



Pollution Prevention Toolkit for Maritime Industries



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Prepared by:

**Virginia St. Jean,
San Francisco Department
of Public Health**

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* Cover photos: Santa Cruz Harbor
and San Francisco Boat Works

DISCLAIMER

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I am indebted to Dr. Katy Wolf, of the Institute for Research and Technical Assistance (IRTA), whose on-going research to find safer alternatives for industrial and consumer uses of products that historically have contained high VOCs and/or ingredients known to cause cancer, reproductive harm or other toxicity, has proven invaluable to the maritime community as well as other industrial sectors. Her findings are shared throughout this report.

I would like to thank Dan Garza, Suhasini Patel and Melissa Salinas from DTSC, who saw the benefit of supplementing work that SFDPH was attempting to do at the local level. It is our great pleasure to share this information State-wide, and without extra funding this would have been impossible to do in such a thorough and timely manner.

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Finally, I'd like to acknowledge all the partners from the maritime community who provided input and feedback into our project. Without industry participation, this project would have been impossible to do.

EXECUTIVE SUMMARY

With approximately 600 marinas, 2.6 million boaters and 1,600 maritime businesses, all of which are environmentally sensitive due to proximity to surface waterways, a variety of potential environmental impacts exists in California based on type of maritime entity and proximity to waterways. The result is that there is a wide array of products and practices used by these entities to maintain their operations, many of which may now have “greener” alternatives available. Additionally, there have been many advances in pollution prevention technologies, some of which were developed for other industry types, but may be well suited to prevent pollution in the maritime community. There is significant opportunity to use products that are less hazardous, reduce the volume of the hazardous products used and incorporate management practices that are less polluting. The difficulty remains as to determining which products are in fact preferable when many toxicological data gaps remain for “greener” chemicals. Environmental trade-offs are also a problem in this industry, a common example being the choice of a reduced VOC maintenance product that may now contain endocrine disrupting surfactants, creating a water versus air pollutant.

The maritime industry, including marinas and marine vessel service and repair facilities, is an entity Cal/EPA’s Department of Toxic Substances Control (DTSC) chose as a focus under the Pollution Prevention program authorized under California Senate Bill 1916. DTSC contracted with the San Francisco Department of Public Health (SFDPH) to expand upon work already done by the California Clean Boating Network (CCBN), the Clean Marinas Program (CMP) and the SFDPH. The project scope included assessing hazardous ingredients in boater/harbor maintenance products currently used, evaluating ingredients of available alternatives marketed as “greener”, and working with the industry to develop convenient and user-friendly alternatives purchasing tools. Project deliverables included the development of a resource guide or “toolkit” comprised of:

- Compliance assistance tools such the *Pollution Prevention Opportunities and Compliance Checklist* (see Appendix B) and a self-inspection compliance checklist for harbormasters and the maritime support industries
- Recommended Practices (RPs) or Best Management Practices (BMPs) for boaters, marinas and harbors; marine transport; marine fueling facilities; vessel repair and maintenance facilities; and underwater boat and harbor maintenance service companies
- A wallet sized marine products alternatives purchasing guide.

The goal is not to address historic pollutants already in waterways, but to identify current products and practices that may be adding to pollution today and evaluate possible alternatives to reduce or prevent on-going pollution. Many product alternatives have already been certified by GreenSeal, EcoLogo and/or the EPA’s Design for the Environment, third party evaluators of green claims, but the maritime community may not know to ask for such products when they make their purchasing decisions.

Initially, SFDPH worked with SF maritime industry partners to determine what products are currently used that have hazardous constituents and for what purpose they are used. Partners were selected based on participant willingness, but also based on their unique role in the SF waterfront community. The most common products used correlate closely to the auto repair and

painting industries, but their impacts are much more environmentally sensitive based on proximity to the waterfront and limited means to properly treat all storm water/wastewater that may become contaminated. SF's harbors and marinas, the Port of San Francisco, ferry companies, tug and bar pilot companies, marine vessel repair facilities, chandleries, the SF Maritime Museum (historic vessels museum) and fueling facilities disclosed typical products they used or sold in the course of operating their businesses.

Partners recruited outside of SF included the large marine products supplier West Marine, local leaders in the marine vessel repair and maintenance industries, and complex harbors that provide a multitude of services for their boat tenants and/or were combined fishing and recreational harbors. While many harbors only offer sewage pump-outs, others provide full fueling services, accept tenants' recyclable hazardous waste and/or provide used oil management services including waste oil collection, dirty bilge pad exchange services and on-site treatment systems for oily bilge waste water. Innovative and/or unique solutions to the more difficult pollutant management issues harbors bear shall be highlighted in this report.

SFDPH is also sharing with the greater San Francisco Bay Area, findings from the copper-free hull paints research project, work of the Institute for Research and Technical Assistance (IRTA) and the Port of San Diego with participation from various paint manufacturers. IRTA and SFDPH are currently testing the performance of a soft, metal-free, biocide-free hull paint on a boat owned by the Port of San Francisco. Performance will be evaluated in the next few months. While BMPs for existing hull paints may be effective, if less toxic hull paints could be substituted, these BMPs would be a less important factor towards preventing pollution.

Pollutants such as nitrates, phosphates, surfactants (including nonlyphenols), solvents, petroleum compounds, phthalates, bisphenol A and metals such as copper, zinc, tributyltin, arsenic and mercury can be correlated to marine products or devices currently in use by the industry which are finding their way into the aquatic environment. The goal of this project is to address those pollutants, and propose either alternatives to those products or engineering methods to keep those pollutants from reaching untreated waterways. Having convenient pump-outs for sewage and bilge water will help lower the current releases of such pollutants, but on-going work will need to continue to gain acceptance of copper-, zinc- and biocide-free hull paints. Until boaters have a way to easily sewer basic boat cleaning waste water, it should be anticipated that there will continue to be small amounts of cleaners and detergents washed into untreated waterways.

Managing non-recyclable, unacceptable or abandoned Household Hazardous Wastes (HHW) from boaters will likely remain a problem for harbormasters and marinas as most approved HHW facilities are inland, often in locations inconvenient to boaters with ground transportation required. Most harbors have abandoned HHW problems, often with such waste left at waste oil collection sheds. Improved signage to show boaters where they can properly manage such waste and hosting periodic collection events co-sponsored with local governments and waste management vendors may reduce the amount of abandoned waste. This report will highlight some of the innovative and varied ways harbormasters and local governments have successfully partnered to keep the aquatic environment safe from hazardous wastes.

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1.0 Introduction and Background

There are approximately 600 marinas, 2.6 million boaters, 1,600 maritime businesses and 1,100 miles of coastline in California. The boating industry has a significant impact on the State's economy with \$1.6 billion spent on boats, accessories and repairs. While marinas may be the most obvious maritime business type, maritime support businesses additionally include chandleries/marine supply stores, maritime vessel repair and maintenance companies (boatyards, dry docks, and underwater divers), marine transportation companies (passenger and commercial shipping who often do their own minor fleet maintenance), maritime support companies (tugboats, bar pilots, in-water commercial vessel support companies), commercial fishing wharfs and their operations, and fueling and vessel pump-out operations.

Considering the variety and volume of hazardous products consumed by the maritime industry and the sensitivity of the environment in which those products are used, there is tremendous opportunity to use less hazardous products and incorporate management practices that are less polluting. With the "green product" movement, choosing the better alternatives is often challenging when many manufacturers make valid single attribute claims such as biodegradable, yet those same products could also be comprised of carcinogens or have other hazards.

In 2001, The San Francisco Department of Public Health (SFDPH), Hazardous Materials Unified Program Agency (HMUPA), although primarily an environmental compliance agency, began a pollution prevention and toxics reduction outreach program to serve businesses regulated by the HMUPA. Initial outreach work began with the auto repair sector and the development of the SFDPH Clean and Green Award Program to recognize those shops that met or exceeded the program's minimum standard. The maritime industry quickly voiced interest, seeking a Clean and Green Award Program for the maritime industry. It was at this point that SFDPH began actively working with the California Clean Boating Network (CCBN) and the Clean Marinas Program (CMP).

The California Clean Boating Network (CCBN) was established in 1995 as a statewide boater education and technical assistance program, developed by the California Department of Boating and Waterways and the California Coastal Commission. The CCBN is comprised of harbor masters and government agencies with the common goal of promoting clean boating practices. In 2004, the California Coastal Commission Boating Clean and Green Campaign produced the California Clean Marina Toolkit providing educational tools for Clean Marina Management and Marina Operations and Maintenance.

In 2004, the Clean Marinas Program (CMP) was established, comprised of a partnership of private marinas, municipal marinas and yacht clubs administered by the Marina Recreation Association. The goal was to define best management practices (BMPs) for harbor management and, by participant input, agree upon the standard for obtaining a Clean Marina Program designation. At present there are 100 California marinas that proudly display this designation and the CMP is now working with marinas outside of California.

Both the CCBN and the CMP had already developed very comprehensive clean standards and recommendations for harbors and boaters. Their work today includes tackling issues such as

abandoned hazardous waste, sinking or sunken vessels, and DIYer (do-it-yourselfers) boat maintenance issues such as oil and bilge maintenance, and painting and sanding activities, while in the marina.

SFDPH was seeking a San Francisco specific Clean and Green standard that could also eventually meld into the greater California Green Business Program standard for marinas and the maritime industries sector. SFDPH was also interested in researching less toxic or hazardous alternatives that were available and applicable to the maritime community, most of which had yet to be evaluated for their “green” claims. Many “green” products evolved as a result of stringent California Air Resources Board (CARB) rules, meant to control air toxics, volatile organic compounds and greenhouse gas emissions. These products, while reducing air emissions, do incorporate a water or land pollution burden. Surfactants and waterborne cleaners are gradually replacing classic solvent applications, creating a water pollution trade-off from the surfactants themselves and from whatever they were cleaning such oils from engine maintenance for example. While waste water treatment plants are learning how to treat such water soluble contaminants, boaters using those same cleaning products don’t have an easy way to collect such wash water, which ideally, should be disposed of in the sanitary sewer system. Marine vessels are not typically equipped with holding tanks to contain waste wash water for shore-side disposal into sewer systems.

Recent studies from various sources ^{5,7,8} on surface waterways pollution show excessive levels of heavy metals, particularly copper, zinc, tributyltin, arsenic and mercury, which are considered to be persistent, bioaccumulative and toxic. While there are known non-maritime sources for copper, zinc, arsenic and mercury, tributyltin was used almost exclusively by the maritime industry as the active ingredient in anti-foulant paints. Due to the adverse effects of tributyltin on marine life, the International Maritime Organization agreed to a global phase-out by 2003. Copper hull paints, often with copper concentrations up to 70%, quickly became the most common replacement of choice as they were very effective repelling hull fouling. Many California harbors now exceed their copper pollution limits, but other known sources of copper such as copper dust from automotive brake pads, architectural materials like roofs, gutters and downspouts do contribute to the copper load in waterways. Zinc is still commonly used in boat paints and primers, but is also the primary metal in sacrificial anodes which are attached to boats underwater to prevent excessive corrosion of submerged metal parts. Zinc anodes leach small amounts of zinc passively, but are necessary to keep boats with underwater metal parts seaworthy. Zinc is also a common contaminant from waste lubricating oils, which during the course of their use act to minimize metal-to-metal friction in motors and engines, and pick up small metal fragments from the machinery they are tasked to protect. Waste oil is considered “dirty” when the metals suspended in the oil become too concentrated to allow the oil to properly perform its lubricating function.

While this report aims to highlight alternatives that will minimize on-going pollution, specific options shall be shared throughout this report based on maritime uses and operations. The following chart shows likely sources of the most common maritime pollutants of concern generated by maritime operations. It does not list other non-maritime sources of the same pollutants, though most would agree are adding to pollutant loads.

This research project began by reviewing the various national and state Clean Boating Programs' standards and recommendations, of which California already in place the CMP and the CCBN Programs. Our first goal was to expand upon the great work the CMP and the CCBN developed and implemented. We were seeking additional standards that would be applicable to the entire maritime industry, but did not find a good match for our entire SF waterfront's needs. We consolidated and combined what green standards we could find that were applicable to our maritime operations to include suppliers and chandleries, ferries, maritime vessel maintenance and repair companies (boatyards), maritime support services, fueling and pumpout facilities, marinas and fishing wharfs.

► Resources

- EPA Report to Congress: Study of Discharges Incidental to Normal Operation of Commercial Fishing Vessels and Other Non-Recreational Vessels Less than 79 Feet <http://cfpub.epa.gov/npdes/vessels/reportcongress.cfm>
- The Institute for Research and Technical Assistance produces various reports on industry chemicals and alternatives www.irta.us
- SFDPH Clean and Green Program <http://www.sfdph.org/dph/eh/green/greenPrgrm.asp>
- The Clean Marinas Program <http://www.cleanmarinascalifornia.org/>
- California Clean Boating Network <http://www.coastal.ca.gov/ccbn/ccbndx.html>
- The California Department of Public Health – Hazard Evaluation System and Information Service (HESIS) produces guidance documents, fact sheets, and other publications on chemicals, ergonomics, and other chemicals <http://www.cdph.ca.gov/programs/hesis/Pages/Publications.aspx>

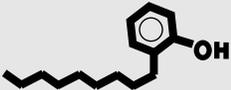
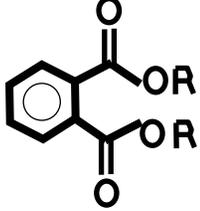
1.1 POLLUTANTS OF CONCERN FROM MARITIME INDUSTRIES

Created 2011 by Virginia St. Jean from the San Francisco Department of Public Health in partnership with the California Department of Toxics Substances Control

Pollutant	Origin/Sources	Human & Environmental Impacts	BMP for Pollution Prevention
Copper ^{8,13} Zinc ¹³ Tributyltin Arsenic ¹³ Mercury ^{13,2}	<ul style="list-style-type: none"> • Anti-fouling hull paint • Architectural materials • Sacrificial zinc anodes • Motor oil • Tires • Legacy anti-fouling hull paint • Paint • Pesticides • Wood Preservatives (as chromate copper arsenate) • Float switches for bilge pumps • Shower water storage tank pumps • Thermostats 	<ul style="list-style-type: none"> • Metals can attach to particles in the water column and in the sediment. • Even if the concentration of metals in the water is small, metals can undergo bioaccumulation as it is ingested by organisms which are in turn ingested by organisms higher in the food chain. • The concentration of metals in the fish and other organisms consumed by humans can reach toxic levels (e.g. fish advisories due to high levels of mercury, oyster advisories due to high levels of copper.) • Metals can be toxic to aquatic life and humans • Heavy metals are persistent in the environment 	<ul style="list-style-type: none"> • Use alternative, non-biocide hull coatings • Use vacuum sanders to both remove paint from hulls and to collect paint dust and chips to avoid paint being carried into the water by storm water runoff • Perform pressure washing and hydro washing on land and prevent the resulting paint chips from entering surface waters • Product substitution – see <i>Purchasing Guide</i> • Properly dispose of oil, fuel, paints, switches containing metals as hazardous waste
Nutrients (i.e. nitrates, phosphates) ¹³ 	<ul style="list-style-type: none"> • Grey water (clothes & dish washer, sinks, showers) • Fertilizer • Detergents containing phosphorous • Trash i.e. food waste 	<ul style="list-style-type: none"> • Contributes to excessive growth of algae and phytoplankton decreasing the concentration of dissolved oxygen and decreasing water clarity • Encourages growth of weedy plants which may entangle propellers and pipelines • Decreases the dissolved oxygen in the water due to the decomposition of organic matter • Degrades water quality as less oxygen is available for aquatic life 	<ul style="list-style-type: none"> • Dispose of gray water properly on land • Prevent trash from entering waterways • Dispose of trash in proper receptacles
Fish Waste 	<ul style="list-style-type: none"> • Fish waste from boats or from dockside fish cleaning 	<ul style="list-style-type: none"> • Water contaminated by large amounts of fish waste suffer the same effects as the introduction of sewage and nutrients (see above) 	<ul style="list-style-type: none"> • Do not discard fish waste into marina water • Dispose of fish waste in appropriate trash or compost receptacles on land • Use fish cleaning stations to clean fish • Adopt catch and release fishing • Freeze fish parts and reuse them as bait

<p>Trash</p> 	<ul style="list-style-type: none"> • Illegally dumped or carelessly discarded into the water by recreational or commercial boaters • Carried by storm water runoff from urban landscapes • Discarded fishing lines and nets 	<ul style="list-style-type: none"> • Can contain materials that degrade water quality and are toxic to humans and aquatic life e.g. plastic, bacteria, metals, etc. • Kills fish, birds, aquatic mammals and other aquatic life etc. by entanglement or ingestion • Can pose an injury hazard to humans who come into contact with debris • Considered an aesthetic nuisance • Can impair enjoyment of beaches and waterways • Accumulates in waterways and in the ocean 	<ul style="list-style-type: none"> • Retain trash and food scraps on the boat to dispose on land into appropriate trash or compost receptacles dockside. • Reduce generation of trash by using biodegradable or non-disposable containers and food ware
<p>Untreated Sewage¹³</p> 	<ul style="list-style-type: none"> • Sewage from recreational and commercial boats • Pet waste carried by stormwater 	<ul style="list-style-type: none"> • Are sources of nitrates and phosphates as well (see <i>Nutrients</i>)above • Introduces disease-causing bacteria and pathogens into the water • Humans who come in contact with or swim in contaminated water can contract a wide variety of acute illnesses • Consumption of contaminated fish can cause illness as well 	<ul style="list-style-type: none"> • Do not discharge sewage in No Discharge Zones • Use sewage pumpouts • Install and properly maintain Type I, II or III Marine Sanitation Devices (MSD) • Ensure the Y-valve of the MSD is in closed position to prevent accidental discharge • Use restrooms on land to reduce boat toilet use • Avoid feeding wild birds at marinas as bird droppings can be a significant source of fecal contamination • Pet owners should pick up after pets and dispose into septic system or a trash receptacle
<p>Oil Dispersants¹²</p> 	<ul style="list-style-type: none"> • Used in cleaning up oil spills in the water • Often consist of surfactants • (see <i>Surfactants</i> below) 	<ul style="list-style-type: none"> • Breaks up oil into water-soluble micelles that rapidly dissolves into the water column effectively dispersing the oil over a larger volume of water • The effects of oil dispersants can have greater toxic effects than the original spilled oil 	<ul style="list-style-type: none"> • Use microbes to “eat” up the oil in the water; it is non-hazardous, nontoxic and biodegradable • Use absorption pads and booms • Avoid use of emulsifiers; it is illegal to use
<p>Surfactants²</p> 	<ul style="list-style-type: none"> • Detergents and cleaners 	<ul style="list-style-type: none"> • Reduces the surface tension of the water decreasing the dissolved oxygen concentration and impairing the breathing of fish • Surfactants can be toxic to aquatic life 	<ul style="list-style-type: none"> • Perform cleaning and maintenance out of the water in an area where the gray water will not enter the surface waters • For small topside cleaning jobs while the boat is in the water, use a bucket to rinse the towel or sponge rather than re-dipping it into the surface waters • Do not discharge gray water into the water • Retain gray water to pumpout or dispose of on land

<p>Petroleum Compounds (i.e. fuel, oil, and grease)^{2,13}</p> 	<ul style="list-style-type: none"> • Fueling station (drips from nozzles; overfilling) • Runoff from boat engine repair & maintenance areas • Storage tank leaks • Bilge oil discharges • Drips from engines, paint, draining oil, fuel from engines, grease, lubricant, finishes, and cleansers 	<ul style="list-style-type: none"> • Even small spills can contaminate large bodies of water • Spills causing a sheen is a violation of federal law and is punishable by fines and penalties • Impairs breathing for birds and aquatic organisms at the surface of the water • Can attach to plants impairing their photosynthesis • Can be ingested by aquatic life especially filter feeders such as oysters and sponges • Can harm juvenile fish and upset fish reproduction • As a sediment contaminant it can interfere with the growth and reproduction of bottom-dwelling organisms 	<ul style="list-style-type: none"> • Place absorbent booms around storm drains • Use donut ring or absorbent pads to catch spills during fueling • Check oil and fuel containers for leaks • Check engine for fuel leaks and use a drip pan under engines • Store oil and fuel containers in a covered area with secondary containment or a berm • Use absorbents pads to soak up oil in the bilge • Install and maintain air/fuel separators on air vents or tank stems of inboard fuel tanks to prevent fuel spills • Install and maintain a bilge pump with oil-water separation systems • Avoid use of detergent bilge cleaners
<p>PAHs - Polyaromatic Hydrocarbon^{8,14}</p> 	<ul style="list-style-type: none"> • Exhaust from boat motors • Paving sealants • Fuel spills • Creosote as a wood preservative 	<ul style="list-style-type: none"> • Can cause cancer • Can damage eyes, kidneys, and liver • Highly toxic to fish and other aquatic life 	<ul style="list-style-type: none"> • Avoid using creosote as a wood preservative • Reduce use of high-PAH paving sealants • Use 4-stroke engines instead of 2-stroke engines
<p>Solvents¹³</p> 	<ul style="list-style-type: none"> • Degreasing agents • Varnishes • Paint removers • Lacquers 	<ul style="list-style-type: none"> • Usually heavy, long chain compounds, they sink and accumulate in the sediment • Many solvents are considered VOC's (volatile organic compounds) which contribute to air pollution and adverse health effects (cancer, respiratory illness, and neurotoxicity) 	<ul style="list-style-type: none"> • Product Substitution – see <i>Purchasing Guide</i> • Avoid cleaning and maintenance while the boat is in the water • Use products that are non-aerosol, water-based, low VOC, less toxic and biodegradable when possible
<p>Antifreeze³</p> 	<ul style="list-style-type: none"> • Bilge water contaminated with antifreeze • Leaks in the engine • Improper storage of antifreeze 	<ul style="list-style-type: none"> • It can be contaminated with fuel or heavy metals (e.g. lead) making it a hazardous waste • Water contaminated with ethylene glycol can be deadly to humans, pets, and aquatic life • Propylene glycol is a less toxic alternative for ethylene glycol although both are still toxic 	<ul style="list-style-type: none"> • Use propylene glycol (pink) instead of ethylene glycol (blue green) • Recycle antifreeze if possible • Dispose of antifreeze as hazardous waste in a separate labeled container

<p>Pesticides¹³</p> 	<ul style="list-style-type: none"> Used on marina property and boat launch sites 	<ul style="list-style-type: none"> Toxic to pets, small mammals, and aquatic life 	<ul style="list-style-type: none"> Apply pesticide as directed by the label Prevent pesticide from entering the water Use low-toxic pesticides Implement Integrated Pest Management techniques to reduce reliance on chemical pesticides e.g. use mulch for weed control
<p>Alkylphenol / Nonylphenol Ethoxylates (APE/NPE)^{8,9,12}</p> 	<ul style="list-style-type: none"> Oil dispersants Detergents, soaps, sanitizers Degreasers and cleaners Paints and plastics Floor care products Epoxy fillers 	<ul style="list-style-type: none"> APE is hormone disruptor to humans and aquatic mammals Does not readily degrade 	<ul style="list-style-type: none"> Product substitution – see <i>Purchasing Guide</i> Avoid discharging gray water into the water Use the minimum amount of cleaner necessary Use showers, sinks, and restroom facilities on land to reduce generation of gray water on the boat Avoid topside cleaning while the boat is in the water
<p>Antimicrobial Products/ Triclosan^{8,10,11}</p> 	<ul style="list-style-type: none"> Gray water containing: liquid hand soap, household cleaners, dishwashing liquid, cleaning products, toothpaste, hair products, plastics Added as a anti-microbial agent to a variety of cleaning products¹⁷ 	<ul style="list-style-type: none"> Triclosan is a hormone disruptor to humans and aquatic mammals Triclosan undergoes bioaccumulation Triclosan and other antimicrobials may be linked to the development of cancer and other adverse health effects in humans and mammals The use of antimicrobials carries the potential for increasing antibiotic resistance 	<ul style="list-style-type: none"> Product substitution – see <i>Purchasing Guide</i> Avoid discharging gray water into the water Use the minimum amount of cleaner necessary Use showers, sinks, and restroom facilities on land to reduce generation of gray water on the boat Avoid topside cleaning while the boat is in the water Use bar soap for routine hand-washing
<p>Disinfectants for MSDs¹⁵</p> 	<ul style="list-style-type: none"> Chemicals added to the MSD to treat sewage before discharge into the water such as: <ul style="list-style-type: none"> Chlorine Ammonia Sodium hypochlorite or bleach Formaldehyde 	<ul style="list-style-type: none"> Chlorine, ammonia, bleach (sodium hypochlorite), formaldehyde, and other caustic chemicals are highly toxic to aquatic life if treated sewage is discharged into the water 	<ul style="list-style-type: none"> Do not use disinfectants and MSD additives that contain these ingredients Use environmentally friendly alternatives such as enzyme or bio-active treatments Do not combine chemical treatments with other types of treatments as chemicals may harm the enzymes and bacteria Do not discharge untreated sewage near shell beds, shallow coves, or recreational beaches
<p>Phthalates¹⁰</p> 	<ul style="list-style-type: none"> Flexible & PVC/vinyl plastic Food packaging and plastic bags Building materials Adhesives and caulks Paints and pigments Detergents Solvents 	<ul style="list-style-type: none"> Phthalates are a hormone disruptor For males in particular, phthalates pose adverse health effects to reproductive systems and hormone levels 	<ul style="list-style-type: none"> Product substitution – see <i>Purchasing Guide</i> Use biodegradable food ware Use re-usable containers and food ware

<p>Bisphenol A (BPA)¹⁰</p> 	<ul style="list-style-type: none"> • Hard plastics • Plastic water bottles • Plastic food ware • Lining of tin cans • Receipts 	<ul style="list-style-type: none"> • BPA is a hormone disruptor linked to infertility, miscarriage and reduced levels of an essential sex hormone in men. 	<ul style="list-style-type: none"> • Retain trash and food scraps on the boat to dispose on land into appropriate trash or compost receptacles dockside. • Reduce generation of trash by using biodegradable or re-usable containers and food ware
<p>Acidic/ Alkaline Solutions^{2,13}</p> 	<ul style="list-style-type: none"> • Detergents and cleaners containing strong acids and bases i.e. lye, bleach, and ammonia • Batteries • Grey water (clothes & dish washer, sinks, showers) 	<ul style="list-style-type: none"> • Alters the pH of the water • Toxic to aquatic life • Toxic to humans e.g. irritate or damage skin 	<ul style="list-style-type: none"> • Product substitution – see <i>Purchasing Guide</i> • Use the minimum amount of cleaner necessary • Use products that are non-aerosol, water-based, low VOC, less toxic and biodegradable when possible • Avoid cleaning and maintenance while the boat is in the water • Dispose of batteries properly as hazardous waste • Do not discharge gray water into surface waters

1.2 LIST OF CHEMICALS OF CONCERN IN MARINE PRODUCTS

The second goal was to survey and evaluate SF waterfront businesses that use or store hazardous materials and generate hazardous wastes to see what products they use, and begin to evaluate their possible waterfront impacts. Material Safety Data Sheets and Product Specification Sheets were reviewed noting any hazardous constituents of concern and any eco-friendly claims such as biodegradable or “less toxic”, both prevalent in marketing to the boating community. We also gathered feedback on any eco-friendly products or practices they may have had experience with attempting to validate the green claims and gauge effectiveness of the alternatives.

The next phase was spent researching the availability of better alternatives to known hazardous products. Our definition of “better alternatives” was along the lines of the CA Green Chemistry Initiative (see <http://www.dtsc.ca.gov/PollutionPrevention/GreenChemistryInitiative/index.cfm>.) We developed a list of chemical ingredients of concern such as known or suspected carcinogens, reproductive toxins, PBTs (persistent, bioaccumulative and toxic chemicals), endocrine disruptors and neurotoxins. We then began to screen product ingredients against this list of chemicals of concern. It was at this point that West Marine (large supplier of maritime products) partnered with us as they were also interested in promoting more eco-friendly products. They, too, struggled with the many “green” claims made by their suppliers, but determining which green standard was most appropriate for the maritime industry and how to validate those claims, remained a challenge. We agreed to review the Material Safety Data Sheets for the liquid products that West Marine distributed (liquids were chosen due to their propensity for spilling or leaking into waterways), cross checking ingredients to the list of chemicals of concern. Additional eco-friendly claims such as biodegradability, bio-based, “less toxic”, safe and/or “green” were noted and suppliers of those products were asked to attempt to validate those claims or get their products third party rated to help consumers be assured those eco claims were valid.

The following chart shows a list of chemicals of concern and where they were found the maritime product categories that were evaluated. The left column is derived from ingredients listed on the Material Safety Data Sheets of surveyed marine products and are identified as a carcinogen, neurotoxin, developmental toxin, or endocrine disruptor according to the sources below:

- California Proposition 65 list of chemicals known to cause cancer or reproductive toxicity
- European Commission Environment - European Chemicals Agency (ECHA)

The top group of chemicals are those not on the Cal Prop 65 List or ECHA List, but are mentioned as chemicals of concern specifically for the maritime industry due to impact on aquatic ecosystems; or are a chemical of concern found in marine products according to the following sources:

- Product Inventories of San Francisco Maritime Businesses
- California Coastal Commission – Clean Green Boat Maintenance Checklist and California Clean Marina Toolkit
- San Francisco Approved Products List www.sfapproved.org
- Good Guide www.goodguide.com
- Reports produced by the Institute for Research and Technical Assistance www.irta.us
- AB 1824 Senate Bill on Holding Tank Treatments

The "x" indicates that the chemical has been found to be an ingredient in that product category through published data or through a comparison of MSDS with lists of chemicals of concern

Subcategory	CLEANERS								MATERIALS					PAINT	REMOVER			OTHER											
	teak cleaner	carpet/upholstery/cleaner	metal cleaners	detergent/soaps	drain opener	scouring powder	cleaners/degreasers	glass cleaners	shower cleaner	holding tank treatment	plastic	sealant	epoxy	filler	adhesive	resins	solvent/thinner/paint/primer	antifouling paint	paint stripper/graffiti remover	varnish remover	rust remover	adhesive remover	mildew remover	polish	lubricants	anti-freeze/coolant	fuel additive	wood preservative	varnish
Alkylphenol or Nonylphenol Ethoxylates (APE/NPE)				x			x																						
Ammonium chloride									x																				
Chlorinated solvents				x		x	x																						x
Creosote																													x
D-limonene							x																						
Diethanolamine							x																						
Ethyl Alcohol								x																					
Folpet																													x
Glycol Ethers							x																						
Lye				x																									
Pentachlorophenol (PCP)																													x
Petroleum distillates/ Naphtha			x	x			x											x		x	x								
Phosphates/ phosphoric acid	x			x			x													x		x							
Quaternary ammonia				x																									
Sodium hydroxide	x				x		x																						
Sodium hypochlorite (bleach)	x			x		x	x																x						
Tributyltin																		x											x
Zinc Pyrithione																		x											
1,1,1-Trichloroethane /TCA																	x												
1-Bromopropane / propyl bromide							x						x	x		x													
2-Bromopropane							x																						
2-Ethoxyethyl acetate							x										x												
2-Ethylhexanoic acid																													x
Acetone																	x		x										
Acrylamide																x	x												
Acrylonitrile																x	x												
Arsenic (inorganic oxides)																	x												x
Benzene							x							x		x	x					x							x
Benzenesulfonamide																	x												
Benzyl alcohol																		x											
Butadiene														x	x														
Cadmium										x							x												
Carbon disulfide							x										x		x										
Carbon tetrachloride																	x		x										
Chromium (hexavalent)																	x												
Copper (cuprous oxide)																	x	x											
Cumene																	x												
Cyclohexane																	x												



BOATER'S GUIDE TO ECO-FRIENDLY PURCHASING

Look For biodegradable
 • non-aerosol • low or non-VOC*
 • water-based • soy-based
 • derived from natural sources
 • eco-label certifications such as Green Seal, EcoLogo, EPA Design for the Environment

Use the least amount of product required, clean more frequently to avoid heavy build up, & exert more elbow grease

*VOC= Volatile Organic Compound
 Products w/ VOCs should comply w/ California VOC regulations

✗ avoid these ingredients known to be toxic to humans and/or the environment

✔ try these alternatives

Cleaner : Bilge

✗ Soap¹ • solvents • degreasers • TCE • PERC • MeCl

✔ Veg-based • biodegradable

Cleaner : Brake

✗ Hexane • toluene • PERC • MeCl

✔ Non-aerosol • water-based

Cleaner : Degreaser

✗ Chlorinated solvents • benzene • sodium hydroxide • phosphates • butoxyethanol • PERC • NMP • PD • MeCl

✔ water-, citrus-, or soy-based • non-aerosol • lemon juice & borax¹

Cleaner: Detergent / Soap

✗ Phosphates • phosphoric acid • sodium hypochlorite (bleach) • chlorinated solvents • PD • APE • quaternary ammonia • lye •

✔ Fresh water & a lot of elbow grease² • biodegradable • phosphate-free • vegetable or citrus-based soaps¹ • hydrogen peroxide²

Cleaner : Dish

✗ 2-bromo-2-nitropropane-1,3-diol (bronopol) • oxybenzone • hypochlorite • sulfuric acid • nitric acid • ethyl alcohol • triclosan • propylene glycol⁵

✔ Vegetable-based¹ • citric acid

Cleaner : Drain

✗ Sodium hydroxide

✔ Disassemble & replace • flush with a mixture of boiling water, ¼ c. baking soda & ¼ c. vinegar¹ • enzymes • citrus extract⁵ • biodegradable

Cleaner : Floor

✗ Sodium hypochlorite (bleach) • APE • sodium hydroxide • chlorinated solvents • phosphoric acid

✔ Vegetable or citrus-based soaps • Fresh water & a lot of elbow grease² • hydrogen peroxide² • phosphate-free • biodegradable

Cleaner : Glass

✗ Glycol ethers³

✔ 1c. vinegar : 1 qt warm water²

Cleaner : Head

✗ Hypochlorite • formaldehyde

✔ Brush w/ baking soda² • active-oxygen-based sprays • ½ c. borax : 1 gal of water¹

Cleaner : Holding Tank

✗ Formaldehyde • ammonium chloride • isopropyl alcohol (isopropanol) • 2-propanol •

✔ bio-active⁴ • nitrates • enzymes • Biodegradable • fragrance-free

Cleaner : Hull

✗ Phosphoric acid • APE

✔ Oxalic acid

Cleaner : Metal

✗ Chlorinated solvents • NMP • strong caustics • hexane • PERC • butoxyethanol • PD

✔ Brass: Worcestershire sauce, or paste made of equal parts salt, vinegar, & water¹ • Chrome: plain or apple cider vinegar to clean; baby oil to polish² • Or, use soap & water; then dry very well⁹ • Stainless Steel: baking soda or mineral oil for polishing, vinegar to remove spots¹ • Copper: lemon juice & water, or paste made of equal parts lemon juice, salt, & flour¹ • Aluminum: 2tbsp cream of tartar: 1 qt of water²

Cleaner : Scouring Powder

✗ Sodium hypochlorite (bleach)

✔ Peroxide • wet surface & use scouring cloth w/ baking soda²

Cleaner : Shower

✗ Ethyl alcohol⁵ • sodium hypochlorite • glycol ethers

✔ Baking soda • salt²

Cleaner : Teak

✗ Phosphoric acid • (bleach) sodium hypochlorite • sodium hydroxide

✔ Oxalic acid • biodegradable soap to remove dirt & salt water¹ • instead of bleaching, try using a mild powder soap & scrub w/ bronze wool¹

Cleaner : Rug/Upholstery

✗ Bromides • triclosan • 2-phenyl phenol • acrylic acid • hypochlorite • sulfuric acid • para-dichlorobenzene⁵

✔ dry corn starch; vacuum¹

Cleaner : Varnish

✗ Xylene • ethylbenzene • PD

✔ wipe with ½ c. vinegar & ½ c. water solution²

Remover : Fiberglass

✗ Xylene • ethylbenzene • PD

✔ Baking soda & water¹ • oxalic acid

Remover : Adhesive / Graffiti / Stain

✗ Benzene • Ethylbenzene • PD • xylene • MeCl • NMP • MEK • toluene

✔ Non-aerosol • ethyl lactate • citrus or soy-based • acetone • methyl lactate • methyl acetate

Remover : Rust

✗ TCE • hexane • MeCl • PD • PERC³ • phosphoric acid

✔ oxalic acid

Remover : Mildew

✗ Phosphate • sodium hypochlorite

✔ Scrub with paste of equal parts lemon juice (or vinegar) & salt² • full strength vinegar, then rinse¹ • scrub mildew w/ borax & water using a nylon scouring pad¹

Paint : Anti-fouling / Hull

✗ Dibutyl phthalates • tributyltin • zinc pyrithione • ethylbenzene • xylene • copper (cuprous oxide)

✔ Epoxy • non-biocide • silicone

Paint : Stripper / Remover

✗ MeCl • NMP • PCBTF

✔ Sodium bicarbonate (soda) • blasting • vacuum sanding

Paint : Thinner / Reducer

✗ PD • toluene • xylene

✔ water or soy-based • acetone

Paint : Topside, Interior, Primer, Wood Coating

✗ MeCl • TCE • benzene • xylene • toluene¹ • ethylbenzene • MEK • hexane • heavy metals i.e. lead, chromate, chromium VI, cobalt,

✔ Water based • low VOC

Adhesive

✗ ethylbenzene • hexane • toluene • xylene • benzene

✔ (Adhesive cont.) water-based²

Anti-freeze

✗ Ethylene glycol

✔ Propylene glycol³ • recycled antifreeze³

Solvent

✗ Ethylbenzene • hexane • toluene • MEK • xylene • MeCl

✔ Water- or soy-based • ethyl lactate • methyl esters

Wood Polish / Preservative

✗ Pentachlorophenol (PCP) • creosote • tributyltin • folpet¹

✔ water-based • shellac, tung, olive, linseed, walnut, or almond oil^{1,2} • 3:1 olive oil to white vinegar²

ONLINE RESOURCES

- www.coastal.ca.gov/cobn/toolkit/marina-toolkit.pdf
- www.dbw.ca.gov/Pubs/CleanBoating-Habits/Default.aspx
- www.sfapproved.org
- www.westmarine.com >West Advisor
- www.GoodGuide.com

LEGEND

APE	alkyl- or nonylphenol ethoxylate
MeCl	methylene chloride, dichloromethane
MEK	methyl ethyl ketone, 2-butanone
NMP	n-methyl 2-pyrrolidone
PCBTF	parachlorobenzotrifluoride
PD	petroleum distillates, naphtha, mineral spirits, kerosene, Stoddard Solvent
PERC	perchloroethylene, tetrachloroethylene
TCE	trichloroethylene

If you have questions, contact: virginia.stjean@sfdph.org

Created in partnership by:
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 San Francisco Dept. of Public Health
 CA Dept. of Boating and Waterways



The next research phase included working on the more difficult hazardous waste or pollutant issues, with the help of strategic taskforces and working groups comprised of industry and government partners, some of whom were already working on the problems. A few examples of such issues include the:

- Need for better ways to manage boater household hazardous waste and abandoned hazardous waste
- Lack of availability of convenient and affordable ways to properly dispose of expired marine flares
- Need for more research on best methodologies for vessel paint removal/stripping
- Problem of copper anti-fouling hull paints and the lack of viable alternatives available at the start of this project and the performance testing needed to ensure alternatives are viable in colder climates and different aquatic environments
- Need for recommended environmentally protective standards for vessel repair work
- Need for approved and consistent standards for marine fueling and pumpout facilities.

In general, the best recommendations are to use the least toxic, the least bioaccumulative and persistent in the environment, the least volatile and the most biodegradable product to do the job. Since there is always the risk of contamination using hazardous products while on waterways or around the waterfront, choosing the most environmentally friendly option is extremely significant. Source reduction, reusing products as long as they are effective, and recycling opportunities should be promoted.

