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OZONE

A Health Problem Near the Earth's Surface
A Necessity in the Stratosphere

Ozone a Necessity in the Stratosphere

Although ozone is a health problem in the atmosphere near the earth's surface, it is a necessity in the stratosphere 12 km to 50 km above the earths surface.

Although the concentration of ozone in the stratosphere is only on the order of a few parts per million (ppm), this molecule absorbs a significant amount of solar ultraviolet radiation and therefore protects the biosphere from several harmful effects. A partial destruction of the ozone layer by, for example chemical compounds would probably have important human and environmental consequences - skin cancers, drop in the growth rate of several crop varieties, and other effects.

Absorption of solar energy by ozone also leads to significant heating of the atmosphere. Besides its interaction with solar ultraviolet radiation, ozone also emits and absorbs infrared terrestrial radiation and thus influences, to a certain extent, the radiation and meteorological process that determine climate.

Standards, Compliance, Possible Sanctions and Controls

Ozone, a major component of smog, is colorless and odorless. It's presence in the air we breathe can cause lung impairment, eye irritation and other health problems. The Clean Air Act set December 31, 1987, as the final deadline for all areas of the country to reduce ozone levels to a level set by EPA that is now no more than 0.12 parts of ozone per million parts of air. EPA estimates that 70 areas have yet to attain the standard and are unlikely to do so by the end of this year. Most major metropolitan areas are included among the non-attainment areas. About 80 million people live in these areas.

EPA must impose sanctions on those areas failing to meet the ozone levels by the final deadline. One serious sanction is a ban on further construction within the so-called "non-attainment" area. Another sanction is a cutoff of Federal highway funds. A further major problem would be that EPA would be required to determine what additional control measures would be required in

each area. Without a major effort to control volatile organic compounds (e.g., hydrocarbons like gasoline vapors) (VOC) emissions, many of these areas will not attain the ozone standard in the foreseeable future.

Los Angeles, which has the nation's most stringent ozone control measures in place, has levels three times the national standard. Houston and the New York City area are at least twice the standard.

Meanwhile, recent scientific studies show that at even the permissible ozone level, there are adverse health effects and that ozone causes crop and forest damage at levels below the standard.

Unlike nitrogen dioxide and sulphur dioxide, ozone is not emitted out of relatively few smokestacks and many exhaust pipes that can be fitted with equipment designed to remove it. Ozone is formed in the air when hydrocarbons-such as gasoline vapors or paint fumes-combine with nitrogen oxides. Many sources contribute to VOC (see table I).

The number of ozone nonattainment areas has declined by about 15 percent since 1980. On a national basis, ozone air quality has improved 10 percent. The health risks for millions of Americans have been reduced significantly because of our past efforts.

But this progress did not come easily or cheaply. Sources in the automobile and petroleum industries, sources that apply surface coatings to cans and metal furniture, and sources involved in the graphic arts had to spend hundreds of millions of dollars, if not more, so we could improve air quality to the extent we have today.

Yet today more than one-third of the American people live in ozone nonattainment areas. If those areas are ever going to reach attainment, and if current attainment areas are going to stay that way in the face of economic growth, then we will have to search for additional emission reductions from many smaller sources--sources that play an even bigger role in our everyday lives. (See table 2 for a list of possible strategy or sources for reducing total VOC's and note that no single strategy or source reduces VOC by more than 10%.) The cost is bound to go up since the cheapest, most obvious targets have already been regulated. One thing seems quite clear from the combined human and animal data: any loosening of the standards now is quite unlikely.

In other words, while the most recent scientific data indicate that the current ozone standard provides little margin of safety, the most recent air quality data indicates that one out of three Americans live in areas where they potentially are exposed to peak ozone concentrations above the level of the standard.

The Clean Air Act does not allow a risk-based management approach in designing a control strategy in the case of National Ambient Air Quality Standards. They are set strictly on the basis of health effects. Deadlines are set, and states and communities are charged with attaining the standards of the deadline. Given this aspect of the Clean Air Act, our regulatory options to address chronic nonattainment after 1987 are somewhat limited.

The only way that cities with the worst problems could achieve the ozone standard in the foreseeable future would be to adopt drastic control measures. For example, in several major urban areas it would be necessary to reduce dramatically the use of motor vehicles through mandatory ridesharing, restricted driving days, and gas rationing. It would also be necessary to ban reactive agents in consumer products such as household cleaning agents and deoderants. Virtually all industrial and commercial sources of hydrocarbons would have to act immediately to install state-of-the-art controls or shut down.

