

Potential Projects for Pollution Prevention Loan Program

General Manufacturing

Equipment/ Technology Modification

- Ion exchange systems
- Closed loop systems
- Chemical recovery
- Distillation or evaporators
- Filtration-reverse osmosis
- Clarifiers
- Air knives equipment
- Countercurrent rinsing
- Centrifuge or cyclone to remove paint solids from water arrestor holding tanks
- Drain boards
- Drag out tanks
- Inventory control software
- Air compressors
- Dryers
- Pumps
- Dust collection system
- Mixers
- Process control equipment (i.e., pH sensors, conductivity meters)

Process/ Procedure Modification

- Closed loop systems
- Semi-aqueous cleaning/ aqueous cleaning
- Metal recovery
- Increase dwell time
- Agitate rinse baths
- Flow control valves

Metal Finishing

- Rinse or drag out tanks
- Freeboards
- Hang bars
- Automating the line for efficiency ion exchange systems
- Closed loop systems
- Chemical recovery distillation or evaporators
- Filtration (reverse osmosis)
- Electrowinning
- Clarifiers
- Air knives equipment
- Countercurrent rinsing
- Conductivity equipment
- Durometers
- Segregating waste streams for recycling/ recovery

- Wetting agents
- Change viscosity by changing the solution
- Closed loop systems
- Semi-aqueous degreasing/ aqueous degreasing
- Metal recovery
- Increase dwell time
- Agitate rinse baths
- Install flow control valves

Printing

- Silver free photographic film
- Ion exchange systems
- Filtration-reverse osmosis
- Automatic mixing units for fountain solution
- Automatic blanket washers
- Solvent distillation
- Parts washer
- Dispense metered solvent
- Automatic towel wringer
- Explosion-proof centrifuge VOC control by fume incineration (oxidation) in heatset web press
- Waterless printing technology
- Digital printing technology
- Automatic ink levelers
- Pumping equipment
- Ink agitator
- Recirculating chiller unit to keep fountain solution clean & reduce evaporation

- Intermittent control of film wash water
- Water washable lithographic ink system
- Aqueous plates
- UV or electron beam inks or coatings

Dry Cleaning

- Use on-site recovery techniques (distillation)
- Replace cartridge filters w/spin disk filters that can be cleaned w/out opening
- Use carbon absorber that is regenerated w/hot air stripping rather than steam stripping
- Replace a transfer machine with a dry-to-dry machine
- Upgrade to a dry-to-dry machine
- Install machine wet washing equipment
- Install a liquid carbon dioxide dry cleaning machine
- Install high efficiency boilers, water conditioning equipment, & energy recovery equipment
- Install secondary containment pans &/or dike system

- Modify processes & equipment to reduce solvent vapor loss to recover solvents for reuse. Add-on carbon adsorption or refrigeration units can be used
- Extract solvents from filters as thoroughly as possible. Gravity drainage and "cooking" are commonly used techniques

Agriculture

- Grid sampling, GIS equipment
- Composting (turner, buildings, application equipment)
- Conservation tillage
- Manure/chemical injection systems
- Pesticide/fertilizer/ manure application & handling

- Chemical mix/load pads
- Chemical injection systems



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Process/ Procedure Modification cont'd.

Reformulation, Reclamation, or Redesign

- Optimize part geometry
- Replace solvent-based cold cleaning systems with other chemicals such as terpenes (d-limonene & α -pinene)

- Optimizing part geometry
- Replace solvent-based cold cleaning systems with other chemicals such as terpenes (d-limonene & α -pinene)
- Optimize racking

- Silver recovery (ion exchange)
- Recycling film developer
- Recycling of solvent cleaners
- Recycle/reblend inks on-site or off-site (vendor)
- Energy recovery for inks
- Return unused ink to supplier
- Reclaim metal plates
- Anti-skinning products to prevent ink dry-up during shutdown & recycling of scrap film
- Paper stock
- Skid wrappers
- Rolls
- Cardboard
- Used oil & rubber blankets

