

MEMORANDUM

TO: Legislative Council of the Louisville/Jefferson County Metro Government

THROUGH: C. Bruce Traughber, Director, Economic Development Department

FROM: Lauren Anderson, Executive Director, Air Pollution Control District

DATE: January 9, 2008

RE: Reformulated Gasoline (RFG)

The Metro Council has asked the Air Pollution Control District to evaluate the use of reformulated gasoline (RFG) in Louisville Metro, to study "clean fuels" alternatives to RFG, and to report to the Council "on the advisability of changing the type of clean fuel used in Louisville."

What is RFG?

RFG is a blend of gasoline that reduces both evaporative emissions and tailpipe emissions. It has a lower Reid vapor pressure than either conventional gasoline or reduced Reid vapor pressure gasoline. It is also further refined, and is required to reduce emissions of certain pollutants by at least 20% over conventional gasoline; it must contain no heavy metals; and it must have a benzene content of no more than 1%.¹ Our regional formulation of RFG reduces emissions of the two main ozone-forming chemicals - volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) - as well as carbon monoxide and certain toxic air pollutants.² In contrast, reduced Reid vapor pressure gasoline cuts down on emissions only from evaporation,

¹ Clean Air Act § 211(k), codified at 42 United States Code (USC) 7545(k).

²RFG is required to reduce emissions of the following chemicals by at least 15% over conventional gasoline: 1,3-butadiene, benzene, formaldehyde, polycyclic organic matter and acetaldehyde. *Id.* Benzene, 1,3-butadiene and formaldehyde were identified by the West Louisville Air Toxics Study to be present in West Louisville at levels that pose unacceptable risks to human health.

not from exhaust. Thus, while it reduces emissions of VOCs, it has a negligible effect on NOx, carbon monoxide, or toxics.³

Why is RFG sold in Louisville?

RFG is part of the package of air quality control measures that Louisville uses to attain and maintain the federally-mandated National Ambient Air Quality Standard for ozone.

Why does ozone have to be controlled?

Ground-level ozone⁴ is a serious and widespread health threat. It can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. Ozone can also reduce lung function and inflame the linings of the lungs. Repeated exposure, especially in children, may permanently scar lung tissue.

Exposure to ambient ozone concentrations has been linked to increased hospital admissions for respiratory ailments, such as asthma. Ozone pollution is a concern during the summer months when the weather conditions needed to form ground-level ozone -- lots of sun, hot temperatures, stagnant air -- normally occur, and people are outdoors for longer periods. Children are most at risk from exposure to ozone because they are active outside, playing and exercising, during the summertime when ozone levels are at their highest.⁵

³ Reduced Reid vapor pressure gasoline reduces evaporative emissions of benzene, but the other four toxics addressed by RFG - 1,3-butadiene, formaldehyde, polycyclic organic matter and acetaldehyde - are the products of combustion and found only in exhaust (tailpipe) emissions. See Regulation of Fuels and Fuel Additives: Standards for Reformulated and Conventional Gasoline, 59 Federal Register 7716 et seq. (Feb. 16, 1994).

⁴ "Ground level" ozone occurs in the troposphere - that is, the air we breathe, which reaches six to ten miles above the earth's surface. Stratospheric ozone, which occurs naturally in the Earth's upper atmosphere (10 to 30 miles above the surface), helps protect the Earth from dangerous amounts of ultraviolet radiation from the sun.

⁵A comprehensive source of information about the health and environmental effects of ground level ozone can be found in the final rule establishing the latest (2008) ozone standard, "National Ambient Air Quality Standard for Ozone," 73 Fed. Reg. 16436 (March 27, 2008).

Ground-level ozone also damages vegetation and ecosystems. In the United States alone, ozone pollution is responsible for an estimated \$500 million in reduced crop production each year.⁶

What does it mean to "attain and maintain the National Ambient Air Quality Standards"?

The Clean Air Act is built around the National Ambient Air Quality Standards. In 1970, Congress instructed the U.S. Environmental Protection Agency (EPA) to identify anthropogenic (man-made) pollutants that needed to be reduced from the nation's air. The six "criteria" pollutants identified represent a broad array of human activities and were chosen because 1) they were common and 2) more important, at certain levels, they harm human health and the environment, and cause property damage.⁷ It is EPA's job to set the national standards at levels protective of human health (primary standard) and the environment (secondary standard), with an adequate margin of safety. EPA works with the states to designate each area of the country as meeting the national standards (being in attainment), not meeting the national standards (nonattainment), or "unclassifiable," meaning there is insufficient information.⁸ EPA then delegates to the states, and local districts like Louisville's, responsibility for reaching the national standards in their communities. This is done through a State Implementation Plan, or SIP.⁹

How does Louisville attain and maintain the national standard for ozone?

