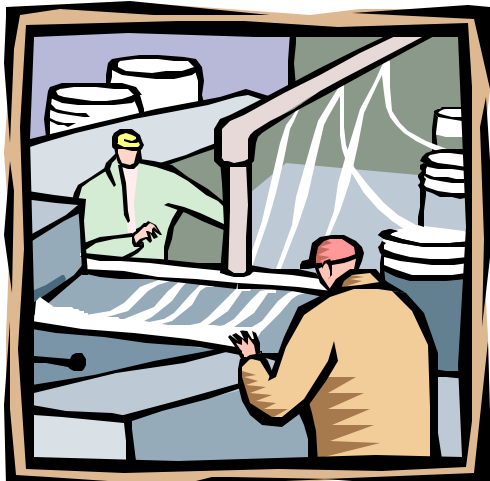


Metal Finishers Pollution Prevention Checklist



NEW JERSEY SMALL BUSINESS
ENVIRONMENTAL ASSISTANCE PROGRAM



New Jersey Department of Environmental Protection
Office of Pollution Prevention and Release Prevention

Use of this Checklist

The purpose of this checklist is to provide a general overview of pollution prevention and safety techniques that can be applied to metal finishing operations. State and federal rules and regulations take precedence over this checklist.

What is Pollution Prevention?

Pollution Prevention (P2), also known as source reduction, attempts to stop pollution before it starts. P2 encourages industries to realize the potential economic benefits of reducing the use and generation of hazardous substances. Implementing P2 can reduce or eliminate the amount of generated hazardous substances and other environmentally harmful substances that must be disposed of, discharged, or released to the environment.

While every plating operation differs, every plating facility creates waste. To some degree there are common elements applicable to all platers that are a cost of doing business, which can be reduced with proper planning. One can prevent pollution through examining the techniques that are applicable to plating operations during the metal forming, metal preparation, and metal finishing steps.

Who Should Implement Pollution Prevention?

- Any business that uses hazardous substances and wants to improve their environmental performance, reduce their environmental obligations and liability;
- Any business that generates Nonproduct Output¹ (NPO) and wants to keep one step ahead of the competition by increasing efficiency and **reducing operating costs**;
- Any business as defined in NJ Pollution Prevention Rules that meets or exceeds the applicable threshold must develop a P2 Plan and submit a P2 Plan Summary and Annual Progress Report (N.J.A.C. 7:1K et seq.).

A business can **save money** through various P2 methods such as material substitution, in-process recycling, product reformulation, and efficiency improvement. Implementing a P2 program will also help make the work environment safer for all employees, promote better community relations, **increase your bottom-line** and protect the environment.

1. Nonproduct output means all emissions, discharges, and hazardous wastes that are generated and that are not intended for use as a product.

Pollution Prevention at Plating Operations

Pressure from the government and the public to reduce hazardous waste disposal, discharge and releases of pollutants is changing the way companies do business. These changes are becoming increasingly focused on pollution prevention. Wastes will vary from each metal finisher, but the overall source reduction of these wastes will benefit metal finishers by reducing raw material needs, lowering disposal and treatment costs, and by decreasing the long term liabilities associated with waste disposal.

To reduce cost and liability, the facility should examine three major types of waste generation.

1. **Solid & Hazardous Waste** – Metal finishing waste generally consists of spent plating baths, spent etchants & cleaning solutions, spent strip & pickle baths, exhaust scrubber solutions, industrial wastewater treatment sludge, off-specification & test products, empty containers, and outdated materials.
2. **Wastewater** – Metal finishing wastewater generally consists of cleaning rinsewater, plating rinsewater, tumbling and burnishing rinsewater, exhaust scrubber solution, non-contact cooling water, steam condensate, boiler blowdown, and stormwater.
3. **Air Emissions** –Air contaminants from plating operations, such as Volatile Organic Compounds (VOC), Hazardous Air Pollutants (HAPs), and particulates are produced from metal cutting & forming, metal cleaning & degreasing, anodizing, electroplating, pickling and surface coating.

Contact List

Pollution Prevention

NJDEP - Small Business Assistance Program
(877) 753-1151 [toll free]
NJDEP - Pollution Prevention & Release Prevention
(609) 777-0518
www.state.nj.us/dep

Air Permits

NJDEP - Bureau of New Source Review
(800) 441-0065 within NJ
(609) 292-6716

Hazardous Waste

EPA RCRA ID# - Call (212) 637-4106
NJDEP - NJX ID # -call (609) 292-7081

Underground Storage Tanks

NJDEP - Bureau of Underground Storage Tanks
(609) 292-8761

Wastewater

NJDEP – Pretreatment and Residuals
(609) 633-3823
NJDEP - Stormwater or Septic Permits
(609) 633-7021
NJDEP - Point source discharges to surface water permits
(609) 633-3869 or (609) 292-4860

Voluntary Compliance Assistance Program

NJDEP - greenSTART
(609) 633-0727

Right to Know

NJDEP - Bureau of Chemical Release Information and Prevention
(609) 292-6714

Other Sources of Help

Small Business Ombudsman- NJ Commerce at (800) 643-6090

Metal Finishers Pollution Prevention Checklist

Pre-Finishing, "The Cleaning Process":

