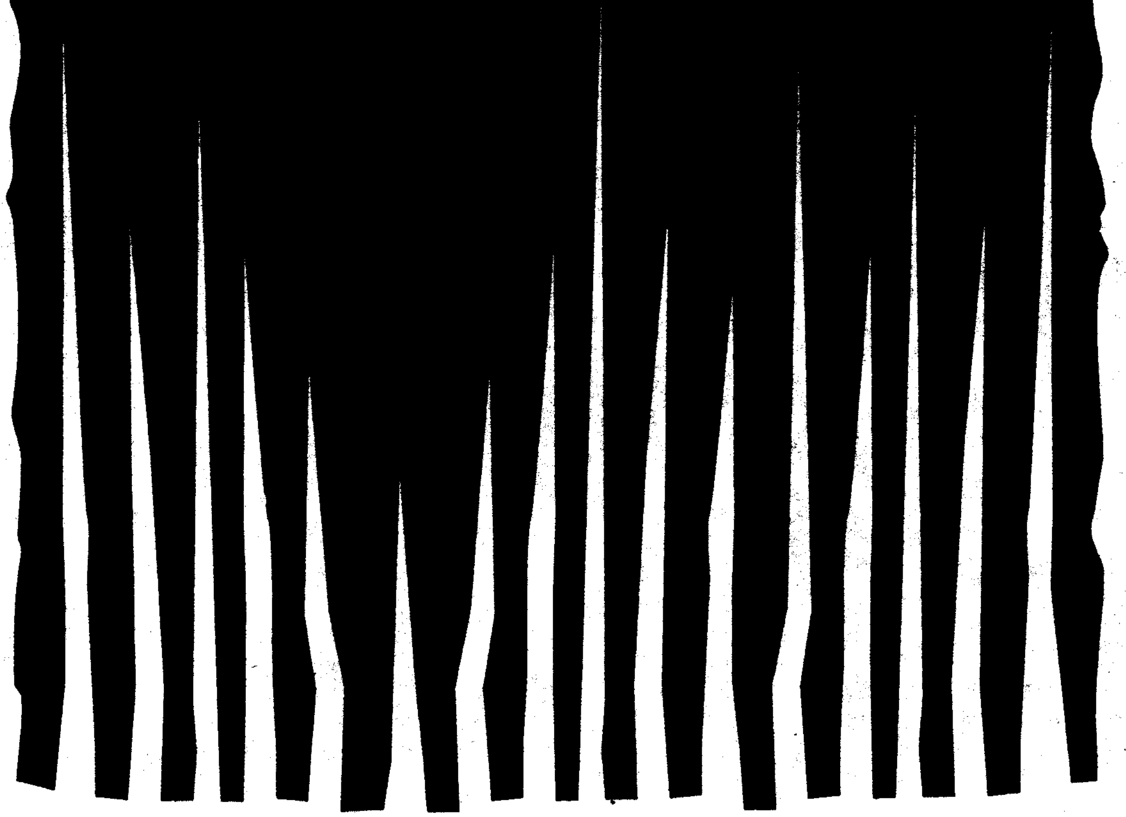
# CLEAN AIR ACT COMPLIANCE
## FOR CHROMIUM EMISSIONS FROM ELECTROLYTIC PROCESSES



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# Clean Air Compliance

# for

# Chromium Emissions from Electrolytic Processes

**First Edition, June 1995**

# ABOUT THIS MANUAL

**The University of Tennessee Center for Industrial Services (CIS)** wrote this manual under contract with the Tennessee Small Business Assistance Program to help chromium electroplating and anodizing facilities comply with Environmental Protection Agency (EPA) regulations (40 CFR 63, Subpart N). These regulations, issued on January 25, 1995, limit chromium emissions from electroplating and anodizing tanks.

Please see Appendix D for more information on the Tennessee Small Business Assistance Program and Clean Air Program. Appendix D also describes Tennessee's regulatory structure and clean air authority.

**Part 1 of this manual (Compliance) focuses on compliance duties.** Part I does not cover every aspect of the regulation but does provide in-depth answers to anticipated questions using a "frequently asked question" format. The following list represents section numbers and sample questions answered in these sections.

| **Section** | **Sample Question** |
|---|---|
| 1 | What types of operations are affected? |
| 2 | What standards must we meet and when? |
| 3 | What must we do to demonstrate compliance? |
| 4 | What plans must we generate? |
| 5 | What monitoring must we do? |
| 6 | What records must we keep? |
| 7 | What reports must we file? |

Terms shown in ***bold italics*** have a regulatory definition. Appendix A provides term definitions.

**Part II (Waste Reduction for Electroplating Facilities) focuses on pollution prevention.** Part II outlines the many opportunities available for reducing the variety of wastes the chromium electroplating and anodizing industry generates.

# CONTENTS

About This Manual . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . iii

The Basics . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 1
  What Emissions Are Regulated? . . . . . . . . . . . . . . . . . . . . . . . . . . . 1
What Types of Operations Are Affected? . . . . . . . . . . . . . . . . . . . . . . . . 1
  Are There Exceptions? . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 1
  Are Emissions From All Tanks Regulated? . . . . . . . . . . . . . . . . . . . . . 1
  How Do The Regulators Want You To Control Chromium Emissions? . . . . . . . . . 2
  What Must You Do To Comply? . . . . . . . . . . . . . . . . . . . . . . . . . . . 2

Emission Standards and Controls . . . . . . . . . . . . . . . . . . . . . . . . . . . 3
  What Emission Standards Must Be Met? . . . . . . . . . . . . . . . . . . . . . . . 3
    Table 1—Emission Limitation Standards . . . . . . . . . . . . . . . . . . . . . 3
  How Does a Hard Chromium Electroplating Facility Qualify for Status as Existing and Small? . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 4
  What Specific Means Do The Regulators Want You To Use To Control Emissions? . . . 4
  When Must You Achieve These Emission Standards? . . . . . . . . . . . . . . . . 5
  Does Your Choice of Control Method Affect Anything Besides the Emission Standard? . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 5

Demonstrating Initial Compliance . . . . . . . . . . . . . . . . . . . . . . . . . . 7
  How Do You Satisfy Initial Compliance Requirements? . . . . . . . . . . . . . . 7
  How Do You Measure Chromium Emissions? . . . . . . . . . . . . . . . . . . . . . 7
  How Do You Measure Surface Tension? . . . . . . . . . . . . . . . . . . . . . . . 7
  When Do You Report Results of Compliance Testing? . . . . . . . . . . . . . . . . 8
  Must You Do Anything Else While Testing Emissions? . . . . . . . . . . . . . . . 8

Operation and Maintenance Plans . . . . . . . . . . . . . . . . . . . . . . . . . . . 9
  What Must an Operation and Maintenance (O&M) Plan Include? . . . . . . . . . . . 9
  When Must You Implement? . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 9
  Are There Any Exemptions? . . . . . . . . . . . . . . . . . . . . . . . . . . . . 9
    Table 2—Summary of Work Practice Standards . . . . . . . . . . . . . . . . . . 10

Compliance Monitoring & Control . . . . . . . . . . . . . . . . . . . . . . . . . . . 13
  How Do You Monitor and Control Ongoing Compliance? . . . . . . . . . . . . . . . 13
  What Specifically Must You Monitor and Control? . . . . . . . . . . . . . . . . . 13
    Table 3—Packed-Bed Scrubber (PBS) System Requirements . . . . . . . . . . . . 13
    Table 4—Composite Mesh-Pad (CMP) Systems . . . . . . . . . . . . . . . . . . . 14
    Table 5—PBS/CMP Composite Systems . . . . . . . . . . . . . . . . . . . . . . . 14
    Table 6—Fiber-Bed Mist Eliminator System Requirements . . . . . . . . . . . . . 14
    Table 7—Wetting-Agent or Combination Wetting-Agent and Foam Blanket-Type Fume Suppressant System Requirements . . . . . . . . . . . . . . . . . . . . . . 14

Table 8—Foam Blanket-Type Fume Suppressant System Requirements . . . . . . . 15
Table 9—Combination Fume Suppressant and Add-On Control Device System Requirements . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 15
Can You Reduce Monitoring Frequency? . . . . . . . . . . . . . . . . . . . . . . 15

Keeping Required Records . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 17
What Records Must You Keep? . . . . . . . . . . . . . . . . . . . . . . . . . . 17
How Long Must You Keep Records? . . . . . . . . . . . . . . . . . . . . . . . . 17
What Specific Information Must Each Record Include? . . . . . . . . . . . . . . . 18
Table 10—Inspection Records . . . . . . . . . . . . . . . . . . . . . . . . . . 18
Table 11—Maintenance Records . . . . . . . . . . . . . . . . . . . . . . . . . 18
Table 12—Malfunction Records . . . . . . . . . . . . . . . . . . . . . . . . . 18
Table 13—Performance Test Report Records . . . . . . . . . . . . . . . . . . . 19
Table 14—Monitoring Records . . . . . . . . . . . . . . . . . . . . . . . . . . 19
Table 15—Excess Emissions Records . . . . . . . . . . . . . . . . . . . . . . 19

Reports and Notices . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 21
What Reports/Notices Must You File—And When? . . . . . . . . . . . . . . . . . 21
Table 16—Chromic Acid Baths
Trivalent Chromium Baths Without A Wetting Agent . . . . . . . . . . . . . . . . 21
Table 17—Trivalent Chromium Baths With A Wetting Agent . . . . . . . . . . . . 21
What Must Compliance Notices and Reports Include? . . . . . . . . . . . . . . . 22
Table 18—Initial Notification . . . . . . . . . . . . . . . . . . . . . . . . . . 22
Table 19—Performance Test Notice . . . . . . . . . . . . . . . . . . . . . . . 22
Table 20—Performance Test Reports . . . . . . . . . . . . . . . . . . . . . . . 23
Table 21—Compliance Status Notification . . . . . . . . . . . . . . . . . . . . 23
Table 22—On-going Compliance Reports . . . . . . . . . . . . . . . . . . . . . 24
Do Exceedances Affect Ongoing Compliance Reporting? . . . . . . . . . . . . . . 25
How Is Construction/Reconstruction Regulated? . . . . . . . . . . . . . . . . . . 26
Table 23—Construction Notice . . . . . . . . . . . . . . . . . . . . . . . . . . 26
Table 24—Reconstruction Notice . . . . . . . . . . . . . . . . . . . . . . . . . 26
Where and How Must You Send Reports or Notices? . . . . . . . . . . . . . . . . 27
Who Must Sign a Report? . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 27

Appendices

A—Definitions . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 29
B—Calculating Procedure . . . . . . . . . . . . . . . . . . . . . . . . . . . . 31
C—Procedures for Establishing Monitoring Parameter Measurements . . . . . . . . . 33
D—Small Business Assistance Program . . . . . . . . . . . . . . . . . . . . . . 35

## Part II—Waste Reduction for Electroplating Facilities

The "Ins & Outs" of Electroplating . . . . . i

Electroplaters' Waste Streams . . . . . 1
  Introduction . . . . . 1
  Solvent Wastes . . . . . 1
  Waste Water . . . . . 2
  Corrosive Aqueous Wastes . . . . . 2
  Sludges . . . . . 3
  Packaging Wastes . . . . . 4
  Other Wastes . . . . . 5

Waste Reduction Options . . . . . 6
  Introduction . . . . . 6
  Awareness—Powerful Weapon in Waste Reduction . . . . . 7

Reduction Options for Individual Waste Streams . . . . . 7
  Solvent Wastes . . . . . 8
  Wastewater from Cleaning Systems . . . . . 12
  Plating Process Wastes . . . . . 13
  Wastewater Treatment Facility Wastes . . . . . 17
  Packaging Wastes . . . . . 19

General Notes on Recycling . . . . . 20

Bibliography . . . . . 22
  Incentives for Waste Reduction . . . . . 22
  Waste Reduction Programs . . . . . 22
  Waste Reduction Techniques—General . . . . . 23
  Waste Reduction Techniques—Specific . . . . . 23
  Selected Electroplating Bibliography . . . . . 24
  Sources of Listed Publications . . . . . 29

Appendix . . . . . 30
  Waste Reduction Preassessment Checklist . . . . . 31
  Selected Vendors . . . . . 34
  On-site Solvent Recovery Services . . . . . 35
  Used Oil Burners . . . . . 35
  Parts Cleaners . . . . . 35
  Sludge Dryers and Compacting Equipment . . . . . 35

# THE BASICS

## What Emissions Are Regulated?

Chromium emissions from all electroplating or anodizing tanks are regulated during startup, operation, and shutdown. Each such tank, by definition, is an affected (regulated) emission source.

## What Types of Operations Are Affected?

- ***hard chromium electroplating***
- ***decorative chromium electroplating***
- ***chromium anodizing***

## Are There Exceptions?

Yes—Limitations on emissions from electrolytic processing tanks do not apply when

- conducting ***research or laboratory operations*** in the tank, or
- equipment ***malfunctions*** and you are applying the work practice standards of your Operations and Maintenance (O&M) Plan

## Are Emissions From All Tanks Regulated?

No—Examples of chromium emissions from non-electrolytic process tanks that are exempted from regulation include the following:

- rinse tanks
- etching tanks
- cleaning tanks
- chrome conversion coating tanks

## How Do Regulators Expect You To Control Chromium Emissions?

The Environmental Protection Agency (EPA) cites the following two fundamental types of control, listing variations and combinations of each. You can choose what to use but bear responsibility for achieving required ***emission limitations***.

- ***add-on air pollution control device(s)***
- ***chemical fume suppressants***

## What Must You Do To Comply?

- Achieve chromium emission standards by controlling atmospheric discharges from all chromium electrolytic processing tanks as required for your specific type of operation.
- Demonstrate timely initial compliance with the emission standard established for your type of operation.
- Prepare and implement an "Operation and Maintenance Plan" for your tank source(s), the emission control system, and the control system's monitoring equipment.
- Monitor operations to demonstrate continuous compliance.
- Keep required records.
- Fulfill reporting and notification requirements, which include notifying the Administrator prior to commencing any construction or reconstruction of a chromium emission source.
- Apply for a Title V Permit-This manual does not cover Title V permitting requirements.

# EMISSION STANDARDS AND CONTROLS

## What Emission Standards Must Be Met?

**Table 1** shows emission limitation standards for electrolytic tanks that perform the same type of operation. The Administrator bases these standards on results achieved by using specific control methods, but you are not obligated to use those methods.

All users of ***add-on air pollution control devices*** and of ***fume suppressants*** unable to comply with the demonstration requirements shown in the table's footnotes must demonstrate compliance with the limitation standards through an emissions test. When an add-on device also controls different source types or non-affected sources, the user must calculate the standards. See **Appendix B.**

### Table 1—Emission Limitation Standards

| **Tank Type** | **Hard Chromium Plating Tanks** | |
|---|---|---|
| | **Small** | **Large** |
| **Existing Tanks:** | 0.03 mg/dscm[1]<br>(1.3 × $10^{-5}$ gr/dscf)[2] | 0.015 mg/dscm<br>(6.6 × $10^{-6}$ gr/dscf) |
| **New Tanks:** | 0.015 mg/dscm(6.6 × $10^{-6}$ gr/dscf) | 0.015 mg/dscm<br>(6.6 × $10^{-6}$ gr/dscf) |
| | **Decorative Chromium Plating Tanks** | |
| **All Tanks:** | 0.01 mg/dscm [a & b] (4.4 × $10^{-6}$ gr/dscf) | |
| | **Chromium Anodizing Tanks** | |
| **All Tanks:** | 0.01 mg/dscm [b] (4.4 × $10^{-6}$ gr/dscf) | |

1 milligrams per dry standard cubic meter

2 grains per dry standard cubic foot

a Decorative electroplaters using a trivalent chromium bath can meet the emission standard by demonstrating ongoing purchase and use of bath chemicals contain a wetting agent ingredient.

b Decorative electroplaters and anodizers using a fume suppressant containing a wetting agent can meet the emission limitation by demonstrating ongoing control of plating bath surface tension. The surface tension must be kept less than 45 dynes/cm (3.1 × $10^{-3}$ $\text{lb}_f$/ft).