⁶ *Id.*

⁷ 42 USC 7407 - 7409. The six criteria pollutants are lead, carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, and particulate matter.

⁸ Since only those areas with air monitoring data can be classified, and since there are few air monitors in many rural areas, they are usually unclassifiable.

⁹ 42 USC 7407, 7410. Although the Louisville Metro Air Pollution Control District is fully delegated to implement the Clean Air Act in Louisville, our implementation plan is part of the Kentucky State Implementation Plan.

Ozone is difficult to control because it is not emitted directly. It is formed when its "precursors" - VOCs and NOx - react in the presence of sunlight. Motor vehicles are a major source of both NOx and VOCs, especially in tailpipe emissions.¹⁰

To control ozone, all local sources of VOC and NOx are subject to some degree of regulatory control. Reducing these pollutants has been an ongoing battle for many cities, including Louisville Metro. We were nonattainment for ozone (that is, Louisville's air did not meet the national standard¹¹) from the 1970s until November 23, 2001. The national standard at that time was 0.12 parts per million (ppm) measured over one hour. During the 1990s, the District convened a SIP Advisory Panel to evaluate Louisville's progress and recommend ways to reach the standard. The Panel was composed of representatives from industry (including Ford and LG&E), environmental groups, and interested citizens. Louisville's attainment of the standard in 2001 was the result of years of regulatory control measures from all sectors, including the vehicle emissions testing (VET) program, vapor recovery at gas stations, and permit and control requirements on virtually every possible fixed (stationary) source of air pollution. Along the way, local industries have adjusted to progressively tighter control requirements. For example, in 1993, when Louisville was mandated to reduce VOCs by 15%,¹² fourteen companies agreed to reduce their VOC emissions; this agreement was codified in District Regulation 6.43. In 2001, eleven companies entered into Agreed Board Orders with the District and its governing body, the Air Pollution Control Board,¹³ to reduce NOx emissions.

¹⁰ Nationally, EPA estimates that motor vehicles account for approximately 56% of all NOx emissions in the U.S. and about 45% of all VOC emissions. See <http://www.epa.gov/air/oaqps/gooduphigh/bad.html#6>.

¹¹ Air quality professionals get used to this jargon: You can be designated as being "in attainment," or simply "attainment"; "out of attainment," or "in nonattainment," or simply "nonattainment."

¹² 42 USC 7511a.

¹³ The Air Pollution Control Board is comprised of seven appointed board members, with authority to pass regulations and orders. Kentucky Revised Statutes (KRS) 77.115.

The national standard for ozone was lowered in 1997 from 0.12 ppm to 0.08 ppm, measured over eight hours (rather than one) to account for longer exposures. After years of litigation,¹⁴ this standard went into effect in 2004, and Louisville was then designated as nonattainment.¹⁵ In response, Louisville Mayor Jerry Abramson appointed a new Air Quality Task Force to study ways to reduce ozone and bring Louisville into attainment with the new standard. Like the prior SIP Panel, the Task Force contained a diverse cross-section of people with backgrounds in health, business, industry, environmental advocacy, neighborhood involvement, and local government. The Task Force was particularly concerned with the health effects of ozone pollution. In its report to the Mayor, the Task Force recognized that even 0.08 ppm of ozone had deleterious health effects (as has EPA; see p. 7 *infra*). The Task Force's final report implored the Mayor and the Air Pollution Control Board to “continue current policies, voluntary programs, and regulatory programs to limit ozone emissions.”

What does all this have to do with RFG?

The use of reformulated gasoline is one of eleven current control measures that the Task Force strongly recommended keeping.¹⁶ RFG is a proven, effective means of controlling VOC and NOx emissions that lead to the formation of ozone.¹⁷ VOC emissions are everywhere. They are released every time a fossil fuel is burned, whether it is gasoline, diesel, coal, or natural gas. They are present in paint, solvents, ink, and industrial coatings. But the most ubiquitous source of VOCs, automobile exhaust, can be controlled by RFG. RFG also controls NOx, another

¹⁴ Culminating in the Supreme Court's decision in *Whitman v. American Trucking Assn., Inc.*, 531 U.S. 457 (2001).