Educating boaters and the maritime community on the better options is important since boaters tend to see the pollution impacts first-hand and are usually highly motivated to try to keep their marine environment clean and safe. Given the right tools, boaters, marina operators and the maritime support industries will have an easier time making those alternative product choices and practicing best methods for keeping the waterfront clean and green.

This report is intended to cover most maritime uses of hazardous materials or operations that may cause pollution. It is broken into segments that can be pieced together to customize for your particular business' needs. For example, should a business consist of only fueling and pumpout services with no marina, those particular chapters can be pieced together to make the recommended practices more applicable to that business. Finally, the appendices can be printed separately to be used as stand-alone resources.

2.0 General Management

2.1 MAINTAINING A CLEAN AND GREEN FACILITY

▶ Environmental Concerns

Outdoor storage and use of materials, equipment, supplies, vehicles and vessels can result in stormwater pollution if exposed to rain and other water that can help spread pollutants to waterways and storm drains. Typical stormwater contaminants include oils and fuels, paint dust and debris, cleaning agents, solvents, untreated sewage and pet waste, pesticides and fertilizers, and heavy metals such as copper and zinc. It is advisable to store such items undercover or indoors when possible. If outdoor storage is the only option, such items should be stored and used in designated areas that are paved, sloped or bermed to divert possible contaminants away from waterways and storm drains. Clean storage areas frequently using dry methods such as sweeping or vacuuming. Keep storage areas free of excess debris and clean up spilled materials immediately.

There are now a few Clean and Green Marina Programs available depending upon your locale. The standards vary slightly, but they generally require marinas to:

- Maintain exemplary compliance with environmental laws and regulations
- Promote and practice clean and pollution preventing activities within the boating community

▶ Recommended Practices for Maintaining a Clean Marina or Marine Vessel Repair Yard

- Determine which regulatory requirements apply to you (see Appendix B *Pollution Prevention Opportunities and Compliance Checklist*)
- Maintain or exceed the minimum requirements with applicable permits
- Integrate regulatory requirements into policies and plans
- Implement spill and emergency response plans (see Section 5.0 *Spill Response and Emergency Planning*)
- Periodically evaluate and update policies, procedures, and emergency plans
 - Solicit feedback from staff
- Provide regular training for staff on policies and procedures
- Require all boat workers and independent contractors register with and receive approval from the manager before conducting work on marina premises¹
- Take enforcement action if there is a violation of environmental policies
 - Provide education
 - Issue warnings and orders to cease work
 - Report to public agencies
 - Eviction

► **Recommended Practices for Routine Inspections**

- Establish a schedule of daily inspections by staff to evaluate the implementation of Recommended Practices and adherence to marina policies
- Inspect as applicable:
 - Maintenance areas
 - Waste oil sheds
 - Areas around rented dock boxes looking for any indication of leaks or spills from contents stored in boxes
 - Trash and recycling receptacles
 - Oil containment, bermed areas, and drip pans
 - Hazardous material storage containers and areas
 - Storm drain inlets
 - Parking lot looking for debris and/or oil or fuel stains
 - Waterfront areas
 - Fueling station and pumpouts
- Immediately clean up any spills or leaks of oil, paint, solvents, etc., according to the BMP's for that substance
- As able, remove debris from the surface water near the pier, bulkheads, dry docks or shorelines
- Ensure trash and recycling receptacles are not overflowing; empty when full
- Properly dispose of debris or litter found
- Prohibit unattended, open containers of paint and other maintenance supplies on the docks.

Ensure that containers (paint cans, absorbent pad drum, etc.) are securely closed, stored in the proper location, and in secondary containment as appropriate; see *Section 7.0 Hazardous Materials Management* and *8.0 Hazardous Waste Management*

► **Recommended Practices for Pest Control and Landscaping**

- Eliminate or reduce use of chemical pesticides by implementing an Integrated Pest Management (IPM) program by specifying non-chemical prevention in pest control contracts.
 - Use traps and barriers
 - Use less toxic pesticides as needed only
 - Set up storage and sanitation procedures to discourage harborage of pests.
 - Contact your local municipal pest or vector control agency for more information
- Avoid over watering landscape or reduce watering landscape by planting water-wise plants
- Plant native plants that are disease and insect resistant. More information available at the CA Native Plant Society (916-447-2677)
- Reduce runoff from landscaping, irrigation, and impervious surfaces like parking lots by placing any of these in strategic locations to slow down runoff and remove pollutants from runoff
 - vegetated filter strips
 - landscape swales

- permeable pavement
- buffer strips
- rain gardens

▶ **Recommended Practices for Protecting Storm Drains**

- Post signs prohibiting dumping of liquid waste into storm drain
- Post a sign (at least 8½" x 5½") above a shop sink area notifying employees: "Do Not Discharge Hazardous Wastes or Chemicals Down Drains or Outside Storm Drains"
- Label all storm water drains with a message such as "No dumping – Protect our Bay and Ocean"
- Clean private catch basins once a year, before the first rain
- Store all hazardous materials and waste (including batteries) away from storm and sanitary sewer drains. Ensure storage area is earthquake safe, use secondary containment and keep containers and area covered/protected from weather
- Have no open floor drains in the process area
- If floor drains are not permanently sealed, use drain mats or plugs to prevent spilled fluids from entering sanitary and storm drains
- Install shut-off valves at storm drains on property or keep temporary storm drain plugs available at loading docks or outdoor process areas for quick spill response.
- Regularly check and maintain storm drain openings and basins that are located on your property. Keep litter, debris and soil away from storm drains
- Regularly inspect and clean out separators and grease traps (at least every three months)
- Place absorbents or filters in drain inlets to remove oil and grease from storm water
 - Replace absorbent or filtering materials regularly
 - Petroleum-saturated or coated absorbents and filters are considered hazardous waste; see Section 8.0 *Hazardous Waste Management*



Typical catch basin screen designed to trap debris that could clog stormwater systems.

▶ **Recommended Practices for Stormwater Pollution Prevention**

- Establish a system for keeping shop/store/docks clean and orderly
- Keep dumpster, receiving, parking, landscape and loading dock areas clean and free from litter, oil drips and debris.

- Clean parking lots using dry methods such as sweeping or using equipment that collects dirty water, which must be disposed of in sanitary sewer
- Design berms or grading to prevent run-off or rain water from flowing across industrial areas where it could be contaminated.
- Prohibit vessel maintenance and washing in parking lots
- Do not wash boats, cars, equipment, floor mats or other items outside where run-off water flows straight to the storm drain. This water should be directed to a sewer drain and not storm drain. Spent steam cleaning solutions and cleaning solutions from dirty/greasy equipment clean up are most likely hazardous waste. Use a licensed waste hauler, ideally one who reclaims water
- Routinely check for vehicle leaks (parking lots, shop floor, sidewalks) and establish a “ground staining” inspection routine
- Routinely inspect and address all potential sources of leaks, spills, accidents and emissions (material/waste storage areas, pipes, valves, hoses and process equipment, open hazardous materials containers left on docks, etc.). Include receiving areas and/or loading docks. Increase preventative maintenance schedules if warranted
- Prevent pet waste from being carried off by storm water into surface waters
 - Require all pets to be on leash and that owners clean up after their pets
 - Consider installing pet waste stations
 - Provide disposal bags for pet waste, ideally compostable bags.
- Install and regularly clean out oil/grit separators in areas where there is potential for large loads of grease, oils, mud, or sand in runoff
- If possible, install and properly maintain a sump or catch basin that stores and treats storm water
- Become a “zero discharger” (eliminate all **industrial** discharge to sanitary sewer and storm drains)

2.2 PROMOTING CLEAN AND GREEN PRACTICES

▶ Environmental Concerns

Maintaining a healthy and safe marine environment requires that everyone - boaters, marina management, and visitors alike- act responsibly to minimize their adverse impact on the marine environment. Cultivating a culture of good environmental stewardship requires intentional effort and educational program strategies. There are numerous resources by a variety of agencies that provide educational materials and other types of resources. Tailor your signage, policies, events, and educational materials to the specific environmental needs of your boating community. It has been shown² that the three most popular sources of information for boaters are marine supply shops, boat shows, and word of mouth. Below are more tips to help maximize educational and outreach opportunities.

▶ Recommended Practices for Promoting Clean and Green Activities

- Provide training and education on marina’s environmental policies for staff, tenants, and visitors-particularly new hires or new tenants

- Tailor communication to the specific needs of the audience e.g. translation, types of boats, local environmental concerns
- Include policies in tenant lease agreements
- Post signs in visible places i.e. office bulletin board, fueling and pumpout areas
- Distribute educational pamphlets, newsletters, fact sheets, etc.
- Include educational materials in mailings and billings
- Advise contractors on environmental policies before beginning work onsite
- Train on-site chandlery staff to educate clients and distribute educational materials on greener and safer alternative practices and products
- Participate in a Dockwalkers Program; see link below

▶ **The Dockwalkers Program**

Originally conceptualized by Save our Shores in Santa Cruz, The Dockwalkers Program promotes safe and environmentally sound boating through education to boaters. Since then, the Program has been adopted and expanded statewide by the California Coastal Commission and the California Department of Boating and Waterways with assistance from the US Coast Guard Auxiliary. Dockwalkers are trained volunteers who walk the marina, fuel docks, and boat launch ramps, as permitted by the marina, to distribute free educational materials and talk to boaters. They also provide education at boat shows, and other boating events. Trainings to become a Dockwalker occur throughout California and throughout the year. Consider or encourage others to consider becoming a Dockwalker. Or, request a Dockwalker to visit your marina and educate your boaters. Visit www.coastal.ca.gov/ccbn/dockwalkers.html for more information or you can contact:

Vivian Matuk
 California Coastal Commission/
 California Department of Boating and Waterways
 45 Fremont Street
 Suite 2000, San Francisco, CA 94105-2219
 (415) 904-6905
vmatuk@coastal.ca.gov

▶ **Resources**

- Check out the Boating Clean and Green Program by the California Department of Boating and Waterways and the California Coastal Commission for a variety of resources – toolkits, posters, fact sheets, links, etc.
<http://www.coastal.ca.gov/ccbn/boatinglinksnew.html>
<http://www.coastal.ca.gov/ccbn/cbndx.html>
- Clean Marina Program Manual <http://www.cleanmarinasocalifornia.org/cmpmanual.pdf>
- See Appendix Boater’s Guide to Eco-Friendly Purchasing

3.0 Routine Vessel Maintenance

3.1 OUT-OF-WATER VESSEL MAINTENANCE

▶ Environmental Concerns

It is preferable to fully inspect vessels prior to water entry to ensure sea-worthiness and that vessels are adequately protective of the environment. Make any necessary repairs on land, in approved areas designated by the marina operator to minimize the likelihood of pollutants entering untreated waterways. Pay particular attention to waterproofing seals and gaskets, excessive corrosion, and deteriorated coatings. Pump any oily waste from bilge holds and top off or replace fluids prior to water entry to minimize spill risk. Note- each harbor must abide by a unique set of rules and guidelines under their individual NPDES permit and Storm Water Pollution Prevention Plan.

▶ Recommended Practices

- Ask your marina operator for the boat maintenance rules and policies for that particular harbor. If the harbor has no designated area for maintenance, ask your harbormaster for a referral to a marine vessel repair and maintenance yard, likely in close proximity to the marina.
- Perform boat cleaning and maintenance in areas designated by the marina operator, paying attention that wastewater is properly directed to appropriate drain system.
- Perform engine maintenance away from waterways and any storm drains, properly containing any oil, solvent cleaners and other hazardous liquids.
- Mix all solvents, paints and varnishes over a tarp or on land¹
- Keep maintenance areas clean and free from excessive clutter
- Immediately clean maintenance area after work is done to prevent oil, debris, and dust from being washed into the water or storm drain;
- Marina operators should routinely clean roads, parking lots and driveways to minimize contaminants spread from maintenance areas
- Routinely check to ensure that materials are placed in the storm drain to catch debris
- If harbor policy allows sanding, use vacuum sanders to remove anti-fouling paint and topside paint, taking care to contain all paint dust. Ask the harbormaster for proper sanding waste disposal advice. See Section 12.0 *Paint Removal*.
- If harbor policy allows paint maintenance, use rollers and tarps when possible to contain spills and drips. Paint that needs to be applied by spray techniques should be applied at an appropriately permitted facility (permits are required by local fire departments and regional air quality management district), properly contained in spray booth or tent.
- Keep spill response materials easily accessible and inform marina operator of any spills and uncontained releases to the environment.

3.2 VESSEL WASHING

► Environmental Concerns

Due to the harsh marine environment, it is necessary to clean boats often. Much depends upon the type of boat and whether it is an infrequently used pleasure craft compared to a commercial fishing boat or ferry for example. Salt water and sea spray can be very corrosive to metal boat parts and leave heavy mineral deposits behind when the water fraction evaporates. Gentle hand washing of boat surfaces with a soft rag and mild biodegradable boat soap is ideal, but often not practical. Boats are typically rinsed with fresh water each time they are hauled from water. Low pressure nozzles on regular garden hoses should suffice, but care should be taken where wash water is directed. High pressure washing can rinse paint and metals from boat hull coatings, polluting water with heavy metals, and possibly damaging expensive hull paints. See Section 3.4 *Underwater Hull Cleaning*

► Recommended Practices

- High pressure washing activities should only be conducted at marine vessel repair yards, where all wash water and overspray can be captured and contained in a sump system for appropriate water treatment prior to discharge to sewer system
- Routine wash-down of vessels should be done with low water pressure and the waste water generated is generally not considered hazardous waste. Ask your harbormaster for their policy on containing and treating such water.
- Harbor policy may require waste water from the wash-down of boats after exiting the water to be sewerred instead of allowing to run-off into waterways. In such a case, they will likely have a designated area with a low pressure hose.
- Do not wash-down boats with deteriorating paint unless all wash water can be collected and properly treated. Paint eroding from boat hulls is particularly hazardous due to metal and possible biocide content.
- Wash water from routine cleaning of boats (above water line cleaning) if mixed with detergents and/or other cleaning agents should be contained and/or directed to sewer drains instead of rinsing into surface waterways. .
- When washing boats by hand, keep two containers available- one for clean water, one for waste water. Rinse cleaning rags into buckets instead of directly into waterways.
- Use mild biodegradable boat wash soaps when possible. See *Boater's Guide to Eco-Friendly Purchasing*

Note- harbor may have strict rules on the avoiding the spread of invasive species. Ask for policy before rinsing/cleaning areas of the vessels prone to unwanted intruders.



Pressure Washing, KKMI Pt. Richmond

3.3 IN-WATER VESSEL MAINTENANCE.....

▶ Environmental Concerns

Any hazardous material stored and used on vessel while in the water, has a potential for release in an emergency situation or during maintenance activities conducted while vessel is in the water. For vessels that are out to sea for long periods of time, in-water vessel maintenance is a necessity. In such cases, only those maintenance activities with little or no environmental risk should be attempted. Planning ahead for larger scale maintenance requirements to be done while at port is advisable as harbors typically have adequate pump-out capabilities waste materials.

▶ Recommended Practices

- Limit in-water maintenance activities to those that have little or no environmental impact
- In-slip maintenance should be limited to small maintenance tasks that involve less than 25% of the surface of the water line.¹
- Refer to the marina's guidelines as to the permissible maintenance activities, if any, that can be performed over the water
- Perform large maintenance activities on shore side facilities capable of preventing pollutant discharge into the waterways, as permissible
- Do not discharge any wastewater, solvent, paint, cleaner etc. directly into the waterway. Hold in appropriate temporary containers with tight fitting lids until they can be properly disposed of at approved on shore facilities.
- **Pressure washing water CANNOT be discharged into the water without an NPDES permit per EPA regulation.** For more information, see: <http://www.epa.gov/region1/assistance/ceitts/bpwvts/regulations.html>
- Do not re-dip and rinse the wash rags in the water when applying a cleaner
- Keep spill response materials including empty containers with tight fitting lids in which to put soiled absorbents materials, easily accessible
- Use portable oil change equipment that contains & prevents oily discharge from crankcase³

3.4 UNDERWATER HULL CLEANING

▶ Environmental Concerns

Underwater hull cleaning is usually a required routine maintenance activity depending upon many factors such as speed and frequency of water travel, salinity, water temperature, light conditions, and types of anti-fouling paints used on hulls. Barnacles and other marine life are naturally attracted to fixed structures under water, attaching to boat hulls and creating a build-up of fouling over time. Periodically, boats need to be hauled out of the water to inspect seaworthiness, replacing corroded parts and making appropriate repairs. Haul-out frequency depends upon the region's particular aquatic environment and a particular boat's needs. That is the time to do major boat repairs and maintenance. Underwater cleaning, while widely considered a required activity to maintain hulls, pollutes by releasing biocides and metals

intentionally added to hull paint to repel fouling. Divers typically clean hulls with soft rags, carpets, and/or mechanized tools to abrade away fouling. Should diving frequency be too seldom, more scraping may be required to remove fouling. High frequency, lighter cleaning is recommended by the California Professional Divers Association to properly maintain boat hulls. It is recommended to use divers certified in proper hull cleaning practices and approved by harbors, although the only certification program currently available is voluntary and standards are yet to be approved by regulatory agencies. It is anticipated that in the near future divers will need to demonstrate they are using some standard of Recommended Practices to minimize the release of toxic paints into waterways prior to working in harbors.

► Recommended Practices

- Do not clean a hull painted within 90 days of application of new paint; this can vary especially with newer non-metal, biocide free paints, but adequate cure time of paint is imperative prior to cleaning surface
- Haul the boat out of the water for cleaning if marine growth can only be removed by abrasive cleaning methods which removes paint
- Regularly clean the hull to extend the life of the hull paint and to avoid hard fouling growths that requires more abrasive cleaning
- Clean with non-abrasive methods such as with a soft cloth, fleece mitt, soft carpet, or a long bristled soft brush
- Avoid aggressive cleaning (with scrapers, abrasives, powered rotary brushes) as it may cause the paint to slough off, releasing copper or biocide unnecessarily
- Employ or contract only with divers formally trained in environmentally sound hull cleaning BMP's such as those put forth by the California Professional Divers Association, currently the only standard available in California
- Ensure professional diver adheres to environmentally sound methods and to the paint manufacturer's label recommendations
- Inform the hull cleaner on the type of hull paint and the date of the last paint application
- When divers need to replace zinc anodes, collect them for recycling by a local scrap metal recycler³
- Use less-toxic and approved anti-fouling hull paints that contain no tributyltin, heavy metals such as copper and zinc or biocides. Cleaning frequencies and methods will be different, so be sure your diver is experienced in cleaning alternative coatings to prevent damaging the paint coating
- Repair paint bonding problems at haul out to avoid further chipping and flaking of paint in the water.¹
- Encourage divers to use different types of pads when necessary to properly maintain a vessel's bottom paint (example: In many cases surfaces close to the waterline are more susceptible to higher growth rates therefore you need to use different pads in order to properly remove marine growth and corrosion. Likewise, a softer pad can be used for the rest of the vessel to maximize hull performance and optimize the lifespan of the paint.)¹

► Resources

- California Professional Divers Association www.prodivers.org

3.5 MAINTENANCE PRODUCTS

► Environmental Concerns

Considering that boats are constructed from various metals, fiberglass, wood, plastics, and/or glass that need maintaining and additionally employ a wide variety of engines, pumps, and electrical equipment to run, there is an overwhelming number of specialty cleaning and maintenance products needed in the marketplace to maintain boats. Today, there are many more environmentally friendly options available, yet while some options may seem better, more aquatic testing is needed to ensure they can safely be discharged untreated into waterways. Buyers should be aware of “green washing” claims, now common in the marketplace. Single attribute green claims such as “biodegradable” are rampant and buyers should be wary of other possible hazards in the product. Examples of “green washing” include a product that may be branded as naturally occurring or vegetable based, but may contain other toxic additives to improve product performance or shelf-life. Other product claims such as “less toxic” may contain no *known* human toxins, but the product may contain ingredients with incomplete toxicity testing. In other cases, the actual ingredients have been withheld stating “proprietary” on the label or Material Safety Data Sheet. It remains advisable to minimize the release of all cleaning and maintenance products into untreated waterways whenever possible.

One major consequence of reducing air emissions is the increased use of surfactants (used as wetting agents, emulsifiers and dispersants) in water-based cleaners and degreasers. Alkylphenol ethoxylates, of which octylphenol and nonylphenol ethoxylates are particularly toxic to marine life, do not readily biodegrade and are found in water treatment plant effluent and in storm water run-off. The problem is so severe, California Air Resources Board (CARB) has proposed a ban of alkylphenol ethoxylates in non-aerosol forms of General Purpose Cleaners, General Purpose Degreasers, Glass and Oven and Grill cleaners by December 31, 2012. It is highly unusual for CARB to ban a water pollutant, but the agency was concerned with the unfortunate trade-off of water pollution created by regulations that solely attempted to reduce air emissions.

There are now at least three credible Green Product certification programs that have begun to rate marine products. When making purchasing choices seek out products with GreenSeal, Ecologo and EPA’s Design for the Environment approvals, all third party rating systems attempting to rebuke “green washing” claims. While these may not be completely safe to humans and the environment, they go through a scientific screening approval process, so are likely better choices than their known toxic alternatives. Some major suppliers such as West Marine, have their own green line called Pure Oceans, and also distribute a wide range of Green rated products. Many alternative products can only be found on line, but the availability and effectiveness of the options is improving. Always use care to mix to manufacturer recommended dilutions, use sparingly and contain waste for land side disposal. Additionally, there are many published less toxic home cleaning guides that recommend using baking soda, vinegar or citrus based “home grown remedies”. While they may not contain known carcinogens and may be less toxic to humans, they may still be hazardous materials when concentrated or improperly mixed. Aquatic toxicity testing and environmental fate data remain inadequate for many of these new

products, but as testing continues, better options will become more available. See references for links to purchasing resources and third party testing agencies.

► Recommended Practices

Chandleries and suppliers:

- Offer environmentally friendly products for purchase
- Make available greener product purchasing guides
- Recommend more environmentally friendly solutions when a customer requests a toxic cleaner. They may not be aware of the hazards and may be open to trying alternatives if they know the negative impact of the material they wanted to use.
- Stock microfiber cleaning cloths and squeegees, tools that allow for less use of cleaners
- Provide fact sheets on recommended practices. West Marine provides guidance in their catalogs and on-line, helping to educate boaters on more environmentally friendly options and best management practices.
- Stock vacuum sanders for sale or consider having one available for DIYers to rent while their vessel has been hauled.
- Stock spill containment items such as hydrophobic pads, mops and booms.

Boaters:

- When possible, remove the boat from the water and perform cleaning where debris can be captured and properly disposed of. Promote the use of **dry** slips and boat lifts, in order to reduce the need for in the water cleaning.³
- Cover the water between the boat and dock with visqueen type materials or tarps.¹
- Use tarps to capture wastes, paint chips, processed water, etc.
- Clean more frequently using milder methods to avoid dirt and fouling build-up that requires more abrasive cleaning methods
- Use cleaners that are water-based, biodegradable, phosphate-free, and labeled as less toxic (likely not actually “non-toxic” as label may claim, but may be less toxic than some alternatives)
- Use only the least amount of cleaner to do the job. Follow the dilution recommendation. The weakest recommended dilution often works well.¹⁹
- Wash the boat hull above the waterline by hand with water and microfiber cloths, using biodegradable boat washes only as needed. Collect water contaminated with cleaning products as much as possible and discharge to sewer when back at harbor.³
- Avoid spilling or rinsing cleaners, solvents, polishes into the water
- Use a cloth and spray bottle to spot clean rather than using aerosols
- Avoid using sudsing soaps that require rinsing
- For major engine work or parts degreasing, use an aqueous parts cleaning unit if practical to reduce the use of solvents. Or use water-based degreasers, using care to retrieve grease/oil laden waste into containers or onto rags that can be properly managed by professional launderers.

► **Purchase greener alternatives that are:**

- Water-based, biodegradable, phosphate-free, **and/or** less toxic (better if more than one green attributes are claimed)
- Biodegradable
- Water-based
- Phosphate-free (and phosphoric acid free, which breaks down to phosphates)
- Free of methylene chloride, trichloroethylene, perchloroethylene, and n-propyl bromide (toxic solvents still found in common aerosol specialty cleaners which are gradually being banned from CA through CARB Rule Changes)
- Low VOC
- Pump sprays instead of aerosols
- Approved by EcoLabels such as Green Seal, Ecologo, or the US EPA Design for the Environment (DfE)
- Vegetable-based, soy-based, natural ingredients (natural does not necessarily mean safe)
- Water-based surfactants and degreasers with no alkylphenol ethoxylates (nonionic surfactants used as wetting agents, emulsifiers, and dispersants which are toxic to aquatic marine life) Better options include alcohol ethoxylates and linear alkybenzene sulphonates⁹

Common Cleaning Ingredients to AVOID in Soaps	Teak Cleaner	Metal Cleaner	Detergent / Soap	Glass Cleaner
Phosphate/phosphoric acid	X		X	
Sodium hypochlorite (bleach)	X		X	
Chlorinated hydrocarbon solvents			X	
Petroleum Distillates (Naphtha)		X	X	
Lye			X	
Alkyl(Nonyl)phenol Ethoxylates			X	
Ammonia			X	
Sodium Hydroxide	X		X	
Glycol ethers		X		X
Hexane		X		
n-methyl pyrrolidone		X		

► **Resources**

- Appendix B *Boater's Guide to Eco-Friendly Purchasing*
- See results from an evaluation of “green” boat soaps by Boat US Foundation http://www.boatus.com/foundation/Findings/47/FF47_Mag.pdf
- Look for certified products by:
 - U.S. EPA Design for the Environment (DfE) www.epa.gov/dfe/
 - Green Sea www.greanseal.org
 - EcoLogo www.ecologo.org
- Check product ratings on www.GoodGuide.com
- Check for alternatives on www.SFapproved.org

- See DTSC Aqueous Parts Cleaning Fact sheet:
<http://www.dtsc.ca.gov/PollutionPrevention/VSR/upload/AqueousPartsCleanAuto02.pdf>
- California Department of Health, Hazard Evaluation System & Information System (HESIS) Fact Sheet – *Methylene Chloride*
<http://www.cdph.ca.gov/programs/hesis/Documents/methylenechloride.pdf>
- California Department of Health, Hazard Evaluation System & Information System (HESIS) Fact Sheet – *Aerosol Cleaner Use in Auto Repair*
<http://www.cdph.ca.gov/programs/hesis/Documents/aerosol.pdf>
- “Safer Alternative Thinners, Cleanup Materials, Coatings, and Sanding Methods in the Autobody Industry.” 2008 Report produced by the Institute for Research and Technical Assistance
<http://irta.us/DTSC%20Autobody%20Report%202008%20Without%20MSDS.pdf>
- “Automotive Aerosol Cleaning Products; Low-VOC, Low Toxicity Alternatives -2006” Report produced by the Institute for Research and Technical Assistance
<http://irta.us/DTSC%20Auto%20Repair%20Report.pdf>
- U.S. EPA Nonylphenol (NP) and Nonylphenol Ethoxylates (NPEs) Action Plan
<http://www.epa.gov/oppt/existingchemicals/pubs/actionplans/np-npe.html>

4.0 Marina Fueling Facilities

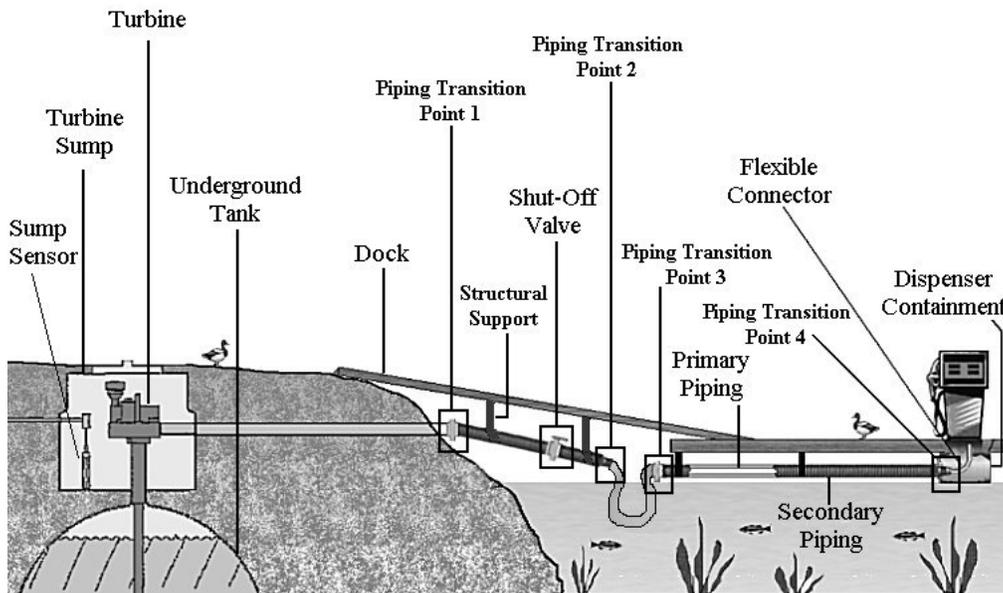
4.1 MARINA FUELING FACILITIES (MFFs)

► Environmental Concerns

In California there are over 220 marinas with fuel docks on coastal and inland waterways that dispense more than 30 million gallons of fuel per year. They vary widely in design, but are generally comprised of aboveground and underground storage tanks with aboveground, underground, over-water, and underwater piping systems.²³ In 1997 the SWRCB was tasked with convening an advisory board to evaluate the status of fueling systems and to report issues needing attention and propose recommendations for remedying such problems. The SWRCB concluded that most MFFs are in need of some sort of upgrades to prevent releases with some sites relying only on visual monitoring to detect releases. Many systems consist of components that are not secondarily contained, are not monitored with continuous leak detection or are using piping not intended for aboveground applications, which are particularly vulnerable in the harsh marine environment. They must resist corrosion, ultraviolet radiation, temperature fluctuations, constant movement from waves, wakes and tidal changes and severe weather situations such as tsunamis, hurricanes and floods.

In 2009, The Petroleum Equipment Institute (PEI) completed its guidance document “Recommended Practices for the Installation of Marina Fueling Systems”, the first industry derived design standards for MFFs. Although some MFF tank system components are still awaiting final UL approval, this comprehensive guidance document is helpful to those intending long or short term upgrades to their MFFs. Copies can be obtained by your local MFF regulators or for purchase directly from the PEI.

Typical Diagram of a Marina Fueling Facility-Source: State Water Resources Control Board¹⁸



Regulatory oversight of MFFs is complex with the SWRCB's storage tank program, local fire authorities and CUPAs all with authority. MFF systems are also subject to the requirements of the National Fire Protection Association (NFPA). Original systems were primarily protective of fire and public safety, designed to slow or stop releases not necessarily prevent them. Underground Tank Systems require operating permits. Under the Aboveground Petroleum Storage Act (APSA), CA Health and Safety Code, Chapter 6.67, owners/operators of aboveground tanks (storage of petroleum products in single tanks exceeding 1320 gallons, and/or aggregate storage of petroleum in containers 55 gallons or greater that when combined, exceed 1320 gallons) are required to file storage statements to their local CUPA's, pay a fee and implement measures to prevent spills.

During normal storage conditions, fuel can easily be spilled or leaked into surface waterways when fuel tanks are being filled, while fuel is flowing through pipelines and while fuel is being dispensed into the boats. Boats should be equipped with fuel tank vents which are intended to prevent "burp back" of product due to air pockets in fuel line. MFF operator should witness all fueling operations, ensuring boaters are not overfilling tanks, spilling fuel into boats, and are containing or immediately cleaning up drips and spills from dispenser nozzles.

Gasoline spills can be a safety problem because of gasoline's flammability and toxicity. Diesel is less flammable, but is still combustible. Both fuels should be cleaned up as soon as possible. They have lower densities than water and will float on the surface of the water causing harm to marine birds and other wildlife. Hydrophobic (also known as water repelling) absorbents such as water repelling booms and pads work well, but are limited when water is choppy and turbulent. It is always ideal to prevent a release versus cleaning it up after the fact. Hydrocarbons are toxic to aquatic plants and animals both at and below the water surface. It is important to clean up on-board spills immediately to avoid fuels to enter boat bilges.

► Recommended Practices

- Conduct daily inspections of all tank system components as prescribed in site's Spill Prevention Plan. If electronically monitored, check monitoring panel for any indications of potential leaks or malfunctions. If visually monitored, log inspection and note and report any problem areas.
- Allow fueling ONLY in designated areas at approved fueling stations
- For outboard tanks, install spill-proof nozzles on portable fuel cans²
- Place signage by the fueling station to visibly display proper fueling instructions and spill prevention and response procedures
- Prohibit washing spills into the water or storm drain
- Prohibit the use of detergents and emulsifiers for spill clean up
- Ensure that adequate amounts of oil absorbents and other spill response equipment are easily accessible by boaters and the fueling attendant on the fuel dock
- Dispose the used absorbents at oil absorbents collection facilities (which often serve as oil absorbents distribution facilities)
- Or, dispose the used absorbents as hazardous waste in an easily accessible closed drum (see Section 8.0 *Hazardous Waste Management*)

- Provide secondary containment e.g. berm around the dispensing area, fuel machinery, and any oil storage containers to prevent oil spills
- Install curbing or grade the area around the fueling island to prevent storm water from flowing onto the area and becoming contaminated⁶
- If possible, have a trained fuel attendant on call to oversee and assist boaters with proper fueling procedures
- Properly maintain fueling equipment and leak detection devices
- Do not use detergents to clean the fueling station or island as surfactants and other chemicals that can be harmful to aquatic life
- Clean with dry methods such as with an absorbent mop. Use a damp cloth for pumps and a damp mop on the paved area⁶
- Pave the fuel island with Portland cement concrete, not asphalt, since gasoline will react with the asphalt and slowly dissolve it. Paving should be sloped to one side with a drain installed at the bottom of the slope to trap all spills. The drain needs to be connected to a lined sump or oil/water separator that will prevent spillage or leakage to surface waters or groundwater. The drain also needs a control valve, such as a locked drainage valve or plug, to prevent the release of large spills.⁶

4.2 FUELING

► Recommended Practices

- Avoid fueling boats from portable fuel containers while in the marina.¹
- Attend to the nozzle at all time while fueling (the hands-free clip should be disabled)
- Nozzles should have an automatic shut off feature...
- Nonetheless fuel slowly paying attention to the fuel gauge, the audible alarm once nearly full, or for the changes in pitch as it is filling
- Keep nozzle vertically upright when mounted in the fueling station to avoid drips
- Do not top-off fuel
- Leave the tank 5-10% empty to allow fuel to expand and not spill out of the vent
- Use an absorbing collar or “donut” pad around the nozzle when fueling to absorb backsplash and any spill
- Use oil absorbents to catch fuel drips and spills while transferring the nozzle between the boat and fuel dock
- Attach containers to the outside of the air vent to catch spills caused by back pressure build up²
- Install fuel/air separators in the air vent for a built-in fuel tank or stems of inboard fuel tanks to prevent spills during fueling
- Clean up spills immediately
- Never try to disperse spilled oil in the water using detergents and emulsifiers – it is illegal. Use absorbent booms and pads instead. Follow the Spill Prevention Plan.
- Keep engines properly maintained for efficient fuel consumption, clean exhaust, and fuel economy. Follow all manufacturers’ specifications.¹

► Resources

- US Boat Foundation *Understanding Boat Fueling*
<http://www.boatus.com/foundation/cleanwater/drops/FuelSystems.asp>
- List of Marina Fueling Facilities
http://www.swrcb.ca.gov/ust/leak_prevention/marina/marina_fac_list.shtml
- SWRCB Underground Storage Tank Program - *Marina Fueling Facility Project Report*, Aug 2006 www.swrcb.ca.gov/ust/leak_prevention/marina/docs/mff_projectreport.pdf
- Petroleum Equipment Institute *Recommended Practices for the Installation of Marina Fueling Systems, PEI/RP1000-09, 2009*

4.3 CASE STUDY: GASHOUSE COVE MARINA

Gashouse Cove Marina, in the northern waterfront in San Francisco, provides fueling services and a small chandlery for recreational and commercial boats in San Francisco. It is one of only two public marina fueling facilities in San Francisco, the only one that sells both gasoline and diesel. Gashouse Cove Marina is operated and co-owned by Christine Kaplan.

The marina consists of continually monitored underground storage tanks installed landside, with piping running underground to a transition sump. At that point the piping transitions to above ground rigid piping which runs to the floating fuel dock. The pipe-run then transitions to flexible pipe, and runs along fuel dock to the dispensers. The dispensers are equipped with under-dispenser containment and a continuous leak monitor. While the piping is designed to let product flow back into tanks between dispensing operations, lowering the risk of release should there be a pipe failure, they are also equipped with in-line leak detectors that can slow and/or stop the flow of product if a release is detected. While this fueling system is well protected by



design and continuously monitored, there remains the risk of vulnerable over-water piping which could fail with some product remaining in the line. Having many transitions and breakaways in such a long pipe-run help to reduce the volume of product that could release from each section of pipe-run, but is not 100% protective of the environment and can only minimize not prevent a release.

4.4 CASE STUDY: BREAKWATER COVE MARINA & MONTEREY BAY BOATWORKS



Monterey Bay Boat Works and its subsidiary Breakwater Cove Marina provide a full service marina with vessel repair and maintenance services. Located in Monterey, at Coast Guard Pier just south of the more famous Monterey Municipal Harbor at Fisherman’s Wharf, it consists of 80 slips, a fuel dock, restrooms, showers, and free bilge, oil and sewage pump-outs. Also offered are vessel restorations, repairs and fabrication for motor and sail vessels up to 70 tons in addition to a small chandlery. Being in such close proximity to the larger Monterey Harbor, which consists of 413 slips that can accommodate vessels ranging from

20 to 75 feet, Monterey Bay Boat Works provides convenient services for a large number of and a wide variety of boats.

In order to better protect the environment and also meet the fueling needs of very large boats to the smallest of boats, Diane Colwell, Manager of Monterey Bay Boat Works, had designed a unique fuel dispensing system. Fuel is stored in underground tanks landside, high

above the water level, and pumped in underground pipes to a transition sump, where the piping transitions to above ground piping for dispensing operations. A hoist system allows for a long dispenser hose and nozzle to reach down to the level of the boat fuel tank. A majority of fuel docks are designed with dispensers on floating piers, with piping running on or under the pier, then transitioning to an on-pier dispenser. These floating piers are vulnerable to high waves, large wakes, and collisions by boaters, and when they consist of rigid or flexible fuel piping with dispensers over water, there stands a risk of product releasing should the piping system fail, spilling fuel directly into the waterways. The Monterey Bay Boat Works design minimizes the spill risk by not having piping and dispensing on floating piers, while also meeting the challenge of trying to dispense fuel to boats of a wide variety of sizes and shapes.



