OFFICE OF WASTE REDUCTION

FOCUS

Waste Minimization

Vol. 4, No. 1

Summer 1995

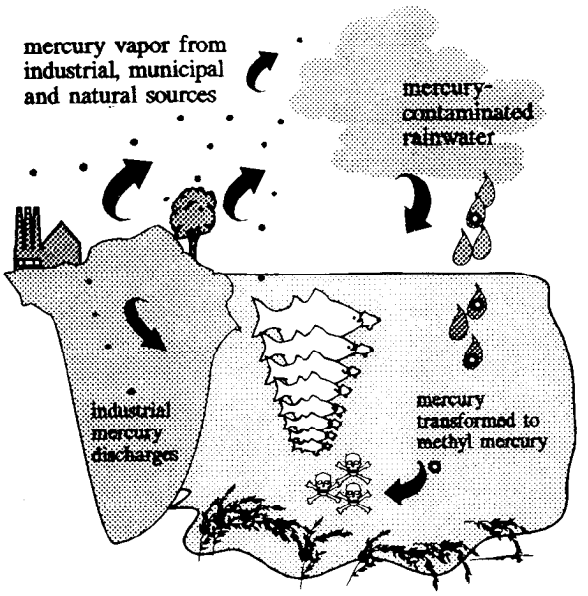
Mercury: An Environmental Issue in North Carolina

Many states including North Carolina are increasingly focusing on the effects of mercury on the environment. Mercury is a naturally occurring element used with great effectiveness in many industrial applications. In small quantities, it conducts electricity, measures temperature and pressure, acts as a biocide, and functions as a catalyst.

The public health effects of mercury, however, are serious. Scientists have discovered that some mercury compounds are potent neurotoxins; they are capable of impairing the neurological development in fetuses and young children and damaging the central nervous system in adults.

Like other metals in the environment, mercury is persistent and cannot be destroyed by combustion or by bacterial degradation. When mercury is released to the environment even in small quantities, its toxic forms can bioaccumulate in fish (see Figure 1). The greatest risk to public health from mercury comes from the consumption of fish, which is the primary route of exposure for birds and mammals, including humans. At least 34 states have issued fish consumption advisories for selected water bodies because of the presence of elevated mercury levels in fish. Aquatic mercury pollution can also have negative social and economic effects on water recreation and tourism.

Figure 1. The Environmental Cycle of Mercury



Also in this issue...

Sources of Mercury

Mercury is a global pollutant released to the environment from both man-derived and natural sources (see Figure 2). Scientists believe that atmospheric

(Continued on page 2)

Office of Waste Reduction
North CarolinaDepartment of Environment, Health, and Natural Resources

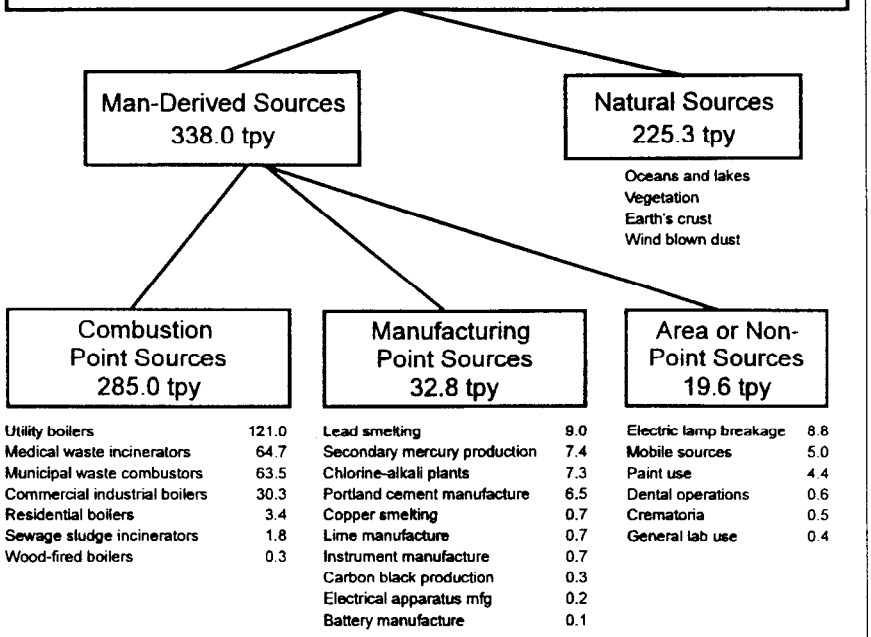
DEHNR

Mercury: An Environmental Issue, *continued*

deposition contributes a large portion of the mercury found in the aquatic food chain. Activities such as the burning of fossil fuels and municipal solid and medical waste release mercury gases and particles into the air. These compounds then settle on the ground downwind and/or are washed into waterways by rain. Mercury that is retained in soil and water bodies will ultimately volatilize back into the atmosphere (see Figure 1).

Natural mercury emissions such as those from marine and aquatic environments, vegetation, degassing from geologic materials, volcanic emissions, and forest fires are also involved in the mercury cycle. To a lesser degree, mercury emissions are contributed by manufacturing point sources and other area non-point sources. Trace amounts of mercury can also be discharged directly into waterways from various sources, including industrial process wastewater and mercury amalgam fillings fragments discharged during dental procedures.

Figure 2. U.S. Mercury Emissions to the Environment, tons per year (tpy)



Mercury Issues in Tarheel Fish

Because of mercury contamination, fish consumption advisories have been issued in several areas of North Carolina including the Lumber River Basin (see Table 1). Elevated mercury levels in Bowfin (blackfish) and Bass have been found throughout the southern coastal plain. The slow-moving, more acidic water near the coast enhances bioaccumulation in fish, but mercury bioaccumulation can occur in any water body.

The Food and Drug Administration has set the limit for human consumption as one part per million (ppm) of methylmercury in fish tissue. The likelihood of negative health effects from the consumption of fish containing elevated mercury levels (>1 ppm) depends on the amount of mercury consumed, the duration of exposure, and the sensitivity of the individual. In fish and other animals, ingested mercury can lead to reproductive problems and even death. The mercury in fish primarily affects the central nervous system of humans and can cause birth defects and delayed development in children.

