

# Boat Hull Paint Removal

Best Management Practices to Minimize Release of Antifouling Chemicals

pacific northwest  
POLLUTION PREVENTION  
resource center



## Introduction

Boatyard managers and boat owners are essential to preserving water quality and healthy marine life. By nature and intended purpose, antifouling paint additives (also called biocides) in hull paint formulations are toxic to certain marine life. The biocides leach from boat bottoms over time, to protect the boat bottoms from fouling, algae, and other marine growth, such as mussels.



Copper, zinc pyrithione, and silver are examples of metal-based antifouling biocide ingredients. Examples of non-metal biocide additives include Ecomea, Irgarol, and Seanine. All are federally regulated pesticides. There are also non-biocidal paint formulations which include ceramic/quartz, silicone, wax-like polymer, and photoactivity to deter fouling.

A series of factsheets provided by Pacific Northwest Pollution Prevention Resource Center (PPRC) and the Clean Boating Foundation provide suggestions to help reduce impacts to marine life and water quality from boat hull maintenance and repair activities. This factsheet covers best management practices (BMPs) for hull paint removal and surface preparation for painting via sanding or grinding.

The following factsheet and video topics are available [here](#).

- Boat Hull Pressure Washing
- Do It Yourself (DIY) Tips to Minimize Antifouling Pollution
- Zinc Anode Alternatives and End of Life Management
- Disposal of Antifouling Paint

## Marine Toxicity Concerns of Antifouling Biocides

Antifouling ingredients in hull paint (aka biocides) become concerning when many boats are stored in a concentrated area together, for instance at marinas. These chemicals build up in the water and affect marine life, such as mussels and marine plants that are a critical part of the food chain. Marinas also offer an attractive breeding environment. The early life stages of these organisms can be very sensitive to biocides



The biocide concentration in these sensitive water bodies elevates if paint dust and particles from hull sanding or grinding at boatyards or back yards is not contained and managed. Biocides from removed paint can reach stormwater drains leading directly to a local water body, or become airborne and deposit directly into the water. Therefore, it is crucial to minimize their release to waterways from upland maintenance activities.



Copper remains one of the most common additives in antifouling paint formulations. Dissolved copper has been found to affect the olfactory system of salmon species, reducing their sense of smell. This impacts

behaviors such as homing, foraging and predator avoidance, reduce chance of survival or reproduction. Zinc ions, which may form when zinc pyrithione is released from the boat hull to saltwater, can be harmful to some marine animals and plants at very low concentrations (NWGC, 2017). Other active biocide ingredients can also impact marine species and water quality. Many can affect human health based on the nature of the chemicals themselves, and especially with inhalation of any fine airborne dust particles from paint removal.

## Overview of Hull Paint Removal

Vacuum sanding is the most commonly reported hull paint removal method at Washington boatyards. Vacuum grinding is used less frequently, while blasting, chemical stripping, wet sanding are rarely used. Chemical stripping is falling out of favor, especially with two of the most hazardous stripping chemicals, methylene chloride and N-methylpyrrolidone, now banned at many retail and online stores.

Whatever the paint removal method, complying with the Washington State Boatyard General Permit necessitates all antifouling-content residuals – from fine dust to larger paint chips or scrapings, blasting dust, or fluid from wet sanding, be contained and disposed of as dangerous waste unless the individual batch is representatively sampled and tested and does not designate as dangerous waste.

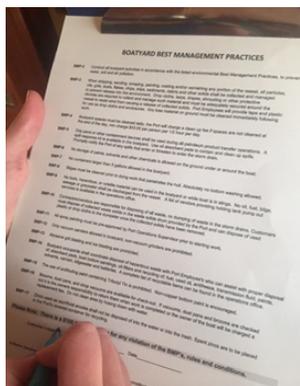
Relevant Washington State Boatyard General Permit Language:

*The Permittee must control and collect all particles, oils, grits, dusts, flakes, chips, drips, sediments, debris, and other solids from work, service, and storage areas of the boatyard to prevent their release into the environment and entry into waters of the State.*

Assuming that most boatyards and boat owners are using vacuum sanding or grinding, the best management practices (BMPs) presented below apply to these methods.

