Pollution Prevention (P2) Checklist for Metal Finishing Operations

Company name:_____

Address: _____**; City:** _____**; Zip code**_____

IU_____**; Permit W-**_____

Inspector or Respondent's name: _____

Date completed: _____

MATERIALS or CHEMICAL SUBSTITUTION

Materials (chemicals) substitution involves the replacement of chemicals of concern (hazardous waste-intensive chemicals) by a new chemical (less toxic) that eliminates or reduces the generation of hazardous waste. Changes in the raw materials used in a process can result in the reduction of pollutants or hazardous materials that enter the production process.

Which practice(s) does your facility implement? Check only applicable boxes below:

☐Use of water based cleaners to degrease parts ☐ Alkaline cleaning for the degreasing of parts
☐Replace acetone with non-organic solvent ☐Neutral washing agents (not acids and bases)
☐ Substituted coating materials used in post-finishing of parts (trivalent chem films)
☐Material purification (i.e. use of distilled or softened water instead of tap water)
☐Increased purity of raw materials (anodes of the highest purity)
☐Use of non-chelator chemicals (Chelators inhibit the precipitation of heavy metals in wastestreams.)
☐Non-chlorophenolic biocides or chromate solutions (used in cooling towers)
☐ Other raw material modification made:_____

PROCESS CHANGE/SUBSTITUTION/REFORMULATION

Process changes, modification (or reformulation) requires altering a waste-producing industrial process to minimize the amount of waste being generated. Process changes means changing one or more processes used by the facility or changing the equipment used in the process.

Which practice(s) does your facility implement? Check only applicable boxes below:

☐ Replaced cyanide with non-cyanide plating solution
☐ Use of trivalent chrome instead of hex-chrome plating
☐Tin/lead (63/37%) plating instead of lead (100 %) only
☐Sand blasting instead of acid cleaning
☐Other processes such as aqueous cleaning and degreasing modifications made: _____
☐Introduction of in-line product quality monitoring or other process analysis system
_____

PRODUCT CHANGE/SUBSTITUTION OR REFORMULATION

Product changes that are considered pollution prevention techniques include any changes in the composition or use of an intermediate or end product which results in reducing waste from the manufacture, use, or ultimate disposal of the product. A life cycle assessment of a product (i.e.; printed circuits boards) may serve to evaluate environmental impact associated with manufacture, use or disposal.

☐ Product substitution (Convert to less toxic product)

☐Product reformulation (Convert to less toxic components)

REUSE/RECOVER PRACTICES & TECHNOLOGY

Installation of systems and implementation of practices which recover process solutions and allow recycling of rinsewater are among the practices and technologies that help to reduce regulatory liability. For example, ion exchange is a frequently used and effective method to recycle nickel rinse waters and capture nickel metal either for reuse or recycling.

Which practice(s) does your facility implement? Check all applicable boxes below:

☐Wastestream segregation to target re-use of rinses or wastewater treatment efficiency

☐Drag-out reductions/Return to process tank (i.e. air knives, drain boards & dragout tanks

☐Reuse of rinse waters; ☐Instituted re-circulation (of rinse water) within a process

Technology

☐ Use alternate treatment system to reduce cyanide or oxidize hexavalent chromium, e.g. electrochemical methods

☐Uses alternate treatment system to minimize metal sludge generation, e.g. electrolytic metal recovery

☐Electrowinning (recovery of metals in process baths) ☐Recovery of precious metals

☐Recycling of rinses (maximizes water usage) water; ☐Ion exchange; ☐Reverse Osmosis

☐Recover plating metals (copper, nickel, etc.) from sludge

☐Recovery/recycling of acids (Electrodialysis)

☐Use of reusable instead of disposable filters ☐diatomaceous filters ☐cartridge filters

☐ Filtration of process baths to recover valuable constituents or regeneration of anodizing solutions (sulfuric acid)

☐ Modified equipment, layout, or piping (such as layout of rinses to include counter-current rinses)

WATER CONSERVATION PRACTICES

Increased rinsewater use requires a larger wastewater treatment or recovery system, which may be costly due to routine monitoring, chemical usage and sludge generation.

