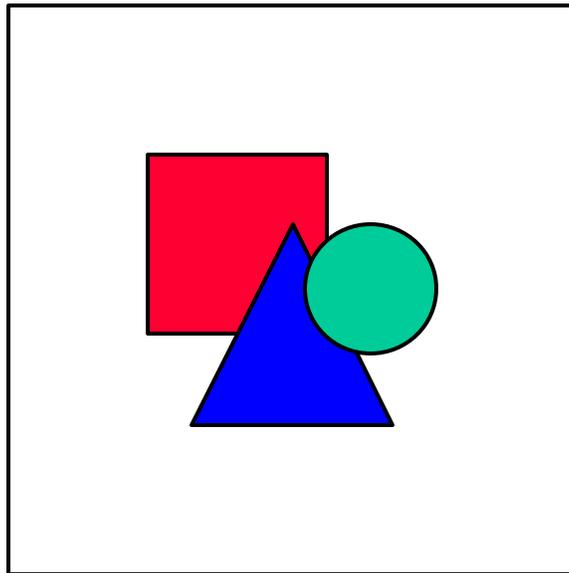

Metal Finishing Industry Pollution Prevention Project

Third Task Force Progress Report

September, 1996



Introduction :

The Metal Finishing Pollution Prevention Task Force is pleased to present its third progress report on the pollution prevention activities of the participating metal finishing companies.

The Metal Finishing Pollution Prevention Project (the Project) is a voluntary cooperative effort between the Canadian Association of Metal Finishers (CAMF), the American Electroplaters and Surface Finishers Society (AESF), the Metal Finishing Suppliers' Association (MFSA), the Ontario Ministry of the Environment and Energy (MOEE), and the federal Department of the Environment (DOE). It is a component of the Ontario Ministry of Environment and Energy's Pollution Prevention Strategy and Canada's Great Lakes Pollution Prevention Initiative.

A joint industry/government task force was established to oversee the Project. It is comprised of technical representatives from CAMF, AESF, MFSA, Environment Canada and the Ontario Ministry of Environment and Energy. The Automotive Parts Manufacturers' Association

(APMA), because of its members' interest in metal finishing, also sits as an observer on this committee.

The Project goals are to develop a methodology and supporting tools for formulating pollution prevention plans for the reduction of toxic substances used, generated and/or released in the metal finishing industry, to promote the development and implementation of site-specific pollution prevention plans by the member companies of CAMF, AESF and MFSA, and to publish progress of substance use reduction under the plans.

The intent of this report is to provide information on the project and inform the reader of results by highlighting case studies which illustrate pollution prevention plans at work within plant facilities. The projects vary in complexity, cost and approach within the environmental management hierarchy. The metal finishing companies have identified pollution prevention initiatives as having clear environmental and economic benefits. The companies have successfully executed many of the initiatives and the pollution prevention process is ongoing in most plants.

Summary of Accomplishments From Our Previous Reports:

The accomplishment of certain tasks by the participating companies and the Task Force as reported in our previous reports were critical to the development of pollution prevention at plant levels. It is beneficial to summarize them as follows:

- In order to direct Task Force efforts to the appropriate sub-sectors of the metal finishing industry, the industry sector was categorized into captive or job shops (non-captive), with each one of these being further sub-sectored into automated or manual plating operations.
- On November 26, 1992, a workshop was held in Toronto with 44 metal finishing companies to convey information and enlist company support and participation in the Project.
- An eight-step pollution prevention planning strategy (Appendix 1) was agreed to by the Task Force. The strategy was incorporated into a draft Metal Finishing Pollution Prevention Planning Guide and used by four companies (Menasco Aerospace Ltd., Dura-Chrome Ltd., Torcad Ltd., and Monroe Auto Equipment Co. of Canada) to develop their site specific pollution prevention plans.
- An initial list of substances targeted for reduction and/or elimination was prepared for use in determining priority areas for source reduction.
- Approximately 50 metal finishing companies received copies of the draft Guide for review. Industry comments and experiences gained from the four participating companies were incorporated into the final Guide.

