Vessel Maintenance and Repair

Environmental Concern
Boat cleaning, engine repair, pressure washing, painting, and regular maintenance near or on the water can release oils, greases, paint chips, paint liquids, detergents, and more. If these contaminants are allowed to flow into the water body they can pollute the water, kill marine life, and reduce the sunlight available for aquatic plants. Toxic heavy metals, such as copper, zinc, lead and tin from bottom paints, can get into the food chain through bottom-dwelling creatures or may settle into the sediments, potentially increasing the cost of dredge spoil disposal. Many of the cleaning products meant to be used in boat shops are also toxic containing 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.

Goals
1. Minimize the amount of materials from vessel maintenance and repair entering the water.
2. Use less toxic alternatives for vessel maintenance and repair.

Legal Setting
Federal
The Federal Water Pollution Control Act/Clean Water Act
Requires permits be issued for projects involving the discharge of dredged or fill material in Federal Waters and wetlands, including nontidal wetlands.

National Pollutant Discharge Elimination System (NPDES)
The Act prohibits the discharge of oil or hazardous substances into U.S. navigable waters. It also prohibits the use of chemical agents like soaps, detergents, surfactants, or emulsifying agents to disperse fuel, oil, or other chemicals without permission of the U.S. Coast Guard.

State
Virginia Pollutant Discharge Elimination System (VPDES)
This permit is required for marinas if there are any point source discharges of process water (collected wash water for example) or storm water. VPDES Permits can be individual permits (for one facility only) or general permits (issued to a class of similar dischargers). For storm water discharges there is a General VPDES Permit that is usually applicable to marinas. This general permit applies to storm water discharges from water transportation facilities that have vehicle (vessel) maintenance shops and/or equipment cleaning operations. The water transportation industry includes facilities engaged in foreign or domestic transport of freight or passengers in deep sea or inland waters; marine cargo handling operations; ferry operations; towing and tugboat services; and marinas (facilities commonly identified by Standard Industrial Classification (SIC) code Major Group 44). The regulation authorizing this general permit is the VPDES General Permit Regulation for Stormwater Discharges associated with Industrial Activity. It governs new and existing storm water discharges associated with industrial activity through a conveyance to surface waters or through a municipal or non-municipal separate storm sewer system to surface waters. All VPDES permits are valid for 5 years; however, as a general permit may have been issued prior to a facility obtaining coverage, the permittee should check to see when the general permit expires. Stormwater General Permit Regulation, 9VAC 25-151-10 et seq. Refer to Stormwater Chapter for more information.
**Best Management Practices**

**In the water** - While working on a boat in the water is not the preferred method, it is sometimes unavoidable.

- Educate employees/boaters/contractors about cleaning methods that prevent the release of pollutants to waters. Post signs and hand out educational materials describing boat cleaning methods.
- Prohibit pressure washing (for boats in the water).
- Avoid in-the-water hull scraping and any abrasive process that occurs underwater that may remove anti-fouling paint from the boat.
- Wash the boat hull above the waterline by hand. Detergents and cleaning compounds used for washing boats should be phosphate-free and biodegradable and amounts used should be kept to a minimum.
- Sell these environmentally sensitive products in your marina store.
- Discourage the use of traditional sudsing cleaners that must be rinsed off and discourage the use of detergents containing ammonia, sodium hypochlorite, chlorinated solvents, petroleum distillates or lye.
- Plug scuppers to contain dust and debris.
- Offer incentives, like reduced mid-season haul out rates, so that boaters can have their hulls cleaned on land where contaminants may be contained.
- Incorporate guidelines for boat maintenance into slip leasing agreements.
- Encourage the owner to remove the boat from the water for maintenance.
- Encourage the use of sponges or soft towels to clean the boat hull on a regular basis.
- Keep containers of cleaning and maintenance products closed.

**Out of the water**

- Collect all maintenance debris. Clean work areas after completing each operation or at the end of the day - whichever comes first. Segregate debris if possible and dispose of properly.
- Vessel maintenance areas for new marinas within the Chesapeake Bay Resource Protection Area must be located outside the 100-foot buffer. (Refer to the Sitings Chapter.)
- Contain and properly dispose of rinse water/paint chips from boats washed on upland areas.
- Designate work area so marina has a sense of order and staff can monitor the area for potential environmental problems
- Perform all major repairs - such as stripping, fiberglassing, and spray painting - in designated areas.
- Locate maintenance areas as far from the water as possible so stormwater runoff will have the maximum amount of time and distance to be filtered.
- Vessel maintenance areas should have an impervious surface (i.e. asphalt or cement) and, where practical, a roof. Sheltering the area from rain will prevent stormwater 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 while allowing water to pass through. Tarps may be potentially re-used multiple times.
- Use vegetative or structural controls sited in the *Stormwater Management Workbook* (obtain a copy from DCR) to treat stormwater runoff, wherever practicable. (Also see Stormwater Chapter)
Establish a schedule for inspecting and cleaning stormwater systems. Remove paint chips, dust, sediment, and other debris. Clean oil/water separators.

Prohibit major maintenance or repair work outside the designated maintenance areas.