5.0

SPILL RESPONSE AND EMERGENCY PLANNING

5.1 GENERAL EMERGENCY PLANS

▶ Recommended Practices for a Response Planning

- Even if Spill Prevention, Control, and Countermeasure Plan (SPCC) regulations do not apply to the facility, an SPCC or Oil Spill Contingency Plan should still be developed
- Organize an emergency response file or binder that is readily accessible by staff and responders
- Include contact information of local entities:
 - Local Emergency Response Agency 9-1-1
 - Cal EMA (Emergency Management Agency) 1-800-852-7550
 - National Response Center 1-800-424-8802
 - Marina owner, emergency coordinator, and staff
 - Local CUPA
 - Spill response contractors
 - Nearby marinas for equipment
 - Hospitals
 - Nearby businesses
- Keep a current site map that shows the location of shut-off valves, power shutoffs, pipes, tanks, hazardous material storage, telephones, response materials, extinguishers, etc.
- Acquaint staff members, the local harbormaster, and fire department with the location and content of the emergency plans
- Provide regular training (at least annually) for staff spill response, reporting, and emergency procedures, maintaining training records
- Provide visible signs on proper spill response procedures and phone numbers to contact
- Designate an emergency coordinator and an emergency notification system
- Evaluate and update the plan at least annually and inform staff and boaters of updates

▶ Recommended Practices for Responding to Spills

- Maintain an adequate supply of oil/hazardous spill response materials in readily accessible locations for boaters and staff
 - Absorbent Boom
 - 3 feet of boom per foot of boat
 - enough to encircle largest boat in the marina
 - Deployment Boat
 - Hydrophobic Mop
 - Absorbent blankets and pillows
 - Empty Drums
 - Sand Bags
 - Miscellaneous Items such as: Rope, Flashlights, Metal Fence Stakes, Straw Bales, and weighted spill mats (for covering storm drains)

- In the event of a spill, immediately stop spill, contain spill from spreading further, collect and remove spilled materials if possible
- Do not use dispersants to treat the oil spill; it is illegal
- Report the spill to the National Response Center 1-800-424-8802; see Section below on *Reporting Spills*

5.2 SPILL PREVENTION, CONTROL, AND COUNTERMEASURE PLAN.....

The following has been directly quoted from the EPA Spill Prevention, Control, and Countermeasure (SPCC) Regulation 40 CFR part 112 – *A Facility Owner/Operator’s Guide to Oil Pollution Prevention* <http://www.epa.gov/oem/docs/oil/spcc/spccbluebroch.pdf>

► Applicability of SPCC Requirements

The purpose of the SPCC rule is to help facilities prevent a discharge of oil into navigable waters or adjoining shorelines. This rule is part of the U.S. Environmental Protection Agency’s oil spill prevention program and was published under the authority of Section 311(j) (1) (C) of the Federal Water Pollution Control Act (Clean Water Act) in 1974. The rule may be found at Title 40, Code of Federal Regulations, Part 112. A facility that meets the following requirements must have SPCC Plan if there is an aggregate aboveground oil storage capacity greater than 1,320 U.S. gallons (includes oils stored in 55 gallon containers or larger, that when aggregated, total oil storage exceeds 1,320 gallons), or a completely buried storage capacity greater than 42,000 U.S. gallons, and there is a reasonable expectation of an oil discharge into or upon navigable waters of the U.S. or adjoining shorelines. In California, those sites are regulated under the Aboveground Petroleum Storage Act and they must submit notifications to their local CUPA and maintain current SPCCs.

► Important Elements of an SPCC Plan

- Facility diagram and description of the facility
- Oil discharge predictions
- Appropriate secondary containment or diversionary structures
- Facility drainage
- Site security
- Facility inspections
- Requirements for bulk storage containers including inspections, overfill, and integrity testing requirements
- Transfer procedures and equipment (including piping)
- Requirements for qualified oil-filled operational equipment
- Loading/unloading rack requirements and procedures for tank cars and tank trucks
- Brittle fracture evaluations for aboveground filed constructed containers
- Personnel training and oil discharge prevention briefings
- Recordkeeping requirements
- Five-year plan review
- Management approval

- Plan certification (by a Professional Engineer (PE) or in certain cases by the facility owner/operator)

▶ **Preventing Oil Spills**

- Use containers suitable for the oil stored
- Provide overfill prevention for oil storage containers i.e. high-level alarm or audible vent
- Provide sized secondary containment for bulk storage containers, such as a dike or a remote impoundment. The containment needs to hold the full capacity of the container plus possible rainfall. The dike may be constructed of earth or concrete. A double-walled tank may also suffice.
- Provide general secondary containment to catch the most likely oil spill where you transfer oil to and from containers, and for mobile refueling and tanker trucks. For example, you may use absorbent materials, drip pans or curbing for these areas.
- Periodically inspect and test pipes and containers. You need to visually inspect aboveground pipes and oil containers according to industry standards; buried pipes need to be leak tested when they are installed or repaired. Include a written record of inspections in the Plan.

▶ **Preparing and Implementing an SPCC Plan**

- The owner or operator of the facility must develop and implement an SPCC Plan that describes oil handling operations, spill prevention practices, discharge or drainage controls, and the personnel, equipment and resources at the facility that are used to prevent oil spills from reaching navigable waters or adjoining shorelines. Although each SPCC Plan is unique to the facility, there are certain elements that must be described in every Plan including:
 - Operating procedures at the facility to prevent oil spills;
 - Control measures (such as secondary containment) installed to prevent oil spills from entering navigable waters or adjoining shorelines; and
 - Countermeasures to contain, cleanup, and mitigate the effects of an oil spill that has impacted navigable waters or adjoining shorelines
- Every SPCC Plan must be prepared in accordance with good engineering practices. Every SPCC Plan must be certified by a Professional Engineer unless the owner/operator is able to, and chooses to, self-certify the Plan.

▶ **Reporting Spills**

If your facility discharges oil to navigable waters or adjoining shorelines, you are required to follow certain federal, state and local reporting requirements. Any person in charge of an onshore or offshore facility must notify the National Response Center (NRC) immediately after he or she has knowledge of the discharge. Oil discharges that reach navigable waters must be reported to the NRC at 1-800-424-8802 or 1-202-426-2675. The NRC is the federal government's centralized reporting center, which is staffed 24 hours per day by U.S. Coast Guard personnel.

A common misunderstanding is that by reporting to the NRC you have met state and local spill reporting requirements. The report to the NRC only satisfies your federal reporting requirements under the Clean Water Act. Additional state and local reporting requirements apply. Spills should be reported to the CA Office of Emergency Services and your local CUPA. In most cases it makes sense to call 911 in the event of an oil spill, particularly in the case of flammable or combustible oil spills. Any owner or operator of a facility regulated by the SPCC rule must also report the discharge to EPA when:

- More than 1,000 U.S. gallons of oil is discharged to navigable waters or adjoining shorelines in a single event; or
- More than 42 U.S. gallons of oil in each of two discharges to navigable waters or adjoining shorelines occurs within any twelve-month period.

Note: The gallon amount(s) specified (either 1,000 or 42) refers to the amount of oil that actually reaches navigable waters or adjoining shorelines, not the total amount of oil spilled. EPA considers the entire volume of the discharge to be oil for the purposes of these reporting requirements.

After the NRC has been notified, the owner/operator must provide the following information to the EPA Regional Administrator (RA):

- Name and location of the facility
- Owner/operator name
- Maximum storage/handling capacity of the facility and normal daily throughput
- Corrective actions and countermeasures taken, including descriptions of equipment repairs and replacements
- Adequate description of the facility, including maps, flow diagrams, and topographical maps, as necessary
- Cause of the discharge to navigable waters, including a failure analysis
- Failure analysis of the system where the discharge occurred
- Additional preventive **measures** taken or planned to take to minimize discharge reoccurrence
- The RA may require additional information. You must also send a copy of this information to the agency or agencies in charge of oil pollution control activities in the state in which the SPCC-regulated facility is located.

► Sources

- EPA Spill Prevention, Control, and Countermeasure (SPCC) Regulation 40 CFR part 112 – *A Facility Owner/Operator's Guide to Oil Pollution Prevention*
<http://www.epa.gov/oem/docs/oil/spcc/spccbluebroch.pdf>
- www.epa.gov/oilspill
- [http://www.oes.ca.gov/Operational/OESHome.nsf/PDF/Spill%20Notification%20Guide/\\$file/SpillNotif06.pdf](http://www.oes.ca.gov/Operational/OESHome.nsf/PDF/Spill%20Notification%20Guide/$file/SpillNotif06.pdf)

5.3 FIRE SAFETY.....

▶ Recommended Practices

- Maintain serviced and clearly marked fire extinguishers in readily accessible locations throughout the facilities especially in areas of higher risks for fire e.g. fueling stations, paint storage, welding stations, etc.
- Maintain a tidy workspace clear of oil, debris, and spills of combustible liquids
- Ensure excess catalyzed resins are cooled down before disposing
- Ensure engines and fluids are cooled down before working on them
- Ensure that fire escape exits are clearly marked and accessible
- Welding, cutting, brazing, and other hot work operations should be done in a designated areas free of fire hazards

▶ Resources

- United States Department of Labor, OSHA Standards for Shipyard Employment 1915 Subpart P – Fire Protection in Shipyard Employment
http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1915#1915_Subpart_P

6.0

STORMWATER POLLUTION PREVENTION

6.1 STORMWATER POLLUTION PREVENTION.....

▶ Environmental Concerns

Storm water runoff is excess water generated from precipitation that spreads over land surfaces, the portion of which does not soak in to ground, runs off into surface waterways. Storm water picks up pollutants such as petroleum products, heavy metals, pesticides, fertilizers, solid waste, debris and soil and is usually discharged untreated into adjacent waterways. Water runoff from irrigation, parking lot maintenance and light vessel rinsing is typically routed to storm drains. Storm water runoff from marinas can also be contaminated from upstream sources not directly related to marina activities such as construction activities, boat repair activities that generate hazardous waste, parks and landscape maintenance, adjacent businesses such as restaurants and commercial fishing operations, and vehicular traffic which can spread contaminants.

Develop a Storm Water Pollution Prevention Plan, a requirement under National Pollutant Discharge Elimination System (NPDES) permit for industrial waste water dischargers. Evaluate all potential sources of pollutants and investigate ways to control those pollutants at the source through isolation or secondary containment. Waste water treatment systems are typically customized based on volume through-put, typical contaminants and local discharge restrictions.

Marinas should have clear and binding lease agreements listing approved and disapproved activities for boaters while in slip or on marina property. Design drainage systems that direct storm water away from any hazmat or hazardous waste storage areas or any other areas where contaminants could be incorporated into storm water. Designate contained areas for boaters to rinse their boats and conduct minor repairs after haul out. Parking lots can be cleaned with sweepers that can collect waste water to be treated or directed to sewer drains. Other protections can be installed such as filter media and filter fences around drain inlets, sediment collection systems, oil water separators and oil absorbing booms or skimmers that can be placed into drains. Incorporate vegetated areas and swales to filter and slow runoff. Isolate all activities that could incorporate hazardous contaminants into the storm water management system. Discharge allowances can vary regionally so consult with your local Water Board representative and your local water agencies to agree on the best storm water pollution prevention plan for your site.

▶ Recommended Practices

- Develop and implement a Storm Water Pollution Prevention Plan (SWPPP)
- Conduct periodic training on facility's SWPPP including roles and responsibilities, good housekeeping practices, preventive maintenance, spill prevention, response and reporting requirements, and hazardous materials management practices.
- Inspect entire storm water management system frequently and especially after each rain event to ensure all is in proper order. Remove debris and replace filters as required to ensure system will be fully functional for the next rain event.

- Immediately report spills that have entered or could enter the storm drain system or a water body to your local authority
- Install vegetated filter strips, swales, permeable pavement, buffer strips and/or rain gardens to help filter runoff from impervious surfaces such as roof tops and parking
- Install filter media and filter fences around storm drain inlets
- Install sediment chambers or filter fabric to catch sediment entering drains
- Place oil absorbent skimmers and booms in or around drain inlets to capture oily waste, but still allow water to pass through.
- Frequently inspect drains, replace filter media and clean drains as needed. Note, oily pads will need to be managed as hazardous waste, but can be commingled with your other oily waste stream.
- Install and properly maintain an oily water/sediment separation system in parking lots as required to minimize oily waste runoff in areas with high traffic volume and/or where there are large amounts of mud and sand that can clog drains
- Post signs prohibiting littering and vessel maintenance in the parking lot
- Clean parking lots using dry methods such as sweeping or using wet sweeping equipment that collects dirty water, which must be disposed of in sanitary sewer
- Routinely check for vehicle leaks (parking lots, shop floor, sidewalks) and establish a “ground staining” inspection routine.
- Eliminate or reduce use of chemical pesticides by implementing an Integrated Pest Management (IPM) program, specifying non-chemical prevention in pest control contracts.
- Use traps, barriers and less toxic pesticides as needed only
- Set up storage and sanitation procedures to discourage pests.
- Limit fertilization of landscaped areas
- Plant drought tolerant plants to avoid excessive watering needs
- Encourage tenants and visitors to clean up after their pets. Provide pet waste bags and waste receptacles convenient locations.
- Provide recycling and compost waste containers to help minimize trash. Containers should be covered to reduce risk of attracting unwanted pests.
- Mark storm drains to indicate where water discharges and that it is illegal to dump hazardous waste. Your local water agency may have stencils you can use.
- Encourage boaters and staff to use less toxic or less hazardous products (see *Boater’s Guide to Safer and Greener Product Purchasing*)
- Designate areas for vessel washing, hull maintenance and mechanical repairs and prohibit such activities except in designated areas.
- Design and install a separate stormwater treatment system for above maintenance areas.
- Clean designated maintenance areas frequently, removing paint chips, sanding dust and debris that could wash into stormwater treatment system.
- Redesign your existing stormwater treatment system to treat runoff from the “first flush” or from the first rain event after a dry spell. This first flush will likely contain more contaminants that can accumulate on impervious surfaces.
- Ensure your sanitary sewer drains are in good working order and not draining or leaking into stormwater

- Plug or permanently seal floor drains in work or maintenance areas that are connected to storm or sanitary sewer drains. If water tends to accumulate in these areas, install a sump area to collect water, pump as needed and treat accordingly if water is suspected to contain hazardous contaminants.
- Prevent liquid wastes from entering floor drains, sinks or outdoor storm drains.

6.2 CASE STUDY: KKMI

Keefe Kaplan Maritime, Inc. (KKMI) operates two marine vessel service and repair yards (boatyards) in the San Francisco Bay Area, one in Richmond since 1996 and a recent acquisition in Sausalito, at the site formerly occupied by the Anderson Boat Yard. Ken Keefe, President, and Paul Kaplan, CEO, have strived to make both sites leaders in environmental protection while providing a wide range of services for the maritime community. In 2006, KKMI received the National Award of Excellence from the American Boatbuilders and Repairs Association (ABBRA) and in 2008, was awarded with ABBRA’s Best Environmental Practice Award.

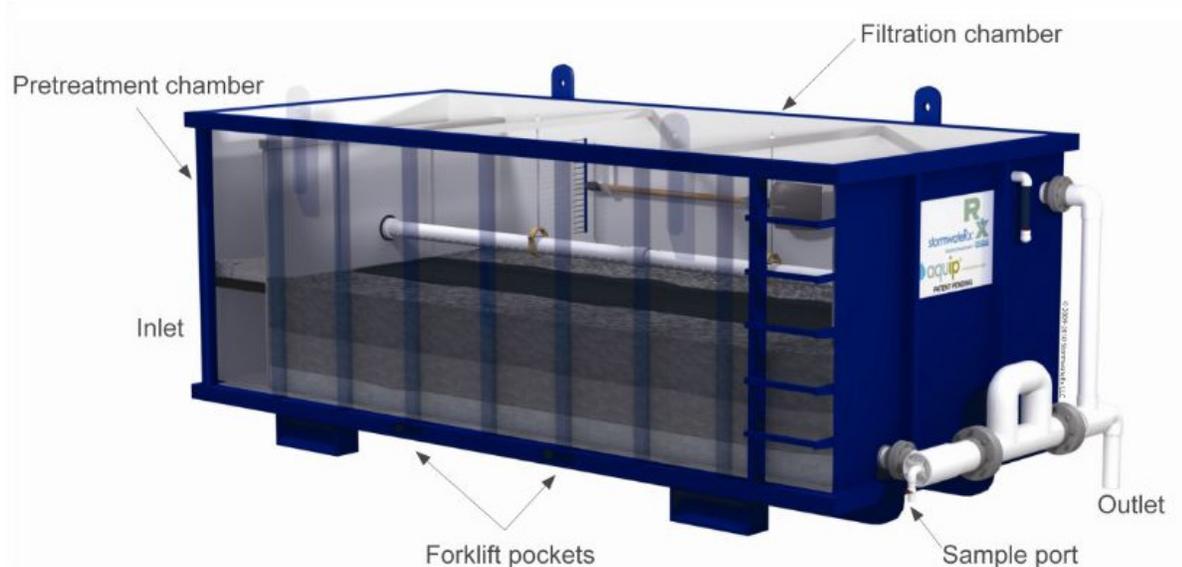
Both KKMI yards provide full vessel repair and maintenance services to boaters, many operations that can generate hazardous wastes, most of which can potentially contaminate the premises and stormwater. KKMI has painstakingly overhauled both sites to minimize stormwater contamination by containing and isolating work areas, and then pre-treating all stormwater prior to discharge. Operations and wastes that could contaminate stormwater include paint dusts, paint overspray, waste oils/lubricants, gasoline and diesel, degreasers and solvents, heavy metals and liquid wastes from boat holds such as sewage, bilge and ballast water. All work areas take into consideration source reduction and pollution prevention to help reduce the volume of hazardous wastes generated and the spread of possible contaminants.

KKMI yards have been designed to capture all stormwater that could contain hazardous constituents. The stormwater is passed through a treatment unit designed to remove oils and hydrocarbons such as fuels and solvents or degreasers, emulsifiers from cleaning operations, and paint dust/debris and other contaminated particulates.

At the Sausalito yard, not only has KKMI taken on the difficult and expensive task of remediating historic copper contamination at the site, they have built a “wall” around the yard to avert tidal flooding that can frequently inundate the yard with bay waters. The “wall” also serves to contain stormwater from the site, which then drains to their stormwater treatment unit prior to being discharged.

The illustration below is an example of a stormwater treatment system, which should ideally be specifically designed and customized for each boatyards particular needs. Types and concentration of contaminants and the volume of water that is required to be treated vary depending upon locale. Sites with very little rain water will have less volume but more concentrated contaminants. Sites in high rain regions are better served by carefully isolating polluting work areas, keep contaminants from entering the stormwater system.

Below is an example of a filtration system for industrial stormwater provided by Aquip®. The system removes metals, nutrients, and particulates. It uses passive filtration instead of chemicals. More information can be found at <http://www.stormwaterx.com/Products/Aquip.asp>



Aquip® Filter - StormwaterRx LLC

7.0 Hazardous Material Management

7.1 HAZARDOUS MATERIAL MANAGEMENT

▶ Environmental Concerns

Any time hazardous materials (hazmats) are stored in close proximity to the waterfront, it is imperative that the materials are stored:

- safely and securely in approved containers,
- undercover or in an approved storage shed or cabinet,
- in adequate secondary containment.

Storing minimal quantities of hazmats is preferable with an emphasis on storing materials with fewer hazards to minimize risk in the event of a release. Choose smaller containers for materials that are less frequently utilized or purchase specialty products on an as-needed basis. See the *Boater's Guide to Eco-Friendly Purchasing*.

▶ Recommended Practices for Chandleries/Maritime Product Suppliers

- Stock only what is likely to sell quickly, but have your distributors available and ready in case a large order is requested with a short turnaround time
- For materials with limited shelf life such as coatings, epoxies and adhesives and marine flares, pay particular attention to expiration dates, agreeing on return/exchange policy with your distributors
- Work with distributors to offer and stock less hazardous products
- Promote eco-friendly products through signage or other eco-labeling scheme
- Consider offering discounts or coupons for eco-friendly products to encourage boaters to try them
- Solicit feedback from customers on the performance of eco-friendly products. Share feedback with manufacturers and other customers.

▶ Recommended Practices for Minimizing Use of Hazardous Materials

- Use less-toxic, environmentally preferable alternatives when possible
- Purchase only the amount of material needed during maintenance work; try to avoid having leftovers that need to be stored and may later become hazardous waste
- Use hazardous materials sparingly, using them up as best you can; a hazardous material only becomes hazardous waste when you deem it as such or when it becomes unusable
- Stock the minimum amount of products needed and order more on a just-in-time basis
- Apply the first in/first out principle; rotate stock to use oldest material first
- Provide a materials exchange program for excess solvents, paints, and other materials that boaters can use when they need them. Inform boaters of available items on notice boards.

▶ Recommended Practices for Storage of Hazardous Materials

- Container should be compatible with the hazardous material inside e.g. store gasoline in containers made for flammable liquids.
- Store hazardous liquid marina supplies indoors or undercover, away from the drains and docks
- Store securely and control access
- If storing materials or wastes outside, use secured, watertight containers
- Store containers in secondary containment (drip pans or on drum storage platforms) or in bermed area to prevent any potential spills into waterways
- Prohibit unattended open containers of hazardous materials such as paints, oils, cleaners or other maintenance supplies on the docks.
- Purchase container sizes appropriate for use and store materials near point of use when possible (away from waterways and any drains)
- Use material transfer methods (closed systems) that prevent spillage such as: a spout and funnel when adding fluids to waste drums and transferring from container to container; and a pump and spigot when dispensing new products. Drain residual from pump back into original container and close container after adding fluids.
- Temporary drip pans should be used to contain only one type of fluid to avoid mixing incompatible liquids. Residues and cleaning water from drip pan should be disposed of in the proper hazardous waste container
- Ensure hazmat storage has adequate aisle space to allow for easier access for spill response and periodic visual inspections of containers and storage conditions. Local Fire Codes specify aisle space allowances
- Make storage space available away from the docks for rent or use by boaters

8.0 Hazardous Waste Management

8.1 GENERAL HAZARDOUS WASTE MANAGEMENT

▶ Environmental Concerns

Being able to identify which operations generate which kinds of waste allows the marina or boatyard operator to know which local, state, and federal regulations apply to their waste streams and to comply accordingly. This knowledge also helps to identify alternative practices and opportunities to reduce the amount of waste generated and hence reduce costs. Improper handling of hazardous materials and waste can expose humans and the environment to harm, incur serious penalties, and lead to expensive clean-up costs.

▶ Recommended Practices for Implementing and Maintaining a Hazardous Waste Collection Program for Boaters

- Consult your local Certified Unified Program Agency (CUPA) on regulations and options for hazardous waste collection at your facility
- If permitted,
 - provide hazardous waste collection services placing the collection area at easily accessible and well visible locations
 - isolate storage area from the immediate waterfront and storm drains to minimize risk of contamination
 - monitor and inspect site frequently
 - provide adequate space with secondary containment
 - protect from weather
- If you do not provide hazardous waste collection services, provide information to tenants, visitors, and staff on nearby hazardous waste disposal facilities
- Inform staff and boaters of proper hazardous waste procedures through signs, training, lease agreements, mailings, pamphlets, etc.
- Train staff on hazardous waste and emergency spill procedures
- Provide signage where to call if containment is full or area needs attention



Waste Oil Shed Building, Monterey Harbor



Inside the Waste Oil Shed, Monterey Harbor

► Recommended Practices for Hazardous Waste Storage

- Properly collect and segregate all paint and cleaning related waste products, batteries, fuel, oily and coolant waste and manage as hazardous waste unless deemed non-hazardous through analytical testing. Your hazardous waste vendors can help with proper segregation for your particular waste generation needs.
- Lock the storage area when a staff member is unavailable to monitor patrons dropping off and segregating their waste
- Place in non-leaching secondary containment, on drum storage platforms, or in a bermed area to prevent the release of any leaks from the container
- The secondary container should be able to hold the capacity of 110% of the largest storage container
- Place undercover to protect from rainwater entering the container or secondary containment structure
- Ensure containers are securely closed
- Ensure all containers are properly labeled
- Routinely monitor the hazardous waste collection area to ensure adequate space for more drop offs and to ensure ongoing compliance with hazardous waste storage requirements

- Regularly inspect storage containers for leaks and ensure containers are in good condition; repackage those in poor condition into secondary containers
- Regularly clean shop floor using “dry” clean up methods. Use shop towels and squeegees for small drips and spills.
- Immediately clean up any spills or leaks according to Spill Prevention Plan
 - Use a hydrophobic mop for oil spills if possible
 - Use absorbent pads and booms and then handle of as hazardous waste
 - Eliminate use of powdered or granular absorbent for routine cleanup - OK for fuel spills but only spills on land
- Clearly label tanks and containers to avoid mixing different kinds of hazardous waste
- Install snap tops on funnels on containers to ensure that it is closed after waste is added
- Store rags soaked with oils, solvents or fuels in a fireproof container
- Contract with an industrial laundry service to transport the soiled rags offsite for proper cleaning and reuse

► Recommended Practices for Hazardous Waste Minimization and Disposal

- Do not dispose of hazardous waste into sewer system, storm drains, or surface waters
- Contract with a licensed hazardous waste handler to periodically transport waste offsite for proper disposal
- Maintain current and accurate records of hazardous waste disposal for at least three years
- Recycle empty hazardous materials containers. Either: return to supplier for refill; recondition on-site or contract with an approved drum re-conditioner (permit requirements may apply); or reclaim scrap value on-site or contract with a scrap dealer.
- Recycle all hazardous wastes that are eligible for recycling. Contract with recycling services for used oil, lead acid batteries and antifreeze. (You may recycle and antifreeze onsite if you have/use large volumes.)
- Post signs informing staff, boaters, and patrons of proper disposal of maritime specific hazardous waste; use symbols and pictures to help those with language barriers



Solvent Distillation Unit used to recover and reuse solvents from paint waste

► Resources

- DTSC Fact Sheet: Defining Hazardous Waste
http://www.dtsc.ca.gov/HazardousWaste/upload/HWMP_DefiningHW11.pdf

8.2 HOUSEHOLD HAZARDOUS WASTE.....

▶ Environmental Concerns

Hazardous waste generated from recreational boaters is categorized as Household Hazardous Waste (HHW). Commercial boats may not be allowed to use HHW facilities since they are not considered “households”, but rather “businesses”. Have commercial boaters to check with the local HHW facility to determine their options. Some jurisdictions have combined Conditionally Exempt Small Quantity Generator (CESQG)/HHW collection authority, but special permit conditions apply. If your harbor is run by a government entity, it may be permitted to collect HHW from boaters if the facility is willing to accept HHW from the public.

Marinas vary widely on HHW management as ownership and management of waterfront businesses tend to be complicated. In many cases, a Port or Harbor Authority is established to run and maintain harbors, with joint responsibility of HW management. In some cases, Marina is on Federal lands, in other cases, completely privately run. It is advisable to check with your local CUPA and regional HHW disposal facility to see what’s allowed for your particular situation.

If your CUPA permits, encourage boaters to bring their HHW to approved collection sites. Provide disposal services free to discourage illegal dumping. Make drop off locations around harbor convenient to boaters but also keep protected from weather and waterfront.

▶ Examples of Acceptable Household Hazardous Waste

Sources:

- Recology San Francisco <http://sunsetscavenger.com/hazardousWasteFacility.htm>
- Santa Cruz Harbor Hazardous Waste Brochure
www.santacruzharbor.org/documents/SantaCruzHarborHazardousWasteBrochure.pdf

Note: What is acceptable may vary between hazardous waste service providers

- Latex paint and other paint products
- Fluorescent tubes and bulbs
- Household batteries
- Oil paint and other finishes
- Degreasers, solvents and thinners
- Used motor oil and auto products
- Waste motor oil, oil filters, fuels, anti-freeze
- Cleaning solutions
- Pesticides and other garden chemicals
- Roofing tar and adhesives
- Photo chemicals
- Aerosols
- Mercury-containing thermometers
- Flammable Liquids
- Outdated or unused medicines or pharmaceuticals (call to see your HHW’s policy as legislation has recently changed; may offer help with mail-back services)

▶ **Examples of Unacceptable Household Hazardous Waste**

Note: What is acceptable may vary between hazardous waste service providers

- Ammunition
- Marine Flares, fireworks, or explosives
- Gas Tanks/Cylinders
- Unknown/Unlabeled containers
- Large drums (over 5 gallons)
- Water reactive chemicals (e.g. calcium carbide or sodium metal)
- Cyanide
- Picric acid
- Di-ethyl ether
- Smoke Detectors (can go in the trash once batteries have been removed)
- Infectious wastes
- Compressed gas cylinders over 5 gallons

Sources:

- Recology San Francisco <http://sunsetsavenger.com/hazardousWasteFacility.htm>
- Santa Cruz Harbor Hazardous Waste Brochure
www.santacruzharbor.org/documents/SantaCruzHarborHazardousWasteBrochure.pdf

▶ **Recommended Practices for Publicly Operated Marinas**

- Consult your local recycling and hazardous waste service provider for a list of acceptable items and pick-up/ drop-off procedures that apply to your particular facility
- Develop a HHW management plan with the following guidelines-
 - Where to locate collection sites
 - Signage
 - Monitoring and inspection frequency
 - Contingency plans
 - Spill prevention and response
 - Plan for managing abandoned and/or unknown wastes
- Provide clearly marked containers and containment shed for household hazardous waste items, preferably near trash and recyclables receptacles
- Ensure adequate secondary containment, allowing extra space for overflow materials should a boater conduct a major “clean out”
- Educate boaters on proper disposal of zinc anodes and lead weights. Must be disposed of as household hazardous waste or recycled as scrap metal at an approved scrap metal recycler.
- Post signs by trash receptacles to inform users to NOT dispose of hazardous waste in normal trash receptacles- direct the to HHW sheds
- Post signs or stencil messages by storm drains to inform users to NOT dispose of hazardous waste down the storm drain
- Post signs around marina, docks and parking areas regarding locations of household hazardous waste shed and distribute literature on proper disposal procedures

- For privately run marinas- instead of only directing boaters to often inconvenient county HHW facilities, coordinate periodic one-day HHW collection events with your HHW facility co-sponsoring event. Ask boaters to bring their wastes periodically instead of abandoning HW.
- Have a plan for marine flare disposal. Ask your county HHW for their policies on marine flare disposal. Many HHW's do not accept them. (See Section 8.2 *Expired Marine Flares*).

Example of What NOT to Do



Problems

- Liquid waste containers are not undercover and not in secondary containment
- Rainwater is highly susceptible to contamination
- There is not enough space to house the containers and accommodate future drop offs of hazardous waste

Solutions

- Increase the frequency of monitoring to ensure compliance with regulations
- Increase frequency of pick-up services for disposal
- Provide sufficient space or locations to meet the hazardous waste needs of the boaters and maintenance staff

► Resources

- www.dtsc.ca.gov/HazardousWaste/UniversalWaste/HHW.cfm
- See HHW Guidance Document www.calrecycle.ca.gov/Publications/HHW/2009013.pdf

8.3 CASE STUDY: SANTA CRUZ HARBOR

Santa Cruz Harbor is a large recreational and fishing harbor run by the Santa Cruz Port District. The Port District is a “special district” defined as a legally constituted government entity, neither a city nor a county, established for the specific purpose of carrying out specific activities within the defined boundaries. Special districts are regulated by the State, not the city or county. Port districts administer harbors, wharves and channels and can pass ordinances and enforce their own regulations.



What that means from an environmental regulatory perspective, is that the district is one large site that generates hazardous waste with various satellite hazardous waste collection sites. The Port District is open to the public and it has four used oil collection sites, located away from the waterfront, but convenient to boaters. They also collect antifreeze, batteries and oil filters at those locations. The District makes it very clear that they do not accept other hazardous wastes, informing boaters and the public of the District’s policy via their website, a detailed brochure, through signage and lease agreements. Boaters are asked to take their HHW to the county run HHW facilities, but hazardous wastes are often left at the used oil collection sheds anyway. The District manages whatever is left at the oil



sheds to keep those wastes from contaminating the environment. Typical wastes that are abandoned include paints, fuels, miscellaneous automotive type fluids, lubricants, thinners, pesticides, propane tanks, flares (marine and automotive types) leaking and universal wastes such as household batteries, fluorescent tubes and aerosols. Oil sheds are well sized to collect this “extra” hazardous waste, providing adequate space, secondary containment and weather and leak protection. The Port District receives an annual grant of \$10,000 from the county to offset the cost of managing the waste, but costs usually exceed that amount.

Jean Brocklebank, in Maintenance Services for the District, does an excellent job of managing the oil sheds and abandoned wastes. At least twice daily, she inspects and manages what wastes need attending to, bringing them back to the District maintenance yard for proper containment and management. She reuses and recycles what she can, consolidating the rest for routine trips to the county HHW facility at the Buena Vista Landfill. In addition to managing the hazardous wastes from such a large harbor, the District offers fueling services and bilge and sewage pumpout services. They also have a comprehensive solid waste diversion program providing receptacles for recycling and compostable waste. While they do not allow DIYers at the harbor, they do have boat repair facilities nearby to be convenient to boaters.

8.4. CASE STUDY: HHW COLLECTION EVENT, SAN FRANCISCO MARINA

The San Francisco waterfront has two large recreational marinas, a few small recreational marinas and the famous Fisherman’s Wharf fishing harbor. Fisherman’s Wharf is managed by the Port of San Francisco, while the other marinas are managed other government entities or private associations under lease agreements to the Port of San Francisco. Fisherman’s Wharf frequently has waste abandoned left at their Used Oil shed and the Port is currently working on a better management plan to address the problem. San Francisco’s HHW facility is run by Recology and is located by Candlestick Park, well south of the wharf. It is not convenient to fishing boaters, many of which are passing through during various fishing expeditions with no access to ground transportation to drive their HHW’s to the approved facility. Port staff manages the abandoned waste, taking it to their maintenance yard to properly containerize and prepare waste for pick up by their contracted hazardous waste haulers.

The privately run marinas also experience abandoned hazardous waste issues, but on a smaller scale. While some harbormasters want to provide HHW services for their leaseholders, they are not authorized to do so. They direct boaters to use the HHW facility. In order to better address the HHW needs of boaters, Larry White, harbormaster of the SF Marina (on National Park Service Land, operated by SF Recreation and Parks Dept.) helped SF pilot its first HHW collection event for boaters in the summer of 2009. SF Marina, Recology, the SF Department of Public Health and the SF Department of the Environment co-hosted and staffed the event. Recology provided their expertise collecting HHW, staff time and their Mobile HHW collection truck. Not many boaters attended the first year, however some local residents took advantage of the opportunity and brought their HHW to be disposed of. A second collection event in the summer of 2010 and was better attended with 20 boaters and 1 non-boater. Nearly 77 gallons of various types of HHW waste were collected along with 50 lbs of household batteries, 59 aerosols, 7 automotive batteries, 8 special Ni-Cd wet cell batteries, 10 fire extinguishers, and various other items. Once boaters became aware of the periodic event, they participated more and feedback was very positive. Boaters tend not to want to keep excess hazardous wastes onboard and they appreciated the convenience of the periodic collection event. We now hope to be able to host collection events twice a year, possibly in different parts of the waterfront.

If you are considering hosting such an event, consult with your CUPA and HHW and ensure you advertise well in advance of the collection day. Carefully stage the site, ideally where boaters can walk up or drive up to drop off their waste, but well away from storm drains and water ways. Adequate spill kits, extra containers, storm drain covers should be part of the plan.

8.5 USED OIL AND OIL FILTERS.....

► Environmental Concerns

Used oil is hazardous to marine life as a result of its oil and metals constituents. All motorized vessels use lubricating oils and grease to protect wear on metal parts. The good part is that used oil is 100% recyclable and reusable. The challenge is in collecting it so it can’t be released into the soils, stormwater system or directly into waterways (from bilge water, for example). This becomes all more difficult considering the environmental sensitivity of the waterfront. It is

important to have collection sites accessible to boaters, but well away from harm's way at the waterfront. Some harbors have oil pumpouts on floating piers, adjacent to fueling operations and bilge and/or sewage pumpouts. This leads to environmental risk transferring liquids over water, yet does encourage use by its high visibility and convenience to boaters. Other sites have boaters bring oil to shore-side facilities minimizing harbor's risk of oily discharges directly into waterways. While this policy may be less convenient to boaters, boaters can be educated to understand the importance of proper waste oil management.

As an incentive to increase the numbers of used oil collection centers, Cal Recycle will reimburse Certified Used Oil Collection Centers up to 16 cents per gallon to help offset costs of running collection programs. See www.calrecycle.ca.gov/usedoil/ for more information on how to become a collection site.

All oily waste should be managed properly. This includes oil filters, oily water waste, bilge water waste, oil laden absorbents and bilge pads or pillows. When setting up oil collection drums, also set up a system to collect filters, pads and oily water. For filters, place a drain screen on top of collection drum for filters to drain prior to being properly disposed of. Note that oil contaminated with fuels or fuels contaminated with water should be managed with waste fuels not waste oil.

▶ **Examples of used oil products**

- crankcase oils
- engine lubricants
- transmission fluids
- gearbox and differential oils
- hydraulic oils
- gear oils
- used oil filters
- oily bilge pads and absorbents

▶ **Recommended Practices for Marinas**

- Provide a collection site for used oily absorbents, used oil, oil filters
- If your marina chooses not to provide used oil collection services, provide information on nearby used oil collection facilities
- Implement an oil absorbent pad exchange: distribute oil absorbent pads and collect used oil absorbent pads
- Collect used oil from the public. The State reimburses 16 cents/gallon if certified by the California Integrated Waste Management Board. See www.calrecycle.ca.gov/usedoil/ for more information.
- Segregate, drain, crush and recycle used oil filters and provide location for boaters to recycle their oil filters, properly label containers.
- Consult your local CUPA (Certified Unified Program Agency) to determine which hazardous waste regulations and procedures apply to your business

- Contract with a used oil recycler or local hazardous waste service provider to transport the used oil and used oil filters off-site to be recycled
- Follow applicable regulations for accumulation, storage, transport, and labeling of oil and other hazardous waste
- Provide signage, pamphlets, mailings, etc. that instruct boaters on proper used oil and oil filter management
- Provide clearly labeled containers for the collection and storage of used oil and oil filters
 - Place in areas accessible to users, but away from the water, storm drains, and fire hazard areas
 - Place in containment areas with berms and on oil-impermeable surfaces (synthetic liners, bentonite liner or high clay soils)⁶
 - Place absorbent pads, booms, and oil drip pans around and on the container to collect oil drips
 - Rainwater trapped inside the oil storage containment berm should be pumped or transported to an oil/water separator or to a waste oil storage tank for eventual treatment.⁶
- Ensure used oil containers have adequate capacity to collect the amount of used oil generated on a regular basis
- Investigate grant and funding opportunities to institute used oil recycling at your facility
- Promote spill-proof oil changes²
 1. Install an oil-change system; maybe as a free service, use re-refined oil
 2. Contract with mobile boat-to-boat oil change service to provide regular service
 3. Offer the use of portable spill-proof oil change equipment
- Maintain records of the sources, quantities, and pick-up dates of used oil

▶ **Recommended Practices for Boaters**

- Do not dispose of used oil into sewers or storm drains
- Do not mixed used oil with gasoline, solvents, brake cleaner, and other substances; the cost to remove contaminant escalates
- Dispose of used oil according to procedures or guidelines at the marina or by municipal hazardous waste provider
- Use re-refined oil
- Before disposal, drain used oil filters through a filter in a funnel over the designated used oil container to allow excess oil to drain into the container; drained filters can be collected and recycled

▶ **Resources**

- CalRecycle Used Oil Recycling Program website: www.calrecycle.ca.gov/UsedOil/
- See DTSC Fact Sheet for more information
<http://www.dtsc.ca.gov/InformationResources/upload/RAG-UsedOilforGenerators.pdf>

8.6 CASE STUDY: PILLAR POINT HARBOR.....

Pillar Point is a large fishing pier in Half Moon Bay, operated by the San Mateo County Harbor District. With 369 berths, they offer a wide range of services for their tenants. Boaters have the convenience of fueling and pumping out their sewage and bilge water dock side. Fuel tanks are shore-side and underground with tank piping that runs under the length of the pier, approximately 600 feet, to fuel dispensers on the floating dock by the pumpouts. Pillar Point used to provide oil collection services on the pier in the same vicinity, but on the fixed portion of the pier, but



the risk of spill, overflowing and people leaving used oil containers created more of a liability risk than the Harbor District was willing to take on. Now boaters take their used oil and oily filters, absorbents and rags to a new used oil collection shed well inland from pier, thus more isolated from the waterfront, but still convenient to boaters since it is located in the harbor parking lot. Photos below are of their new used oil shed. Note clear signage, covered containers, weather-proof and leak-proof double walled containment on top of more spill containment.