## Oversight BMPs

- Conspicuously post boatyard BMPs.
- Require staff, contractors, and boat owners (if performing DIY work), to read and sign the compliance document.
- Provide brief pre-job meetings or trainings and a user manual outlining sanding and grinding (or other) paint removal methods, containment, and waste disposal.
- Prohibit DIY work on weekends when lead yard personnel are not present.
- Post clear signage for all waste receptacles.



## Work Area Prep BMPs

- For outdoor boat work or storage, always place a tarp underneath every boat at the yard before blocking even if the boat is there just for storage.

YES



NO



NO



- In windy or rainy weather, fully shroud the perimeter of the full hull or specific hull work area, and tightly secure bottom edges.
- Place shoe scraper or walk-off mat at work area exit to capture dust on shoes.



## Dustless Vacuums: Pre-Job

Relevant Permit Language:

The permit specifies 98% dust extraction efficiency, along with minimum static water lift, air flow, and power for vacuums, plus filtration of one-micron (or smaller) for the air filter cartridge and five-micron containment bag which serves as a pre-filter.

### Swantown Boatworks and Department of Ecology Vacuum Sander System Requirements for the Removal of Bottom Paint:

#### Requirements for Sander Tool:

- 98% dust extraction capable
- Variable speed random orbit with proper dust collection shroud

#### Minimum Specifications for Vacuum System:

- Vacuum must be in newer condition
- No smaller than 10 gallons
- Power: 9 Amp, 6HP
- Minimum Peak Air Flow: 120 CFM

#### Minimum Vacuum Filtration Specifications:

- BRAND NEW 1 micron cartridge
- Manufacturer approved 5 micron collection bag filter (bag must be changed regularly)

- While sanding or grinding, always use a dustless vacuum system and filtration that meets minimum WA Department of Ecology permit requirements.
- Inspect the vacuum filter(s), cartridge(s), and hose connections prior to each work session.



- If grinding is used, even for small repair jobs, note the difference in airborne dust between the vacuum grinder and non-vacuum grinder conducted in a side by side comparison in this YouTube video: Makita Grinder Dust Shroud Review (screenshot shown). When grinding, either a fully shrouded work area and/or a vacuum grinder with shroud attachment connected directly to dustless vacuum hose is necessary. **Holding a vacuum hose up next to the grinder provides inadequate dust collection.**



## Paint Removal

- Wear personal protective equipment during paint removal; avoiding inhalation of fine paint dust is especially important.
- Unless the hull is fully shrouded, never sand, grind, or blast during wind or rain.
- Keep the orbital vacuum sander flat on the hull surface rather than sanding with a leading edge of the sander. Edge sanding breaks the vacuum seal and reduces dust collection effectiveness. In addition, it can create an uneven surface and damage the bearings in the sander itself.
- Stop work immediately if airborne dust is being released through vacuum exhaust or other means. Clean up all dust, and take corrective action to avoid additional airborne releases.
- Prohibit water or other liquid rinsing after paint removal.

TIP: Swantown Boatworks in Olympia shuts off water to all spigots around the yard aside from the designated pressure wash pad.

## Daily and End-of-Job Clean-Up

- At the end of each work session, brush all dust off clothes, shoes, etc. onto the tarp, then vacuum or collect all residuals and dispose of as dangerous waste. Use a floor brush nozzle to vacuum dust off tarp.
- Remove paint suits while still on the tarp to avoid bringing dust outside work area into car, boat, home, etc.
- Check vacuum bag – if full, remove bag and place in dangerous waste dumpster (unless the dust is certain to not designate as dangerous waste). When removing the bag from the vacuum, shut the self-closing flap or seal hole with duct tape.
- If any dust in the vacuum bag originated from boats with antifouling paint, dispose of the full bags in the dangerous waste receptacle at the yard, or for DIYs, at local household hazardous waste facility.
- If shrouding plastic was used, clean off loose dust and consolidate the dust with dangerous waste, then carefully roll up shrouding material and dispose of as solid waste.
- See PPRC’s fact sheet on disposal of antifouling paint to determine how to dispose of paint removal wastes.



## References

See PPRC’s [factsheet](#) on designation and disposal of antifouling paint dust and wastes.

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