¹⁵ 69 Fed. Reg. 23857 (April 30, 2004).

¹⁶ Louisville Metro Air Quality Task Force Report to Mayor Abramson and Air Pollution Control Board, available on-line at <http://www.louisvilleky.gov/APCD/Stakeholder/AirQualityTaskForce2003.htm>; click on "Final Report of the Air Quality Task Force."

¹⁷ There is a plethora of information about RFG and its benefits on EPA's web site at <http://www.epa.gov/otaq/rfg.htm>.

ozone precursor, and is one of the tools that has helped Louisville achieve healthier air by reducing both of these pollutants in significant amounts.

How significant?

Very significant. RFG is estimated to reduce VOCs alone by more than 3.5 tons per summer day. If Louisville were to drop the use of RFG, we would have to find equivalent reductions in both NOx and VOCs - most likely by resorting to one or more of the Contingency Measures in the State Implementation Plan (see below). Reduced Reid vapor pressure gasoline would not provide equivalent reductions in NOx and VOCs (see below pp. 9-10), so it could not simply be substituted for RFG in Louisville.

Why would we have to do that - find other ways to reduce VOCs and NOx?

To understand this, go back to the State Implementation Plan. To drop a control measure from the SIP, APCD must: 1) formally petition EPA, and 2) demonstrate to EPA that there are enough "equivalent reductions" in both VOCs and NOx to offset the increase in pollution that would result. If the Louisville area switched from RFG to conventional gasoline or reduced Reid vapor pressure gas, we would have to come up with *new* reductions and control measures, on top of any that are already in place. This is due to the "anti-backsliding" provision of the Clean Air Act.¹⁸

Areas that have been redesignated as attainment must have a Maintenance Plan with Contingency Measures as part of their State Implementation Plan.¹⁹ This is not an afterthought,

¹⁸ 42 USC 7410(l). This was explained at length in the Federal Register notice proposing to grant Louisville's request (after the fact) to remove the VET from the active portion of our State Implementation Plan to the contingency measures section of the Maintenance Plan.

¹⁹ Both are contained in the formal Request to Redesignate Bullitt, Oldham and Jefferson Counties, which can be found at <http://www.air.ky.gov/NR/rdonlyres/5F76BC36-C462-4CED-BF5C-52ED65B7A543/0/JeffersonCountyProposedRedesignationNarrative.pdf>; see pp. 32 and 34.)

but an integral part of every SIP.²⁰ In 2007, Louisville was designated as having attained the 0.08 ozone standard based on data from 2003 - 2005. Ironically, in the same year, 2007, there were 28 monitored exceedances of the standard, and one violation. This is where the Maintenance Plan comes in: a violation requires us to determine whether further measures from the Contingency Plan are needed. The first such measure identified is additional emission reductions from stationary sources, i.e. industry. Another contingency measure is re-implementation of a VET program.²¹

No one wants the VET to come back. Can't we get additional reductions from industry?

Not without significant impacts on Louisville's major employers and future prospects. Remember that we would need to compensate for more than 3.5 tons of VOCs per summer day. The following is a list of the 2006 emissions reported by the ten highest VOC-emitting stationary sources in Louisville. The listed amounts are the reductions that would occur if the *entire plant* were shut down.

<u>Company</u>	<u>Tons per summer day</u>
Carbide Industries	2.83
Brown-Forman Distillery	2.59
Ford Louisville Assembly Plant	1.86
Reynolds Metals, Foil Plant	1.85
Ford Kentucky Truck Plant	1.84
American Synthetic Rubber	1.16
Rohm & Haas	0.39
LG&E, Mill Creek	0.39

I thought Louisville's air had gotten better. Why do we still need to control ozone?

²⁰42 USC 7505a; see Memorandum from John Calcagni, "Procedures for Processing Requests to Redesignate Areas to Attainment," September 4, 1992. This and other EPA documents relating to redesignation to attainment may be found at <http://epa.gov/ozonedesignations/redesig/guidance.htm>.

