

OWNER/OPERATOR INFORMATION SHEET

**Could your family be affected?**

One electroplating shop switched from a vapor degreaser parts washing system that used solvents to a water-based power washing system. It saves approximately \$12,600 per year and has reduced toxic air emissions by 90%.

— **Pollution Prevention Resource Center**

One electroplating shop replaced their toxic cleaning solvent with a water-based solution. This completely eliminated toxic air emissions, reduced air permit fees, and created a more pleasant work environment.

Annual savings:
\$8,440 per year

— **Kansas Small Business Environmental Assistance Program**

One firm used a low-concentration plating solution in 5 nickel tanks and saved \$1,300 in disposal and feedstock costs.

— **U.S. EPA**



Reducing Air Pollution from: Electroplating Operations

Why should my electroplating shop reduce air pollution?

People who are exposed to toxic air pollutant at sufficient concentrations, for sufficient durations, may increase their chances of getting cancer or experiencing other serious health effects, such as reproductive problems, birth defects, and aggravated asthma.

Pollution prevention safeguards the health of your employees, customers, and families by using materials, processes, or practices that reduce or eliminate air pollution at the source. For example, covering containers of cleaning solvents prevents vapors from affecting your employees.

Pollution prevention practices also save money on waste disposal, materials usage, and the cost of air pollution controls.

You may already be regulated by federal, state, local, and Tribal agencies and may already voluntarily implement pollution prevention practices. However, increasing pollution prevention efforts can further minimize impacts on human health and the environment.

Why should I be concerned about air pollution from my electroplating shop?

- Electroplating operations can produce emissions of toxic air pollutants, including heavy metals and cyanide.
- Degreasing and cleaning solutions can release toxic air pollutants and volatile organic compounds (VOC). Chemicals in these substances can react in the air to form ground-level

ozone (smog), which has been linked to a number of respiratory effects.

- Plating processes generate heavy metals such as hexavalent chromium and cadmium. While federal, state, local, and Tribal regulations limit the amount of emissions from electroplating shops, dangerous releases of toxic air pollutants can occur if an electroplating shop is not in compliance with regulations.
- Cyanide has been a key component of plating solutions for years. It can impact the nervous system, heart, and lungs.

How can I reduce air pollution from my electroplating shop?**Substitute Materials**

- Use cleaners such as water-based cleaners that have a lower toxic air pollutant and VOC content.
- Use degreasing solvents with a lower toxic air pollutants and VOC content.
- If you are a chromium electroplater, switch from hexavalent chromium-bearing solutions, which can cause cancer, to trivalent chromium ones, which do not cause cancer.
- Replace the cyanide in plating solutions with less toxic compounds like zinc chloride and pyro-phosphate copper.

Lower Emissions at the Source

- Cover containers of cleaning solvents and used shop towels. This will reduce emissions of toxic air pollutants and VOC as well as the

EPA's Sector Strategies Program has an Environmental Management System (EMS) available for electroplating shops to use. An EMS helps electroplating shops integrate environmental decision making into day-to-day operations.

— **U.S. EPA**

amount of solvent lost to evaporation. This reduces the amount of new solvent purchased.

- Securely cover all containers to reduce the chance of spills when transferring materials.
- Use funnels or pumps to avoid spills when dispensing materials.
- Install ventilation hoods over plating baths to help protect workers from evaporative plating solutions.

Change Cleaning Procedures

- Mandate a “clean as you go” policy to reduce the amount of solvent needed for removing heavy build-up.
- Mechanically clean parts with a wire brush or sandblasting equipment to reduce solvent use.
- Use old solvent as a pre-wash or wipe for cleaning equipment or parts.
- Switch to a water-based cleaning system like ultrasonic cleaners, manual parts washers, automatic spray equipment, steam cleaners, or baths with agitation.
- Clean parts with hot water and detergent at high pressures in a pressurized washer.

Recycle Materials

- Use an on-site distillation unit to clean dirty cleaning liquid. This makes the solvent available for reuse in the production process. An on-site distillation reduces the costs of both solvent disposal and fresh solvent purchase.
- Use old solvent for cleaning very dirty parts.
- Reuse plating bath solution and rinse water.
- Reduce bath dumps by continuously filtering bath solutions.

Change Production Processes

- Review and streamline production processes to reduce overall cleaning solvent and degreaser use. For example, evaluate your solvent quality, consolidate parts washing processes, and service units only when necessary. These steps can greatly reduce solvent waste.
- Lower emissions of toxic air pollutants such as cyanide, chromium and other heavy metals by using

alternative electrocoating technologies like thermal spray coating, vapor deposition, and chemical vapor deposition.