Naturally occurring bacteria in water convert elemental mercury into methylmercury through a process called methylation. Methylmercury is taken up by plankton, the tiny plants and animals in the water. Small fish eat plankton, and the methylmercury in them tightly binds to the proteins of the fish. Because fish excrete

(Continued on page 3)

Table 1. Fish Consumption Advisories on Mercury Bioaccumulation Issued by the North Carolina State Health Director [1,2]

County	Waterbody	Fish Species	Advisory Overview
Columbus, Brunswide, Bladen, Richmond, Scotland, Hoke, Robson, and Moore	Lumbar River Basin	Bowfin (Blackfish) Bass	General Population: 2 meals/month. Children & Child-Bearing Women: No consumption.
Bladen	Baytree (Black) Lake	Bowfin Bass	All groups should not consume fish.
Richmond	Ledbetter Lake	Bass	General Population: 2 meals/month. Children & Child-Bearing Women:

methylmercury slowly, it tends to accumulate in their tissues.

As larger fish eat more and more smaller fish, the concentration of mercury in their tissues rises. This process of increased pollutant concentration in each step up the food chain is called bioaccumulation. The bioaccumulation process is the reason larger predatory freshwater fish (bass and bowfin) often have much higher levels of mercury than smaller panfish (crappie and brim). The total accumulation of mercury in a large predatory fish could be ten thousand times the concentrations found in surrounding waters. Mercury levels can also accumulate to high levels in fish-eating birds such as osprey or bald eagles.

The standard set to protect North Carolina waters from mercury contamination is 0.012 micrograms per liter. However, the bioaccumulation in fish and in humans that eat fish is the reason for the low standard.

The standard set to protect North Carolina waters from mercury contamination is 0.012 micrograms per liter (µg/L), or parts per billion. One way to imagine a number this small is that it would be equivalent to one square inch in 20 square miles. This water quality standard is 17 times lower than the best widely available detectable limit of 0.2 µg/L. However, the bioaccumulation in fish and in humans that eat fish is the reason for the low standard. Often, the state standard means that a reading exactly at the detection limit will be a notable violation of a permit limit.

Ongoing Mercury Studies

While the sources of mercury in the environment, especially man-derived sources, are fairly well understood, mercury transport mechanisms are still under considerable discussion by the scientific community. Recent on-going or completed mercury studies conducted by the EPA include the EPA Mercury Study, the Great Waters Study, and Electric Utilities Study. These and other studies are helping direct EPA and state regulations for major sources of mercury including combustion sources.

In North Carolina, the Division of Environmental Management has monitored methylmercury in fish tissues for over a decade and has increased monitoring in the more recent basin-wide management initiatives. The Division's Air Quality Section (AQS) is involved in a eight-year collaborative study with the US Forestry Service and ten other states. As part of the study, the AQS will be performing simultaneous air and rainwater sampling with state-of-the-art monitoring equipment that can detect mercury air concentrations in the parts-per-quadrillion range. The tests will be performed at Lake Waccamaw and Pettigrew state parks.

Although historic studies show that atmospheric mercury concentrations are increasing by one percent per year, significant reductions in mercury use have been accomplished. The total demand for mercury in the United States dropped 61 percent from 1989 to 1991, and there are success stories on reducing mercury contamination closer to home. High Rock Lake (Abbotts Creek) near Salisbury was under a mercury advisory from 1981 to 1991 because of industrial pollution; but through a combination of better management and natural processes, the levels improved to the extent that the 1994 Bassmaster's Tournament was hosted at the lake. Despite these reductions, North Carolina still faces challenges in understanding and reducing the environmental effects of mercury. □

FOCUS: Waste Minimization is currently published twice a year by the Office of Waste Reduction, the Division of Solid Waste Management, and the Division of Environmental Management of the North Carolina Department of Environment, Health, and Natural Resources. It is intended to provide North Carolina industries and other interested parties with current information concerning proper waste management and waste reduction. The information contained in this publication is believed to be accurate and reliable. However, the application of this information is at the reader's own risk. Mention of products and services in the publication does not constitute an endorsement by the State of North Carolina. The information contained in the publication may be cited freely.

State of North Carolina: James B. Hunt, Jr., Governor
DEHNR: Jonathan B. Howes, Secretary
Office of Waste Reduction: Gary Hunt, Director
Pollution Prevention Program Manager: David Williams

Comments? If you have any comments, waste minimization case summaries, resource information, or questions for the next issue of the FOCUS newsletter, contact Terry Albrecht at (919) 571-4100 (FAX: (919) 571-4135)), or write the N.C. Office of Waste Reduction, Post Office Box 29569, Raleigh, North Carolina 27626-9569.

Reducing Common Sources of Mercury

Although the largest man-derived sources of mercury in the environment are combustion point sources and other specific manufacturing sources, every business and industry should be aware of its own use and of the waste management options for products that contain mercury.

Most industries use common mercury-containing devices such as electrical switches, batteries, and fluorescent lighting. However, there are options to use non-mercury products and alternatives with lower mercury or to better manage mercury-containing waste. Every business and industry should focus on measures it can take to reduce mercury releases to the environment.

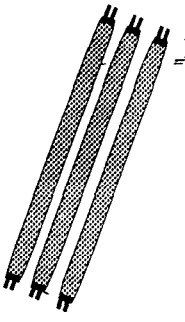
These nearly universal mercury sources such as electrical switches, batteries, and fluorescent lighting are often more problematic as a solid waste contaminant or an elusive wastewater pollutant rather than an air emission as discussed above. However, mercury introduced into landfills or surface water also may be characterized as an air emissions source because of its high volatility.

In 1992, EPA estimated that the mercury contained in discards in the municipal solid waste (MSW) stream (including common industrial waste) increased from 421 tons in 1970 to 709 tons in 1989. This amount is expected to decrease to 173 tons by the year 2000, primarily as a result of source reduction activities. The following sections describe common mercury-containing materials that may be found at industrial and business facilities and suggest some potential alternatives.