²¹ See the proposed and final redesignations of Louisville to attainment with the 0.08 eight-hour standard, 72 Fed. Reg. 20966, 20974 (April 27, 2007) and 72 Fed. Reg. 33601 (July 5, 2007); and for the 0.15 one-hour standard, 66 Fed. Reg. 33505, 33514 (June 22, 2001) and 66 Fed. Reg. 53665, 53673 (October 23, 2001).

Louisville's air *is* better than it has been since the beginning of the industrial revolution. But this is the result of control measures the District has implemented over time, with input and cooperation from business and citizens. Moreover, over the years the ozone standard has gotten stricter and is likely to become more so. The Clean Air Act requires EPA to review the national standards every five years, considering the latest scientific information.²² If the science indicates a need to revise a standard, EPA proposes a new standard, which undergoes rigorous review by the scientific community, industry, environmental groups, the general public and the Clean Air Science Advisory Committee.²³ Before promulgating a new standard, EPA literally reviewed thousands of scientific studies on the effects of ozone.²⁴ The science demonstrated that ozone has harmful health effects at levels lower than the 1997 standard of 0.08 ppm (a conclusion also reached by Louisville's Air Quality Task Force; see p. 5). This is a trend: As our knowledge of ozone effects increases, we discover harmful effects at lower and lower levels. In March of 2008, EPA again lowered the standard, this time to 0.075 ppm, measured over an eight-hour period.

Do we meet this standard?

APCD monitors criteria pollutants in the Louisville area. Based on quality-assured monitoring results,²⁵ Louisville Metro currently does not meet, and is likely to be designated as out of attainment with, the 0.075 ppm standard.

In other words, now is not a good time to get rid of an efficient and effective control measure, just as we are about to be found nonattainment for the very pollutant RFG reduces.

²² 42 USC 7409.

²³ An independent scientific review committee composed of seven members, including at least one member of the National Academy of Sciences, one physician, and one person representing State air pollution control agencies. 42 USC 7409(d)(2).

²⁴ See the 73 Fed. Reg. 16436 et seq.

²⁵ See <http://www.louisvilleky.gov/APCD/ambient/> for more information.

Isn't RFG sold in Louisville only because former Governor Brereton Jones signed an order requiring it? Can't Governor Beshear sign an order rescinding it?

In 1993, then-Governor Jones signed an Executive Order which had the effect of requiring Louisville and other nonattainment areas in the state to adopt RFG, rather than the reduced Reid vapor pressure gas formulation then under consideration by the SIP Advisory Panel. The Panel had learned that changing the composition of gasoline sold in the area is one of the most effective ways a community can reduce ozone pollution. At the time, it had reached a tentative decision to recommend reduced Reid vapor pressure to the District and the Air Pollution Control Board. However, the Governor's order decided the issue.

Two things to keep in mind:

1. The history of how we got here is less important than the fact that RFG
 - is in our State Implementation Plan;
 - has helped us attain the ozone National Ambient Air Quality Standard; and
 - is part of our maintenance plan to stay in compliance with the national standard for ozone.

All of this makes using RFG federally mandated. It is the law.²⁶ We can't get rid of RFG without satisfying EPA first, even if Governor Beshear were to sign a new Executive Order.

2. RFG reduces much more pollution than reduced Reid vapor pressure gasoline, or at least the reduced Reid vapor pressure gasoline blend sold in southern Indiana.

How much more?

If we switched from the current RFG sold in Louisville to the Reid vapor pressure blend used in Clark and Floyd Counties in Indiana, we would add more than 1000 tons per year of

²⁶ 42 USC 7410; see also *Kentucky Resources Council v. U.S. Environmental Protection Agency*, 304 F.Supp.2d 920 (W.D. Ky. 2004).

VOCs to our air. RFG reduces VOCs by nearly 1300 tons per year over conventional gasoline; in comparison, the difference between the Southern Indiana reduced Reid vapor pressure blend and conventional gasoline is only 260 tons per year.