8.7 ANTIFREEZE.....

Antifreeze is an engine coolant most commonly comprised of ethylene glycol. Ethylene glycol is toxic to land and marine mammals. As in the case of waste oil, not only does waste antifreeze contain ethylene glycol, it also contains metals that leach into the coolant in the course of flowing through metal radiators. Antifreeze is 100% recyclable and reusable. Again, the challenge is collecting the coolant from boaters. Include waste antifreeze collection services in your harbors hazardous waste management plan. Propylene glycol is a substitute for ethylene glycol and while it is less toxic as a raw material, both propylene and ethylene glycol pick up metals in the course of their cooling, and both must be properly managed as hazardous waste.

▶ Recommended Practices for Marinas

- Keep new or collected used antifreeze in closed containers and in a secured area protected from the elements
- Provide secondary containment.
- Clearly label antifreeze containers and collection equipment
- Ensure the funnels, pans, and containers are compatible with antifreeze
- Inspect containers regularly for leaks, corrosion, or damage; replacing containers as necessary
- Post signs instructing boaters on proper procedures for disposing antifreeze

▶ Recommended Practices for Boaters

- Use propylene glycol instead of ethylene glycol for antifreeze
- Use recycled antifreeze
- Recycle used antifreeze – transfer used antifreeze immediately to the dedicated used antifreeze containers

8.8 EXPIRED MARINE FLARES.....

▶ Environmental Concern

Marine flares are pyrotechnic devices that when activated produce a brilliant light or intense heat and are used by boaters to attract attention in an emergency situation. Handheld and aerial (or rocket) flares are the two most commonly used by boaters as they produce visual distress signals that can be seen both day and night. Flares are typically comprised of strontium nitrate (produces a bright red or orange-red flame), potassium perchlorate, potassium nitrate or strontium peroxide (act as a powerful oxidizer making the strontium burn rapidly), and/or an energetic fuel such as magnesium (which burns very brightly) or aluminum (which is added to give the extra energy needed for a fast combustion). All of these ingredients are considered hazardous to human health and pose a risk to the marine environment. Deteriorated flares should be handled with extreme care. Refer to the specific flare's MSDS for safe handling instructions, but ideally they should be managed by properly trained and licensed hazardous waste managers.

United States Coast Guard (USCG) requires boaters to have on board three flares in order to meet the visual distress signal requirements. Specific requirements can be found in

Federal Requirements: Title 33 Code of Federal Regulations Part 87 - Annex IV: Distress Signals. (NOTE: This can also be referenced as "33 CFR 87-Annex IV").

State Requirements: Harbors and Navigation Code 652 and Title 14 of the California Code of Regulations Section 6692 (NOTE: This can also be referenced as "HNC 652 and 14 CCR 6692").

According to the USCG regulations the shelf-life of pyrotechnic flares is three years. In California alone, there are estimated 174,026 out-of-date flares generated annually that need to be disposed of a hazardous waste. While expired flares generated by boaters are considered Household Hazardous Waste (HHW), only 13 HHW facilities currently accept them due to their explosive risk. Due to the lack of convenient and affordable means to properly manage expired flares, the majority of expired flares are being disposed of in an unsafe and illegal manner, either abandoned at harbors or disposed of in trash bins or waterways.

At the time of the writing this final report, there is a CA workgroup tasked with determining the best methods to manage this waste stream, considering regulatory constraints and the need for convenient and affordable boater access to approved disposal sites.



One season collection in Dana Point, CA (Jan-Aug, 2010).
The one flare with wood handle expired in 1959



► Recommended Practices for Marinas

- Post signs letting boaters know expired flares are dangerous and need to be properly managed as hazardous waste and cannot be tossed into the trash or waterways.
- Work with your local CUPA and HHW to determine your county's policy on managing explosive hazardous waste.
- Develop and implement a management plan for the proper disposal of expired flares and post your marina's policy for boaters to see.
- Publicize your marina's policy in tenant lease policies and agreements.
- Periodically remind boaters of your marina's policy in monthly dues notices or marina newsletters and/or bulletin boards.

- Plan and host a periodic one day collection event for boaters to turn in their expired flares. Work with your local HHW, CUPA, Fire Departments and Coast Guard to best coordinate the event.
- Ensure the collection event is well publicized, so boaters know to save their expired flares for the event.
- Ensure adequate and appropriate personnel are working the collection event, have the site properly staged for safety, have collection and transportation containers ready for use and ensure that the licensed Hazardous Waste hauler is available to transport the waste at the end of the event. Suggestion: have the collection event in the morning which can leave the afternoon to finalize the proper packaging and records management required prior to transportation of the waste. The goal is to avoid overnight storage of the waste if at all possible.
- Post signs at used oil sheds informing boaters not to leave flares.
- Use pictures of flares with symbols indicating “not allowed” instead of words when possible to avoid language barriers.
- Keep latest Expire Marine Flare Fact sheet available and post at the harbormasters office.

▶ **Recommended Practices for Boaters**

- Don’t stockpile expired marine flares on boats or in dock boxes. Keeping a few extra recently expired flares on-board as extra emergency back-up is acceptable, but store with caution.
- Keep flares protected from moisture and physical damage
- Don’t store flares near flammable liquids or gases or ignition sources.
- Protect flares from excessive heat and weathering.
- Monitor expiration dates of your flares and plan ahead for disposal with the help of your harbormaster.
- Store expired flares safely landside until marina’s periodic collection event (if available at your harbor). If your HHW allows, safely transport them to the HHW for proper disposal.
- Plan your flare purchases to stagger expiration dates when possible, but use care to ensure you have the minimum required by the USCG. This will help minimize having all expire at the same time.
- Ask your flare suppliers for information and status of approved non-hazardous distress signals. The more boaters voice concern over the hazardous constituents in flares and the difficulty of proper waste management, the more research will be conducted to develop and manufacture approved distress signals that won’t pose such a problem with limited shelf-life and the proper waste management.

▶ **Resources**

Marine Expired Flares Disposal Problem in California – Fact Sheet (See *Appendix C*)

See Coastal Commission website for the most updated Expired Marine Flares Fact Sheet

<http://www.coastal.ca.gov/ccbn/cbndx.html>. Or, contact Vivian Matuk for the final fact sheet:

California Coastal Commission/ California Department of Boating and Waterways

45 Fremont Street

Suite 2000, San Francisco, CA 94105-2219

Phone: (415) 904-6905

Email: vmatuk@coastal.ca.gov

9.0 Solid Waste Management

9.1 TRASH

▶ Environmental Concerns

Solid waste, although it may not be hazardous waste, can be a real problem at marinas or along the waterfront if it is not properly managed and contained. Providing sufficient container capacity, in locations convenient to boaters, but protected from high winds and weather is imperative to keeping litter and debris from flowing or blowing into waterways.

Promote waste minimization, reusable items, and items made with recycled materials. Incorporate recycling and compostables waste management to help divert unnecessary waste from. Research the latest in appropriate waterfront containment for waste diversion. Options exist that are “critter-proof”, have compactor add-ons (some are actually powered by solar cells on top of bins) and can withstand the harsh marine environment by being waterproof and leak proof. By implementing proper containment and segregation, waste costs can be lowered and staff time cleaning up trash may be reduced. Good signage around the entire facility is a must with containers in convenient locations. If containers are placed on docks, ensure they are well secured and have tight fitting lids. Empty these receptacles often to prevent trash overflows. One may think that marinas don’t generate enough compostable waste to be worth the trouble, but many people eat and recreate by the waterfront, boaters generate food soiled papers and many harbors have restaurants in the vicinity. Ask your local waste handler to help plan a waste management system that is suited to your harbor’s needs.

▶ Recommended Practices for Marinas

- Keep marina property and trash storage areas clear of debris
 - Schedule regular inspections or walk-throughs of grounds, parking lots, docks, and trash storage areas
 - Instruct staff to pick up litter or “net” trash out of the water
 - Encourage boaters to pick up litter that they come across
- Incorporate a waste diversion program- set up recycling, compostables and trash receptacles.
- Provide clear signage using symbols and pictures of acceptable waste on or by each container to help boaters choose the correct bin
- Provide signage on recycling options near trash receptacles to help promote recycling
- Place clearly marked receptacles in convenient locations and in sufficient number (e.g. restrooms, parking lots, boat launch ramps, fuel docks, etc.)
- Ensure that receptacles are covered, sturdy, leak proof, waterproof and “critter” proof.
- Ensure that receptacles are not filled beyond capacity or with rainwater
- Ensure that receptacles are protected from high wind and tidal influences
- Provide signage and instructions for staff and boaters on proper solid waste disposal and location of cleanup equipment

- Provide signage prohibiting the disposal of hazardous waste (oil, paint, batteries) in trash receptacles
- Encourage pet owners to pick up after their pet
 - Provide biodegradable pet waste bags to dispose waste in trash receptacles
 - Prohibit pets from running freely around the marina

▶ **Recommended Practices for Boaters**

- Do not release any trash or debris into the water; it is illegal
- Stow trash securely on board, ensuring that trash (especially plastic bags) does not accidentally fall or blow out into the water
- Dispose of trash and recyclables on land in proper receptacles
- If recycling is not provided at the facility, bring it home to recycle
- Pick up after pet and dispose of waste in trash or toilet
- Immediately cleanup spills of any sort

9.2 REDUCING WASTE GENERATION

▶ **Recommended Practices for Marinas**

- Check with local solid waste or recycling service provider on recycling and compost guidelines and pick up services
- Place recycling receptacles in convenient locations for boaters and staff to collect:
 - Monofilament fishing line and netting
 - Plastic shrink wrap
 - Plastic, aluminum, glass, paper, etc.
 - Batteries, used oil, antifreeze, etc.; see Section 8.0 *Hazardous Waste Management*
- Promote recycling to boaters through boater education and signage
- Promote recycling and reduction of waste in office operations
- Provide compost bins for boaters or staff
- Adopt and promote the use of reusable or compostable foodware and containers rather than those made of plastic, polystyrene, or Styrofoam

▶ **Recommended Practices for Boaters**

- Place recyclables in appropriate recycling bins
- Place compostable materials in compost bin
- Adopt and promote the use of reusable or compostable foodware and containers rather than those made of plastic, polystyrene, or Styrofoam
- Ask your diver to recycle the old zinc anodes at the marina or to take it elsewhere for recycling

9.3 FISH WASTE

▶ Environmental Concerns

Fish waste disposed of into waters close to shore or at marinas should be discouraged. Excess fish waste in concentrated form can deplete oxygen levels as fish decompose. It is recommended to provide fish cleaning stations shore-side with waste water diverted to the sanitary sewer systems. Solid fish waste can and should be composted.

▶ Recommended Practices for Marinas

- Prohibit discharge of fish waste in the marina
- Encourage boaters to eviscerate fish and dispose of fish waste at sea, not in marina
- Provide fish cleaning stations at boat launches, fishing piers, and at marinas with fishing clientele
- Post signage of location of cleaning stations or fish waste receptacles
- Post instructions on proper fish cleaning and disposal at fish cleaning stations
- Options for fish waste disposal:
 - 1) Compost fish waste
 - a. Check with local solid waste service provider regarding composting guidelines
 - b. Provide compost bins
 - c. Combine with peat moss or woodchips to make mulch for marina gardens
 - 2) Treat as other solid waste
 - a. Provide separate trash receptacles for fish waste
 - b. Keep trash containers closed or covered
 - 3) Discharge through the sewer
 - a. Check with local sewer service provider for approval
 - b. Provide a fish grinder or macerator

▶ Recommended Practices for Boaters

- Do not discharge fish waste into marina waters
- Dispose of fish waste and unwanted bait at sea, not in the marina
- Follow marina guidelines on fish waste disposal
- If disposing of fish in the trash, double bag the fish waste and dispose of in appropriate receptacle
- Take home fish waste and freeze to use as bait for next fishing trip

10.0 Waste Water Management

10.1 MINIMIZING GRAY WATER

▶ Environmental Concerns

Gray water is wastewater generated from topside cleaning, sinks, showers, dishwashing, and laundering, using mild soaps and detergents that are preferably biodegradable. Gray water is of particular concern because untreated gray water comprised of harmful surfactants, directly discharged into waterways can degrade water quality and could be toxic to marine life. See Section 3.5 for a discussion on Nonylphenols. Avoid the generation of gray waste water as much as possible by using dry cleaning methods, microfiber cloths, and less toxic biodegradable soaps sparingly. Where possible to hold gray water in covered containers on boats, it is preferable to discharge into sewer system once back land side, although many boats are not equipped with gray water holding tanks. Ask your marina operator how to properly manage gray water at your harbor.

▶ Recommended Practices for Marinas

- Provide gray water management information to boaters, share BMPs below
- Post signs asking boater to contain gray water and bring to harbor for disposal in sewer system.
- Provide gray water management policies in lease agreements
- Provide purchasing information on mild, biodegradable soaps to use while on board.
- Inform boaters that small to medium vessels rarely have gray water holding tanks and that their gray water is going into waterways untreated.

▶ Recommended Practices for Boaters

- Use shore-side facilities – showers, sinks, laundry
- If not available, save showers, laundry, and dishwashing for home²
- Install holding tanks for gray water
- Use water saving devices such as low pressure showerheads to conserve water²
- Use less cleaning product and more “elbow grease”
- Rinse and scrub your boat with fresh water after each trip³
- Use tarps or canvas boat covers to keep boat clean between trips and reduce the amount of cleaning you need to do.³
- Use only biodegradable, non-phosphate, and less toxic laundry detergents, soaps, drain openers, cleaners etc.
- Encourage boaters to conserve water and use water saving devices such as low volume showerheads.³

10.2 HOLDING TANK MAINTENANCE

▶ Environmental Concerns

Assembly Bill 1824 was proposed to the California State Senate in 2010 which aimed to ban a certain chemicals used in boat and RV sanitation systems. Although the Bill was vetoed by the governor, these chemicals should be avoided in treating head and holding tanks. All of these are toxic and non-biodegradable chemicals that can disrupt the functioning of sanitation systems. When the contents of the tank are pumped out, the chemicals in the treated sewage can disrupt the functioning of sanitation systems. These chemicals of concern are:

Formaldehyde	Para-formaldehyde
Bronopol	Dowicil
Glutaraldehyde	Para-dichlorobenzene

It is generally advised to not combine chemicals or treatments. Especially for the enzyme and bio-active treatments, do not mix with any other products containing formaldehyde, bleach, and other harmful caustic chemicals that harm the bacteria and enzymes. There seems to be debate on alternatives - whether bioactive treatments are feasible in places of extreme weather temperatures or whether nitrate treatments are effective in odor control.

▶ Summary of Holding Tank Treatments

Directly taken from the West Marine Catalog West Advisor Article: Head & Holding Tank Treatments¹⁶

- Chemical Treatments the most common, kill bacteria immediately. They very effectively control odors by masking smells with deodorant. Although relatively inexpensive compared to other treatments, chemicals must be added regularly. They don't dissolve waste and are the least environmentally friendly. They can be added to tanks that contain other treatments without cleaning the tank.
- Enzyme Treatments accelerate the digestion of organic materials in waste and neutralize odors at the same time. Their toxicity is extremely low; they're environmentally friendly and free of fragrances. They quickly and completely emulsify paper and sewage. They must be added regularly, work best in well-ventilated systems, and work well in hotter climates. Enzymes require a tank free of residuals of other treatment products.
- Nitrate Treatments provide an interesting alternative. Oxygen is vital to bacteria in the process of breaking down organic waste. When little air is present (as in most holding tanks), bacteria derives the oxygen from sulfates in the waste, which produces hydrogen sulfide (stinky!) gas. When nitrates are introduced, they act as nutrients for the bacteria, providing an alternative source of oxygen, which results in the production of nitrogen (odorless) gas. Nitrates are environmentally friendly, and are ideal for systems with less ventilation. They speed up the breakdown process and eliminate odors. The tank must be free of residuals from other products.

- Bio-active Treatments contain live aerobic bacteria which break down waste, reproduce and crowd out anaerobic (odor-producing) bacteria. They, too, are environmentally friendly. Like enzymes, bio-active treatments emulsify paper and sewage completely. Unlike other treatments, they multiply and continue to work long after treatment is complete, eliminating the need to add more between pump outs. However, the microbes require a well-ventilated and residual free holding tank to survive. Although initially expensive, bio-active treatments become more cost effective over time because of bacteria propagation.

▶ **Recommended Practices for Boaters**

- Use enzyme and bio-active treatments when possible as these are biodegradable and less toxic treatments
- Avoid chemical treatments containing:
 - Chlorine compounds including sodium hypochlorite
 - Formaldehyde
 - Para-formaldehyde
 - Ammonium compounds
 - Bronopol
 - Glutaraldehyde
 - Para-dichlorobenzene
 - Dovicil
 - And other caustic chemicals
- See Section *10.3 Sewage Pumpout* below
- Tank cleaning effluent must be discharged to a sanitary system or pumped out by a licensed sewage disposal contractor

10.3 SEWAGE MANAGEMENT AND PUMPOUTS.....

▶ **Environmental Concerns**

Untreated sewage contains pathogens, comprised mostly of bacteria, parasites and viruses. Pathogens cause a wide variety of illnesses, most commonly diarrhea and infections. The very young, the very old and those with compromised immune systems are more likely to suffer from long-term illnesses or death from exposure to pathogens. Exposure can occur through direct human contact, from swimming in contaminated water, and from consumption of contaminated fish. Untreated sewage also contains high amounts of nitrates and phosphates which can cause algal blooms, some of which are toxic to humans. Humans are exposed though contact with contaminated water and from consuming contaminated shellfish.

Boaters are prohibited from discharging untreated sewage waterways unless they are at least three miles from shore. Most medium to large boats are equipped with Marine Sanitation Devices (MSDs or commonly known as heads), while smaller boats may have none, forcing boaters to rely on harbor restroom facilities. Some MSDs are simple holding tanks (Type III), while others (Types I and II) are capable of treating waste for direct discharge to waterways.

Strict laws apply regulating discharges of MSD waste. See below for specific requirements. Boaters should be in compliance with the law at all times, and should use harbor's restroom facilities and pumpouts while in the harbor. Monitor MSD levels to ensure holding capacity is sufficient and plan ahead for pumpouts. It is important to not to exceed MSD capacity to avoid direct overflows untreated sewage as sewage from MSDs is more concentrated since little water is used per flush.

Marinas should have working sewage pumpouts available for boaters. Restroom should also be clean and well maintained to encourage boaters to use landside facilities instead of MSDs. Marinas should keep sewage discharge rules posted and assist boaters to find local repair service contractors should they need their MSDs either cleaned or serviced. Pumpouts should be in good working order and well maintained to avoid drips, leaks or spills.

► **Boating Laws regarding Marine Sanitation Devices and Sewage Management**

Directly quoted from: "Environmental Boating Laws Every Recreational Boater Should Know",²²

- It is against federal and state laws to discharge untreated sewage waste anywhere within the three mile US territorial limit (lakes, rivers, reservoirs or coastal water within three mile of shore). Fines of up to \$2,200 can be imposed for illegal discharges (CWA §312 [h]).
- No person shall place, deposit, or dump any human excreta in or upon the navigable waters of the state, that are within a marina, yacht harbor, freshwater lake, or fresh water impoundment, from any vessel tied to any dock, slip, or wharf that has toilet facilities available for the use of persons on the vessel. Any violation of this article is a misdemeanor (CHSH Div 104. Port 13 § 117515).
- Do not discharge your Type I or II Marine Sanitation Device (MSD) while in a marina, in a swimming area, in a No Discharge Zone, over an oyster bar, or in a poorly flushed area (40 CFR 140.4).
- It is illegal to discharge treated or untreated wastes into a federally designated No Discharge Zone. Your MSD must be connected to a holding tank or secured to prevent all sewage discharges. Fines of up to \$2,200 can be imposed for illegal discharges (33 CFR 159.7 [b] and [c]).
- Any vessels with an installed toilet on board must have a US Coast Guard approved MSD (33 CFR Part 159 and CWA Section 312). Violators are subject to fines from \$375 to \$6,500.
- Vessels with Type I or Type II MSD must treat their sewage before discharge. For Type I MSD the fecal coliform count in the effluent must be no greater than 1,000 per 100 milliliters of water and have no visible floating solids. This system must bear a US Coast Guard approved label. For a Type II MSD, the fecal coli- form count must be no greater than 200 per 100 milliliters and suspended solids no greater than 150 milligrams per liter

(33 CFR Part 159). Type II systems must also have a US Coast Guard certification label. Violators are subject to fines from \$375 to \$6,500.

- Y-valve must be secured in a closed position when navigating inland waters (lake, reservoir or freshwater impoundment) or less than three miles off-shore to prevent accidental spills.
- A state or local peace officer who reasonably suspects that a vessel is discharging sewage in an area where the discharge is prohibited may board the vessel, if the owner or operator is aboard, for the purpose of inspecting the MSD for proper operation and placing a dye tablet in the holding tank (CHNC, Section 782 d).

► **Recommended Practices for Marinas with Pumpout Facilities**

- Provide pumpout service at convenient times and if possible at no cost
- Schedule regular staff inspections to keep pumpout in good working condition
- Arrange a contract with a qualified contractor to provide maintenance and repair of the pumpout equipment and dump stations
- Ensure staff are available to monitor, help, and educate boaters on proper use of equipment
- If fueling services are also provided, cross-train the fueling attendant to also help with the sewage pumpout
- Ensure that sewer lines are clean to prevent clogging
- Keep a variety of nozzles on hand to replace broken ones
- Provide an intercom system at the pumpout for boaters to call for help of an attendant if needed
- Post signs for boaters that include:
 - Proper pumpout procedures
 - Location of the pumpout and hours of operation
 - What to do and who to call if problems or malfunctioning arises
- Ensure that your marina is listed in boater pumpout directories such as regional boater maps and websites (see Resources)
- Post signs that inform boaters on regulations and BMP's regarding:
 - Proper usage of Marine Sanitation Devices
 - Prohibition of discharge of toxic materials and sewage in marina
 - Use of shore side restroom facilities
 - Proper disposal of pet waste (see Solid Waste Management)
- Ensure restroom facilities are accessible, clean and in good working condition to encourage use of using the restroom on land thereby decreasing the use of onboard systems
- Install waste dump receptacles at boat ramps for the disposal of port-a-potties
- Select the sewage disposal options according to the needs of the boaters or liveaboards
 - Pumpout fixed to end of the pier for boats to pull up to
 - Slip-side pumpouts installed at each berth (especially useful for liveaboards)
 - Mobile boat-to-boat pumpout services (e.g. a radio-dispatched boat)

- Mobile units on hand trucks
- Dump stations for portable toilets
- Ensure that liveaboards have a contract with a pumpout service or provide regular pumpout service and include the charge in slip fees

▶ **Recommended Practices for Marinas without Pumpout Facilities**

- If marina does not provide pumpout services post or provide literature to boaters with a list of nearby pumpout services available
- Post signs that inform boaters on regulations and BMP's regarding:
 - Proper usage of Marine Sanitation Devices
 - Prohibition of discharge of toxic materials and sewage in marina
 - Use of shore side restroom facilities
- Ensure restroom facilities are accessible, clean and in good working condition to encourage use of using the restroom on land thereby decreasing the use of onboard systems

▶ **Recommended Practices for Boaters**

- Never empty holding tank and discharge sewage within three miles of the coast; it is illegal
- Use shore side restroom facilities to minimize the need for sewage pumpout
 - Proper disposal of pet waste (see Section 9.0 *Solid Waste Management*)
- If a connection to a shore-side sewer system is not available, contract a licensed septage hauler to pump out the sewage and transport it to a permitted disposal site or sewage treatment facility
- The connection, holding tank, or transfer system for sewage waste should be properly cleaned and stored when not in use
- See Section 10.2 *Holding Tank Maintenance*

▶ **Resources**

- EPA Coastal Zone Act Reauthorization Amendments/ Sewage Facility Management Measure
<http://water.epa.gov/polwaste/nps/czara/ch5-2g.cfm>
- Sewage pumpout locations:
http://www.dbw.ca.gov/Environmental/pump24/pumpout_locations.html
- “Marina Based Services by California County” by the California Department of Boating and Waterways and by the California Coastal Commission’s Boating Clean and Green Program
<http://www.coastal.ca.gov/ccbn/mobileservices.pdf>
- EPA “Sewage from Recreational Activities”
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=27&minmeasure=3>

10.4 BILGE MAINTENANCE AND PUMPOUTS

▶ Environmental Concerns

A bilge is the lowest space in a marine vessel below the vessel's engine room. Bilge wells or compartments accumulate fresh water, sea water, oil, sludge, cleaning chemicals and other maintenance fluids due to leakage from pumps, pipe lines, valve and shaft glands, propulsion systems and machinery and from spills and overflowing tanks. This mixture when accumulated in bilge wells is called bilge water. Bilge wells need to be pumped out regularly by on-board bilge pumps. Since bilge water contains oil and other contaminants, it should not be discharged to waterways or public drains without proper treatment to separate oil and other contaminants from the water. Some vessels are equipped or can be equipped with on-board oil/water separators. Marpol 73/78 (International Convention for the Prevention of Pollution from Ships, Protocol) allows the water fraction of treated bilge water to be discharged once oil concentration is less than 15ppm, but only when a vessel is out to sea. Once treated, the oily fraction should be treated as waste oil and properly managed. Untreated bilge water is presumed to be hazardous waste and must be properly managed and disposed of.

Boaters can play a part in pollution prevention by maintaining clean bilge wells and by minimizing non-oil contaminants that can reach bilge wells. Never pump untreated bilge water at sea. Plan pumpout stops in advance to avoid having to discharge in "emergency" situations. Monitor the rate it takes to fill the bilge and plan accordingly. See recommended practices below.

Marinas, harbors and fueling facilities can play a part by offering bilge pumpout and maintenance services. It is recommended that bilge pumping operations are monitored to avoid "hot batches" (high in fuel content) from being pumped into shore side bilge tank or treatment system. Some bilge treatment systems have sensitive monitors to detect fuels, and shut down system before it can be damaged. Other bilge treatment systems need manual oversight and should test bilge water for fuels prior to pumping into a treatment unit.

▶ Recommended Practices for Boaters

- Do not discharge untreated bilge water into the water
- Minimize contamination of the bilge water by checking for leaks of oil and fuel in the bilge and fixing the sources of the leaks
- Properly maintain engine to avoid fuel leaks
- Do not pumpout bilge water that has an oily sheen
- Do not use emulsifying soaps or detergents to clean the bilge
- Use absorbent pads or other oil-absorbing materials to remove as much of the oil and fuel in the bilge as possible
- Examine the absorbent materials in the bilge periodically and replace as necessary
- Dispose of used absorbent pads as hazardous waste into the designated container for used absorbents

▶ Recommended Practices for Marinas and Maritime Businesses

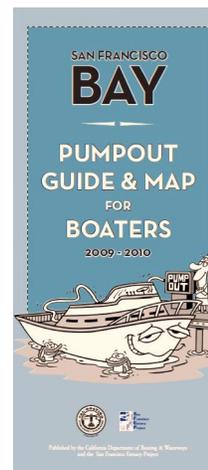
- Prohibit the discharge of bilge water into the water
- Prohibit the use of emulsifiers, soaps, and detergents to clean the bilge
- Place signage instructing boaters on proper bilge maintenance and on proper disposal of oil absorbents
- Bilge pumpouts should have oil-water separation systems with the capability of capturing oil for recycling
- Implement an oil absorbent pad exchange: distribute oil absorbent pads and collect used oil absorbent pads
- Dispose of used absorbents as hazardous waste as oil-saturated absorbents can be flammable and toxic.
- Place well marked, closed drums or containers in easily accessible locations to collect used absorbent pads.
- Provide mobile bilge pumpout services or make a list of vendors available to boaters
- Inform boaters about where they can find bilge pumpout locations, absorbent pad collection sites, and of collection services in their area. See *Resources*.

▶ Recommended Practices Bilge Pumpouts

- Boaters can install oil/water separators on their boats however the discharge of treated water into the waterways should be in compliance with local regulations
- Unfiltered bilge water or oil from oil/water separators should be treated as hazardous waste
- Shore side bilge pumpouts should contain oil/water separators that are connected to the sanitary sewage system or a temporary holding tank
- The bilge water should undergo treatment to remove pollutants before the water is discharged or pumped into the sanitary sewage system; the oil is recovered for recycling
- Oil/water separators must meet EPA and local municipality requirements to discharge treated bilge water to the municipal sewage system
- Do not use a wet-vac system to pump out bilge water because the oil and water will emulsify and foul the oil/water separator

▶ Resources

- Pumpout Guides for Boaters in the San Francisco Bay, San Joaquin, and Sacramento River Delta regions are available here:
www.sfestuary.org/projects/detail.php?projectID=3
- San Francisco Bay Area Clean Boating Map
www.coastal.ca.gov/ccbn/SF_Bay_Clean_Boating_Map.pdf



10.5 CASE STUDY: MOSS LANDING HARBOR

Moss Landing Harbor, located in Moss Landing, is a large commercial fishing harbor with over 600 slips for recreational and commercial boats. Linda G. McIntyre, Esq. has been the harbormaster since 1999 and in 2007 they received their designation as California Clean Marina with an overall score of 95%. Moss Landing provides full pumpout services to boaters, except for fueling services, which is offered offsite across from the Moss Landing Harbor District.



Moss Landing was one of the first harbors that installed a full on-site bilge water pumpout and waste treatment system. This system was custom designed (Bagley Design) for their needs to treat bilge water from a variety of boats using both diesel and gasoline. It has a detector that alarms and shuts down system when it detects high levels of fuels, protecting the sensitive treatment unit. It has an initial holding tank, with a skimmer feature to capture floating hydrocarbons, and then the waste water

either goes to a coalescer if mostly water or is diverted to a centrifugal separator if high in heavy oil content. Although the system is very sensitive and needs frequent maintenance, the system treats bilge water to allowable levels to be discharged into the protected Monterey Bay water. This entire treatment system is contained in walled-off structure, with secondary containment and the waste oil collection area adjacent, making waste management convenient to boaters. Pumpouts are on a floating dock, but all hazardous waste storage and waste water is treated shore-side to help protect the environment.



11.0 Painting

11.1 PAINTING

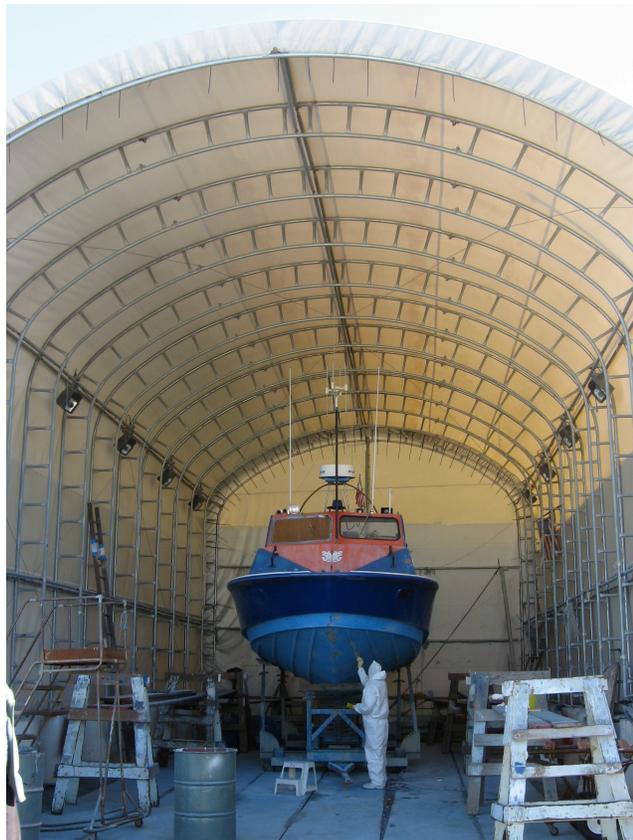
▶ Environmental Concerns

Paints and other coatings are mainly comprised of pigments, resins and solvents with other specialty additives to improve performance for particular coatings applications. Marine vessels must withstand harsh elements and weather conditions, so paints vary based on what is being protected. Topside and interior boat paints don't need quite the durability and alkyd and water-based paints may be sufficient. Hull and bottom side paints tend to be comprised of either polyurethane, epoxy or silicone resins, or combinations there of, resins that are more durable in moist or wet conditions. Hull paints have their own environmental concerns as they need to prevent fouling of boat hulls and contain ingredients that inhibit such growth. Hull paints are further addressed in Section 11.2

Paint and coatings should only be applied after proper substrate preparation. See below for Recommended Practices once boats have been adequately prepared for painting. For wood components such as teaks, consider not varnishing and let weather naturally or use bio-based oils to protect wood.

▶ Recommended Practices for Boaters

- Perform painting on land in designated areas
- Ensure painting areas is located a sufficient distance away from the water and storm drains
- If spraying paint, paint inside a building, shroud, or plastic tarp enclosure to prevent paint spray from being dispersed by the wind, from being exposed to rainwater, and from entering storm drains and surface waters
- Contain overspray
 - Only allow major hull and topside work in the designated areas
 - Do not paint in windy conditions
 - Carry out operations over an impervious surface



Portable Production Shelter, KKMI Pt. Richmond

- Immediately use a boom to clean up overspray that has reached surface waters
- Ensure good transfer efficiency of paint to the surface
 - Keep spray guns clean and well maintained
 - Angle spray guns perpendicular to surface
 - Maintain uniform speed and distance from surface
- Use high volume, low pressure spray guns that have a transfer efficiency of at least 85%³
- Choose paints that are No- or Low-VOC
- Consider painting with rollers or brushes rather than with a spray if possible
- If rolling on paint, ensure area is well ventilated, protected from weather and wind and tarp work area to catch any spills or drips
- Waste from paint operations (cleaning solvent for spray equipment, paint waste, and thinner) should be treated as hazardous waste; follow procedures under Section 8.0 *Hazardous Waste Management*
- Check with your local hazardous waste handler on guidelines and acceptability of paint waste and empty paint/thinner cans
- Recycle solvent from solvent paint waste stream using an Underwriters Laboratory (UL) and/or local Fire Department approved solvent distillation unit. The distillation bottoms will be hazardous waste and must be managed and disposed of accordingly. The recovered solvent can be used to clean equipment, saving the facility the cost of new solvent.³
- For unpainted topside wood surfaces, consider not coating and allow wood to weather or gray naturally OR use bio-based oils to lubricate and preserve wood.
- When applying varnishes, lacquers and other wood preservatives, use same guidelines above to protect the environment, with special attention to proper ventilation.
- Choose No or Low-VOC wood preservative coatings when possible.



Covered spray area, Bay Ship & Yacht Co

11.2 ANTIFOULING HULL PAINT

► Environmental Concerns

Anti-fouling coatings (anti-foulants) are used to protect boat hulls that are at risk of fouling from barnacles and other marine life that are naturally attracted to fixed structures under water, attaching to boat hulls and creating a build-up of fouling over time. Excessive buildup of fouling can cause increased drag which can lead to loss of speed, increased fuel consumption and unnecessary engine strain. Anti-foulants don't prevent, but slow the growth of fouling organisms attached to boat-bottoms. Photo below illustrates what can happen when boat hulls are neglected



Photo of a neglected boat hull!

Copper Free Hull Paints

New copper free anti-fouling paints have been developed in response to water quality concerns. Anti-fouling hull paints need to be registered by the California Department of Pesticide Regulation (CDPR) since they contain biocides, which are regulated as pesticides. Not all alternative paints have been registered with CDPR.

The effectiveness in terms of cost, application, efficiency, maintenance, and anti-fouling properties of copper free paints were compared in a study conducted by the Port of San Diego and the Institute for Research and Technical Assistance (IRTA) in 2010. This study was sponsored by the U.S. Environmental Protection Agency, and results comparing the effectiveness of copper free paints will be available in 2011. Information on this 2010 non-copper biocide and non-biocide alternative paint effectiveness study is in the IRTA winter 2011 newsletter published on line at this link: http://www.irta.us/IRTA_newsletter.htm. Several news articles with information about the study comparing biocide paint alternatives to copper hull paints are provided by the Unified Port of San on their website: <http://www.portofsandiego.org/environment/alternative-hull-paints.html>.

USEPA Project, NP00946501-4: “Safer Alternatives to Copper Based Antifouling Paints for Marine Vessels” Project - Alternative Hull Coating Selection Matrix

		Initial Hull Preparation and Coating Application (For 30' Boat)			Long-Term Cost (For 30' Boat)	Longevity	Cleaning Maintenance		Special Considerations
Boat Use	Coating Category	One Time Stripping Required?	Method	One Time Cost ²	Annualized Cost Over 30 year Period ²	Estimated Years Until Repainting ³	Optimal Inspection Frequency	Resistance to Cleaning Impacts ³	
I,F,P,R	Soft Non-Biocide ¹	Yes	S	\$\$\$	\$-\$\$	5-10	3 to 4 weeks	Good	NB,1
			R	\$\$\$	\$				
I,P,T,R	Hard Non-Biocides ¹	Yes	S or R	\$\$\$	\$\$	7.5-10	3 to 4 weeks / winter 2 weeks / summer	Excellent	NB,2
Cr,P	Zinc Oxide Non-biocide ¹	Depends on specific coating	R	\$-\$\$	\$\$-\$\$\$\$	1.5-2	3 to 4 weeks	Fair	NB,1,3,4
Cr,P	Organic Biocide	No	R	\$-\$\$	\$\$\$	1-1.5	3 to 4 weeks	Fair	B,1,3,4
F,Cr,P,T	Zinc Biocide	No	R	\$-\$\$	\$\$	1.5-2	3 to 4 weeks	Fair	B,1,3,4
<u>BOAT USE KEY</u> Inactive (I) Frequent-Use Power (F) Racers –Sail (R) Cruisers (Cr) Trailer (T) Pleasure (P)		Yes/No <i>Stripping may be required for initial application, but may not be required for subsequent applications</i>	Spray (S) Roller (R)	\$ = \$900-1,500 \$\$ = \$1,501-2,000 \$\$\$ = \$2,001+ <i>One time cost for soft and hard non-biocides includes stripping costs.</i>			<i>Cleaning may not be required during every inspection. The appropriate cleaning strategy should reduce or prevent the removal (i.e., thinning) of hull paint.</i>		NB= Product does not contain biocide B = Biocide containing product 1=Soft cleaning tools, extra care for cleaning, 2= Periodic cleaning by power tool is acceptable 3= Cleaning likely not necessary for 90-120 days after application 4= May require more coats at waterline

¹The non-biocide paints identified in this table include only those products that do not require registration with California Department of Pesticide Regulation at the time of publishing.

²Prices based on information gathered during 2009-2010 from San Diego Bay boatyards.

³Assumes use of appropriate cleaning strategy

The copper free products can be classified in two categories: biocide and non-biocide hull coatings. However, zinc oxide only is a non-biocide paint that generally behaves like biocide paint. The biocide coatings may contain substances that may slough off and result in water pollution. Biocide coatings may contain zinc pyrithione, a new organic biocide called Econeal which may leach bromine, fluorine and chlorine, or a combination of zinc pyrithione and organic biocides.

Non-biocide products last longer than copper, biocide, and zinc oxide only paints. Non-biocide coatings can be further classified as soft or hard. Hard non-biocides may be ceramic or epoxy, and soft non-biocides may contain silicone or fluoropolymers.

The cleaning schedule and appropriate tools for cleaning the alternative paints may be different than for copper based paints. Generally, alternative paints currently cost more to purchase and apply than copper paints, but because the non-biocide coatings last longer, they may be more cost effective in the long run.