Fluorescent Lamps

Studies have shown that used 4-foot fluorescent lamps contain approximately 30 to 40 milligrams (mg) of mercury. High-intensity-discharge (HID) lamps such as high-pressure sodium, metal halide, and mercury vapor lamps often contain mercury in amounts higher than those in fluorescent lamps.

Mercury is an essential component of fluorescent lamps, and no non-mercury alternatives currently exist that can provide comparable energy efficiency.

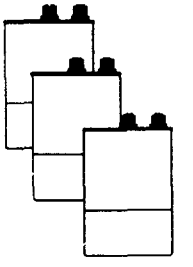


Although fluorescent lamps contain mercury, these energy-efficient lamps contribute to a net decrease in mercury releases to the environment because they demand less electricity; less energy demand means fewer mercury emissions from electric utility combustion sources.

Modifications in manufacturing and increases in source reduction activities have reduced the mercury content of a 4-foot lamp to a 1994 average of 22.8 mg, a 52-percent reduction since 1985. Even with these reductions, a significant percentage of lamps fail hazardous waste characterization tests. North Carolina policy on the management of used fluorescent lamps is currently under revision. Federal EPA proposed rules have not been finalized.

Dry Cell Batteries

Batteries represent a significant but decreasing source of mercury releases to the environment, primarily to the MSW stream. In 1991 and 1992, mercury usage by U.S. battery manufacturers dropped sharply as production of mercury-free alkaline dry-cell batteries began. These mercury-free batteries contain less than 0.025 percent mercury (250 ppm). Also, most carbon zinc-air batteries manufactured in the U.S. no longer contain mercury. Used primarily as button cells in hearing aids and pagers, carbon zinc-air batteries are replacing mercuric oxide batteries. However, medical and military use of mercuric oxide batteries continues, and there are few acceptable alternatives for these applications. Nationwide, only 6 percent of battery mercury is recovered, and this small amount comes primarily from the few states that have household battery collection and recycling programs. For a list of North Carolina dry-cell battery recyclers, contact the Office of Waste Reduction at (919) 571-4100.



Switching Devices

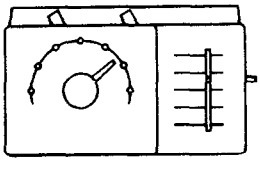
Mercury is used in both high- and low-voltage mercury-arc rectifiers; oscillators; motor control switches; phanatrons; thyratrons; ignitrons; and silent-switch thermostats and in the cathode tubes used in radios, radar, and telecommunication equipment. The quantity of mercury used in electronic

(Continued on page 5)

controls and switches is significant: 121 metric tons in 1992. Solid-state switches and hard- contact switches are alternatives to mercury switches in some applications.

Approximately 10 to 15 metric tons of mercury are consumed annually in U.S. production of thermostats, which are used primarily in home heating and cooling applications. Alternatives to the common mercury tilt-switch thermostat include the mechanical snap-acting switch, the open-contact magnetic snap switch, the sealed-contact magnetic snap switch, and electronic thermostats. Because of the low cost, reliability and long service, and accuracy of mercury thermostats, alternatives must be chosen carefully to ensure net environmental savings and energy efficiency.

Mercury switch thermostats are relatively easy to recycle. Honeywell, Inc., is conducting a pilot program in Minnesota to collect and recycle mercury thermostats and is working to develop this program into a nationwide recycling program for mercury switches. For more information, write to Honeywell, Inc., Honeywell Plaza, Post Office Box 524, Minneapolis, MN 55440.



Other Control Instruments

Mercury is used in medical and industrial instruments to control or measure reactions and equipment function. Most of these applications use metallic mercury equipment such as thermometers, manometers, barometers, and other pressure-sensing devices. The calomel electrode, which contains mercurous chloride, is commonly used to measure pH and other ionic activities. Alternatives to silver bulb (mercury-containing) thermometers include alcohol-based red bulb thermometers and digital models.

Paints

Mercury was used, until recently, as a fungicide and preservative in latex paints. Since 1991, no mercury compounds have been permitted in the manufacture of paints. Mercury compounds may be present in old mildew-resistant latex paints still in use or in storage at facilities.

Laboratory and Medical Uses

Mercury is also used as a catalyst and reagent in laboratory operations as, for example, in tests for chemical oxygen demand (COD) in wastewater. Alternative procedures have reduced but not eliminated the volumes of mercury used for such testing.

A variety of mercury compounds is used in medical applications such as medications, staining solutions, and fixatives, although alternatives may be available for some of these uses. Issues associated with the use of mercury in laboratory settings include proper use of spill cleanup kits, mercury vacuum sweepers, and proper disposal or recycling in accordance with Federal, state, and local hazardous waste disposal regulations.

The Next Step

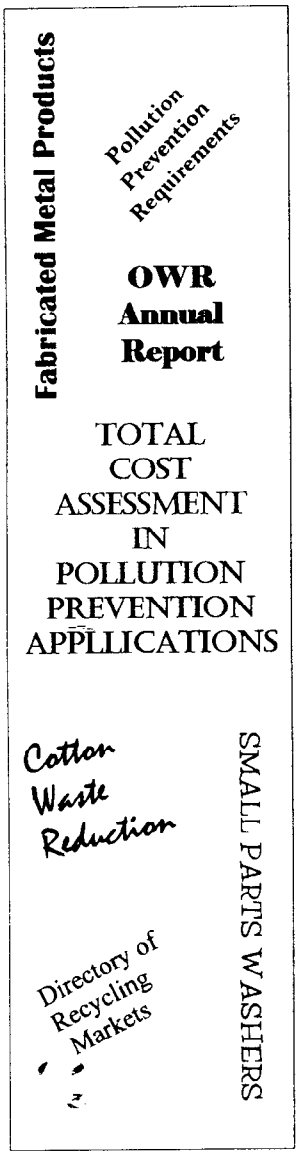
The uses of mercury in industrial operations should be investigated for potential non- or low-mercury product substitutions. The proper waste management or recycling options for used mercury-containing products should be carefully evaluated. In North Carolina the generator is responsible for determining whether a waste is hazardous. For more information on product substitutions or recycling options, contact the Office of Waste Reduction. For information on hazardous waste disposal requirements, contact one of the Regional Offices of the Division of Environmental Management.□

Mission Statement

North Carolina Office of Waste Reduction

The Office of Waste Reduction is the agency responsible for carrying out the State's program of pollution prevention. The goal of the program is to promote the elimination, reduction, or recycling of waste prior to treatment or disposal. This effort addresses air and water quality, solid and hazardous wastes, and toxic chemicals. The goals are accomplished by providing non-regulatory technical assistance, training, policy support, and fiscal support to industries, local governments, and state agencies. The Office has two programs, the Pollution Prevention Program, which addresses multimedia industrial waste, and the Solid Waste Reduction Program, which addresses reduction and recycling of municipal solid waste. Additional information and technical assistance are available at (919) 571-4100.