- On September 22, 1994, the first Progress Review and Workshop Meeting was held in Toronto with attendance from 47 metal finishing companies. Case studies from three of the four test facilities were presented along with updates on the Project and breakout sessions to discuss pollution prevention training and technical assistance programs.
- A Project Coordinator was hired in December 1994 to promote pollution prevention within the Ontario metal finishing sector.
- In December 1994, the first training course based on the Metal Finishing Pollution Prevention Guide was delivered by Sheridan College and the Water Technology International Corporation (WTI), formerly Wastewater Technology Centre.

Accomplishments Since Our Previous Report:

1. Sixteen Companies Join Project

During this period, sixteen metal finishing companies have become signatories to the Project. The companies include **Continuous Colour Coat Ltd.** (Rexdale), **Delphax Systems** (Mississauga), **Dovercourt Electro-Plating Co. Ltd.** (Toronto), **Dura-Chrome Ltd.** (Wallaceburg), **Elite Metal Finishing Inc.** (Cambridge), **Kuntz Electroplating Inc.** (Kitchener), **Menasco Aerospace Ltd.** (Oakville), **Monroe Auto Equipment Co. of Canada** (Owen Sound), **Prototype Circuits Inc.** (Scarborough), **Rauscher Plating Ltd.** (Cambridge), **Reliable Plating Ltd.** (Gloucester), **Strataflex Canada Corp.** (Toronto), **Torcad Ltd.** (Toronto), **Anti-Friction Enterprises (1985) Ltd.** (Rexdale), **Circoflex Corp.** (Scarborough), and **Aerospace Metal Finishing** (Schomberg). In the Metal Finishing Sector, twelve facilities have applied for recognition of their achievements by the Ontario MOEE Pollution Prevention Pledge Program (P4). The companies and results reported to the Ontario P4 program are listed in Appendix 5.

2. Development and Implementation of Pollution Prevention Plans

To develop and implement pollution prevention plans within their facilities, the metal finishing companies used the 8-Step Pollution Prevention Planning Process (Appendix 1) developed by the Task Force.

The companies also use a reporting format developed by the Task Force for reporting on their site specific pollution prevention projects. The site specific project reports were used by the Task Force to prepare the project profile tables which appear as Tables 1 and 2. Table 3 summarizes the reductions and cost savings achieved from the case studies and the project summary case studies are provided at the end of this progress report. The project summaries provide information on plant projects, target chemicals, objectives, project description, expected or achieved reductions, and advantages including cost savings (See Appendices 2 & 3).

The site-specific pollution prevention project achievements in this report are examples of the pollution prevention activities by the companies.

3. Publication of Metal Finishing Pollution Prevention Guide

The Pollution Prevention Planning Guide was finalized in September 1995 and released at the Task Force's Second Progress Review and Workshop Meeting in October 1995. To date, the Guide has been widely distributed across the metal finishing sector.

4. Progress Workshop

On October 5, 1995, the Metal Finishing Pollution Prevention Task Force hosted the Second Progress Review and Workshop Meeting at the Holiday Inn (Airport South) in Toronto. The meeting has become an annual fall event in Toronto. Approximately 70 people attended the meeting with 55% of them representing metal finishing companies, 26% metal finishing suppliers and 19% governments (Appendix 4).

Four metal finishing companies, Dovercourt Electro-Plating Co. Ltd., Torcad Ltd., Kuntz Electroplating Ltd. and Plate-Way Ltd., presented their experiences and successes with the pollution prevention planning process. Both Dovercourt and Torcad presented their cost savings associated with conducting one specific pollution prevention activity, that is, Dovercourt from chrome use reduction and Torcad from re-using spent cleaners. Kuntz Electroplating spoke about how the company has made pollution prevention work for them and the benefits of taking the Task Force sponsored training and Plate-Way discussed pollution prevention as a continuous improvement process.

The meeting provided an opportunity for participating metal finishing companies to address their peers, to outline the programs that they are committed to and to summarize some of the results that they have achieved to date. At the same time, the Task Force sought input from industry on issues which have arisen since the last workshop and future directions.

