AIR EMISSION LEGISLATION AND THE PRINTER

Gary F. Legrand

ABSTRACT

This paper is not meant to be a treatise on the Clean Air Act. The purpose of this discussion is to walk you through simplified basics, i.e., how and why was it created, how does it effect the printer, and how do you begin the compliance process.

What makes this important is that it is just one of several pieces of legislation that will have a dramatic impact on the products and technologies chosen by the printer in the 1990's.

INTRODUCTION

Figure 1 shows the evolution of environmental law from 1960. As each law is re-authorized, the bar will grow in proportion to the new changes in the law. It's obvious that the 1990's. will be a highly regulated period. Secondly, with the advent of pollution prevention legislation, it also be a period where the different regulations become more integrated.

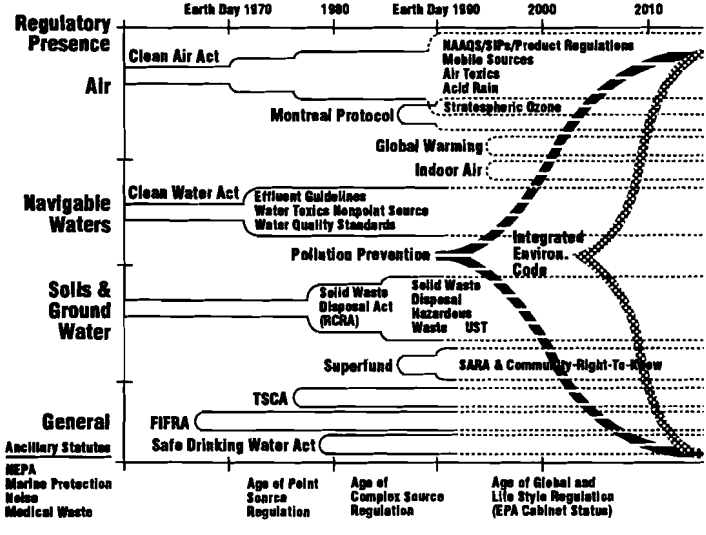

Figure 1: Evolution of Federal Environmental Law

The Clean Air Act was created in response to urban air pollution. Its constituents are outlined in Table 1, and for this discussion, we will focus on the major constituent, Ozone. Ozone is formed when the combination of hydrocarbons and oxides of nitrogen is exposed to ultraviolet light.

1. Ozone
2. Nitrogen Dioxide
3. Sulfur Dioxide
4. Carbon Monoxide
5. Particulate (PM 10)
6. Lead

Table 1: NAAQS (Criteria Air Pollutants)

The hydrocarbons of concern, or what we call VOC's (Volatile Organic Compounds) is defined by the EPA as "Any compound which participates in atmospheric reactions; that is any organic compound other than those which the administrator designates as having negligible photochemical reactivity."

The EPA set 0.12 PPM as the concentration goal. It is referred to as the National Ambient Air Quality Standard (NAAQS). Figure 2 shows the trend from 1978 to 1988.

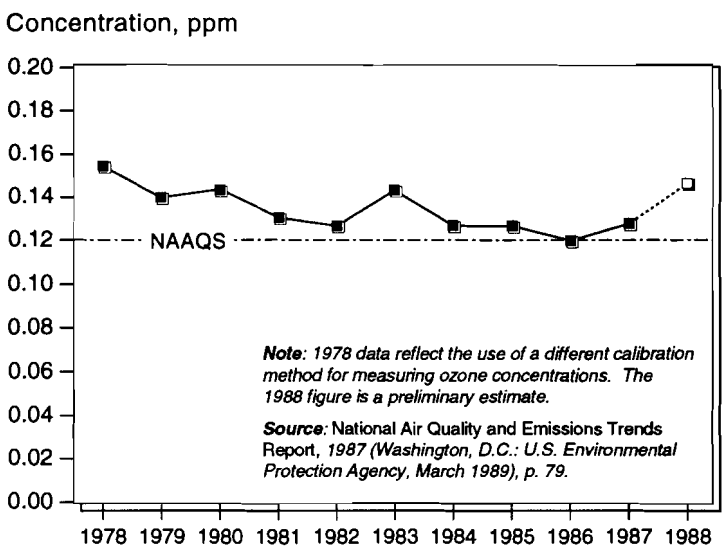

Figure 2: National Trends in Ozone Levels (1978 to 1988)

In Table 2, is a partial list of man-made and natural sources of VOC's.

Man-Made (partial list)	**Natural**
■ Automobile Exhaust	■ Flowers
■ Marine Coating	■ Trees
■ Liquid Fuels	■ Decaying Vegetation
■ Architectural Coatings	■ Animals
■ Solvent Degreasers	■ Humans
■ Asphalt or Coal Tar Operations	
■ Paints	
■ Consumer Products (household)	
■ Dry Cleaning Operations	
■ Aerosol Coatings	
■ Adhesives	

Table 2: VOC Sources

The Clean Air Act classified each city or area of the country, from extreme to marginal (Table 3) as to its non-attainment from the NAAQS. In turn, it set a correlating major source definition in tons per year of emission and a twenty year target for compliance.