## How Does a Hard Chromium Electroplating Facility Qualify for Status as Existing and Small?

***Existing sources*** are defined as having operated before December 16, 1993, and as having had no ***reconstruction*** after that date.

The regulators consider sources small if they are less than the Maximum Cumulative Potential Rectifier Capacity (MCPRC) of 60 million amp-hours/year. When they equal or exceed this amount, these sources become large size and have one year to comply with large source standards.

The regulators base MCPRC on installed, hard-plating rectifier capacity but conditionally accepts actual usage or Title V permit operating limitations from sources wanting to be classified as small.

These three status conditions are summarized as follows:

- MCPRC = (8400) (0.70) (Installed, hard-plating rectifier capacity)
- MCPRC = Actual, if source uses non-resettable amp-hr meters and keeps monthly validating records
- MCPRC = (Title V-permitted operating hours) (installed rectifier capacity)

## What Specific Means Do The Regulators Want You To Use To Control Emissions?

The regulations allow you to make that choice. EPA does not specify what controls to use but acknowledges the applicability of the following specific control techniques:

- Add-on air pollution control devices
  - composite mesh-pad system (CMP)
  - packed-bed scrubber (PBS)
  - PBS/CMP system
  - fiber-bed mist eliminator
- Chemical fume suppressants
  - wetting agent-type
  - foam blanket-type

## When Must You Achieve These Emission Standards?

Hard chromium electroplaters and chromium anodizers existing on December 16, 1993, must achieve compliance by January 25, 1997.

Decorative chromium electroplaters existing on December 16, 1993, must achieve com iance by January 25, 1996.

Any type source, new or reconstructed, started after January 25, 1995, must achieve c pliance upon startup.

Any type of source, new or reconstructed, started after December 16, 1993, but before January 25, 1995, must follow an approved compliance schedule.

## Does Your Choice of Control Method Affect Anything Besides the Emissio Standard?

Yes—Your choice of control method affects most other regulated duties, such as

- Operations and Maintenance Plans (Section 4)
- Monitoring (Section 5)
- Recordkeeping (Section 6)
- Reporting (Section 7)

## When Do You Report Results of Compliance Testing?

Report results within 90 days following test completion. The test report must accompany your formal "Notice of Compliance."

## Must You Do Anything Else While Testing Emissions?

Yes—Establish the specific value of your control system's operating parameters for compliance monitoring.

The regulations require ongoing monitoring. The regulations have identified system operating parameters requiring control but because each control system is unique, have not specified single control values for those parameters. Hence, they require you to establish site-specific values for these system control parameters during compliance testing.

Specific parameters to be monitored and monitoring frequency depend upon your emission control system. **Section 5** covers the details.

# OPERATION AND MAINTENANCE PLANS

## What Must an Operation and Maintenance (O&M) Plan Include?

- Specific O&M criteria covering the affected source, add-on control equipment, if used, and process and control system monitoring equipment
- An O&M checklist for documentation of routine activities
- Work practice standards specified in Table 2 when the device or monitoring equipment listed is used for emission control
- Preventive O&M procedures
- Preplanned malfunction response actions for source and emission control equipment
- Normal and emergency procedures for startup and shutdown
- A corrective action procedure to identify and eliminate the cause(s) of any repetitive failure or malfunction

## When Must You Implement?

Hard chromium electroplaters and chromium anodizers existing on December 16, 1993, must implement the plan by January 25, 1997.

Decorative chromium electroplaters existing on December 16, 1993, must implement the plan by January 25, 1996.

New sources or those reconstructed after December 16, 1993, must implement the plan upon startup.

## Are There Any Exemptions?

Yes—Decorative electroplaters using trivalent chromium baths have no regulated work practices if they can demonstrate on-going purchase and use of bath chemicals containing a wetting agent.

**Table 2—Summary of Work Practice Standards**

| Control method | Work practice standards | Frequency |
|---|---|---|
| Composite mesh-pad (CMP) system | 1. Visually inspect device to ensure there is proper drainage, no chromic acid buildup on the pads, and no evidence of chemical attack on the structural integrity of the device.<br>2. Visually inspect back portion of the mesh pad closest to the fan to ensure there is no breakthrough of chromic acid mist.<br>3. Visually inspect ductwork from tank or tanks to the control device to ensure there are no leaks.<br>4. Perform washdown of the composite mesh pads in accordance with manufacturer's recommendations. | 1. 1/quarter<br>2. 1/quarter<br>3. 1/quarter<br>4. Per manufacturer |
| Packed-bed scrubber (PBS) | 1. Visually inspect device to ensure there is proper drainage, no chromic acid buildup on the packed beds, and no evidence of chemical attack on the structural integrity of the device.<br>2. Visually inspect back portion of the chevron blade mist eliminator to ensure it is dry and there is no breakthrough of chromic acid mist.<br>3. Visually inspect ductwork from tank or tanks to the control device to ensure there are no leaks.<br>4. Add fresh makeup water to the top of the packed bed.[a,b] | 1. 1/quarter<br>2. 1/quarter<br>3. 1/quarter<br>4. Whenever makeup is added |
| PBS/CMP system | 1. Same as for CMP system<br>2. Same as for CMP system<br>3. Same as for CMP system<br>4. Same as for CMP system | 1. 1/quarter<br>2. 1/quarter<br>3. 1/quarter<br>4. Per manufacturer |

**Table 2—Summary of Work Practice Standards**

| | | |
|---|---|---|
| Air pollution control device (APCD) not listed in rule | To be proposed by the source for the air regulatory authority's approval | To be proposed by the source and approved by the air regulatory authority |
| **Monitoring Equipment** | | |
| Pitot tube | Backflush with water or remove from the duct and rinse with fresh water. Replace in the duct and rotate 180 degrees to ensure that you obtain the same zero reading. Check pitot tube ends for damage. Replace pitot tube if cracked or fatigued. | 1/quarter |
| Stalagmometer | Follow manufacturer's recommendations. | |

a If greater than 50 percent of the scrubber water is drained (e.g., for maintenance purposes), add makeup water to the scrubber basin.

b For horizontal-flow scrubbers, the top is defined as the section of the unit directly above the packing media such that the makeup water would flow perpendicular to the air flow through the packing. For vertical-flow units, the top is defined as the area downstream of the packing material such that the makeup water would flow countercurrent to the air flow through the unit.

# COMPLIANCE MONITORING & CONTROL

## How Do You Monitor and Control Ongoing Compliance?

- Establish site-specific parameters during initial compliance tests for your type of emission control system as mandated by the regulations.
- Use procedures mandated by the regulations to establish these parameters. Appendix C outlines requirements for locating ports and pressure taps to measure system pressure drop and velocity pressure.
- Observe and record the degree of control being exerted on those parameters during all subsequent operation according to the minimum frequency the regulations specify.
- Take corrective action when any ***malfunction*** occurs according to a written Operations and Maintenance plan. (See Section 4.)
- Report "exceedances," that is, any failure to control within designated limits.

## What Specifically Must You Monitor and Control?

Monitoring and controlling depend on the type of control system you use. The following tables reflect mandated requirements for various types of control systems. Users of unlisted types of control devices must submit and secure the air regulatory authority's approval of a monitoring plan. The submittal must include a description of the device, test results establishing compliance, a copy of the O&M plan, and appropriate site-specific operating parameters.

| Table 3—Packed-Bed Scrubber (PBS) System Requirements |
|---|
| Establish the pressure drop and velocity pressure at the inlet of your system's control device during initial compliance testing. |
| Monitor and record system pressure drop and velocity pressure once per day. |
| Control the pressure drop at the value established ± 1 inch of water. |
| Control the velocity pressure within ± 10 percent of the value established. |

| Table 4—Composite Mesh-Pad (CMP) Systems |
|---|
| Establish your system's pressure drop during initial compliance testing. |
| Monitor and record the system pressure drop once per day. |
| Control system pressure drop at the value established ± 1 inch of water. |

| Table 5—PBS/CMP Composite Systems |
|---|
| Establish your system's pressure drop during initial compliance testing. |
| Monitor and record the system pressure drop once per day. |
| Control system pressure drop at the value established ± 1 inch of water. |

| Table 6—Fiber-Bed Mist Eliminator System Requirements |
|---|
| Establish your system's pressure drop and the pressure drop across the anti-plugging control device installed upstream of the fiber bed during initial compliance testing. |
| Monitor and record the system pressure and pressure drop across the upstream control valve drop once per day. |
| Control system pressure drop and upstream control valve pressure drop at respective values established ± 1 inch of water. |

| Table 7—Wetting-Agent or Combination Wetting-Agent and Foam Blanket-Type Fume Suppressant System Requirements |
|---|
| Establish maximum plating or anodizing bath surface tension during initial compliance testing.[1] |
| Monitor and record bath surface tension once every 4 hours. |
| Control bath surface tension so it never exceeds the maximum value established during compliance testing or 45 dynes/cm; whichever is the greater value. |

[1] You can accept 45 dynes/cm as the maximum bath surface tension, but must be able to demonstrate on-going control via monitoring records to avoid emission testing.

| Table 8—Foam Blanket-Type Fume Suppressant System Requirements |
|---|
| Establish the minimum bath foam blanket thickness during initial compliance testing.[1] |
| Monitor and record the thickness of the foam blanket once per hour. |
| Control foam blanket thickness so it never is less than the thickness established, or 1 inch, whichever is the lesser value. |

[1] You can accept a minimum foam blanket thickness of 1 inch in lieu of this effort.

| Table 9—Combination Fume Suppressant and Add-On Control Device System Requirements |
|---|
| Establish parameters consistent with the system or systems providing control of your chromium emissions. If compliance compels you to use both types of control systems, establish parameters for both. |
| Monitor and record control parameters on a frequency consistent with those employed for the system(s) providing emissions control.<br>(Use above tables for guidance.) |
| Control parameters to a degree consistent with those employed for the system(s) providing emissions control.<br>(Use above tables for guidance.) |

## Can You Reduce Monitoring Frequency?

Yes—You can reduce monitoring frequency if you control emissions with a fume suppressant. The regulators have set up the following three-level monitoring scheme (that continues on next page) so that your monitoring frequency depends on how well you control.

- Level 1: Monitor surface tension systems every four hours.
  Monitor foam blanket systems monitor hourly.

  Level 1 is the highest monitoring frequency. You must use this frequency after any exceedance occurs or whenever you drain the bath solution and replace it with a new solution.

- Level 2: Monitor surface tension systems every 8 hours.
  Monitor foam blanket systems every 4 hours.

  Level 2 is an intermediate frequency. You can reduce sampling frequency to this rate when no exceedance occurs during the previous 40 hours of monitoring at Level 1 frequency.

- Level 3: Monitor surface tension systems every 40 hours.
  Monitor foam blanket systems every 8 hours.

  Level 3 is the lowest monitoring frequency. You can reduce frequency to this rate when no exceedance occurs during the previous 40 hours of monitoring at Level 2 frequency. You can continue this frequency thereafter, providing no exceedance or bath replacement occurs.

# KEEPING REQUIRED RECORDS

## What Records Must You Keep?

- Inspection records
- Maintenance records
- Performance test report records
- Monitoring records
- Excess emissions records
- Source dependent records
  - ***Hard chromium electroplating*** sources using actual cumulative rectifier capacity to show their size must have records supporting computation of the amperes expended each month and for the entire reporting period.
  - ***Fume suppressant*** users must record the date and time of each suppressant addition to the plating or anodizing bath.
  - ***Trivalent chromium bath*** users complying by purchasing bath ingredients that contain a wetting agent must keep records of bath component purchases and be able to clearly identify the wetting agent as an ingredient.
- Miscellaneous other records
  - Keep copies of all submittals plus documentation supporting that submittals were sent to the proper address in a timely manner (e.g., certified mail receipts).
  - Keep records supporting all computations (e.g., the total time your source operated during each reporting period).
  - Keep information confirming that you meet requirements for a waiver of recordkeeping and reporting requirements if such a waiver is in force.

## How Long Must You Keep Records?

Keep records for five years, making sure records from the past two years are on site. Keep your files orderly and ready for inspection.

## What Specific Information Must Each Record Include?

The following tables show requirements for various records.

| **Table 10—Inspection Records** |
|---|
| Document the inspections work practice standards required for your add-on air pollution control device and its associated monitoring equipment. |
| Identify the equipment item being inspected. |
| Give the date and time of the inspection and the inspector's identity. |
| Briefly describe the item's working condition discovered during the inspection. |
| Describe actions taken to remedy any deficiencies found. |

| **Table 11—Maintenance Records** |
|---|
| Document all maintenance performed on your source(s), the add-on air pollution control device, or its associated monitoring equipment. |
| Identify the equipment item being maintained. |
| Give the date maintenance was performed. |
| Briefly describe the work. |
| Document the type of maintenance performed; e.g., preventative, emergency, etc. |

| **Table 12—Malfunction Records** |
|---|
| Document every malfunction of your source(s), the add-on air pollution control device, or its associated monitoring equipment. |
| Document what malfunctioned: the process, control device, or monitoring equipment. |
| Document the occurrence date and duration. |
| Document the cause of the malfunction, if known. |
| Document the corrective action taken, if the action is inconsistent with the written O&M plan. |

| Table 13—Performance Test Report Records |
|---|
| Keep a copy of the test report on file. |
| Keep records showing any measurements made of process operating conditions existing during the test. |
| Keep records of all pollution control monitoring device measurements made during the test. |

| Table 14—Monitoring Records |
|---|
| Record all pollution control monitoring; e.g., a pressure drop across your add-on pollution control device, bath surface tension. |
| Identify the equipment item being monitored. |
| Record the date and time of each observation. |
| Record the actual observation. |
| Show if emission control was being achieved or not. |

| Table 15—Excess Emissions Records |
|---|
| Record every instance in which excess emissions were indicated by emission control monitoring, whether or not attributable to equipment malfunction. |
| Record the date and time each excess emissions period began and ended. |
| Briefly describe of actions taken to remedy the situation. |

# REPORTS AND NOTICES

## What Reports/Notices Must You File—And When?

Tables 16 and 17 provide report and notice types required and the timing for their submittal for chromic acid and trivalent chromium bath users.

