

Vessel Maintenance and Repair

Environmental Concerns

Vessels require a great deal of attention. They must be scraped, painted, and cleaned. Their engines need to be lubricated and otherwise tended. They need to be prepared to withstand the cold of winter. Each of these activities has the potential to introduce pollutants into the environment.



Sanding, blasting, and pressure washing are meant to remove paint and marine growth. In the process, toxic heavy metals such as copper and tin may be released. If heavy metals find their way into the water, they may be consumed by mussels, worms, and other bottom-dwelling creatures and passed up the food chain to fish, birds, and humans. Heavy metals that are not incorporated into living tissue will remain in the sediments where they will substantially increase the cost of dredge spoil disposal.

Paints, solvents, thinners, and brush cleaners generally are toxic and may cause cancer. If spilled, they may harm aquatic life and water quality. Additionally, the fumes—known as volatile organic compounds (VOCs)—released by some paints and solvents contribute to air pollution. Likewise, oil and grease from maintenance areas threaten aquatic life.

Many of the cleaning products meant to be used in boat shops are also toxic. Many contain caustic or corrosive elements. They may also contain chlorine, phosphates, inorganic salts, and metals. Even non-toxic products are harmful to wildlife. For example, detergents found in many boat cleaning products will destroy the natural oils on fish gills, reducing their ability to breathe.

Legal Setting

Federal Clean Water Act—

National Pollution Discharge Elimination System (NPDES)

General Permit for Discharges from Marinas

As described earlier, all marinas that perform vessel maintenance and repair (including pressure washing) must obtain a General Permit for Discharges from Marinas from the Maryland Department of the Environment (MDE). The permit requires marina operators to control pollutants from vessel maintenance and wash areas. Please refer to [Laws and Regulations](#) for more information about the General Permit for Discharges from Marinas.

Critical Area Program

The Critical Area criteria state that adverse impacts to water quality from boat cleaning and maintenance operations must be minimized (COMAR 27.01.03.04).

Best Management Practices to Control Pollution from Vessel Maintenance and Repair Activities

Designate Work Areas One of the easiest ways to contain waste is to restrict the area where maintenance activities may be performed.

- ❖ Perform all major repairs—such as stripping, fiberglassing, and spray painting—in designated areas.
- ❖ Collect all maintenance debris. Clean work areas after completing each operation or at the end of the day—whichever comes first. Remove sanding debris, paint chips, fiberglass, trash, etc.
- ❖ Locate the maintenance area as far from shore as possible.
- ◆ Non-waterdependent areas for new marinas within the Chesapeake Bay Critical Area must be located outside of the 100-foot buffer.
- ◆ Vessel maintenance areas must have an impervious surface covering the ground (e.g., asphalt, cement, or a tarp). Although not required, where practical, a roof will prevent storm water from carrying debris into surface waters.
- ✧ If asphalt or cement is not practical, perform work over filter fabric or over canvas or plastic tarps. Filter fabric will retain paint chips and other debris yet—unlike plastic, or to a lesser extent, canvas—filter fabric will allow water to pass through. Tarps may potentially be re-used multiple times.
- ❖ Surround the maintenance area with a berm or retaining wall.
- ❖ Use vegetative or structural controls cited in Storm water Management to treat storm water runoff.
- ◆ Establish a schedule for inspecting and cleaning storm water systems. Remove paint chips, dust, sediment, and other debris. Clean oil/water separators. Required as part of a Storm Water Pollution Prevention Plan.
- ❖ Prohibit extensive maintenance or repair work outside of the designated maintenance areas.
- ❖ Clearly mark the work area with signs, e.g., “Maintenance Area for Stripping, Fiberglassing, and Spray Painting.”
- ❖ Post signs throughout the boatyard describing best management practices that boat owners and contractors must follow, e.g., “Use Tarps to Collect Debris.”
- ❖ Develop procedures for managing requests to use the work space, to move boats to and from the site, and to insure the use of best management practices.

Contain Dust from Sanding.

- ◆ Do not let dust fall onto the ground or water or become airborne.
- ❖ Invest in vacuum sanders and grinders. These tools collect dust as soon as it is removed from the hull. Vacuum sanders allow workers to sand a hull more quickly than with conventional sanders. Additionally, because paint is collected as it is removed from the hull, health risks to workers are reduced.
- ❖ Require tenants and contractors to use vacuum sanders. Rent or loan the equipment to tenants and contractors.
- ◇ Post signs indicating the availability of vacuum sanders and grinders.
- ◇ Bring vacuum sanders to tenants if you see them working with non-vacuum equipment.
- ◆ Conduct shoreside sanding in the hull maintenance area or over a drop cloth.
- ❖ Restrict or prohibit sanding on the water to the greatest extent practical.
- ❖ When sanding on the water is unavoidable, use a vacuum sander and keep dust out of the water.
- ❖ Use a damp cloth to wipe off small amounts of sanding dust.
- ◆ Collect debris. Characterize the waste (either through an independent laboratory or product knowledge/MSDS) and bring it to a facility authorized to manage municipal or industrial solid waste, provided that, if the waste is hazardous, the amount generated is less than 220 pounds per month or less than this amount is accumulated at any time.