Classification	**Limit** (Tons/year)
Extreme	10
Severe	25
Serious	50
Moderate	100
Marginal	100

Table 3: Major Source Definition In Ozone (Nonattainment Areas)

To implement the clean-up of urban smog, the EPA assigned the responsibility to the states. Each state, in turn, was then required to come up with a plan to achieve the NAAQS standard of .12 PPM. Figure 3 shows how this was implemented in California. The California Air Resource Board (CARB) was created to come up with the plan, and implement it, upon approval by the EPA. CARB, in turn, divided the state into 14 air districts. The most famous of these is the South Coast Air Quality Management District (SCAQMD) that covers the Los Angeles area of four counties and a 142 cities. The staff of SCAQMD has in turn created 131 rules. For the printer, it is Rule 1130 - Graphic Arts.

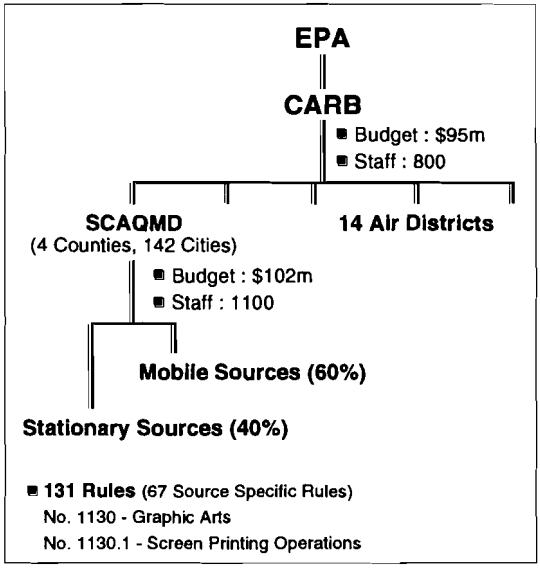

Figure 3: Clean Air Act implementation (California Organization)

The obvious question is: why focus on California? It's because it has become the trend setter that many states follow. Their staffing and rule-making capacity is such that many states can simply tailor the California rules to their situation.

Enforcement capability of the EPA over a state is through the use of sanctions. Federal funds can be withheld from construction, highway, and sewer projects. At the state level, fines and civil/criminal penalties are used.

Figure 4 shows a ranking of major source categories in the South Coast. Printing and coating emissions account for 14% of the districts stationary source total. Further rule-making standards by the EPA will come this spring under what is called CTG's or Control Technique Guidelines. This will effect new categories of printers.

District Jurisdiction	Tons/Day
Gas Distribution	158.0
*Other Coating and Printing	56.2
Petroleum Refining	45.2
Structural Coating	32.9
Other Industrial	18.7
Commercial	18.7
Ships	17.9
Total District Jurisdiction	**406.0**
Total Mobil Sources	**942.0**
TOTAL	**1560.0**

***Coating and printing is 14% of district total and 4% of total emissions.**

Figure 4: ROG Emissions by Source Category (1986 Annual Average)

How do these rules effect the printer? Using Rule 1130, as an example, it applies to:

a. Any facility which emits greater than 8 pounds of VOC per day. Roughly one ton per year. This means the facility must file for a permit to construct, a permit to operate, and you will pay a fee per ton of emissions.

b. The VOC content of the materials you use. Inks, coatings, and adhesives are limited to 300 gms/liter, fountains to 100 gms/L, and cleaning solvents to 200 gms/L.

c. If the above cannot be achieved, then you must use an approved emission control with a collection efficiency of 70% and a destruction efficiency of 95%; provided none of the materials exceeds 500 gms/L of VOC.

e. Daily recordkeeping.

Another rule, called New Source Review, applies anytime you plan to install new equipment or make modifications. It is intended to keep you reducing your overall emissions in spite of improvements or expansions. The way it works is through a combination of modeling, BACT, and emission offsets. Typical offsets are shown in Table 4. This means that if your modifications or new equipment adds one new pound of VOC, then you must reduce 1.5 lbs from some other operation. Best available control technology will also have to be applied.

Classification	Limit	Offset Ratio
Extreme	10 TPY	1.5 : 1
Severe	25	1.3 : 1
Serious	50	1.2 : 1
Moderate	100	1.15 : 1
Marginal	100	1.1 : 1

Table 4: Offset Ratios - New Source Review

How does a printer get this process started?

Step 1: Know the regulations in your area.

- Contact the EPA agency for your state or county.
- Ask if they offer any seminars.
- Contact your local PIA (Printing Industries of America).

Step 2: Do a self audit to determine your emissions.