Recent Fact Sheets From OWR



Below are brief descriptions of Fact Sheets recently developed by the Office of Waste Reduction.

- Cotton Waste Reduction (3 pages)

  This fact sheet reviews the quantities and types of waste associated with cotton fiber products in North Carolina. It presents regulatory and management techniques for alternative management options including the use of the waste as an animal feed source, as a soil additive, and as a fuel source.

Fabricated Metal Products (FMP) Waste Reduction Series

- Incentives and Methodology for Wastewater Reduction in the Metal Products Industry (3 pages)
- Identifying and Reducing Sources of Metal Cleaning and Plating Bath Contaminant (3 pages)
- In-Tank Filtration (3 pages)
- Cartridge In-tank Filtration Systems (3 pages)
- Bag In-Tank Filtration Systems (3 pages)
- Disc In-Tank Filtration System (3 Pages)

  The FMP fact sheets are designed to provide the metal products industry with information on extending the life of surface-finishing process baths through a number of filtration systems. The series highlights economic savings and related environmental advantages of source reduction techniques for process baths.

- Pollution Prevention Requirements in North Carolina (3 pages)

  This fact sheet reviews both state and Federal waste minimization requirements for large and small hazardous waste generators and state pollution prevention/waste reduction requirements for air quality permit holders and industrial waste discharges to local publicly owned treatment works (POTWs). The fact sheet briefly reviews other pollution prevention requirements in the NPDES industrial stormwater regulations and the toxic release inventory (TRI) and the pollution prevention planning recommendations of the Pollution Prevention Advisory Council.

- Total Cost Assessment in Pollution Prevention Applications (4 pages)

  A general overview of total cost assessment protocols as applied to pollution prevention projects is discussed. This document reviews concepts of expanded cost inventories, direct allocation of costs, extended time horizons, and the use of long-term financial indicators to justify pollution prevention projects that are competing for company capital.

- Waste and Cost Reduction Techniques for Small Parts Washers (4 pages)

  This fact sheet reviews the advantages of higher flash point petroleum solvents and aqueous systems to clean parts in small manufacturing maintenance shops. Cost-effective methods to prolong the life of these solvents and ways to keep them from becoming hazardous are discussed. Vendor list included.

Other OWR Publications of Interest to Businesses and Industries

- NC Directory of Markets for Recyclable Material (updated June 1995)
- Recycling in North Carolina, March 95 (4 pages)
- Office of Waste Reduction Annual Report FY 1993-1994 (37 pages) □

Pollution Prevention Reports Show Large Air Emission Reductions

Since July 1, 1994, air quality permit holders must submit a description of emission source reduction and recycling activities with their annual permit fee. The new reporting form fulfills North Carolina General Statute 143-215.108 (g) that requires air quality permit holders to submit a written description of current and projected plans to reduce, by source reduction or recycling, the emission of air contaminants under such permits. A waste reduction summary is also required for new permits and permit modifications.

References for this requirement for a waste reduction summary are found in the following air quality rules: NCAC 15A 2D 2Q .0206, .0304, and .0507. The one-page form (D3-3) requests a summary of activities related to source reduction and recycling, the quantity of air emissions reduced and materials recycled during the previous year, and a summary of plans for further source reduction and recycling activities; or, for a new facility, the industry must provide a summary of activities related to and plans for source reduction and recycling. The form provides a code sheet to express ongoing and planned source reduction activities, but companies are encouraged to elaborate on additional pages if they wish.

Preliminary Review of Waste Reduction

A preliminary review of submitted forms shows that 38 percent of the first 345 submissions reported some type of emission reduction activities. Twenty-four percent (approximately 80 facilities) of the forms contained information on the quantity of emission reductions before and after implementation of initiatives. These facilities reported an average emission reduction of 44 percent for reported pollutants addressed in reduction activities. Preliminary results show a reduction of 3.4 million pounds of emissions during the last year from source reduction and recycling initiatives. Of the reductions from these 80 facilities, 2.87 million pounds were volatile organic compounds (VOCs) or hazardous air pollutants (HAPs). Common pollution prevention activities included substitution of alternative degreasing solvents; alternate coatings and adhesives such as water-borne; reuse of captured particulates; improved coating techniques and transfer efficiencies; switches to cleaner fuels; and modifications to equipment, layout, or piping to reduce emissions. □

New Air Quality Requirements Notification:

Degreasing MACT Standards

By Joelle Bryan, NC Division of Environmental Management, Air Quality Section

On December 2, 1994, the EPA published in the Federal Register a final rule establishing air emission control requirements for halogenated solvent cleaning operations. Officially titled "National Emission Standards for Hazardous Air Pollutants: Halogenated Solvent Cleaning," the rule is better known as the "Degreaser MACT." Because the parts cleaning process targeted by this rule is an integral part of many processes, the rule potentially affects a number of facilities including some small businesses that are scattered throughout a variety of industries.

Six Halogenated HAPs Covered

The rule regulates emissions of six halogenated hazardous air pollutant (HAP) solvents: methylene chloride (MC), perchloroethylene (PCE or "perc"), trichloroethylene (TCE), 1,1,1-trichloroethane (TCA), carbon tetrachloride (CT), and chloroform (C). The standards apply to each solvent-cleaning machine that uses *any* solvent containing one or any combination of these six solvents in a total concentration greater than 5

(Continued on page 10)

The tables below summarize recent Clean Air Act Regulations. The rules can be downloaded from the Clean Air Act board of EPA's Electronic Technology Transfer Network (TNN) bulletin board by calling (919) 541-5742. For more information about accessing the board, call (919) 541-5384.