► **Recommended Practices for Boaters**

- Select a vessel repair and maintenance facility that is open to trying newer copper free and biocide free hull coatings
- Work with your repair facility to choose the best paint option
- Work with your repair facility to determine a regular hull maintenance plan
- Upon haul out, ensure boat hull paint is thoroughly inspected and repaired.
- If hull is in need of major repairs or re-coating, consider having old paint stripped and copper free non-biocide paint applied (non-biocide coatings generally cannot be applied over old paint layers)
- Since routine maintenance differs with these new paints, have your repair facility work with your professional diver and paint manufacturer to determine the best cleaning and maintenance strategy (soft hull paints can easily be damaged using abrasive hull cleaning tools)
- Cure times vary with new non-biocide paints- check with the manufacturer how long to wait before boat goes into water and when first cleaning should take place
- Regularly clean the hull to extend the life of the hull paint and to avoid hard fouling growths that requires more abrasive cleaning
- Clean with non-abrasive methods such as with a soft cloth, fleece mitt, soft carpet, or a long bristled soft brush
- Avoid aggressive cleaning (with scrapers, abrasives, powered rotary brushes) as it may cause the damage to the paint.
- Haul the boat out of the water for cleaning if marine growth can only be removed by abrasive cleaning methods which removes paint
- Employ only divers formally trained in environmentally sound hull cleaning who are also familiar with the maintenance needs of the newer paints
- Ensure professional diver adheres to environmentally sound methods and to the paint manufacturer's label recommendations
- Inform the hull cleaner on the type of hull paint and the date of the last paint application

► Resources

- For a CDPR report about anti-fouling paints see: http://www.cdpr.ca.gov/docs/emon/surfwtr/caps/biblio_aquatic_studies_copper_antifouling_paints.pdf. The minutes, agendas, presentations, and documents from the Anti-fouling Strategy Workgroup are available through this link: <http://www.cdpr.ca.gov/docs/emon/surfwtr/caps.htm>.
- For information on alternative paint effectiveness study see IRTA winter 2011 newsletter published on line at this link: http://www.irta.us/IRTA_newsletter.htm.
- Several news articles with information about the study comparing biocide paint alternatives to copper hull paints are provided by the Unified Port of San on their website: <http://www.portofsandiego.org/environment/alternative-hull-paints.html>
- The University of California Cooperative Extension Coastal Resource program conducted extensive research on anti-fouling paints. Information on the use, cost and effectiveness of boat hull cleaning and maintenance and less toxic anti-fouling paints can be viewed on the University of California Cooperative Extension Coastal Resource website: <http://ucanr.org/sites/coast/>.
- Research on less toxic anti-fouling boat hull coatings and boating and marina pollution prevention can be access through these links: http://ucanr.org/sites/coast/Nontoxic_Antifouling_Strategies/, and http://ucanr.org/sites/coast/Boating_-_Marina_Pollution_Prevention/.

11.3 CASE STUDY: PORT OF SAN FRANCISCO COPPER-FREE PAINT TRIAL AND DEMONSTRATION

The Port of San Francisco partnered with Katy Wolf of IRTA and Interlux Paints to paint one of their Boston Whalers with an Interlux silicone based, copper free, biocide free hull paint (also known as soft paints). The goal was to find a boat in San Francisco that needed a new paint job, on which we could test performance of a biocide free coating that performed well in the Port of San Diego study. The SF Port staff was willing to try the new paints since they were concerned with copper pollution and wanted to see if the alternative coatings worked well in SF Bay. The Port's boat was properly prepared with the hull completely stripped prior to priming and top



*Application of Primer Coat,
Port of San Francisco*

coating. Dry and cure time proved much slower since it was a cold, damp and windy day. The boat is not yet in the water (awaiting other maintenance work to be completed while it was hauled out), but will be soon and performance will be evaluated over time.

Cleaning techniques and cleaning frequency for copper and biocide free paints will be different than what divers are used to. Soft non-biocide and the hard non-biocide paints can be easily damaged by using anything but soft cloths. It is expected that less frequent cleaning will be required than if the boat were in San Diego. Based on reports from professional divers, fouling rates are higher in San Diego due to various conditions such as water temperature, sun exposure, salinity, tidal flushing and local marine species, all of which can vary fouling rates. Boaters using these new coatings should talk to their boatyards, divers and paint manufacturers and develop a hull inspection and cleaning schedule, taking care to use the gentlest cleaning techniques possible.

I'd like to extend a special thanks to the Port of San Francisco for spending their time and resources to test these new copper and biocide free paints in San Francisco Bay waters. Stay tuned for performance results over the next few months.

12.0 Paint Removal

12.1 CHEMICAL STRIPPING

▶ Environmental Concerns

Typically, chemical strippers contain toxic ingredients that generate hazardous air emissions and large volumes of hazardous waste. Methylene chloride, the most common active ingredient historically and still used today, is known to cause serious health effects as a developmental toxin and a potential carcinogen. It was deemed a Toxic Air Contaminant by the Air Resource Board in California and is noted to be emitted largely through paint removers.⁷ Although n-methyl pyrrolidone is another chemical stripper claimed to be a safer alternative, it is a reproductive and developmental toxin causing similar environmental adverse impacts.²¹ Both methylene chloride and n-methyl pyrrolidone generate air emissions and a large volume of waste which is costly to dispose of. Ask your supplies for less toxic options for paint stripping or consider vacuum sanding instead. See Resources at end of this section for other options.



Photo of paint removal using chemical strippers

▶ Recommended Practices

- Avoid chemical stripping methods when possible
- Try alternative stripping methods i.e. vacuum sanding instead of using chemical strippers
- If you do use chemical strippers, wear the proper protective personal equipment
- Work in a well-ventilated area
- Work over a tarp if area does not have an impervious surface
- Dispose of the waste as hazardous waste
- Avoid purchasing and using chlorinated solvents such as methylene chloride, perchloroethylene (PERC), and trichloroethylene

▶ Resources

- “Methylene Chloride Consumer Product Paint Strippers: Low-VOC, Low Toxicity Alternatives – May 2006. Produced by the Institute for Research and Technical Assistance. www.irta.us/PaintStrippers06.pdf
- California Department of Health, Hazard Evaluation System & Information System (HESIS) Fact Sheet – *Methylene Chloride* www.cdph.ca.gov/programs/hesis/Documents/methylenechloride.pdf

12.2 SANDING

▶ **Environmental Concerns**

Small boats are often sanded or stripped by hand as opposed to abrasive blasting which is often used for large or industrial vessels. Sanding should always be done with a vacuum sander which captures the paint dust. The dust can contain heavy metals such as copper, lead, zinc, cadmium, etc.²⁰ associated with the removal of often many layers of paint and should be treated as hazardous waste. Vacuum sanders can be either portable, allowing for use throughout the yard or stationary with long hose attachments that can be customized for multiple users in fixed work areas. Marinas or boatyards can set up a lending system for a vacuum sander on site. Issues and impacts of boat paint removal often correlate to those of paint removal in auto body shops. The Auto Body Pollution Prevention Toolkit produced by the Department of Toxic Substances Control is a useful resource for information on paint removal, sanding, and other pollution prevention concerns. See <http://www.dtsc.ca.gov/PollutionPrevention/ABP/index.cfm>

▶ **Benefits of Vacuum Sanding**

- Avoids unnecessary exposure to hazardous ingredients found in chemical strippers
- Protects the user from inhaling paint dust that can cause respiratory damage
- Prevents the paint dust and other debris from entering the water
- Prevents paint dust from falling on the ground and being washed into the storm drain
- Reduces the cleanup time and increases the speed of sanding²
- Reduces the volume of hazardous waste generated, saving money

▶ **Recommended Practices**

- Wear personal protective equipment like eye protection and appropriate respirator even though exposure to dust during vacuum sanding might be minimal
- Avoid sanding during windy conditions
- Avoid sanding over the water
- Sweep or vacuum any residual sanding dust and dispose as hazardous waste into clearly marked receptacles
- Plug scuppers to contain dust and debris
- Make sure your space is away from the water, well-ventilated, and floor is impervious

▶ **Resources**

- The Department of Toxic Substances Control- Pollution Prevention Toolkit for Auto Body Shops www.dtsc.ca.gov/PollutionPrevention/ABP/index.cfm
- “Laser Strip: A Portable Hand-Held Laser Stripping Device for Reducing VOC, Toxic, and Particulate Emissions – December 2009. Produced by the Institute for Research and Technical Assistance. <http://irta.us/FINAL%20Laser%20Report%20icat%2006-010%20%20NO%20MSDS.pdf>
- “Safer Alternative Thinners, Cleanup Materials, Coatings, and Sanding Methods in the Autobody Industry.” 2008 Report produced by the Institute for Research and Technical Assistance <http://irta.us/DTSC%20Autobody%20Report%202008%20Without%20MSDS.pdf>
- Mirka Abrasives www.mirka.com

12.3 CASE STUDY: SAN FRANCISCO BOAT WORKS.....



San Francisco Boat Works is a small vessel repair and maintenance facility in San Francisco owned and operated by Mike Denman. They provide general repair services including paint maintenance. Due to their proximity to San Francisco Bay and the potential for high winds, capturing all paint related waste has been a challenge. They've used chemical strippers in the past, but

were concerned about the toxicity and employee exposures. Chemical strippers also generate a large volume of hazardous waste, especially costly to manage. SF Boat Works investigated various sanding methods as alternatives to chemical strippers. Wet sanding methods were employed for a while, but containing the sanding waste liquid proved to be a challenge. In addition, the water needed to be treated to remove sanding dust. Dry sanding methods generate a lot of paint dust, exposing the worker and spreading paint dust to the surrounding environment unless properly contained. That posed a problem with winds, rains, and wash down areas in the vicinity.

They now use vacuum sanding techniques, capturing, containing and properly managing the paint dust as hazardous solid waste. There are a various vacuum sanding systems available. Some are fixed vacuum units with long hoses with sanding media attached. These systems work well for contained sanding and paint removal booths. Portable sanding units have become more popular with users for boat repair applications. Boats vary so much in size, height, and substrates, and paint removal is further complicated when often just certain parts of the boat need re-painting. The light weight portable units are easy for workers to use especially for sanding intricate and hard to reach areas. Units are light weight enough for workers to bring units up to the work areas, sanding dust is captured in the vacuum unit, which can easily be transferred to solid paint waste containment for proper disposal as hazardous waste. Vacuum sanders vary in particulate capture efficiency, cost and portability. Workers and the environment are most protected with higher capture efficiency so shop around. Ask your vendors to provide you with side by side demonstrations. Thanks to Mike Denman for hosting a comparison demonstration for this project!



12.4 ABRASIVE BLASTING

▶ Environmental Concerns

Repair and maintenance activities for large vessels most often employ abrasive blasting methods. The hull and upper decks are blasted with grit and other materials to remove layers of old paint and to prepare the surface for a new coating. This generates large volumes of waste consisting of grit and paint chips and hence is considered hazardous waste. Marine paint solids usually contain heavy metals that considered pollutants. Given the large volume of waste and large work area, proper measures need to be taken to ensure that the abrasive grit that contains sanding dust does not end up in the water.

▶ Types of Abrasive Blasting

Taken directly from the 2009 Report by the Institute for Research and Technical Assistance: “Laser Strip: A Portable Hand-Held Laser Stripping Device for Reducing VOC, Toxic and Particulate Emissions.”²¹

Many different types of technologies are used today to strip paint or contaminants from surfaces. They include:

- Manual removal techniques like sanding with sand paper or abrasive discs and
- Abrasive blasting methods using sand, steel shot, plastic media, wheat starch media, sodium bicarbonate and water
- Thermal methods like steam or burn-off ovens
- Chemical methods using methylene chloride or VOC solvent based strippers

Manual removal methods are obviously very labor intensive and therefore costly and slow. In aircraft stripping, this method is not selective. It not only removes the coating, it also removes the aluminum clad and/or anodizing as well. Stress cracks can also be created and can remain undetected by a buildup of paint dust.

Abrasive blasting methods all rely on a medium to abrade the paint or contaminant from the surface of the substrate. The paint residue and the stripping medium residue together account for a very large volume of material that is emitted to the atmosphere, is discharged to the wastewater treatment system or is disposed of as waste. This large volume of material has to be controlled or treated at a high cost. Generally, blasting technologies require a very high capital investment. Sand and steel shot blasting can damage some substrates and the particulate emissions must be captured. Plastic media and wheat starch blasting can harm substrates if they are not controlled carefully and cracks in the substrate may be masked by the dust. Medium pressure water blasting and sodium carbonate blasting also require large capital investments.

Steam stripping, like water blasting, creates a large volume of wastewater that must be treated and/or disposed of, again at a high cost. This process must also be carefully controlled so that substrate damage does not occur. Use of burn-off ovens for stripping is energy intensive and generates large amounts of NO_x emissions.

▶ **Cost Comparison of Blasting Methods**

Katy Wolf at the Institute for Research and Technical Assistance is testing alternatives for stripping paint off of boats – laser stripping, sodium bicarbonate (or soda) blasting, volcanic rock blasting, and dry ice blasting. The analysis is currently being conducted and the test results will be publicly available. More information can be found at www.irta.us

▶ **Recommended Practices for Blasting**

- Designate areas for hull scraping and blasting - inside a building, shroud, or plastic tarp enclosure to prevent abrasive blast material from being dispersed by the wind, from being exposed to rainwater, and from entering storm drains and surface waters
- Ensure hull maintenance areas are located a sufficient distance away from the water
- Contain overspray and waste
 - Only allow major hull and topside work in the designated areas
 - Do not blast under windy conditions
 - Carry out operations over an impervious surface
- Blasting should be performed by personnel trained on use of blasting equipment
- Direct the nozzle and blast downward when possible
- All runoff should be channeled to treatment units
- Consider installing shrouds
 - Shrouds should be large enough to keep the working area isolated from exposure to the Bay and routes to surface waters
 - Ensure that support structures or scaffolding can are strong enough to withstand strong winds
 - Regularly check and sweep up trapped abrasive blast under the shroud
 - Ensure that the shroud is properly designed, constructed, and positioned

▶ **Recommended Practices for Managing Blasting Waste**

- Clean up work area regularly especially after work is discontinued for a length of time
- Clean shrouding material and equipment upon completing work
- Do not dispose spent abrasives, paint dust, and paint chips in regular trash receptacles
- Provide clearly labeled containers to store all spent abrasive, an example of a label: “Excluded Recyclable Material Grit Blast Only, No Trash”
- Place abrasive blast storage containers away from storm drains, gutters, and routes to surface waters
- Ensure storage containers are covered to prevent rainwater from entering containers and percolating through the abrasive waste material
- Avoid storing abrasive blast waste for longer than six months⁶
- Contract with a licensed waste hauler to transport spent abrasive offsite for proper recycling or disposal

- Check with your local hauler for recycling options and suggestions for recyclable abrasive blast materials. Used abrasive materials can be segregated and recycled diverting large volumes from the landfill and preserving raw materials.
 - Try using plastic medium blast instead of silica sand to remove anti-fouling paint; plastic medium blast can be separated from paint dust and recovered for recycling
 - Try using a sponge blast system (urethane foam and plastic chips) for fiberglass hulls; sponge blast material is reusable like the plastic medium blast³

13.0 References

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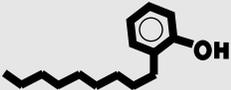
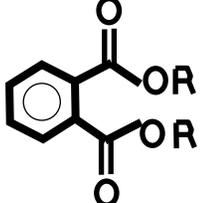
**APPENDIX A:
POLLUTANTS OF CONCERN FROM MARITIME INDUSTRIES**

Created 2011 by Virginia St. Jean from the San Francisco Department of Public Health in partnership with the California Department of Toxics Substances Control

Pollutant	Origin/Sources	Human & Environmental Impacts	BMP for Pollution Prevention
Copper ^{8,13} Zinc ¹³ Tributyltin Arsenic ¹³ Mercury ^{13,2}	<ul style="list-style-type: none"> • Anti-fouling hull paint • Architectural materials • Sacrificial zinc anodes • Motor oil • Tires • Legacy anti-fouling hull paint • Paint • Pesticides • Wood Preservatives (as chromate copper arsenate) • Float switches for bilge pumps • Shower water storage tank pumps • Thermostats 	<ul style="list-style-type: none"> • Metals can attach to particles in the water column and in the sediment. • Even if the concentration of metals in the water is small, metals can undergo bioaccumulation as it is ingested by organisms which are in turn ingested by organisms higher in the food chain. • The concentration of metals in the fish and other organisms consumed by humans can reach toxic levels (e.g. fish advisories due to high levels of mercury, oyster advisories due to high levels of copper.) • Metals can be toxic to aquatic life and humans • Heavy metals are persistent in the environment 	<ul style="list-style-type: none"> • Use alternative, non-biocide hull coatings • Use vacuum sanders to both remove paint from hulls and to collect paint dust and chips to avoid paint being carried into the water by storm water runoff • Perform pressure washing and hydro washing on land and prevent the resulting paint chips from entering surface waters • Product substitution – see <i>Purchasing Guide</i> • Properly dispose of oil, fuel, paints, switches containing metals as hazardous waste
Nutrients (i.e. nitrates, phosphates) ¹³ 	<ul style="list-style-type: none"> • Grey water (clothes & dish washer, sinks, showers) • Fertilizer • Detergents containing phosphorous • Trash i.e. food waste 	<ul style="list-style-type: none"> • Contributes to excessive growth of algae and phytoplankton decreasing the concentration of dissolved oxygen and decreasing water clarity • Encourages growth of weedy plants which may entangle propellers and pipelines • Decreases the dissolved oxygen in the water due to the decomposition of organic matter • Degrades water quality as less oxygen is available for aquatic life 	<ul style="list-style-type: none"> • Dispose of gray water properly on land • Prevent trash from entering waterways • Dispose of trash in proper receptacles
Fish Waste 	<ul style="list-style-type: none"> • Fish waste from boats or from dockside fish cleaning 	<ul style="list-style-type: none"> • Water contaminated by large amounts of fish waste suffer the same effects as the introduction of sewage and nutrients (see above) 	<ul style="list-style-type: none"> • Do not discard fish waste into marina water • Dispose of fish waste in appropriate trash or compost receptacles on land • Use fish cleaning stations to clean fish • Adopt catch and release fishing • Freeze fish parts and reuse them as bait

<p>Trash</p> 	<ul style="list-style-type: none"> • Illegally dumped or carelessly discarded into the water by recreational or commercial boaters • Carried by storm water runoff from urban landscapes • Discarded fishing lines and nets 	<ul style="list-style-type: none"> • Can contain materials that degrade water quality and are toxic to humans and aquatic life e.g. plastic, bacteria, metals, etc. • Kills fish, birds, aquatic mammals and other aquatic life etc. by entanglement or ingestion • Can pose an injury hazard to humans who come into contact with debris • Considered an aesthetic nuisance • Can impair enjoyment of beaches and waterways • Accumulates in waterways and in the ocean 	<ul style="list-style-type: none"> • Retain trash and food scraps on the boat to dispose on land into appropriate trash or compost receptacles dockside. • Reduce generation of trash by using biodegradable or non-disposable containers and food ware
<p>Untreated Sewage¹³</p> 	<ul style="list-style-type: none"> • Sewage from recreational and commercial boats • Pet waste carried by stormwater 	<ul style="list-style-type: none"> • Are sources of nitrates and phosphates as well (see <i>Nutrients</i>)above • Introduces disease-causing bacteria and pathogens into the water • Humans who come in contact with or swim in contaminated water can contract a wide variety of acute illnesses • Consumption of contaminated fish can cause illness as well 	<ul style="list-style-type: none"> • Do not discharge sewage in No Discharge Zones • Use sewage pumpouts • Install and properly maintain Type I, II or III Marine Sanitation Devices (MSD) • Ensure the Y-valve of the MSD is in closed position to prevent accidental discharge • Use restrooms on land to reduce boat toilet use • Avoid feeding wild birds at marinas as bird droppings can be a significant source of fecal contamination • Pet owners should pick up after pets and dispose into septic system or a trash receptacle
<p>Oil Dispersants¹²</p> 	<ul style="list-style-type: none"> • Used in cleaning up oil spills in the water • Often consist of surfactants (see <i>Surfactants</i> below) 	<ul style="list-style-type: none"> • Breaks up oil into water-soluble micelles that rapidly dissolve into the water column effectively dispersing the oil over a larger volume of water • The effects of oil dispersants can have greater toxic effects than the original spilled oil 	<ul style="list-style-type: none"> • Use microbes to “eat” up the oil in the water; they are non-hazardous and biodegradable • Use absorption pads and booms • Avoid use of emulsifiers; they are illegal to use
<p>Surfactants²</p> 	<ul style="list-style-type: none"> • Detergents and cleaners 	<ul style="list-style-type: none"> • Reduces the surface tension of the water decreasing the dissolved oxygen concentration and impairing the breathing of fish • Surfactants can be toxic to aquatic life 	<ul style="list-style-type: none"> • Perform cleaning and maintenance out of the water in an area where the gray water will not enter the surface waters • For small topside cleaning jobs while the boat is in the water, use a bucket to rinse the towel or sponge rather than re-dipping it into the surface waters • Do not discharge gray water into the water • Retain gray water to pumpout or dispose of on land

<p>Petroleum Compounds (i.e. fuel, oil, and grease)^{2,13}</p> 	<ul style="list-style-type: none"> • Fueling station (drips from nozzles; overfilling) • Runoff from boat engine repair & maintenance areas • Storage tank leaks • Bilge oil discharges • Drips from engines, paint, draining oil, fuel from engines, grease, lubricant, finishes, and cleansers 	<ul style="list-style-type: none"> • Even small spills can contaminate large bodies of water • Spills causing a sheen are a violation of federal law and can be punishable by fines and penalties • Impairs breathing for birds and aquatic organisms at the surface of the water • Can attach to plants impairing their photosynthesis • Can be ingested by aquatic life especially filter feeders such as oysters and sponges • Can harm juvenile fish and upset fish reproduction • As a sediment contaminant it can interfere with the growth and reproduction of bottom-dwelling organisms 	<ul style="list-style-type: none"> • Place absorbent booms around storm drains • Use donut ring or absorbent pads to catch spills during fueling • Check oil and fuel containers for leaks • Check engine for fuel leaks and use a drip pan under engines • Store oil and fuel containers in a covered area with secondary containment or a berm • Use absorbents pads to soak up oil in the bilge • Install and maintain air/fuel separators on air vents or tank stems of inboard fuel tanks to prevent fuel spills • Install and maintain a bilge pump with oil-water separation systems • Avoid use of detergent bilge cleaners
<p>PAHs - Polyaromatic Hydrocarbon^{8,14}</p> 	<ul style="list-style-type: none"> • Exhaust from boat motors • Paving sealants • Fuel spills • Creosote as a wood preservative 	<ul style="list-style-type: none"> • Can cause cancer • Can damage eyes, kidneys, and liver • Highly toxic to fish and other aquatic life 	<ul style="list-style-type: none"> • Avoid using creosote as a wood preservative • Reduce use of high-PAH paving sealants • Use 4-stroke engines instead of 2-stroke engines
<p>Solvents¹³</p> 	<ul style="list-style-type: none"> • Degreasing agents • Varnishes • Paint removers • Lacquers 	<ul style="list-style-type: none"> • Light or heavy, long chain compounds that can sink and accumulate in the sediment or volatilize or stay mixed in surface waters. • Many solvents are considered VOC's (volatile organic compounds) which contribute to air pollution and adverse health effects (cancer, respiratory illness, and neurotoxicity) 	<ul style="list-style-type: none"> • Product Substitution – see <i>Purchasing Guide</i> • Avoid cleaning and maintenance while the boat is in the water • Use products that are non-aerosol, water-based, low VOC, less toxic and biodegradable when possible
<p>Antifreeze³</p> 	<ul style="list-style-type: none"> • Bilge water contaminated with antifreeze • Leaks in the engine • Improper storage of antifreeze 	<ul style="list-style-type: none"> • It can be contaminated with fuel or heavy metals (e.g. lead) making it a hazardous waste • Water contaminated with ethylene glycol can be deadly to humans, pets, and aquatic life • Propylene glycol is a less toxic alternative for ethylene glycol although both are still toxic 	<ul style="list-style-type: none"> • Use propylene glycol (pink) instead of ethylene glycol (blue green) • Recycle antifreeze if possible • Dispose of antifreeze as hazardous waste in a separate labeled container

<p>Pesticides¹³</p> 	<ul style="list-style-type: none"> • Used on marina property and boat launch sites 	<ul style="list-style-type: none"> • Toxic to pets, small mammals, and aquatic life 	<ul style="list-style-type: none"> • Apply pesticide as directed by the label • Prevent pesticide from entering the water • Use low-toxic pesticides • Implement Integrated Pest Management techniques to reduce reliance on chemical pesticides e.g. use mulch for weed control
<p>Alkylphenol / Nonylphenol Ethoxylates (APE/NPE)^{8,9,12}</p> 	<ul style="list-style-type: none"> • Oil dispersants • Detergents, soaps, sanitizers • Degreasers and cleaners • Paints and plastics • Floor care products • Epoxy fillers 	<ul style="list-style-type: none"> • APE is hormone disruptor to humans and aquatic mammals • Does not readily degrade 	<ul style="list-style-type: none"> • Product substitution – see <i>Purchasing Guide</i> • Avoid discharging gray water into the water • Use the minimum amount of cleaner necessary • Use showers, sinks, and restroom facilities on land to reduce generation of gray water on the boat • Avoid topside cleaning while the boat is in the water
<p>Antimicrobial Products/ Triclosan^{8,10,11}</p> 	<ul style="list-style-type: none"> • Gray water containing: liquid hand soap, household cleaners, dishwashing liquid, cleaning products, toothpaste, hair products, plastics • Added as a anti-microbial agent to a variety of cleaning products¹⁷ 	<ul style="list-style-type: none"> • Triclosan is a hormone disruptor to humans and aquatic mammals • Triclosan undergoes bioaccumulation • Triclosan and other antimicrobials may be linked to the development of cancer and other adverse health effects in humans and mammals • The use of antimicrobials carries the potential for increasing antibiotic resistance 	<ul style="list-style-type: none"> • Product substitution – see <i>Purchasing Guide</i> • Avoid discharging gray water into the water • Use the minimum amount of cleaner necessary • Use showers, sinks, and restroom facilities on land to reduce generation of gray water on the boat • Avoid topside cleaning while the boat is in the water • Use bar soap for routine hand-washing
<p>Disinfectants for MSDs¹⁵</p> 	<ul style="list-style-type: none"> • Chemicals added to the MSD to treat sewage before discharge into the water such as: • Chlorine • Ammonia • Sodium hypochlorite or bleach • Formaldehyde 	<ul style="list-style-type: none"> • Chlorine, ammonia, bleach (sodium hypochlorite), formaldehyde, and other caustic chemicals are highly toxic to aquatic life if treated sewage is discharged into the water 	<ul style="list-style-type: none"> • Do not use disinfectants and MSD additives that contain these ingredients • Use environmentally friendly alternatives such as enzyme or bio-active treatments • Do not combine chemical treatments with other types of treatments as chemicals may harm the enzymes and bacteria • Do not discharge untreated sewage near shell beds, shallow coves, or recreational beaches
<p>Phthalates¹⁰</p> 	<ul style="list-style-type: none"> • Flexible & PVC/vinyl plastic • Food packaging and plastic bags • Building materials • Adhesives and caulks • Paints and pigments • Detergents • Solvents 	<ul style="list-style-type: none"> • Phthalates are a hormone disruptor • For males in particular, phthalates pose adverse health effects to reproductive systems and hormone levels 	<ul style="list-style-type: none"> • Product substitution – see <i>Purchasing Guide</i> • Use biodegradable food ware • Use re-usable containers and food ware

<p>Bisphenol A (BPA)¹⁰</p> 	<ul style="list-style-type: none"> • Hard plastics • Plastic water bottles • Plastic food ware • Lining of tin cans • Receipts 	<ul style="list-style-type: none"> • BPA is a hormone disruptor linked to infertility, miscarriage and reduced levels of an essential sex hormone in men. 	<ul style="list-style-type: none"> • Retain trash and food scraps on the boat to dispose on land into appropriate trash or compost receptacles dockside. • Reduce generation of trash by using biodegradable or re-usable containers and food ware
<p>Acidic/ Alkaline Solutions^{2,13}</p> 	<ul style="list-style-type: none"> • Detergents and cleaners containing strong acids and bases i.e. lye, bleach, and ammonia • Batteries • Grey water (clothes & dish washer, sinks, showers) 	<ul style="list-style-type: none"> • Alters the pH of the water • Toxic to aquatic life • Toxic to humans e.g. irritate or damage skin 	<ul style="list-style-type: none"> • Product substitution – see <i>Purchasing Guide</i> • Use the minimum amount of cleaner necessary • Use products that are non-aerosol, water-based, low VOC, less toxic and biodegradable when possible • Avoid cleaning and maintenance while the boat is in the water • Dispose of batteries properly as hazardous waste • Do not discharge gray water into surface waters

APPENDIX B: Boater's Guide to Eco-Friendly Purchasing



BOATER'S GUIDE TO ECO-FRIENDLY PURCHASING

Look For biodegradable
 • non-aerosol • low or non-VOC*
 • water-based • soy-based
 • derived from natural sources
 • eco-label certifications such as Green Seal, EcoLogo, EPA Design for the Environment

Use the least amount of product required, clean more frequently to avoid heavy build up, & exert more elbow grease

*VOC= Volatile Organic Compound
 Products w/ VOCs should comply w/ California VOC regulations

✗ avoid these ingredients known to be toxic to humans and/or the environment

✔ try these alternatives

Cleaner : Bilge

✗ Soap¹ • solvents • degreasers • TCE • PERC • MeCl

✔ Veg-based • biodegradable

Cleaner : Brake

✗ Hexane • toluene • PERC • MeCl

✔ Non-aerosol • water-based

Cleaner : Degreaser

✗ Chlorinated solvents • benzene • sodium hydroxide • phosphates • butoxyethanol • PERC • NMP • PD • MeCl

✔ water-, citrus-, or soy-based • non-aerosol • lemon juice & borax¹

Cleaner: Detergent / Soap

✗ Phosphates • phosphoric acid • sodium hypochlorite (bleach) • chlorinated solvents • PD • APE • quaternary ammonia • lye •

✔ Fresh water & a lot of elbow grease² • biodegradable • phosphate-free • vegetable or citrus-based soaps¹ • hydrogen peroxide²

Cleaner : Dish

✗ 2-bromo-2-nitropropane-1,3-diol (bronopol) • oxybenzone • hypochlorite • sulfuric acid • nitric acid • ethyl alcohol • triclosan • propylene glycol⁵

✔ Vegetable-based¹ • citric acid

Cleaner : Drain

✗ Sodium hydroxide

✔ Disassemble & replace • flush with a mixture of boiling water, ¼ c. baking soda & ¼ c. vinegar¹ • enzymes • citrus extract⁵ • biodegradable

Cleaner : Floor

✗ Sodium hypochlorite (bleach) • APE • sodium hydroxide • chlorinated solvents • phosphoric acid

✔ Vegetable or citrus-based soaps • Fresh water & a lot of elbow grease² • hydrogen peroxide² • phosphate-free • biodegradable

Cleaner : Glass

✗ Glycol ethers³

✔ 1c. vinegar : 1 qt warm water²

Cleaner : Head

✗ Hypochlorite • formaldehyde

✔ Brush w/ baking soda² • active-oxygen-based sprays • ½ c. borax : 1 gal of water¹

Cleaner : Holding Tank

✗ Formaldehyde • ammonium chloride • isopropyl alcohol (isopropanol) • 2-propanol •

✔ bio-active⁴ • nitrates • enzymes • Biodegradable • fragrance-free

Cleaner : Hull

✗ Phosphoric acid • APE

✔ Oxalic acid

Cleaner : Metal

✗ Chlorinated solvents • NMP • strong caustics • hexane • PERC • butoxyethanol • PD

✔ Brass: Worcestershire sauce, or paste made of equal parts salt, vinegar, & water¹ • Chrome: plain or apple cider vinegar to clean; baby oil to polish² • Or, use soap & water; then dry very well⁹ • Stainless Steel: baking soda or mineral oil for polishing, vinegar to remove spots¹ • Copper: lemon juice & water, or paste made of equal parts lemon juice, salt, & flour¹ • Aluminum: 2tbsp cream of tartar: 1 qt of water²

Cleaner : Scouring Powder

✗ Sodium hypochlorite (bleach)

✔ Peroxide • wet surface & use scouring cloth w/ baking soda²

Cleaner : Shower

✗ Ethyl alcohol⁵ • sodium hypochlorite • glycol ethers

✔ Baking soda • salt²

Cleaner : Teak

✗ Phosphoric acid • (bleach) sodium hypochlorite • sodium hydroxide

✔ Oxalic acid • biodegradable soap to remove dirt & salt water¹ • instead of bleaching, try using a mild powder soap & scrub w/ bronze wool¹

Cleaner : Rug/Upholstery

✗ Bromides • triclosan • 2-phenyl phenol • acrylic acid • hypochlorite • sulfuric acid • para-dichlorobenzene⁵

✔ dry corn starch; vacuum¹

Cleaner : Varnish

✗ Xylene • ethylbenzene • PD

✔ wipe with ½ c. vinegar & ½ c. water solution²

Remover : Fiberglass

✗ Xylene • ethylbenzene • PD

✔ Baking soda & water¹ • oxalic acid

Remover : Adhesive / Graffiti / Stain

✗ Benzene • Ethylbenzene • PD • xylene • MeCl • NMP • MEK • toluene

✔ Non-aerosol • ethyl lactate • citrus or soy-based • acetone • methyl lactate • methyl acetate

Remover : Rust

✗ TCE • hexane • MeCl • PD • PERC³ • phosphoric acid

✔ oxalic acid

Remover : Mildew

✗ Phosphate • sodium hypochlorite

✔ Scrub with paste of equal parts lemon juice (or vinegar) & salt² • full strength vinegar, then rinse¹ • scrub mildew w/ borax & water using a nylon scouring pad¹

Paint : Anti-fouling / Hull

✗ Dibutyl phthalates • tributyltin • zinc pyrithione • ethylbenzene • xylene • copper (cuprous oxide)

✔ Epoxy • non-biocide • silicone

Paint : Stripper / Remover

✗ MeCl • NMP • PCBTF

✔ Sodium bicarbonate (soda) blasting • vacuum sanding

Paint : Thinner / Reducer

✗ PD • toluene • xylene

✔ water or soy-based • acetone

Paint : Topside, Interior, Primer, Wood Coating

✗ MeCl • TCE • benzene • xylene • toluene¹ • ethylbenzene • MEK • hexane • heavy metals i.e. lead, chromate, chromium VI, cobalt,

✔ Water based • low VOC

Adhesive

✗ ethylbenzene • hexane • toluene • xylene • benzene

✔ (Adhesive cont.) water-based²

Anti-freeze

✗ Ethylene glycol

✔ Propylene glycol³ • recycled antifreeze³

Solvent

✗ Ethylbenzene • hexane • toluene • MEK • xylene • MeCl

✔ Water- or soy-based • ethyl lactate • methyl esters

Wood Polish / Preservative

✗ Pentachlorophenol (PCP) • creosote • tributyltin • folpet¹

✔ water-based • shellac, tung, olive, linseed, walnut, or almond oil^{1,2} • 3:1 olive oil to white vinegar²

ONLINE RESOURCES

- www.coastal.ca.gov/cobn/toolkit/marina-toolkit.pdf
- www.dbw.ca.gov/Pubs/CleanBoating-Habits/Default.aspx
- www.sfapproved.org
- www.westmarine.com >West Advisor
- www.GoodGuide.com

LEGEND

APE	alkyl- or nonylphenol ethoxylate
MeCl	methylene chloride, dichloromethane
MEK	methyl ethyl ketone, 2-butanone
NMP	n-methyl 2-pyrrolidone
PCBTF	parachlorobenzotrifluoride
PD	petroleum distillates, naphtha, mineral spirits, kerosene, Stoddard Solvent
PERC	perchloroethylene, tetrachloroethylene
TCE	trichloroethylene

If you have questions, contact: virginia.stjean@sfdph.org

Created in partnership by:
 CA Dept. of Toxic Substances Control
 San Francisco Dept. of Public Health
 CA Dept. of Boating and Waterways



APPENDIX C:

Marine Expired Flares Disposal Problem in California - Fact Sheet - January, 2011

Fact Sheet Purpose

The purpose of this factsheet is to provide background information on the problem of disposal of marine expired flares in California.

Flare Facts

A flare is a type of pyrotechnic that produces a brilliant light or intense heat without an [explosion](#). The basic form is a tube packed with explosive chemicals that burn very brightly or give off smoke, and is used to attract attention in an emergency. Handheld flares (which operate on the ground) and rocket flares (which are fired into the air) are the two most commonly used as visual distress signals because they can be used for day or night.

The main ingredients of flares include **strontium nitrate** (which provides the color—it burns with a bright red or orange-red flame), **potassium perchlorate** or **potassium nitrate** (as powerful oxidizer, which makes the strontium burn rapidly), and/or an energetic fuel such as **magnesium** (which burns very brightly) or **aluminum** is added to give the extra energy needed for a fast combustion.

Safe Boating requires Visual Distress Signals

Boaters must have three flares in order to meet the visual distress signal requirement for the boat. . These flares must be in serviceable condition, stowed where readily accessible and not outdated. Flares expire after 36 months. One can be fined for having expired flares. Stockpiling flares on a boat, in a car, or at home is never a good idea.

State and Federal Regulations for Marine Flares

Federal Requirements: [Title 33 Code of Federal Regulations Part 87 - Annex IV](#): Distress Signals. (NOTE: This can also be referenced as "33 CFR 87-Annex IV").

State Requirements: [Harbors and Navigation Code 652 and Title 14](#) of the California Code of Regulations Section 6692 (NOTE: This can also be referenced as "HNC 652 and 14 CCR 6692").

USCG Regulations for Visual Distress Signals: All boaters operating on coastal waters, the Great Lakes, territorial seas, and waters directly connected to them (up to the point where the body of water is less than two miles wide) must carry visual distress signals approved for daytime and nighttime use. For pyrotechnic devices (hand-held or aerial flares, floating or hand-held orange

smoke, and launchers for aerial red meteors or parachute flares) a minimum of three is required, in any combination that totals three for daytime and three for night use. Three day/night devices will suffice. Devices must be in serviceable condition, dates not expired and stowed accessibly. Exceptions are recreational boats less than 16'L, open sailboats less than 26'L and not equipped with propulsion machinery, and manually propelled boats. These vessels are only required to carry nighttime signals when operating from sunset to sunrise. (Ex Lake Tahoe boaters aren't required to use flares because even though the water body is greater than 2 miles as it is not connected to international waters).

According to US Coast Guard regulations the shelf life for pyrotechnic devices is three (3) years from manufacture. Just because the flares are expired doesn't mean they don't work, and if a real emergency occurs one may need more than 3 flares. Failure to have flares or having expired flares could result in a \$1,100 fine.

Disposal of Flares

Flares are considered hazardous waste when they are no longer needed and require disposal. They should NEVER be thrown overboard or in the regular trash, even if you first soak them in water. Perchlorate, one of the ingredients in flares, is a recognized pollutant of concern. If you soak flares in water, you now have water contaminated with perchlorate and/or nitrates that becomes a pollution issue. Some counties collect flares as part of their Household Hazardous Waste disposal days – but only residents of that county can utilize those services. If your county collects them, this is probably the best way to get rid of excess expired flares.

The Department of Transportation (DOT) defines aerial and marine flares as explosives with following definition Hazard Class 1.2 Explosives (with a projection hazard) for aerial flare and Hazard Class 1.4 Explosives (with no significant blast hazard) for marine flare. Marine flares classified as 1.4 by DOT that will no longer be used for their intended purpose are considered by the Department of Toxic Substances Control to be hazardous wastes because of their high concentrations of toxic metals in addition to their explosive classification. They must be disposed of at a permitted hazardous waste facility. State laws and regulations prohibit the disposal of hazardous waste in the trash and in municipal landfills. Some counties accept Marine Flares classified as 1.4 from the public as part of their Household Hazardous Waste disposal – but only residents of that county can utilize those services. See http://www.coastal.ca.gov/ccbn/Ca_Flares.pdf. If your county collects them, this is the best way to dispose of expired flares.

Companies disposing of marine flares must use a hazardous waste hauler registered by DTSC to transport explosive waste to a permitted hazardous waste facility (http://www.dtsc.ca.gov/HazardousWaste/upload/hwm_list_fireworks.pdf)

California requires that the only people who can pick up and transport or store flares are those licensed for that purpose. If any unlicensed person accepts flares for disposal they are breaking the law. However, any individual can hold, transport or store up to 50 pounds of his/her own flares (Health and Safety Code – Sub section b, Section 25218.5.1).

