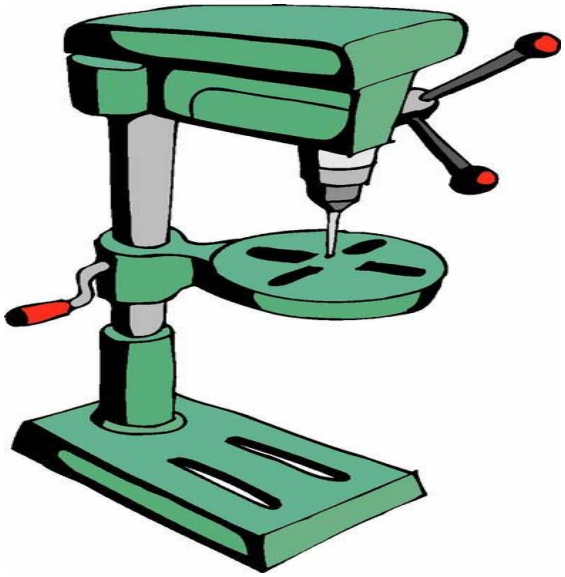
Help us save tax dollars by protecting our environment and our Publicly Owned Treatment Works…



Machine Shops

Whether your business is two blocks or 20 miles from the water, it has two connections to the Monterey Bay. Indoor drains such as sinks, toilets, and most floor drains convey wastewater through the sanitary sewer system to a treatment plant where the water is treated before it is discharged into the Bay. Outside your business, rainwater, wash water from buildings, road surfaces, vehicles, and equipment pick up oil, grease, cleaning compounds, pesticides, paint, garbage and other pollutants. Storm drains carry these pollutants through the storm drain system directly into local creeks and the Bay. They are not filtered or treated in any way.

Machine shops have a high potential to impact storm water and sewer wastewater with contaminants. These contaminants can damage sensitive creek habitats and eventually pollute our bay and ocean, yet these industries are important to our community. The good news is that implementing the best management practices detailed in this pamphlet can drastically reduce environmental impacts from machine shops. This pamphlet has been prepared to familiarize machine shop owners and their employees with the best management practices for dealing with typical wastes generated in the industry. It also details the County of Santa Cruz Industrial Wastewater Pretreatment requirements specific to your facility. Use this pamphlet as a tool to ensure that your business is compliant, to save money on costly spill cleanups and waste disposal, and to train all shop employees. Leave it posted in a visible location.

Best Management Practices

Pollution Prevention Tip

- **Do not change fluids over asphalt or blacktop because these surfaces are absorbent, meaning contaminants can get through these surfaces and into the soil and eventually in our waterways.**

Discharge of any wastewater other than storm water directly or indirectly to a storm drain, a creek, an underground percolation sump, or other water body is strictly prohibited. No metal working fluids are permitted to be discharged.

Floor drains in an area where metal working fluids are changed are prohibited.

- Drip pans and adequate spill prevention and clean-up materials must be kept on-site and readily available for use. See Spill Prevention and Control for more details on spill control.
- Change fluids in bermed or contained areas, or using drip pans. The ideal location to change fluids is over an epoxy-sealed concrete shop floor.
- Drip pans and open containers containing metal working fluids must not be left unattended unless they are covered securely and within secondary containment.
- Transfer fluids using pumps wherever possible to prevent discharges due to spills or leaks.
- Contain all fluids in secondarily contained waste drums for waste removal and treatment. Keep manifest records for their removal, transport, and final disposition to demonstrate that your facility is disposing of waste appropriately. Most metal working fluids are recyclable. Make sure your waste vendors are renewing these resources appropriately.