TABLE 1. Summary Of New/Updated Pollution Prevention Case Studies

Plant Pollution Prevention Project	Target Substance	Results/Advantages	Method Employed	Media Addressed
Closed Loop Water System	Water	<ul style="list-style-type: none"> • \$5,000 /y savings on water • Quality improvement resulting in less re-works 	<ul style="list-style-type: none"> • Install deionization equipment and electro dialysis equipment on metal bearing rinses 	<ul style="list-style-type: none"> • Discharge to sewer
Recovery of sulphuric acid and ferric chloride for reuse	Sulphuric acid, Ferric chloride	<ul style="list-style-type: none"> • 4,000 kg/y and \$1,473/y savings for sulphuric acid • 9,048 kg/y and \$8,324/y savings for ferric chloride 	<ul style="list-style-type: none"> • Install acid purification unit for sulphuric acid • Internal recycling of spent ferric chloride 	<ul style="list-style-type: none"> • Discharge to sewer
Elimination of acid and alkaline wastes from disposal	Acid and alkaline wastes	<ul style="list-style-type: none"> • \$72,000 /y savings on disposal cost • 229,000 kg/y acid waste & 2,660 kg/y alkaline waste containing heavy metals • 370 kg/y waste oils and lubricants 	<ul style="list-style-type: none"> • Installed an electrowinning system and used an existing ion exchange system for persulfate and sulphuric acid wastes 	<ul style="list-style-type: none"> • Offsite disposal
Cooling water reduction	Non-contact cooling water	<ul style="list-style-type: none"> • \$50,000 /y savings • 50% of process 	<ul style="list-style-type: none"> • Install a cooling water recycling system 	<ul style="list-style-type: none"> • Discharge to sewer

		cooling waters		
Reduction in chromate in zinc chromate process	Spent chromate solution	<ul style="list-style-type: none"> • \$6,000 /y savings • 1,080 kg/y of conc. chromate solution 	<ul style="list-style-type: none"> • Installed a screen tray for the chromate tank 	<ul style="list-style-type: none"> • Discharge to sewer, on-site disposal
Extension of cleaner life by oil removal	Alkaline cleaning solution	<ul style="list-style-type: none"> • 40% use reduction • 80% reduction in cleaner dump 	<ul style="list-style-type: none"> • Installation of a unit to remove oil & suspended matter from their alkaline cleaning solutions 	<ul style="list-style-type: none"> • Discharge to sewer, on-site disposal
Reduction of chromic acid wastes	Chromic acid	<ul style="list-style-type: none"> • \$102,000 /y savings • 25,000 kg/y of chromium hydroxide sludge disposal eliminated 	<ul style="list-style-type: none"> • Installed a pulse spray system with atmospheric evaporation 	<ul style="list-style-type: none"> • Discharge to sewer, offsite disposal
Regeneration of Spent Acid	Hydrochloric acid	<ul style="list-style-type: none"> • Savings on acid and acid neutralizing chemicals • Reduction in waste and solid disposal cost 	<ul style="list-style-type: none"> • Conducting trial runs on acid recovery prototype system on its phosphating bath 	<ul style="list-style-type: none"> • Discharge to sewer, off-site disposal

TABLE 2. Summary Of Previously Reported Pollution Prevention Case Studies

Plant Pollution Prevention Project	Target Substance	Results/Advantages	Method Employed	Media Addressed
Elimination of spills from black oxide	Sodium Hydroxide	<ul style="list-style-type: none"> • 454 kg/y use 	<ul style="list-style-type: none"> • Employee awareness and charting for process 	<ul style="list-style-type: none"> • Discharge to