Problem Statement

Expired Marine flares (1.4) generated by households and recreational boaters in California are considered household hazardous waste. The majority of marine flares are being disposed of in an unsafe manner by recreational boaters due to the limited number of household hazardous waste collections centers in California that are willing to accept the 1.4 marine flares.

Currently, there are only 13 Household Hazardous Waste Collection centers throughout the State collecting marine and aerial expired flares http://www.coastal.ca.gov/ccbn/Ca_Flares.pdf Mismanagement of marine expired flares poses a public safety hazard and potential harm to the environment.

Estimated Number of Expired Flares Produced in California

An estimated 174,026 flares are generated per year by recreational vessels and recreational documented vessels in California. With an estimated 174,026 out-of date flares generated annually by boaters in California making it essential to find proper and convenient disposal options for boaters in California.

Documented Cases of Environmental Harm or Emergency incidents Caused by Mismanagement of Marine Flares

- In Florida on July 4th, 1998, a boat was destroyed in Port St. Lucie by a fire ignited by fire works which in turn ignited oil out date flares as back ups and had between 25 to 30 flares on board.
- In Florida (Palm Beach County) in 1999, a small child found an old flare in the back seat of a car, set it off and injured all six people in the vehicle. Florida boaters alone generate over 400,000 expired flares annually, according to state officials. (FL got this number from the number and types of registered boats) Flares are explosives and pose certain safety hazards. Marine flares that end up in landfills or washed up on shorelines can cause injuries, and improper storage may result in fires.
- Nova Scotia: In 2007, a residential fire, resulting in over \$75,000 in estimated damage was caused by an old flare.
- Massachusetts (2008). The flares are costing the public money to deal with in Massachusetts.
http://www.capecodtoday.com/blogs/index.php/2008/03/12/creosote_buildup_causes_chi_mney_fire?blog=80
- New Zealand (2010). A marine flare set off at midnight is being blamed for a blaze that destroyed a hillside of native bush at Piha, west of Auckland.
<http://www.3news.co.nz/Marine-flare-blamed-for-Piha-blaze/tabid/423/articleID/135839/Default.aspx>

There are no documented cases of environmental harm or emergency incidents caused by mismanagement of marine flares in California. However, it is imperative to find proper and

convenient solution to this issue before a major disaster involving human life or environmental impacts happen.

Some testimonies in California Include:

Rick Saber (US Coast Guard Auxiliary Flotilla 12, District 11NR - ricksaber@comcast.net)

“As a USCG - Auxiliary certified Vessel Safety Examiner, I have assessed 700 vessels. About 1 in 7 vessels has numerous expired flares needing disposal. With no official plan in place, this has always been a major problem with little solution.”

Doug Powell (Sergeant Contra Costa County Office of the Sheriff - dpowe@so.co.contra-costa.ca.us)

This has been a problem for years! I applaud your efforts to find a safe location to drop flares, as in Contra Costa County the Fire Department, U.S.C.G. do not take or have a SOP for flares. I have been contacted by boaters trying to do the right thing with little information to give them.

James J. Fitzgerald (U.C. Davis, Office of Boating Safety Bodega Marine Laboratory - jjfitzgerald@ucdavis.edu) “I typically provide the list of approved CA marine flare collection sites issued through the Dockwalker program, and/or instruct them to check with their local fire department. Some fire departments will expend them during controlled burns or training. Locally here in Bodega Bay, I have a verbal agreement with the local USCG station to direct mariners to the Bodega Bay Fire Department; they will take receipt of the expired flares and store them in a safe manner until I can stop in to retrieve them. I later employ the flares during formal pyrotechnic and visual distress signal training as part of the standardized Department of Interior, Motor Boat Operator Training Course curriculum. When teaching the above curriculum at various field sites through out CA, I’m often approached by local police officers and firemen, asking what they should do with expired marine flares that they have accepted from mariners. Many of these municipalities struggle with the same problem the mariners are faced with, “What do we do with expired marine flares?” Due to a lack of training with marine flares, many people have a fear of how to use them, and are unable to expend them legally for training or in a distress situation. Unfortunately there can be severe risks and liability associated with an accidental discharge, or perceived false distress signal when the training is not communicated properly to the authorities. Therefore it is difficult for mariners to receive any training in the proper safe use due to the obvious liabilities associated with live fire training exercises. Local authorities also discourage the practice of “Joe/Jane Boater” conducting their own random pyrotechnic training, due to the potential for fire hazard and a lack of control measures, further compounding the problem for safe use.”

Shelley Griffin (Bay Club Marina, Dockmaster marina@bayclubhotel.com) I never accepted any old flares from my tenants. I only got a constant flooding of inquiries on where they could dispose of them. Some of my tenants indicated to me that they quite literally had 20 to 30 expired flares on their boat because they had no where to dispose of them. This is when I

decided to take action and find out what could be done because I was so concerned that it is not safe to "stockpile" old flares on your boat.

Richard Engfer (Boater San Jose CA - hiltotii@sbcglobal.net) In all my years of boating on San Francisco Bay, I have never known of where to properly discard outdated flares. I have quite a (metal) box of them aboard my boat. I would welcome a convenient location for disposal.

Jim Haussenner (CA Marine Affairs and Navigation Conference - jhaussener@aol.com) While a problem, not sure how big. I personally keep the old flares on my boat.

Susan West Village (West Yacht Club Stockton - westdoublej23@yahoo.com) I personally have time expired flares on my vessel. I was told by the USCG Auxiliary when I had my annual vessel inspection this year that I do not have to replace expired flares. The date says they may not work, but there is no rule that says that I have to replace them with new one or current flares, just current Fire Extinguishers.

Anthony Budlong (Monterey, US Coast Guard Auxiliary - a_budlong@msn.com) I have been involved in sea and river kayaking for over 15 years, and every 42 Months, my flares expire whether used or not. My first set of three got wet when I capsized in the surf returning to shore with no need to use or signaling and became mushy, so I spread out the material and let it dry in the sun over time. My second, third and fourth sets , still look good, but have expired and I keep them in my Gear Box along with my current set which are to expire in two years, also in my Gear box. I keep my gear box in our garage to keep dry and for ready use. So now I am getting an increased pyrotechnic load in my gear box/garage. We attempt to keep down gasoline, paint, paint thinners and oils to a minimum at our home and try to better meet Federal, State and County Laws and Ordances using the County Hazardous Waste Facility in Marina, but they will not accept any highway or boat flares or other pyrotechnics.

James Haas (ADSO - MEP, Sector LA/LB - USCG Auxiliary - jguanabob@msn.com) As we have discussed many times in the past, expired flares are a major problem among boaters. We find when we do vessel safety checks. They often have several expired ones that they have no idea what to do with them. We, unfortunately, cannot offer them any solution to the problem. Several boaters have confessed to us that they simply throw them over board or dump them in the dock side trash. Many have indicated a willingness to handle it properly if only there were a place to get rid of them. The danger in dumping them, as you know, is that they could inadvertently be exploded in the process of the trucks picking them up. Additionally, the other obvious dangers are children or teens finding them and setting them off improperly. Also, if trash is dumped into an incinerating plant we have the potential for a major hazard. All in all, providing a proper place for disposal serves a community purpose.

Norma E. Lococo (USCG Auxiliary, Dana Point - bogart11@cox.net) Although some locations accept hand held flares periodically (depending on who is working that day), none of the locations will accept any form of aerial flares or any flare that had the general appearance of ammunition. Additionally, it is unrealistic to develop a level of boater responsibility with this

limitation and level of inconsistency particularly when the drive is generally 15-20 miles to these locations. We have advocated dedicating one day a year at each of the local mariners for proper flare disposal. The photos below represent the flares volunteered by boaters and collected in one season (January-August 2010) from boaters only in Dana Point Harbor, CA with many boaters electing to retain expired flares.

Anonymous A postcard signed anonymous stated that this person has been dumping their expired marine flares into San Francisco Bay off of Alcatraz Island for years.



One season collection in Dana Point, CA (Jan-Aug, 2010).
The one flare with wood handle expired in 1959



Water Quality

Potassium perchlorate

Potassium perchlorate may cause health affects if ingested. Many *states* control the amount of potassium perchlorate in drinking water.

Barium nitrate

Polyvinyl chloride

Strontium nitrate

Marine Expired Flares Working Group:

California Department of Boating and Waterways
California Department of Toxic Substances Control

California Coastal Commission
CalRecycle

San Francisco Department of Public Health
California Emergency Management Agency

USEPA

APPENDIX D:

Pollution Prevention Opportunities and Compliance Checklist

Hazardous Materials/Waste	Pollution Prevention Opportunities and Compliance Tips	Y	N	NA
Does your amount of hazardous materials (55 gal liquid, 500 lbs solid, 200 cu ft gas) meet your local CUPA agency's thresholds of hazardous materials?	A compliance certificate is required. Maintain a current Hazardous Materials Business Plan (hazardous materials/ waste generation sites). Consult your local Certified Unified Program Agency (CUPA) and they can help determine if you need one.			
Do you generate any hazardous waste?	A compliance certificate is required by your local CUPA.			
Do you have MSDSs for your hazardous materials?	CalOSHA requires employers to maintain current Material Safety Data Sheets (MSDSs) for all hazardous materials stored or used on site.			
Do you have any underground storage tanks (UST's)?	A permit is required by your local CUPA and Fire Department. If gasoline, Air District permit required			
Do you have any old, obsolete UST's?	Abandonment is prohibited by your local CUPA.			
Do you have any aboveground storage tanks (AST's) of Petroleum products – 1,320 or more gallons?	Notification to CUPA under Aboveground Petroleum Storage Act (APSA) and Spill Prevention Control and Countermeasure Plan (SPCC) is required. For 100% biofuels, EPA has oversight, not CA.			
Do you generate waste from an oil/water separator?	A permit is required by your local waste water agency. May need CUPA tiered permit if more than just oil/water being separated.			
Do you generate or collect Universal Waste?	Handle according to federal and state laws. Ask your CUPA about requirements.			
Do you store liquid hazardous materials/marina supplies indoors?	Store undercover and away from drains. Store securely. Control access and rotate stock to use oldest material first. If storing hazardous materials or wastes outside, use secured, watertight containers and secondarily contain or berm area to prevent spills into waterways.			
Do maintain an inventory of chemicals as minimal as necessary?	Only stock what you need and order materials on a "just in time" basis. Purchase container sizes appropriate for use and store materials near point of use when possible (away from waterways and any drains). Require vendors to take back unused samples or off-spec materials and work with vendors to return excess or expired stock. Inspect shipments prior to acceptance for opened, damaged or leaking containers. Reduce redundant or similar products (e.g. replace several types of differential oil with slip oil that works on all cars). Use longer lasting synthetic oils.			

Do use material transfer methods to prevent spills?	Use material transfer methods (closed systems) that prevent spillage such as: a spout and funnel when adding fluids to waste drums and transferring from container to container; and a pump and spigot when dispensing new products. Drain residual from pump back into original container and close container after adding fluids.			
Do you inform boaters and staff on proper HHW disposal?	Post signs encouraging boaters to use the HHW facility for left over paints, paint sanding and stripping waste, cleaners and petroleum wastes. Provide locations and times of temporary HHW collection events. Provide examples of wastes not permitted in regular trash. Contact your local HHW handler.			
Do you know how to handle Universal Waste and e-Waste?	Post signs educating boaters on proper disposal of Universal Waste and e-Waste (such as fluorescent lights, household batteries, mercury containing switches, non-empty aerosol containers, TVs and computers). HHW facilities usually accept these materials. Universal Waste and e-waste are illegal to dispose of in landfills and must be recycled or managed as hazardous waste.			
Do you have Biodiesel (B100 or 100% biodiesel only), 1320 or more gallons above ground?	Consult your local CUPA. Considered a hazmat in most jurisdictions. SPCG required by EPA. Lower blends regulated as hazmats in all jurisdictions due to diesel content.			
Do you have a fire permit for the storage, use, dispensing, transporting or handling of other hazmats (amts vary per type)?	Consult your local Fire Department. A permit may be required.			
Do you have a fire permit for the storage/use of compressed gas?	Consult your local Fire Department (permit may be required); storage allowances vary depending upon hazards of the gas). Consult your local CUPA (registration required if over 200cf).			
Do you have a fire permit for your Underground Storage or Aboveground Storage Tanks (UST/AST) containing flammable or combustible liquids?	Consult your local Fire Department. A permit may be required.			
Do you have a fire permit for any amounts of Liquefied Petroleum gases (propane forklifts, catering propane and butane)?	Consult your local Fire Department. A permit may be required.			
Do you have a fire permit for fuel dispensing facilities?	Consult your local Fire Department. A permit may be required.			
Do you store or use over 5 gallons of flammable liquids inside building, over 10 gals outside building?	Consult your local Fire Department. A permit may be required.			
Do you storage or use over 25 gallons combustible liquids inside building, over 60 gallons outside	Consult your local Fire Department. A permit may be required.			

building (examples include diesel, some degreasers)?				
Do you have a back-up generator: fixed over 50 HP or 27 Kw?	Consult your local Air Quality Management District. Regulations may apply and a permit may be required.			
Do you dispose of your expired or used flares as hazardous waste?	Properly dispose of expired or used flares as hazardous waste. The shelf life for such pyrotechnic devices is three years from the date of manufacture. Unexpired flares may still work and are good to keep on hand should you need more than the standard three flares for an emergency. Contact your local police and/or fire departments for disposal options as they vary by local jurisdiction.			
Do you maintain a clause in boaters' lease agreements or harbor rules requiring the proper disposal of all hazardous waste?	Work with boaters to determine what wastes they are likely to generate, and educate them on proper disposal methods that are free if they use the Household Hazardous Waste (HHW) facility. See http://www.sfrecycling.com/sfhhw/index.php?t=d for more info on what is defined as HHW.			
Do you segregate the different types of hazardous waste?	Properly collect, segregate and manage all paint related, cleaning, fuel, oily and coolant waste as hazardous waste unless deemed non-hazardous through analytical testing. Your hazardous waste vendors can help with proper segregation for your particular waste collection needs.			
Do you have a used oil absorbents (pads and pillows) exchange program?	Initiate and maintain a used oily absorbent exchange program in which slip holders can exchange used pads or pillows for new ones. Properly recycle or dispose of used oil absorbents as hazardous waste. See http://www.sfrecycling.com/sfhhw/index.php?t=d for more information on disposal.			
Do you provide recycling for used oil and oil filters?	Segregate, drain, crush and recycle used oil filters and provide location for boaters to recycle their oil filters. Properly label containers. Provide a waste oil collection program for boaters if possible and/or educate boaters where to recycle their oil waste. If boaters are abandoning oil containers on your premises, provide an approved collection location landside and protect from weather with secondary containment. Recycle all collected oil waste from oil pump-out system. Collect used oil from the public. The State reimburses 16 cents/gallon if certified by the California Integrated Waste Management Board.			
Do you have a parts washer?	For facilities with maintenance shops using parts washers, use a water-based parts washing system that recirculates, distills or regenerates spent cleaning solutions on-site. Enzyme additives can extend the life of your cleaning solution (ask your vendor for specific guidance). Conduct maintenance according to manufacturer recommendations and ensure filters are managed as hazardous waste. Ask your vendor for more information. Parts washers with volatile solvents are likely regulated by your BAAQMD. Consult your CUPA as parts washers generate hazardous wastes.			
Do you recycle other hazardous wastes?	Recycle all hazardous wastes that are eligible for recycling. Contract with recycling services for used oil, lead acid batteries and antifreeze. (You may recycle antifreeze onsite if you have/use large volumes.) Recycle empty hazardous materials containers. Either: return to supplier for refill; recondition on-site or contract with an approved drum re-conditioner (permit requirements may apply); or reclaim scrap value on-site or with a scrap dealer.			
Do you send your Universal Waste	Recycle the following Universal Wastes: fluorescent lights, computers, electronic equipment, mobile phones,			

for recycling?	household batteries, and mercury switches. Consult your CUPA for help finding handlers of your Universal Wastes.			
Do you generate used zinc anode and lead fishing weights?	Educate boaters on proper disposal of zinc anodes and lead weights. Must be disposed of as HHW or recycled as scrap metal at an approved scrap metal recycler.			
Do you transfer liquid hazardous wastes?	Use a fully enclosed transfer system for waste liquids to minimize spills and maximize volume that can be recycled.			
Fueling	Pollution Prevention Opportunities and Compliance Tips	Y	N	NA
Do you provide fueling education at your facility?	Educate boaters to fill fuel containers on land to reduce the chance of spills into the water and to avoid over-filling containers and fuel tanks. If boaters must fuel from portable containers while in the water, fuel away from marina using care to not to spill into waterways or into boat hulls (could flow into bilge holds contaminating oily water with diesel or gasoline).			
Do your boats have a fuel/air separator?	Promote the installation and use of fuel/air separators on air vents or tank stems of inboard fuel tanks or fuel whistles to reduce the amount of fuel spilled into surface waters during fueling. Consider using pollution prevention products that can help prevent fuel spills at your facility (i.e. Fuel Vent Collectors and fuel bibs). Use/provide petroleum absorption collars/pads while fueling to catch splash back and the last drops when the fuel pump nozzle is returned to fuel dock after fueling. (See A18.)			
Do you dispense gasoline?	Consult your local Air Quality Management District and Fire Depts. Permit is required.			
Spill & Emergency Response	Pollution Prevention Opportunities and Compliance Tips	Y	N	NA
Is your maintenance shop floor impermeable?	Seal maintenance shop floor with an impermeable coating such as epoxy or other sealant. This makes floor clean-up easier and saves clean-up time.			
Do you clean shop floor using “dry” cleanup methods?	Regularly clean shop floor using “dry” clean up methods. Use shop towels and squeegees for small drips and spills. Eliminate use of powdered or granular absorbent for routine cleanup, but OK for fuel spills on land in an emergency situation to reduce fire risk. Use hydrophobic systems when possible (pick up oily wastes, but leave water and/or other aqueous liquids behind). Clean up larger spills with a hydrophobic mop, pad or wet/dry vacuum (vacuum must be fire approved for picking up flammable fuel spills). Recover spilled fluids for reuse or recycling (wring from mop, rags or pads/mats), or discharge from vacuum. Use a cloth mop for water-based and antifreeze spills. Place segregated liquids into appropriate waste for recycling. Dispose of mop water into sanitary sewer if it meets local discharge limits. Check with your local waste water agency for local allowances.			
Do you use reusable absorbents?	Reuse absorbents until spent, then dispose of properly (most likely as hazardous waste). Consider replacing disposable absorbents with cleanable, reusable absorbent pads, mats or socks as a more efficient and cost effective alternative. Wring them out, recycle the liquids and reuse as long as effective.			
Do your boaters or staff know how to clean up a liquid spill?	Provide marina and boater information on cleaning liquid spills immediately using dry sweeping techniques, absorbent pads (avoid loose absorbents when possible), rags and vacuum techniques.			
Do you have sufficient oil spill	Prohibit use of detergents and emulsifiers on fuel and oil spills. The Office of Spill Prevention and Response			

materials in the event of an oil or fuel spill?	restricts the use of loose particulate materials for purpose of on-water spill response. Use absorbent pillows or socks or within the confines of booms or booming operations. Maintain an adequate supply of oil spill response materials on site. For every foot of boat, expect to use three feet of absorbent boom. Store at least enough boom material to adequately encircle the largest boat in the marina. For a current list of CA Licensed Oil Spill Cleanup Agents see http://www.dfg.ca.gov/ospr/reg_com/osca/licensed_oil_spill_agents_exempt_agents_2009.pdf . In order for a product to be considered for use, the product must be listed in the National Contingency Plan and licensed by the Administrator of the Office of Spill Prevention and Response. California Government Code 8670.13(b) states that adsorbents and other cleanup devices that do not employ the use of active chemical clean up agents or are otherwise determined not to <u>cause aquatic toxicity</u> are not subject to the licensing provisions. A current list of California licensed oil spill cleanup agents can be found at: http://www.dfg.ca.gov/ospr/reg_com/osca/licensed_oil_spill_agents_exempt_agents_2009.pdf			
Are the spill response materials easily accessible?	Place clean-up supplies (absorbent pads, mops, buckets, drain mats/plugs, etc.) in convenient, easy to locate areas around the shop and docks as needed.			
Do you train your employees semi-annually on pollution prevention and spill response?	Train new employees upon hire. Keep a log of attendees, training dates and training topics. Educate your boaters on what to do and to whom they should report any oil or chemical spills.			
Is the phone number to report spills easy to locate?	Post signs educating boaters, marina users and employees to immediately report spills to the marina office and to both the US Coast Guard National Response Center (1-800-424-8802) and the State Line (1-800-852-7550)			
Do your boaters or staff know where the fire extinguishers are?	Educate boaters to keep fire extinguishers serviced and available, to keep work areas free of oil and debris and to only work on cooled engines.			
Do you or your boaters routinely check for leaks?	Maintain clause in boaters' lease agreements for boaters to routinely check for fuel, oil and hydraulic leaks on boats and to correct maintenance problems quickly. Use drip pans and/or absorbent until problem is remedied.			
Do you routinely inspect and address all potential sources of leaks, spills, accidents and emissions including receiving areas and/or loading docks?	Check hazardous material/waste storage areas, pipes, valves, hoses and process equipment, open hazardous materials containers left on docks, etc. Increase preventative maintenance schedules if warranted.			
Do you maintain a current emergency plan?	The plan should include maps with shut-off valve locations, and emergency phone numbers.			
Do you store materials outside?	Store deliveries and supplies under a roof to protect from weather.			
Routine Vessel Maintenance	Pollution Prevention Opportunities and Compliance Tips	Y	N	NA
Do you have a fire permit for welding or hot work operations?	If you do any welding or conduct hot work operations (such as cutting metal vessels that used to contain flammables), consult your local Fire Department. A permit may be required.			
Do you have a fire permit for repair operations?	Consult your local Fire Department. A permit may be required.			

Do you use solvents to clean parts (parts washers and/or degreasers)?	Pre-clean excessively soiled parts to minimize contamination of cleaning solutions/solvents. Use wire brush or shop towel to remove heavy dirt/grease. Use an additional tank with partially spent solution for pre-rinsing. Avoid cross-contaminating aqueous cleaning solution in parts washers by not washing parts sprayed with degreasers such as chlorinated solvents or petroleum distillates. Use high temperature ovens and dry abrasives (shot blast) for parts cleaning/machining. Be sure your unit meets local air district requirements. Consider using a parts cleaning system with ultrasonic or mechanical agitation, ideally with an oil skimmer feature.			
Do you maintain a clause in boaters' lease agreements that requires all major engine maintenance be conducted away from surface water?	Any maintenance work on engine must be conducted in compliance with the rules and regulations governing the marina. Only allow work on boats in the water if less than 25% of the surface above the water line is involved.			
Do you repair paint bonding problems while the vessel is out of the water?	Provide boater education on repairing paint bonding problems at haul out or at dry dock to avoid further chipping and flaking of paint into the water.			
Do you use volatile organic compounds (VOCs) over 30 gallons/yr?	Consult your local Air Quality Management District. Regulations may apply and a permit may be required.			
Do you use Cold Cleaners with VOC's?	Consult your local Air Quality Management District. Regulations may apply and a permit may be required.			
Do you maintain clause in boaters' lease agreements that specifies only small maintenance jobs are permitted while in the slip?	Perform small maintenance jobs that involve less than 25% of the deck length. Requires recovering and containing of all wastes such as oil, paint sanding dust, liquid paint related materials and other maintenance wastes. Provide guidance on proper containment, disposal and/or recycling of such wastes using tarps, covering or plugging scuppers, windows and vacuum sanding systems to contain dusty wastes. Sanding dust should not be put in the trash unless it is tested and verified that it is not hazardous waste. Implement Best Management Practices such as those found at www.cleanmarinascalifornia.org .			
Do you have a system for keeping shop/store/docks clean and orderly?	Use employee incentive programs to reduce spills and sloppy work areas (e.g. bonuses/prizes for safety and/or violation-free months, posting photographs of poor/good employee work areas, using employee spill accident record as criteria in determining pay increases. Prohibit unattended open containers of hazardous materials such as paints, oils, cleaners or other maintenance supplies on the docks.			
Do you use zinc-free flux and lead-free solder?	Use zinc-free flux and lead-free solder.			
Do you use re-refined oil?	Purchase re-refined oil for use in your shop ensuring it meets appropriate standards (warranty, ASTM, etc.).			
Do you use cleaners with toxic ingredients?	Eliminate use of toxic cleaners and lubricants containing chlorinated solvents, n-hexane, and n-bromopropane, and reduce and/or eliminate aromatic hydrocarbons such as toluene, xylene and ethylbenzene (commonly found in aerosol degreasers and brake cleaners). In general, use the least hazardous, least polluting products that are effective.			
Do you use propylene glycol for	Substitute less toxic propylene glycol for ethylene glycol (antifreeze). Purchase re-refined antifreeze for use in			

antifreeze?	your shop ensuring it meets appropriate standards (warranty, ASTM, etc.). All used antifreeze is hazardous as it picks up metals while cooling engines and should be properly recycled.			
Do you have a permit for your air compressor?	The CA Dept of Industrial Relations (CalOSHA) requires a permit. See http://www.dir.ca.gov/dosh for more information			
Do you use rags or uniforms?	Use an industrial laundry service for shop rags and uniforms. Do not saturate rags. Keep oily rags in a covered container. Use a rag and uniform service that recycle its wastewater if possible.			
Is maintenance performed away from the storm drains and surface waters?	Do not wash boats, cars, equipment, floor mats or other items outside where run-off water flows straight to the storm drain. This water should be directed to a sanitary sewer drain and not storm drain. [Note: Spent steam cleaning solutions and cleaning solutions from dirty/greasy equipment clean up are most likely hazardous waste. Use a licensed waste hauler, ideally one who reclaims water. Routinely check for vehicle leaks (parking lots, shop floor, sidewalks) and establish a "ground staining" inspection routine. Perform all boat maintenance under cover or indoors, as far away from surface waters as possible.			
Paint & Paint Removal	Pollution Prevention Opportunities and Compliance Tips	Y	N	NA
Do you use water-based, low VOC, or recycled paint?	Use water-based, low VOC or recycled paint and paint related products for marina office and facilities maintenance where possible. Use non-chlorinated paint related materials. Avoid paints with pigments that contain heavy metals. Consider using new copper-free and tin-free hull coatings.			
Do you have the proper permits for the application of flammable materials and paint spray booths?	Consult your local Fire Department. A permit may be required. Consult your local Air Quality Management District. Regulations may apply and a permit may be required.			
Do you use a vacuum sander to remove paint?	Purchase a vacuum sander and allow boaters to borrow it for light sanding jobs (as marina policy permits). Educate on collecting sanding waste and inform boaters to take waste to a Household Hazardous Waste facility. Use vacuum sanders for all boat coatings removal whenever possible. Should strippers be required, use products without chlorinated hydrocarbons or other toxic ingredients (see Prop. 65 list for ingredients of concern). Ensure use of personal protective equipment.			
Do you apply and recommend less toxic antifouling paint?	Recommend less toxic and EPA and IMO-compliant hull paint to slip holders. Anti-fouling paints historically contained toxic metals such as tin and copper which have been shown to pollute harbors. Newer paints are less toxic to the environment and are proving effective. Check the Sea Grant Extension program website for alternatives: http://commserv.ucdavis.edu/cesandiego/seagrant/nontoxicdemo.htm			
Do you educate boaters on effective hull cleaning practices?	Provide hull cleaning and maintenance BMPs to boaters and post them at the marina. Provide boater education on properly applying and maintaining hull paints. Include education on waiting at least 90 days after painting to clean hulls and how to properly repair hull bonding or paint problems. Regularly scheduled gentle cleaning can increase the effectiveness of the anti-fouling hull paint and extend its useful life.			
Do your divers abide by environmentally friendly BMP's for	Recommend the use of environmentally friendly hull cleaning companies who use Best Management Practices, monitor their divers and use non-abrasive scrubbing agents, soft sponges or pieces of carpet when possible for			

hull-cleaning?	keeping hulls clean yet reducing the sloughing of paint. More abrasive pads may be needed for surfaces close to the waterline as these areas are susceptible to higher growth rates, but always use the softest media possible first. This should not be done in the water. Provide education to divers to use least abrasive media possible for the type of growth on hulls.			
Waste water	Pollution Prevention Opportunities and Compliance Tips	Y	N	NA
Do you comply with waste water discharge limits to sanitary sewer?	Consult your local sanitary sewer district for waste water discharge limits, prohibitions, and applicability of an industrial discharge permit.			
Do you have permits for wastewater discharge?	No specific permits are issued unless waste water is hazardous. Facilities may be inspected if violations are suspected or reported. Industrial waste water discharges may need a permit. Check with your local sanitary sewer district.			
General Marina Management	Pollution Prevention Opportunities and Compliance Tips	Y	N	NA
Do you purchase from and support other green vendors or services?	Do business with other "green" vendors or services. See Green Business listings at http://greenbusinessca.org/			
Do you provide Workers' Comp. Insurance for employees?	Worker's Compensation Insurance is required for all businesses with employees- CA Dept of Industrial Relations Worker's Comp. Division. See http://www.dir.ca.gov/dwc/dwc_home_page.htm for more info.			
Do you implement Integrated Pest Management (IPM) techniques for pest control?	Eliminate or reduce use of chemical pesticides by implementing an Integrated Pest Management (IPM) program specifying non-chemical prevention in pest control contracts. Use traps, barriers and less toxic pesticides as needed only. Set up storage and sanitation procedures to discourage pests. Call your local county Environmental Health Department for information.			
Are the plants that you have native plants?	Plant native plants that are disease and insect resistant. More information available at the CA Native Plant Society (916-447-2677) or contact the SF Bay Conservation and Development Commission (415-352-3600) for a copy of the Bay Shoreline Landscape Guide.			
Do you use refillable pump strays instead of aerosols?	Replace aerosols with refillable pump sprays containing low toxic alternatives when possible. Empty aerosols can be discarded as metal recycling waste. To dispose of non-empty aerosols, see http://www.sfenvironment.org/ecofinder/ (search under paints, spray). Note the different guidelines for commercial vs. recreational (residential) users. Use refillable and air pressurized (pump) spray cans. Ensure container meets fire code standards.			
Do you donate old electronics you no longer need?	Donate reusable electronic equipment such as computers or phones.			
Do you use rechargeable batteries?	Use rechargeable batteries and appliances, such as hand-held vacuum cleaners and flashlights.			
Do you use recycled ink cartridges?	Buy recycled/remanufactured toner and ink-jet cartridges for your office machines. Have promotional materials printed with vegetable or other low VOC inks.			
Do you recycle your toner and ink-jet cartridges?	Recycle spent toner and ink-jet cartridges.			

Are your light bulbs energy-efficient?	Replace standard fluorescent lights with low or no mercury fluorescent lights and replace incandescent lights with compact fluorescent lamps (CFLs).			
Are your energy sources "green"?	Contract for or install "green" energy sources.			
Do you use recycled, chlorine-free paper products?	Use unbleached and/or chlorine-free paper products (copy paper, paper towels, napkins, coffee filters, etc.) with at least 30% post-consumer waste content.			
Do you have adequate ashtrays for smokers your facility?	Have an outdoor ashtray or cigarette "butt" can if there is regular smoking by employees or visitors (i.e. outside of the marina office, boat launch ramp, restaurant, if applicable).			
Education	Pollution Prevention Opportunities and Compliance Tips	Y	N	NA
Do you routinely check for Clean and Green Boater information updates?	Check for Clean and Green Boater information updates on the Boating Clean and Green Program (www.coastal.ca.gov/ccbn) and the Clean Marinas California Program (www.cleanmarinascalifornia.org) websites and share pertinent information with your staff, leaseholders and day users.			
Do you post educational posters around your facility?	Post Clean Boating posters (free from the Boating Clean and Green Program) on bulletin boards, facility entrances, information kiosks, marinas, offices, dock entrances, boat launch ramps and/or fuel docks. See www.coastal.ca.gov/ccbn/boating_posters.html for ordering information.			
Do you provide boating education materials to boaters and staff?	Host a Dockwalkers Program presentation at your marina or special event. See www.coastal.ca.gov/ccbn/dockwalkers.html for more information. Post boating education materials index provided by the California Clean Boating Network (CCBN). Publications can be found at http://www.coastal.ca.gov/ccbn/catalognew.html Encourage boaters to print out only those pertinent to their boater operations. Educate boaters on proper methods for filling fuel containers, containing replaced oil while conducting oil changes, using oil absorbing materials and bilge pumping. Educate boaters about regularly scheduled maintenance using Best Management Practices and environmentally preferred products. For assistance see the Boating Clean and Green program publications: "A Boater's Guide to Less-Toxic Cleaning" and "Shopping Clean and Green" display at www.coastal.ca.gov/ccbn/materialsforeducators.html Post these guides for your marina use or provide information on where to obtain them on bulletin boards or information kiosks.			
Do you provide guidance to tenants in determining safer products for cleaning and routine maintenance, safer boat maintenance?	Provide boater education for proper topside boat maintenance and cleaning using environmentally preferred products and methods. Include sanding BMPs such as the use of vacuum sanders (no steel wool), not sanding in heavy winds, and mixing all paint related materials and cleaners over secondary containment. Recommend water based cleaners and avoid products with phosphates, ammonia, lye, sodium hypochlorite (bleach), chlorinated hydrocarbons (methylene chloride, perchloroethylene or trichloroethylene) petroleum distillates and nonylphenols. Distribute the "Boater's Guide to Eco-Friendly Purchasing". Avoid aerosols and volatile degreasers. This reduces the amount of solvents and cleaners that become airborne, which eventually end up polluting waterways. Suggest wipe cleaning (using cleaners on rags) and pump sprays instead of aerosols, always using the minimum amount necessary.			

Do you teach boaters about environmentally safer methods for treating teak?	Educate boaters on the benefits of allowing teak to weather naturally, fading to gray. Teach boaters about rinsing teak with salt water to remove dirt or for a freshly sanded look, scrub decks with salt water and let sun bleach decks. Educate boaters on using teak cleaners and fiberglass polishers sparingly. Teach boaters to avoid both spills into the water and dipping rags in the water while cleaning.			
Do you provide boater education for proper use of MSDs?	Provide boater education for proper use of marine sanitation devices and how to abide by the Clean Water Act. For more information see the Boating Clean and Green Program website.			
Do you educate boaters on the problem of trash in the waterways?	Educate boaters to avoid throwing trash overboard and to keep materials secured to avoid blowing out of boats. Post the Boating Clean and Green Program posters and provide the "Environmental Boating Laws" brochure. Recommend boaters to participate in a Marina Clean Up Day.			
Do you educate boaters on proper disposal of hazardous materials and other trash?	Post "Protect Our Waterways" signs around docks to educate on the proper storage and disposal of hazardous materials and other trash to avoid harm to aquatic life and the environment. Use the Boating Clean and Green Program posters and other signs as appropriate in applicable languages for your marina.			
Do you promote Coastal Clean up day?	Organize an annual Clean Up Day at your marina or participate in the Annual Coastal Clean Up Day. For more information visit www.coast4u.org .			
Reducing Car and Boat Emissions	Pollution Prevention Opportunities and Compliance Tips	Y	N	NA
Do you encourage employees, tenants, or boaters to carpool or take public transit?	Join the Air District's "Spare the Air" program to notify employees and boaters of "Spare the Air" days and what they can do to help out. Go to: www.sparetheair.org to sign up. Encourage commute alternatives by informing employees, customers and others who visit your office about transportation options for reaching your location (post transit schedules/routes). Help employees rideshare by posting commuter ride sign-up sheets, employee home zip code map, etc. Get assistance from www.rides.org or 1-800-755-POOL. Provide "guaranteed ride home" when needed by employees who carpool or take public transit to work. Offer secure bicycle storage for staff and customers (e.g. bike lockers). Offer subsidized transit passes as employee incentives for carpooling or using mass transit. Provide lockers and showers for employees who walk/jog/bike to work or contract with an athletic club to use their facilities. Set aside car/van pool parking spaces. Provide commuter van. Encourage bicycling to work by offering rebates on bicycles bought for commuting. Offer a shuttle service to and from bus, train and/or light rail stops. Provide boaters information on the use of biofuels which reduce air emissions. Educate boaters that keeping their boats properly maintained will increase fuel efficiency and reduce exhaust emissions.			
Do your business operations minimize car emissions?	When possible, arrange for a single vendor who makes deliveries for several items. Patronize services close to your business (e.g., food/catering, copy center, etc.) and encourage employees to do the same. Convert vehicles and vessels to Low Emission Vehicles (electric, hybrid or alternative fuels—natural gas, fuel cell, etc.). Keep			

	vehicles and vessels well maintained to prevent leaks and minimize emissions, and encourage employees to do the same. Offset company's vehicle CO2 emissions. See www.driveneutral.org , www.carneutral.org , or www.terrapass.org .			
Do you prohibit idling?	Implement and enforce an anti-idling policy. Provide dock-side power to allow boaters access to electricity without idling their motors.			
Pumpouts	Pollution Prevention Opportunities and Compliance Tips	Y	N	NA
Do you educate your boaters on proper waste water management?	Post and make available lists of mobile vendors for bilge, oil and sewage. California list available at http://www.coastal.ca.gov/ccbn/marinaoilsewage.pdf			
Do you provide a bilge pumpout at your facility?	Maintain clause in boaters' lease agreements requiring them to use oil-absorbing (either oil capturing or oil digesting) materials in their bilges and to check for traces of oil before pumping out the bilge. Require they routinely inspect bilges and replace oil absorbing materials as necessary. Provide signage on the pump-out on proper use and contact information in case the system isn't working.			
Do you provide a permitted bilge waste water pump-out?	Install and make available to boaters a bilge waste water pump-out and treatment (permit required by local CUPA agencies) system, OR at a minimum provide a list of locations for bilge wastewater treatment units in your area. See SF Estuary Partnership map: www.sfestuary.org/projects/detail.php?projectid=3			
Do you provide a sewage pumpout at your facility?	If marina provides on-site sewage pump-out facility, ensure it is user-friendly, open at convenient times and at a reasonable cost. Provide signage on the pump-out on proper use and contact information in case the system isn't working. Regularly inspect and maintain sewage pump-outs if marina provides this service.			
Suppliers	Pollution Prevention Opportunities and Compliance Tips	Y	N	NA
Do you stock and promote less toxic alternatives?	Stock/sell products which are less toxic or less polluting than conventional products and educate customers about less toxic products.			
Do you stock and promote compostable or re-usable products?	Stock compostable picnic supplies, food containers and trash bags for boaters and educate customers about these products.			
Solid Waste	Pollution Prevention Opportunities and Compliance Tips	Y	N	NA
Do you require pet owners to pick up after their pet?	Require all pets to be on leash and that owners clean up after their pets. Consider installing pet waste stations. Provide disposal bags for pet waste, ideally compostable bags.			
Do you regularly clean and inspect your trash receptacles?	Keep dumpster, receiving, parking, landscape and loading dock areas clean and free from litter, oil drips and debris. Keep dumpsters covered when not in use to keep water out and routinely inspect for leaks and rust.			
Do fishing boats frequent your marina?	Install and maintain fish cleaning stations and provide conveniently located covered compost or trash receptacles for proper disposal of fish waste. Ensure fish cleaning stations do not discharge to the marina waters. Provide signage at fish cleaning stations that informs boaters of importance of proper fish cleaning practices and			

	discourages boaters from disposing of unwanted bait and fish waste at sea. This helps to reduce the impacts of invasive species as well as nutrient pollution.			
Stormwater and Waste Water	Pollution Prevention Opportunities and Compliance Tips	Y	N	NA
Do you regularly maintain separators and grease traps?	Regularly inspect and clean out separators and grease traps (at least every three months).			
Are your storm drains protected from processed water or contaminated storm water?	If floor drains are not permanently sealed, use drain mats or plugs to prevent spilled fluids from entering sanitary and storm drains. Have no open floor drains in the process area. Become a “zero discharger” (eliminate all industrial discharge to sanitary sewer and storm drains). Design berms or grading to prevent run-off or rain water from flowing across industrial areas where it could be contaminated. Install shut-off valves at storm drains on property or keep temporary storm drain plugs available at loading docks or outdoor process areas for quick spill response.			
Are your storm drains labeled?	Post a sign (at least 8½" x 5½") above shop sinks notifying employees: "Do Not Discharge Hazardous Wastes or Chemicals Down Drains or Outside Storm Drains" Label all storm water drains with a message such as "No dumping – Protect our Bay and Ocean".			
Do you clean out your storm drains?	Clean private catch basins once a year, before the first rain. Regularly check and maintain storm drain openings and basins that are located on your property. Keep litter, debris and soil away from storm drains. Clean parking lots using dry methods such as sweeping or using equipment that collects dirty water, which must be disposed of in sanitary sewer.			
Do you enforce proper sewage management?	Enforce existing local, state and federal regulations applicable to marine sanitation devices and illegal discharge of boat sewage.			
Do you have signs posted at areas at risk of contamination?	Post signs at trouble spots (e.g. loading docks, dumpster areas, outside hoses or drains) describing proper practices.			