**Table 16—Chromic Acid Baths**
**Trivalent Chromium Baths Without A Wetting Agent**

| Report or Notice Type | Report No Later Than |
|---|---|
| Initial notification | July 24, 1995 |
| Performance test notification | 60 days before the test is performed |
| Compliance status notification | 30 days after your required compliance date |
| Compliance status change | 30 days after any status change |
| Performance test report | 90 days after emissions test (Usually accompanies the Compliance Status Notification) |
| Ongoing compliance report (Major sources) | Semi-annually, unless an exceedance requires quarterly reporting |
| Ongoing compliance report (Area Sources) | *Kept on site* and prepared annually, unless exceedance problems require semi-annual preparation or submittal |
| Pre-construct / reconstruction notice | Prior to construction start |
| Construction start notice | 30 days after construction starts |
| Process startup notice | 30 days after process startup |

**Table 17—Trivalent Chromium Baths With A Wetting Agent**

| Report or Notice Type | Report No Later Than |
|---|---|
| Initial notification | July 24, 1995 |
| Performance test notification | None required |
| Compliance status notification | February 24, 1996 |
| Compliance status change | 30 days after any status change |
| Performance test results | None required |

| **Table 17—Trivalent Chromium Baths With A Wetting Agent** | |
|---|---|
| Ongoing compliance report<br><All sources> | None required |
| Pre-construct / reconstruction notice | Prior to construction start |
| Construction start notice | 30 days after construction starts |
| Process startup notice | 30 days after process startup |

## What Must Compliance Notices and Reports Include?

The following tables outline the information that various compliance-type reports and notices should include.

| **Table 18—Initial Notification** |
|---|
| The name and address of your facility, your name, and your title |
| A statement that 40 CFR 63, Subpart N, is the basis for the notice |
| A statement that either your tank(s) is located at a ***major source*** or your tank(s) is located at an ***area source*** |
| A list of each individual plating or anodizing tank |
| For each listed plating or anodizing tank, provide the following information:<br>▪ Address where the tank is physically located<br>▪ The applicable emission limitation and compliance date<br>▪ A brief description of the process operation performed in the tank |
| ***Hard chromium electroplating*** facilities must state whether they are ***small*** or ***large*** facilities and include their ***maximum potential cumulative rectifier capacity***. |
| ***Trivalent chromium bath*** users must state that their process requires a wetting agent, identify the wetting agent, and list bath components. |

| **Table 19—Performance Test Notice** |
|---|
| The name and address of your facility, your name, and your title |
| A statement that pursuant to 40 CFR 63, Subpart N, you are giving notice that a performance test will be conducted at your facility on (give specific date) |

**Notes:**

- The regulators must receive this notice at least 60 days before the test date.
- If you reschedule this test, you must notify the Administrator at least five days in advance of the originally scheduled date and provide the new date.

| Table 20—Performance Test Reports |
|---|
| A brief process description |
| Sampling location description(s) |
| A description of sampling and analytical procedures and any modifications to standard procedures |
| Test results |
| Quality assurance procedures and results |
| Records of operating conditions during the test, preparation of standards, and calibration procedures |
| Raw data sheets for field sampling and field and laboratory analyses |
| Documentation for calculations |
| Any other information required by the test method |
| **Notes:**<br>▪ You may use testing results to demonstrate compliance only if a) you conducted the test under representative operating conditions and b) you secured sufficient data to establish site specific operating parameters for continuous compliance monitoring.<br>▪ You may need professional assistance to cope with the required emission testing method and test-reporting complexity. |

| Table 21—Compliance Status Notification |
|---|
| Provide the name and address of your facility. |
| As a ***responsible official,*** certify that the notice is accurate and include your name, title, and signature. |
| Submit data supporting compliance with your emission standards, such as the following:<br>▪ A performance test report<br>▪ Rectifier capacity records demonstrating that a facility is a ***small hard chromium electroplater***<br>▪ Records showing ongoing control of bath surface tension<br>▪ Updated or reaffirmed information relating to bath chemistry and wetting agent identification provided in your initial notification |

### Table 21—Compliance Status Notification

If you are a chromic acid or non-exempted trivalent chromium user, provide the following information:

- A description of the air pollution control technique used to control your source's chromium emissions
- The emission limitation applicable to your operation and the method used to determine compliance with this limitation
- The method you will use to demonstrate continuous compliance
- The site-specific operating parameter(s) developed during emission testing that enable you to demonstrate continuous compliance

Make statements attesting to the following items:

- You have an operations and maintenance manual on file.
- All your tanks comply with 40 CFR Part 63, Subpart N.
- All information transmitted by the notice is accurate.
- If applicable, state that the performance report corrects or verifies any previously submitted emission estimates.

### Table 22—On-going Compliance Reports

Provide the company name and address.

Provide the report's date and the reporting period's beginning and ending dates.

Describe the process(es) performed at your facility.

As a ***responsible official***, certify that the report is accurate. Include your name, title, and signature.

Provide the total operating time of the affected source during the reporting period.

**Note:**

- ***Small, existing hard chromium electroplaters*** also report their actual maximum cumulative rectifier capacity, on a month-by-month basis.

Identify the site-specific operating parameter(s) you monitor for compliance, its value as provided by the regulatory authority in your notice of compliance, and the emission limitation relevant to your source.

Summarize your control of operating parameters. When exceedances occur, include the following:

- The duration of all excess emission incidents as a percent of total operating time during the reporting period
- The percent of time such excess emissions were a result of a) process upset, b) control equipment malfunction, c) other known causes, and d) unknown causes

Describe any changes in monitoring, process, or controls made since the last reporting period.

Make a statement that work practices were in accordance with the O&M plan or you may explain why you did not follow the O&M.

**Table 22—On-going Compliance Reports**

If you did not follow the O&M, you must assess the extent of any excess emissions caused by this inconsistency and provide a copy of the "Procedural Inconsistency Record." A "Procedural Inconsistency Record" details actions inconsistent with your O&M plan taken to remedy a *malfunction*.

Note:

- You must give a verbal report of such actions to the regulatory authority within two working days after the actions commenced. A letter to the air authority seven days after the event ends must follow the verbal report.

## Do Exceedances Affect Ongoing Compliance Reporting?

Yes—Exceedances affect reporting frequency.

A *major source's* time spent in report preparation and submittal frequency double when monitoring shows non-compliance with a site-specific operating parameter.

*An area source's* time spent in report preparation and submittal frequency double, but reports continue to be kept on-site for the air authority's inspection when

- the duration of excess emissions, as a percent of total operating time, equals or exceeds 1 percent, and
- the total time the add-on air pollution control device has *malfunctioned* equals or exceeds 5 percent of the total operating time. However, the air regulatory authority can increase report preparation to an even higher frequency or require submitted reports rather than keeping them on site.

Your reporting frequency continues at this increased level forever, unless

- you achieve uninterrupted compliance with emission limitations for one year,
- you comply with all recordkeeping and monitoring requirements, and
- you give the air regulatory authority written notice that you intend to reduce ongoing compliance reporting and they do not object

## How Is Construction/Reconstruction Regulated?

The regulators require you to submit a complete notice before beginning construction or reconstruction of a chromium emission source. The tables below outline the information needed for complete construction and reconstruction notices.

| **Table 23—Construction Notice** |
|---|
| The owner or operator's name, title, and address |
| A statement to the effect that "In compliance with 40 CFR 63, Subpart N, the purpose of this notice is to inform the air regulatory authority that [your company] plans to construct a new [or reconstruct an existing] source of chromium emissions." |
| The proposed address of the source, if different from the owner's |
| The date the planned effort is expected to begin and to end |
| The date the new, or reconstructed, facility's initial startup is expected to take place |
| The type of process operation to be performed |
| A description of the air pollution control technique to be used for controlling process emissions following project completion (Where applicable, provide preliminary design drawings and capacity estimates.) |
| An estimate of chromium emissions expressed in units consistent with the applicable emission limitation (Provide calculation details.) |

| **Table 24—Reconstruction Notice** |
|---|
| The owner or operator's name, title, and address |
| A statement to the effect that "In compliance with 40 CFR 63, Subpart N, the purpose of this notice is to inform the air regulatory authority that [your company] plans to construct a new [or reconstruct an existing] source of chromium emissions." |
| The proposed address of the source, if different from the owner's |
| The date the planned effort is expected to begin and to end |
| The date the new, or reconstructed, facility's initial startup is expected to take place |
| The type of process operation to be performed |
| A description of the air pollution control technique to be used for controlling process emissions following project completion (Where applicable, provide preliminary design drawings and capacity estimates.) |

| **Table 24—Reconstruction Notice** |
|---|
| An estimate of chromium emissions expressed in units consistent with the applicable emission limitation (Provide calculation details.) |
| A brief description of the tanks and components to be replaced |
| A brief description of the air pollution control technique presently used for controlling emissions and the amount of such emissions expressed in units consistent with the applicable emission limitation |
| A declaration that "No economic or technical limitations prevent the source from complying with relevant standards or requirements." |
| However, if you cannot make such a declaration, demonstrate to the Administrator that technical or economic limitations affect your ability to comply with relevant standards. This demonstration requires the following additional information:<br>▪ An estimate of the fixed capital cost of the replacements and of constructing a comparable, entirely new source<br>▪ The estimate life of the source after replacement<br>▪ A detailed discussion of how economic or technical limitations affect the source's ability to comply with relevant standards after the replacement |

## Where and How Must You Send Reports or Notices?

Send reports and notices to your state or county air regulatory authority. See Appendix D for Tennessee air authority addresses.

Use the U.S. mail, fax, or another courier. You may use electronic mail if that is acceptable to both parties. Sending certified mail to regulatory agencies is a good practice. Request a return receipt.

## Who Must Sign a Report?

*A responsible official* from major sources must sign the *Notification of Compliance Status* and *Ongoing Compliance Reports*, thereby certifying the accuracy of the report.

Any person who owns, leases, operates, controls, or supervises an affected source may sign other reports.

# Appendix A—Definitions

# APPENDIX A - DEFINITIONS

**Add-on air pollution control device:-** equipment installed in the ventilation system of chromium electroplating and anodizing tanks for the purposes of collecting and containing chromium emissions from the tank(s).

**Air pollution control technique:-** any method, such as an add-on air pollution control device or a chemical fume suppressant, that is used to reduce chromium emissions from chromium electroplating and chromium anodizing tanks.

**Area source:-** any stationary source of hazardous air pollutants that is not a major source as defined in this part.

**Base metal:-** the metal or metal alloy that comprises the workpiece.

**Bath component:-** the trade or brand name of each component(s) in trivalent chromium plating baths. For trivalent chromium baths, the bath composition is proprietary in most cases. Therefore, the trade or brand name for each component(s) can be used; however, the chemical name of the wetting agent contained in that component must be identified.

**Chemical fume suppressant:-** any chemical agent that reduces or suppresses fumes or mists at the surface of an electroplating or anodizing bath; another term for fume suppressant is mist suppressant.

**Chromic acid:-** the common name for chromium anhydride (CrO3).

**Chromium anodizing:-** the electrolytic process by which an oxide layer is produced on the surface of a base metal for functional purposes (e.g., corrosion resistance or electrical insulation) using a chromic acid solution. In chromium anodizing, the part to be anodized acts as the anode in the electrical circuit, and the chromic acid solution, with a concentration typically ranging from 50 to 100 grams per liter (g/L), serves as the electrolyte.

**Chromium electroplating or chromium anodizing tank:-** the receptacle or container in which hard or decorative chromium electroplating or chromium anodizing occurs.

**Commenced:-** with respect to construction or reconstruction of a stationary source, that an owner or operator has undertaken a continuous program of construction or reconstruction or that an owner or operator has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction or reconstruction.

**Compliance date:**- the date by which an affected source is required to be in compliance with a relevant standard, limitation, prohibition, or any federally enforceable requirement established by the Administrator (or a State with an approved permit program) pursuant to section 112 of the Act.
**Composite mesh-pad system:**- an add-on air pollution control device typically consisting of several mesh-pad stages. The purpose of the first stage is to remove large particles. Smaller particles are removed in the second stage, which consists of the composite mesh pad. A final stage may remove any reentrained particles not collected by the composite mesh pad.

**Decorative chromium electroplating:**- the process by which a thin layer of chromium (typically 0.003 to 2.5 microns) is electrodeposited on a base metal, plastic, or undercoating to provide a bright surface with wear and tarnish resistance. In this process, the part(s) serves as the cathode in the electrolytic cell and the solution serves as the electrolyte. Typical current density applied during this process ranges from 540 to 2,400 Amperes per square meter (A/m2) for total plating times ranging between 0.5 to 5 minutes.

**Electroplating or anodizing bath:**- the electrolytic solution used as the conducting medium in which the flow of current is accompanied by movement of metal ions for the purposes of electroplating metal out of the solution onto a workpiece or for oxidizing the base material.

**Emission limitation:**- for the purposes of this subpart the concentration of total chromium allowed to be emitted expressed in milligrams per dry standard cubic meter (mg/dscm), or the allowable surface tension expressed in dynes per centimeter (dynes/cm).

**Existing source:**- any affected source that is not a new source.

**Facility:**- the major or area source at which chromium electroplating or chromium anodizing is performed.

**Fiber-bed mist eliminator:**- an add-on air pollution control device that removes contaminants from a gas stream through the mechanisms of inertial impaction and Brownian diffusion. These devices are typically installed downstream of another control device, which serves to prevent plugging, and consist of one or more fiber beds. Each bed consists of a hollow cylinder formed from two concentric screens; the fiber between the screens may be fabricated from glass, ceramic plastic, or metal.

**Foam blanket:-** the type of chemical fume suppressant that generates a layer of foam across the surface of a solution when current is applied to that solution.

**Fresh water:-** water, such as tap water, that has not been previously used in a process operation or, if the water has been recycled from a process operation, it has been treated and meets the effluent guidelines for chromium wastewater.

**Hard chromium electroplating or industrial chromium electroplating:-** a process by which a thick layer of chromium (typically 1.3 to 760 microns) is electrodeposited on a base material to provide a surface with functional properties such as wear resistance, a low coefficient of friction, hardness, and corrosion resistance. In this process, the part serves as the cathode in the electrolytic cell and the solution serves as the electrolyte. Hard chromium electroplating process is performed at current densities typically ranging from 1,600 to 6,500 A/m2 for total plating times ranging from 20 minutes to 36 hours depending upon the desired plate thickness. NOTE: EPA considers chromium plating processes using current densities above 223 amp/sq.ft. to be hard plating. This includes decorative black chromium plating.

**Hexavalent chromium:-** the form of chromium in a valence state of +6.
**Large, hard chromium electroplating facility:-** a facility that performs hard chromium electroplating and has a maximum cumulative potential rectifier capacity greater than or equal to 60 million ampere-hours per year (amp-hr/yr).

**Major source:-** any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants, unless the Administrator establishes a lesser quantity, or in the case of radionuclides, different criteria from those specified in this sentence.

**Malfunction:-** any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

**Maximum cumulative potential rectifier capacity:-** the summation of the total installed rectifier capacity associated with the hard chromium electroplating tanks at a facility, expressed in amperes, multiplied by the maximum potential operating schedule of 8,400 hours per year and 0.7, which assumes that electrodes are energized 70 percent of the total operating time. The maximum potential operating schedule is based on operating 24 hours per day, 7 days per week, 50 weeks per year.

**New source:-** any affected source the construction or reconstruction of which is commenced after EPA first proposes a relevant emission standard under this part. EPA proposed the chromium emissions standards contained in Subpart N on December 16, 1993.