Changing Metal Working Fluids

Pollution Prevention Tip

- **Purchase reusable or recyclable products whenever you can. Reduce or eliminate the hazardous materials that you use. Materials that have the potential to be recycled include the following: oil, coolants, cleaning solvents, oily rags, and metal chips. Recycling is not only good for the environment, it is good for business. Often times, it is cheaper to recycle and you may even be able to get a return on your recycled goods.**

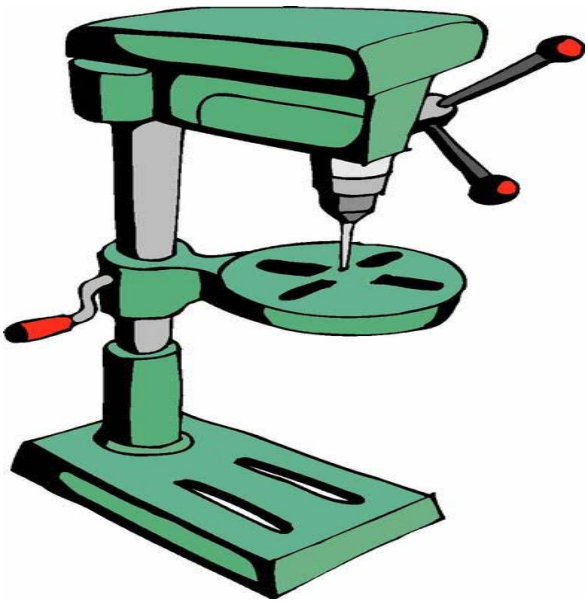
Consider using oil-based metal working fluids versus those that contain chlorinated compounds. Most metal working fluids that contain chlorinated compounds are hazardous. Once spent, these metal working fluids must be labeled as hazardous waste, are more expensive to off haul and cannot be recycled as used oil. Fluids that do not contain chlorinated compounds can become chlorinated by contaminants entering the sump of a machine where the fluid is stored. Contaminants can result from additives such as tapping fluids, biocides, lubricating oils (infrequent), machined plastics, paint, and cleaning or degreasing products used in machine maintenance. Ensure that these additives and cleaning products do not contain chlorinated compounds. This will result in cheaper waste disposal costs. The easiest way to determine whether a metal working fluid or additive contains chlorinated compounds is to check the material safety data sheet (MSDS) for the product. Look for any chemical with the syllable "chloro-" (for example, poly***chlor***inated alkane) on the list of ingredients. If you find this, you know the product contains chlorinated compounds. Most manufacturers don't list all ingredients on the MSDS. In that case, or if you don't find chlorinated compounds on the MSDS, ask the manufacture or supplier if the product is free of chlorinated compounds.

Reuse and Recycling

PROPER CHIP MANAGEMENT CAN SAVE YOU $ MONEY $

DRAIN METAL CHIPS TO RECOVER FLUID- During the work day manually shut off the chip conveyor for a period of time and allow the fluids to drain back into the machine sump. Place metal chips into a perforated container with a catch basin and reuse the collected metal working fluid. At the end of the workday let the chips drain overnight in the machine and clean machine as an opening/morning procedure. These processes also create higher quality chips for recycling.

CHIP FILTERS- Filters keep the chips and grit created in the machining process from contaminating the metalworking fluid sump. The high amount of surface area created by chips provides an excellent area for microbe growth. Consequently, filtering helps to lower the bacteria count.



Chip Management

YOU MAY BE FAMILIAR WITH FLUID MAINTENANACE PROBLEMS – bad odors • health complaints • machine downtime • high fluid disposal costs • poor finish • short tool life

When using coolant as a metal working fluid:

The main recommendation for reducing machining process waste is to institute metal working fluid maintenance programs that prevent fluid degradation and prolong its life, thus reducing the volume of spent fluids in the waste stream. Monitoring is the first step in fluid maintenance. Monitoring includes determination of concentration using a refractormeter or titration kits, and control of rancidity with pH measurements. Knowing your fluid concentrations allows maintenance in the form of fluid concentration adjustments, tramp oil removal, chip and fines removal through sump cleaning, biocide addition, and pH adjustment.

Water Quality- The quality of the water used to dilute fluid concentrate is important to the performance of the fluid. Hard water has more minerals or total dissolved solids than soft water and the higher the initial hardness of the water the faster the solids will increase in the working fluid. The fluid manufacturer may recommend some form of water treatment based on the water quality being used. This may be the use of deionized water from an inline tank much like a water softener, or a reverse osmosis unit.