Summary of Recent Clean Air Act Regulations

National Emission Standards for Hazardous Air Pollutants (NESHAP)	Proposal Date	Promulgation Date	Federal Register Citation
Coke Oven Emissions	12/4/92	10/27/93	Vol. 58, No. 206, pgs. 57898-57935
Perchloroethylene Dry Cleaning Facilities	12/9/91	9/22/93	Vol. 58, No. 182, pgs. 49354-49380
NESHAP for Certain Source Categories (Hazardous Organic NESHAP or HON)	12/31/92	4/22/94	Vol. 59, No. 78, pgs. 19402-19625
Chromium Emissions from Industrial Process Cooling Towers	8/12/93	9/8/94	Vol. 59, No. 173, pgs. 46339-46352
Chromium Emissions from Hard and Decorative Chromium Electroplating and Chromium Anodizing	12/16/93	2/25/95	Vol. 60, No. 16, pgs. 4948-4993
Epoxy Resins Production and Non-Nylon Polyamides Production	5/16/94	Has appeared on EPA bulletin board	Not yet published in the Federal Register
Ethylene Oxide Commercial Sterilization and Fumigation Operations	3/7/94	12/6/94	Vol. 59, No. 233, pgs. 62585-62601
Gasoline Distribution (Stage I)	2/8/94	12/14/94	Vol. 59, No. 239, pgs. 64303-64326
Magnetic Tape Manufacturing	3/11/94	12/15/94	Vol. 59, No. 240, pgs. 64580-64612
Halogenated Solvent Cleaning	11/29/93	12/2/94	Vol. 59, No. 231, pgs. 61801-61820
Other Section 112 Rules			
General Provisions	8/11/93	3/16/94	Vol. 59, No. 51, pgs. 12408-12459
112 (j)	7/13/93	5/20/94	Vol. 59, No. 97, pgs. 26429-26454
112 (l)	5/19/93	11/26/93	Vol. 58, No. 226, pgs. 62262-62288
112 (r) Regulated Substances for Accidental Release Prevention (Final List)	1/19/93	1/31/94	Vol. 59, No. 20, pgs. 4478-4499

Summary of Recent Clean Air Act Regulations, *continued*

National Emission Standards for Hazardous Air Pollutants (NESHAP)	Proposal Date	Federal Register Citation
Aerospace Manufacturing and Rework	6/6/94	Vol. 59, No. 107, pgs. 29216-252
Epoxy Resins and Non-nylon Polyamides Production	5/16/94	Vol. 59, No. 93, pgs. 25387-399
Marine Tank Vessel Loading and Unloading operations	5/13/94	Vol. 59, No. 92, pgs. 25004-25024
Petroleum Refineries	7/15/94	Vol. 59, No. 135, pgs. 36130-157
Pulp and Paper Production	12/17/93	Vol. 58, No. 241, pgs. 66078-186
Printing and Publishing Industry	Has appeared on A bulletin board	Not yet published in Federal egister
Secondary Lead Smelters	6/9/94	Vol. 59, No. 110, pgs. 29750-779
Ship Building and Ship Repair	12/6/94	Vol. 59, No. 233, pgs. 62681-695
Wood Furniture Manufacturing Operations	12/6/94	Vol. 59, No. 233, pgs. 62652-681
Other Section 112 Rules		
112 (g)	4/1/94	Vol. 59, No. 63, pgs. 15504-15571
112 (r) Risk Management Plan Requirements	10/20/93	Vol. 58, No. 201, pgs. 54190-219

Small Business Office Holds Air Quality Training Courses

The North Carolina Office of the Small Business Ombudsman (SBO) and the Community College Small Business Center have developed a two-hour course to provide small business owners and managers with an overview of state and federal air quality rules. The course provides an overview of air quality requirements; identifies operations/processes that require a permit; and provides sample calculations, waste reduction tips, and technical and regulatory contacts. Eight sessions of the course have been held at various community colleges across North Carolina. The course will be conducted through mid-May and will likely be held again in the Fall.

The SBO Office provides free, confidential assistance to small businesses on air quality and related environmental matters. For more information, call the Office of Small Business Ombudsman at (800) 829-4841. □

Degreasing MACT *continued*

percent by weight. Halogenated solvent-cleaning machines at both major and area sources are included in the regulation. (Major sources are those with a facility-wide potential to emit 10 or more tons of any single HAP or 25 or more tons of any combination of HAPs. Area sources are those with a facility-wide potential to emit less than the 10- or 25-ton thresholds.)

Under the "Degreaser MACT," solvent-cleaning machines are classified as either batch vapor-cleaning machines, batch cold-cleaning machines, or in-line cleaning machines. Specific requirements of the rule differ with machine type and size as well as with the status of the machine (existing or new) and its emission potential (an area or major source).

Compliance Options

The rule provides several options for owners and operators to comply with the standard. An owner or operator may use one of multiple control combinations listed in the rule or demonstrate that each machine can maintain an idling mode emission limit or a specified overall solvent emissions limit. The control combinations generally comprise pollution prevention standards such as a maintained freeboard ratio and room draft reduction in conjunction, on occasion, with an air pollution control device such as a carbon adsorber.

- The option for idling mode emission limits requires calculation of emissions from solvent records and solvent/air interface areas to show that emissions for the machine at idle are below 0.22 kilograms per hour per square meter ($kg/hr/m^2$) for batch vapor-cleaning machines and 0.10 $kg/hr/m^2$ for in-line cleaning machines.

- The overall solvent emission limits option requires solvent consumption records and material balance calculations to show that overall solvent emissions are less than 150 kg/m^2/month for batch vapor-cleaning machines, 153 kg/m^2/month for existing in-line solvent-cleaning machines, and 99 kg/m^2/month for new in-line solvent-cleaning machines.

Various pollution prevention work practice standards are also required with the different options. The idling mode emission limits and overall solvent emission limits are not available for batch cold-cleaning machines.

In addition to the alternatives outlined in the rule, solvent substitution or other process modifications are other means to achieve compliance. To eliminate the source of its HAP emissions, a facility may opt to change to non-HAP solvents or perhaps install an aqueous system.