**Operating parameter value:-** a minimum or maximum value established for a control device or process parameter which, if achieved by itself or in combination with one or more other operating parameter values, determines that an owner or operator is in continual compliance with the applicable emission limitation or standard.

**Packed-bed scrubber:-** an add-on air pollution control device consisting of a single or double packed bed that contains packing media on which the chromic acid droplets impinge. The packed-bed section of the scrubber is followed by a mist eliminator to remove any water entrained from the packed-bed section.

**Potential to emit:-** the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the stationary source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable.

**Reconstruction:-** the replacement of components of an affected or a previously unaffected stationary source to such an extent that:

> The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost required to construct a comparable new source; and
>
> It is technologically and economically feasible for the reconstructed source to meet the relevant standard(s) established by the Administrator (or a State) pursuant to section 112 of the Act. Upon reconstruction, an affected source, or a stationary source that becomes an affected source, is subject to relevant standards for new sources, including compliance dates, irrespective of any change in emissions of hazardous air pollutants from that source.

**Research or laboratory operation:-** an operation whose primary purpose is for research and development of new processes and products, that is conducted under the close supervision of technically trained personnel, and that is not involved in the manufacture of products for commercial sale in commerce, except in a de minimis manner.

**Responsible official:-** one of the following:

For a corporation: A president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities and either:

(I) The facilities employ more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars); or

(ii) The delegation of authority to such representative is approved in advance by the Administrator.

For a partnership or sole proprietorship: a general partner or the proprietor, respectively.

For a municipality, State, Federal, or other public agency: either a principal executive officer or ranking elected official. For the purposes of this part, a principal executive officer of a Federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., a Regional Administrator of the EPA).

For affected sources (as defined in this part) applying for or subject to a title V permit: "responsible official" shall have the same meaning as defined in part 70 or Federal title V regulations in this chapter (42 U.S.C. 7661), whichever is applicable.

**Small, hard chromium electroplating facility:-** a facility that performs hard chromium electroplating and has a maximum cumulative potential rectifier capacity less than 60 million amp-hr/yr.

**Source:-** any stationary source of hazardous air pollutants that is not a major source as defined in this part.

**Stalagmometer:-** a device used to measure the surface tension of a solution.

**Surface tension:-** the property, due to molecular forces, that exists in the surface film of all liquids and tends to prevent liquid from spreading.

**Tank operation:-** the time in which current and/or voltage is being applied to a chromium electroplating tank or a chromium anodizing tank.

**Tensiometer:**- a device used to measure the surface tension of a solution.

**Trivalent chromium:**- the form of chromium in a valence state of +3.

**Trivalent chromium process:**- the process used for electrodeposition of a thin layer of chromium onto a base material using a trivalent chromium solution instead of a chromic acid solution.

**Wetting agent:**- the type of chemical fume suppressant that reduces the surface tension of a liquid.

## NOMENCLATURE

EPA uses the nomenclature given below for equations given at 40 CFR 63.344(e). The equations are used to calculate allowable emission limits for systems exhausting gases from multiple mixed sources. In an effort to improve clarity, a few minor changes were adopted for use in this manual's review of calculations made with these equations. See Appendix B

AMR = the allowable mass emission rate from each type of affected source subject to the same emission limitation in milligrams per hour (mg/hr).
AMRsys = the allowable mass emission rate from affected sources controlled by an add-on pollution control device controlling emissions from multiple sources in mg/hr.
EL = the applicable emission limitation from § 63.342 of this subpart in milligrams per dry standard cubic meter (mg/dscm).
Iatotal = the sum of all inlet duct areas from both affected and non-affected sources in meters squared.
IDAi = the total inlet area for all ducts associated with affected sources in meters squared.
IDAi,a = the total inlet duct area for all ducts conveying chromic acid from each type of affected source performing the same operation, or each type of affected source subject to the same emission limitation in meters squared.
VR = the total of ventilation rates for each type of affected source subject to the same emission limitation in dry standard cubic meters per minute (dscm/min).
Vrinlet = the total ventilation rate from all inlet ducts associated with affected sources in dscm/min.
VRinlet,a = the total ventilation rate from all inlet ducts conveying chromic acid from each type

# Appendix B—Calculating Procedure

# APPENDIX B - CALCULATING EMISSION LIMITS FOR MULTIPLE SOURCES

**I. Use Single Source Standards for exhaust gases from multiple affected sources of the same type.**

| SINGLE SOURCE STANDARDS | | |
|---|---|---|
| **Source Type** | **Size** | **Limitation, mg/dscm** |
| Hard chromium electroplater | Small & Existing | 0.030 |
| Hard chromium electroplater | Large | 0.015 |
| Decorative electroplater | All w/o bath control | 0.010 |
| Anodizer | All w/o bath control | 0.010 |

**II. Calculate per the following procedure for an exhaust gas stream from multiple affected sources of the same type that includes exhaust from a non-affected source.** Make certain you use consistent units, metric or english.

- Determine the cross-sectional area of every inlet duct connecting a tank hood to the air pollution control device. Calculate the total area of all sources and the total area of affected sources connected to the device.

- Calculate the minimum sample time, in minutes, required for each Method 306 test run using the equation:

$$Time_{sample}\ (minimum) = 120 \times \frac{IDA_{all}}{IDA_{affected}}$$

Equation nomenclature is at this appendix section's end.

- Perform Method 306 or 306A testing using the calculated minimum sampling time for each run. Determine the actual average mass emission rate exhausted and the average ventilation rate from all sources processed by the device.
- Calculate the average ventilation rate from affected sources by using the following equation:

$$VR_{affected} = VR_{all} \times \frac{IDA_{affected}}{IDA_{all}}$$

Equation nomenclature is at this appendix section's end.

- Calculate the system's maximum allowable mass emission rate, AMR $_{system}$, in mg/hr, using the following equation:

$$AMR_{system}(maximum) = VR_{affected} \times EL_{type} \times 60$$

Equation nomenclature is at this appendix section's end.

Compliance requires the actual average mass emission rate determined by a three-run Method 306 test to not be greater than this calculated AMR $_{system}$.

**III. Calculate per the following procedure if the exhaust gas stream is from multiple affected sources of different types and may include exhaust from a non-affected source.**

- Determine the cross-sectional area of every inlet duct connecting a tank hood to the air pollution control device. Calculate the total area of all sources and the total area of affected sources (all types) connected to the device.

- Calculate the minimum sample time, in minutes, required for each Method 306 test run using the equation:

$$Time_{sample}\ (minimum) = 120 \times \frac{IDA_{all}}{IDA_{affec}}$$

Equation nomenclature is at this appendix section's end.

- Perform Method 306 testing using the calculated minimum sampling time for each run. Determine the average mass emission rate exhausted and average ventilation rate from all sources processed by the device.

- Calculate the average ventilation rate <u>from each type</u> of affected sources by using the following equation:

$$VR_{affected,type} = VR_{all} \times \frac{IDA_{affected,type}}{IDA_{all}}$$

Equation nomenclature is at this appendix section's end.

Establish the maximum allowable mass emission rate <u>for each type</u> of affected source controlled. Use the equations below as appropriate:

$$AMR_{hc_{small}} = VR_{affected_{hc}} \times EL_{hc_{small}} \times$$
$$AMR_{hc_{large}} = VR_{affected_{hc}} \times EL_{hc_{large}} \times$$
$$AMR_{dc_{all}} = VR_{affected_{dc}} \times EL_{dc} \times 6$$
$$AMR_{ca_{all}} = VR_{affected_{ca}} \times EL_{ca} \times 6$$

<u>where basic types are:</u>

"hc" - hard chromium plating
"dc" - decorative chromium plating
"ca" - chromium anodizing

- Calculate the maximum allowable mass emission rate for the system.

$$AMR_{system} = AMR_{hc_{small}} + AMR_{hc_{large}} + AMR_{dc_{all}} + AMR_{ca_{all}}$$

*Include each type as appropriate.*

Compliance requires the actual average mass emission rate determined by a three-run Method 306 test to not be greater than this calculated AMR $_{system}$.

**Equation Nomenclature**

| | |
|---|---|
| $IDA_{affected}$ | The total area of tank hood inlet ducts connected to the emission control system associated with affected sources. This is the same as the EPA's $\Sigma$ IA $_{total}$. |
| $IDA_{all}$ | The total area of all tank hood inlet ducts connected to the emission control system, affected and non-affected sources. This is same as EPA's IDA $_{I}$. |
| $VR_{affected}$ | The average total ventilation rate from all inlet ducts associated with affected sources. This is the same as EPA's VR $_{inlet}$. |
| $VR_{all}$ | The average of the three total ventilation rate determinations made at the device outlet during Method 306 testing. This is the same as EPA's VR $_{total}$. |
| $EL_{type}$ | The applicable exhaust gas emission concentration limitation for a specific type of undiluted source. This the same as EPA's EL. |

| | |
|---|---|
| $AMR_{system}$ | The maximum allowable mass emission rate for the total system, mg/hr. This is the same as EPA's $AMR_{sys}$. |
| $AMR_{type}$ | The portion of a systems maximum allowable mass emission rate derived from a specific type of source. |

# Appendix C—Procedures For Establishing Monitoring Parameter Measurements

# APPENDIX C - ESTABLISHING SITE-SPECIFIC OPERATING PARAMETERS

**Follow procedures in this section to establish site-specific operating parameters.**

- All monitoring equipment shall be installed such that representative measurements of emissions or process parameters from the affected source are obtained. For monitoring equipment purchased from a vendor, verification of the operational status of the monitoring equipment shall include execution of the manufacturer's written specifications or recommendations for installation, operation, and calibration of the system.

  (i) Specifications for differential pressure measurement devices used to measure velocity pressure shall be in accordance with Section 2.2 of Method 2 (40 CFR part 60, appendix A).

  (ii) Specification for differential pressure measurement devices used to measure pressure drop across a control system shall be in accordance with manufacturer's accuracy specifications.

- The surface tension of electroplating and anodizing baths shall be measured using Method 306B, "Surface Tension Measurement and Recordkeeping for Tanks used at Decorative Chromium Electroplating and Anodizing Facilities." This method should also be followed when wetting agent type or combination wetting agent/foam blanket type fume suppressants are used to control chromium emissions from a hard chromium electroplating tank and surface tension measurement is conducted to demonstrate continuous compliance.

- The owner or operator of a source required to measure the velocity pressure at the inlet to an add-on air pollution control device shall establish the site-specific velocity pressure as follows:

  (I) Locate a velocity traverse port in a section of straight duct that connects the hooding on the plating tank or tanks with the control device. The port shall be located as close to the control system as possible, and shall be placed a minimum of 2 duct diameters downstream and 0.5 diameter upstream of any flow disturbance such as a bend, expansion, or contraction (see Method 1, 40 CFR part 60, appendix A). If 2.5 diameters of straight duct work does not exist, locate the port 0.8 of the duct diameter downstream and 0.2 of the duct diameter upstream from any flow disturbance.

(ii) A 12-point velocity traverse of the duct to the control device shall be conducted along a single axis according to Method 2 (40 CFR part 60, appendix A) using an S-type pitot tube; measurement of the barometric pressure and duct temperature at each traverse point is not required, but is suggested. Mark the S-type pitot tube as specified in Method 1 (40 CFR part 60, appendix A) with 12 points. Measure the velocity pressure (Δp) values for the velocity points and record. Determine the square root of the individual velocity point Δp values and average. The point with the square root value that comes closest to the average square root value is the point of average velocity. The Δp value measured for this point during the performance test will be used as the reference for future monitoring.

- The owner or operator of a source required to measure the pressure drop across the add-on air pollution control device may establish the pressure drop in accordance with the following guidelines:

(I) Pressure taps shall be installed at any of the following locations:

(A) At the inlet and outlet of the control system. The inlet tap should be installed in the ductwork just prior to the control device and the corresponding outlet pressure tap should be installed on the outlet side of the control device prior to the blower or on the downstream side of the blower;

(B) On each side of the packed bed within the control system or on each side of each mesh pad within the control system; or

(C) On the front side of the first mesh pad and back side of the last mesh pad within the control system.

(ii) Pressure taps shall be sited at locations that are:

(A) Free from pluggage as possible and away from any flow disturbances such as cyclonic demisters.

(B) Situated such that no air infiltration at measurement site will occur that could bias the measurement.

(iii) Pressure taps shall be constructed of either polyethylene, polybutylene, or other nonreactive materials.

(iv) Nonreactive plastic tubing shall be used to connect the pressure taps to the device used to measure pressure drop.

(v) Any of the following pressure gauges can be used to monitor pressure drop: a magnehelic gauge, an inclined manometer, or a "U" tube manometer.

(vi) Prior to connecting any pressure lines to the pressure gauge(s), each gauge should be zeroed. No calibration of the pressure gauges is required.

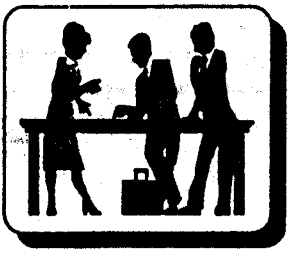
# Appendix D—Small Business Assistance Program

# WHO REGULATES AIR POLLUTION IN TENNESSEE?

U. S. E.P.A.
⇓
⇓
⇓
⇓
TN. DEPT. OF
ENVIRONMENT & CONSERVATION
(91 COUNTIES - EXCLUDING: DAVIDSON,
SHELBY, HAMILTON, KNOX)
⇓
⇓
⇓
⇓
LOCAL AIR REGULATORS
FOUR COUNTIES:
DAVIDSON, SHELBY, HAMILTON, KNOX

The air regulatory authority for ninety-one counties in Tennessee is the Tennessee Department of Environment and Conservation Division of Air Pollution Control. There are local air regulatory programs in the remaining four Tennessee counties of Knox, Davidson, Shelby and Hamilton. The federal Environmental Protection Agency grants delegation of air regulatory authority to the State agency and the State delegates regulatory authority to the four local air program areas. The chart illustrates the regulatory chain.

The Tennessee Small Business Assistance Program (SBAP) is housed within the Tennessee Department of Environment and Conservation but is administratively separate from the regulatory agency. The SBAP is non-regulatory and has no enforcement authority. The program is explained on the following pages.



# Section 2 - Small Business Assistance Program (SBAP)

## What types of small businesses will the CAAA impact?

There is no comprehensive listing of businesses that have to comply with the CAAA, but Table 2 lists some businesses possibly covered by CAAA regulations. EPA suggests that you could be subject to the regulations if your business:

- Emits **volatile organic compounds** (VOCs) and **nitrogen oxides** ($NO_x$) in areas where **ozone** is an air quality problem;
- Sells or distributes petroleum products;
- Services and repairs motor vehicles;
- Operates a fleet of 10 or more vehicles in an urban area;
- Coats or paints metal surfaces;
- Degreases machinery;
- Uses or transports chemicals that are hazardous when emitted into the air, or are particularly dangerous if accidentally released;
- Services or repairs air conditioning systems, or uses refrigerants;
- Uses asphalt, rubber, metal finishes, plastics, or synthetic materials in manufacturing or construction.

This means that many small businesses previously not regulated by EPA and TDEC will have to comply with the CAAA regulations. In writing the CAAA, Congress realized that these small businesses would need help in achieving compliance. Therefore, the CAAA requires each state to create a Small Business Assistance Program (SBAP).