Coolant- The concentration of your coolant must be monitored regularly. Concentration is important because it is the measure of the amount of active ingredients present in the coolant. Dilute concentrations can result in shorter tool life, increased biological activity, and increase of rust on newly machined parts. Refractometry and titration are the most common techniques for measuring fluid concentrations.

pH- The pH of coolants usually remains constant and any rapid change in pH is indicative of increased biological activity or change in coolant concentration. Coolants should be maintained within a limited pH range between 8.5 and 9.5. If the pH of coolant in a sump falls below 8.5, the coolant loses efficiency, is prone to rusting, and biological activity will increase significantly. The pH can be measured using a low cost test paper.

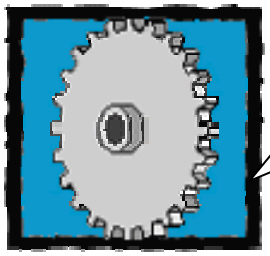
When using oil based metal working fluid:

Sump and Trench Maintenance- Periodically cleaning out the metal working fluid sumps and trenches will keep them free of solid matter that can hamper fluid flow. Solid materials provide excellent areas for microbe growth and may clog fluid delivery lines. Disinfect sumps and trenches when metal working fluid is removed.

Tramp Oil - Machine shops generate tramp oil. This is lubricating or hydraulic oil from the system that contaminates the metal working fluid. Tramp oil contributes to the growth of anaerobic bacteria and interferes with the cooling effects of the fluids. To successfully manage tramp oil, prolong fluid life and reduce health risks you need to:

- Understand how your metal working fluid responds to tramp oil (talk to your supplier or manufacturer) and select a lubricating oil that is compatible with your metal working fluid.
- Fix lubricant leaks to minimize tramp oil infiltration into metal working fluid sumps.
- Remove floating tramp oil with treatment units such as skimmers or centrifuges.

Fluid Maintenance



Pollution Prevention Tips

- **Remove deburred parts from tumblers prior to rinsing.**
- **If practical, prior to rinsing deburred parts, wipe parts with a dry rag or towel to remove metal contaminants that may be in the spent water or solvent.**
- **Recycle and reuse deburring water as much as possible.**

Any discharges of wastewater to the sanitary sewer must meet the local discharge limits!

When spent water is no longer suitable for use, the following methods may be used to dispose of your water:

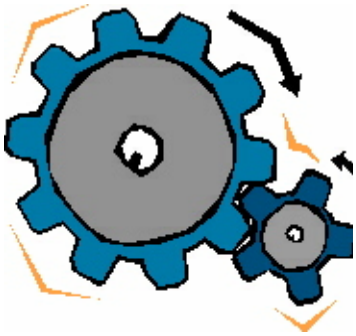
a) If only ***aluminum*** parts have been tumbled in water, this wastewater may be discharged to the sanitary sewer after the following steps:

- Allow the wastewater to sit for at least 24 hours to settle out the debris.
- Scrape off any material that floats to the top of the container.
- Gently decant the liquid, keeping the sediment at the bottom.
- This decanted liquid then may be discharged to the sanitary sewer.
- Properly dispose of the sediment by recycling with the metal chips.
- Sludge scraped from the top and in the sediment may be a hazardous waste.

b) The wastewater generated from tumbling parts that contain alloys of such metals as ***chromium, copper, lead, nickel, silver*** and ***zinc*** are not acceptable for discharge to the sanitary sewer. Dispose of this wastewater with spent coolant, or allow it to evaporate.

c) Rinse water from parts cleaning conducted after tumbling may be discharged to the sanitary sewer.

Organic solvents used in tumbling may not be discharged to the sewer. Spent organic solvents should be disposed of as a hazardous waste.



Tumbling and Deburring

Pollution Prevention Tips

- **Perform parts cleaning at a centralized area so that residues and pollutants remain in one area of the shop. Do not wash or rinse parts outdoors.**
- **Use self-contained sinks and tanks when working with solvents and aqueous cleaners, allowing parts to drain and dry over tanks. Rinse and drain parts over the self-contained sink or tanks. If rinsing is required, rinse over the tank as well, using static or countercurrent rinsing to reduce rinse water quantity. Use drip boards or pans to catch excess solvent solutions and divert them back to a sink or tank.**

Never discharge wastewater, solvents, or aqueous cleaners from parts cleaning to the storm drain or sanitary sewer!