Monitoring, Reporting, and Recordkeeping Requirements

Along with each compliance option, the rule contains specific monitoring, reporting, and recordkeeping requirements. One reporting requirement applicable to all owners and operators of solvent-cleaning machines is the initial notification. All owners or operators of halogenated solvent-cleaning machines must provide to the appropriate air permitting authority written notification of the location, number, type of machine, date of installation, type and annual quantity of HAP solvent used, and the anticipated compliance approach. The initial notification is due **August 29, 1995.**

The Air Quality Section of the NC Division of Environmental Management sent out initial notification forms in May. With assistance from the NC Office of Waste Reduction and the NC Small Business Ombudsman's Office, the Section will also conduct a workshop to help facilities comply with this requirement.

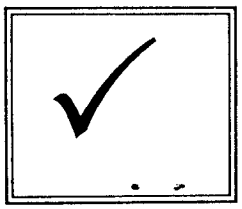
Permit Requirements

In addition to the initial notification, all owners and operators of solvent cleaning machines, ***except*** batch cold-cleaning machines located at area sources, must obtain a permit.

Owners and operators of degreasers at major sources must apply for a permit within one year after the state or local air permitting authority receives approval of its Part 70 Operating Permit (Title V) program from EPA.

Owners and operators of solvent-cleaning machines other than cold batch-cleaning machines at area sources must submit a permit application within 3 1/2 years from the time the permitting authority receives Title V program approval from EPA and must be issued a permit within 5 years of that approval.

This rule appears in the Friday, December 2, 1994, Federal Register, Volume 59, Number 231, pages 61802-61820. If you would like additional information on the requirements of the rule and their effect on your facility, contact Joelle Bryan of the Air Quality Section of the NC Division of Environmental Management at (919) 733-1474. For additional information on solvent substitution alternatives, contact Norma Murphy of the NC Office of Waste Reduction at (919) 571-4100.□



"Low Tech" Operational Checklist for Solvent Vapor Degreasers

This checklist can be used by operators of solvent vapor degreasers to determine problem areas and minimize air emissions. Low-tech pollution prevention practices to reduce evaporative losses of cleaning solvents include:

- ✓ **Install lids/silhouettes on tanks.**
- ✓ **Increase freeboard space on tanks.**
- ✓ **Avoid drafts over the degreaser.**
- ✓ **Adjust cooling for proper vapor zone.**
- ✓ **Check the water jacket for proper water flow and temperature.**
- ✓ **Install freeboard chillers in addition to cooling jackets.**
- ✓ **Avoid spraying parts above the vapor zone or cooling jacket.**
- ✓ **Move the work more slowly.**
- ✓ **Avoid solvent carry-out.**
- ✓ **Bring parts up to temperature before removal.**
- ✓ **Dewater the solvent.**
- ✓ **Locate the cold cleaning tanks away from heat sources.**
- ✓ **Consolidate cold cleaning operations into a centralized vapor degreasing operation.**
- ✓ **Do not overload the degreaser.**
- ✓ **Repair leaks.**

Note! These suggestions are not directly associated with the requirement of the new air quality regulations for vapor degreasers. Other ways to eliminate or minimize the use of regulated solvents include the following steps: (1) eliminate the need to clean by removing upstream contamination or by changing cleanliness requirements, (2) modify the part or contaminant to enable use of a less hazardous cleaning material or method, and (3) select the least hazardous/toxic cleaning material that achieves the desired cleanliness. □

New NESHAP for CHROMIUM ELECTROPLATING

By Joelle Bryan, NC Division of Environmental Management, Air Quality Section

Products of chromium electroplating or anodizing processes are commonplace in everyday life. Many automotive parts and accessories, various hand tools, bathroom and kitchen fixtures, and appliances have chromium-plated components. Some aircraft parts such as wings and landing gear are chromium-coated and have undergone an anodizing process. Whether applied for corrosion resistance or a lustrous shine, chromium coatings have a substantial presence in modern life.

On January 25, 1995, the EPA finalized the "National Emission Standards for Chromium Emissions From Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks." This rule sets emission standards for

(Continued on page 12)

Chromium Electroplating Standards, *continued*

processes used to apply chromium coatings to the surface of objects. While most chromium electroplating facilities are probably area source "job shops" that plate parts for a variety of other manufacturers, plating operations are known to exist at major sources as well. (Major sources are those that have the facility-wide potential to emit 10 or more tons of any single hazardous air pollutant (HAP) or 25 or more tons of any combination of HAPs). Chromium-coating operations at both area and major sources are addressed by this rule.

The rule governs three types of chromium-coating processes: hard chromium electroplating used to deposit a thick layer of chromium that has functional properties such as hardness and a low-coefficient of friction; decorative plating, which is used to deposit a thin layer of chromium for a bright, wear-resistant surface; and chromium anodizing, which provides corrosion resistance or electrical insulation. Under the rule, each tank must meet specific emission limits that vary with the particular process, equipment type, capacity, and classification as a new or existing source. The following table summarizes the emission standards.

Table 1. Summary of Chromium Electroplating Emission Standards

Type of Tank	Emission Limit, Cr mg/dscm[1]	
	Small[2]	Large
Existing Tanks	0.03	0.015
New Tanks	0.015	0.015
Decorative Chromium Plating Tanks, New & Existing[3]	0.01	
Chromium Anodizing Tanks, New & Existing	0.01	

[1]dscm=dry standard cubic meter.
[2]Small=A facility has maximum potential rectifier capacity of <60 million ampere-hours/year.
[3]Existing=Installed before December 16, 1993 (Proposed regulations).

A variety of options is available for compliance with the standards. Some of the options address pollution prevention technologies such as fume suppressants while others include traditional add-on controls such as packed bed scrubbers. In addition to the pollution prevention and control methodologies suggested in the rule as emission limit compliance options, pollution prevention techniques are incorporated as work practice standards which must be implemented. These standards require owners or operators to prepare and follow an operation and maintenance plan to ensure that equipment and process malfunctions do not occur.