Clearly mark work areas with signs, i.e., Maintenance Area for Painting

Post signs and distribute materials describing best management practices that boat owners and contractors must follow, i.e., Use Tarps to Collect Debris.

Develop, initiate and maintain procedures for managing requests to use the workspace, to move boats to and from the site, and to insure the use of BMPs.

Surround the maintenance area with a berm or retaining wall.

**Minimize Impacts of Painting**

- Recommend to your customers antifouling paints containing the minimum amount of toxin necessary for the expected conditions.
- Avoid soft ablative paints.
- Use water-based paints whenever practical.
- Stay informed about antifouling products, like Teflon, silicone, polyurethane, and wax that have limited negative impacts. Pass
- Store boats out of the water, where feasible, to eliminate the need for antifouling paints.
Pressure Washing

All pollutants must be removed from wash water before it may be discharged. At a minimum, allow large particles to settle out. More thorough treatment involves filtration or chemical or physical techniques to treat the rinse water:

- Use filtration devices such as screens, filter fabrics, oil/water separators, sand filters, and hay bales to remove particles;
- Chemical treatment relies upon the addition of some type of catalyst to cause the heavy metals and paint solids to settle out of the water; and
- Swirl concentrators are examples of physical structures that can be used to concentrate pollutants. They are small, compact soil separation devices with no moving parts. Water flowing into a concentrator creates a vortex that centralizes the pollutants. Clean water is then discharged.

Discharge treated wash water to surface water if it contains no pollutants. If detergents were used, the waste water must be directed into a sewer system.

Collect debris. Have your waste hauler characterize the waste 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.

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Anti-fouling bottom paints

Antifouling bottom paints protect hulls from fouling organisms that can interfere with vessel performance, but pesticides within them harm fish and other non-target species. Most paints work by slowly releasing a biocide, generally cuprous oxide (Cu2O). These copper-based paints are not used on aluminum hulls; the interaction of copper and aluminum leads to corrosion. Instead, with the proper federal permit, tin-based paints (tributyltin or TBT) are often used on aluminum-hulled vessels. 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). Tin is easily absorbed by fish through their gills and accumulates to high levels in sediments. 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. Any boatyard operator wishing to apply TBT paints must obtain a pesticide business license.

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.
- 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 cleanup 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.
Pressure wash over a bermed, impermeable surface that allows the waste water to be contained and filtered to remove particulates and solids.
When pressure washing 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.
Alternatively, reuse the wash water. For example, recycle it through the power washing system (a closed water recycling operation) or use it to irrigate landscaped portions of the marina. The recycled water may be treated with an ozone generator to reduce odors.

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 or near the water.
Use spray equipment with a high transfer efficiency. Tools such as high-volume, low-pressure (HVLP) spray guns direct more paint onto the work surface than conventional spray guns. Air-atomizer and gravity-feed guns are other types of highly efficient spray equipment.
Train staff to operate spray painting equipment properly in order to reduce overspray and minimize the amount of paint per job.
Limit in-water painting jobs to small jobs. Any substantial painting should be done on land, in the vessel maintenance area, and/or over 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 needed for a 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.
Keep records of paint use to show where too much paint was mixed for a job. Use the information to prevent over mixing in the future.
Handle Solvents Carefully: Store open containers of usable solvents as well as waste solvents, rags, and paints in covered, UL-listed, or Factory approved containers.
Hire a licensed waste hauler to recycle or dispose of used solvents.
Keep records of solvent and paint usage so you have a handle on the amount of hazardous waste generated on site.
Direct solvent used to clean spray equipment into containers to prevent evaporation of volatile organic compounds. 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. This will result in not contaminating a large amount of expensive 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.
Do not let dust from sanding fall onto the ground or water or become airborne.
Conduct shoreside sanding in the hull maintenance area or over a drop cloth (if other areas on your property will result in pollutant discharges to the water).
Collect debris. Have your waste hauler characterize the waste 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 220 pounds per month or less.

- 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 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 them.
- Post signs indicating the availability of vacuum sanders and grinders.
- Bring vacuum sanders to tenants if you see them working with non-vacuum equipment.
- Restrict or prohibit sanding on the water to the greatest extent practical. When unavoidable, use a vacuum sander and keep the dust out of the water.
- Use a damp cloth to wipe off small amounts of sanding dust.
- 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.

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- 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.
- 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.

**Engine Repair/Maintenance**

- Do not wash engine parts over the bare ground or water.
- Perform all engine repair/maintenance in the designated work area.
- Store engines and engine parts under cover on an impervious surface like asphalt or concrete.
- If you use solvents 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 prior to disposal.
- Clean engine repair areas regularly using dry cleanup methods, i.e., capture petroleum spills with oil absorbent pads.
- Use dry pre-cleaning methods, such as wire brushing.
- Avoid unnecessary parts cleaning.
- Adopt alternatives to solvent-based parts washers such as aqueous-based or 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.

- 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. Sell this item in your store.
- 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 if you have an external overflow vent. 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.
- Use the minimum amount of antifreeze necessary for the job.

**Educate Boaters**

- ★ Post signs clearly marking designated hazardous waste disposal sites.
- Explain the environmental benefits of regular maintenance of boat and engines.