Dragout Reduction

Theory: Drag-out refers to the chemicals that remain on parts after they have been removed from a solution. The less the dragout volume, the less rinse water will be consumed, and the less sludge will be generated during treatment. Drain boards reduce dragout from entering rinse tanks and improve housekeeping.

Tasks during Inspection-Check the appropriate box when applicable.

Dragout reduction by:

☐Increase draining over tank

☐Dragout tanks; # of tanks_____

☐Drag-in/drag-out tanks _____

☐Improved barrel/rack design. Y / N

☐Dragout drain time: _____

☐Type of drain boards_____

☐Drain/drip board _____

☐Drip bars over tanks. ☐Yes;☐ No

☐Direct drag-out return; ☐Yes; ☐No

☐Flow rinsing rate: _____

Theory: The primary source of pollution in a metal finishing shop is the dragout of various processing baths into subsequent rinses.

Factors affecting the volume of dragout, including viscosity, surface tension, and temperature:

☐Optimize process bath concentrations

☐Install process bath filters

☐Viscosity: _____

Note: > viscosity > drag out

☐Surface tension: _____

☐Addition of wetting agents: _____

Note: addition of wetting agents reduces surface tension

☐Temperature of tank: _____

☐Agitation; ☐non-agitation.

Note: Temperature > Agitation < surface tension.

☐Design and maintenance of racks & barrels

☐Physical condition (of racks & barrels): _____

☐Position of parts on racks: _____

☐Withdrawal of racks from tanks:_____

RINSING EFFICIENCY

Rinse water reduction involves rinsing the work-piece in the most efficient manner, thereby using the smallest volume of rinse water possible and in turn reducing treatment needs, sludge generation, and ultimately saving money.

Which rinsing efficiency practices are implemented at your facility? Check all that apply to your facility:

☐ Over-tank rinsing; ☐Cascade rinsing; ☐ Static rinsing
☐Counter-current rinses: ☐2 tanks; ☐3 tanks; ☐4 tanks
☐Improved draining of metal parts (resulting in decreased in drag-outs); ☒Documentation maintained
☐Redesigned part racks to reduce drag out ☐Draining/rinsing over plating tank
☐Installation of drip boards
☐Improved rinse equipment efficiency; ☐ Use of spray or mist rinsing

WATER CONTROLS

Rinsewater should only be flowing when parts are being processed or when the rinse tank contains water that has been utilized extensively. A significant amount of water can be wasted if the rinse tank is allowed to flow continuously. While several methods of controlling water flow exist, the list below is not exhaustive.

Which water controls have you installed or are you planning to install? Check all that apply:

☐ Automatic or ☐Manual flow restrictors on rinse tanks; ☐ Conductivity meters
☐ Installed overflow alarms or automatic shut-off valves
☐Improved rinse equipment operation
☐Other controls or water saving techniques**:** _____

IMPROVED WASTEWATER TREATMENT

Treatment methods can reduce the pollutant load, toxicity, volume or certain waste streams which cannot be eliminated. Equipment/technology used in wastewater treatment should be inspected regularly to identify leaks, non-functional pH/ORP meters, pumps, filtration systems and other equipment used to treat wastewater. Frequent inspection may identify potential regulatory problems.

Which practice(s) or method(s) does your company implement? Check all that apply:

☐Use of different metal precipitating agents, which generate less sludge or chelated waste
☐Substituting organic polyelectrolytes in place of traditional coagulation and flocculation agents (e.g; lime, alum), to reduce quantities of sludge generated.
☐Batch discharge mode ☐Batch treatment of high strength wastewater
☐ Segregation of cyanide waste stream ☐collection stations near process tanks
☐Segregated treatment of chrome laden wastestreams
☐Filtration of effluent (polishing of effluents to meet compliance) ☐Functional filter press (solids removal)
☐Separate wastewater delivery system (segregated by strength and treatability)
☐Isolated closed loop systems ☐Alarm system (pH/ORP) at sampling points
☐Model Best Available Technology (BAT) wastewater system
☐Evaporation; type of evaporators: a) Atmospheric ☐; and b) Vacuum ☐; other_____
☐ Sludge drying system to reduce the weight of hazardous wastes for recycling and disposal.
☐Other wastewater treatment activities.