- Add steam or hot water line insulation
- Install a "closed loop perc delivery system"

- If solvents cannot be made reusable, find a way to recycle them (e.g., purchase solvents from a company that will pick up & recycle the spent solvent)

- Recycling of solvent cleaners
- Recycle/reblend oils on- or off-site
- Used oil & rubber
- Energy efficient watering systems
- Livestock fencing
- Heating/cooling systems
- Solar/wind power generators

Raw Material Substitution

- Substitute nonhazardous ingredients for hazardous material
- Substitute biodegradable materials for persistent material where possible

- Substitute plating chemicals to a less toxic chemical

- Alcohol substitutes in fountain solution without HAPs water-based adhesive (polyvinyl acetate)
- Nonhazardous washer solvent
- Water-miscible solvent cleaners (hydrocarbon-based solvent cleaners mixed with water for blanket & roller cleaning)
- Low VOC solvent cleaners
- Switching from a petroleum oil-based ink to a vegetable oil-based ink such as soy or linseed oil

- Alternative petroleum solvents are being developed with lower VOC contents

- Closed loop recycling
- Substitute nonhazardous ingredients for hazardous material
- Substitute biodegradable materials for persistent material

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Housekeeping Maintenance Inventory Control Improvements

- Recover oils, solvents & other cleaning materials for reuse & recycling
- Preventative maintenance activities

- Rack & barrel maintenance

- Closed containers
- Recycling materials through supplier or recycling service
- Purchasing in bulk
- Standardizing pallet sizes
- Waste exchange
- Shop towel management
- Clean rubber gloves for reuse and paper waste reduction

- Size garment loads correctly
- Use spigots & pumps when dispensing new materials & funnels when transferring wastes to storage containers
- Close dryer door immediately upon completion of transfer
- Clean the filters that precede carbon filters weekly
- Clean lint screens to avoid clogging fans & condenser
- Open button trap & lint baskets only long enough to clean
- Check baffle assembly in cleaning machine biweekly
- Conduct transfer of solvent-saturated clothes from washer to dryer as quickly as possible
- Replace seals & gaskets as soon as they no longer form a tight seal

- Barnyard roof guttering
- Recover oils, solvents & other cleaning materials
- Preventative maintenance
- Recordkeeping

Employee Training

- Water conservation
- Leak & spill prevention
- Energy conservation
- Material handling
- Maintenance, storage & office areas

- Manual drag out time
- Maintenance of equipment for proper efficiency

- Waste reduction techniques
- Water-use reduction
- Painting techniques
- Housekeeping & spill control
- Waste segregation

- Waste reduction techniques
- Water-use reduction
- Housekeeping & spill control
- Waste segregation
- Perform boiler & water conditioning tune-ups

- Water & energy conservation
- Leak & spill prevention
- Material handling
- Maintenance, storage & office areas, equipment efficiency
- Waste reduction & segregation techniques
- Housekeeping & spill control

Energy

- Studies that determine the power factor, changing the hours of operations to lower energy costs & the installation of light timers or upgrades to more efficient lighting

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- Ventilation systems
- Soil testing
- Light efficiency upgrades
- Solar & wind power generators
- Agricultural energy production systems

General Manufacturing

**On-Site
Water
Conservation**

- Shut-off valves
- Recycle/reuse water
- Timers & foot pedals

Metal Finishing

- Shut-off valves
- Countercurrent rinsing systems
- Recycling of water
- Timers & foot pedals

Printing

- In-process water recycling
- Countercurrent rinsing

Dry Cleaning

Agriculture

- Shut-off valves
- Recycle/reuse water
- Countercurrent rinsing systems
- Recycling of water
- Backflow devices
- Nurse tanks, transfer pumps & transport
- Barn gutters
- Retention areas
- Irrigation systems
- Tiling



Michigan Department of Environmental Quality

800-662-9278
www.michigan.gov/p2loan

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