## What is a small business according to the CAAA?

To qualify for small business assistance under the CAAA, a business must:

- Meet the *Small Business Act* small business definition. In general, this is an independently owned and operated concern that is not dominant in its field;
- Emit less than 50 tons of a single pollutant in a year, or less than 75 tons per year of all regulated pollutants;
- Not be a major stationary source of the criteria pollutants, their precursors, or Hazardous Air Pollutants; and,
- Employ 100 or fewer individuals.

***If you do not meet these criteria, you are* not eligible *for assistance from the Tennessee SBAP. For other sources of assistance, see Section 5.5.***

**Table 2. Businesses possibly covered by CAAA regulations**

- Agricultural Chemical Applicators
- Asphalt Manufacturers
- Asphalt Applicators
- Auto Body Shops
- Bakeries
- Distilleries
- Dry Cleaners
- Foundries
- Furniture Manufacturers
- Furniture Repair Shops
- Gasoline Service Stations
- General Contractors
- Hospitals
- Laboratories
- Lawnmower Repair Shops
- Lumber Mills
- Metal Finishers
- Newspapers
- Pest Control Operators
- Photo Finishing Laboratories
- Printing Shops
- Air Conditioning/ Refrigeration Service
- Tar Paving Applicators
- Textile Mills
- Wood Finishers (Resource #2)

## What can a SBAP do for me?

The services provided by the SBAP include:

- Disseminating regulatory information;
- Investigating and resolving complaints;
- Working with trade associations;
- Training;
- Assisting with permit applications;
- Explaining CAAA requirements;

- Notifying affected industry of new regulations;
- Helping with technical, administrative, and compliance problems;
- Distributing information;
- Providing referrals for specific environmental problems; and,
- Advocating for small business during regulatory process.

## Does Tennessee have a SBAP?

The Tennessee SBAP is part of the Tennessee Department of Environment and Conservation (TDEC). A contact list for this non-regulatory assistance is in Section 5.5, page 65. Tennessee's program includes three components: a Small Business Ombudsman (Advocate); a comprehensive Clean Air Assistance Program, which is part of TDEC's Division of Pollution Prevention and Environmental Awareness; and, a seven-member Compliance Advisory Panel.

## The Tennessee Small Business Advocate

The state advocate acts as the small business community's representative in matters that affect it under the Act. To ensure confidentiality, the Advocate is organizationally independent of the regulatory program. The Advocate has the authority to identify and propose solutions to small business on technical and compliance problems. Other duties include:

- Working with trade associations to bring about voluntary compliance;
- Aiding in investigating and resolving complaints and disputes involving small business;
- Disseminating regulatory and technical information;
- Providing direction to the Clean Air Assistance Program; and
- Providing assistance and cooperation with other small business groups.

For more information on the Tennessee Small Business Advocate, contact:

**Ernie Blankenship**
**Small Business Advocate**
**Tennessee Department of Environment and Conservation**
**14th Floor, L & C Tower**
**401 Church Street**
**Nashville, TN 37243-0454**

**(615) 532 - 0734 Fax: (615) 532-0231**

## The Tennessee Clean Air Assistance Program (CAAP)

The Clean Air Assistance Program provides technical, administrative and regulatory support for small business. The staff serves as a liaison between the regulatory agency and the small businesses of Tennessee, but does not report to the regulatory agency. When representing the interests of a small business, CAAP maintains confidentiality. The types of assistance provided by the CAAP include:

- Informing businesses of requirements in the Act that apply to them and the dates these requirements apply;
- Maintaining a mailing list information distribution;
- Disseminating up-to-date information about the CAAA to the small business community, including easy-to-understand public information material;
- Helping small businesses with specific technical, administrative and compliance problems;
- Making necessary referrals to assist businesses with specific environmental problems; and,
- Providing training opportunities.

For more information on the Tennessee CAAP, contact:

**Linda Sadler**
**Manager, Small Business Clean Air Assistance Program**
**Pollution Prevention/ Environmental Awareness Division**
**Tennessee Department of Environment and Conservation**
**8th Floor, L & C Annex**
**401 Church Street**
**Nashville, TN 37243-1551**

**1-800-734-3619, or (615) 532-0779**
**Fax: (615) 532-0614**

## The Compliance Advisory Panel

The state Compliance Advisory Panel reviews the work and evaluates the effectiveness of the state SBAP and submits periodic progress reports to the federal Ombudsman. The panel reviews program materials to ensure they are clear and understandable. The panel consists of at least seven members. Four of the members will be small business owners or representatives selected by the state legislature; the governor will appoint two members to represent the general public. The Tennessee Department of Environment and Conservation will select the seventh member.

## Is there any financial assistance available?

If you can prove that the new pollution control equipment you are installing also conserves energy, you may apply for a loan from the Tennessee Small Business Energy Loan Program. This program provides loans at 5% interest to assist in the identification, installation, and incorporation of approved energy efficiency measures onto, or into, the existing Tennessee located facilities, processes, and/or operations of approved applicants. Loans are paid back over the lesser of 84 months or the payback period of the project. Loans up to $100,000 are available. For more information on these loans, contact:

**Clinton Berry**
**The Tennessee Small Business Energy Loan Program**
**Tennessee Department of Economic and Community Development - Energy Division**
**320 Sixth Avenue North - 6th Floor**
**Nashville, TN 37243-0405**

**1-800-342-1340, or 615-741-6671**

If you do not qualify for this type of financial assistance, contact traditional sources of loans, such as banks and financial institutions.

For guidance in these and other areas of business planning, contact your nearest Tennessee Small Business Development Center (TSBDC). TSBDC's offer one-on-one counseling, training, or technical assistance for such issues as lack of capital, declining sales revenue, high expenses, production overruns, or employee retention. TSBDC is about people coaching people to business excellence. Seventeen domestic service centers across Tennessee, an International Trade Center and the Technology & Energy Services make up the TSBDC Network.

# PART II

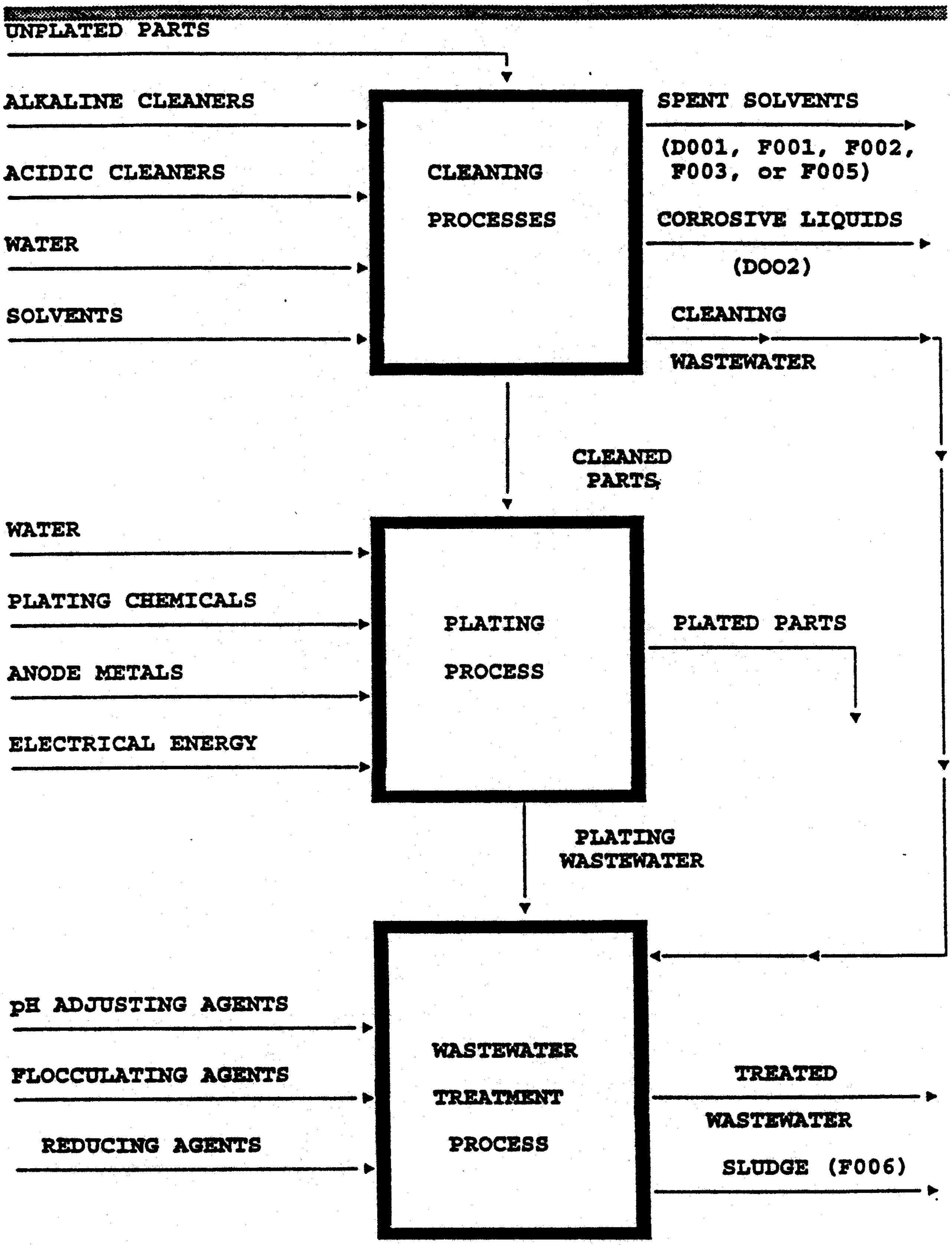
# WASTE REDUCTION ASSESSMENT MANUAL

# for

# ELECTROPLATING FACILITIES

(SIC Code 3471)

# ELECTROPLATING "INS & OUTS"



# ELECTROPLATERS' WASTE STREAMS AND THE DISPOSAL RESTRICTIONS IMPOSED ON THEM

## INTRODUCTION

To accomplish waste reduction, you must first **identify and characterize the waste streams.** The most common waste streams found in electroplating operations will be described in this section, along with the regulatory requirements and other issues associated with them. Suggestions for reducing the streams will be given in a later section.

The following definition of a **waste stream** may help when you begin to try to identify them:

> A waste stream from your plant is simply any material which enters your plant, but does not exit as part of your final product, being instead discarded into the environment. This applies whether the ultimate destination is the air, the land, the waters of our planet, or even a recycling or recovery agent.

Electroplating facilities generate a number of different waste streams. Some are generated by almost all facilities; others may or may not be generated, depending on the specific nature of the business. The "*Ins & Outs*" diagram on the facing page indicates those waste streams you may expect to find in almost every electroplating facility. In addition to the process waste streams suggested by this diagram, you may also expect to find wastes generated by materials handling and warehousing, by maintenance operations, and even by the plant office and lunchroom.

## SOLVENT WASTES

Solvent wastes are generated in electroplating plants by the cleaning operations which are necessary to prepare the surface of the objects to accept the plating metal. Likely operations to be found are vapor degreasing, immersion washing in cold or heated solvent, or hand cleaning with rags, brushes or spray sinks.

All liquid wastes are prohibited from landfill disposal, and most fall into one or another category of hazardous wastes as defined by RCRA . . . either D001 (ignitable, flash point below 140°F) or F001-F005 (listed wastes). Also, if the use to which the solvent has been put causes the waste to be contaminated with a hazardous substance, it must be subjected to the Toxic Characteristics Leaching Procedure (TCLP) to determine whether it is hazardous because of the Toxicity Characteristic

(D004-D043). The only possible exception is solvents which (1) pass the TCLP, (2) are not listed, and (3) have flash points above 140°F. Although prohibited from landfill disposal, they may be handled as if they are used oils.

One of the largest solvent waste streams in many plants (and one which is often not even considered when assessing wastes because it is not a visible stream) is solvent evaporated into the atmosphere. Such losses will be increasingly regulated as air pollutants (Volatile Organic Compounds or "VOC's"). Sources may be "point sources" such as a degreaser, or "fugitive emissions" such as evaporation from the surface of a sink, tub, storage tank, etc.

Specific equipment likely to be sources of solvent wastes will include:

- Vapor degreasers;
- Sinks, tubs and vats used for cleaning parts;
- Containers, rags, sprayers, and aerosol products used for manual cleaning of parts or of equipment.

## WASTE WATER

Waste water is usually the largest-volume waste stream in a plating facility. The rinsewater effluent from an electroplating process will inevitably contain dissolved metallic salts which must be removed before the water is discharged from the facility. As will be noted from the "*Ins & Outs*" diagram, cleaning operations, as well as the plating process, can also generate contaminated waste water. Waste water from many plants which contain an electroplating facility will also come from such sources as:

- Water-curtain type paint spray booths;
- Anodizing systems;
- Burnishing systems;
- Paint stripping systems;
- Maintenance and general clean-up operations;
- Cooling systems and boiler blow-down;

## CORROSIVE AQUEOUS WASTES

If the plating facility is part of a metal fabricating plant, some of the liquid wastes from cleaning and rust-removal operations may actually be Corrosive (D002) hazardous wastes:

- Spent pickling acids;

- Spent alkaline cleaning solutions;

It should be noted that combining all these streams and sending them through the waste water treatment facility may unnecessarily complicate the treatment process and lead to generation of more hazardous waste than is absolutely necessary. More will be said about this later.

There are usually two options for disposing of wastewater:

- Discharge from the plant site directly or indirectly into an existing surface stream,

or

- Discharge into a sewer system served by a Publicly Owned Treatment Works (POTW).

In the first case, even if the discharge is clean, potable tapwater, a permit under the National Pollutant Discharge Elimination System (NPDES) is required. In order to obtain an NPDES permit, it will be necessary to treat process wastewater to eliminate certain pollutants prior to discharge to surface waters.

In the latter case, the local POTW is the regulating agency. If the discharge is anything other than domestic sewage, an industrial user agreement which sets concentration and total discharge quantity limits on specific pollutants and establishes sampling and monitoring procedures to ensure the limits are met probably will be required. Because some industrial pollutants interfere with a POTW's treatment process or may carry through to a POTW's discharge, on-site pretreatment to prevent such materials from entering the sewer system is usually required.

## SLUDGES

The sludges which appear as wastes in plating plants are:

- Sludges generated by treatment of electroplating, heat-treating or anodizing wastewater;

- Sludges from periodic clean-out of solvent or aqueous cleaning systems, sumps or grease traps.

Disposal options depend on both source and characteristics of the particular sludge:

Most sludges generated by treating electroplating and heat-treating wastewaters are listed RCRA hazardous wastes (F006 - F012, F019), although there are a few exceptions.

Clean-out sludges must be individually considered; they may be non-hazardous, but they can be ignitable (D001), corrosive (D002), or toxicity characteristic (D004-D043) hazardous wastes.

In Tennessee, if an industrial sludge is neither a listed nor a characteristic hazardous waste, Special Waste Approval from the state is still required for landfill disposal.

## PACKAGING WASTES

### I. Wood Wastes

Primary sources of wood waste in metal fabricating plants will be:

- Wooden pallets;
- Crates, boxes, skids and dunnage from inbound materials;
- Wood waste from in-house crating and boxing operations.

Little or no characterization of these wastes is necessary. Reduction, recycle, re-use and disposal options will be discussed elsewhere.