To put these numbers into perspective, here are the 2006 emission inventories in tons per year for Louisville's largest industrial emitters of VOCs:

<u>Company</u>	<u>2006 Tons per Year VOC Emitted</u>
1. Carbide Industries	1083.15
2. Brown-Forman (Early Times)	955.87
3. Reynolds Metals, Foil Plant	694.0
4. Ford Kentucky Truck Plant	674.3
5. Ford Lou. Assembly Plant	646.6
6. American Synthetic Rubber	384.39

The difference between RFG and reduced Reid vapor pressure gasoline is also meaningful for NOx. Changing to the RVP blend sold in Indiana would result in more than 350 additional tons per year of NOx in Louisville. To compare, here are the 2006 emission inventories for NOx from some of our largest sources:

<u>Company</u>	<u>2006 Tons per Year NOx Emitted</u>
1. Louisville Medical Center Steam Plant	183.6
2. Rohm & Haas	200.2
3. GE Appliance Park	132.5
4. Oxy Vinyls	432.5

Finally, it should be noted that reduced Reid vapor pressure gasoline is a something of a misnomer for the gasoline sold in Clark and Floyd Counties. It is true that it has a slightly lower

Reid vapor pressure than conventional gasoline - 7.8 pounds per square inch (psi). However, Louisville's RFG has a lower Reid vapor pressure of 6.93 psi.

What are the consequences if we get rid of RFG anyway? Would EPA really care? Don't the wishes of the community count?

One possible consequence is a federal enforcement action or citizen suit for violating the Clean Air Act and the State Implementation Plan.²⁷ In 2003, when Louisville closed the VET in compliance with state law, but without following the procedures described above to change its federally enforced SIP, a citizen sued.²⁸ The citizen prevailed, and Louisville Metro was fined \$100,000 and required to pay attorneys' fees.²⁹

Second, and more important, there would be a marked increase in ozone pollution. We are already concerned about the challenge of coming into compliance with the 0.075 ppm standard. To do so without RFG would make the task much more difficult. In fact, it might cause us to fall out of attainment with the *current* standard of 0.80 ppm. As explained above, we have had a violation of that standard as recently as 2007. Another really hot summer, without such a significant control measure as RFG, could cause us to slip out of attainment with the NAAQS.

What kind of sanctions?

Sanctions under the Clean Air Act include increased emission reduction requirements for all new pollution sources, making it difficult for local industry to expand, and providing a strong disincentive to new businesses to locate here. The next level of sanctions is a cut-off of federal highway funds.³⁰

²⁷42 USC 7413; and see fn. 38.

²⁸ Citizens have a right to sue to enforce the provisions of the Clean Air Act. 42 USC 7604.

²⁹The Court could also have ordered reinstatement of the VET program.

³⁰42 USC 7410(m) and 7509.

Why does RFG cost so much more?

Nationally, RFG costs *at most* \$0.04 - \$0.08 per gallon more than conventional gasoline.³¹ This was about what Northern Kentuckians paid for the same RFG we used last summer when gas prices spiked. There is no legitimate reason that we know of for the inflated cost of gasoline in Louisville last summer. In fact, the Attorney General is investigating.

Isn't RFG bad for the environment somehow?

The oxygenate used in RFG used to be a chemical called MBTE, which has the potential to contaminate groundwater and is persistent in the environment. This is no longer a concern, since the oxygenate in the RFG currently sold in Louisville is ethanol.

Doesn't RFG decrease fuel efficiency?

RFG decreases fuel efficiency by a range of 1% (summer blend) to 3% (winter blend).³² That is less than one mile per gallon (.25 and .75 respectively) for a vehicle that gets 25 miles per gallon.

Are there other "boutique" gasoline blends that are cheaper?

RFG is not considered a "boutique" gasoline. About 30 percent of the gasoline sold in the U.S. is reformulated. RFG is used in 17 states. The boutique blends are what another city or state has mandated to deal with its particular pollution problems or to prohibit the sale of gas containing MBTE.

Does this relate to or impact the STAR program?

RFG furthers the same goals of the STAR program by reducing toxic emissions.

³¹ Testimony of Jeffrey Holmstead, U.S. EPA, before the Committee of Energy and Commerce, Energy and Air Quality Subcommittee, July 15, 2004.

³² See EPA, "Reformulated Gasoline," Emission Facts, November 1999.

CONCLUSION

In sum, the volatility in gasoline prices in Louisville last summer was not the result of reformulated gasoline. In fact, the use of reformulated gasoline in Louisville has helped us to have cleaner air - and it is mandated by federal law. To change from the RFG formulation currently sold in Louisville would require us to offset the increased amount of VOCs and NOx by taking those emissions from other sources. This would mean requiring more emission reductions from local businesses, both large and small.