HOUSEKEEPING & EMPLOYEE TRAINING

Pollution prevention activities include housekeeping and training of staff which are intended to avoid, eliminate or reduce the generation of waste. Many source reduction options require only simple housekeeping and maintenance activities. Housekeeping improvements can provide low to no cost opportunities for waste reduction.

Choose which practice(s) or method(s) your company implements. Check all that apply:

☐Training of personnel to implement inspection or monitoring program to reduce spills or leak sources.
☐Internal pollution prevention opportunity audit(s) ☐Daily check for leaking tanks or pipes.
☐Employee participation/recommendations; ☐Training by trade associations/industry assistance programs
☐ Cleaning/maintenance of racks (prevents bath contamination)
☐Keeping the plating areas clean to prevent foreign material from entering a process bath
☐ Spills cleanup kits on site; ☐Uses spouts or funnels to transfer fluids
☐Storm drains are stenciled with "No Dumping…Flows to waterway"
☐Other: List items_____

Installation of P2 Equipment

Many operations at a metal finishing facility depend on the functionality of equipment, integrity of process tanks and associated auxiliary controls. Equipment, tanks and controls must be routinely inspected and maintained.

Maintenance personnel must be responsible for inspecting on a routine basis (weekly preferred) the infrastructure of the facility. Possible sources of accidental chemical losses include tank leaks, equipment leaks, spillage between process tanks, overflows, accidental opening or rupture of a valve, and the spilling of chemicals in storage or during application.

Installation of P2 Equipment refers to:

☐ Replaced copper coils ☐Replaced lead-lined tanks ☐ Replaced metal piping (PVC)
☐Automated systems for more precise monitoring and transfer operations
☐Use of refrigerated freeboard on vapor degreasing units ☐Overflow control devices
☐ Closed loop systems ☐Equipment modernization

Management Systems and other programs:

Which management systems does your facility implement?

☐SB 14/Source Reduction ☐ ISO14000/Environmental Management
☐ Approved Toxic Organic Management Plan ☐ P2 Self-assessment or EMS
☐ Other P2/Environmental Management programs (i.e. NADCAP Certification)

Health and safety issues:

Please check all that applies to your facility: ☐ Employee training P2 ☐ PPE, exposure prevention,

☐ Spill prevention, ☐ Housekeeping; Other _____

Operations & Maintenance issues (spills & leak prevention):

☐ Improved storage or stacking procedures ☐Other changes to operating practices

☐ Preventing drag-in from entering or remaining in a bath (this prolongs process bath life)

☐ Rack maintenance to keep clean and free of contaminants and cracks/deformities that can drag out plating solution

☐ Evaporation loss prevention (balls, covers, etc.) ☐Protection of anodes from corrosion using bags

Notes:

OTHER RECYCLING (technically not considered P2/SR)

Reuse and Recycling include the use of a waste without prior treatment (reuse) and use of a waste after some form of treatment (recycling). For example, solvent re-used for cleaning of parts; reclaiming waste oil or use as a fuel supplement.

Off-site Recycling, Reclamation & Circularity

Off-site recycling(technically not source reduction) refers to the promotion of the reuse and recycling of hazardous waste by other generators, which waste can be used in their production process. Check only practices that apply to your facility.

☐ Tramp oils

☐ Recycling of machine shop coolant

☐ Precipitate sludges (bath contaminants)

☐ Filter cake recycle (recover precious metals)

☐ Cellulose filters cake

☐ Silver (spent developer solutions)

☐ Metal recovery including retorting, smelting, chemical, etc.

☐ Inter-industry waste exchange

☐ Instituted clearinghouse to exchange materials that would otherwise be discarded

☐Alternate energy sources; ☐Energy efficiency (rectifiers, lighting, other)

Social & Environmental Justice

☐Participation in community organizations

☐Engaged in community and schools outreach ☐Participation in EJ initiatives

☐Trade association member