### II. Paper Products Wastes

No waste in any industrial establishment occurs in more forms or from more sources than paper products. This category includes office paper, wrapping paper from inbound goods, corrugated cardboard, paperboard products and various composites of which paper is a component. Places to look for paper products generation are:

- Office and computer room;

- Shipping and receiving areas;
- Storage and warehousing areas;
- All production areas.

Almost all paper products, except those which are bonded to other materials (such as plastic) or have adhesive backs, or are soiled with oil, are prime candidates for recycling.

**Miscellaneous Packaging Wastes**

Many other waste streams are likely to be found, for example:

- Plastics
  - Stretch wrap and plastic strapping from inbound goods,
  - Trimmings or scrap from plastic components incorporated into the plant's product,
  - Expanded polystyrene protective packaging,
  - Empty plastic drums and pails, from maintenance or housekeeping.

- Miscellaneous Steel Items
  - Steel strapping from inbound shipments,
  - Empty steel drums,
  - Empty paint and solvent pails and cans,

## OTHER WASTES

- Used fuel, hydraulic fluid and oil filters.
- Blasting beads, shot, sand or grit.
- Aluminum soft-drink cans.
- Spent fluorescent light tubes, solvents, dry-cell batteries, aerosol cans, etc. from maintenance operations.

# WASTE REDUCTION OPTIONS

## INTRODUCTION

Reduction of any waste stream may be accomplished by one or more methods. The preferred method for any stream is one which prevents or lessens its generation in the first place. This is SOURCE REDUCTION.

If a waste cannot be eliminated by source reduction methods, then it is time to look at RECYCLING, which allows the material to be:

- Returned to the process from which it came (in-process recycling);
- Re-used as a raw material in another process or product in the same plant (on-site recycling); or
- Re-used as a raw material in a process at some other site (off-site recycling).

If neither source reduction nor recycling is feasible, then some sort of TREATMENT option may have to be considered. Treatment may reduce the volume of waste, return at least a part of it to its original form and purity, lessen the material's potential for harming the environment, or destroy the material by converting it into other substances. If a waste is to be destroyed by burning, it is desirable to recover its energy content by using it to replace a fossil fuel, if possible.

The "last resort" option is DISPOSAL. If a waste is hazardous by RCRA definition, the method of disposal is prescribed by law. It is expensive, and the law gives the generator "cradle-to-grave" responsibility for any harm his hazardous waste may cause the environment. WASTE REDUCTION is the surest way to lessen that expense and future liability. To ensure that this happens, Tennessee enacted the Hazardous Waste Reduction Act of 1990 which requires every generator to devise a written plan setting specific reduction goals and to report progress toward their attainment annually.

The Solid Waste Management Act of 1991 has mandated that non-hazardous solid wastes landfilled or incinerated in Tennessee be reduced by 25% (weight basis) by December 31, 1995. To this end, some 60 Solid Waste Management Regions, each consisting of one or more counties, have been formed. Each region is currently determining how to meet that goal. While plans have not been completed, there is no doubt the necessary infrastructure will involve considerable cost which will be passed on to waste generators in the form of disposal fees. It is obvious that reduction of non-hazardous waste will pay dividends just as it will with hazardous waste.

## AWARENESS -- A POWERFUL WEAPON IN WASTE REDUCTION

In conducting many on-site waste reduction assessments in many types of industries and businesses, members of the UT-CIS' Waste Reduction Assistance Program (WRAP) have come to realize that an alarming amount of industrial waste is generated unnecessarily. The prime reason for this is that established procedures have been set up - often they just happened - with no consideration for waste generation. Therefore, a logical place to begin waste reduction is to make everyone in the organization aware of the influence their actions may have on waste generation rates through a training program, followed by participation in a facility-wide waste assessment. When a waste stream has been identified, those whose activities generate it should be asked questions such as:

> What causes this material to become a waste?
>
> Can we change our way of doing things to conserve the waste material?
>
> Could we accomplish the same result in a way which won't generate the waste?
>
> Could we substitute something less hazardous?
>
> Could we recover, re-use or reclaim the waste?

Once waste awareness has been established throughout the organization, options to reduce wastes may originate from any quarter. For example, much of the non-hazardous waste generated in most plants arrives with incoming raw materials and supplies. A waste-aware purchasing department can be remarkably effective in helping to eliminate at the source unnecessary packaging materials, "throwaway" pallets, and similar material which becomes your solid waste.

You will find in the Appendix a checklist which will help you get started in the process. Answering these questions and locating the documents related to the regulatory reporting you already do will provide a wealth of information on waste streams to all media.

Assistance in training, making waste assessments and establishing a waste reduction program is available from WRAP.

# REDUCTION OPTIONS FOR INDIVIDUAL WASTE STREAMS

Regulations governing hazardous waste handling, storage, treatment and disposal impose limitations on your options. The options listed are believed to include only those allowed under Tennessee statutes. An Appendix follows this section with vendor lists, information sources, etc. for your use in evaluating options.

## CLEANING OPERATIONS WASTES

## SOLVENT WASTES

### I. Vapor Degreasing Solvent Wastes

#### A. Reduce vapor losses through better operating practices

Far too many users of vapor degreasers are actually using them as hot-solvent soak washers. Using them in this way negates the built-in solvent-conserving features. Two excellent publications on vapor degreaser operation are listed in the Waste Reduction Techniques - Specific section of the Bibliography. Following the procedures given there can make a dramatic difference in solvent waste generation and vapor losses.

Good housekeeping procedures can significantly affect the amount of solvent waste and VOC emissions produced by vapor degreasers. These include:

- Liquid/liquid separators should be cleaned and checked frequently to avoid contamination of solvent with other cleaners or water which can lead to acid formation. Also, parts should not be allowed to enter the degreaser while wet;
- Promptly remove sludge collected at the bottom of the tank. This increases cleaning efficiency by not allowing contaminants to absorb solvent and dissolve into the solution. As solvents are used, their ability to neutralize acids lessens. While the common practice is to add new solvent to the aged solvent, a more efficient method is to analyze the solvent and replenish specific components.

The expense of analysis will be offset by the savings in solvent for tanks of approximately 500 gallons or more; and

**Other Improved Operating Practices which Result in Waste Reduction Include:**

- Standardize the solvent used to allow for recycling,
- Control the amount of heat supplied to vapor degreasers to minimize vapor escape,
- Avoid spraying parts above the vapor zone or cooling jackets,
- Avoid solvent vapor "pump-out" caused by rapid parts-basket insertion and withdrawal,
- Avoid liquid solvent "drag-out" by allowing parts to come to vapor temperature before withdrawing the parts basket;

### B. Vapor Degreaser Modifications for Waste Reduction

- Install lids/silhouettes on tanks -- all tanks should be covered when not in use. Covers that can be used even during the cleaning process (known as "silhouette entries") are available and allow for an even greater reduction in vapor loss. All covers should be designed to slide horizontally over the top of the tank, since this disturbs the vapor zone less than hinged covers;
- Increase the freeboard space on tanks -- an increased freeboard has been proven to decrease emissions. Early degreasers had a freeboard equal to one-half the tank width. When the U. S. EPA in the mid-1970s recommended a 75% freeboard, emissions were decreased up to 46%. Increasing the freeboard to 100% can provide an additional 39% reduction where air turbulence is present; and
- Install freeboard chillers in addition to cooling jackets -- a second set of refrigerated coils is installed above the condenser coils. These coils chill the air above the vapor zone and create a second barrier to vapor loss. Reductions in solvent use of up to 60% have been realized. However, water contamination of the solvent can occur due to frost on the coils, so a water collector is also necessary.

## II. Solvent Soak Tank or Parts-Cleaning Sink Solvent Wastes

### A. Better Operating Procedures

There used to be a washtub or soak tank in almost every maintenance, machine or plating shop. It was filled with a petroleum solvent such as "Varsol", mineral spirits, or the like. The historical procedure is to use the solvent and a brush or rag to wash grease, oil, dirt, and other soils from parts, dies, hands, etc. In the case of small parts to be plated, they are often placed in a perforated basket which is lowered into the tank and "swished" until the parts are considered free of oil. When the solvent "looks dirty", someone pours it out into a waste drum (Everybody now realizes that it is illegal to take it out back and pour it along the fence as weed killer, don't they?) and replaces it with clean solvent. If the company is "modern and progressive", the washtub or soak tank may well have been replaced by a parts-cleaning sink which is serviced by a congenial routeman who comes around every few weeks, removes the solvent container, replaces it with another filled with clean solvent, and leaves behind a properly-completed hazardous waste manifest.

A surprising number of companies have found themselves in the category of LQG simply on the strength of the accumulated amount of solvent waste manifested from such operations. In most instances, this is unnecessary -- a return to SQG or even non-generator status can probably be achieved through procedure changes. Some options are:

- Assume control of the "change-out" schedule instead of leaving it to the parts-sink vendor. The replacement schedule is set for the convenience of the routeman, (and possibly to ensure adequate billings on the route), not to get maximum use from the solvent before replacement. Many users have found that there are no cleaning problems even when the period between replacements is stretched out to three times that recommended by the vendor. Some have installed timers to record the time the sink is in use, basing solvent replacement on actual hours of use.

- Consolidate multiple cold cleaning operations into a centralized vapor degreasing operation.

- Locate cold cleaning tanks away from heat sources, keeping vaporization levels at a minimum.

- Keep soak tanks covered when not in use to minimize evaporation.

- Use multi-stage cleaning. If a washtub is replaced with a three-compartment sink where solvent overflows from compartment to compartment, counter-current to parts flow, the solvent usage can be reduced 75% to 80%. Dirty parts are scrubbed in the dirtiest solvent, then rinsed in less dirty solvent, and finally quickly sprayed off with clean solvent. The dirty solvent that overflows from the last compartment will equal the volume used in the final spray rinse.

### B. Substitute a high-flash, "unlisted" solvent for the hazardous one.

Some spent solvents used for metal cleaning (e.g., mineral spirits, petroleum naphtha) fall under regulation as hazardous wastes solely because of the ignitability characteristic, defined as having a flash point lower than 140°F. Others (e.g., toluene, methyl ethyl ketone, methyl chloroform) are "listed" hazardous wastes, because they are found in the lists of solvents in the definitions of F001-F005 wastes.

If the required cleaning job can be done with another solvent which is not included in those definitions, then the spent solvent will not be a hazardous waste unless it has become contaminated with some toxic material in the course of use. In most applications in the plating industry, this is rather unlikely to occur. Most vendors can now supply cleaning solvents formulated so as to avoid being classified a hazardous waste when spent. Examples are petroleum products prepared so that the flash point is well above 140°F, bearing names such as "Solvent 140", "Exxon Aromatic 150", etc.

### C. Substitute water-borne cleaning agents for the solvent.

Newly developed synthetic detergents and compounded cleaners have been successfully used to replace solvents for general in-shop cleaning. This eliminates solvent wastes and removes a fire hazard from the workplace. If the cleaning operation is a production operation, a number of vendors now supply both equipment and formulated detergent preparations which can exceed the performance of most solvent operations.

One of the objections frequently voiced to these systems is that parts cleaned in them rust quickly. Although rusting is a good indication that cleaning has been extremely effective, suppliers of cleaning compounds can supply rust inhibiting compounds to avoid this problem.

Another barrier has been that the aqueous solutions require more "elbow grease" than the solvent cleaners to remove heavy soils. It's as if you tried to wash all your dishes in cold water. To meet this objection, there are now a number of parts-cleaning sinks available which keep the solution warm, greatly enhancing degreasing ability, and some are equipped with high-pressure sprays or violent agitation so that extremely hot solutions can be used without exposing the operator to scalding hazards. Some have oil skimmers to keep the surface clear of oil, and/or circulating filtration systems to continuously remove dirt and other particulate matter. With those features, the need for solution replacement is greatly reduced.

## III. Spent Solvents from Any Source

Spent solvents are those which, by virtue of having been used for cleaning, are contaminated with oils, grease, paint resins and pigments to the extent that they can no longer remove the soils from the items to be cleaned. Once they reach that state, the common procedure is to dispose of them, usually as hazardous waste.

There are some options which may be worth considering before taking this step:

### A. Find A Use for the Spent Solvent

- Some fabricating shops which do a large amount of grinding or lapping have found that spent hydrocarbon solvent which has been used for removing oil and grease can be passed through a filter to remove solid suspended matter and used as a lubricant on a grinder or lapping machine.

- If the solvent is of the high-flash hydrocarbon type, it can be burned on-site in a used-oil burner for water heating or space heating.

### B. Recover the Solvent with an On-Site Still

- A number of manufacturers can supply small solvent recovery stills, some of which process batches as small as five gallons, on a cycle which requires about six hours. Other stills will process as much as 30 gallons. With appropriate controls, no attention is required except to charge and start the unit, and remove the still bottoms. If the solvent to be recovered is flammable, the unit should be equipped with explosion-proof controls. It is also desirable to isolate the still from other operations.

  The still bottoms will contain all the non-volatile contaminants, along with some of the solvents. The bottoms from spent solvents which would be F001-F005 hazardous wastes will still be a hazardous waste, and should also be tested to determine whether they exhibit ignitability or TCLP toxicity.

- At least one user of a still to recover paint thinner was able to work with his paint supplier and formulate an inexpensive undercoat product with superior protective properties, using bottoms from the recovery still as a raw material.

### ☹ THINGS TO CONSIDER BEFORE IMPLEMENTING THIS OPTION:

These devices are not truly "distillation systems", but are simple evaporators. They are not capable of separating one volatile solvent from another, but can only evaporate volatile materials (including water) from such non-volatiles as grease, oil and dirt. If you have wet or mixed solvents, the distillate may be of no use to you, making purchase of a still inadvisable. If there is any doubt, technical assistance should be obtained.

It must be noted that, under current Tennessee regulatory interpretation, some, **if not all, of the solvent charged to a recovery still must be reported as hazardous waste generated.** However, the costs associated with storage, transportation, replacement solvent disposal will be substantially reduced.

# WASTEWATER FROM CLEANING SYSTEMS

## I. Better Operating Practices

Some options which can reduce the quantity of wastewater generated in cleaning operations include:

- Use countercurrent water flow. That is, instead of using fresh water for each rinse stage and for make-up in the detergent solution, you introduce fresh water at the final rinse, then collect it and move it counter to parts flow, using it finally as make-up water to replace evaporation losses in the detergent solution. To avoid mineral build-up, it is usually necessary to arrange a continuous overflow, or even better, to use **demineralized (deionized) water** as the final rinse.

- Add filtration devices and oil skimmers to cleaning and stripping baths to remove solid matter and oils, thus avoiding the necessity for periodic draining and replacement.

- Save acidic wastewater from pickling operations and use it to neutralize exhausted alkaline cleaning or stripping solutions, or use it as a rinse between an alkaline cleaning bath and an acid etching bath.

- If detergent solution is contaminated with oils, use skimmers followed by ultrafiltration to remove oil and return detergent solution for re-use instead of discarding it.

## II. Spent Pickling Acids

Spent pickling acids are generated because the metal content has reached a level where the acid no longer effectively performs the intended function of removing rust.

- There is little to be done to increase the life of a pickling solution, except to establish procedures to ensure that the material being pickled remains in the bath only the amount of time required to de-rust. Any time beyond this simply allows the acid to dissolve good metal, unnecessarily consuming base metal while at the same time depleting the bath.