process		reduction.	control.	sewer
Elimination of lead masking tape disposal to landfill	Lead masking tape	<ul style="list-style-type: none"> • 385 kg/y from landfill to recycle. 	<ul style="list-style-type: none"> • Employee awareness and providing a collection container. 	<ul style="list-style-type: none"> • Offsite disposal
Substitution of Liquid Cleaners in Place of Powder Cleaners	Powder cleaners	<ul style="list-style-type: none"> • No longer have wasted cleaner that didn't dissolve, and saved labour in adding the cleaners. 	<ul style="list-style-type: none"> • Switched all cleaners on the stainless steel line to liquid form. 	<ul style="list-style-type: none"> • Discharge to sewer
Reduction in chlorine use in waste treatment	Chlorine	<ul style="list-style-type: none"> • Reduced residual chlorine from 50 mg/L to <10 mg/L. • Reduced chlorine use as a percent of sales by 20%. 	<ul style="list-style-type: none"> • Increased monitoring frequency. 	<ul style="list-style-type: none"> • Discharge to sewer
Reduction and Recycling of rinse waters	Water	<ul style="list-style-type: none"> • Savings from improved product quality and a reduced number of rejects. • Unexpectedly, no decrease in water use was achieved. 	<ul style="list-style-type: none"> • Automated rinsewater flow control with installation of 12 conductivity controllers. 	<ul style="list-style-type: none"> • Discharge to sewer
Recycling of Spent	Cleaning	<ul style="list-style-type: none"> • \$30,000 / y 	<ul style="list-style-type: none"> • Installed 4 oil removers 	<ul style="list-style-type: none"> • Discharge to

Cleaning Solution	Solutions	savings <ul style="list-style-type: none"> • 15,000 L/y reduced 		sewer
Recycling of Rinsewater	Water	<ul style="list-style-type: none"> • 50% of rinsewater recycled • \$60,000 /y savings on water 	<ul style="list-style-type: none"> • reduced chlorine level in process rinsewater by reducing and diverting waste acid dumps and acid pickling rinsewaters 	<ul style="list-style-type: none"> • Discharge to sewer

TABLE 3. Reductions Acheived In New And Previous Studies By Substances

Substance	Reduction/Elimination reported in 4 New Case Studies (kg/year)	Reduction/Elimination reported in 4 Previous Case Studies (kg/year)	Total (kg/year)	Financial Savings reported in 4 New Case Studies (\$/year)	Financial Savings reported in 4 Previous Case Studies (\$/year)	Total (\$/year)
sodium hydroxide	---	454	454	---	---	---
lead masking tape	---	385	385	---	---	---
alkaline cleaner*	---	15,000	15,000	---	\$30,000	\$30,000
chromium hydroxide sludge	---	25,000	25,000	---	\$102,000	\$102,000
sulphuric acid	4,000	---	4,000	\$1,473	---	\$1,473
ferric chloride>	9,048	---	9,048	\$8,324	---	\$8,324
chromate solution (concentrated)	1,080	---	1,080	\$6,000	---	\$6,000

acid waste (containing heavy metals)	229,000	---	229,000	\$72,000	---	\$72,000
alkaline waste (containing heavy metals)	2,660	---	2,660			
>waste oils and lubricants	370	---	370			
Total	246,158	40,839	286,997	\$87,797	\$132,000	\$219,797

*Assumed a specific gravity of 1 kg/L in converting from litre to kilogram.

5. Project Co-ordinator to Promote Pollution Prevention to the Industry

Over the past year and a half, John Nagata, Metal Finishing Project Co-ordinator, visited more than 100 metal finishing companies throughout Ontario to promote and assist companies initiating pollution prevention activities. He has been in contact with municipal staff to solicit their assistance and participation on the Project. He attends all Task Force meetings, assists in Task Force activities, and reports on his activities to the Task Force. His activities have significantly raised the awareness of the Project within the metal finishing sector.

6. Training

A training course based on the Metal Finishing Pollution Prevention Guide was developed by WTI and Sheridan College and offered to metal finishers throughout Ontario. The training provides an introduction to the eight step pollution prevention planning process documented in the Guide. Through examples and case studies, the course demonstrates the benefits that can be achieved from the planning process. To date, three courses have been delivered to 41 students. The course fee is partially subsidized by the Ontario Ministry of Environment and Energy and Environment Canada.

Government funding for pollution prevention training courses is available for metal finishers. All requests for reimbursement of course tuition fee will be reviewed by the Task Force.