- Utilize alternative cleaning methods for solvent cleaning.
- Only degrease parts that must be cleaned. Do not routinely degrease all parts.
- Pre-clean to extend the life of the aqueous or vapor degreasing solvent (wipe, squeeze, or blow part with air, shot, etc.)
- Use compressed gas to physically remove contaminates.
- Use aqueous cleaning: a solution of water detergents, and acidic or alkaline chemicals to clean parts.
- Regenerate aqueous cleaners: some aqueous cleaners can be collected, treated and reused.
- Use ultrasonic cleaning to improve aqueous cleaning efficiency.
- Use semi-aqueous cleaning: a combination of non-aqueous cleaners (hydrocarbon and surfactant mixtures, alcohol blends, trepenes, and petroleum distillates) with an aqueous rinse.
- Use countercurrent solvent cleaning, rinse initially in previously used solvent and progress to new, clean solvent.
- Cold clean with a recycled mineral spirits stream to remove the bulk of oil before final vapor degreasing.
- Use electrocleaning methods such as reverse or anodic cleaning; direct or cathodic cleaning; or periodic reverse cleaning.
- Use vacuum de-oiling: a vacuum furnace uses heat and vacuum to vaporize oils from parts.
- Use laser ablation to vaporize thin layers of material surfaces.
- Reduce solvent loss to the atmosphere from vapor degreasing by covering the degreasing unit, installing refrigerated coils above the vapor zone, and returning condensed solvent on the part to the degreasing unit.

Plating Process:

- Modify and optimize rinsing methods to control drag-out and to extend bath life and conserve water: decreasing workpiece withdrawal while increasing drain rates; changing the bath concentrations and temperature; improving racking and rack design; using drainboards and dragout tanks; rinsing over the plating tanks; lower the viscosity of the bath; and using air knives.
- Use a reverse osmosis system to recover metals.
- Use electrodialysis to maintain consistent deposition rate; maintain consistent physical deposit properties; and lower waste stream volumes.
- Use electrowinning to reduce dragout and water usage.
- Use conductivity control systems to reduce rinse water use, wastewater discharge and wastewater treatment chemical use.
- Install a process to reduce pressure to vaporize water at cooler temperatures and recycle water.
- Redesign the cyanide and chromic acid oxidation and reduction tanks as gravity flow systems to eliminate the risks associated with pump failure and to equalize flow rate.

Good Housekeeping:

- Use aprons, gloves and safety glasses at all times to prevent injuries.
- Do regular maintenance on equipment to ensure that all machinery and processes are working efficiently. Check for leaks and spills, and perform repairs immediately (e.g., exercise all valves periodically, combustion sources, tanks, pumps, pipes...).
- Maintain spill-kits and instruct all employees in the proper use and location of the spill-kits.
- Prohibit the mixing of hazardous waste and non-hazardous waste. By keeping them separate you can readily recycle non-hazardous waste. When you mix hazardous with non-hazardous waste, all the waste becomes hazardous.
- To reduce spills use spigots, pumps, and funnels when dispensing or transferring liquids to and from storage containers.
- Keep chemicals in safety cans or covered containers between uses to reduce evaporation, spills and contamination.

Alternative Materials:

- Replace cyanide plating solutions with non-cyanide alternatives including alkaline zinc and acid zinc.
- Replace sodium bisulfite and sulfuric acid with ferrous sulfate, and substitute gaseous chlorine with liquid chlorine.
- Replace conventional chelating agents such as tartarates, phosphates, EDTA, and ammonia with sodium sulfides and iron sulfates.
- Replace methanol with nonflammable alkaline cleaners.
- Use less hazardous degreasing agents such as petroleum solvents or alkali washes.
- Replace chromic acid cleaner with non-fuming cleaners such as sulfuric acid and hydrogen peroxide
- Replace cyanide cleaners with trisodium phosphate or ammonia.
- Change copper bright-dipping process from a cyanide dip and chromic acid dip to a sulfuric acid/hydrogen peroxide dip.
- Use alcohol instead of sulfuric acid to clean copper wire.
- Replace caustic wire cleaner with a biodegradable detergent.
- Replace chromated desmutting solutions with nonchromated solutions for alkaline etch-cleaning of wrought aluminum.
- Replace barium and cyanide salt heat treating with a carbonate/chloride carbon mixture, or with furnace heat treating.
- Replace solvents with condensate of saturated chlorite vapors in thermal cleaning of metals.
- Replace solvent based paints with high solids coatings; water based coatings; or powder coatings.

Inventory:

- Order and manage material to reduce expiring products. Simply put, "Do not order more inventory than you need."
- Use the "first in, first out" inventory procedure to reduce waste. This method will reduce the possibility of expired material by first using the oldest product.
- Material should be inspected when received. If materials are damaged or off-specification, they should be returned immediately.
- Expired material should be inspected and tested before disposal to determine if the expired material can be salvaged.
- Use a computerized inventory system to track inventory.

Waste Segregation:

- Use hydrometallurgical processes to extract metals from sludge.
- Convert sludge to smelter feed.
- Install an electrolytic cell to recover dissolved copper.
- Solvent waste streams should be kept segregated and free from water contamination.
- Solvent recovery units can be used to recycle spent solvents generated in flushing operations.

Waste Accounting:

- Collect accurate data on the generation of waste from each source, such as spent plating baths, spent cleaning solutions, and rags.
- Establish a tracking system for waste generation and encourage waste reduction.
- Provide feedback to your employees on waste reduction, informing them of their progress.
- Consider installing a distillation unit at your facility to recycle solvents.
- Consider recycling solvents off-site to be returned and reused. Remember it is better not to generate the waste in the first place.