- A more effective approach would be to avoid the need for pickling, or at least to minimize the amount of rust by protecting metal from the elements, by storing it under cover, or by applying rust preventatives before storage.
- Mechanical cleaning methods have successfully replaced acid pickling in some plants. Blasting with plastic beads, glass, steel shot, or even sponge particles are some methods in use. Some users of wire or rod have installed abrasive cleaning machines which remove rust and scale as the material is un-reeled.

### III. Spent Alkaline Cleaning Solutions

Proper maintenance of alkaline cleaning baths can extend the bath's life many times. Things which are helpful are:

- Filter the bath continuously to remove suspended solids before a sludge develops at the bottom of the vat.
- Install a continuous oil skimmer to remove un-emulsified oils from the surface of the bath.
- Analyze the bath frequently and adjust the pH, solids content, etc. to the original levels by adding more alkali or detergent.
- To prevent a build-up of unwanted minerals, prepare the solution with demineralized water, and use only demineralized water for make-up.

## PLATING PROCESS WASTES

The only continuous waste stream from the plating process itself is waste water which, in almost all cases, must be treated to remove metal salts before it can be disposed of either to surface waters or to a POTW. Occasional waste streams sometimes found include plating baths which are being replaced, and sludges generated by tank cleaning, bath maintenance, etc. Traditionally, these wastes are simply transferred to the wastewater treatment plant. Wastes for which the plating process is responsible thus show up either as sludge or treated wastewater exiting the treatment facility. There are two prime sources of excessive wastes in the plating process:

- **Excessive Sludge:**

  This consists of metallic salts removed from water discharged from the plating process. It takes only a little thought to realize that those metal salts should have ended up as plating metal deposited on parts. Source reduction measures which eliminate this waste usually pay handsome economic dividends. The major contributor to sludge generation is plating solutions transferred from the plating tank into rinsewater as parts are transferred. This transfer is usually called "drag-out".

- **Excessive Wastewater:**

  Most frequently, excess water leaving a plating plant is the result of "overkill" with rinse water. More discussion of this subject follows.

Waste reduction measures which can be implemented in the plating plant are almost solely in the category of improved operating procedures.

Source reduction measures involve substitutions which reduce the toxicity of the wastes emitted by the facility. Several are discussed below.

**Waste Reduction Techniques:**

Refer to the Electroplating section of the Bibliography for over fifty detailed descriptions of waste reduction techniques and case studies of their successful application by platers.

What follows is a brief summary of what can be accomplished by using the source reduction and procedure improvement techniques presented there.

**Source Reduction Measures:**

- Substitute tri-valent ($3^+$) Chromium for hexa-valent ($6^+$) if appearance is the major reason you have been using it. New techniques have been developed which make the finishes derived from tri-valent chromium equal in appearance to traditional hexavalent chrome finishes.

- Substitute other surface finishes - *this won't fly if you're in a plating business where the customer specifies the finish, rather than one where plating is just the final step.*

- Eliminate the use of cyanide solutions. With today's technology, using cyanides is not necessary for good results in any kind of plating. Doing away with them removes an acute hazard from your workplace, and avoids generating wastes that are hazardous because of the presence of cyanides.

- Use nothing but deionized water and avoid many complications. This is probably not practical unless rinse flows are drastically reduced.

Improved Operating Procedures:

The twelve waste-reducing operating techniques which follow have been referred as *The Electroplater's Dirty Dozen*[1]. Applying them can reduce wastes, plating costs and environmental worries.

SLOW DOWN -- **REDUCES DRAG-OUT**

Drag-out of solution on parts wastes bath chemicals and generates sludge. Anything done to reduce DRAG-OUT will reduce waste. Most drag-out occurs as parts leave plating bath. Some productive actions are:

Don't splash;
Raise parts out slowly;
Let them drain; set times and see that they are adhered to;
Use drip racks to support parts during draining for manual operations.

COUNTERCURRENT RINSE -- **REDUCES WATER USE**

Fresh water is fed into the rinse tank farthest from the process tank and overflows backwards through the flowing rinse tanks until it reaches the rinse tank immediately after the process tank.

A two-stage countercurrent rinse can cut water use by 90% over a single flowing rinse without affecting quality. (3-stage, >95%)

Divide large rinse tanks so each compartment is just large enough for the parts. Thus, you can sometimes accomplish two or three stages of countercurrent rinsing in a single existing tank.

STATIC RINSE and/or DRAG-OUT TANK -- **RECOVERS DRAG-OUT**

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[1] Metro-Dade Department of Environmental Resources Management., *Pollution Prevention Quarterly*.

After draining as completely as possible, immerse parts in a static tank of deionized water. This removes much of the solution clinging to parts. As concentration of solution in tank increases, transfer some back to plating tank instead of using fresh water for make-up. Replenish the static rinse tank with DI water.

Place an empty tank (drag-out tank) next in sequence after the plating tank and let parts drain into it. As solution accumulates, periodically return it to the plating tank.

## RACK TO REDUCE DRAG-OUT -- **REDUCES DRAG-OUT**

Hang parts so drainage is most rapid;
Avoid pockets -- even drill drain holes if necessary;
Design special racks if necessary;
Don't hang parts so they drip on one another;
Hang flat sheets so lowest point is one corner.

## CHECK BATH CHEMISTRY -- **EXTENDS LIFE, REDUCES LOSSES**

Platers have developed a tradition of keeping solutions stronger than is actually necessary for good results, as "insurance" against rejects. Testing and determining minimum concentration which gives proper result makes drag-out less concentrated, thereby saving chemicals and sludge generation.

Filtering the bath continuously removes material which often causes the plater to have to discard and replace a bath.

## RESTRICT WATER FLOW -- **REDUCES WATER USE**

Once water flow rates have been optimized, install orifice-type (not adjustable by operator) flow limiters in series with the shut-off valve.

Establish procedures to make sure water lines not in use are turned off.

Severely limit opportunities for operators to connect hoses and "defeat the system".

## DRAIN BOARDS -- **REDUCES DRAG-OUT**

Spaces between tanks should be covered with drain boards with top surface sloped to cause drag-out to flow back to the previous tank.

Split flexible duct has been seen placed across the gap between tanks. They do help keep floors clean, but they don't return all the drip to the previous tank. Do it right!

## AGITATED BATHS -- REDUCES WATER USE

High water flow rates within a rinse tank do not really agitate well.

Agitation by lifting parts out and re-immersing during rinse is good.

Air spargers agitate quite well. Use minimum air flow that will cause entire bath to be turbulent . . . remember, generating compressed air requires expenditure of energy.

Filtering may be necessary to prevent deposition of solids which would settle out in non-agitated rinse.

Watch out for foaming!

## FOGGING/SPRAYING/AIR KNIVES -- REDUCES DRAG-OUT

While part is draining above plating bath, a fine mist or fog of fresh (DI) water, or with water from the static rinse tank, allowed to drip into the plating bath can return drag-out and furnish make-up water to replace evaporation.

Drag-out on some types of parts can be reduced by using a jet of air to assist in fast drainage of solution from surface.

## ION EXCHANGERS -- RECOVERS METAL VALUES

Ion exchange units can recover metal ions from rinsewater, but a regenerating solution or resin bed must then be treated to reclaim the metal.

## ELECTROLYTIC RECOVERY -- RECOVERS METAL VALUES

This process is simply to provide a cathode of thin metal and electroplate metal from the solution onto it until the solution treated is exhausted. Can be used to recover metal from spent plating baths which otherwise would be discarded, or from ion exchanger regeneration solutions.

## SLUDGE RECYCLING -- RECLAIMS METALS, LOWERS DISPOSAL COST

Commercial availability of this option has been steadily increasing and becoming more affordable. Sludge must be manifested as hazardous waste when going to reclaimer, but cost is generally lower than stabilization and disposal, and metals are returned to commerce, rather than landfilled.

☹ **WARNING:** **Don't get the cart before the horse!**

Be sure when you start your program to reduce wastes in the plating plant that you begin with those options which reduce drag-out, and when you have accomplished all you can, then move to those which reduce water consumption. If the reverse order is chosen, it is likely that a drastic reduction in water flows will result in an increase in metal ion concentrations in the input to the waste water treatment facility causing serious problems in the treatment process and possible out-of-specification excursions in the effluent from the facility.

## WASTEWATER TREATMENT FACILITY WASTES

### EVALUATE WHETHER MIXING STREAMS IS COSTING YOU

If a wastewater treatment facility receives only the effluent from the plating process, there are usually only two exit streams, the treated wastewater and a sludge containing the metal salts removed from it. However, in the majority of plants, plating is not the only operation generating a process wastewater. In order to avoid generating an unnecessarily large amount of sludge which is a hazardous waste under RCRA, management needs to carefully evaluate each of the streams to be treated, and avoid mixing them with the electroplating effluent for treatment, if they can be treated separately without generating a RCRA hazardous waste. Other reasons for segregating and separately treating various wastewater streams include such advantages as avoiding oils, chelating agents and other substances which interfere with precipitation and separation of metallic sludges, usually resulting in increased volume and mass of sludge.

Examples:

- Spent pickling acid contains a heavy concentration of iron. If it is mixed with plating rinsewater before treatment, all that non-hazardous iron sludge becomes hazardous waste. There is a small market for pickling acid for fertilizer manufacture or for recovery of metal and acid content. One of the best ways to contact potential users of spent pickling acids is to list it on a waste exchange. See the Appendix for details.

- Sludge from treatment of effluent from a plant which is plating zinc on steel segregated from that from other plating operations is specifically exempted from classification as hazardous waste. One company won the Tennessee Governor's award for Hazardous Waste Reduction simply by segregating the wastewater from zinc-on-steel plating (about 90% of their output) from that of other types of plating and treating it in a separate facility. While they reduced their hazardous waste by 90%, they reduced their total waste generation not at all.

## REDUCE SLUDGE WEIGHT AND VOLUME

Many companies have considerably reduced disposal costs by removing as much water as possible from the treatment sludge.

Examples:

- Belt presses can physically squeeze water out of the sludge, reducing both weight and volume.
- Use of proper polymer coagulants can make separation much faster and more efficient.
- Using magnesium hydroxide instead of caustic soda or lime as a neutralizer may improve settling rate and filterability of the sludge, yielding a denser, drier sludge.
- Sludge driers can reduce the volume of sludge cake by a 4:1 ratio, and reduce the weight by 65%.

See the Bibliography and the vendor list in the Appendix for sources of further information.

## RE-USE WASTE WATER FACILITY EFFLUENT

It is common practice to discharge treatment effluent directly to the receiving stream or to the sewer system. However, in order to meet the restrictions imposed by an NPDES permit or a POTW's industrial user agreement, the effluent must be relatively pure, and because it has just passed through a filter to remove sludge, it is quite free of suspended solids. Considering the cost of purchased water and sewer surcharge fees, which are almost sure to increase in the future, it would be well to consider whether economic justification exists for re-uing at least part of this water. Some possible uses:

- Make-up, dilution and rinse water for pickling baths;
- Burnishing machine charge;
- Quenching baths;
- Make-up water for cooling towers.

## PACKAGING WASTES

Most packaging wastes found in a metal finishing shop do not result from anything which has taken place in the manufacturing operation. Rather, they arrived in the plant along with the materials and supplies used in manufacturing. Regardless of their origin, once in your plant they must be discarded, recycled, or otherwise disposed of. As hauling and tipping fees for solid waste increase, this becomes a significant financial burden. Recent site assessments have revealed single plants bearing a waste management and disposal burden from $250,000 to over $500,000 annually, most of it due to packaging wastes.

The first, and most effective, source reduction measure which should be taken is to determine whether all this material is really necessary, then arrange with the suppliers to eliminate all that can be eliminated without jeopardizing the "as received" quality of the products.

The next is to determine how much of the material can be re-used, either in the plant, or as packaging for outbound material.

Third, dispose of as much of the excess as possible through recyclers or waste exchange.

Finally, all the rest must be disposed of, usually into a landfill.

Some options which may be of help in reducing specific types of packaging wastes follow.

☹ **WARNING:** Many ingenuous schemes to reduce packaging waste have to be discarded for economic reasons. For example, returnable containers may not be practical because of the cost of shipping them back. Be sure you make a complete financial analysis before committing.

**Wood Wastes**

- Arrange for suppliers to ship you their goods only on pallets which you will be able to use for outbound shipments. Unless you are in a single-supplier situation, this essentially eliminates inbound "throwaway" pallets.

- Have suppliers who ship on heavy skids, or in wooden boxes take them back for re-use.

- Enter into dialog with suppliers to devise multi-trip packaging such as collapsible wire or plastic boxes, plastic pallets, special racks,etc.

**Paper Products Wastes**

- Have suppliers cease using composite (e.g., plastic-coated paper) materials, replacing them with recyclable materials such as plastic stretch wrap.

- Have suppliers supply corrugated cardboard cartons heavy enough that the usual pallet overwrap and/or strapping can be dispensed with. If these are designed to be knocked down, they may be returned for re-use. If return freight is prohibitive, maybe they can be used to ship your products. Failing all else, the cardboard is recyclable.

- Don't allow paper and cardboard to become contaminated with oil, or mixed with non-recyclable material. Only relatively clean material has recycling value.

- Many fibre drums can be eliminated by purchasing cleaning compounds, drawing-die lubricants, or other powdered materials in 1 cubic yard returnable "super-sacks".

**Metal Packaging Wastes**

Likely, there is already a scrap metal recycling program in a metal finishing shop. Most metal packaging wastes can go directly into the proper scrap metal hopper.

- Empty steel cans, pails and drums are acceptable as scrap steel, but dealers may insist they be crushed, deheaded, or some other measure be taken to ensure they are and will remain empty.

- Steel strapping is usually accepted, but may have to be cut into short lengths.

- Steel 55-gallon drums should be eliminated to the extent possible by such measures as buying solvents and chemicals in returnable drums, buying in returnable 6-drum (330 gallon) tote bins, or even in bulk with storage in on-site tanks.

**Plastic Packaging Wastes**

Although plastic materials are recyclable in theory, markets are poorly defined. If plastics are a disposal problem, source reduction measures directed at suppliers may be the only effective route.

## GENERAL NOTES ON RECYCLING

In a plant environment, recycling will be an effective option only if there is real employee involvement. To accomplish that involvement, there must be training, awareness that involvement is expected from top management downward, constant reminders, and incentives.

In general, if any two materials become mixed together, the opportunity for recycling is compromised. Therefore it is important that employees be educated as to what is permissible and what is not. For example, one sheet of carbon paper in a bale of office waste paper can be cause for the recycler to reject the entire bale. Stretch wrap with self-adhesive paper labels attached and cardboard with oil or paint on it are other examples of contamination which leads to rejection.

Composite materials such as plastic-coated paper, fiber glass reinforced plastic, etc. cannot be economically separated into their component parts, and are thus not recyclable. Use of such materials should be avoided if possible.

Supply of recyclable material usually far exceeds demand, but this situation varies from place to place. The only sure information on the market at your plant site for any material will come from someone who is willing to negotiate with you for it.

**Do not expect to make money on recycling. If you can avoid paying for disposal, you are faring well under today's recycling market.**

The Center for Industrial Services maintains a list of companies involved in recycling materials from Tennessee sources. The list, which is subject to change almost daily, can be obtained by calling Keith Ridley at 615-532-4928. CIS will appreciate receiving any information you may have concerning companies which should be added to or deleted from the list.