APPENDIX E:

Product Inventories of San Francisco Maritime Businesses

In 2010, data was collected from the product inventories of nine different maritime businesses in San Francisco in late 2010. The sample includes: four ferry companies, two maritime transporters, one maritime service provider, one boatyard, and one marina. The following is a list of products and their ingredients as specified by the MSDS or other labeling. The ingredients in different colors indicate that it is a chemical of concern - a known or suspected pollutant, carcinogen, neurotoxin, or endocrine disruptor.

Product Category	Product Name	Ingredients as listed on the MSDS or labeling
acrylic basecoat	SP97 Multi-purpose Waterbase Basecoat	ethylene glycol monobutyl ether
acrylic epoxy	Ameron Amercoat 2290 Haze Gray	unknown or discontinued
acrylic urethane	U.S. Paint Corporation Activator A0031 High Solids Brushing Activator	methyl amyl ketone, ethyl 3-ethoxypropionate, 2,4,-pentanedione, 2-butoxyethyl acetate
acrylic urethane	U.S. Paint Corporation Awl-Brite Plus Converter J3006	hexane, 1,6-diisocyanato-,homopolymer, ethyl 3-ethoxypropionate, hexamethylene diisocyanate
adhesive	3M Contact 80 Neoprene Adhesive	methyl acetate, dimethyl ether, cyclohexane, nonvolatile components trade secret, toluene
adhesive	3M Hi-Tack 76 Spray Adhesive	dimethyl ether, methyl acetate, nonvolatile components trade secret, cyclohexane, 1,1,-difluoroethane, petroleum naphtha, light petroleum distillates, methyl alcohol
adhesive	3M Super 77 Multipurpose Spray Adhesive	acetone, propane, 2-methylpentane, 3-methylpentane, cyclohexane, 2,2-dimethylbutane, hexane
adhesive	3M Super Trim Adhesive	methyl acetate, dimethyl ether, cyclohexane, toluene, hydrotreated heavy naphtha, petroleum, zinc oxide
adhesive - gasket	NAPA Permatex High Tack Spray-A-Gasket	butane, acetone, propane, dichloromethane, ethyl acetate, solvent naphtha
adhesive - spray	CAT General Purpose Spray Adhesive 222-3113	methyl acetate, toluene, propane, butane, proprietary resin, butyl benzyl phthalate
adhesive filler	West System 403 Microfibers Adhesive Filler	silicone dioxide
adhesive filler	West System 406 Colloidal Silica Adhesive Filler	silicone dioxide
alcohol appliance fuel, marine stove fuel	Sunnyside Denatured Alcohol Solvent Shellac Thinner	ethyl alcohol, ethyl acetate, solvent naphtha (petroleum) light aliph., methyl isobutyl ketone, methyl alcohol
alkyd gloss finish	International Interlac 655 Black CLY999	carbon black, barium sulfate, Stoddard solvent, petroleum distillates,
aluminum cleaner	Henkel Technologies Alumiprep 33	phosphoric acid, 2-butoxyethanol, surfactant, potassium phosphate, hydrogen fluoride
aluminum coating	Henkel Surface Technologies Alodine 1201	chromic acid, cyanide compound
anti-corrosion	Evinrude Johnson Anti-corrosion spray	unknown or discontinued
anti-corrosion	Lear Chemical Corrosion Block	tetrafluoroethane 1,1,1,2 (propellant)

anti-corrosion	Z Spar A-788 Splash Zone Compound	epoxy resin, talc, microcrystalline silica
antifreeze	Sierra Antifreeze/Coolant	propylene glycol, water, proprietary additives
anti-seize compound	Caterpillar Anti-seize compound 5P3931	petroleum distill., graphite, copper, calcium hydroxide, nitrous acid, sodium salt, silica crystalline
anti-seize compound	Lawson Nickel High-Temperature Anti-Seize & Lubricating Compound 59934	nickel, carbon, aluminum, synthetic grease, rust inhibitor
anti-skid	AwlGrip Griptex Additive 73013 Non Skid Particles	propylene
anti-skid	Interlux Interdeck Polyurethane Non-skid Finish Gray YJF684	carbon black, aluminum oxide, Stoddard solvent, potassium oxide, titanium dioxide, quartz, naphtha petroleum hydrodesulfurized heavy, solvent naphtha petroleum medium aliph.
anti-skid	Rust-Oleum Professional Anti-Slip Textured Coating	unknown or discontinued
anti-skid	Amercoat Anti-Slip Additive 886	pumice, silica quartz
anti-skid	Amercoat Anti-slip Additive 888	aluminum oxide aggregate
anti-skid	PPG Amercoat 888 Anti Slip Additive	pumice, silica quartz
anti-skid	Matson Floor Grip 222 Light Gray	petroleum distill.
battery protector	CRC Marine Battery Terminal Protector (Aerosol)	Petrolatum, Stoddard solvent, Heptane, Solvent-refined paraffinic distill., Xylene, n-Hexane, Ethylbenzene, Liquefied petroleum gas
battery protector	Gunk Battery Terminal Protector	butane, hydrocarbon fluid, propane
bearing mount	Caterpillar Bearing Mount 7M-7546	unknown or discontinued
bedding for joined parts	Dolfinite Marine Products 2005N Natural Bedding Compound	mica, crystalline silicon dioxide, mineral spirits
brake fluid	Johnsen's DOT 3 Brake Fluid	triethylene glycol ether
brake fluid	Johnsen's Heavy Duty Brake Fluid	alkylene glycols, alkylene glycol ethers
brake fluid	NAPA Heavy Duty Brake Fluid	unknown or discontinued
brushing converter	AwlGrip Awl-Cat#3 #3002 Brushing Topcoat Converter	ethyl 3-ethoxypropionate, hexamethylene diisocyanate homopolymer
cement	IPS Corporation, Weld-On 717 PVC, low VOC	tetrahydrofuran (THF), methyl ethyl ketone, cyclohexane
cement	ACE Lo VOC ABS Cement Medium Body Black	unknown or discontinued
cement	ACE Lo VOC Heavy Duty Cement Medium Body Grey	tetrahyde, methyl ethyl ketone, polyvinyl chloride resin, cyclohex, acetone, silicon dioxide
cement	ACE Lo VOC PVC Industrial Grade Medium Body	tetrahyde, methyl ethyl ketone, polyvinyl chloride resin, cyclohex, acetone, silicon dioxide
cement	CAT Cement 5H-2471	methylbenzene, hexane, acetone, methyl ethyl ketone, magnesium oxide, zinc oxide, 2,6-di-tert-butyl-p-cresonl, water, phenolic novolac resin, polychloroprene-2-chloro-1,3-butadiene polymers and copolymers
cement	Devcon Contact Cement	methyl ethyl ketone, solvent naphtha petroleum light aliph, n-hexane, methylcyclopentane, hexane isomers
cement - pipe	IPS Weld ON PVC 2717	polyvinyl chloride resin, tetrahydrofuran, methyl ethyl ketone, cyclohexanone
cement - pipe	Uni-Weld PVC Cement 1200	acetone, amorphous silica, cyclohexanone, methyl ethyl ketone, PVC Resin, tetrahydrofuran
cement for pipe fittings	Oatey Regular Clear PVC Cement	tetrahydrofuran, methyl ethyl ketone, acetone, pvc resin (non-hazardous), cyclohexanone

cement primer for plastic	ACE Lo VOC Purple Primer 4235909	acetone, methyl ethyl ketone, cyclohexanone, tetrahydrofuran
cement-pipe	ACE Lo VOC Wet or Dry PVC Cement	unknown or discontinued
cleaner	3M Citrus Base Cleaner	d-limonene, propane, nonionic surfactant mix
cleaner	Aldran Chemical Just Great II Non-Acid Rust Remover	ammonium hydrogendifluoride
cleaner	Aldran Chemical Quick & Easy	
cleaner	Armor All Multi-purpose Auto Cleaner	linear alcohol ethoxylates, n-propoxypropanol
cleaner	AwlGrip AwlWash Wash Down Concentrate 73234	none
cleaner	BALL Pull Up Extraction Cleaner	unknown or discontinued
cleaner	Magnaflux Spotcheck Cleaner/Remover SKC-S	Light aliph. solvent naphtha, carbon dioxide propellant
cleaner	Sprayon Environmental Contact Cleaner	heptane, ethanol, 2-propanol, methyl acetate, carbon dioxide
cleaner	Aldran Chemical - At Last	silica, microcrystalline, Pine Oil, Tall Oil Fatty Acid
cleaner	Four Monks White Distilled Vinegar	distilled vinegar
cleaner	Endust Dusting and Cleaning Spray Lemon Zest	isoparaffinic hydrocarbon, propane, 2-methyl-propane
cleaner	Aldran Chemical Liquid Dynamite	sodium hydroxide, sodium nitrate
cleaner - all purpose	Spartan All purpose orange tough	d-limonene, nonylphenol ethoxylate, alcohol ethoxylate
cleaner - all purpose	Kirkland Environmentally Friendly Multi-purpose Cleaner	cocamide DEA (from coconut oil), d-limonene
cleaner - all purpose	Simple Green All-Purpose Cleaner	undiluted 2-butoxyethanol (<4%)
cleaner - all purpose	Spic and Span	dimethyl benzyl ammonium chloride, dimethyl ethylbenzyl ammonium chloride, ethanol, monoethanolamine
cleaner - bathroom	Scrubbing Bubbles Bathroom Cleaner	water, diethylene glycol monobutyl ether, tetrasodium ethylene diamine, tetraacetate, alkyl dimethyl ethyl benzyl ammonium chloride, alkyl dimethyl benzyl ammonium chloride
cleaner - bathroom	Soft Scrub Bleach Clean Gel Cleanser Bathroom & Kitchen	water, sodium hypochlorite, lauramine oxide, soap (sodium tallowate, sodium cocoate, sodium palm kernelate, sodium palmate), sodium hydroxide, myristamine oxide, potassium iodide, fragrance, pigment green 7
cleaner - bathroom	Unisource Vortex Bathroom Cleaner	Isopropyl alcohol , N-alkyl dimethyl benzyl ammonium chlorides, N-alkyl dimethyl ethylbenzyl ammonium chlorides
cleaner - bathroom	Ajax Oxygen Beach Cleaner Heavy Duty Formula	calcium carbonate, crystalline silica
cleaner - battery	CRC Industrial Battery Cleaner #03176	sodium bicarbonate, water, 2-butoxy ethanol, detergent, propane, isobutane
cleaner - battery	CRC Marine Battery Cleaner #06023	water, sodium bicarbonate, liquefied petroleum gas, 2-butoxyethanol, detergent
cleaner - bilge	West Marine Citrus Bilge Cleaner	none listed
cleaner - bilge	West Marine Pure Oceans Citrus Bilge Cleaner	none listed
cleaner - bleach	PRO value bleach	sodium hypochlorite, sodium hydroxide
cleaner - bleach	Walgreens Bleach	sodium hypochlorite, sodium hydroxide
cleaner - boat soap	Boater's Edge Boat Wash	unknown

cleaner - boat soap	West Marine Boat Soap #245050	none listed
cleaner - boat soap	West Marine Heavy Duty Boat Soap 245068	alkyloxypolyetheleneoxyethanol, sodium metasilicate anhydrous
cleaner - brake	Gunk Ultra Low VOC Brake Cleaner	2-propanone, carbon dioxide
cleaner - brake	CRC Brakleen® Brake Parts Cleaner	tetrachloroethylene (PERC), carbon dioxide
cleaner - brake	Cyclo Brake & Parts Clean - Pro Strength, Non-chlorinated	acetone, toluene, carbon dioxide, heptane
cleaner - carpet	Bissell multi-allergen removal formula; carpet & upholstery	2-butoxyethanol, EDTA, tetrasodium salt, alkoxyated linear alcohol
cleaner - carpet	CarpetCare Spot, Odor & Stain Remover	unknown or discontinued
cleaner - carpet	Vista Solutions Carpet Care All-in-One Steam Cleaner	unknown or discontinued
cleaner - carpet	Star Brite Boat Carpet Cleaner	isopropyl alcohol
cleaner - carpet	Unisource Spot Lift Carpet Spot Remover #U23027	2-butoxyethanol, liquefied petroleum gas mixture, propane, n-butane, isobutane
cleaner - carpet	Zep-Assist Spray Type Carpet & Upholstery Shampoo	unknown or discontinued
cleaner - choke	CRC Marine Carb & Choke Cleaner	heptane isomers, acetone, carbon dioxide
cleaner - cooling system	Caterpillar Cooling System Cleaner 4C-4611	water, ethanol, 2,2',2"-nitrolis-,2-hydroxy-1,2,3-propanetricarboxylate, ammonium citrate
cleaner - degreaser	CRC Hydroforce Industrial Strength Cleaner/Degreaser	2-butoxyethanol, sodium metasilicate, sulfonate potassium, hydroxide, water, sodium xylene
cleaner - degreaser	Simple Green Concentrated Cleaner Degreaser Deodorizer	undiluted 2-butoxyethanol (<4%)
cleaner - degreaser	Aldran Chemical - Big O X	Citrus terpenes
cleaner - degreaser	All Star Solvent Cleaner & Degreaser Natural Citrus Based	monocyclic terpene, carbon dioxide
cleaner - degreaser	Chemtrol Twister Heavy Duty Degreaser U23090	potassium dodecylbenzene sulfonate, potassium hydroxide, dipropylene glycol methyl ether, ethyl alcohol
cleaner - degreaser	Tough Guy Citrus Cleaner/Degreaser	diethanolamine, glycerin, monoethanolamine, myrcene, d-limonene, ethyl alcohol
cleaner - degreaser	ZEP True Blitz Aerosol	acetone, heptane, ethanol, isopropyl alcohol
cleaner - degreaser	Goo Gone Pro Power Citrus Solvent GZ92	distill. (petroleum) hydrotreated light, tripropylene glycol methyl ether, citrus extracts blend
cleaner - degreaser	CRC Lectra-Clean Heavy Duty Electrical Parts Degreaser 02018	tetrachloroethylene (PERC), carbon dioxide
cleaner - degreaser	Aldran Chemical Dyna-Tar Citrus Special	d-limonene
cleaner - degreaser	ACE Acetone Epoxy & Fiberglass Thinner 12271	acetone
cleaner - dish soap	Kirkland Environmentally Friendly Liquid Dish Soap	water, plant-based cleaning agents, natural citrus scent, 100% biodegradable preservatives
cleaner - dish soap	Spartan Blue-Glo dish soap	sodium olefin sulfonate, sodium dodecyl benzene sulfonate, sodium lauryl ether sulfate
cleaner - dish soap & used as boat soap	Dawn Dishwashing Soap	unknown or discontinued

cleaner - disinfectant	One Step Cleaner Disinfectant	quaternary ammonium
cleaner - disinfectant	RMC (Rochester Midland Corporation) Byquat Cleaner Disinfectant Deodorant Fungicide	n-alkyl dimethyl benzylammonium chlorides -irritant, n-alkyl dimethyl ethylbenzylammonium chlorides -irritant, sodium bicarbonate, sodium tripolyphosphate, sodium hydroxide
cleaner - disinfectant	Aldran Chemical - One-Step	isopropyl alcohol, disinfectant liquid mixture BTC 2125M, containing active ingredients: n-alkyl dimethyl benzyl ammonium chloride, n-alkyl dimethyl ethyl benzyl ammonium chloride
cleaner - disinfectant	Chemtrol Action-D Disinfectant	didecyl dimethyl ammonium chloride, alkyl dimethyl benzyl ammonium chloride, octyl decyl dimethyl ammonium chloride
cleaner - disinfectant	Clorox Regular Bleach	sodium hypochlorite, sodium hydroxide
cleaner - disinfectant	One Step Detergent Disinfectant Lemon Fragrance	dimethyl benzyl ammonium chloride
cleaner - disinfectant	Comet	sodium hypochlorite, sodium hydroxide, Sodium Dichloro-S-triazinetriene Dihydrate
cleaner - disinfectant	Lysol disinfectant	ethanol, carbon dioxide
cleaner - disinfectant	Spartan PSQ Disinfectant Cleaner	dialkyl dimethyl ammonium chloride, alkyl dimethyl benzyl ammonium chloride, lauramine oxide, sodium carbonate, pine oil, sodium tripolyphosphate
cleaner - disinfectant	Sud 'N Kleen Foaming Aerosol Disinfectant Cleaner	didecyl dimethyl ammonium chloride, nonylphenol ethoxylate, disodium EDTA
cleaner - disinfectant	Unisource Action D Disinfectant Cleaner Deodorizer U23051	para-teritary amyphenol, ortho-phenyllphenol, ethyl alcohol, methanol, butane, propane
cleaner - disinfectant	Zep Venture II	diethylene glycol monoethyl ether, tetra sodium ethylenediamine tetraacetate, quaternary ammonium chlorides (blend of alkyl dimethylbenzyl ammonium chloride and alkyl dimethyl ethylbenzyl ammonium chlorides and alcohol)
cleaner - electrical	LPS CFC Free Electro Contact Cleaner 3116	2-methylpentane, 3-methylpentane, 2,3-dimethylbutane, 2,2-dimethylbutane, isopropanol, carbon dioxide, n-hexane
cleaner - electrical	CRC Contact Cleaner	decafluoropentane, methyl nonafluorisobutyl ether, methyl nonafluorobutyl ether, 1,1,1,2-tetrafluoroethane
cleaner - electrical	Lawson PowrOn Electronic Contact Cleaner 53858	dichlorofluoroethane, 2-propanol, carbon dioxide
cleaner - electrical	Zep Screen Clean Anti-Static Cleaner & Polish for Video Screens	ethanol, ethylene glycol monobutyl ether, hydrocarbon propellant (propane & isobutane)
cleaner - engine	Mercury Power Tune Engine Cleaner	oleic acid, methylisobutyl carbinol, 2-butoxyethanol, ammonia solution
cleaner - fiberglass	West Marine One Step Fiberglass Cleaner Wax Model 375147	unknown or discontinued
cleaner - floor	Bissell Floor Cleansing Formula For Deep Cleaning Machines	2-butoxyethanol, nonyl Phenoxypolyethoxyethanol (1999 MSDS)
cleaner - furniture	Bissell Fabric & Upholstery Cleaner Fabric-Safe Brush	unknown or discontinued
cleaner - gasket	SysteMatched Gasket Cleaning Compound	unknown or discontinued
cleaner - glass	Aldran Chemical-PDQ Glass & Mirror Cleaner	unknown: possibly discontinued
cleaner - glass	Spartan Fast and Easy Glass	propylene glycol n-propyl ether

cleaner - glass	Unisource Twenty to One Conc Glass Cleaner U22969	Isopropyl alcohol
cleaner - glass	BiRite Glass Brite	isopropyl alcohol, tetrasodium ethylene-diamine tetraacetate solution
cleaner - glass	Chemtrol Repsect Non-Ammoniated Glass Cleaner	sodium lauryl sulfate, ethyl alcohol
cleaner - glass	ZEP Glass Cleaner Commercial Concentrate	isopropyl alcohol, tetrasodium ethylenediamine tetraacetate
cleaner - hand soap	Permatex Fast Orange Hand Cleaner Pumice	water, pumice, d-limonene, ethoxylated alcohol, silica quartz
cleaner - hand soap	Santora Sales Pink Floral Lanolin Hand Cleaner	glycerin, fragrance, triclosan
cleaner - hand soap	Zep TKO Hand Cleaner	none listed
cleaner - hand soap	Pumicized Gent-L-Kleen Hand Cleaner	distillates (petroleum), naphtha, undeceth-7, undeceth-3, ethanolamine
cleaner - hand soap	Unisource Castile Pink Lotion Soap U22674	potassium oleate, potassium salt/mixed vegetable oils
cleaner - hull	Mary Kate On & Off Hull and Bottom Cleaner MK2032	water, hydrochloric acid, phosphoric acid, oxalic acid
cleaner - hull	Star Brite Sea Safe Hull Cleaner	Oxalic Acid, Propylene Glycol n-Methyl Ether 2-Propanol), water
cleaner - hull	West Marine EZ-On EZ-Off Extra Strength Hull & Bottom Cleaner	hydrochloric acid
cleaner - kitchen	409 Kitchen Cleaner Deep Cleaning	n-alkyl dimethyl benzylammonium chlorides, n-propoxypropanol, monoethanolamine
cleaner - laundry detergent	Kirkland Signature Laundry Detergent	naturally derived cleaning agents (palm and/or coconut based surfactants), naturally derived enzymes, natural anti-redposition agent, natural lavender scent
cleaner - liquid steam	Aldran Chemical Dyna Steam	sodium hydroxide, ethanolamine
cleaner - non skid deck	Starbrite Non-Skid Deck Cleaner w/ PTEF	1-(2-methoxy-2-methylethoxy)-2-propanol, isopropyl alcohol
cleaner - sail	Boatlife Sail Cleaner	unknown or discontinued
cleaner - sail	Davis Sail Bath #795	alkaline detergents
cleaner - splice and termination	CRC Cable Clean High Voltage Splice Cleaner	decafluoropentane, Cozol 103, Cozol 104, carbon dioxide
cleaner - steel	Unisource Satin Oil Based Stainless Steel Cleaner U22966v2	Methyl acetate, Acetone, Propane
cleaner - thin shellac based products	ACE Denatured Alcohol	methyl isobutyl ketone, ethyl acetate, rubber solvent?, ethyl alcohol, methanol
cleaner - tile	Aldran Chemical JB477 Porcelain & Tile Cleaner	phosphoric acid
cleaner - toilet	Comet	citric acid, dipropylene glycol butyl ether
cleaner - toilet bowl deodorant	Aldran Chemical - Big Bad Blue	Nonylphenol ethoxylate
cleaner - wipe down topcoats	AwlGrip Cleaner T0170 AwlPrep 400 Slow Evaporating Wipe Down S	1,2,4-trimethyl benzene, Stoddard solvent, petroleum distill. hydrotreated light, solvent naphtha (petroleum) light aliph.
cleaner and polish	Weiman Stainless steel cleaner and Polish	synthetic isoparaffinic hydrocarbon, white mineral oil, liquefied petroleum gas

cleaner, lubricant	WD-40 Aerosol, Smart Straw	aliph. hydrocarbon, petroleum baseoil; LVP aliph. hydrocarbons, carbon dioxide, surfactant
cleaner, thinner, solvent	Parks MEK Methyl Ethyl Ketone 2745	methyl ethyl ketone
coating	Sherwin-Williams Hi-Solids Polyurethane - Gloss, Ultra White	methyl n-Amyl ketone, cyclohexanone, quartz, titanium dioxide
coating	Z-Spar A-788 Splash Zone Compound (component A)	iron oxide, talc, epoxy resin
coating	Z-Spar A-788 Splash Zone Compound (component B)	Talc, 2,4,6-Tris(dimethyl amino) methyl phenol
coating - dock	Henderson's Marine Deck & Dock Coating Black 14-015	unknown or discontinued
color restorer	West Marine Heavy Duty Fiberglass Color Restorer Model 492546	unknown or discontinued
compressor oil	CRC Compressor Oil SAE 30	Heavy naphthenic distillate, Light Naphthenic distillate, Additive Package Proprietary Blend, Zinc alkyldithiophosphates
coolant	CAT Supplemental Coolant Additive (SCA) 3P-2044	sodium nitrite, boric acid, disodium salt, pentahydrate, sodium metasilicate, pentahydrate, sodium nitrate
coolant	Detroit Diesel Power Cool Plus 6000	unknown or discontinued
coolant	Peak All Weather Antifreeze Coolant	ethylene glycol, diethylene glycol, dipotassium phosphate
coolant	Peak Long Life Antifreeze Coolant	ethylene glycol, diethylene glycol
curing agent	Interlux Interspray 800 High Gloss Polyurethane Curing Agent YQA 803	aliph. polyisocyanate, xylene, petroleum distill., ester solvents
cutting fluid	LPS Tapmatic #1 Gold Cutting Fluid	distill. (petroleum) hydrotreated heavy, dipropylene glycol monobutyl ether, carbon dioxide
cutting fluid	Tap Magic Cutting Fluid	chlorinated paraffins, naphthenic oils, sulfurized paraffins, petroleum sulfonic acid salt, petroleum olefins
cutting oil	ACE Thread Cutting Oil	Highly Refined Petroleum Oil
deodorizer	Aldran Chemical Inc. R.O.C. Residual Odor Counteractant #1301	no known hazardous ingredients listed on MSDS
developer	Magnaflux Spotcheck Developer SK-S2	2-propanol, 2-propanone, isobutane, talc
electrical tape	Star Brite Liquid Electrical Tape	xylene, acetone, methyl ethyl ketone
enamel	ACE Rust Preventative Alkyd #16674 Quick Drying Enamel Fudge Brown	unknown or discontinued
enamel	Aerove Water based Acrylic Enamel	oxygenated hydrocarbons, <5% glycols and alcohols, acrylic modified alkyd
enamel	Ameron Amercoat 5450 Light Tint Alkyd Gloss Enamel	titanium dioxide, barium sulfate, Stoddard solvent, xylene, high flash naphtha, alkyd resin, 1,2,4-trimethylbenzene, odorless mineral spirits
enamel	Z Spar 89 Spar Buff Marine Enamel	unknown or discontinued
enamel	ACE Royal Hi Gloss 100% Acrylic Latex Enamel	ammonia, titanium dioxide, perm-yellow, iron III oxide, chromium III oxide, propylene glycol, ammonium hydroxide, amorphous silica, 2,2,4-trimethyl-1,3-pentanediolmonoisobutyrate
enamel	Millennium Spectra-Tone, Satin Latex Enamel	unknown or discontinued
enamel	Millennium Spectra-Touch Semi Gloss Enamel	unknown or discontinued
enamel	Rust-Oleum Alkyd Resin-High Gloss Enamel	mineral spirits, xylene

engine enamel	Dupli-color Engine Enamel	propane, butane, toluene, ethylbenzene, acetone, ethyl 3-ethoxypropionate, titanium dioxide
engine enamel	Tempo Marine Inboard/Outboard Engine Enamel	acetone, propane, xylene, butane, ethyl 3-ethoxypropionate, ethylacetate, ethylbenzene, methyl ethyl ketone
engine oil	Chevron Delo 400 LE SAE 15W-40	Highly Refined mineral oils, zinc dialkyldithiophosphate
engine tuner	Evinrude Johnson Engine Tuner 777185	unknown or discontinued
epoxy	Amercoat 235 Off White 235B3501 Resin	epoxy resin, epichlorohydrin, bis (2,3-epoxypropyl) ether, 1,2-epoxy-3-phenoxy, talc, silica crystalline-quartz, titanium dioxide, aluminum hydroxide, amorphous silica, mica, hydrocarbon resin, butyl alcohol, solvent naphtha, benzene, 1,2,4-trimethylbenzene, polyisocyanate resin, calcium carbonate, bisphenol A diglycidyl ether-bisphenol A copolymer, methyl n-amyl ketone
epoxy	Amercoat Clear Cure 235	alkylated phenolic polyamine, aromatic naphtha, n-butyl alcohol, ethylenediamine
epoxy	Ameron Amercoat DV235 Multipurpose Epoxy Black base 2359903	talc, mica group minerals, petroleum resins, butan-1-ol, solvent naphtha, 1,2,4-trimethylbenzene, phenol 4-(1,2,-dimethyl)-polymer with 2-(chloromethyl)oxirane and 4,4,-(1-methylethylidene)bis[phenol], heptan-2-one, mesitylene, carbon black, xylene isom
epoxy	PPG Amercoat 235 Clear Cure Multipurpose Epoxy	alkylated phenolic polyamine, aromatic naphtha, n-butyl alcohol, ethylenediamine
epoxy	PPG Ameron Amercoat 235B9903 Black Resin	magnesium silicate, epoxy resin, hydrocarbon resin, butyl alcohol, MICA, HF Naphtha, 1,2,4-trimethylbenzene, polyisocyanate resin, epoxy resin, methyl n-amyl ketone, carbon black
epoxy	Amercoat 235 Black 235B9903 Resin	magnesium silicate, epoxy resin, hydrocarbon resin, butyl alcohol, MICA, HF Naphtha, 1,2,4-trimethylbenzene, polyisocyanate resin, epoxy resin, methyl n-amyl ketone, carbon black
epoxy - multipurpose	PPG Americoat	butan-1-ol, 2-butoxyethanol, 2-dimethylaminoethanol
epoxy filler	International Intergard 822 Red EAA200	ethyl alcohol, iron oxide, oxirane, silica amorphous
epoxy primer	Z-Spar P-527 Strontium Chromate Epoxy Primer	unknown or discontinued
epoxy primer	International Intertuf 262 Converter KHA062	butanol, triethylene tetramine, fatty acids
epoxy primer - cure accelerator	AwlGrip Accelerator M3066 Cold Cure Accelerator for 545 Epoxy Primer	tri(dimethylaminomethyl)phenol, ethylbenzene, bis[(dimethylamino)methyl]phenol
epoxy reducer	Pro-Line Yacht Finishes Y18 Epoxy Reducer	unknown or discontinued
epoxy reducer	System Three Silvertip Marine Epoxy EZ Fillet Epoxy Part A/B	unknown or discontinued
epoxy resin	West System 105 Epoxy Resin	bisphenol-A type epoxy resin, benzyl alcohol, bisphenol-F type epoxy resin, ethylene glycol monobutyl ether

epoxy sealer	Smith & Co Clear Penetrating Epoxy Sealer	aromatic hydrocarbons, xylene , toluene , isopropyl alcohol, 2-butanone, 4-methyl 2-pentanone, 2-heptanone, 4-methyl 2-hexanone, dipropylene glycol monomethyl ether, diisobutyl ketone, ethyl acetate, isobutyl acetate, ethyl 3-ethoxy propionate, propylene glycol monomethyl ether acetate, hexyl acetate, isobutyl isobutyrate, diacetone alcohol, cyclohexanone
epoxy thinner	PPG Amercoat Thinner T-10	aluminum oxide, titanium oxide
fiberglass gel coat finish	91 Marine RV Meguiar's Power Cut Compound	medium aliph. naphtha , diethylene glycol ether, glycerin, isoparaffinic hydrocarbon
fiberglass primer	Interlux Fiberglass Primer AL 200	unknown or discontinued
fiberglass primer	Z Spar P-619 Non-Sanding Fiberglass primer	chromate compound, ketones, alcohols
fiberglass wash	Interlux 202 Fiberglass Solvent Wash	benzene 1,2,4-trimethyl, methylisobutyl ketone
fill seams	Interlux Seam Compound 30 Brown	limestone, xylene , iron oxide, tar pine, Wollastonite (Ca(SiO3)), silica cristobalite, quartz, petroleum distill. hydrotreated light, solvent naphtha petroleum medium aliph. , talc
fill seams	Interlux Seam Compound 31 White	xylene , barium sulfate, titanium dioxide, quartz, talc
filler	West System 407 Low-Density Fairing Filler	Phenol-formaldehyde resin, Expanded perlite, Silicon dioxide
filler	Evercoat Home Fix Universal Repair Filler	talc, polyester resin, calcium carbonate, styrene , magnesite, inert filler, crystalline silica
filler	Evercoat White Marine Filler	calcium carbonate, polyester resin, talc, styrene , titanium dioxide, magnesite, quartz
filler	MAS Epoxies Colloidal Silica	amorphous fumed silica
filler	West Marine Structural Filler	polyester resin, talc, styrene , magnesite, fiberglass strands
filler	West System 404 High-Density Filler	calcium metasilicate, treated fumed silica
filler	Evercoat Formula 27 All-Purpose Filler	calcium carbonate, talc, polyester resin (non-hazardous), styrene , magnesite, titanium dioxide, quartz,
filler - wood	MinWax Stainable Wood Filler	amorphous silica, calcium carbonate
filler stain	Z Spar Filler Stain various colors	unknown or discontinued
filling holes, gelcoat blisters	Interlux Watertite Epoxy Filler	p-tert-butyl phenol, aluminum oxide, m- xylene -alpha alpha-diamine, antigorite (Mg3H20(SiO4)2.H2O), titanium dioxide, tremolite, talc, anthophyllite, trimethylhexamethylenediamine, phenol 4-nonyl branched , silica amorphous fumed cryst-free
filling holes, imperfections	Interlux Surfacing Putty 257 White	isopropyl alcohol, acetone, butanone, methylbenzene , butyl acetate, limestone, titanium dioxide, cristobalite silica, quartz, talc
finish	3M Imperial Compound & Finishing Material	water, Stoddard solvent , aluminum oxide, poly(oxyethylene) sorbitan monostearate, white mineral oil (petroleum) , 1,2,4-trimethylbenzene, xylene , n-butyl acetate
finish	Devoe Devflex QD Quick Dry Acrylic Enamel Semi-Gloss 4206 QD	ethylene glycol, 2-butoxyethanol , diethylene glycol monobutyl ether, titanium dioxide, propylene glycol monooleate, iron oxide, clay, carbon black, aluminum hydroxide, styrene copolymer , yellow iron oxide, alkylaryl polyether, pigment yellow 74, petroleum
finish	Epifanes Woodfinish Matte	naphtha (petroleum) hydrotreated heavy
finish	Interlux Bilgekote Finish YMA102 White	silica amorphous, Stoddard solvent , titanium dioxide, aluminum hydroxide, solvent naphtha petroleum medium aliph.