Contain Debris from Blasting.

- ◆ Prohibit uncontained blasting.
- ◆ Perform abrasive blasting in the vessel maintenance area within a structure or under a plastic tarp enclosure. Do not allow debris to escape from the enclosure.
- ◇ Investigate alternatives to traditional media blasting. Hydroblasting and mechanical peeling essentially eliminate air quality problems. Debris must still be collected, however. Consider using a filter cloth ground cover.
- ◇ Avoid dust entirely by using a stripper that allows the paint to be peeled off. These products are applied like large bandages, allowed to set, and are then stripped off. When the strips are removed, the paint is lifted from the hull. Dust and toxic fumes are eliminated.
- ◇ Invest in a closed, plastic medium blast (PMB) system. These systems blast with small plastic bits. Once the blasting is completed, the spent material and the paint chips are vacuumed into a machine that separates the plastic from the paint dust. The plastic is cleaned and may be reused. The paint dust is collected for disposal. A 50-foot vessel will produce about a gallon of paint dust; substantially less than the many barrels full of sand and paint that must be disposed of with traditional media blasting methods.
- ◆ Collect debris. Characterize the waste (either through an independent laboratory or product knowledge/MSDS) and bring it to a facility authorized to manage municipal or industrial solid waste, provided that, if the waste is hazardous, the amount generated is less than 220 pounds per month or less than this amount is accumulated at any time.

Minimize Impacts of Pressure Washing

- ◆ The General Permit for Discharges from Marinas governs discharges from facilities that perform or allow vessel maintenance ashore—including pressure washing bottoms. Facilities engaged in these activities must obtain the permit which is available at mde.maryland.gov; the permit is renewed every five years.
- ◆ Waste water from pressure washing painted boat bottoms may not be discharged to waters of the state unless it meets strict limits for: oil and grease, total suspended solids (TSS), and dissolved metals (copper, zinc, and lead). If seeking to discharge such waste water, marinas must capture and test the waste water at the point of discharge and report findings. Refer to the General Permit for testing frequency, numeric limits, and reporting requirements.
- ◆ Alternatively, marinas must collect the wash water in a closed system and send it to either: 1) a closed loop recycling system with proper disposal of solid waste; 2) off site disposal by a licensed operator; or 3) connection to the sanitary sewer with permission from the local utility's pre-treatment or industrial discharge program. Facilities that wash few boats may find containment and evaporation are an economical solution.
- ❖ Do no pressure wash ablative paint. Use the least amount of pressure necessary to remove the growth but leave the paint intact. Where practical, use a regular garden-type hose and a soft cloth.
- ◆ Collect debris. Characterize the waste (either through an independent laboratory or product knowledge/MSDS) and bring it to a facility authorized to manage municipal or industrial solid waste, provided that, if the waste is hazardous, the amount generated is less than 220 pounds per month or less than this amount is accumulated at any time.

Box 1. Bottom Paints

Antifouling bottom paints protect hulls from barnacles and other types of fouling organisms that can interfere with vessel performance. Pesticides within them also harm fish and other non-target species. Most paints work by slowly releasing a biocide, generally cuprous oxide (Cu₂O).

Antifouling paints containing cuprous oxide are not used on aluminum hulls; the interaction of copper and aluminum leads to corrosion of the aluminum. In the past tin-based paints (tributyl tin or TBT) were used on aluminum-hulled vessels. Because tin is extremely toxic and easily absorbed by fish and accumulates to high levels in sediments, it must be applied cautiously. Concentrations of TBT as low as a few parts per trillion have caused abnormal development and decreased reproductive success in oysters, clams, and snails (EPA 1993). For these reasons, Federal law restricts the use of tin-based paints to aluminum vessels, boats larger than 82 feet (25 meters), and outboard motors and lower drive units. As of December 2003 the registrations to manufacture the raw material were cancelled and in December 2005 the last registration to manufacture antifouling paint containing TBT was cancelled. The International Maritime Organization's (IMO) Treaty, *International Convention on the Control of*

The General Permit for Discharges from Marinas governs discharge of both storm water from boat maintenance areas and pressure washing waste water from cleaning boat bottoms.

Strict limits on dissolved metals in bottom wash water cause most boatyards to send the water to a recycling system, sanitary sewer, or a tank to be emptied by a licensed hauler.