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54. Kohl, Jerome. "Reducing Wastes from Electroplating: Causes of Loss and Options for Reducing Loss." Technical Assistance Training Program 3 - WRATT, , 15 September 1991. FMP 0878.

55. WRITAR. Rinsing Process Modifications for Electroplaters, Undated. This script suggests modifying rinsing processes, with the goal of reducing water use and reducing waste generation (by extension), in four steps: Step 1. Dragout Reduction. Step 2. Improved rinsing efficiency, Step 3. Reduce water flows, and Step 4. Manage captured solutions. FMP 0980.

56. Foecke, Terry. Rinsing Process Modifications for Electroplaters, , 23 September 1992. This article discusses the selection of waste reduction options in rinsing operations. Drag out, waste treatment and water usage are discussed. FMP 1197.

57. Greiner, Timothy J. Closed-Looped Metal Finishing Processes, , 1989. This paper discusses the purification of wastewater and recovery of residuals in metal finishing processes. It includes a method for eliminating wastewater discharge, potential barriers to the process and a case study. It also includes a listing of electroplating source reduction sources of information. FMP 1198.

58. Frederick Gumm Chemical Company, Inc. Envirochrome (TM) Decorative Trivalent Chromium Plating Process, , Undated. This technical bulletin compares the working parameters of Envirochrome, an environmentally safe product, with those of Hexavalent Chromium. MISC 0256.

59. MISSTAP. Checklists for Identifying Waste Reduction Opportunities, , Undated. This workbook on waste reduction opportunities is provided by the State of Mississippi. Operating procedures, cleaning, machining, plating/metal finishing, coating/painting and formulating are covered. PPP 0390.

## SOURCES OF LISTED PUBLICATIONS:

[1] California Department of Health Services
Alternative Technology Section
Toxic Substance Control Division
P.O. Box 942732
Sacramento, CA 94234-7320 Telephone: 916-324-1807

[2] Center for Hazardous Materials Research
University of Pittsburgh Applied Research Center
320 William Pitt Way
Pittsburgh, PA 15238 Telephone: 412-826-5320

[3] Institute for Local Self-Reliance
2425 18th Street, NW
Washington, DC 20009 Telephone: 202-232-4108

[4] North Carolina Department of Human Resources
Solid and Hazardous Waste Management Branch
P.O. Box 2091
Raleigh, NC 27602 Telephone: 919-733-2178

[5] North Carolina State University
Industrial Extension Service
Raleigh, NC 27695-7902 Telephone: 919-737-2303

[6] United States EPA Small Business Ombudsman
401 M Street, SW (A-149C)
Washington, DC 20460 Telephone: 800-368-5888

[7] United States EPA
Center for Environmental Research Information
Publication Office
26 Martin Luther King Drive
Cincinnati, OH 45268 Telephone: 513-569-7562

[8] Tennessee Dept. of Economic and Community Development
7th Floor, 320 6th Avenue North
Nashville, TN 37219 Telephone: 615-741-1888

[9] Reprints of this and a number of related articles can be obtained from:
Master Chemical Company
P.O.Box 220
Perrysville, Ohio 43551 Telephone: 419-874-7902

[10[ WRRC, P.O. Box 27687, Raleigh, NC 27611-7687 Telephone: 800-476-8686

# APPENDIX

# WASTE REDUCTION PREASSESSMENT CHECKLIST

This form should be completed and made available to the assessment team prior to the formal assessment.

DATE ______________________________

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CompanyName ________________________________________________ SIC Code: ____________________

Street Address: ______________________ City: ____________________ County: ________________

No. of Employees: __________ Days Operated/Week _____ No. of Shifts/Day: _____ Sq. Ft. Under Roof __________

Products: ____________________________________________________________

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Information provided by: ______________________________ Title: ______________________________

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Comments:

| INDICATE WHICH OF THE FOLLOWING CAN BE MADE AVAILABLE AS BACKGROUND FOR THE WASTE REDUCTION ASSESSMENT: | YES | NO | ?? |
|---|---|---|---|
| Process or work flow diagrams? | | | |
| Facility/equipment layout drawings? | | | |
| An inventory of all hazardous materials used or processed in the facility? | | | |
| Material Safety Data Sheets (MSDS's) on hazardous chemicals used or processed? | | | |
| Environmental audit report? | | | |
| Hazardous waste analyses or profiles? | | | |
| Hazardous waste annual reports and shipping manifests? | | | |
| Copies of environmental permits (Air Emissions, wastewater discharges etc.)? | | | |
| Raw material inventory and cost data? | | | |
| Waste treatment and disposal cost data? | | | |
| Utility cost and sewer charges records? | | | |
| **GENERAL QUESTIONS FOR HAZARDOUS WASTE GENERATORS:** | **YES** | **NO** | **??** |
| Indicate your EPA/TN Hazardous Waste Generator ID No.: | n/a | n/a | n/a |
| Are you a Large Quantity Generator? [Over 2,200 lbs. (1,000 kg) hazardous waste generated in any one calendar month] | | | |
| Are you a Small Quantity Generator? [From 220 to 2,200 lbs. (100 to 1,000 kg) hazardous waste generated in any one calendar month] | | | |
| Have you generated 2.2 pounds ( 1 kg) or more of an Acutely Hazardous waste (one on the RCRA "P" list) in any one calendar month? | | | |
| Are you aware that by signing the Uniform Hazardous Waste Manifest, you've implied a "good faith effort" to minimize generation of hazardous wastes? | | | |
| Does the company have on file the Hazardous Waste Reduction Plan which is required by Tennessee's Hazardous Waste Reduction Act of 1990? | | | |
| If the above plan is on file, is there an active effort to implement it and meet its goals? | | | |
| Has the company ever performed or had conducted a waste reduction assessment before this? (This is sometimes called a "waste minimization audit".) | | | |
| Do the Transportation, Storage and Disposal Facilities (TSDF's) you use meet all RCRA requirements? | | | |

SPECIFIC QUESTIONS ABOUT HAZARDOUS WASTES, WASTE WATER AND AIR EMISSIONS

| | | | |
|---|---|---|---|
| **HAZARDOUS WASTES:** | YES | NO | ?? |
| Do you store hazardous waste in lagoons, ponds or surface impoundments? | | | |
| Do you store chemicals or petroleum products in underground storage tanks?<br>How many tanks? ________<br>Contents? | | | |
| **WASTE WATER DISCHARGES:** | YES | NO | ?? |
| Does the facility release wastewater into surface waters under a National Pollutant Discharge Elimination System (NPDES) permit? | | | |
| Does the facility discharge process wastewater into a sewer system served by a Publicly Owned Treatment Works (POTW)? | | | |
| **AIR EMISSIONS -- STACK AND FUGITIVE DISCHARGES:** | YES | NO | ?? |
| Does the facility have exhaust stacks which require air pollution control permits under the National Emission Standard for Hazardous Air Pollutants (NESHAP)? | | | |
| Does the facility use or process volatile materials such as solvents which evaporate and become so-called fugitive emissions? | | | |
| **SARA TITLE III REPORTABLE DISCHARGES:** | YES | NO | ?? |
| Does the facility produce, use or store any substance on the Title III Extremely Hazardous Substances list? | | | |
| If yes, has the company submitted copies of MSDS's or chemicals list to State and local authorities as required under Section 311? | | | |
| If there was 10,000 pounds of a reportable chemical on-site during the year, were Tier II reports submitted as required under Section 312? | | | |
| If required to do so under Section 313, has the company submitted Toxic Chemical Release Form (Form R) to the Tennessee Department of Environment & Conservation? | | | |

| QUESTIONS ABOUT RECYCLING AND RE-USE PRACTICES | YES | NO | ?? |
|---|---|---|---|
| Are any wastes being recycled on-site?<br>If yes, what are they? | | | |
| Are any wastes being recycled off-site?<br>If yes, what are they? | | | |
| Does the facility generate non-hazardous used oil?<br>Sources? | | | |
| Is used oil being placed into a fuel-blending program? | | | |
| Do you bale recyclable materials such as corrugated, paper, and shrink wrap? | | | |
| Does the facility practice segregation of solid wastes to enhance recycling potential? | | | |
| Are any wastes (solid or liquid) being converted on-site to energy for process or space heating?<br>Explain | | | |

## NON-HAZARDOUS WASTE STREAMS

| | SOURCE | | | DISPOSITION | | | |
|---|---|---|---|---|---|---|---|
| WASTE | Process | Packaging | Other | Landfill | Recycler | Other | % of Total |
| Corrugated | | | | | | | |
| Paper | | | | | | | |
| Pallets | | | | | | | |
| Stretch Wrap | | | | | | | |
| Glass | | | | | | | |
| Metal Drums | | | | | | | |
| Fiber Drums | | | | | | | |
| Plastic Containers | | | | | | | |
| Used Oils | | | | | | | |
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| | | | | | | | |

## WASTE CONTAINERS ON PREMISES

| LOCATION | CU. YDS | OPEN-TOP or COMPACT-OR? | PULLS PER WEEK | MONTHLY RENTAL | HAULING FEE | TIPPING FEE |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
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| | | | | | | |
| | | | | | | |

**YOUR QUESTIONS ABOUT THIS ASSESSMENT OR COMMENTS ON YOUR AREA(S) OF PARTICULAR INTEREST AND CONCERN:** (please use the back of this sheet if you need more space)

# II. SELECTED VENDORS

## SOLVENT RECOVERY STILLS

Acra Electric Corporation
3801 N. 25th Ave.
Schiller Park, IL 60176

ARTECH, Inc.
1221 East Houston
Broken Arrow, OK 74012

Artisan Industries, Inc.
73 Pond Street
Waltham, MA 02254

B/R Instrumental Corp.
P.O.Box 7
Pasadina, MD 21122

Baron-Blakeslee
2001 N. Janice Avenue
Melrose, Park IL 60160

Branson Cleaning Equip. Co.
Post Office Box 768
1 Parret Drive
Shelton, CT 06484

Brighton Corporation
11861 Mosteller Road
Cincinnati,OH 45241

Ceilcote/APC Division
Master Builder, Inc.
140 Sheldon Road
Berea, Ohio 44017

Corning Process Systems
Corning Glass Works
Big Flats Plant
Big Flats, NY 14814

Crest Ultrasonic Corp.
Scotch Road
Mercer County Airport
Trenton, NJ 08628

Detrex Corporation
Industrial Equipment Division
4000 Town Center
Southfield, MI 48075

Distillation Environmental Systems
525 Boulevard
Kenilworth, NJ 07033

Eaton Corporation
Process Control Components
1199 S. Chillicothe Rd.
Aurora, OH 44202

Ecology Equipment, Inc.
4162 Library Road
Pittsburgh. PA 15234

Finish Engineering Co.
921 Greengarden Road
Erie, PA 16501-1591

Hoyt Corporation
Forge Road
Westport, MA 02790-0217

HydroTek, Inc.
8501 W. 191st Street
Units 42 & 43
Mokena, IL 60448

Interel Corporation
P.O.Box 4676
Englewood, CO 80155

Kleer-Flo Company
15151 Technology Drive
Eden Prairie, MN 55344

Lenan Corp. (Recyclit)
P.O.Box 1017
Janesville, WI 53547

LUWA Corporation
Process Division
P.O.Box 16348
Charlotte, NC 28297

Phillips Mfg. Co.
7334 N. Clark Street
Chicago, IL 60626

Progressive Recovery, Inc.
700 Industrial Drive
Dupo, IL 62239

Ramco Equipment Corp.
32-34 Montgomery St.
Hillside, NJ 07205

Recyclene Systems
405 Eccles Avenue
So. San Francisco, CA 94080

Siva International, Inc.
c/o J. B. Systems
P.O.Box 11000
Rock Hill, SC 29731

Vaco-Solv Chicago, Inc.
P.O.Box 1544
Barrington, IL 60011

VARA International, Inc.
VARA Corporation Center
1201 19th Place
Vero Beach, FL 32960

## ON-SITE SOLVENT RECOVERY SERVICES

Smiseth Corporation
Post Office Box 1424
Murfreesboro, TN 37133

Solvent Reclaimers
Route 3, Box 323
Murfreesboro, TN 37219

## USED OIL BURNERS

Clean Burn, Inc.
83 South Groffdale Road
Leola, PA 17540
800-331-0183

Hooter, Ltd.
P.O.Box 19
Fombell, PA 16123
412-758-4561

Kroll Heating Alternatives, Inc.•
P.O.Box 6
Manhasset, NY 11030
516-456-3475

Lenan Corporation••
615 North Parker Drive
Janesville, WI 53545
608-752-1601

Reznor Waste Oil Heaters
Telephone 800-695-1901
Ask for Catalog WOHUS 5/92

Robert Sun Company•
240 Great Circle Road, #344
Nashville, TN 37228
615-251-0680

• Water-heating capabilities available
•• Both water-heating and multiple-waste fuel capabilities indicated.

## PARTS CLEANERS

ADF Systems, Ltd.
1301 19th Street N.
P.O.Box 278
Humboldt, Iowa 50548
515-332-5400

Better Engineering Mfg., Inc.
7101 Belair Road
Baltimore, MD 21206
800-638-3380

Bowden Industries, Inc.
1004 Oster Drive NW
Huntsville, AL 35816
800-553-3637

Kleer-Flo Company
15151 Technology Drive
Eden Prairie, MN 55344
800-328-7942

J. S. Mannor Machine Corp.
427 East Judd St.
Woodstock, IL 60098
815-338-8700

Safety Kleen Corp.
P.O.Box 1419
Elgin, IL 60120
Local Offices Everywhere

Zep Manufacturing Company
P.O.Box 2015
Atlanta, GA 30301
404-352-1680

## SLUDGE DRYERS AND COMPACTING EQUIPMENT

JWI, Incorporated
2155 112th Avenue
Holland, MI 49424
616-772-9011
(Dryer)

Eco Systems & Design, Inc.
Rt. 9, Box 539 Belmont Drive
McMinnville, TN 37110
800-332-8426
(Recovery Press)

## HIGH-FLASH CLEANING SOLVENTS

Chemex Industrial Chemicals
1357 Heistan Place
Memphis, TN 38104
901-272-2431

Cone Solvents
2064 Channel Avenue
Memphis, TN 38113
901-946-1638

CTC Industrial Services, Inc.
1827 Latham St.
Memphis, TN 38104
901-942-1212

Safety-Kleen Corp.
7217 Airways Road N.
Olive Branch, MS 38635
901-349-2842
(Memphis No.)

Zep Manufacturing Company
P.O.Box 2015
Atlanta, GA 30301
404-362-1680

## III. WASTE EXCHANGE INFORMATION

Maxie L. May
Southeast Waste Exchange
Urban Institute, UNC-Charlotte
Charlotte, NC 28233
704-547-4289

The exchange listed above is the only one known to be operating in this area at present. Efforts are under way, however, by Tennessee Department of Environment and Conservation's Technical Assistance Department to establish one for Tennessee waste generators. For current information, call DeAnna Fry at 615-532-0074.

## IV. SOURCES OF FREE, PERSONAL, HANDS-ON TECHNICAL ASSISTANCE

The University of Tennessee's Center for Industrial Services -- Telephone Keith Ridley at 615-532-4928

Waste Reduction Resource Center for the Southeast -- Telephone 800-476-8686