All owners or operators of an affected tank must submit a written **initial notification** to the appropriate permitting authority by **July 24, 1995**. The Division of Environmental Management will send out initial notification forms to help sources fulfill this requirement. Owners or operators of any affected tank must also apply for a Title V permit within 12 months from the time the permitting authority receives Title V program approval from EPA.

This rule appears in the Wednesday, January 25, 1995, Federal Register, Vol. 60, No. 16, pages 4948-4993. If you would like additional information on the requirements of the rule and their effect on your facility, contact Joelle Bryan of the Air Quality Section of the NC Division of Environmental Management at (919) 733-1474. □

Source Reduction Workshop Focuses on Residential and Commercial/Industrial Solid Waste

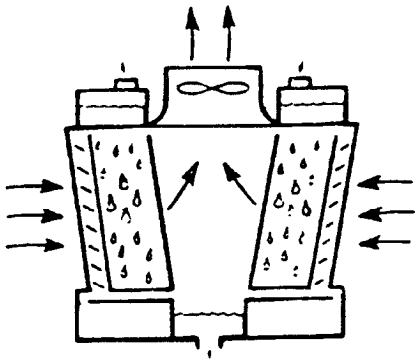
August 9 and 10, 1995 **Days Inn, Asheboro, NC**

A two-day source reduction workshop in Asheboro on August 9 and 10 will focus on preventing waste and reducing waste through recycling. For residential waste reduction, local governments will learn how to develop, budget, measure, and evaluate residential source reduction programs and develop education programs for consumers. Commercial/industrial participants will lean how to produce less waste, reduce disposal costs, lower operating expenses, and reduce purchasing costs. Solid waste professionals in the public and private sectors are encouraged to attend.

Presenters at the workshop will include staff from the following organizations: North Carolina Recycling Association (NCRA), Mecklenburg County, NC Cooperative Extension Service, SunShares, and NC Office of Waste Reduction.

For further information about the workshop, contact the NCRA at (919) 851-8444.

Keeping Chromium Out of



Cooling Towers

Many facilities use industrial process cooling towers (IPCTs) to remove heat from chemical and industrial processes. To provide corrosion protection and prevent algae growth, chromium-based chemicals are often mixed with the cooling tower water. In the evaporation that occurs as the cooling process takes place, chromium is released into the atmosphere.

On September 8, 1994, the EPA published a rule known as the "National Emission Standard for Hazardous Air Pollutants for Industrial Process Cooling Towers." This standard prohibits the use of chromium-based chemicals in all industrial process cooling towers located at major sources. Substitution of phosphate-based treatment programs is the technical basis of the rule.

Owners or operators of industrial process cooling towers that use chromium for water treatment are required to submit an initial notification to the air permitting authority no later than September 8, 1995. The notification should include the name and address of the owner/operator, the physical address of the IPCT, a statement that the notification is submitted as required by Subpart Q, and a description of the water treatment program used in the IPCT as detailed in the rule.

If you would like additional information on the requirements of the rule and their effect on your facility, contact Joelle Bryan of the Air Quality Section of the NC Division of Environmental Management at (919) 733-1474. Additional information on water treatment alternatives may be obtained from the NC Office of Waste Reduction at (919) 571-4100. □

Multimedia Compliance Workshop To Highlight Compliance Assistance for Vapor Degreasers

A free one-day workshop on waste reduction and regulations for vapor degreasers will be held on June 14, 1995, at the North Carolina State University's McKimmon Center in Raleigh. All personnel involved in vapor degreasing operations are encouraged to attend.

Below are topics for the vapor degreasing workshop.

- Overview of North Carolina Regulations on the Multimedia Effects of Solvent Alternatives.
- An open discussion with state regulators.
- An interactive forum with technical experts on solvent alternatives and their implementation.
- A demonstration of EPA's Solvent Alternatives Guide (SAGE) software.
- North Carolina industry success stories.

For registration information, contact Ravila Gupta or Norma Murphy of the Office of Waste Reduction at (919) 571-4100. Seating is limited, so register early! □

Questions and Answers

Air Quality Regulatory and Prevention Issues

Air Quality Section of the NC Division of Environmental Management

1. *If I recycle clean-up solvents via on-site batch distillation, do I need an air quality permit?*

   Conditional. Permanent on-site distillation systems may be exempted from permitting if the system qualifies as an exempted source under 15A NCAC 2Q.0102 (b)(2)(E)(1). For more information, see the Air Quality Section's memo, "Portable Solvent Distillation," dated November 30, 1994.

2. *If I decide to contract a mobile solvent recycling service to distill spent solvent on-site, will this service require an air quality permit?*

   No. If the portable distillation system is not owned by the facility and it is operated at the facility for no longer than seven consecutive days, a permit is not required. For more information, see the memo mentioned above.

3. *The process of distillation may alter the composition of a solvent so that non-photochemically reactive solvents may be reclaimed as photochemically reactive solvents. Must I evaluate these recycled solvents for photochemical reactivity even through they were non-photochemically reactive before distillation?*

   No. To encourage recycling, the reactivity of the solvent prior to distillation for both permanent and portable distillation systems will be considered in evaluations of solvent emissions from the facility. If the solvents are non-photochemically reactive before being distilled, the emissions will be considered non-photochemically reactive even if their reactivity has changed as a result of distillation. For more information, see the memo mentioned above.

4. *I am considering a switch to a terpene solvent as an alternative to 1,1,1 trichloroethane (TCA). Are terpenes photochemical reactive solvents? If so, what additional regulatory requirements would I need to consider?*

   Terpenes may be considered photochemically reactive if, as applied, the total volume of terpene exceeds the percent composition limitation defined in 15A NCAC 2D .0518 (d). If it is determined that the terpenes are photochemically reactive, as defined by 2D .0518 (d), the total emissions of all photochemically reactive solvents from the facility would be limited to 40 pounds per day, unless the emissions have been reduced by at least 85 percent by weight.

5. *Certain water-borne paints substitutions are considered photochemically reactive. What additional regulatory requirements would I need to address if I use photochemically water-borne reactive paints?*

   In addition to the requirement of 15A NCAC 2D .0519 - Miscellaneous Volatile Organic Compound Emissions - the water-borne paint substitutions may be subject to 15A NCAC 2H .0610 - Permit Requirement for Toxic Air Pollutants. For further information on permitting requirements, contact your respective Regional Air Quality Office.