7. Industrial Waste Audit Program (IWAP)

To date, two signatory companies, Reliable Plating Ltd. in Gloucester and Anti-Friction Enterprises (1985) Ltd. in Rexdale, have taken advantage of the Industrial Waste Audit Program (IWAP) to help them with their pollution prevention planning. The program provides assistance to companies initiating pollution prevention planning activities. Through this service, companies are given assistance in developing a comprehensive list of wastes that could be addressed in a pollution prevention program. Furthermore, for some of the higher priority wastes, potential solutions for the reduction or elimination of the wastes are provided.

This program provides a hands-on demonstration of the benefits that can be realized through pollution prevention planning. It is especially important for those metal finishers who believe that they have neither the expertise nor resources to conduct a pollution prevention planning program to investigate this program. The goal of the program is to assist the metal finisher in realizing that the time and effort put into the program can result in cost savings, larger profits and a better environmental record. It is hoped that participation in the program will encourage the finisher to continue the planning process on his own.

The Metal Finishing Pollution Prevention Project is providing, through the WTI and funding from Environment Canada, this subsidized on-site technical assistance for the metal finishers signed onto the MOU.

8. Pollution Prevention Resource Centre

A Metal Finishing Resource Centre was established in Burlington, Ontario by the Great Lakes Pollution Prevention Centre and WTI. It provides a central location for the metal finisher to obtain information on pollution prevention. The Centre is linked with international information resources and provides a comprehensive range of expertise to companies.

Aside from providing pollution prevention publications and case studies, the Centre will also advise clients on available consultants, suppliers and technology to meet the metal finishers' needs. Through reports provided by the Centre, the Task Force will have a better idea of the needs of the industry.

9. Demonstration Projects/Studies

Monroe Auto Equipment Co. of Canada has taken an initiative to replace its cooling water tower systems with a magnetic field treatment system. The project will reduce chemical use, waste and

costs. The project is partially funded by Environment Canada and results from the project will be published in the fourth progress report.

Kuntz Electroplating Inc. in Kitchener, Ontario has proposed a demonstration project on nickel recycling by a group of metal finishing companies in the Kitchener/Waterloo area. The Task Force is providing support to the project by hiring the Pollution Prevention Resource Centre to conduct a thorough literature review on nickel recovery.

The Task Force will continue to support the technology development and assessment needs of industry by promoting, encouraging and supporting demonstration projects and studies by companies and research facilities.

10. Ongoing Communications

For the past two years, the Task Force has hosted a booth at the annual AESF Springfest in April. At the last Springfest, representatives from metal finishing companies staffed a booth to promote the Project and to answer inquiries.

In February 1996, a paper written by the government task force representatives and entitled "Ontario Metal Finishing Industry Pollution Prevention Project" was presented at the annual AESF Conference in Florida. Information on the Project was also distributed through the Environment Canada booth.

Ongoing Activities And Future Directions:

The Task Force will continue to promote and assist companies in developing and implementing pollution prevention programs for reduction of pollutants into the environment. Some of the issues to be addressed by the Task Force are:

- Identify and recommend solutions for regulatory and technology barriers to pollution prevention
- Increase company participation in the Metal Finishing Project
- Ensure all practices and tools, including technical assistance (e.g. IWAP) and training are available to all metal finishers

- Assist metal finishers in documenting past VOC and toxics reduction efforts in cleaning, degreasing and surface coating operations and identify alternatives
- Renewal of the Memorandum of Understanding which terminates in February 1997
- Publish more case studies from metal finishers
- Provide support to metal finishing companies initiating demonstration projects

Additional focus will be placed on more effective reporting and verification of quantifiable results.

Requests For Additional Information:

For additional information, please contact

Mr. John Nagata
**Project Coordinator &
Canadian Association of
Metal Finishers**

(519) 681-5590

Mr. Walter Wikaruk
**American Electroplaters and
Surface Finishers**

(416) 237-1400

Ms. Pauline M. Brown
Environment Canada

(416) 739-5892

Dr. Brian LeClair
**Ministry of Environment
and Energy**

(416) 314-3878

Information herein is provided by the Government of Canada. Its use and reference is unlimited, upon condition that the source is correctly attributed.

Thank you.