- Identify each piece of equipment and the chemistries it uses. Determine if the process is continuous or a batch, and if the emissions are fugitive or point source.
- From the MSDS's (Material Safety Data Sheets) determine the VOC content of each chemistry. To convert grams/liter to pounds/gallon, multiply by .00834.
- Determine your annual usage from your purchase orders.
- Table 5 will assist you in determining likely sources.

- Isopropyl Alcohol (IPA) or Substitutes for Dampening Solution
- Cleaning Solvents
- Ink Solvents (Flexo and Gravure)
- Ink Oils
  (Heatset, sheet fed, non-heat set litho, and offset news)
- Solvent Containing Coatings
- Solvent Based Adhesives
- Miscellaneous Solvents

Table 5: V.O.C. Emission Inventory

Step 3: Determine your emission credits (subtracted from the emissions).

- Table 6 will assist you in determining these sources.

- Percent Ink Oil retained by the Print
- Percent Ink Solvent retained by the Print
- Cleaning Solvents contained in Dirty Rags
- Waste or Discarded Ink/Cleaning Solvents
- Isopropyl Alcohol/Substitutes in discarded Dampening Solution

Table 6: V.O.C. Emission Credits

Step 4: Start the permit process.

- Depending on the severity of non-attainment in your area the rules that apply to you may vary greatly from the Los Angeles example.
- The permit process will add a burden in these areas.
  - Control requirements
  - Emission limits
  - Variance reporting
  - Compliance certification
  - Monitoring requirements
  - Inspection schedules

Step 5: Begin the process of emission reduction.

Table 7 is a starting point.

- Isopropyl alcohol evaporation can be reduced by cooling the dampening solution.
- Alcohol substitutes or extenders such as Cellosolves.
- Low solvent plate developers.
- Aqueous and UV coatings.
- Pump sprays instead of aerosols.
- Higher water content (lower VOC) cleaning solutions.
- Tape instead of web splicing cement.
- Store dirty solvent-laden cleaning rags in tightly covered container.
- Replace high VOC products with vegetable oil or aqueous based products.
- Keep accurate daily records of used and discarded VOC containing materials.
- Consider automatic blanket washers.
- Process modification and worker retraining.
- Add-on control devices.

Table 7: Potential Emission Reductions

In all likelihood, you will have to apply some form of Add-On Control to limit emissions for different processes. My best advice is to seek professional help to determine your needs. Figure 5 describes the pollution control technologies available for different pollutants.

Method	Type of Pollutant		
	Organic Vapors	Inorganic Vapors	Particulates
Incineration	■		
Adsorption	■		
Condensation	■		
Absorption	■		
Electrostatic Precipitation			■
Baghouses			■
Wet Scrubbing		■	■

Pollution Engineering, Aug. 1991

Figure 5: Air Pollution Control Technologies

Figure 6 describes their removal efficiencies for different VOC concentrations.

Method	VOC Concentrations							
	30	50	100	300	500	1000	3000	5000
Incineration								
Thermal	95%		99%					
Catalytic		90%	99%					
Carbon Adsorption				50%		95%		95%
Absorption				90%	95%			
Condensation					50%		80%	95%

Pollution Engineering, Aug. 1991

Figure 6: Air Pollution Control Technologies

STAYING ON TOP

The regulations are not static, but a continuously moving target. They can change every two or three years. Unfortunately, like the tax codes, you are responsible for keeping up. There are some simple steps that can help.

1. Get on the agency mailing list for regulation updates or changes. This often includes notification of public workshops. These workshops allow you to comment on proposed rule changes.
2. Join a trade organization like PIA or GATF. They can do a good job of interpreting the rules and assisting you.
3. Attend industry seminars.
4. Read your trade magazines.

Surprisingly enough, it doesn't take that much time each month to become familiar with the regulations and how they are changing in your area. Maybe you can't change them, but it will help you plan the future better.

REFERENCES

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Pollution Engineering, August 1991

Los Angeles Times, April 28, 1991

LEGAL/REGULATORY ACRONYMS & ABBREVIATIONS

BACT	best available control technology
BAT	best available technology
BPCT	best practicable control technology
CAA	Clean Air Act
CARB	California Air Resources Board
CAWG	Clean Air Working Group
CFC	chlorofluorocarbon
CFR	Code of Federal Regulations
CTG	Control Technique Guideline
EPA	Environmental Protection Agency
FIP	Federal Implementation Plan
FR	Federal Register
HAPS	Hazardous Air Pollutants
LAER	lowest available emission rate
MACT	maximum achievable control technology
NAAQS	National Ambient Air Quality Standards
NATICH	National Air Toxics Information Clearinghouse
NEPA	National Environment Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NSPS	New Source Performance Standard
NOx	oxides of nitrogen
RACT	reasonable available control technology
SCAQMD	South Coast Air Quality Management District
SIP	state implementation plan
VOC	volatile organic compound