- Installation of filters in cleaning tanks will remove contaminants and will extend the service life of the solution.
- Keep solvent sinks and tanks covered when not in use.
- Regularly inspect containment tanks and degreasing solvent sinks for leaks, and make necessary repairs immediately.

Parts cleaning is typically accomplished with either organic solvents or aqueous cleaning solutions.

- Spent organic solvents should be recycled or disposed of as hazardous waste. If possible, contract with a recycling service that will provide fresh solution.
- Aqueous cleaners, in general, are less toxic than organic solvents. Aqueous cleaners range from mild soap and water to concentrated chemical solutions. If mild soap and water solutions are used to clean parts, both the cleaning solution and the rinse water ***may*** be discharged to the sanitary sewer. When using concentrated cleaning solutions (these may be caustic, acidic or chelated solutions), only the rinse waters ***may*** be discharged to the sanitary sewer. The concentrated cleaning solutions may not be discharged directly without pretreatment. It is the responsibility of the user to demonstrate that treated cleaning solutions are acceptable to the sanitary sewer.
- Pretreatment of cleaning solutions or rinse waters may require a permit. Contact the **Industrial Wastewater Pretreatment Program at 831.464.5462.**

Parts Cleaning

Discharge of any wastewater other than storm water directly or indirectly to a storm drain, a creek, an underground percolation sump, or other water body is strictly prohibited. All indoor floor drains and/or sumps that are connected to the storm drain system must be permanently plugged.

Floor drains in work areas are prohibited.
Utilize dry clean-up methods wherever possible. Clean up spills by using a shop vacuum, dedicated mops, sweeping, and/or by using rags or dry absorbents. Remove all unnecessary hoses to discourage employees from washing down floors and outdoor paved areas. Once the dry clean up is complete, floor and paved areas may be mopped.

Take the following steps while mopping floors:

Clean up spills with rags or dry absorbent.
Sweep the floor. Collect all metal filings, dust, and paint chips from grinding, shaving, and sanding and dispose of properly. Do not wet mop the floor in machining areas until all metal particles have been removed.
Mop the floor using a bucket of non-corrosive cleaner and water diluted as specified on the label. If possible, only spot mop the area that requires cleaning.
If an oil spill can be cleaned up with three or fewer shop rags, use the shop rags to clean up the oil and launder the rags off-site. If it is a larger spill, use a hydrophobic mop and designated oil mop bucket to soak up the oil and ultimately place it into the "used oil only" waste container for recycling. This will save the costs of disposing of absorbent pads or "kitty litter" as hazardous waste. See Spill Prevention Control and Response for more details.

Floor Drains and Floor Cleaning

The best spill control is prevention! Spills are cheaper to clean up when quickly contained! Write a Spill Response Plan. Train employees on the plan annually. During the required annual training, perform drills to ensure that employees can put the Plan into action safely. Adequate spill prevention and clean-up materials must be kept on-site and readily available for use. Examples of such materials are the following:

- Vermiculite (kitty litter)
- Rags (for laundering)
- Absorbent mats - When obtaining mats, ensure that the material you have chosen will absorb the appropriate fluids. Some only absorb water-based fluids, or solvents, while others absorb oil and grease. There are also absorbents that neutralize as well as absorb for acids or bases.
- Portable berms and dikes
- Drain blockers - These are rubber mats that are generally stored on the walls and can be quickly thrown down to cover a drain to prevent a spill from going into the drain.
- Absorbent "socks" - These can be used as a temporary berm.
- Consider using a hydrophilic (oil absorbing) mop and dedicated mop squeegee bucket for cleaning up oil leaks and spills. This enables the oil to be more easily recycled.
- Waste containers – Drums or other UN-rated, DOT approved containers for any wastes generated during cleanup.
- Personal protective equipment such as gloves, bunny suits, safety goggles, face shields, etc.
- Dry sweep brush and scoop.