- Minimize chemical usage and its associated emissions by using the lowest concentration of chemicals in the bath that will produce the desired results.
- If possible, use mechanical scraping instead of a chemical solution to remove undesired buildup on the metal.
- Change baths and rinses based on bath/rinse quality, not to meet an arbitrary schedule.

What do I need to consider before converting to alternative plating processes?

Converting to alternative plating processes may result in high costs from research and development and new equipment, but these alternative processes often reduce operating costs.

Some alternative processes may be more labor intensive, which results in higher labor costs, but these processes can significantly reduce the amount of toxic air pollutants emitted.

Check with your state, local, or Tribal pollution prevention office for funding possibilities.

What else can I do to reduce air pollution?

Your community may already have groups working for cleaner air. Your expertise and knowledge can be very helpful to these groups.

Many pollution prevention offices offer free on-site assessments for interested businesses. A list of these small business assistance programs can be found at www.epa.gov/smallbusiness. This site provides information about assistance and technical help, environmental experts, environmental regulations and laws, funding, and cost-saving opportunities.

Sponsor employee awards for good ideas, great efforts, and dedication to pollution prevention. For example, you could provide a cash award for workers who implement a work practice that reduces both costs and pollution.



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Electroplating Operations



Could your family be affected?

One company uses active carbon filtration to regenerate plating baths.

Capital costs: \$9,192

Maintenance costs: \$7,973/yr

Reduction in plating bath disposal and fresh chemicals purchased: 47%

Savings from reduced waste disposal: \$67,420

Savings in chemical purchases: \$55,000

— Illinois Waste Management and Research Center

P2/Finance is a user-friendly series of free software programs designed to help business people analyze the costs of pollution prevention, energy efficiency, and other projects to enhance resource efficiency. It enables the user to compare costs/savings of business-as-usual practices with alternative scenarios.

— Tellus Institute



Resources

- National Association of Metal Finishers: www.namf.org, (407) 281-6445
- EPA Air Toxics Web Site: www.epa.gov/ttn/atw/
- National Emission Standards for Hazardous Air Pollutants: Chromium Electroplating: www.epa.gov/ttn/atw/chrome/chromepeg.html
- Owner/Operator Information Sheet for Metal Operations.
- EPA's Sector Strategies Partnership Program for the Metal Finishing Sector: www.epa.gov/sectors/metalfinishing/index.html
- Fabricated metal products sector notebook: www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/fabmetn.pdf
- U.S. EPA Office of Research and Development Capsule Report: Approaching Zero Discharge in Surface Finishing. EPA 625/R-99/008, November 2000. Guidance on controls and process changes: www.pfonline.com/mag_images/625R99008AZD.pdf
- P2/Finance (Tellus Institute): www.tellus.org/b&s/software/p2.html
- Electroplating and metal finishing: www.cdphe.state.co.us/ap/P2/el_met.htm
- Plating process: www.wmrc.uiuc.edu/main_sections/info_services/library_docs/manuals/finishing/plating.htm
- Electroplating and metal finishing industry: www.engext.ksu.edu/ppi/publications/manual/Metalfinish/contents.html
- Options for industry: www.dep.state.ct.us/wst/p2/industry/optindex.htm
- Community-Based Projects: www.epa.gov/air/toxicair/community.html

Topic Hubs

- Metal fabrication and machining: www.newmoa.org/prevention/topic/toc.cfm?hub=23&subsec=7&nav=7
- Machining and metal fabrication: www.pprc.org/hubs/subsection.cfm?hub=23&subsec=4&nav=4
- Plating: www.pprc.org/hubs/subsection.cfm?hub=24&subsec=4&nav=4

Toxicity of Solvents

- Integrated Risk Information Systems (IRIS): www.epa.gov/iris
- Air Toxics Health Effects Notebooks: www.epa.gov/ttn/atw/hapindex.html

Alternatives

- Finding an Alternative to Solvent Degreasing: www.pprc.org/cpc/Contents/Baseline/EPA%20Publications/Solvent%20Degreasing%20Alternatives.pdf
- Biochemical substitutions: www.carbohydrateeconomy.org/library/admin/uploadedfiles/Biochemical_Substitution_in_the_Metal_Plating_.html
- Solvent Alternatives Guide: www.sage.rti.org