finish	Interlux Brightside Polyurethane Premium Single Part Enamel 4359 White	naphthalene, ethylbenzene, amorphous silica, Stoddard solvent, titanium dioxide, petroleum distill. hydrotreated light, solvent naphtha petroleum medium aliph., naphtha petroleum heavy aromatic
finish	Interlux Perfection - Polyurethane Gloss Finish YHA198 Matterhorn White	propylene glycol monomethyl ether acetate, xylene, butoxyl, amorphous silica, titanium dioxide, aluminum hydroxide,
finish	Krylon Interior-Exterior Spray Paint	propane, butane, V.M.&P. naphtha, toluene, light aromatic hydrocarbons, 1,2,4-trimethylbenzene, acetone
finish	Minwax Wood Finish	mineral spirits, heavy naphthenic petroleum oil, highly refined naphthenic oil, talc, titanium dioxide, carbon black
finish	Minwax Tung Oil Finish	mineral spirits, cobalt 2-thylhexanoate
finish	Pressurized Finishes Matterhorn White AR11-W355A	acetone, propane, butane, titanium dioxide, mineral spirits, V.M.&P. naphtha, toluene, amorphous silica, ethyl-3-ethoxypropionate
finish	Pro-Line Yacht Finishes - Y20 Vinyl Rtardr	unknown or discontinued
finish	Rust-Oleum Metallic Finish Bright Coat	toluene, liquefied petroleum gas, hydrocarbon resin, xylene, alkyd resin, hydrotreated light distillate, acetone, copper compounds aluminum flake, ethylbenzene, magnesium silicate, Stoddard solvents, zinc
finish	Rust-Oleum Professional High Performance Protective Enamel White	mineral spirits, calcined aluminum silicate, titanium dioxide
finish	Rust-Oleum Stops Rust Protective Enamel Gloss Various Colors	mineral spirits, titanium dioxide, ethylbenzene
finish	Watco Danish Oil Finish Dark Walnut	mineral spirits, aromatic solvent 100, dipropylene glycol monomethyl ether, Stoddard solvent
finish	West Marine WoodPro Plus Semi-Gloss	naphtha hydrotreated heavy, petroleum naphtha, 2-butanone oxime, 1,2,4-trimethylbenzene
finish	Evercoat 100499 Automotive Fiberglass Resin Finish	polyester resin (non-hazardous), styrene, silica amorphous
finish	Varathane Spar Urethane water based clear gloss	dipropylene glycol monomethyl ether, methyl-n 2-pyrrolidone
finish	Dem-Kote Enamel Finish	toluol, acetone, glycol ether EP, SC-100 solvent, propane, phthalocyanine green, n-butane, titanium dioxide, xylene, ethylbenzene
finish	Interlux Brightside Polyurethane	silica amorphous, Stoddard solvent, titanium dioxide, aluminum hydroxide, Petroleum distill., Solvent naphtha (petroleum), Naphtha (petroleum), heavy
finish - topside	Interlux Premium Yacht Enamel 16 Endeavour Blue	naphthalene, kerosene, Stoddard solvent, titanium dioxide, petroleum distill. hydrotreated light, solvent naphtha petroleum medium aliph., naphtha petroleum heavy aromatic, talc
finish - urethane	Devco Devthane 379 HY Reach Orange	ethylbenzene, UV absorber, diisobutyl ketone, 2-butoxyethanol, butyl acetate, xylene, acrylic polymer, aliph. polyisocyanate, tert-butyl acetate, light aromatic solvent naphtha, castor oil, hexamethylene diisocyanate, oxo-heptyl acetate, pseudocumene
finish - wood	ACE Boiled Linseed Oil #1 1336	linseed oil, ?
finish - wood	Epifanes Woodfinish Gloss	naphtha petroleum, barium sulphate, butan-1-ol, p-mentha-1.4(8)-dien

finish - wood	Sikkens Cetol Marine	1,2,4-trimethylbenzene, ethylbenzene, xylene, Stoddard solvent, dipropylene glycol monomethyl ether, petroleum distill. hydrotreated light, naphtha, petroleum naphtha, silica gel, benzenepropanoic acid
finish - wood	U.S. Paint Corporation Awl-Brite Plus Clear Base J3005	ethyl 3-ethoxypropionate, methyl amyl ketone, butyl acetate, n-amyl propionate, xylene, ethylbenzene
finish - wood	Jasco Termin-8	Aliphatic petroleum distill., copper naphthenate: 8% copper and 8% fungicide
fogging oil	CRC Engine Stor Fogging Fluid	hydrotreated naphthenic distill., solvent-refined heavy paraffinic distillates, inhibitor blend, liquefied petroleum gas
fuel	Coleman Propane Fuel	Propane
fuel	Master Appliance Ultratane/Butane Fuel	isobutane, propane, butane
fuel	TurboTorch Map/Pro	propylene and propane
fuel additive	Biobor JF	Substituted dioxaborinanes, naphtha
fuel additive	Marvel Mystery Oil	naphthenic hydrocarbons, mineral spirits, chlorinated hydrocarbons
fuel additive	Biobor JF	substituted dioxaborinanes, naphtha, *2,2' - (1-methyltrimethylenedioxy) bis - (4-methyl-1, 3, 2-dioxaborinane); 2,2' - oxybis (4, 4, 6 - trimethyl-1, 3, 2-dioxaborinane)
fuel additive	Goldeagle Sta-bil concentrate	petroleum distill.
fuel stabilizer	Marine Formula Sta-bil Fuel Stabilizer	petroleum distill.
gear lubricant	Pride Multi-Purpose Grease #2	petroleum hydrocarbon lubricant
gear oil	Valvoline VV831 High Performance Gear Oil SAE 80W-90	distill. petroleum hydrotreated heavy paraf.
gear oil	West Marine Hypoid 90 Lower Unit Model 3704616	unknown or discontinued
gear oil	Chevron Open gear	asphalt, highly refined mineral oil, graphite, molybdenum disulphide
glass treatment	RainX Original The invisible Windshield Wiper	ethanol/SD Alcohol 40, isopropanol, ethyl sulfate, polydimethylsiloxanes (silicon oil), silicic acid, siloxanes and silicones
hardener	West System 205 Fast Hardener	polyethylenepolyamine, reaction products of TETA w/Pheno/Formaldehyde, TETA, hydroxybenzene, reaction products of TETA & propylene oxide, TEPA
hardening accelerator	PPG Amercoat 861 Accelerator	2,4,6-tris(dimethylaminomethyl)phenol
hydraulic fluid	Royal Purple	base oil; synthetic additives with iso-paraffinic diluents
hydraulic oil	Chevron Clarity Hydraulic Oil AW	highly refined mineral oil
lacquer thinner	ACE Lacquer Thinner 12784	quaternary ammonium salt, rosin acid, styrene/butadiene copolymer
lighter fluid	Safeway odorless, charcoal lighter fluid	aliph. hydrocarbons
liquid gasket	Caterpillar Liquid Gasket Material 7M7260	1,1,1-trichloroethane
lock fluid	Lock-ease Graphited Lock Fluid	Stoddard solvent, dripless base compound, graphite
lubricant	3-in-1 Multipurpose Oil	severely hydrotreated heavy naphthenic oil, proprietary additive
lubricant	Ace Pure Silicone Lubricant	propane, hexane, isohexane isomers, 3-methyl pentane, 2-3-dimethylbutane, cyclohexane, acetone

lubricant	Boeshield T-9 Rust & Corrosion Protection Waterproof Lube	petroleum distillate, white mineral oil, propane, butane
lubricant	CAT Light Penetrating and Lubricating Oil 222-3123	Stoddard solvent, proprietary oil, acetone, 1,3,5-trimethylbenzene, proprietary additive, pseudocumene, xylene, proprietary oil
lubricant	Coilhose Pneumatics Air Tool lubricant ATL 016	petroleum based lubricating oil, butylated hydroxytoluene
lubricant	CorrosionX	proprietary, no reportable ingredients
lubricant	CRC Heavy Duty Silicone Multi-Use Lubricant	heptane isomers, acetone, polydimethylsiloxane, liquefied petroleum gas
lubricant	CRC Industrial Technical Grade 3-36 #030003	petroleum distill., white mineral oil, butyl stearate, fatty acid ester, carbon dioxide
lubricant	Ease-On Pipe Joint Lubricant	no hazardous materials
lubricant	Evinrude Outboard lubricant	unknown or discontinued
lubricant	Fehr Penetrating Oil	tetrachloroethylene, petroleum distillate, carbon dioxide, sorbitan monoleate, methyl silicylate
lubricant	Kano Laboratories AeroKroil	severely hydrotreated petroleum distill., light petroleum distill., aliph. alcohols, glycol ether, proprietary ingredients, carbon dioxide propellant
lubricant	Lawson Protecting Agent 90401	mineral spirits, butane, unknown additive, hexane, isohexane, propane, 2-butoxyethanol
lubricant	Lawson Tef-Gel Penetrating Gel Gear Lubricant with P.T.F.E. 97673	hexane, olefin polymer, propane/isobutane/n-butane, tetrafluoroethylene
lubricant	LPS 2 Heavy Duty Lubricant	distill. (petroleum), hydrotreated light, mineral seal (petroleum) oil, carbon dioxide
lubricant	Lubrimatic Multipurpose Lithium Grease	lubricating oils, petroleum, base oils highly refined
lubricant	McLube Sailkote	heptane, ethyl alcohol, toluene, isopropyl alcohol, dimethyl ether, n-butane
lubricant	Mobil Rarus 427 Air Compressor Oil	petroleum hydrocarbons and additives
lubricant	Never-Seez Anti-Seize and Lubricating Compound	copper powder, aluminum
lubricant	Permatex Anti-Seize Lubricant	distill. (petroleum), calcium oxide, aluminum powder, graphite, mineral oil
lubricant	Sprayon Lubricant S00777	mineral spirits, mineral oil, paraffinic mineral oil, 2-methoxymethylethoxypropanol, carbon dioxide calcium carbonate
lubricant	TIF Lubrilink 8175 Chain & Cable Lube	petroleum distillate, isobutane/propane blend, petroleum oil mix
lubricant	Tri-Flow Superior Lubricant	propane, butane, heavy aliph. solvent, heavy naphthenic petroleum oil, naphthenic oil, heavy paraffinic oil, 2-methoxymethylethoxypropanol, amyl acetate
lubricant	Unisource Lubri-can Penetrating Lubricant	Synthetic Isoparaffinic Hydrocarbon, 2-Butoxyethanol, Hydrotreated Heavy Naphthenic Distillate, Paraffin Wax, Propane,
lubricant	CRC White Lithium Grease	2-methylpentane, distill., liquefied petroleum (LPG), zinc oxide, heavy body cements
lubricant - dry film	CRC Industrial Dry Moly Lube	propane, butane, heptane, mineral spirits, 2-propanol, acetone, molybdenum disulfide
lubricant - dry film	Lawson Tef-Coat Lube	propane, butane, heptane, 2-propanol, tetrafluoroethene polymer

lubricant & penetrant (aerosol)	Zep 45 NC Aerosol	light aromatic naphtha, light aliph. naphtha, paraffin oil, ethanol, 1,2,4-trimethylbenzene, mineral seal oil, amylacetate blend, diethylene glycol monobutyl ether, carbon dioxide
lubricant (chain)	PJI	unknown
lubricant, degreaser	SprayOn Electrical Cleaner	trichloroethylene, carbon dioxide
lubricant, petroleum cleaner	SeaFoam Deep	pale oil, low odor base solvent, IPA, carbon dioxide
lubricant, rust protector	Certified Laboratories Certified Free	petroleum distill.
marking chalk	Strait-Line Marking Chalk Blue 94901	sodium aluminum, sulfosilicate, pigment blue 29
metal finish	Rust-Oleum Hammered	acetone, liquefied petroleum gas, naphtha, xylene, ethylene glycol monobutyl ether, ethylbenzene
metal finish	Rust-Oleum Protective Enamel Aluminum	Stoddard solvents, hydrotreated light distillate, aluminum flake, xylene, ethylbenzene
metal primer	Blue Water Commercial Marine Rusty Metal Primer	phenolic resin, titanium dioxide, talc, calcium carbonate, aromatic hydrocarbons
metal primer	Corroseal Rust Converting Metal Primer	diethylene glycol ethyl ether acetate, gallic acid, ethylene glycol
metal primer	Rust-Oleum Clean Metal Primer	liquefied petroleum gas, aliph. hydrocarbon, magnesium silicate, titanium dioxide, xylene, mineral spirits, n-butyl acetate, acetone, ethylbenzene, zinc phosphate, quartz
motor oil	Castrol GTX 5W-20	base oil - highly refined
motor oil	Chevron 4 Supreme Motor Oil SAE 5W-30	highly refined mineral oil
motor oil	Chevron Delo 400 SAE 30	highly refined mineral oil, zinc dialkyldithiophosphate
motor oil	Peak Performance Motor Oil SAE 10W-30	petroleum lubricating oil, zinc compounds
motor oil	Peak Performance Motor Oil SAE 5W-30	petroleum lubricating oil, zinc compounds
motor oil	Pennzoil SAE 10W-30 Motor Oil	unknown or discontinued
paint	ACE Oil Based Primer 218A100 White	kerosene (petroleum) hydrotreated mineral spirits, 2-propoxyethanol
paint	Aervoe Rust Roofing Paint	aliph. hydrocarbon, aliph. petroleum distill.
paint	Amercoat Amersshield Cure AM-B/04 formerly ASHC0000	hexane-1,6-di isocyanate polymer, n-butyl acetate, aromatic naphtha, 1,2,4-trimethyl benzene, hexamethylene-di-isocyanate, xylene
paint	AwlGrip G5002 Flag Blue Paint	ethylbenzene, propylene glycol monomethyl ether acetate, diisobutylketone, xylenes, carbon black, titanium dioxide, 2 heptanone 4,6-dimethyl, 2-propanol 1-methoxy propanoate
paint	AwlGrip G8001 Pure White Linear Polyurethane Top Coat	diisobutyl ketone, propylene glycol monoethyl ether acetate, xylene, ethylene glycol, monoethyl ether acetate, barium sulfate
paint	AwlGrip H1021 Bright Aluminum Paint	ethylbenzene, propylene glycol monomethyl ether acetate, diisobutylketone, 2-ethoxyethyl acetate, xylene, 2-heptanone 4,6-dimethyl, petroleum naphtha
paint	AwlGrip Polyester Urethane Topcoat base G5003 Aristo Blue	ethylbenzene, propylene glycol monomethyl ether acetate, diisobutylketone, 2-ethoxyethyl acetate, xylene, titanium dioxide, 2-heptanone 4,6-dimethyl, petroleum naphtha
paint	Benjamin Moore Regal 100% Acrylic Semi-Gloss Finish Deep Base N333	titanium dioxide, kaolin, carbon black, diethylene glycol monomethyl ether, silica amorphous

paint	Benjamin Moore Super Hide Latex Flat Pastel Base 282103	water, calcium carbonate, titanium dioxide, latex resin, silica crystalline
paint	CAT Yellow Primer Paint Aerosol 4C-4205	acetone, propane, methyl ethyl ketone, naphtha, talc, Stoddard solvent, isobutyl alcohol, petroleum distill., ethyl-3-ethoxypropionate, titanium dioxide, zinc oxide, ethylbenzene
paint	Caterpillar White Paint 4C-4203	pigments, ethylbenzene
paint	Caterpillar Yellow Paint 4C-4200 (?)	acetone, toluene, propane, butane, xylene (mix)
paint	Chicago Metallic Touch-Up Spray	acetone, propane, toluene, xylene, methyl ethyl ketone, PM acetate, n-butane
paint	Devoe Bar-Ox 452 Neutral Tint	xylene, ethylbenzene, butyl alcohol, methyl n-amyl ketone, silica, high flash naphtha, alkyd resin, 1,2,4-trimethylbenzene, odorless mineral spirits, barium sulfate
paint	Douglas & Sturgess Inc. Cadmium Light Orange	cadmium sulfide, cadmium selenide, barium sulfate, zinc sulfide
paint	Interlux Micron Extra Blue 5690	1,2,4-trimethylbenzene, ethylbenzene, 1,3,5-trimethylbenzene, zinc oxide, copper oxide, xylenes, rosin, titanium dioxide, butyl-n-cyclopropyl-6-(methylthio)-1,3,5-triazine, petroleum naphtha, phenol isopropylated phosphate
paint	Kelly-Moore Paints Acry-Tred 1350-222 Medium Base	titanium dioxide
paint	Krylon Epoxy Enamel	propane, butane, toluene, acetone, n-butyl acetate, carbon black
paint	Krylon Fusion for Plastic	propane, butane, V.M.&P. Naphtha, toluene, ethylbenzene, xylene, acetone, methyl isobutyl ketone, titanium dioxide
paint	Mercury Phantom Black Spray Paint	toluol, methyl isobutyl ketone, acrylic resin, ethyl 3-ethoxypropionate, methyl ethyl ketone, ethyl alcohol, inert material (no Gas number), nitrocellulose, butylbenzylphthalate
paint	Moeller Engine Paint 25350 Mercury Phantom Black	needs to be requested from customer for viewing
paint	Pettit Marine Paint Easyoxy Single Component Polyurethane Topside Paint 3237 Electric Blue	calcium carbonate, titanium dioxide, kerosene, mineral spirits
paint	Plasti-kote Body Shop Paint 1001 Bright Silver Metal	unknown or discontinued
paint	PPG Amercoat 185H Gray	calcium carbonate, alkyd resin, V.M.&P. naphtha, xylene, titanium dioxide, carbon black, quartz, methyl propyl ketone, ethylbenzene
paint	PSX Engineered Siloxane 1001 Deep tint	titanium dioxide, alumino silicate, xylene, high flash naphtha, acrylic resin, 1,2,4-trimethylbenzene, ethyl benzene
paint	PSX Engineered Siloxane 1001 White	titanium dioxide, proprietary silicone, xylene, solvent naphtha petroleum light aromatic, nepheline syenite, 1,2,4-trimethylbenzene, ethylbenzene, proprietary silane, m-xylene, aluminum oxide, p-xylene, mesitylene, methanol
paint	PSX Siloxane 1001 Golden Yellow F/S 13697	titanium dioxide, alumino silicate, xylene, high flash naphtha, acrylic resin, 1,2,4-trimethylbenzene, ethyl benzene
paint	Rust-Oleum Professional High Performance Enamel Black	liquefied petroleum gas, acetone, alkyd resin, n-butyl acetate, xylene, methyl ethyl ketone, ethylbenzene, carbon black
paint	Pettit Marine Paint 100 Gloss White Marine Enamel	ethylbenzene, propylene glycol mono methyl ether, PM acetate, toluene, Methyl N-amyl ketone, butyl cellosolve acetate, epoxy resin, formaldehyde, N-butyl alcohol, Aluminum, mineral spirits

paint	Pettit Marine Paint Bottom Prep 6998 Skip Sand Primer	ethylbenzene, propylene glycol mono methyl ether, PM acetate, toluene, Methyl N-amyl ketone, butyl cellosolve acetate, epoxy resin, formaldehyde, n-butyl alcohol, aluminum, mineral spirits
paint	Moeller Zinc Chromate Primer Yellow 025421	unknown or discontinued
paint	Rust-Oleum Corporation Painter's Touch	acetone, liquefied petroleum gas, toluene, n-butyl acetate, methyl N-amyl ketone, xylene, ethyl benzene, ethylene glycol monobutyl ether
paint	Cat Matterhorn White Paint Aerosol	acetone, propane, titanium dioxide, solvent naphtha, butane, toluene, ethylbenzene
paint	Loctite Color Guard Tough Rubber Coating	propane, light aliphatic solvent naphtha, xylene, n-heptane, butane, ethylbenzene, methyl n-amyl ketone, carbon black
paint	Rust-Oleum High Performance Enamel Gloss White	liquefied petroleum gas, acetone, alkyd resin, titanium dioxide, n-butyl acetate, xylene, ethylbenzene, propylene glycol monobutyl ether, calcined aluminum silicate
paint	Rust-Oleum High Performance Enamel Yellow	liquefied petroleum gas, acetone, n-butyl acetate, xylene, titanium dioxide, methyl ethyl ketone, ethylbenzene, pigment yellow 17, propylene glycol monobutyl ether, petr. Distillates
paint	Rust-Oleum High Performance Enamel Safety Red	acetone, liquefied petroleum gas, alkyd resin, xylene, n-butyl acetate, ethylbenzene, toluene, propylene glycol monobutyl ether
paint	Pettit Marine Paint EasyEpoxy Single Component Polyurethane Topside Paint 3801 Black	calcium carbonate, titanium dioxide, talc, aluminum hydroxide, mineral spirits, amorphous, silicone, kerosene
paint	Zero-Rust 28-71 Safety Yellow	solvent naphtha (petroleum) light aromatic, normal butyl acetate, methyl propyl ketone, xylene
paint - antifouling	Blue Water Marine Paint Copper Pro SCX 67 8101 Newport Beach Royal Blue	cuprous oxide, irgaraol 1051, aromatic naphtha, titanium dioxide, silica
paint - antifouling	Interlux Micron 5694 Extra Shark White	1,2,4-trimethylbenzene, ethylbenzene, copper oxide (Cu2O), xylene, rosin, titanium dioxide, butyl-n-cyclopropyl-6-(methylthio)-1,3,5-triazine, petroleum naphtha light aromatic, phenol isopropylated phosphate
paint - antifouling	Interlux Micron 66 YBA063 Black	n-butyl alcohol, methylisobutyl ketone, zinc oxide, copper (+1) oxide, xylene, zinc pyrithione, naphtha petroleum heavy aromatic, acrylic polymer chelates of copper
paint - antifouling	Interlux Trilux 33 Antifouling Paint YBA063 Black	acetone, ethylbenzene, thiocyanic acid copper (1+) salt, zinc oxide, xylene, carbon black, ethyltoluenesulfonamide, rosin, zinc pyrithione, liquefied petroleum gas
paint - antifouling	Interlux Ultra Black 3779F	ethylbenzene, copper oxide, xylene, carbon black, copper rosin, butyl-n-cyclopropyl-6-(methylthio)-1,3,5-triazine, glass oxide chemicals
paint - antifouling	Interlux Ultra Red 3449F	ethylbenzene, iron oxide, copper oxide, xylene, rosin, butyl-n-cyclopropyl-6-(methylthio)-1,3,5-triazine, glass oxide chemicals
paint - antifouling	Interlux Ultra-Kote 2779N Black	1,2,4-trimethylbenzene, ethylbenzene, zinc oxide, copper oxide, xylene, carbon black, copper, rosin, petroleum naphtha light aromatic
paint - antifouling	Petit Easy Epoxy hydrocoat	ethylene glycol monobutyl, cuprous oxide, kaolin, titanium dioxide, barium sulfate
paint - antifouling	Pettit Marine Paint Ablative Copper Polymer 1670 Red	cuprous oxide

paint - antifouling	Pettit Marine Paint Trinidad Anti Fouling 1875 Black	epoxy ether, ethylbenzene, cupric oxides, cuprous oxides, carbon black, petroleum distill., copper, naphthalene, dibutyl phthalates, 1,2,4 Trimethylbenzene
paint - antifouling	Pettit Marine Paint Trinidad Anti Fouling Bottom Paint Pro various colors	ethylbenzene, cuprous oxides, titanium dioxide, petroleum distill., copper, naphthalene
paint - antifouling	Sea Hawk Yacht Finishes AF33 Antifouling Paint 3345 Black	Linseed Oil, Hydrotreated Light distill. (petroleum) [Hydrotreated Kerosene]
paint - antifouling	Sea Hawk Yacht finishes Sharkskin Antifouling Paint 6142 Blue	aromatic carbon, ethylbenzene, carbon black, cupric oxide, mineral spirits, cuprous oxide
paint - antifouling	Z Spar Supertox TF Hard Type Antifouling Paint B-70 Red	unknown or discontinued
paint - antifouling	Z Spar The Protector Hard Type Antifouling Paint B-91 Blue	unknown or discontinued
paint - engine	Moeller Engine Paint 025340 Chrysler Blue	unknown or discontinued
paint - marking	Rust-Oleum Hard Hat Marking Paint	liquefied petroleum gas, toluene, xylene, ethylbenzene, titanium dioxide, 2-butoxyethanol
paint - motor	Tempo Marine Motor Paint Evinrude Blue Metallic #020483	unknown or discontinued
paint - motor	Tempo Marine Motor Paint Silver 1983-86 Model 6962	unknown or discontinued
paint - motor	Tempo Marine Motor Paint Silver 1983-86 Model 6962	unknown or discontinued
paint - slow drying reducer	US Paint Reducer T0031 Slow Drying Topcoat Brush Reducer	ethylene glycol monobutyl ether acetate
paint - spray	Aerovoe Hi-heat Spray Paint	acetone, hydrocarbon propellant, xylene, solvent naphtha (petroleum) light aliph.
paint - spray	Grainger Dem-Kote Gloss Black	propane, acetone, toluene, n-butane, VM&P naphtha, mineral spirits, isopropyl alcohol
paint - spray	Krylon Interior Exterior Spray Paint	toluene, xylene, petroleum distill.
paint - striping	Krylon Solvent-based Upside Down Striping Paint	propane, butane, hexane, isohexane isomers, VM&P naphtha, toluene, ethylbenzene, xylene, methanol, acetone, talc, calcium carbonate, barium sulfate, titanium dioxide, carbon black
paint - touchup & machine	Krylon Farm an Implement Paint (Red) they have different colors	propane, butane, toluene, ethylbenzene, acetone, ethyl 3-ethoxypropionate, titanium dioxide
paint - traffic	Spectra-Tone 100% Acrylic Traffic Paint T-6 Black	unknown or discontinued
paint - transducer	Pettit Marine Paint Transducer Paint 1793	toluene, mineral spirits, liquefied petroleum gas
paint - vinyl bottom	Interlux 355 Viny-Lux Solvent	ethylbenzene, methylisobutyl ketone, diacetone alcohol, xylene
paint drier	Parks Japan Drier	unknown or discontinued
paint finish	Armor All Armor Plate Paint Protectant	silicone emulsion solution, methoxytriglycol, water
paint prep	Amercoat 12 Cleaner	toluene, acetone
penetrant	Gunk Liquid Wrench Super Penetrant	2-butoxyethanol, naphthenic petroleum distill.ic petroleum distill., natural methyl ester, refined soybean oil
penetrant	Magnaflux Spotcheck Penetrant SKL-SP1	white mineral oil (petroleum), phthalic esters, liquefied petroleum gasses

penetrant, rust inhibitor, lubricant	PB Blaster Penetrating Catalyst	solvent naphtha petroleum heavy arom., distill. petroleum hydrotreated lig., distillates petroleum solvent-dewaxed, alcohols C11-15-secondary ethoxylated
pipe fitting	ACE PVC Industrial Grade	unknown or discontinued
pipe sealant	AST-PPD Plumber's Pipe Dope	petroleum oil, kaolin clay, calcium carbonate
pipe thread compound	Whitlam Blue Magic Industrial Grade Pipe Thread Compound	isopropyl alcohol, ethylene glycol
pipe thread sealant	Rectorseal Slow Dry Soft Set 5 Pipe Thread Sealant	diacetone alcohol
pipe thread sealant	Rectorseal TPlus2	none listed
pipe thread sealant	Rectorseal Tru-Blu Pipe Thread Sealant	diacetone alcohol
polish	Star Brite Premium Polish with PTEF	hydrotreated light distill., kerosene, kaolin, isopropyl alcohol, Stoddard solvent, dimethoxysilyldimethyl Aminoethylaminopropyl silicone
polish	Aldran Chemical Hi Gloss Vehicle Polish	water, petroleum distillates, carnauba wax
polish - boat	West Marine Premium Boat Polish with PTEF	unknown or discontinued
polish - floor	BALL Perflexion Floor Finish	unknown or discontinued
polish - furniture	BALL Lemon-Up Furniture Polish	unknown or discontinued
polish - metal	Flitz Polish Liquid	aliph. hydrocarbons, alumina, diatomite
polish - metal	Sea Power Metal Polish	ammonia
polyurethane coating	Ameron Amershield Cure aliph. Polyurethane AMSHC0000	aliph. polyisocyanate, butyl acetate, high flash naphtha, 1,2,4-trimethyl benzene
polyurethane finish	International Interthane Black 990HS	1,2,4-trimethylbenzene, methyl n-amyl ketone, butyl acetate, ethyl 3-ethoxypropionate, kaolin, carbon black, petroleum naphtha, acrylic copolymer
primer	AwlGrip Primer Converter D3001	butanone, propylene glycol monomethyl ether acetate, methylbenzene, butyl acetate, polymer of epoxy resin and bisphenol A
primer	AwlGrip Primer Converter D9001	propylene glycol monomethyl ether acetate, butyl acetate, limestone, xylene, 1-butoxy-2-propanol, titanium dioxide, talc, bisphenol A-Epichlorohydrin polymer
primer	AwlGrip Primer D8001 545 Epoxy Primer White Base	isopropyl alcohol, butanol, butanone, ethylbenzene, propylene glycol monomethyl ether, butyl acetate, limestone, xylene, kaolin, trizinc diphosphate, titanium dioxide, quartz, fatty acids c18-unsaturated dimers polymers with TA, talc
primer	Interlux Brightside Pre-Kote Primer 4279 White	silica amorphous, Stoddard solvent, titanium dioxide, aluminum hydroxide, nepheline syenite, petroleum distill. hydrotreated light, glass oxide chemicals, silica amorphous fumed crystalline free
primer	Interlux Epoxy Primekote (formerly Epoxy Barrier-Kote) 404 Base	1,2,4-trimethylbenzene, ethylbenzene, 1,3,5-trimethylbenzene, methyl isoamyl ketone, xylene, mica, titanium dioxide, quartz, polymer of epoxy resin and bisphenol A, petroleum naphtha light aromatic, silica amorphous fumed cryst-free, talc
primer	PPG Speedhide Exterior Wood Primer	unknown or discontinued
primer	Rust-Oleum Hard Auto Primer	xylene, toluene, and propellane (propane or butane)
primer	Zinsser Bulls Eye Odorless Primer Sealer Stain Killer	calcium carbonate, ethylene glycol, limestone, talc, titanium dioxide, zinc oxide

primer	Zinsser Cover Stain Primer Sealer Stain-Killer White	aliph. petroleum distill., limestone, magnesium aluminum silicate, mineral spirits, quartz, talc, titanium dioxide, VM&P naphtha
primer	Moeller Sandable Primer Platinum Gray 25740	unknown or discontinued
primer	International Interprime 198 Grey CPA098	butanol, naphthalene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, limestone, xylene, carbon black, barium sulfate, titanium dioxide, Wollastonite (Ca(SiO ₃)), quartz, naphtha
primer - latex	Glidden Interior Sped Satin Latex Satin Flat	propanoic acid, butyl ester polymer
primer - zinc	Ameron Dimetcote 302F Green Base	barium sulfate, cement, zinc dust, methyl n-amyl ketone, epoxy resin
primer - zinc	Ameron Dimetcote 302H Clear Converter	butyl alcohol, methyl n-amyl ketone, triethylene tetramine, polyamid resin, polyamide adduct
primer - zinc chromate	Moeller Zinc Chromate Primer Green 025472	unknown or discontinued
primer (aerosol)	Interlux Primocon Underwater Primer YPA985	pseudocumene, trimethylbenzene, magnesium carbonate, aluminum, Stoddard solvent, petroleum naphtha light aromatic, talc
primer for pipe fittings	ACE Purple Primer ACE 43625	unknown or discontinued
primer for pipe fittings	Oatey Lo-V.O.C. Purple Primer	methyl ethyl ketone, cyclohexanone, tetrahydrofuran, acetone
putty	ACE Plumber's Putty	unknown or discontinued
putty	Z Spar #2 White Glazing Putty Semi Paste	titanium oxide, talc, Stoddard solvent
radiator stop leak	Bar's Leaks Liquid Aluminum Radiator Stop Leak	methanol alcohol
remover	Formby's Wood Formula Paint & Poly Remover Wash	unknown or discontinued
remover	Goof Off The Ultimate Remover	acetone, hydrotreated light distillate, xylene, ethylbenzene, diethylene glycol monobutyl ether, liquefied petroleum gas sweetened
remover - adhesive	3M General Purpose Adhesive Cleaner 08984	xylene, nonane, octanes, ethylbenzene, toluene, benzene
remover - adhesive	3M Woodgrain & Stripe Adhesive Remover	acetone, hydrotreated light petroleum distill., methyl ethyl ketone, propane, synthetic amorphous silica fumed crystalline free, ethylene glycol
remover - adhesive	Jasco Semi-Paste Adhesive Remover	methylene chloride, methanol
remover - adhesive	Goof Off The Ultimate Remover	acetone, xylene, ethylbenzene, butyl carbitol, petroleum distill., toluene
remover - glue	Goof Off Glue Remover	acetone, petroleum, xylene, ethylbenzene, diethylene glycol monobutyl ether
remover - graffiti	Ameron Amerase Cleaner	n-methyl-2-pyrrolidone, surfactant, stearyl alcohol, pine oil
remover - paint	Jasco Premium Paint & Epoxy Remover	methylene chloride, methanol, Stoddard solvent
remover - paint/varnish	Aldran Chemical Graf-Off premoistened towels	Dimethyl Glutarate, Ethyl Lactate, Dimethyl Succinate, Dimethyl Adipate, Linear alcohol ethoxylate
remover - rust stain	ZEP Rust Remover	phosphoric acid

remover - rust stain	Star Brite Rust Stain Remover	oxalic acid, ethylene glycol n-butyl ether
remover - rust stain	Starbrite Rust Eater and Converter	phosphoric acid
remover - rust/primer	COMAR Phospho primer and rust remover	phosphoric acid
remover - scale	Aldran Chemical Super Ox Off	hydrochloric acid
remover - stain	Davis Fiberglass Stain Remover #790	isopropanol, oxalic acid
remover - stain	Star Brite Bird & Spider Stain Remover	dipropylene glycol methyl ether
remover- paint	Jasco Speedomatic Paint Remover Semi-Paste 0103	methylene chloride, methanol
repair gel coat blistering	Interlux InterProtect 2000E Gray Base	butanol, 1,2,4-trimethylbenzene, ethylbenzene, 1,3,5-trimethylbenzene, xylene carbon black, barium sulfate, mica, titanium dioxide, talc, quartz, polymer of epoxy resin and bisphenol A, petroleum naphtha light aromatic
resin	3M Marine Dual Purpose Resin	unsaturated vinyl ester resin, styrene monomer, synthetic amorphous silica crystalline free
resin	3M Marine Premium Filler	resin, styrene monomer, limestone, talc, filler-trade secret, glass bubbles, silica crystalline free, magnesium carbonate, titanium dioxide, quartz silica
resin	Ameron Amerlock 2/400 Light Tint Resin	acrylic resin polymer, titanium dioxide, parachlorobenzo trifluoride, calcium silicate, polyester resin, silica quartz, ethyl ethoxypropionate, oxohexyl acetate
resin	Ameron Amershield Black Resin	calcium black, calcium silicate, silica quartz, butyl acetate, oxohexyl acetate, ethyl ethoxypropionate, polystearate ester, polyester resin, acrylic resin polymer
resin	Ameron Amershield Black resin AMSHB90000	wollastonite (Ca(SiO3)), n-butyl acetate, polyester resin, carbon black, ethyl 3-ethoxypropionate, 2-butoxyethanol
resin	Ameron Amershield Light Tint Resin	wollastonite (Ca(SiO3)), n-butyl acetate, titanium dioxide, polyester resin, ethyl 3-ethoxypropionate, 1,2,3,4-tetrahydronaphthalene
resin	Ameron Amershield Neutral Tint Resin	calcium silicate, silica quartz, butyl acetate, oxohexyl acetate, ethyl ethoxypropionate, polystearate ester, polyester resin, acrylic resin polymer
resin	Ameron Amershield Pearl Grey Resin	titanium dioxide, calcium silicate, silica quartz, butyl acetate, oxohexyl acetate, ethyl ethoxypropionate, polystearate ester, polyester resin, acrylic resin polymer
Resin	Ameron Amershield White Resin aliph. Polyurethane	acrylic resin polymer, titanium dioxide, butyl acetate, polyester resin, calcium silicate, oxohexyl acetate, silica quartz, silica amorphous
resin	Seafit Premium Polyester Resin	styrene, polyester resin
resin	West Marine Polyester Boaters Resin	polyester resin, (non-hazardous), proprietary styrene, silica amorphous
resin primer	Ameron Amercoat 1000 Off White II	unknown or discontinued
rubber coating	Plasti-Dip Rubber Coating	propane, VM&P naphtha, heptane, n-butane, xylene, methyl ethyl ketone, methyl n-amyl ketone, ethylbenzene, carbon black
rubber/vinyl/plastic polish	Unisource Allstar Guard All Surface Protectant U22974	Alkoxyated alcohol, Glycerin, Dicoco alkyl dimethyl ammonium chloride

rust inhibitor	LPS 3 Rust Inhibitor	mineral spirits, petroleum oil, microcrystalline wax, calcium carbonate, aromatic hydrocarbon resin, carbon dioxide
rust inhibitor	Aldran Chemical - Just Great	Ammonium hydrogendifluoride
rust inhibitor	RMC AC 500 Acid Cleaner	phosphoric acid
rust inhibitor	Skyco Ospho Metal Treatment	phosphoric acid
rust inhibitor	LPS 3 Heavy Duty Rust Inhibitor	aliph. hydrocarbon, dipropylene glycol mono butyl ether, distill. petroleum, acetone, propylene glycol mono-n-butyl ether, carbon dioxide, light mineral spirits
rust preventative	Dunn-Edwards Paints Syn Lustro Rust Preventative Alkyd Semi-Gloss Enamel	propylene glycol monobutyl ether, texanol ester alcohol
rust preventative	Krylon Rust Tough Enamel	propane, butane, V. M. & P. Naphtha, toluene, ethylbenzene, xylene, acetone, Methyl Isobutyl Ketone, Titanium Dioxide
rust stopper enamel	Ace Indoor/Outdoor Rust Stop	petroleum distillate aliph., Stoddard solvent
rust-preventative paint	Rust-Oleum Stops Rust Protective Enamel various colors	mineral spirits, xylene, ethylbenzene, n-octadecylamine, methyl ethyl ketoxime, toluene
sealant	3M Marine Adhesive Sealant Fast Cure 5200 White	urethane polymer, titanium dioxide, fumed silica, zinc oxide, p,p'-methylene(phenyl isocyanate), diethylene glycol monoethyl ether acetate, alumina trihydratem alkyl isocyanate silane
sealant	CAT Liquid Gasket 138-8436	acetone, iron oxide
sealant	Permatex Aviation Form-A-Gasket Sealant Liquid	vegetable oil, rosin, 2-propanol, talc
sealant	Permatex High Tack Spray-A-Gasket Sealant	butane, acetone, propane, dichloromethane, ethyl acetate, solvent naphtha petroleum light aliph.
sealant	Touch 'n Foam Max Fill Maximum Expanding Sealant	flame retardant, polymethylene polyphenylene isocyanate, methylene bisphenyl isocyanate, polyol blend, isobutane, methylnediphenyl diisocyanate, propane, dimethyl ether
sealant	AwlGrip AwlCare Protective Polymer Sealer 73240	Stoddard solvent, dipropylene glycol monomethyl ether
sealant	CAT High Temperature Manifold Sealer 2P-2333	water, sodium silicate, iron, copper powder, chromium, nickel, zinc oxide, manganese
sealant foam	Evercoat Professional Sealant Foam	methylene bisphenyl isocyanate MDI, chlorofluoromethane, polyurethane resin
silicone coating	Midsun 579 Silprocoat Silicone Rubber Protective Coating	petroleum naphtha, amorphous silica, oximino silane, crystalline quartz
solvent	ACE Xylol Xylene Medium Strength Solvent	xylene, acetone, methyl ethyl ketone
solvent	Interlux 2316N Reducing Solvent for Spraying	butanone, methylbenzene, butyl acetate
solvent	Interlux 2333N Reducing Solvent for Spraying or Rolling	naphthalene, cyclohexanone, methyl n-amyl ketone, ethylene glycol monobutyl ether acetate, acetic acid C6-8 branched alkyl esters
solvent	Interlux 333 Brushing Liquid Solvent	kerosene, solvent naphtha (petroleum) medium aliph.
solvent	Interlux 433 Brush-Ease Solvent	1,2,4-trimethyl benzene, cumene, 1,3,5-trimethylbenzene, xylene, petroleum naphtha light aromatic
solvent	Interlux Interspray 800 YTA 810 Fast Drying Spray Solvent	toluene, methyl ethyl ketone, butyl acetate
solvent	Klean-Strip Odorless Mineral Spirits	petroleum distill.
solvent	Sherwin-Williams Seaguard Epoxy (Black)	1-Butanol, phenylmethanol, polyamine, talc, carbon black

starting fluid	CRC Jump Start Starting Fluid	diethyl ether, heptane, carbon dioxide, upper cylinder lubricant
starting fluid	Prime Blend Premium Starting Fluid	50% ether
starting fluid	Valvoline Extra Strength Starting Fluid	diethyl ether, naphtha hydrotreated light
steering fluid	Gold Eagle Power Steering Fluid	oil petroleum distill. solvent dewaxed heavy paraffinic
steering fluid	Prestone Power Steering Fluid + Leak Stop 2-in-1 Formula w/Conditioner	refined petroleum distill.
stove fuel, thinner, cleaner	Klean-Strip S-L-X Denatured Alcohol	ethyl alcohol, methanol, methyl isobutyl ketone
teak & wood - bleach	West Marine Oxalic Acid Model 244913	oxalic acid
teak brightener	Star Brite Premium Teak Brite	oxalic acid
teak cleaner	TE-KA Teak Wood Cleaner	phosphoric acid
teak oil	Star Brite Step 3 Premium Golden Teak Oil	Linseed Oil, Hydrotreated Light distill. (petroleum) [Hydrotreated Kerosene]
teak oil	West Marine Premium Gold Teak Oil Long Lasting Finish	unknown or discontinued
textile flooring	Lee's Neofloor Adhesive	no hazardous materials
thinner	Devoc T-10 Thinner	methyl n-amyl ketone, n-butyl alcohol, xylene
thinner	Epifanes Brush Thinner	distilled white spirits
thinner	Interlux 216 Special Thinner	ethylbenzene, xylene
thinner - lacquer	Klean-Strip Lacquer Thinner	methanol, acetone, methyl ethyl ketone, ethylene glycol n-butyl ether, ethyl acetate, toluene, light aliph. solvent naphtha
thinner - paint	ACE Paint Thinner	100% mineral spirits
thinner - paint	Klean-Strip Paint Thinner	Stoddard solvent
thinner - paint	Pettit Marine Paint Brushing / Spraying Thinner	xylene, trimethyl benzene, petroleum distill., petroleum naphtha
thinner - paint	Klean-Strip Paint Thinner with Conditioner	Stoddard solvent (mineral spirits, aliph. petroleum distill., white spirits)
thinner - paint	PPG ACRYLIC LACQUER THINNER	toluene, Acetone, isopropyl alcohol, hexane, naphtha, isohexane, 1-methoxy-2-propyl acetate, 3 methylpentane
thinner, solvent, cleaner	Jasco Denatured Alcohol Shellac Thinner, Solvent, and Cleaner	unknown or discontinued
thinner/solvent	Bio-Solv Acetone Replacement	ethyl lactate, proprietary blend
topcoat base	AwlGrip Topcoat Polyester Urethane Topcoat Base G2002 Flat Black	ethylbenzene, propylene glycol monomethyl ether acetate, diisobutylketone, carbon black, talc, silica crystalline free, 2-propanol 1-methoxy propanoate
topcoat base	AwlGrip Topcoat Polyester Urethane Topcoat Base G2017 Super Jet Black	propylene glycol monomethyl ether acetate, diisobutylketone, 2-ethoxyethyl acetate, butyl acetate, carbon black, 2-heptanon 4,6-dimethyl
topcoat converter	AwlGrip Topcoat Converter G3010 Awl-Cat#2 Spray Converter	ethylbenzene, methylbenzene, 2-ethoxyethyl acetate, ethylacetate, xylene, hexamethylene diisocyanate homopolymer
topcoat reducer	AwlGrip Reducer T0001 Fast Spray Reducer	butanone, butyl acetate, ethyl acetate
transmission fluid	Pennzoil ATF Automatic Transmission Fluid	unknown or discontinued
varnish	ACE Oil Based Varnish Clear Gloss #16389	petroleum distill., polyurethane resin, lang? oil, alkyd resin, zirconium compound, alkyl ketoxime
varnish	AwlGrip AwlSpar Wood Finish M3146	propylene glycol monomethyl ether acetate, Stoddard solvent, naphtha petroleum hydrotreated heavy

varnish	Epifanes Extra UV-Filter High Gloss Clear Varnish	naphtha (petroleum) hydrotreated heavy, xylene
varnish	Epifanes Rubbed Effect Varnish	naphtha (petroleum) hydrotreated heavy
varnish	Pettit Marine Paint 2015 Flagship Premium Exterior Marine Varnish	ethylbenzene, PM acetate, Trimethyl benzene, ethylene glycol, Bis (1,2,2, 6,6-Pentmethyl), mineral spirits
wax	3M Marine Ultra Performance Paste Wax	hydrotreated heavy naphtha, hydrotreated light petroleum distill., carnauba wax, poly(dimethylsiloxane), montan wax, synthetic hydrocarbon mixture, silane polymer w/siloxanes,

and local marine species can vary fouling rates.