thetford's Grey Water Odor Control poured into the drains cleans that scum and helps control odor. "Make sure there is a bit of water in each drain's P-trap to block vapors," Thomson says. Dyes in her company's products won't stain, but a large spill of formaldehyde should be neutralized with ammonia.

Potable water pipes also need maintenance. "Minerals and iron leave deposits inside water lines," Leclerc says. When boats go unused, a slimy coating forms as well. "If that system is drained and sits, that slime hardens and turns to scale," he says. "If you notice discoloration, the water flow slowing or a strange taste, it's time to clean that system." TRAC



Aqua-Kem cleans and deodorizes black-water tanks. Porto-O-Flush Jr. clears seawater pipes.



DEALING WITH DRAIN FLIES

Two types of flies can live in a boat's gray- or black-water systems. The most common resembles a tiny moth. "The aquatic larvae live in the slime lining drain pipes," says Dr. William Kern, an associate professor of entomology and nematology at the University of Florida. Kern says that boat owners can prevent the flies from breeding by scrubbing drains with an enzyme-based drain cleaner. "Use a brush and get at least down to the P-trap," he says.

Those resembling fruit flies typically live in black-water tanks. "Instead of feeding on sugars in fermenting fruit, they feed on fecal material," Kern adds. The best prevention is a sealed black-water system, including screens over vents. "It takes something a bit finer than window screen to keep the adult flies out," Kern says.

Ecological's PSR removes scale, using food-grade phosphoric acid. "Add it to the freshwater tank," Leclerc says. "Turn each faucet on until it foams, indicating the chemical has reached that faucet. Let it sit, and then turn the water back on for one minute every five minutes."

Leclerc's company also markets Barnacle Buster, the same food-grade acid with a few additives, in a variety of ready-made solutions to clean the inside of seawater plumbing systems, including air-conditioners, generators and engines.

Although he recommends wearing gloves while handling any of the company's products, Leclerc says none of them are particularly harmful to people, as long as you rinse your skin or flush your eyes if you get splashed. The acid will remove sealant from polished aluminum plates as well as from granite or marble,

though, so protect those surfaces.

Once pipes are too far gone, consider relining them rather than tearing the interior apart to replumb. Nu Flow Technologies cleans pipes with hot air and aggregate (the same principle as sandblasting) and then lines pipes with epoxy. Heated air moving through the pipe injects epoxy throughout, and that moving air then holds the epoxy in place as it cures. "We're creating a barrier between the pipe and the substance that flows through it," says Tom Bowman, Nu Flow's domestic license manager. "It's the porous metal of the pipe that calcite attaches to," he says. "When we're done, if the system is used regularly, it keeps itself clear."

When pipes have been damaged too much to repair with an epoxy coating, Nu Flow lines them with structural cure-in-place material. "The resulting pipe lining is as strong as conventional pipe," Bowman says. It is applied by pulling a collapsed felt outer form through the pipe. Inside that felt, an inflatable bladder forms the inside of the liner, and uncured epoxy lies between the felt and bladder. Inflating the bladder expands the form inside the pipe while the epoxy cures.

The system has some limitations. Although it works on metal and PVC pipes, Nu Flow shies away from PEX plastic pipe because of its expansion and flex properties. On the other hand, the bladder and mold pulled through the pipe can repair badly deteriorated pipes, even spanning long gaps.

Next time you turn on a sink or take a shower aboard, give some thought to where your water comes from and goes to, and consider that a little preventive maintenance will keep the flow going. **V**