Harmful Anti-Fouling Systems on Ships, will ban the use of all tin-based paints. Vessels painted with TBT paints will not be allowed to enter ports without documentation that the paint has been either removed or sealed. Modern antifouling paints for use on aluminum boats use Zinc Pyrithione and Cuprous Thiocyanate as biocides.

Any boatyard operator wishing to apply TBT paints must obtain a pesticide business license from the Maryland Department of Agriculture and employ an applicator certified to apply TBT.

Antifouling paints can be separated into three general categories:

Leaching Paints. Water soluble portions of leaching antifouling paints dissolve slowly in water, releasing the pesticide. The insoluble portion of the paint film remains on the hull. The depleted paint film must be removed before the boat is repainted. Most leaching paints are solvent based. Consequently, fumes are a concern.

Ablative Paints. Ablative antifouling paints also leach some toxicant into the water. The major difference is that as the active ingredient is leached out, the underlying film weakens and is polished off as the boat moves through the water. As the depleted film is removed, fresh antifouling paint is exposed. There are several water-based ablative paints on the market that are up to 97% solvent free. As a result, levels of volatile organic compounds are substantially reduced as compared to solvent-based paints. Ease of clean up is another advantage of water-based paints.

Non-toxic Coatings. Teflon, polyurethane, and silicone paints are nontoxic options. All deter fouling with hard, slick surfaces.

Minimize Impacts of Paints.

- ❖ Recommend antifouling paints which contain the minimum amount of toxin necessary for the expected conditions to your customers.
- ❖ Avoid soft ablative paints.
- ❖ Use water-based paints whenever practical. Touch up areas under jack stands with quick-drying, solvent-based paints. Ask your sales representative to recommend compatible paints.
- ❖ Consider metal free bottom paints coming on the market.
- ◇ Stay informed about antifouling products, like Teflon, silicone, polyurethane, and wax, that have limited negative impacts. Pass the information along to your customers.
- ◇ Store boats out of the water, where feasible, to eliminate the need for antifouling paints.

Minimize Impacts of Painting Operations.

- ❖ Use brushes and rollers whenever possible.
- ❖ Reduce paint overspray and solvent emissions by minimizing the use of spray equipment.
- ❖ Prohibit spray painting on the water.

- ❖ Limit in-water painting to small jobs.
- ◆ Any substantial painting done on land should be in the vessel maintenance area, and/or over a ground cloth.
- ❖ If painting with brush or roller on the water, transfer the paint to the vessel in a small (less than one gallon), tightly covered container. Small containers mean small spills.
- ❖ Mix only as much paint as is needed for a given job.
- ◆ Mix paints, solvents, and reducers in a designated area. It should be indoors or under a shed and should be far from the shore.
- ◆ Track emission of volatile organic compounds (VOCs) from application of marine coatings (e.g., bottom paint). Calculate pounds of VOCs emitted per day using a monthly average. A spreadsheet will make easy work of this requirement. VOC information is available on product labels, safety data sheets, or the manufacturer's website.
- ✧ Keep records of paint use to show where too much paint was mixed for a job. Use the information to prevent overmixing in the future.

Reduce Overspray. In some cases, spray painting is the only practical choice in terms of time and money. Minimize the impact of spray painting by adopting the following recommendations.

- ◆ Conduct all spray painting in a spray booth or within an enclosure.
- ❖ Use equipment with high transfer efficiency. Tools such as high-volume, low-pressure (HVLP) spray guns direct more paint onto the work surface than conventional spray guns. As a result, less paint is in the air, less volatile organic compounds are released, less paint is used, and clean up costs are reduced. Air-atomizer spray guns and gravity-feed guns are other types of highly efficient spray equipment.
- ❖ Train staff to use spray painting equipment properly in order to reduce overspray and minimize the amount of paint per job.

Handle Solvents Carefully. Refer to Waste Containment and Disposal for further information about requirements for handling, storing, and transporting hazardous wastes.

- ◆ Store open containers of usable solvents as well as waste solvents, rags, and paints in covered, UL-listed, or Factory Mutual approved containers.
- ◆ Hire a licensed waste hauler to recycle or dispose of used solvents.
- ❖ Direct solvent used to clean spray equipment into containers to prevent evaporation of volatile organic compounds. A closed gun cleaning system will save you money on cleaning materials.
- ❖ Use only one cleaning solvent to simplify disposal.
- ❖ Use only the minimal amount of solvent (stripper, thinner, etc.) needed for a given job.
- ❖ For small jobs, pour the needed solvent into a small container in order not to contaminate a large amount of solvent.
- ✧ Use soy-based solvents and other similar products with no or low volatility.
- ✧ Order your spray painting jobs to minimize coating changes. Fewer changes mean less frequent purging of the spray system. Order your work light to dark.
- ✧ Allow solids to settle out of used strippers and thinners so you can reuse solvents.



To operate a permanent paint spray booth, you must obtain an air permit from the Maryland Department of the Environment.