Spill kits are available that contain a combination of the above-mentioned materials and are put together based on the quantity of liquid your facility has the potential to release in a worst-case scenario. Plan on getting enough material to clean up the largest quantity of material your shop has onsite. There are several commercial vendors that distribute these materials. They can usually be found on the Internet. Some of the larger suppliers are Lab Safety Supply (www.labsafety.com) and New Pig (www.pigalog.com 1.800.hot.hogs).

Minimize the distance between waste collection points and storage areas and, when transferring wastes, keep lids and containers secured. Attempt to use secondary containment "carboys" when transferring wastes so that if there is a spill, it will hopefully be contained in the carboy. Always use both hands when carrying wastes.

Spill Prevention Control and Response

Posted Example
Spill Control Plan

Spill Response Procedures:

1. **Protect yourself first. Be sure and put on the appropriate personal protective equipment: gloves, goggles, and an apron.**
2. **Contain the spill with trays, or absorbent materials. Do not allow the material to reach storm or sewer drains.**
3. **Check the MSDS for the spilled substance for safe handling and disposition.**
4. **Clean up the spill as directed on the MSDS.**
5. **Use dry clean-up methods first, then wet clean-up methods. Do not send any wash water to the storm drain!**
6. **Package and label all contaminated materials (absorbents, PPE, liquids) for off-site disposal.**
7. **Notify the manager/owner that a spill has occurred (see below).**
8. **Notify the appropriate government agency (see below)**

Spill Response Personnel

Manager Name:	**Pager/Phone:**
Owner Name:	**Pager/Phone:**
Government Entities	***Phone***
Santa Cruz County Sanitation District	**831.477.3907**
Santa Cruz Wastewater Treatment Plant	**831.420.6050**
Fire Department	***Phone***
Environmental Health Services	**831.454.2022**

Posted Spill Control Plans do not need to be elaborate. They should be short and to the point so that they are just enough information to quickly and efficiently prevent a spill from spreading. However, if your facility has an Industrial Wastewater Discharge permit, a written Spill Control Plan is required. Call the County of Santa Cruz Industrial Wastewater Pretreatment Program (831) 477-3907 if you would like an example template.

No hazardous materials or waste may be discharged to the sanitary sewer or storm drain!
Keep a record of disposal of hazardous waste to their final resting place. You are liable for these wastes after they leave your facility!
Hazardous Materials typically generated by machine shops include the following:

- Waste oil and coolants
- Waste solvent
- Metal chips
- Used shop rags
- Used wash water
- Used absorbents such as vermiculite or "kitty litter"

All hazardous materials and waste must be secondarily contained, or placed in a bin that can contain up to 110% of the entire contents of the containers should there be a leak. Store all batteries within secondary containment and locate them either on the floor or on the lower levels of shelving that has been secured to the wall for earthquake protection.

Keep these items stored indoors or in a covered area outdoors. Do not store these items near a sanitary sewer drain or near a storm drain. If these items are stored near a drain, a spill has the potential to travel off of your property, making cleanup more costly and exposing poor business practices to the public. If storage near storm drains is unavoidable, keep drain blockers (rubber mats that seal a drain) in close proximity to the drain at all times and place berms around the storage areas.

Check all containers on a regular basis for potential holes and leaks. Leaks on steel drums can appear as rusted out spots or indentations initially. If a leak is discovered, place drip pans or absorbent material under the leak and then attempt to repair the leak immediately. Keep lids, bungs, and tops secured on waste barrels and containers at all times, except when adding waste to containers or dispensing product.

In areas where hazardous materials are stored, make sure there are adequate spill cleanup materials (see the section on Spill Prevention, Control, and Response). Hazardous waste containers must be labeled and stored according to hazardous waste regulations. For more information on Best Management Practices for Hazardous Materials Storage, contact the County of Santa Cruz Environmental Health Services Department at 831.454.2022.

Hazardous Materials Storage and Management

Make sure that all employees understand and follow Best Management Practices. Mistakes and misunderstandings can lead to violations and costly cleanups!