Possible New Control Measures

The Possibilities for VOC regulatory control being considered by EPA include:

1. Gasoline marketing - national/local

   The total VOC's emitted as a result of gasoline marketing can be separated into two broad categories: a) those resulting from wholesale gasoline marketing including all steps between the refinery and the delivery of the product to the retail station and b) those resulting from refueling motor vehicles at these stations (retail sales).

   Wholesale or "stage I" emissions could be controlled through tighter seals on storage tanks, and through changes in the equipment and/or loading/dispensing practices of tank trucks. Retail or "stage II" emissions can be controlled in one of two basic ways: a) through modifications of the nozzles and pumping equipment used by the service station or b) by modification of the motor vehicle gasoline tank and existing vapor recovery system. The latter, or "onboard" option, appears to be cheaper.

2. Vapor pressure

   EPA could also regulate the volatility of motor fuels. By controlling volatility (setting a maximum allowable vapor pressure), the tonnage of VOC's emitted is

reduced. Such an action has the benefit of reducing VOC emissions sooner than those outlined above under "gasoline marketing" but may be constrained (over the near term) by refining capacity.

3. Other options

Several other categories of actions have been or are being considered by EPA to reduce VOC emissions. Some of these actions could be required through federal regulations while others could be suggested to states through guidance. The categories include:

- o New VOC control technologies for existing stationery sources like architectural coatings, wood furniture refinishing and metalrolling;
- o New VOC controls (new source performance standards) for new sources:
- o Enhanced enforcement; and
- o Limits on VOC's used in paints, household cleaners and waxes, charcoal lighter fluid and other consumer products.

Reasonable Efforts Probably Not Legally Sustainable

EPA is now considering measures to assure ozone reduction progress without initiating a ban on construction in the areas of the country that are unlikely to attain the National Ambient Air Quality Standard for ozone by the end of 1987. These measures, referred to as the Sustained Progress Program and the Reasonable Extra Efforts Program, have been described in general terms to the public. The EPA legal assessment at this point is that these Programs, while defensible, present major legal problems and that the risk of an adverse court decision is significant.

The principal legal argument supporting these Programs is that Congress never contemplated the situation we are now facing--persistent nonattainment that cannot be remedied without severe economic disruption, and even then not by the statutory deadline. The Programs are thus arguably defensible as a reasonable response to an unforeseen circumstance. However, there are strong countervailing arguments that this situation was not unforeseen and that Congress intended the Agency to force Congressional reexamination of the issue by imposing sanctions and promulgating Federal implementation plans.

Current Status

EPA is now completing internal review of national, gasoline marketing VOC control measures and expects to submit a proposal for Administration review in the immediate future.

EPA has been testifying at Congressional hearings on a frequent basis about this issue. EPA's objectives in testifying are to:

1. Lay out the dilemma posed by the ozone standard and the Clean Air Act (i.e., large parts of the country are unable to meet the statutory requirement) and

2. Have Congress deal with the issue, not the Administration.

TABLE 1

CONTRIBUTIONS TO TOTAL VOC

SOURCE	%CONTRIBUTION (1984)
Highway Vehicles	27.9
All Other Transportation	5.6
Residential Fuel Combustion	11.6
Solid Waste Disposal	2.8
Oil, Petroleum Processes	12.5
Industrial and Other Solvent Use	12.5
Surface Coating	10.5
Plastics, Organic and Other Chemicals	7.5
All Other Industrial	4.9
Miscellaneous	4.2
TOTAL	100.0 %

Explanatory Footnotes for Table 2

RACT - Reasonably Available Control Technology

RVP - Reid Vapor Pressure

I/M - Vehicle Inspection and Maintance Program

CTG - Control technique guidance

SIP - State Implementation Plan - under the Clean Air Act

TABLE 2

AVAILABLE VOC REDUCTIONS

Strategy (or Source)	Potential Reduction in Total VOC (% of 1982 Inventory)
Additional Application of Existing RACT	0-10
Stage II Control	1.1-1.6
Onboard Control	1.9
Cert. Fuel Change (11.5 psi)	2.9
RVP Control	0.4-5.5
Additional I/M	3
Consumer Solvents	2-4
Pesticides (Reduction in VOC Content)	1-2
Small Source RACT	1
New RACT CTG's	2-6
-Auto Body Shops (0-1)	
-Architectural Coatings (2-4)	
RACT III (Only New SIP Call Areas)	1-2
Non-CTG RACT (Only New SIP Call Areas)	1-3
Enhanced New Source Review	0-1
Lower RACT Limits	0-2
Waste Disposal	1-2
Barge and Tanker (Only Ports)	1-2
Total*	17-45

* Total includes a range of 1.1 - 1.9 for refueling emissions control (combined range for Stage II and onboard). Also, total could be less than shown due to some potential overlap of RACT-related strategies.