The General Permit for Discharges from Marinas requires that marinas prevent or minimize contamination of stormwater runoff from all areas used for engine maintenance and repair. It further requires that spill prevention and response procedures be developed for all areas where spills can contribute to stormwater discharge.

- ◇ Keep records of solvent and paint usage so you have a handle on the amount of hazardous waste generated on site. You are required to maintain these types of records if you have a permanent, MDE-approved spray booth.

Repair and Maintain Engines with Care.

- ◆ Store engines and engine parts under cover to prevent storm water contamination. Ideally store off the ground as well (concrete or pallet).
- ◆ Do not wash engine parts over the bare ground or water.
- ❖ Use dry precleaning methods, such as wire brushing.
- ❖ Avoid unnecessary parts cleaning.
- ◇ Adopt alternatives to solvent-based parts washers such as bioremediating systems that take advantage of microbes to digest petroleum. Bioremediating systems are self contained; there is no effluent. The cleaning fluid is a mixture of detergent and water. Microbes are added periodically to “eat” the hydrocarbons.
- ❖ If you use a solvent to clean engine parts, do so in a container or parts washer with a lid to prevent evaporation of volatile organic compounds. Reuse the solvent. Once the solvent is totally spent, recycle it.
- ❖ Use drip pans when handling any type of liquid. Use separate drip pans for each fluid to avoid mixing. Recycle the collected fluid.
- ❖ Use funnels to transfer fluids.
- ❖ Drain all parts of fluids prior to disposal.
- ❖ Clean engine repair areas regularly using dry cleanup methods, e.g., capture petroleum spills with oil absorbent pads.
- ❖ Prohibit the practice of hosing down the shop floor.

Winterize Safely.

- ❖ Use propylene glycol antifreeze for all systems. It is much less toxic than ethylene glycol antifreeze.
- ❖ Use the minimum amount of antifreeze necessary for the job.
- ❖ For health reasons, ethylene glycol should never be used in potable water systems; it is highly toxic and cannot be reliably purged come springtime.
- ❖ Add stabilizers to fuel to prevent degradation. Stabilizers are available for gasoline and diesel fuels and for crankcase oil. These products protect engines by preventing corrosion and the formation of sludge, gum, and varnish. Also, the problem of disposing of stale fuel in spring is eliminated.
- ❖ Be sure fuel tanks are 85-90 percent full to prevent flammable fumes from accumulating and to minimize the possibility of condensation leading to corrosion. Do not fill the tank more than 90% full. The fuel will expand as it warms in the springtime; fuel will spill out the vent line of a full inboard tank.
- ❖ Use the highest rated octane recommended by the engine manufacturer; premium fuels are more stable than regular.
- ❖ Be sure the gas cap seals tightly.
- ❖ Promote reusable canvas or recyclable plastic covers. Some manufacturers will clean and store canvas covers during the boating season.
- ❖ Recycle used plastic covers.

Conduct In-Water Maintenance Wisely.

- ◆ If the impacts of cleaning or maintenance activities (regardless of area involved) cannot be contained or mitigated against, remove the boat from the water. No debris should be allowed to fall into the water.

- ❖ Keep containers of cleaning and maintenance products closed.
- ❖ Restrict or prohibit sanding on the water. When it is absolutely necessary to sand on the water, use vacuum sanders to prevent dust from falling into the water. Do not sand in a heavy breeze.
- ❖ Plug scuppers to contain dust and debris.
- ❖ Do not spray paint on the water.
- ❖ Discourage underwater hull cleaning in your facility. Given the concentration of boats, underwater cleaning is dangerous to divers and the heavy metals that are released are harmful to aquatic life. Insurance to cover divers is also expensive.
- ◆ If you allow divers to clean painted bottoms in the water, the General Permit for Discharges from Marinas requires marinas to restrict customers to using only divers who abide by the best management practices outlined on the Tip Sheet included in this Guidebook and available at dnr.state.md.us/boating/cleanmarina/
- ◆ Removal of any paint—ablative or hard—in the water is prohibited.
- ❖ Offer incentives, like reduced mid-season haul out rates, so that boaters can have their hulls cleaned on land where contaminants may be contained. Tie the incentive to early return and deposit for annual slip rental.

Educate Boaters.

- ❖ Copy the Vessel Cleaning and Maintenance, Selecting a Bottom Paint, and Underwater Hull Cleaning tip sheets from the back of this book and distribute them to your customers. There is room on each sheet to add your marina's name and logo.
- ❖ Find out about local hazardous waste collection days. Call 1-800-4-RECYCLE or visit mdrecycles.org for local recycling contacts. Post notices informing your tenants when and where they can take their hazardous wastes.

Information

Sources

Appendix I

Maryland
Department of
Agriculture

Maryland
Department of the
Environment

- Air Quality
Permits Program
- Industrial Permits
Division