The following page can be used as a training log. Ensure that all employees are trained on Best Management Practices upon hiring and annually thereafter. Use the following as training and education tools:

- This Best Management Practice pamphlet.
- Your written Spill Response Plan.
- Drills on emergency spill cleanup.

Post and/or label the following:

- Post multiple copies of this pamphlet throughout your facility.
- Emergency telephone numbers to your local Fire Department and Wastewater Treatment Facility (831.420.6050).
- Post signs above all sinks prohibiting the discharge of metal working fluids and wastes.
- Label all drains within your facility indicating whether they flow to a treatment system, directly to the sanitary sewer, or to the storm drain.
- Stencil or post signs near all storm drains on your property with a message- "No Dumping-Flows to Ocean."

How do you know you're complying? Use the Green Chip Inspection Checklist at the end of this pamphlet. Enlist a different employee to perform this inspection every month so that they familiarize themselves with the Best Management Practices and solidify their training.

Training

Training Record

Date: _____

Training Topic _____

Trainer Name _____

Trainer Signature _____

Printed Name of Attendee	Attendee Signature

Date: _____

Training Topic _____

Trainer Name _____

Trainer Signature _____

Printed Name of Attendee	Attendee Signature

GREEN CHIP INSPECTION CHECKLIST

All items marked "NO" will require corrective action. Items marked "N/A" do not apply to this area.

Yes	No	INSPECTION ITEM	CORRECTIVE ACTIONS/COMMENTS/DATES OF COMPLETION
☐	☐	1. Are waste oil, coolants, solvents and chips being sent to a recycling vendor?	
☐	☐	2. Are employees carefully calculating chemical needs to reduce the amount of excess waste? Are expired or surplus chemicals returned to vendors?	
☐	☐	3. All waste containers are properly labeled.	
☐	☐	4. Only appropriate containers are used for hazardous wastes and all containers are in good condition.	
☐	☐	5. Are employees trained in proper dilution of coolant?	
☐	☐	6. Dry clean up methods are being used in preference or always before wet clean up methods (those using water).	
☐	☐	7. Are all metal working processes done indoors?	
☐	☐	8. Are solvent sinks/tanks self-contained? Are all parts allowed to drain and dry over the sinks/tanks? Are sink/tanks kept covered at all times?	
☐	☐	9. Spill cleanup material is available in the immediate area. Employees are trained appropriately to cleanup spills and are familiar with the Spill Response Plan.	
☐	☐	10. Are all chemical and waste containers (in storage or in use) in secondary containment?	
☐	☐	11. Metal working fluids are not being changed in the vicinity of floor drains or over asphalt.	
☐	☐	12. All fluids are secondarily contained in waste drums for waste removal and treatment.	
☐	☐	13. Cleaning of machined parts is only done in self-contained areas.	
☐	☐	14. If solvents are used in tumbling and deburring is the solvent disposed of as a hazardous waste?	
☐	☐	15. Are chips drained of metal working fluid effectively?	
☐	☐	16. There are no indoor floor drains and/or sumps that are connected to the storm drain system.	
☐	☐	17. Only non-corrosive cleaners are being used to mop floors and they are being diluted appropriately. The mop bucket water is being poured into a drain going to the sanitary sewer. Floors are not being hosed down.	
☐	☐	18. Cleaning of waste storage areas is done using dry methods.	
☐	☐	19. All hazardous wastes are secondarily contained and are stored indoors away from floor and storm drains.	
☐	☐	20. Lids, bungs, and tops are secured on containers at all times, except when adding waste to containers or dispensing product.	
☐	☐	21. Hazardous waste manifests are kept up to date and are available for review.	
☐	☐	22. Ask an employee if they know what Best Management Practices are. Can they list an example Best Management Practice? Have they been trained on BMPs in the last year?	
Pollution Prevention Measures for a Green Business (not required but recommended)			
☐	☐	23. Are non-chlorinated metal working fluids being used?	
☐	☐	24. Are chip filters used and disposed of as a hazardous waste?	