6. *Can I burn used oil or absorbents in my industrial boiler? Do I need an air quality permit?*

   Yes, provided that the emissions from the combustion of used oil or absorbents can comply with applicable emission control standards (e.g., 15A NCAC 2H .0610 - Permit Requirement for Toxic Air Pollutants). An air quality permit is required to burn used oil or absorbents in an industrial boiler, unless the boiler can be exempted under 15A NCAC 2Q.0102. Under North Carolina Solid Waste Statutes (Senate Bill 111 ratified in 1989), "on-specification" used oil or absorbents may be burned for energy recovery with a valid air permit. Other more stringent RCRA requirements apply to the burning of "off-specification" used oil or absorbents. For more information on the solid waste requirements, contact Margaret Babb of the NC Division of Solid Waste Management at (919) 733-2178.

(Continued on page 15)

Questions and Answers, *continued*

Used Oil Issues

NC Division of Solid Waste Management

1. *Can I burn my own used oil in a space heater? If so, under what conditions?*

   Yes. Pursuant to air regulations 15A NCAC 2Q .0102 (b)(2)(B)(iii), space heaters burning waste oil for energy recovery are exempt from air quality permitting if (a) the heater burns only oil that the owner or operator generates or used oil from do-it-yourself oil changers who generate the oil as household wastes, (b) the heater is designed with a maximum capacity of not more than 500,000 Btu per hour, and (c) the combustion gases from the heater are vented to the ambient air. The new used oil solid waste requirements in 40 CFR 279 for used oil burning in space heaters do not require used oil to be tested for On-Spec or Off-Spec status if the only used oil burned is generated on-site or from do-it-yourself oil changers.

2. *The lab analysis on my used oil states that it contains 21 parts per million (ppm) lead and 8 ppm chromium. Is this used oil a hazardous waste?*

   No. The used oil would be On-Spec Used Oil fuel. In the table found in 40 CFR 279.11, On-Spec Used Oil fuel may have levels up to 100 ppm of lead and up to 10 ppm of chromium. If the values exceed 100 ppm and/or 10 ppm, respectively, the used oil is considered Off-Spec Used Oil fuel, not a hazardous waste.

3. *If I mix a listed hazardous waste with my used oil, does the used oil mixture become a hazardous waste?*

   Yes.

4. *My used oil transporter conducts a field test for total halogen content each time used oil is picked up. What is the purpose of this test?*

   This test is performed to determine the concentration of halogens: compounds of fluorine, chlorine, and/or bromine. One example of a halogenated compound is 1,1,1-trichloroethane (TCA). The test is a screening method used to help determine if the used oil has been mixed with a hazardous waste.

5. *If the total halogen concentration of my used oil is 1,000 ppm or greater; what must I do?*

   If the halogen levels are 1,000 ppm or greater, the EPA assumes that you may have mixed a hazardous waste in the used oil. You must disprove this assumption (i.e., rebut the presumption of mixing) if you are to manage the used oil as non-hazardous. (See Rebuttable Presumption, CFR 261.3 (a)(2)(v) & 40 CRF 279.10(b)(i)).

   To prove that you did not mix a hazardous waste in your used oil, you may:

   (1) Show by laboratory analysis that no significant concentrations of Appendix VIII (40 CFR 261) halogenated organics, e.g., perchloroethylene (perc), methylene chloride, 1,1,1-trichloroethane, etc., are present in your used oil, or;

   (2) Show in your Material Safety Data Sheets (MSDS) that a high halogen level is present in the unused oil. (See 279.10(a)(ii)(A) and (B) for conditional exemptions of certain metal working oils/fluids and CFC refrigerants).

   If you successfully rebut the presumption of mixing hazardous waste in your used oil and your halogen levels are between 1,000 ppm and 4,000 ppm, the used oil is On-Spec Used Oil. If you successfully rebut the presumption and your halogen levels are 4,000 ppm or greater, the used oil is Off-Spec Used Oil. If you cannot disprove EPA's assumption of mixing, the used oil is a hazardous waste and must be handled accordingly.

   For more information on used oil regulations, contact Margaret Babb of the NC Division of Solid Waste Management at(919) 733-2178. □

NC Reduce Reuse Recycle

Help us promote the North Carolina Reduce-Reuse-Recycle Message!

Call Barbara Satler of the Office of Waste Reduction at (919) 571-4100 for information about how you can participate in this statewide campaign. □

Upcoming Events . . .

Event	Sponsor	Location	Date(s), 1995
Multimedia Compliance Workshop for Vapor Degreasers With Solvent Alternative	NC Department of Environment, Health, and Natural Resources	NCSU McKimmon Center, Raleigh, NC	June 14
Contact: Ravila Gupta or Norma Murphy, NC Office of Waste Reduction, (919) 571-4100			
Certified Hazardous Materials Management Program	NCSU Continuing and Professional Education	NCSU McKimmon Center, Raleigh, NC	June 19-23
Contact: Lisa Patton/Gertha Heggie at (919) 515-2261. Cost: $995			
Engineering Solution to Indoor Air Quality Problems	EPA and Air & Waste Management Association	Research Triangle Park, NC	July 24-26
Contact: Kelly Leovic, EPA, (919) 541-7717			
Source Reduction Workshop on Residential & Commercial Solid Waste	NCRA, OWR, Mecklenburg County, SunShares, NC Cooperative Extension Service	Days Inn, Asheboro, NC	August 9-10
Contact: NCRA, (919) 851-8444			

Printed on Recycled Paper
7,000 copies of this publication were printed at a cost of $1,596 or 22 cents each.

OFFICE OF WASTE REDUCTION

Vol. 4, No. 1 Summer 1995

FOCUS: WASTE MINIMIZATION

N.C. Department of Environment, Health, and Natural Resources
Office of Waste Reduction
Post Office Box 29569, Raleigh, North Carolina 27626-9569

BULK RATE
U.S. Postage Paid
Raleigh, NC
Permit No. 1719

FORWARD AND ADDRESS CORRECTION